

ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

	KA24DE	
TROUBLE DIAGNOSIS - INDEX	19	
Alphabetical & P No. Index for DTC	19	
PRECAUTIONS	23	
Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	23	
Precautions for On Board Diagnostic (OBD) System of Engine and A/T	23	
Engine Fuel & Emission Control System	24	
Precautions	25	
Wiring Diagrams and Trouble Diagnosis	26	
PREPARATION	27	
Special Service Tools	27	
Commercial Service Tools	27	
ENGINE AND EMISSION CONTROL OVERALL SYSTEM	29	
Engine Control Component Parts Location	29	
Circuit Diagram	31	
System Diagram	32	
Vacuum Hose Drawing	33	
System Chart	34	
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION	35	
Multiport Fuel Injection (MFI) System	35	
Distributor Ignition (DI) System	37	
Air Conditioning Cut Control	39	
Fuel Cut Control (at no load & high engine speed)	39	
Evaporative Emission System	40	
On Board Refueling Vapor Recovery (ORVR)	45	
Positive Crankcase Ventilation	55	
BASIC SERVICE PROCEDURE	57	
Fuel Pressure Release	57	
Fuel Pressure Check	57	
Fuel Pressure Regulator Check	58	
Injector	58	
Fast Idle Cam (FIC)	58	
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment	59	
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION	73	
Introduction	73	
Two Trip Detection Logic	73	
Emission-related Diagnostic Information	74	
Malfunction Indicator Lamp (MIL)	87	
OBD System Operation Chart	87	
CONSULT-II	93	
Generic Scan Tool (GST)	104	
TROUBLE DIAGNOSIS - INTRODUCTION	106	
Introduction	106	
Work Flow	108	
TROUBLE DIAGNOSIS - BASIC INSPECTION	110	
Basic Inspection	110	
TROUBLE DIAGNOSIS - GENERAL DESCRIPTION	124	
DTC Inspection Priority Chart	124	
Fail-safe Chart	125	
Symptom Matrix Chart	126	
CONSULT-II Reference Value in Data Monitor Mode	130	
Major Sensor Reference Graph in Data Monitor Mode	132	
ECM Terminals and Reference Value	135	
TROUBLE DIAGNOSIS - SPECIFICATION VALUE	144	
Description	144	
Testing Condition	144	
Inspection Procedure	144	
Diagnostic Procedure	145	
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT	148	
Description	148	
Diagnostic Procedure	148	
TROUBLE DIAGNOSIS FOR POWER SUPPLY	149	
Main Power Supply and Ground Circuit	149	
DTC P0100 MASS AIR FLOW SENSOR (MAFS)	156	

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

CONTENTS (Cont'd)

Component Description	156	On Board Diagnosis Logic.....	199
CONSULT-II Reference Value in Data Monitor Mode	156	DTC Confirmation Procedure	200
ECM Terminals and Reference Value	156	Overall Function Check	201
On Board Diagnosis Logic.....	157	Wiring Diagram.....	202
DTC Confirmation Procedure	157	Diagnostic Procedure	203
Overall Function Check	159	DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)	206
Wiring Diagram.....	160	Component Description	206
Diagnostic Procedure	161	CONSULT-II Reference Value in Data Monitor Mode.....	206
DTC P0105 ABSOLUTE PRESSURE SENSOR	166	ECM Terminals and Reference Value	206
Component Description	166	On Board Diagnosis Logic.....	207
On Board Diagnosis Logic.....	166	DTC Confirmation Procedure	207
DTC Confirmation Procedure	166	Overall Function Check	208
Diagnostic Procedure	167	Diagnostic Procedure	208
DTC P0110 INTAKE AIR TEMPERATURE SENSOR	168	DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)	213
Component Description	168	Component Description	213
On Board Diagnosis Logic.....	168	CONSULT-II Reference Value in Data Monitor Mode.....	213
DTC Confirmation Procedure	169	ECM Terminals and Reference Value	213
Wiring Diagram.....	170	On Board Diagnosis Logic.....	214
Diagnostic Procedure	171	DTC Confirmation Procedure	214
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)	174	Overall Function Check	215
Component Description	174	Diagnostic Procedure	215
CONSULT-II Reference Value in Data Monitor Mode.....	174	DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)	220
On Board Diagnosis Logic.....	174	Component Description	220
DTC Confirmation Procedure	175	CONSULT-II Reference Value in Data Monitor Mode.....	220
Wiring Diagram.....	176	ECM Terminals and Reference Value	220
Diagnostic Procedure	177	On Board Diagnosis Logic.....	221
DTC P0120 THROTTLE POSITION SENSOR	179	DTC Confirmation Procedure	221
Component Description	179	Overall Function Check	222
CONSULT-II Reference Value in Data Monitor Mode.....	179	Wiring Diagram.....	223
ECM Terminals and Reference Value	180	Diagnostic Procedure	224
On Board Diagnosis Logic.....	180	DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)	231
DTC Confirmation Procedure	181	Component Description	231
Wiring Diagram.....	184	CONSULT-II Reference Value in Data Monitor Mode.....	231
Diagnostic Procedure	185	ECM Terminals and Reference Value	231
DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR	193	On Board Diagnosis Logic.....	232
Component Description	193	DTC Confirmation Procedure	232
On Board Diagnosis Logic.....	193	Wiring Diagram.....	233
DTC Confirmation Procedure	193	Diagnostic Procedure	234
Wiring Diagram.....	195	DTC P0135 HEATED OXYGEN SENSOR 1 HEATER (FRONT)	238
Diagnostic Procedure	196	Description.....	238
DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT)	198	CONSULT-II Reference Value in Data Monitor Mode.....	238
Component Description	198	ECM Terminals and Reference Value	238
CONSULT-II Reference Value in Data Monitor Mode.....	198		
ECM Terminals and Reference Value	198		

CONTENTS (Cont'd)

On Board Diagnosis Logic.....	238	
DTC Confirmation Procedure	239	
Wiring Diagram	240	
Diagnostic Procedure	241	
DTC P0137 HEATED OXYGEN SENSOR 2		
(REAR) (MIN. VOLTAGE MONITORING)	243	
Component Description	243	
CONSULT-II Reference Value in Data Monitor		
Mode	243	
ECM Terminals and Reference Value	243	
On Board Diagnosis Logic.....	243	
DTC Confirmation Procedure	244	
Overall Function Check	245	
Wiring Diagram	246	
Diagnostic Procedure	247	
DTC P0138 HEATED OXYGEN SENSOR 2		
(REAR) (MAX. VOLTAGE MONITORING)	253	
Component Description	253	
CONSULT-II Reference Value in Data Monitor		
Mode	253	
ECM Terminals and Reference Value	253	
On Board Diagnosis Logic.....	253	
DTC Confirmation Procedure	254	
Overall Function Check	255	
Wiring Diagram	256	
Diagnostic Procedure	257	
DTC P0139 HEATED OXYGEN SENSOR 2		
(REAR) (RESPONSE MONITORING)	263	
Component Description	263	
CONSULT-II Reference Value in Data Monitor		
Mode	263	
ECM Terminals and Reference Value	263	
On Board Diagnosis Logic.....	263	
DTC Confirmation Procedure	264	
Overall Function Check	265	
Wiring Diagram	266	
Diagnostic Procedure	267	
DTC P0140 HEATED OXYGEN SENSOR 2		
(REAR) (HIGH VOLTAGE)	273	
Component Description	273	
CONSULT-II Reference Value in Data Monitor		
Mode	273	
ECM Terminals and Reference Value	273	
On Board Diagnosis Logic.....	273	
DTC Confirmation Procedure	274	
Overall Function Check	274	
Wiring Diagram	275	
Diagnostic Procedure	276	
DTC P0141 HEATED OXYGEN SENSOR 2		
HEATER (REAR)	281	
Description	281	
CONSULT-II Reference Value in Data Monitor		GI
Mode	281	
ECM Terminals and Reference Value	281	MA
On Board Diagnosis Logic.....	281	
DTC Confirmation Procedure	282	EM
Wiring Diagram	283	
Diagnostic Procedure	284	
DTC P0171 FUEL INJECTION SYSTEM		
FUNCTION (LEAN SIDE)	286	LC
On Board Diagnosis Logic.....	286	
DTC Confirmation Procedure	286	
Wiring Diagram	288	EC
Diagnostic Procedure	289	
DTC P0172 FUEL INJECTION SYSTEM		
FUNCTION (RICH SIDE)	293	FE
On Board Diagnosis Logic.....	293	
DTC Confirmation Procedure	293	CL
Wiring Diagram	295	
Diagnostic Procedure	296	MT
DTC P0180 FUEL TANK TEMPERATURE		
SENSOR	300	
Component Description	300	AT
On Board Diagnosis Logic.....	300	
DTC Confirmation Procedure	301	TF
Wiring Diagram	302	
Diagnostic Procedure	303	
DTC P0300 - P0304 NO. 4 - 1 CYLINDER		
MISFIRE, MULTIPLE CYLINDER	306	PD
On Board Diagnosis Logic.....	306	
DTC Confirmation Procedure	306	AX
Diagnostic Procedure	307	
DTC P0325 KNOCK SENSOR (KS)	315	SU
Component Description	315	
ECM Terminals and Reference Value	315	BR
On Board Diagnosis Logic.....	315	
DTC Confirmation Procedure	315	
Wiring Diagram	316	ST
Diagnostic Procedure	317	
DTC P0335 CRANKSHAFT POSITION SENSOR		
(CKPS) (OBD)	319	RS
Component Description	319	
ECM Terminals and Reference Value	319	BT
On Board Diagnosis Logic.....	319	
DTC Confirmation Procedure	320	
Wiring Diagram	321	HA
Diagnostic Procedure	322	
DTC P0340 CAMSHAFT POSITION SENSOR		
(CMPS)	325	SC
Component Description	325	
ECM Terminals and Reference Value	325	EL
On Board Diagnosis Logic.....	326	
DTC Confirmation Procedure	327	

CONTENTS (Cont'd)

Wiring Diagram	328	DTC Confirmation Procedure	393
Diagnostic Procedure	329	Wiring Diagram	394
DTC P0400 EGR FUNCTION (CLOSE)	333	Diagnostic Procedure	395
Description	333	DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)	406
On Board Diagnosis Logic.....	334	On Board Diagnosis Logic.....	406
DTC Confirmation Procedure	335	DTC Confirmation Procedure	407
Overall Function Check	336	Diagnostic Procedure	408
Wiring Diagram	337	DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)	419
Diagnostic Procedure	338	Component Description	419
DTC P0402 EGRC-BPT VALVE FUNCTION	345	On Board Diagnostic Logic.....	419
Description	345	Possible Cause.....	419
On Board Diagnosis Logic.....	345	DTC Confirmation Procedure	419
DTC Confirmation Procedure	346	Wiring Diagram	420
Overall Function Check	347	Diagnostic Procedure	421
Diagnostic Procedure	348	DTC P0461 FUEL LEVEL SENSOR FUNCTION	423
DTC P0420 THREE WAY CATALYST FUNCTION	353	Component Description	423
On Board Diagnosis Logic.....	353	On Board Diagnostic Logic.....	423
DTC Confirmation Procedure	353	Possible Cause.....	423
Overall Function Check	354	Overall Function Check	423
Diagnostic Procedure	355	DTC P0464 FUEL LEVEL SENSOR CIRCUIT	425
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)	358	Component Description	425
On Board Diagnosis Logic.....	358	On Board Diagnostic Logic.....	425
DTC Confirmation Procedure	360	Possible Cause.....	425
Diagnostic Procedure	362	DTC Confirmation Procedure	425
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)	375	Wiring Diagram	426
Description	375	Diagnostic Procedure	427
CONSULT-II Reference Value in Data Monitor Mode	375	DTC P0500 VEHICLE SPEED SENSOR (VSS)	429
ECM Terminals and Reference Value	376	Component Description	429
On Board Diagnosis Logic.....	376	ECM Terminals and Reference Value	429
DTC Confirmation Procedure	377	On Board Diagnosis Logic.....	429
Wiring Diagram	378	DTC Confirmation Procedure	429
Diagnostic Procedure	379	Overall Function Check	430
DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)	383	Wiring Diagram	432
Component Description	383	Diagnostic Procedure	433
CONSULT-II Reference Value in Data Monitor Mode	383	DTC P0505 IDLE AIR CONTROL VALVE (IACV) - AUXILIARY AIR CONTROL (AAC) VALVE	434
ECM Terminals and Reference Value	383	Description	434
On Board Diagnosis Logic.....	383	CONSULT-II Reference Value in Data Monitor Mode	435
DTC Confirmation Procedure	384	ECM Terminals and Reference Value	435
Wiring Diagram	385	On Board Diagnosis Logic.....	435
Diagnostic Procedure	386	DTC Confirmation Procedure	436
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR	391	Wiring Diagram	437
Component Description	391	Diagnostic Procedure	438
CONSULT-II Reference Value in Data Monitor Mode	391	DTC P0510 CLOSED THROTTLE POSITION SWITCH	440
ECM Terminals and Reference Value	391	Component Description	440
On Board Diagnosis Logic.....	392	ECM Terminals and Reference Value	440
		On Board Diagnosis Logic.....	440
		DTC Confirmation Procedure	441

CONTENTS (Cont'd)

Overall Function Check	441	Possible Cause	481	GI
Wiring Diagram	442	DTC Confirmation Procedure	482	
Diagnostic Procedure	443	Diagnostic Procedure	482	MA
DTC P0605 ECM	447	DTC P1441 EVAP CONTROL SYSTEM (VERY		
Component Description	447	SMALL LEAK)	483	EM
On Board Diagnosis Logic.....	447	On Board Diagnosis Logic.....	483	EM
DTC Confirmation Procedure	447	Possible Cause.....	483	
Diagnostic Procedure	448	DTC Confirmation Procedure	484	
DTC P1126 THERMOSTAT FUNCTION	449	Diagnostic Procedure	486	LC
On Board Diagnosis Logic.....	449	DTC P1444 EVAP CANISTER PURGE VOLUME		
Possible Cause.....	449	CONTROL SOLENOID VALVE	498	EC
DTC Confirmation Procedure	449	Description	498	
Diagnostic Procedure	450	CONSULT-II Reference Value in Data Monitor		
DTC P1148 CLOSED LOOP CONTROL	451	Mode	498	FE
On Board Diagnosis Logic.....	451	ECM Terminals and Reference Value	499	
DTC Confirmation Procedure	451	On Board Diagnosis Logic.....	499	CL
Overall Function Check	452	DTC Confirmation Procedure	500	
Diagnostic Procedure	452	Wiring Diagram	501	
DTC P1336 CRANKSHAFT POSITION SENSOR		Diagnostic Procedure	502	MT
(CKPS) (OBD) (COG)	453	DTC P1446 EVAPORATIVE EMISSION (EVAP)		
Component Description	453	CANISTER VENT CONTROL VALVE (CLOSE)	510	AT
ECM Terminals and Reference Value	453	Component Description	510	
On Board Diagnosis Logic.....	454	CONSULT-II Reference Value in Data Monitor		
DTC Confirmation Procedure	454	Mode	510	TF
Wiring Diagram	455	ECM Terminals and Reference Value	510	
Diagnostic Procedure	456	On Board Diagnosis Logic.....	510	TF
DTC P1400 EGRC-SOLENOID VALVE	459	DTC Confirmation Procedure	511	
Component Description	459	Diagnostic Procedure	512	PD
CONSULT-II Reference Value in Data Monitor		DTC P1447 EVAPORATIVE EMISSION (EVAP)		
Mode	459	CONTROL SYSTEM PURGE FLOW		
ECM Terminals and Reference Value	459	MONITORING	516	AX
On Board Diagnosis Logic.....	459	System Description.....	516	
DTC Confirmation Procedure	460	On Board Diagnosis Logic.....	516	SU
Overall Function Check	460	DTC Confirmation Procedure	517	
Wiring Diagram	461	Overall Function Check	517	
Diagnostic Procedure	462	Diagnostic Procedure	518	BR
DTC P1401 EGR TEMPERATURE SENSOR	466	DTC P1448 EVAPORATIVE EMISSION (EVAP)		
Component Description	466	CANISTER VENT CONTROL VALVE (OPEN)	526	ST
On Board Diagnosis Logic.....	466	Component Description	526	
DTC Confirmation Procedure	467	CONSULT-II Reference Value in Data Monitor		
Overall Function Check	468	Mode	526	RS
Wiring Diagram	469	ECM Terminals and Reference Value	526	
Diagnostic Procedure	470	On Board Diagnosis Logic.....	526	
DTC P1402 EGR FUNCTION (OPEN)	472	DTC Confirmation Procedure	527	BT
Description	472	Overall Function Check	528	
On Board Diagnosis Logic.....	473	Diagnostic Procedure	528	
DTC Confirmation Procedure	473	DTC P1464 FUEL LEVEL SENSOR CIRCUIT		
Wiring Diagram	475	(GROUND SIGNAL)	534	HA
Diagnostic Procedure	476	Component Description	534	
DTC P1440 EVAP CONTROL SYSTEM (SMALL		On Board Diagnostic Logic.....	534	SC
LEAK) (POSITIVE PRESSURE)	481	Possible Cause.....	534	
On Board Diagnosis Logic.....	481	DTC Confirmation Procedure	534	EL

CONTENTS (Cont'd)

Wiring Diagram	535	DTC Confirmation Procedure	571
Diagnostic Procedure	536	Diagnostic Procedure	572
DTC P1490 VACUUM CUT VALVE BYPASS		TROUBLE DIAGNOSIS FOR OVERHEAT	574
VALVE (CIRCUIT)	537	On Board Diagnosis Logic.....	574
Description	537	Overall Function Check	574
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	575
Mode	537	Main 11 Causes of Overheating.....	578
ECM Terminals and Reference Value	537	IGNITION SIGNAL	579
On Board Diagnosis Logic.....	538	Component Description	579
DTC Confirmation Procedure	538	CONSULT-II Reference Value in Data Monitor	
Wiring Diagram	539	Mode	579
Diagnostic Procedure	540	ECM Terminals and Reference Value	580
DTC P1491 VACUUM CUT VALVE BYPASS		Wiring Diagram	581
VALVE	544	Diagnostic Procedure	582
Description	544	INJECTOR	588
CONSULT-II Reference Value in Data Monitor		Component Description	588
Mode	544	ECM Terminals and Reference Value	588
ECM Terminals and Reference Value	544	Wiring Diagram	589
On Board Diagnosis Logic.....	545	Diagnostic Procedure	590
DTC Confirmation Procedure	545	START SIGNAL	593
Overall Function Check	546	CONSULT-II Reference Value in Data Monitor	
Wiring Diagram	547	Mode	593
Diagnostic Procedure	548	ECM Terminals and Reference Value	593
DTC P1706 PARK/NEUTRAL POSITION (PNP)		Wiring Diagram	594
SWITCH	555	Diagnostic Procedure	595
Component Description	555	FUEL PUMP	597
CONSULT-II Reference Value in Data Monitor		System Description.....	597
Mode	555	Component Description	597
ECM Terminals and Reference Value	555	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic.....	555	Mode	597
DTC Confirmation Procedure	556	ECM Terminals and Reference Value	598
Overall Function Check	557	Wiring Diagram	599
Wiring Diagram	558	Diagnostic Procedure	600
Diagnostic Procedure For M/T Models.....	559	POWER STEERING OIL PRESSURE SWITCH	605
Diagnostic Procedure For A/T Models	561	Component Description	605
DTC P1775 TORQUE CONVERTER CLUTCH		CONSULT-II Reference Value in Data Monitor	
SOLENOID VALVE (CIRCUIT)	564	Mode	605
System Description.....	564	ECM Terminals and Reference Value	605
CONSULT-II Reference Value in Data Monitor		Wiring Diagram	606
Mode	564	Diagnostic Procedure	607
ECM Terminals and Reference Value	564	IACV-FICD SOLENOID VALVE	609
On Board Diagnosis Logic.....	565	Component Description	609
DTC Confirmation Procedure	565	ECM Terminals and Reference Value	609
Wiring Diagram	566	Wiring Diagram	610
Diagnostic Procedure	567	Diagnostic Procedure	611
DTC P1776 TORQUE CONVERTER CLUTCH		MIL & DATA LINK CONNECTORS	615
SOLENOID VALVE	570	Wiring Diagram	615
System Description.....	570	SERVICE DATA AND SPECIFICATIONS (SDS)	616
CONSULT-II Reference Value in Data Monitor		Fuel Pressure Regulator.....	616
Mode	570	Idle Speed and Ignition Timing.....	616
ECM Terminals and Reference Value	571	Ignition Coil	616
On Board Diagnosis Logic.....	571	Mass Air Flow Sensor.....	616

CONTENTS (Cont'd)

Engine Coolant Temperature Sensor	616	
EGR Temperature Sensor	616	
Fuel Pump	616	
IACV-AAC Valve	617	
Injector	617	
Resistor.....	617	
Throttle Position Sensor	617	
Heated Oxygen Sensor 1 Heater (Front).....	617	
Calculated Load Value.....	617	
Intake Air Temperature Sensor.....	617	
Heated Oxygen Sensor 2 Heater (Rear).....	617	
Crankshaft Position Sensor (OBD).....	617	
Fuel Tank Temperature Sensor	617	
VG33E		
TROUBLE DIAGNOSIS - INDEX	618	
Alphabetical & P No. Index for DTC	618	
PRECAUTIONS	624	
Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER".....	624	
Precautions for On Board Diagnostic (OBD) System of Engine and A/T.....	624	
Engine Fuel & Emission Control System	625	
Precautions	626	
Wiring Diagrams and Trouble Diagnosis.....	627	
PREPARATION	628	
Special Service Tools	628	
Commercial Service Tools	628	
ENGINE AND EMISSION CONTROL OVERALL SYSTEM	630	
Engine Control Component Parts Location.....	630	
Circuit Diagram	632	
System Diagram	633	
Vacuum Hose Drawing	634	
System Chart.....	635	
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION	636	
Multiport Fuel Injection (MFI) System	636	
Distributor Ignition (DI) System	638	
Air Conditioning Cut Control.....	639	
DTC P0217 Coolant Overtemperature Enrichment Protection (Without Electric Cooling Fan).....	640	
Evaporative Emission System.....	640	
On Board Refueling Vapor Recovery (ORVR)	646	
Positive Crankcase Ventilation	656	
BASIC SERVICE PROCEDURE	658	
Fuel Pressure Release	658	
Fuel Pressure Check.....	658	
Fuel Pressure Regulator Check	659	
Injector	659	
Fast Idle Cam (FIC).....	660	
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment.....	662	GI
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION	674	MA
Introduction	674	
Two Trip Detection Logic.....	674	EM
Emission-related Diagnostic Information	675	
Malfunction Indicator Lamp (MIL).....	689	
OBD System Operation Chart	690	LC
CONSULT-II	696	
Generic Scan Tool (GST)	709	
TROUBLE DIAGNOSIS - INTRODUCTION	711	EC
Introduction	711	
Work Flow.....	713	FE
TROUBLE DIAGNOSIS - BASIC INSPECTION	715	
Basic Inspection.....	715	
TROUBLE DIAGNOSIS - GENERAL DESCRIPTION	729	CL
DTC Inspection Priority Chart.....	729	
Fail-safe Chart	730	MT
Symptom Matrix Chart.....	731	
CONSULT-II Reference Value in Data Monitor Mode.....	735	AT
Major Sensor Reference Graph in Data Monitor Mode.....	737	TF
ECM Terminals and Reference Value	740	
TROUBLE DIAGNOSIS - SPECIFICATION VALUE	749	PD
Description	749	
Testing Condition	749	AX
Inspection Procedure.....	749	
Diagnostic Procedure	750	
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT	753	SU
Description	753	
Diagnostic Procedure	753	BR
TROUBLE DIAGNOSIS FOR POWER SUPPLY	754	
Main Power Supply and Ground Circuit.....	754	ST
DTC P0100 MASS AIR FLOW SENSOR (MAFS)	760	
Component Description	760	
CONSULT-II Reference Value in Data Monitor Mode.....	760	RS
ECM Terminals and Reference Value	760	
On Board Diagnosis Logic.....	760	BT
DTC Confirmation Procedure	761	
Overall Function Check	763	
Wiring Diagram	764	HA
Diagnostic Procedure	765	
DTC P0105 ABSOLUTE PRESSURE SENSOR	769	SC
Component Description	769	
On Board Diagnosis Logic.....	769	
DTC Confirmation Procedure	769	EL

CONTENTS (Cont'd)

Diagnostic Procedure	770	Diagnostic Procedure	813
DTC P0110 INTAKE AIR TEMPERATURE		DTC P0132, P0152 HEATED OXYGEN SENSOR 1	
SENSOR	771	(FRONT) (BANK 1)/(BANK 2) (RICH SHIFT	
Component Description	771	MONITORING)	819
On Board Diagnosis Logic.....	771	Component Description	819
DTC Confirmation Procedure	771	CONSULT-II Reference Value in Data Monitor	
Wiring Diagram	773	Mode	819
Diagnostic Procedure	774	ECM Terminals and Reference Value	819
DTC P0115 ENGINE COOLANT TEMPERATURE		On Board Diagnosis Logic.....	820
SENSOR (ECTS) (CIRCUIT)	776	DTC Confirmation Procedure	821
Component Description	776	Overall Function Check	822
On Board Diagnosis Logic.....	776	Diagnostic Procedure	822
DTC Confirmation Procedure	777	DTC P0133, P0153 HEATED OXYGEN SENSOR 1	
Wiring Diagram	778	(FRONT) (BANK 1)/(BANK 2) (RESPONSE	
Diagnostic Procedure	779	MONITORING)	828
DTC P0120 THROTTLE POSITION SENSOR	781	Component Description	828
Description	781	CONSULT-II Reference Value in Data Monitor	
CONSULT-II Reference Value in Data Monitor		Mode	828
Mode	781	ECM Terminals and Reference Value	828
ECM Terminals and Reference Value	782	On Board Diagnosis Logic.....	829
On Board Diagnosis Logic.....	782	DTC Confirmation Procedure	829
DTC Confirmation Procedure	783	Overall Function Check	830
Wiring Diagram	786	Wiring Diagram	831
Diagnostic Procedure	787	Diagnostic Procedure	833
DTC P0125 ENGINE COOLANT TEMPERATURE		DTC P0134, P0154 HEATED OXYGEN SENSOR 1	
SENSOR (ECTS)	794	(FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)	842
Description	794	Component Description	842
On Board Diagnosis Logic.....	794	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	795	Mode	842
Wiring Diagram	796	ECM Terminals and Reference Value	842
Diagnostic Procedure	797	On Board Diagnosis Logic.....	843
DTC P0130, P0150 HEATED OXYGEN SENSOR 1		DTC Confirmation Procedure	843
(FRONT) (BANK 1)/(BANK 2) (CIRCUIT)	799	Wiring Diagram	844
Component Description	799	Diagnostic Procedure	846
CONSULT-II Reference Value in Data Monitor		DTC P0135, P0155 HEATED OXYGEN SENSOR 1	
Mode	799	HEATER (FRONT) (BANK 1)/(BANK 2)	850
ECM Terminals and Reference Value	799	Description	850
On Board Diagnosis Logic.....	800	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	801	Mode	850
Overall Function Check	802	ECM Terminals and Reference Value	850
Wiring Diagram	803	On Board Diagnosis Logic.....	850
Diagnostic Procedure	805	DTC Confirmation Procedure	851
DTC P0131, P0151 HEATED OXYGEN SENSOR 1		Wiring Diagram	852
(FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT		Diagnostic Procedure	854
MONITORING)	810	DTC P0137, P0157 HEATED OXYGEN SENSOR 2	
Component Description	810	(REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE	
CONSULT-II Reference Value in Data Monitor		MONITORING)	857
Mode	810	Component Description	857
ECM Terminals and Reference Value	810	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic.....	811	Mode	857
DTC Confirmation Procedure	812	ECM Terminals and Reference Value	857
Overall Function Check	813	On Board Diagnosis Logic.....	857

CONTENTS (Cont'd)

DTC Confirmation Procedure	858	DTC Confirmation Procedure	906	GI
Overall Function Check	859	Wiring Diagram	907	
Wiring Diagram	860	Diagnostic Procedure	909	MA
Diagnostic Procedure	862	DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2)		
DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)	867	FUEL INJECTION SYSTEM FUNCTION (RICH)	914	EM
Component Description	867	On Board Diagnosis Logic.....	914	EM
CONSULT-II Reference Value in Data Monitor		DTC Confirmation Procedure	915	
Mode	867	Wiring Diagram	916	LC
ECM Terminals and Reference Value	867	Diagnostic Procedure	918	
On Board Diagnosis Logic.....	867	DTC P0180 FUEL TANK TEMPERATURE SENSOR	922	EC
DTC Confirmation Procedure	868	Component Description	922	
Overall Function Check	869	On Board Diagnosis Logic.....	922	
Wiring Diagram	870	DTC Confirmation Procedure	923	FE
Diagnostic Procedure	872	Wiring Diagram	924	
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)	877	Diagnostic Procedure	925	
Component Description	877	DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)	927	CL
CONSULT-II Reference Value in Data Monitor		System Description.....	927	MT
Mode	877	CONSULT-II Reference Value in Data Monitor		
ECM Terminals and Reference Value	877	Mode	927	AT
On Board Diagnosis Logic.....	877	On Board Diagnosis Logic.....	927	
DTC Confirmation Procedure	878	Possible Cause.....	928	TF
Overall Function Check	879	Overall Function Check	929	
Wiring Diagram	880	Wiring Diagram	932	PD
Diagnostic Procedure	882	Diagnostic Procedure	933	
DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)	887	Main 12 Causes of Overheating.....	940	
Component Description	887	DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)	941	AX
CONSULT-II Reference Value in Data Monitor		On Board Diagnosis Logic.....	941	
Mode	887	Possible Cause.....	941	SU
ECM Terminals and Reference Value	887	Overall Function Check	942	
On Board Diagnosis Logic.....	887	Diagnostic Procedure	944	BR
DTC Confirmation Procedure	888	Main 12 Causes of Overheating.....	947	
Overall Function Check	888	DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE	948	ST
Wiring Diagram	890	On Board Diagnosis Logic.....	948	
Diagnostic Procedure	892	DTC Confirmation Procedure	949	RS
DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)	897	Diagnostic Procedure	949	
Description	897	DTC P0325 KNOCK SENSOR (KS)	957	BT
CONSULT-II Reference Value in Data Monitor		Component Description	957	
Mode	897	ECM Terminals and Reference Value	957	HA
ECM Terminals and Reference Value	897	On Board Diagnosis Logic.....	957	
On Board Diagnosis Logic.....	898	DTC Confirmation Procedure	957	
DTC Confirmation Procedure	898	Wiring Diagram	958	SC
Wiring Diagram	899	Diagnostic Procedure	959	
Diagnostic Procedure	901	DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD)	961	EL
DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)	905	Component Description	961	
On Board Diagnosis Logic.....	905	ECM Terminals and Reference Value	961	EL

CONTENTS (Cont'd)

On Board Diagnosis Logic.....	962	Diagnostic Procedure	1010
DTC Confirmation Procedure	962	DTC P0455 EVAP CONTROL SYSTEM (GROSS	
Wiring Diagram	963	LEAK)	1018
Diagnostic Procedure	964	On Board Diagnosis Logic.....	1018
DTC P0340 CAMSHAFT POSITION SENSOR		DTC Confirmation Procedure	1019
(CMPS)	967	Diagnostic Procedure	1021
Component Description	967	DTC P0460 FUEL LEVEL SENSOR FUNCTION	
ECM Terminals and Reference Value	967	(SLOSH)	1032
On Board Diagnosis Logic.....	968	Component Description	1032
DTC Confirmation Procedure	969	ECM Terminals and Reference Value	1032
Wiring Diagram	970	On Board Diagnosis Logic.....	1032
Diagnostic Procedure	971	DTC Confirmation Procedure	1033
DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT		Wiring Diagram	1034
BANK, -B2) THREE WAY CATALYST FUNCTION	974	Diagnostic Procedure	1035
On Board Diagnosis Logic.....	974	DTC P0461 FUEL LEVEL SENSOR FUNCTION	1037
DTC Confirmation Procedure	974	Component Description	1037
Overall Function Check	975	On Board Diagnosis Logic.....	1037
Diagnostic Procedure	976	Overall Function Check	1037
DTC P0440 EVAP CONTROL SYSTEM (SMALL		DTC P0464 FUEL LEVEL SENSOR CIRCUIT	1039
LEAK) (NEGATIVE PRESSURE)	979	Component Description	1039
On Board Diagnosis Logic.....	979	ECM Terminals and Reference Value	1039
DTC Confirmation Procedure	981	On Board Diagnosis Logic.....	1039
Diagnostic Procedure	982	DTC Confirmation Procedure	1040
DTC P0443 EVAP CANISTER PURGE VOLUME		Wiring Diagram	1041
CONTROL SOLENOID VALVE (CIRCUIT)	994	Diagnostic Procedure	1042
Description	994	DTC P0500 VEHICLE SPEED SENSOR (VSS)	1044
CONSULT-II Reference Value in Data Monitor		Component Description	1044
Mode	994	ECM Terminals and Reference Value	1044
ECM Terminals and Reference Value	995	On Board Diagnosis Logic.....	1044
On Board Diagnosis Logic.....	996	DTC Confirmation Procedure	1044
DTC Confirmation Procedure	996	Overall Function Check	1045
Wiring Diagram	997	Wiring Diagram	1046
Diagnostic Procedure	998	Diagnostic Procedure	1047
DTC P0446 EVAPORATIVE EMISSION (EVAP)		DTC P0505 IDLE AIR CONTROL VALVE (IACV)	
CANISTER VENT CONTROL VALVE (CIRCUIT)	1001	- AUXILIARY AIR CONTROL (AAC) VALVE	1048
Component Description	1001	Description	1048
CONSULT-II Reference Value in Data Monitor		CONSULT-II Reference Value in Data Monitor	
Mode	1001	Mode	1049
ECM Terminals and Reference Value	1001	ECM Terminals and Reference Value	1049
On Board Diagnosis Logic.....	1002	On Board Diagnosis Logic.....	1049
DTC Confirmation Procedure	1002	DTC Confirmation Procedure	1050
Wiring Diagram	1003	Wiring Diagram	1051
Diagnostic Procedure	1004	Diagnostic Procedure	1052
DTC P0450 EVAPORATIVE EMISSION (EVAP)		DTC P0510 CLOSED THROTTLE POSITION	
CONTROL SYSTEM PRESSURE SENSOR	1007	SWITCH	1054
Component Description	1007	Component Description	1054
CONSULT-II Reference Value in Data Monitor		CONSULT-II Reference Value in Data Monitor	
Mode	1007	Mode	1054
ECM Terminals and Reference Value	1007	ECM Terminals and Reference Value	1054
On Board Diagnosis Logic.....	1008	On Board Diagnosis Logic.....	1054
DTC Confirmation Procedure	1008	DTC Confirmation Procedure	1055
Wiring Diagram	1009	Overall Function Check	1055

CONTENTS (Cont'd)

Wiring Diagram	1056	
Diagnostic Procedure	1057	
DTC P0600 A/T CONTROL	1061	
System Description	1061	
ECM Terminals and Reference Value	1061	
On Board Diagnosis Logic	1061	
DTC Confirmation Procedure	1062	
Overall Function Check	1062	
Wiring Diagram	1063	
Diagnostic Procedure	1064	
DTC P0605 ECM	1066	
Component Description	1066	
On Board Diagnosis Logic	1066	
DTC Confirmation Procedure	1066	
Diagnostic Procedure	1067	
DTC P1126 THERMOSTAT FUNCTION	1068	
On Board Diagnosis Logic	1068	
DTC Confirmation Procedure	1068	
Diagnostic Procedure	1069	
DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL	1070	
On Board Diagnosis Logic	1070	
DTC Confirmation Procedure	1070	
Overall Function Check	1071	
Diagnostic Procedure	1071	
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)	1072	
System Description	1072	
CONSULT-II Reference Value in Data Monitor Mode	1072	
ECM Terminals and Reference Value	1072	
On Board Diagnosis Logic	1073	
Overall Function Check	1074	
Wiring Diagram	1075	
Diagnostic Procedure	1076	
Main 12 Causes of Overheating	1083	
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)	1084	
On Board Diagnosis Logic	1084	
Overall Function Check	1084	
Diagnostic Procedure	1085	
Main 12 Causes of Overheating	1088	
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)	1089	
Component Description	1089	
ECM Terminals and Reference Value	1089	
On Board Diagnosis Logic	1090	
DTC Confirmation Procedure	1090	
Wiring Diagram	1091	
Diagnostic Procedure	1092	
DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)	1096	GI
On Board Diagnosis Logic	1096	
DTC Confirmation Procedure	1097	MA
Diagnostic Procedure	1097	
DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)	1098	EM
On Board Diagnosis Logic	1098	
DTC Confirmation Procedure	1099	LC
Overall Function Check	1100	
Diagnostic Procedure	1101	
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	1113	EC
Description	1113	
CONSULT-II Reference Value in Data Monitor Mode	1113	FE
ECM Terminals and Reference Value	1114	CL
On Board Diagnosis Logic	1114	
DTC Confirmation Procedure	1115	MT
Wiring Diagram	1116	
Diagnostic Procedure	1117	
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)	1125	AT
Component Description	1125	
CONSULT-II Reference Value in Data Monitor Mode	1125	TF
ECM Terminals and Reference Value	1125	
On Board Diagnosis Logic	1126	PD
DTC Confirmation Procedure	1126	
Wiring Diagram	1127	AX
Diagnostic Procedure	1128	
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING	1132	SU
System Description	1132	
On Board Diagnosis Logic	1132	BR
DTC Confirmation Procedure	1133	
Overall Function Check	1134	ST
Diagnostic Procedure	1135	
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)	1144	RS
Component Description	1144	
CONSULT-II Reference Value in Data Monitor Mode	1144	BT
ECM Terminals and Reference Value	1144	
On Board Diagnosis Logic	1144	HA
DTC Confirmation Procedure	1145	
Overall Function Check	1146	SC
Wiring Diagram	1147	
Diagnostic Procedure	1148	
DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)	1152	EL

CONTENTS (Cont'd)

Component Description	1152	Component Description	1189
ECM Terminals and Reference Value	1152	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic.....	1152	Mode.....	1189
DTC Confirmation Procedure	1152	ECM Terminals and Reference Value	1189
Wiring Diagram	1154	Wiring Diagram.....	1190
Diagnostic Procedure	1155	Diagnostic Procedure	1191
DTC P1490 VACUUM CUT VALVE BYPASS		START SIGNAL	1194
VALVE (CIRCUIT)	1156	CONSULT-II Reference Value in Data Monitor	
Description	1156	Mode.....	1194
CONSULT-II Reference Value in Data Monitor		ECM Terminals and Reference Value	1194
Mode.....	1156	Wiring Diagram.....	1195
ECM Terminals and Reference Value	1156	Diagnostic Procedure	1196
On Board Diagnosis Logic.....	1157	FUEL PUMP	1198
DTC Confirmation Procedure	1157	System Description.....	1198
Wiring Diagram.....	1158	Component Description	1198
Diagnostic Procedure	1159	CONSULT-II Reference Value in Data Monitor	
DTC P1491 VACUUM CUT VALVE BYPASS		Mode.....	1198
VALVE	1162	ECM Terminals and Reference Value	1199
Description	1162	Wiring Diagram.....	1200
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	1201
Mode.....	1162	POWER STEERING OIL PRESSURE SWITCH	1205
ECM Terminals and Reference Value	1162	Component Description	1205
On Board Diagnosis Logic.....	1163	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	1163	Mode.....	1205
Overall Function Check	1164	ECM Terminals and Reference Value	1205
Wiring Diagram.....	1165	Wiring Diagram.....	1206
Diagnostic Procedure	1166	Diagnostic Procedure	1207
DTC P1605 A/T DIAGNOSIS COMMUNICATION		IACV-FICD SOLENOID VALVE	1210
LINE	1171	Component Description	1210
Component Description	1171	ECM Terminals and Reference Value	1210
ECM Terminals and Reference Value	1171	Wiring Diagram.....	1211
On Board Diagnosis Logic.....	1171	Diagnostic Procedure	1212
DTC Confirmation Procedure	1171	MIL & DATA LINK CONNECTORS	1216
Wiring Diagram.....	1172	Wiring Diagram.....	1216
Diagnostic Procedure	1173	SERVICE DATA AND SPECIFICATIONS (SDS)	1217
DTC P1706 PARK/NEUTRAL POSITION (PNP)		Fuel Pressure Regulator.....	1217
SWITCH	1174	Idle Speed and Ignition Timing.....	1217
Component Description	1174	Ignition Coil.....	1217
CONSULT-II Reference Value in Data Monitor		Mass Air Flow Sensor.....	1217
Mode.....	1174	Engine Coolant Temperature Sensor	1217
ECM Terminals and Reference Value	1174	Heated Oxygen Sensor 1 Heater (Front).....	1217
On Board Diagnosis Logic.....	1174	Fuel Pump	1217
DTC Confirmation Procedure	1175	IACV-AAC Valve	1217
Overall Function Check	1176	Injector	1218
Wiring Diagram.....	1177	Throttle Position Sensor	1218
Diagnostic Procedure	1178	Calculated Load Value.....	1218
IGNITION SIGNAL	1183	Intake Air Temperature Sensor.....	1218
Component Description	1183	Heated Oxygen Sensor 2 Heater (Rear).....	1218
ECM Terminals and Reference Value	1183	Crankshaft Position Sensor (OBD).....	1218
Wiring Diagram.....	1184	Fuel Tank Temperature Sensor	1218
Diagnostic Procedure	1185		
INJECTOR	1189		

CONTENTS (Cont'd)

VG33ER		
TROUBLE DIAGNOSIS - INDEX	1219	
Alphabetical & P No. Index for DTC	1219	
PRECAUTIONS	1225	
Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	1225	
Precautions for On Board Diagnostic (OBD) System of Engine and A/T	1225	
Engine Fuel & Emission Control System	1226	
Precautions	1227	
Wiring Diagrams and Trouble Diagnosis	1228	
PREPARATION	1229	
Special Service Tools	1229	
Commercial Service Tools	1229	
ENGINE AND EMISSION CONTROL OVERALL SYSTEM	1231	
Engine Control Component Parts Location	1231	
Circuit Diagram	1233	
System Diagram	1234	
Vacuum Hose Drawing	1235	
System Chart	1236	
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION	1237	
Multiport Fuel Injection (MFI) System	1237	
Distributor Ignition (DI) System	1239	
Air Conditioning Cut Control	1240	
Fuel Cut Control (at no load & high engine speed)	1241	
Evaporative Emission System	1241	
On Board Refueling Vapor Recovery (ORVR)	1247	
Positive Crankcase Ventilation	1257	
BASIC SERVICE PROCEDURE	1259	
Fuel Pressure Release	1259	
Fuel Pressure Check	1259	
Fuel Pressure Regulator Check	1260	
Injector	1260	
Fast Idle Cam (FIC)	1261	
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment	1262	
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION	1274	
Introduction	1274	
Two Trip Detection Logic	1274	
Emission-related Diagnostic Information	1275	
Malfunction Indicator Lamp (MIL)	1289	
OBD System Operation Chart	1290	
CONSULT-II	1295	
Generic Scan Tool (GST)	1308	
TROUBLE DIAGNOSIS - INTRODUCTION	1310	
Introduction	1310	
Work Flow	1312	
TROUBLE DIAGNOSIS - BASIC INSPECTION	1314	
Basic Inspection	1314	GI
TROUBLE DIAGNOSIS - GENERAL DESCRIPTION	1329	
DTC Inspection Priority Chart	1329	MA
Fail-safe Chart	1330	
Symptom Matrix Chart	1331	EM
CONSULT-II Reference Value in Data Monitor Mode	1335	
Major Sensor Reference Graph in Data Monitor Mode	1337	LC
ECM Terminals and Reference Value	1340	
TROUBLE DIAGNOSIS - SPECIFICATION VALUE	1349	
Description	1349	
Testing Condition	1349	FE
Inspection Procedure	1349	
Diagnostic Procedure	1350	CL
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT	1353	
Description	1353	MT
Diagnostic Procedure	1353	
TROUBLE DIAGNOSIS FOR POWER SUPPLY	1354	
Main Power Supply and Ground Circuit	1354	AT
DTC P0100 MASS AIR FLOW SENSOR (MAFS)	1360	
Component Description	1360	TF
CONSULT-II Reference Value in Data Monitor Mode	1360	
ECM Terminals and Reference Value	1360	PD
On Board Diagnosis Logic	1360	
DTC Confirmation Procedure	1361	
Overall Function Check	1363	AX
Wiring Diagram	1364	
Diagnostic Procedure	1365	SU
DTC P0105 ABSOLUTE PRESSURE SENSOR	1369	
Component Description	1369	
On Board Diagnosis Logic	1369	BR
DTC Confirmation Procedure	1369	
Diagnostic Procedure	1370	
DTC P0110 INTAKE AIR TEMPERATURE SENSOR	1371	
Component Description	1371	
On Board Diagnosis Logic	1371	RS
DTC Confirmation Procedure	1371	
Wiring Diagram	1373	BT
Diagnostic Procedure	1374	
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)	1376	
Component Description	1376	HA
On Board Diagnosis Logic	1376	
DTC Confirmation Procedure	1377	SC
Wiring Diagram	1378	
Diagnostic Procedure	1379	EL

CONTENTS (Cont'd)

DTC P0120 THROTTLE POSITION SENSOR	1381	Component Description	1429
Description	1381	CONSULT-II Reference Value in Data Monitor	
CONSULT-II Reference Value in Data Monitor		Mode	1429
Mode	1381	ECM Terminals and Reference Value	1429
ECM Terminals and Reference Value	1382	On Board Diagnosis Logic.....	1430
On Board Diagnosis Logic.....	1382	DTC Confirmation Procedure	1430
DTC Confirmation Procedure	1383	Overall Function Check	1431
Wiring Diagram	1386	Wiring Diagram	1432
Diagnostic Procedure	1387	Diagnostic Procedure	1434
DTC P0125 ENGINE COOLANT TEMPERATURE		DTC P0134, P0154 HEATED OXYGEN SENSOR 1	
SENSOR (ECTS)	1394	(FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)	1443
Description	1394	Component Description	1443
On Board Diagnosis Logic.....	1394	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	1395	Mode	1443
Wiring Diagram	1396	ECM Terminals and Reference Value	1443
Diagnostic Procedure	1397	On Board Diagnosis Logic.....	1444
DTC P0130, P0150 HEATED OXYGEN SENSOR 1		DTC Confirmation Procedure	1444
(FRONT) (BANK 1)/(BANK 2) (CIRCUIT)	1400	Wiring Diagram	1445
Component Description	1400	Diagnostic Procedure	1447
CONSULT-II Reference Value in Data Monitor		DTC P0135, P0155 HEATED OXYGEN SENSOR 1	
Mode	1400	HEATER (FRONT) (BANK 1)/(BANK 2)	1451
ECM Terminals and Reference Value	1400	Description	1451
On Board Diagnosis Logic.....	1401	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	1402	Mode	1451
Overall Function Check	1403	ECM Terminals and Reference Value	1451
Wiring Diagram	1404	On Board Diagnosis Logic.....	1451
Diagnostic Procedure	1406	DTC Confirmation Procedure	1452
DTC P0131, P0151 HEATED OXYGEN SENSOR 1		Wiring Diagram	1453
(FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT		Diagnostic Procedure	1455
MONITORING)	1411	DTC P0137, P0157 HEATED OXYGEN SENSOR 2	
Component Description	1411	(REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE	
CONSULT-II Reference Value in Data Monitor		MONITORING)	1458
Mode	1411	Component Description	1458
ECM Terminals and Reference Value	1411	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic.....	1412	Mode	1458
DTC Confirmation Procedure	1413	ECM Terminals and Reference Value	1458
Overall Function Check	1414	On Board Diagnosis Logic.....	1458
Diagnostic Procedure	1414	DTC Confirmation Procedure	1459
DTC P0132, P0152 HEATED OXYGEN SENSOR 1		Overall Function Check	1460
(FRONT) (BANK 1)/(BANK 2) (RICH SHIFT		Wiring Diagram	1461
MONITORING)	1420	Diagnostic Procedure	1463
Component Description	1420	DTC P0138, P0158 HEATED OXYGEN SENSOR 2	
CONSULT-II Reference Value in Data Monitor		(REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE	
Mode	1420	MONITORING)	1468
ECM Terminals and Reference Value	1420	Component Description	1468
On Board Diagnosis Logic.....	1421	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	1422	Mode	1468
Overall Function Check	1423	ECM Terminals and Reference Value	1468
Diagnostic Procedure	1423	On Board Diagnosis Logic.....	1468
DTC P0133, P0153 HEATED OXYGEN SENSOR 1		DTC Confirmation Procedure	1469
(FRONT) (BANK 1)/(BANK 2) (RESPONSE		Overall Function Check	1470
MONITORING)	1429	Wiring Diagram	1471

CONTENTS (Cont'd)

Diagnostic Procedure	1473	
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)	1478	
Component Description	1478	
CONSULT-II Reference Value in Data Monitor Mode	1478	
ECM Terminals and Reference Value	1478	
On Board Diagnosis Logic.....	1478	
DTC Confirmation Procedure	1479	
Overall Function Check	1480	
Wiring Diagram	1481	
Diagnostic Procedure	1483	
DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)	1488	
Component Description	1488	
CONSULT-II Reference Value in Data Monitor Mode	1488	
ECM Terminals and Reference Value	1488	
On Board Diagnosis Logic.....	1488	
DTC Confirmation Procedure	1489	
Overall Function Check	1489	
Wiring Diagram	1491	
Diagnostic Procedure	1493	
DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)	1498	
Description	1498	
CONSULT-II Reference Value in Data Monitor Mode	1498	
ECM Terminals and Reference Value	1498	
On Board Diagnosis Logic.....	1499	
DTC Confirmation Procedure	1499	
Wiring Diagram	1500	
Diagnostic Procedure	1502	
DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)	1506	
On Board Diagnosis Logic.....	1506	
DTC Confirmation Procedure	1507	
Wiring Diagram	1508	
Diagnostic Procedure	1510	
DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)	1515	
On Board Diagnosis Logic.....	1515	
DTC Confirmation Procedure	1516	
Wiring Diagram	1517	
Diagnostic Procedure	1519	
DTC P0180 FUEL TANK TEMPERATURE SENSOR	1523	
Component Description	1523	
On Board Diagnosis Logic.....	1523	
DTC Confirmation Procedure	1524	
Wiring Diagram	1525	
Diagnostic Procedure	1526	GI
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION	1528	
System Description.....	1528	MA
CONSULT-II Reference Value in Data Monitor Mode	1528	EM
ECM Terminals and Reference Value	1528	
On Board Diagnosis Logic.....	1529	
Possible Cause.....	1529	LC
Overall Function Check	1530	
Wiring Diagram	1533	
Diagnostic Procedure	1534	EC
Main 12 Causes of Overheating.....	1545	
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE	1546	FE
On Board Diagnosis Logic.....	1546	
DTC Confirmation Procedure	1547	CL
Diagnostic Procedure	1547	
DTC P0325 KNOCK SENSOR (KS)	1555	MT
Component Description	1555	
ECM Terminals and Reference Value	1555	
On Board Diagnosis Logic.....	1555	AT
DTC Confirmation Procedure	1555	
Wiring Diagram	1556	
Diagnostic Procedure	1557	TF
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD)	1559	
Component Description	1559	PD
ECM Terminals and Reference Value	1559	
On Board Diagnosis Logic.....	1560	AX
DTC Confirmation Procedure	1560	
Wiring Diagram	1561	
Diagnostic Procedure	1562	SU
DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)	1565	
Component Description	1565	BR
ECM Terminals and Reference Value	1565	
On Board Diagnosis Logic.....	1566	ST
DTC Confirmation Procedure	1567	
Wiring Diagram	1568	
Diagnostic Procedure	1569	RS
DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION	1572	
On Board Diagnosis Logic.....	1572	BT
DTC Confirmation Procedure	1572	
Overall Function Check	1573	HA
Diagnostic Procedure	1574	
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)	1577	
On Board Diagnosis Logic.....	1577	SC
DTC Confirmation Procedure	1579	
Diagnostic Procedure	1580	EL

CONTENTS (Cont'd)

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)	1592	Wiring Diagram	1639
Description	1592	Diagnostic Procedure	1640
CONSULT-II Reference Value in Data Monitor		DTC P0500 VEHICLE SPEED SENSOR (VSS)	1642
Mode	1592	Component Description	1642
ECM Terminals and Reference Value	1593	ECM Terminals and Reference Value	1642
On Board Diagnosis Logic.....	1594	On Board Diagnosis Logic.....	1642
DTC Confirmation Procedure	1594	DTC Confirmation Procedure	1642
Wiring Diagram	1595	Overall Function Check	1643
Diagnostic Procedure	1596	Wiring Diagram	1644
DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)	1599	Diagnostic Procedure	1645
Component Description	1599	DTC P0505 IDLE AIR CONTROL VALVE (IACV) - AUXILIARY AIR CONTROL (AAC) VALVE	1646
CONSULT-II Reference Value in Data Monitor		Description	1646
Mode	1599	CONSULT-II Reference Value in Data Monitor	
ECM Terminals and Reference Value	1599	Mode	1647
On Board Diagnosis Logic.....	1600	ECM Terminals and Reference Value	1647
DTC Confirmation Procedure	1600	On Board Diagnosis Logic.....	1647
Wiring Diagram	1601	DTC Confirmation Procedure	1648
Diagnostic Procedure	1602	Wiring Diagram	1649
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR	1605	Diagnostic Procedure	1650
Component Description	1605	DTC P0510 CLOSED THROTTLE POSITION SWITCH	1652
CONSULT-II Reference Value in Data Monitor		Component Description	1652
Mode	1605	CONSULT-II Reference Value in Data Monitor	
ECM Terminals and Reference Value	1605	Mode	1652
On Board Diagnosis Logic.....	1606	ECM Terminals and Reference Value	1652
DTC Confirmation Procedure	1606	On Board Diagnosis Logic.....	1652
Wiring Diagram	1607	DTC Confirmation Procedure	1653
Diagnostic Procedure	1608	Overall Function Check	1653
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)	1616	Wiring Diagram	1654
On Board Diagnosis Logic.....	1616	Diagnostic Procedure	1655
DTC Confirmation Procedure	1617	DTC P0600 A/T CONTROL	1659
Diagnostic Procedure	1619	System Description.....	1659
DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)	1630	ECM Terminals and Reference Value	1659
Component Description	1630	On Board Diagnosis Logic.....	1659
ECM Terminals and Reference Value	1630	DTC Confirmation Procedure	1660
On Board Diagnosis Logic.....	1630	Wiring Diagram	1661
DTC Confirmation Procedure	1631	Diagnostic Procedure	1662
Wiring Diagram	1632	DTC P0605 ECM	1664
Diagnostic Procedure	1633	Component Description	1664
DTC P0461 FUEL LEVEL SENSOR FUNCTION	1635	On Board Diagnosis Logic.....	1664
Component Description	1635	DTC Confirmation Procedure	1664
On Board Diagnosis Logic.....	1635	Diagnostic Procedure	1665
Overall Function Check	1635	DTC P1126 THERMOSTAT FUNCTION	1666
DTC P0464 FUEL LEVEL SENSOR CIRCUIT	1637	On Board Diagnosis Logic.....	1666
Component Description	1637	DTC Confirmation Procedure	1666
ECM Terminals and Reference Value	1637	Diagnostic Procedure	1667
On Board Diagnosis Logic.....	1637	DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL	1668
DTC Confirmation Procedure	1638	On Board Diagnosis Logic.....	1668
		DTC Confirmation Procedure	1668
		Overall Function Check	1669

CONTENTS (Cont'd)

Diagnostic Procedure	1669	
DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)	1670	
System Description	1670	
CONSULT-II Reference Value in Data Monitor Mode	1670	
ECM Terminals and Reference Value	1670	
On Board Diagnosis Logic	1671	
Overall Function Check	1672	
Wiring Diagram	1673	
Diagnostic Procedure	1674	
Main 12 Causes of Overheating	1685	
DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE	1686	
Description	1686	
CONSULT-II Reference Value in Data Monitor Mode	1687	
ECM Terminals and Reference Value	1687	
On Board Diagnosis Logic	1687	
DTC Confirmation Procedure	1688	
Wiring Diagram	1689	
Diagnostic Procedure	1690	
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)	1692	
Component Description	1692	
ECM Terminals and Reference Value	1692	
On Board Diagnosis Logic	1693	
DTC Confirmation Procedure	1693	
Wiring Diagram	1694	
Diagnostic Procedure	1695	
DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)	1699	
On Board Diagnosis Logic	1699	
DTC Confirmation Procedure	1700	
Diagnostic Procedure	1700	
DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)	1701	
On Board Diagnosis Logic	1701	
DTC Confirmation Procedure	1702	
Overall Function Check	1703	
Diagnostic Procedure	1704	
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	1716	
Description	1716	
CONSULT-II Reference Value in Data Monitor Mode	1716	
ECM Terminals and Reference Value	1717	
On Board Diagnosis Logic	1717	
DTC Confirmation Procedure	1718	
Wiring Diagram	1719	
Diagnostic Procedure	1720	
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)	1728	GI
Component Description	1728	
CONSULT-II Reference Value in Data Monitor Mode	1728	MA
ECM Terminals and Reference Value	1728	
On Board Diagnosis Logic	1729	EM
DTC Confirmation Procedure	1729	
Wiring Diagram	1730	LC
Diagnostic Procedure	1731	
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING	1735	EC
System Description	1735	
On Board Diagnosis Logic	1735	FE
DTC Confirmation Procedure	1736	
Overall Function Check	1737	CL
Diagnostic Procedure	1738	
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)	1747	MT
Component Description	1747	
CONSULT-II Reference Value in Data Monitor Mode	1747	AT
ECM Terminals and Reference Value	1747	
On Board Diagnosis Logic	1747	TF
DTC Confirmation Procedure	1748	
Overall Function Check	1749	PD
Wiring Diagram	1750	
Diagnostic Procedure	1751	
DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)	1755	AX
Component Description	1755	
ECM Terminals and Reference Value	1755	SU
On Board Diagnosis Logic	1755	
DTC Confirmation Procedure	1755	BR
Wiring Diagram	1757	
Diagnostic Procedure	1758	
DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)	1759	ST
Description	1759	
CONSULT-II Reference Value in Data Monitor Mode	1759	RS
ECM Terminals and Reference Value	1759	
On Board Diagnosis Logic	1760	BT
DTC Confirmation Procedure	1760	
Wiring Diagram	1761	HA
Diagnostic Procedure	1762	
DTC P1491 VACUUM CUT VALVE BYPASS VALVE	1765	SC
Description	1765	
CONSULT-II Reference Value in Data Monitor Mode	1765	EL

CONTENTS (Cont'd)

ECM Terminals and Reference Value	1765	Wiring Diagram	1798
On Board Diagnosis Logic.....	1766	Diagnostic Procedure	1799
DTC Confirmation Procedure	1766	FUEL PUMP	1801
Overall Function Check	1767	System Description.....	1801
Wiring Diagram	1768	Component Description	1801
Diagnostic Procedure	1769	CONSULT-II Reference Value in Data Monitor	
DTC P1605 A/T DIAGNOSIS COMMUNICATION		Mode	1801
LINE	1774	ECM Terminals and Reference Value	1802
Component Description	1774	Wiring Diagram	1803
ECM Terminals and Reference Value	1774	Diagnostic Procedure	1804
On Board Diagnosis Logic.....	1774	POWER STEERING OIL PRESSURE SWITCH	1808
DTC Confirmation Procedure	1774	Component Description	1808
Wiring Diagram	1775	CONSULT-II Reference Value in Data Monitor	
Diagnostic Procedure	1776	Mode	1808
DTC P1706 PARK/NEUTRAL POSITION (PNP)		ECM Terminals and Reference Value	1808
SWITCH	1777	Wiring Diagram.....	1809
Component Description	1777	Diagnostic Procedure	1810
CONSULT-II Reference Value in Data Monitor		IACV-FICD SOLENOID VALVE	1813
Mode	1777	Component Description	1813
ECM Terminals and Reference Value	1777	ECM Terminals and Reference Value	1813
On Board Diagnosis Logic.....	1777	Wiring Diagram	1814
DTC Confirmation Procedure	1778	Diagnostic Procedure	1815
Overall Function Check	1779	MIL & DATA LINK CONNECTORS	1819
Wiring Diagram	1780	Wiring Diagram	1819
Diagnostic Procedure	1781	SERVICE DATA AND SPECIFICATIONS (SDS)	1820
IGNITION SIGNAL	1786	Fuel Pressure Regulator.....	1820
Component Description	1786	Idle Speed and Ignition Timing.....	1820
ECM Terminals and Reference Value	1786	Ignition Coil.....	1820
Wiring Diagram	1787	Mass Air Flow Sensor.....	1820
Diagnostic Procedure	1788	Engine Coolant Temperature Sensor	1820
INJECTOR	1792	Heated Oxygen Sensor 1 Heater (Front).....	1820
Component Description	1792	Fuel Pump	1820
CONSULT-II Reference Value in Data Monitor		IACV-AAC Valve	1820
Mode	1792	Injector	1821
ECM Terminals and Reference Value	1792	Throttle Position Sensor	1821
Wiring Diagram	1793	Calculated Load Value.....	1821
Diagnostic Procedure	1794	Intake Air Temperature Sensor.....	1821
START SIGNAL	1797	Heated Oxygen Sensor 2 Heater (Rear).....	1821
CONSULT-II Reference Value in Data Monitor		Crankshaft Position Sensor (OBD).....	1821
Mode	1797	Fuel Tank Temperature Sensor	1821
ECM Terminals and Reference Value	1797		

TROUBLE DIAGNOSIS — INDEX

KA24DE

Alphabetical & P No. Index for DTC

Alphabetical & P No. Index for DTC

NEEC0001

NEEC0001S01

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*4	Reference page
	CONSULT-II GST*2	
Unable to access ECM	—	EC-125
*COOLAN T SEN/CIRC	P0125	EC-193
ABSL PRES SEN/CIRC	P0105	EC-166
AIR TEMP SEN/CIRC	P0110	EC-168
CKP SENSOR (COG)	P1336	EC-453
CKP SEN/CIRCUIT	P0335	EC-319
CLOSED LOOP-B1	P1148	EC-451
CLOSED TP SW/CIRC	P0510	EC-440
CMP SEN/CIRCUIT	P0340	EC-325
COOLANT T SEN/CIRC	P0115	EC-174
CYL 1 MISFIRE	P0301	EC-306
CYL 2 MISFIRE	P0302	EC-306
CYL 3 MISFIRE	P0303	EC-306
CYL 4 MISFIRE	P0304	EC-306
ECM	P0605	EC-447
EGR SYSTEM	P0400	EC-333
EGR SYSTEM	P1402	EC-472
EGR TEMP SEN/CIRC	P1401	EC-466
EGRC SOLENOID/V	P1400	EC-459
EGRC-BPT VALVE	P0402	EC-345
EVAP GROSS LEAK	P0455	EC-406
EVAP PURG FLOW/MON	P1447	EC-516
EVAP SMALL LEAK	P0440	EC-358
EVAP SMALL LEAK	P1440	EC-481
EVAP SYS PRES SEN	P0450	EC-391
EVAP VERY SML LEAK	P1441	EC-483
FUEL LEVEL SENSOR	P0461	EC-423
FUEL LEVL SEN/CIRC	P0464	EC-425
FUEL LEV SEN SLOSH	P0460	EC-419
FUEL LEVL SEN/CIRC	P1464	EC-534
FUEL SYS LEAN/BK1	P0171	EC-286
FUEL SYS RICH/BK1	P0172	EC-293
FUEL TEMP SEN/CIRC	P0180	EC-300
HO2S1 (B1)	P0130	EC-198

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HA

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EL

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TROUBLE DIAGNOSIS — INDEX

KA24DE

Alphabetical & P No. Index for DTC (Cont'd)

Items (CONSULT-II screen terms)	DTC*4	Reference page
	CONSULT-II GST*2	
HO2S1 (B1)	P0131	EC-206
HO2S1 (B1)	P0132	EC-213
HO2S1 (B1)	P0133	EC-220
HO2S1 (B1)	P0134	EC-231
HO2S1 HTR (B1)	P0135	EC-238
HO2S2 (B1)	P0137	EC-243
HO2S2 (B1)	P0138	EC-253
HO2S2 (B1)	P0139	EC-263
HO2S2 (B1)	P0140	EC-273
HO2S2 HTR (B1)	P0141	EC-281
IACV/AAC VLV/CIRC	P0505	EC-434
KNOCK SEN/CIRC-B1	P0325	EC-315
MAF SEN/CIRCUIT*2	P0100	EC-156
MULTI CYL MISFIRE	P0300	EC-306
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—
OVERHEAT	—	EC-574
P-N POS SW/CIRCUIT	P1706	EC-555
PURG VOLUME CONT/V	P0443	EC-375
PURG VOLUME CONT/V	P1444	EC-498
TCC SOL/V	P1775	EC-564, AT-43
TCC SOL/V	P1776	EC-570
THERMSTAT FUNCTN	P1126	EC-449
THRTL POS SEN/CIRC*2	P0120	EC-179
TW CATALYST SYS-B1	P0420	EC-353
VC CUT/V BYPASS/V	P1491	EC-544
VC/V BYPASS/V	P1490	EC-537
VEH SPEED SEN/CIRC*3	P0500	EC-429
VENT CONTROL VALVE	P0446	EC-383
VENT CONTROL VALVE	P1446	EC-510
VENT CONTROL VALVE	P1448	EC-526

*1: These numbers are prescribed by SAE J2012.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: 1st trip DTC No. is the same as DTC No.

TROUBLE DIAGNOSIS — INDEX

KA24DE

Alphabetical & P No. Index for DTC (Cont'd)

P NO. INDEX FOR DTC

NEEC0001S02

DTC*4	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-125
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—
P0100	MAF SEN/CIRCUIT*2	EC-156
P0105	ABSL PRES SEN/CIRC	EC-166
P0110	AIR TEMP SEN/CIRC	EC-168
P0115	COOLANT T SEN/CIRC	EC-174
P0120	THRTL POS SEN/CIRC*2	EC-179
P0125	*COOLAN T SEN/CIRC	EC-193
P0130	HO2S1 (B1)	EC-198
P0131	HO2S1 (B1)	EC-206
P0132	HO2S1 (B1)	EC-213
P0133	HO2S1 (B1)	EC-220
P0134	HO2S1 (B1)	EC-231
P0135	HO2S1 HTR (B1)	EC-238
P0137	HO2S2 (B1)	EC-243
P0138	HO2S2 (B1)	EC-253
P0139	HO2S2 (B1)	EC-263
P0140	HO2S2 (B1)	EC-273
P0141	HO2S2 HTR (B1)	EC-281
P0171	FUEL SYS LEAN/BK1	EC-286
P0172	FUEL SYS RICH/BK1	EC-293
P0180	FUEL TEMP SEN/CIRC	EC-300
P0300	MULTI CYL MISFIRE	EC-306
P0301	CYL 1 MISFIRE	EC-306
P0302	CYL 2 MISFIRE	EC-306
P0303	CYL 3 MISFIRE	EC-306
P0304	CYL 4 MISFIRE	EC-306
P0325	KNOCK SEN/CIRC-B1	EC-315
P0335	CKP SEN/CIRCUIT	EC-319
P0340	CMP SEN/CIRCUIT	EC-325
P0400	EGR SYSTEM	EC-333
P0402	EGRC-BPT VALVE	EC-345
P0420	TW CATALYST SYS-B1	EC-353
P0440	EVAP SMALL LEAK	EC-358
P0443	PURG VOLUME CONT/V	EC-375

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TROUBLE DIAGNOSIS — INDEX

KA24DE

Alphabetical & P No. Index for DTC (Cont'd)

DTC*4	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*1		
P0446	VENT CONTROL VALVE	EC-383
P0450	EVAP SYS PRES SEN	EC-391
P0455	EVAP GROSS LEAK	EC-406
P0460	FUEL LEV SEN SLOSH	EC-419
P0461	FUEL LEVEL SENSOR	EC-423
P0464	FUEL LEVL SEN/CIRC	EC-425
P0500	VEH SPEED SEN/CIRC*3	EC-429
P0505	IACV/AAC VLV/CIRC	EC-434
P0510	CLOSED TP SW/CIRC	EC-440
P0605	ECM	EC-447
P1126	THERMSTAT FNCTN	EC-449
P1148	CLOSED LOOP-B1	EC-451
P1336	CKP SENSOR (COG)	EC-453
P1400	EGRC SOLENOID/V	EC-459
P1401	EGR TEMP SEN/CIRC	EC-466
P1402	EGR SYSTEM	EC-472
P1440	EVAP SMALL LEAK	EC-481
P1441	EVAP VERY SML LEAK	EC-483
P1444	PURG VOLUME CONT/V	EC-498
P1446	VENT CONTROL VALVE	EC-510
P1447	EVAP PURG FLOW/MON	EC-516
P1448	VENT CONTROL VALVE	EC-526
P1464	FUEL LEVL SEN/CIRC	EC-534
P1490	VC/V BYPASS/V	EC-537
P1491	VC CUT/V BYPASS/V	EC-544
P1706	P-N POS SW/CIRCUIT	EC-555
P1775	TCC SOL/V	EC-564, AT-43
P1776	TCC SOL/V	EC-570
—	OVERHEAT	EC-574

*1: These numbers are prescribed by SAE J2012.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: 1st trip DTC No. is the same as DTC No.

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

NEEC0002

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.
- The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.

Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NEEC0003

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to *EL-5*, "HARNESS CONNECTOR".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission Control Module) before returning the vehicle to the customer.

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Engine Fuel & Emission Control System

NEEC0004

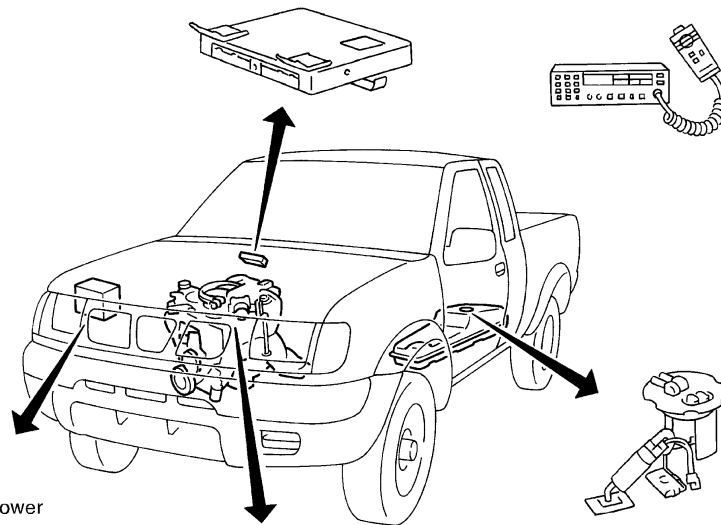
ECM

- Do not disassemble ECM.
- Do not turn on board diagnostic test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).

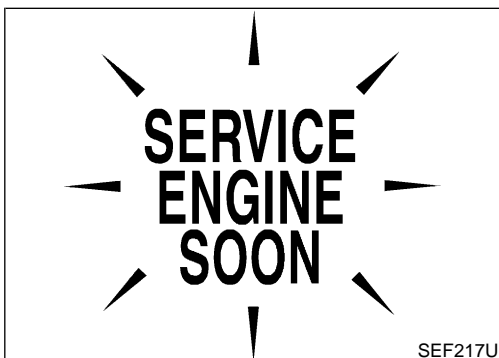
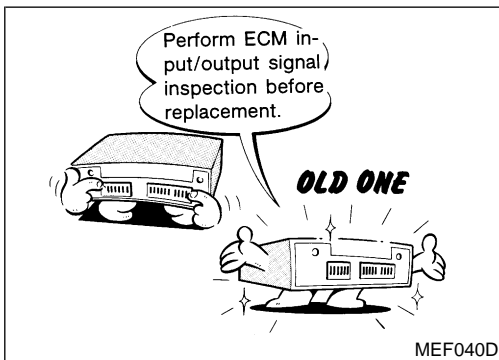
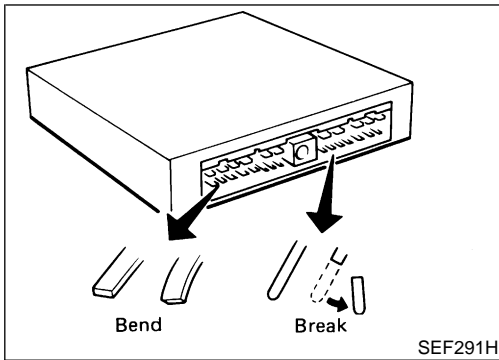
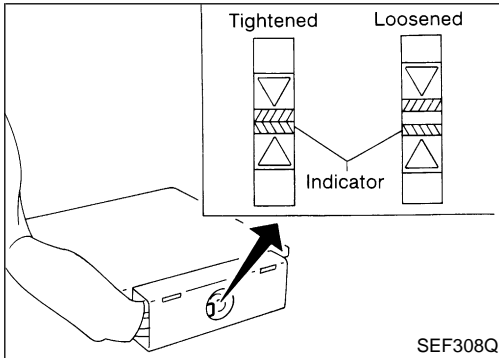
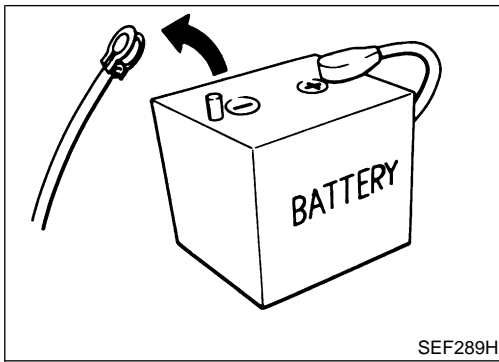


FUEL PUMP

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.



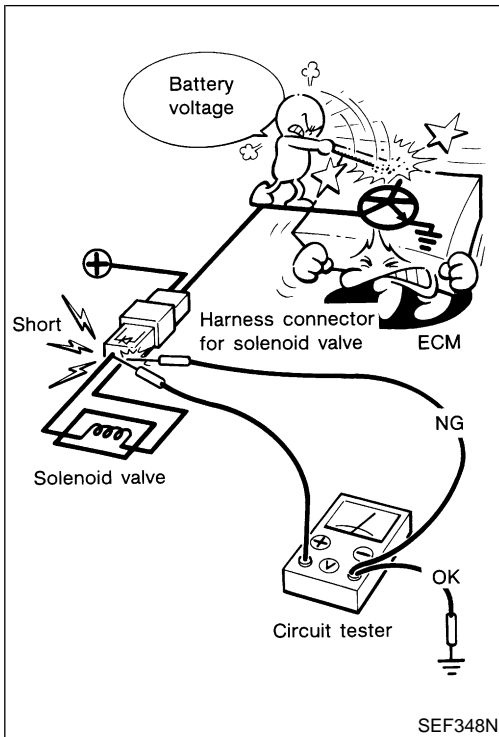
Precautions

NEEC0005

- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 ⚙️ : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
 Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.
- Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-135.
- After performing each TROUBLE DIAGNOSIS, perform "Overall Function Check" or "DTC Confirmation Procedure".
 The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.

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Precautions (Cont'd)



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

Wiring Diagrams and Trouble Diagnosis

NEEC0006

When you read Wiring diagrams, refer to the following:

- **GI-11**, "HOW TO READ WIRING DIAGRAMS".
- **EL-9**, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- **GI-34**, "How to Follow Test Groups in Trouble Diagnoses".
- **GI-23**, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

PREPARATION

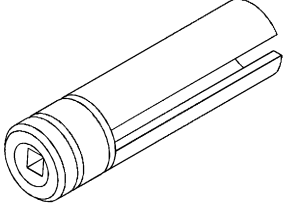
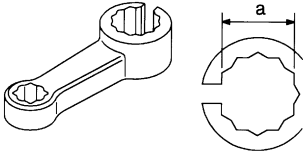
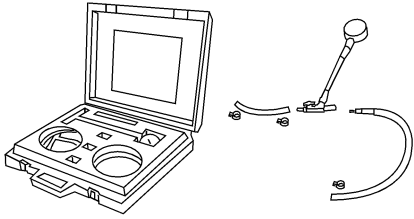
KA24DE

Special Service Tools

Special Service Tools

NEEC0007

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10117100 (J36471-A) Heated oxygen sensor wrench	 <p>Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut</p> <p>NT379</p>
KV10114400 (J-38365) Heated oxygen sensor wrench	 <p>Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)</p> <p>NT636</p>
(J-44321) Fuel pressure gauge kit	 <p>Checking fuel pressure</p> <p>LEC642</p>

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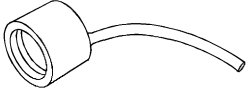
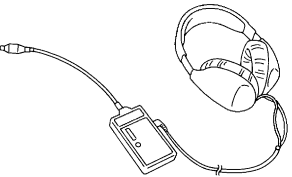
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Commercial Service Tools

NEEC0008

Tool name	Description
Fuel filler cap adapter	 <p>Checking fuel tank vacuum relief valve opening pressure</p> <p>NT653</p>
Leak detector (J41416)	 <p>Locating the EVAP leak</p> <p>NT703</p>

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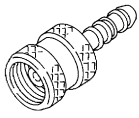
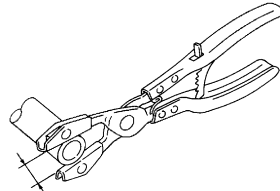
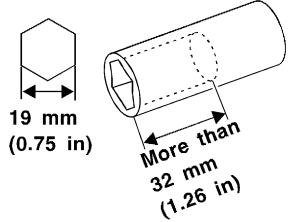
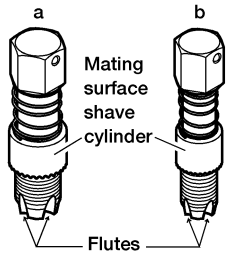
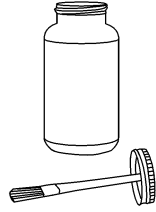
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PREPARATION

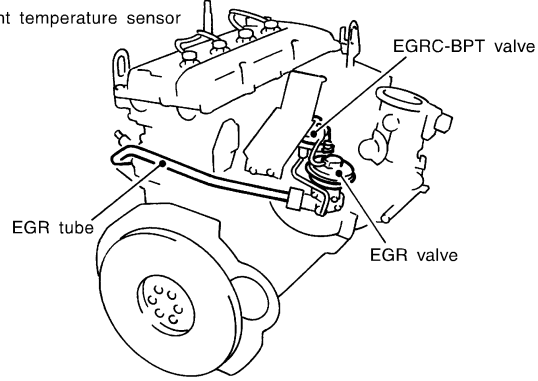
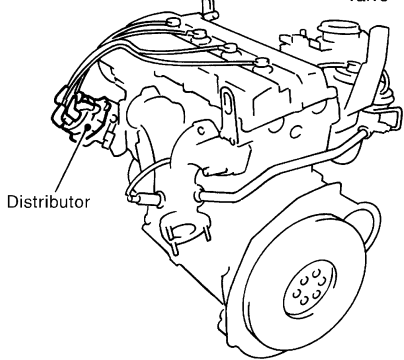
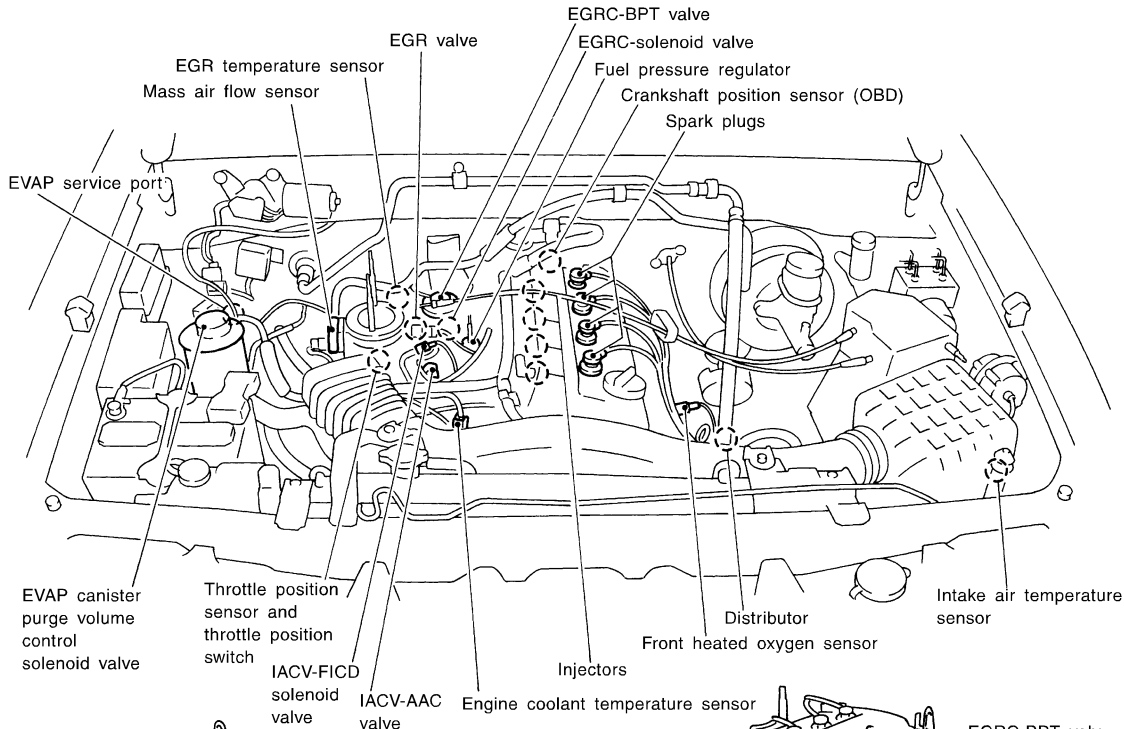
KA24DE

Commercial Service Tools (Cont'd)

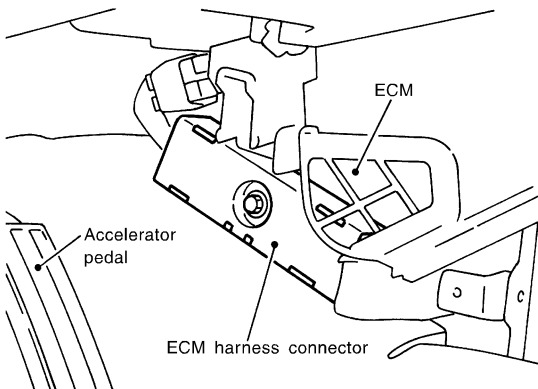
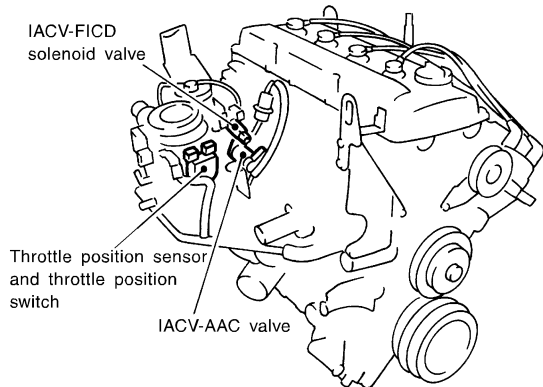
Tool name	Description
EVAP service port adapter (J41413-OBD)	Applying positive pressure through EVAP service port  NT704
Hose clipper (—)	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (Small leak — Positive pressure)]  Approx. 20 mm (0.79 in)
Socket wrench	Removing and installing engine coolant temperature sensor  NT705
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service tools". a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor  AEM488
Anti-seize lubricant (Permatex [®] 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.  AEM489

Engine Control Component Parts Location

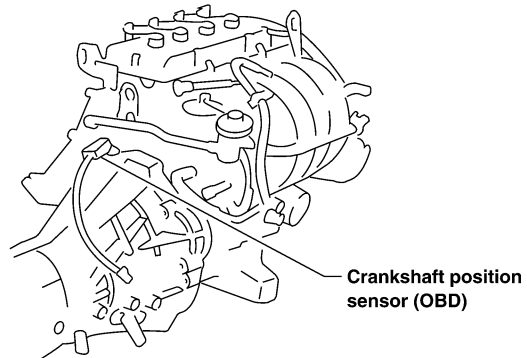
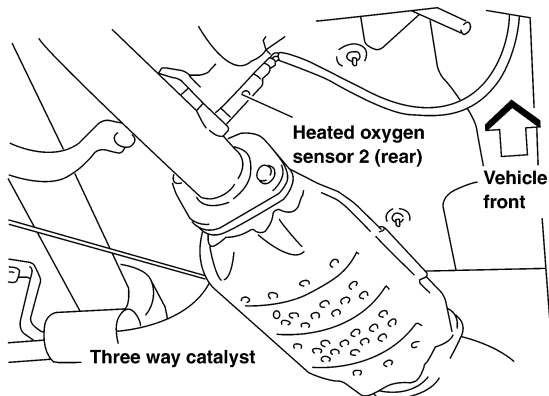
NEEC0009



Driver side



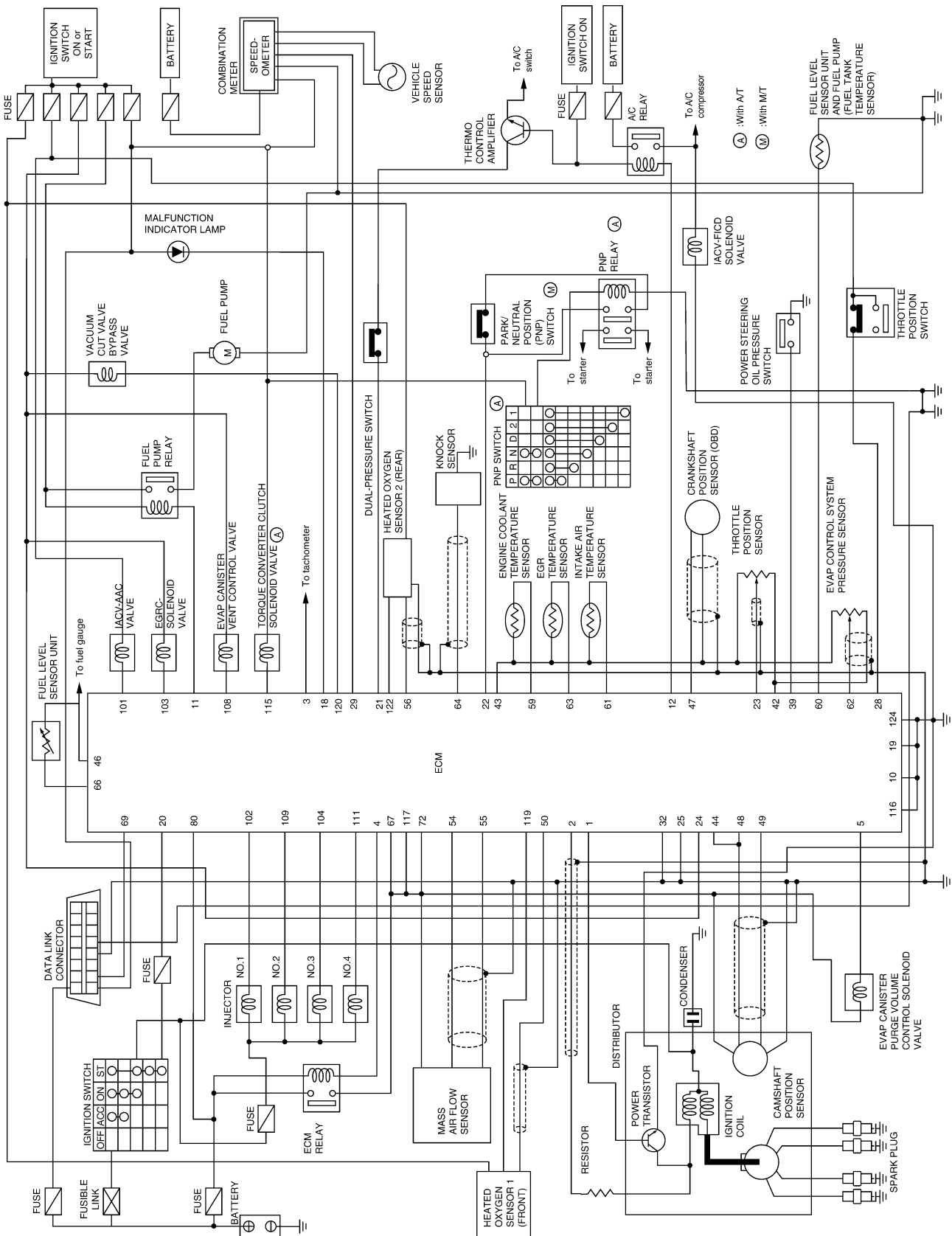
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WEC550

Circuit Diagram

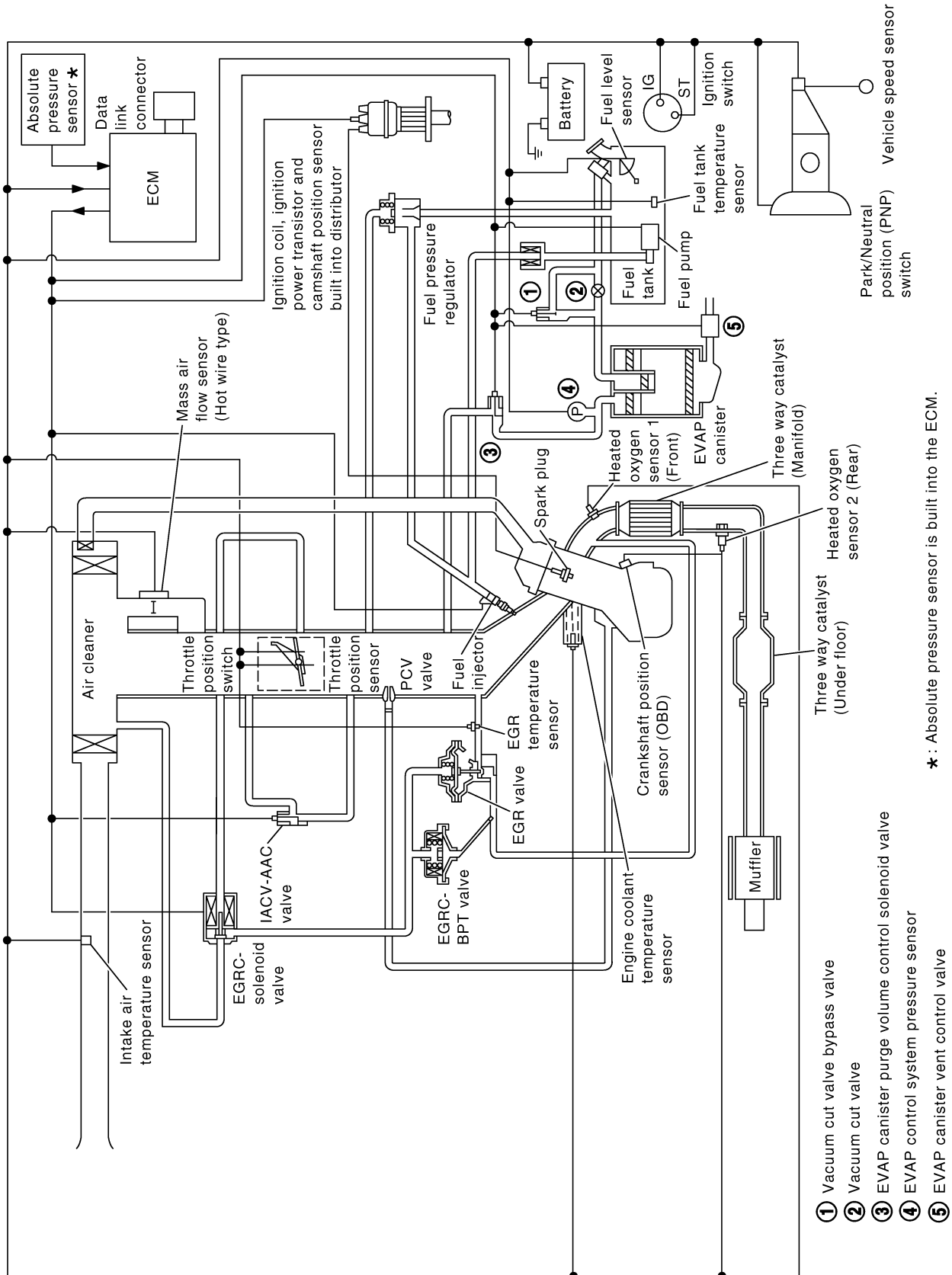
NEEC0010



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System Diagram

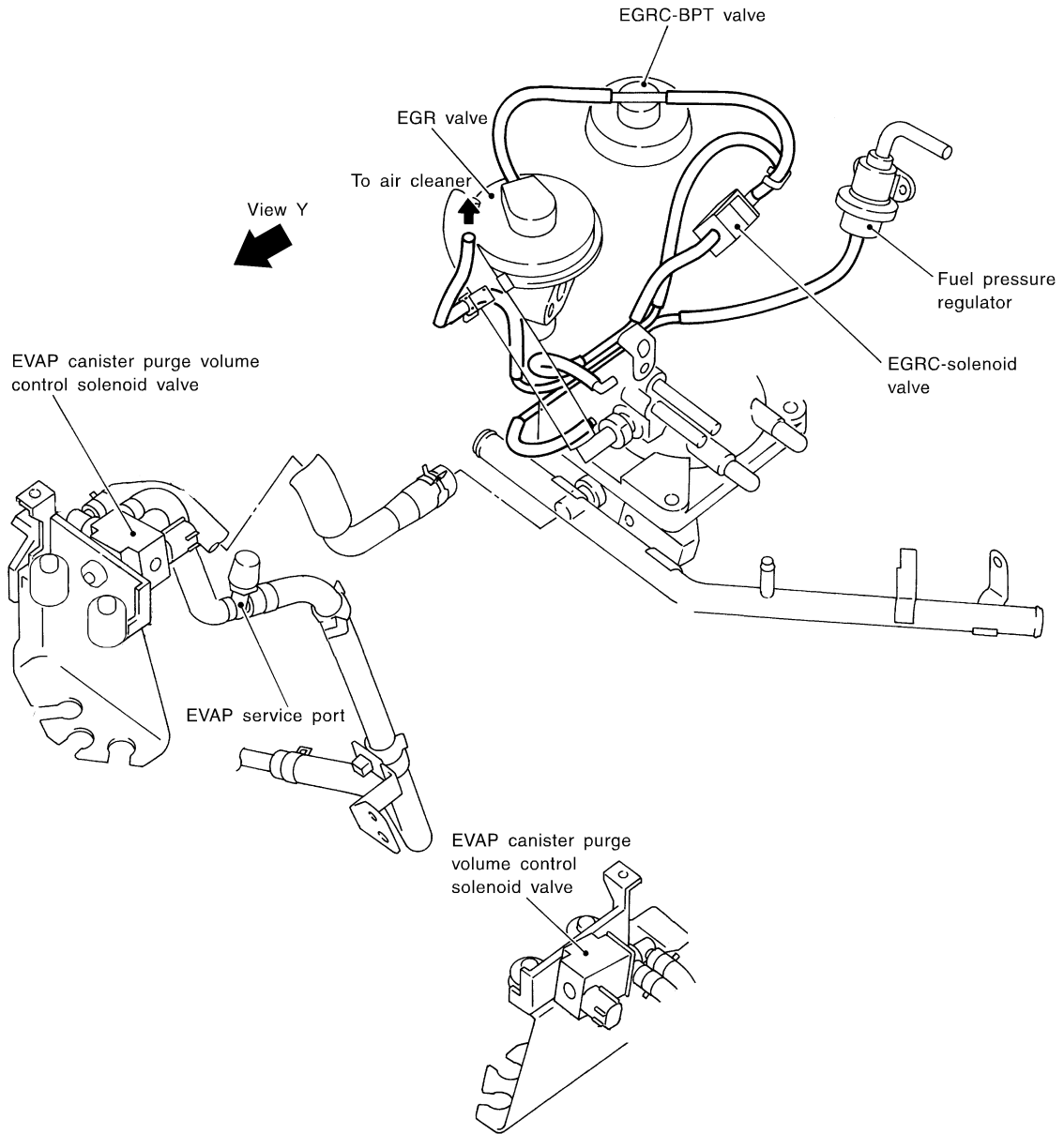
NEEC0011



Vacuum Hose Drawing

NEEC0012

Refer to "System Diagram" on EC-32 for vacuum control system.



NOTE: Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

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System Chart

NEEC0013

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 (front) ● Ignition switch ● Throttle position sensor ● PNP switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● Crankshaft position sensor (OBD) ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Heated oxygen sensor 2 (rear)*2 ● Closed throttle position switch*3 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	Heated oxygen sensor 1 (front) monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Heated oxygen sensors 1, 2 (front and rear) heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	<ul style="list-style-type: none"> ● EVAP canister purge volume control valve ● EVAP canister purge control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

*2: Under normal conditions, this sensor is not for engine control operation.

*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NEEC0014

NEEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

* Under normal conditions, this sensor is not for engine control operation.

Basic Multiport Fuel Injection System

NEEC0014S02

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the camshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NEEC0014S03

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

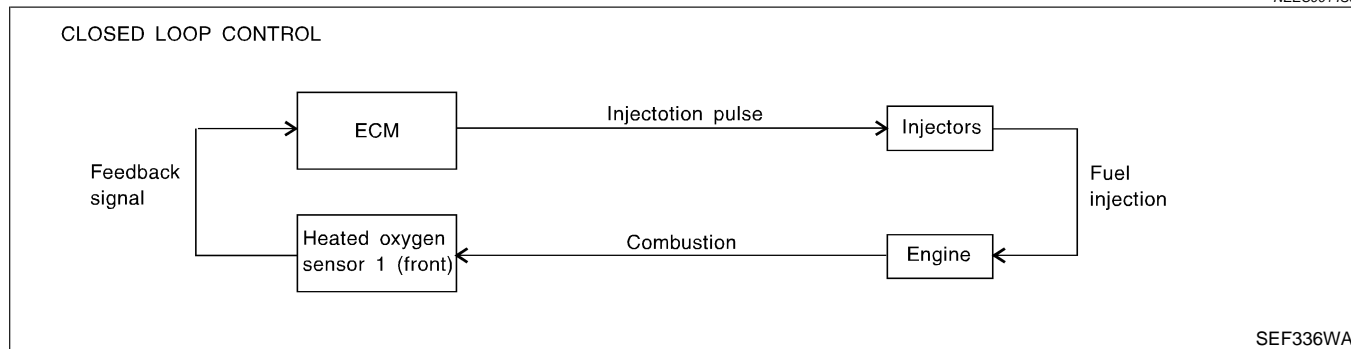
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NEEC0014S04



SEF336WA

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-198. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 (rear) is located downstream of the three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NEEC0014S05

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

Mixture Ratio Self-learning Control

NEEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

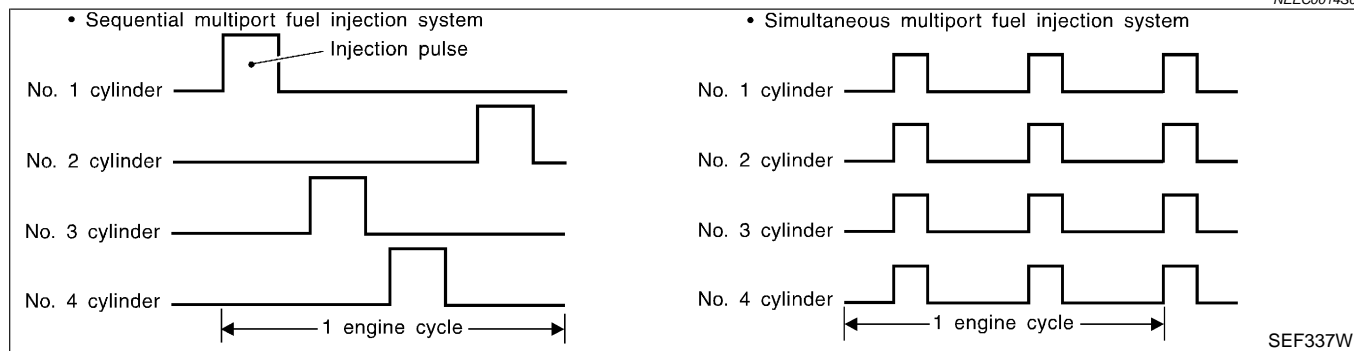
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Multiport Fuel Injection (MFI) System (Cont'd)

Fuel Injection Timing

NEEC0014S07



SEF337W

Two types of systems are used.

Sequential Multiport Fuel Injection System

NEEC0014S0701

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

NEEC0014S0702

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The four injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NEEC0014S08

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

NEEC0015

NEEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
PNP switch	Gear position		
Battery	Battery voltage		

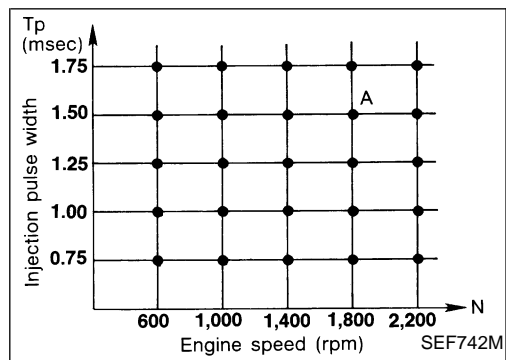
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Distributor Ignition (DI) System (Cont'd)

System Description

NEEC0015S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown above.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

e.g., N: 1,800 rpm, Tp: 1.50 msec

A°BTDC

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Air Conditioning Cut Control

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

=NEEC0016

NEEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NEEC0016S02

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- When the engine coolant temperature becomes excessively high.
- When operating power steering and air conditioner during low engine speed or when fully releasing accelerator pedal.
- When engine speed is excessively low.

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

Input/Output Signal Chart

NEEC0017

NEEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Camshaft position sensor	Engine speed		

If the engine speed is above 3,000 rpm with no load, (for example, in Neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

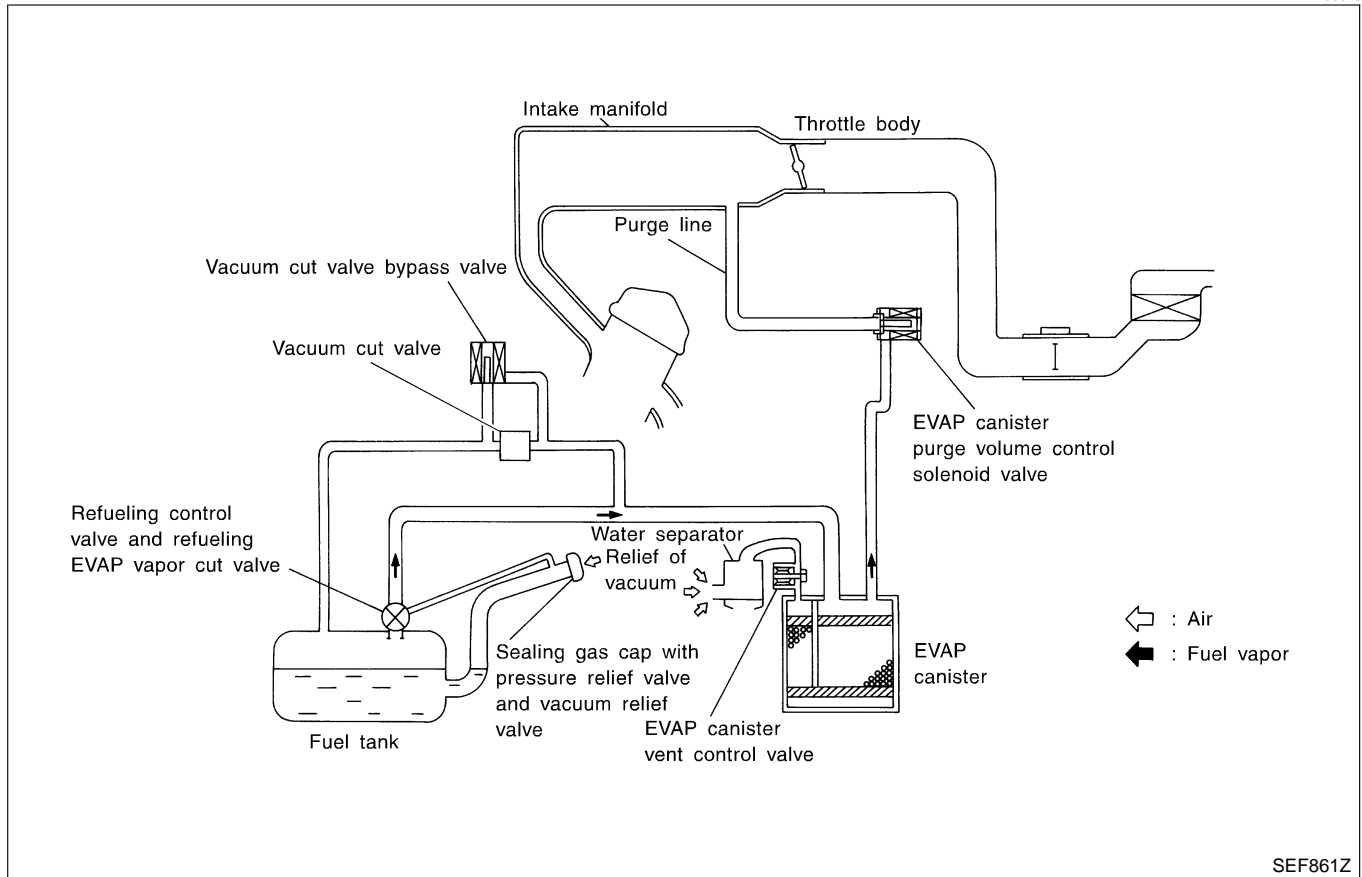
NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-35.

Evaporative Emission System

DESCRIPTION

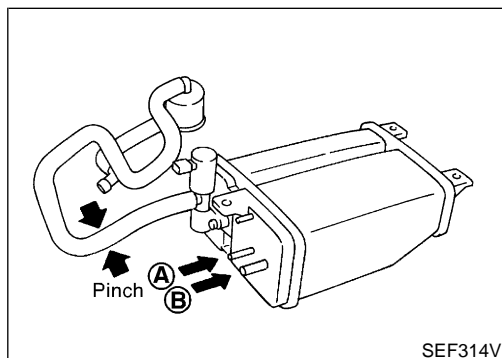
=NEEC0018



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating.

EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.



INSPECTION

EVAP Canister

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B**.

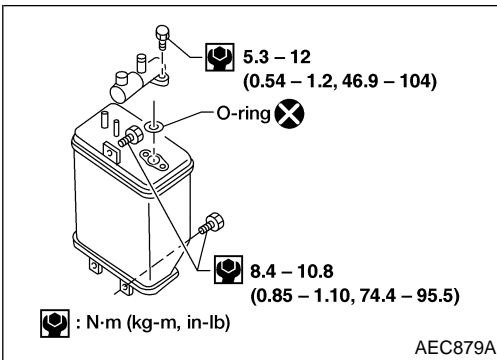
NEEC0019

NEEC0019S01

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Evaporative Emission System (Cont'd)

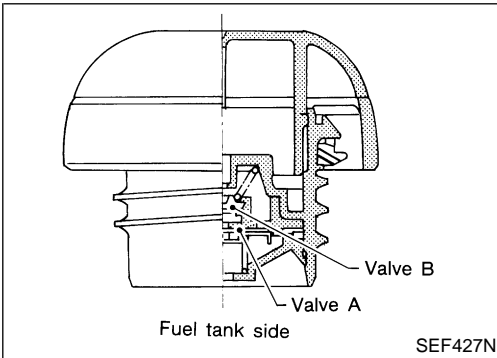


Tightening Torque

NEEC0019S02

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

NEEC0019S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)

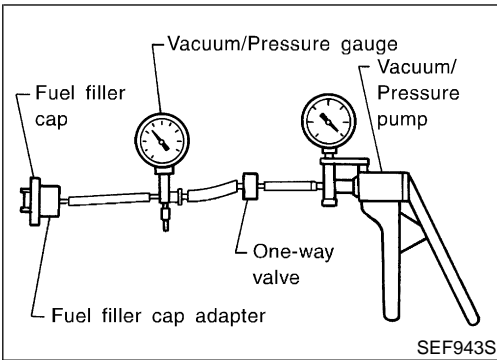
Vacuum:

-6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NEEC0019S05

Refer to EC-544.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

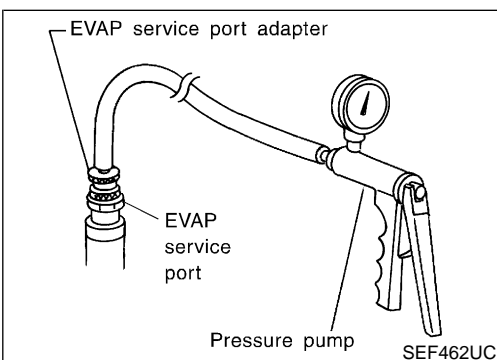
NEEC0019S06

Refer to EC-498.

Fuel Tank Temperature Sensor

NEEC0019S08

Refer to EC-300.



EVAP Service Port

NEEC0019S09

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

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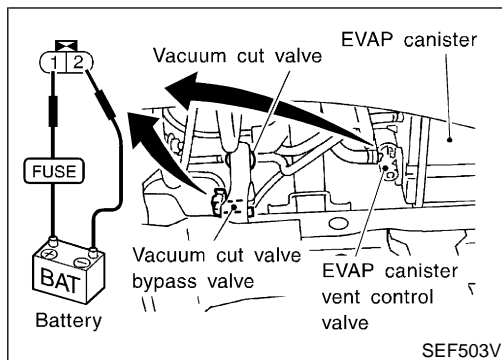
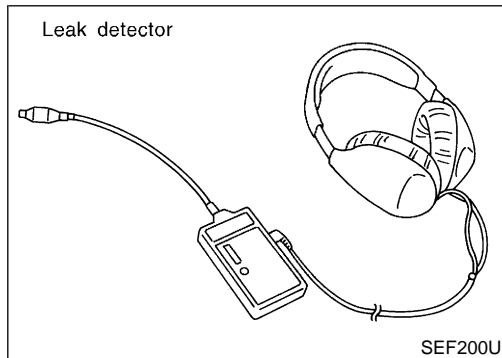
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Evaporative Emission System (Cont'd)

EVAP SYSTEM CLOSE
APPLY PRESSURE TO EVAP SYSTEM FROM SERVICE PORT USING HAND PUMP WITH PRESSURE GAUGE AT NEXT SCREEN. NEVER USE COMPRESSED AIR OR HIGH PRESSURE PUMP! DO NOT START ENGINE. TOUCH START.

PEF658U



How to Detect Fuel Vapor Leakage

NEEC0019S10

CAUTION:

- Never use compressed air or a high pressure pump.
- Do not start engine.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

Improper installation of adapter to the service port may cause a leak.

With CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose.
- 3) Turn ignition switch "ON".
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove the EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "Evaporative Emission Line Drawing", EC-43.

Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
- 2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4) Remove the EVAP service port adapter and hose with pressure pump.
- 5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

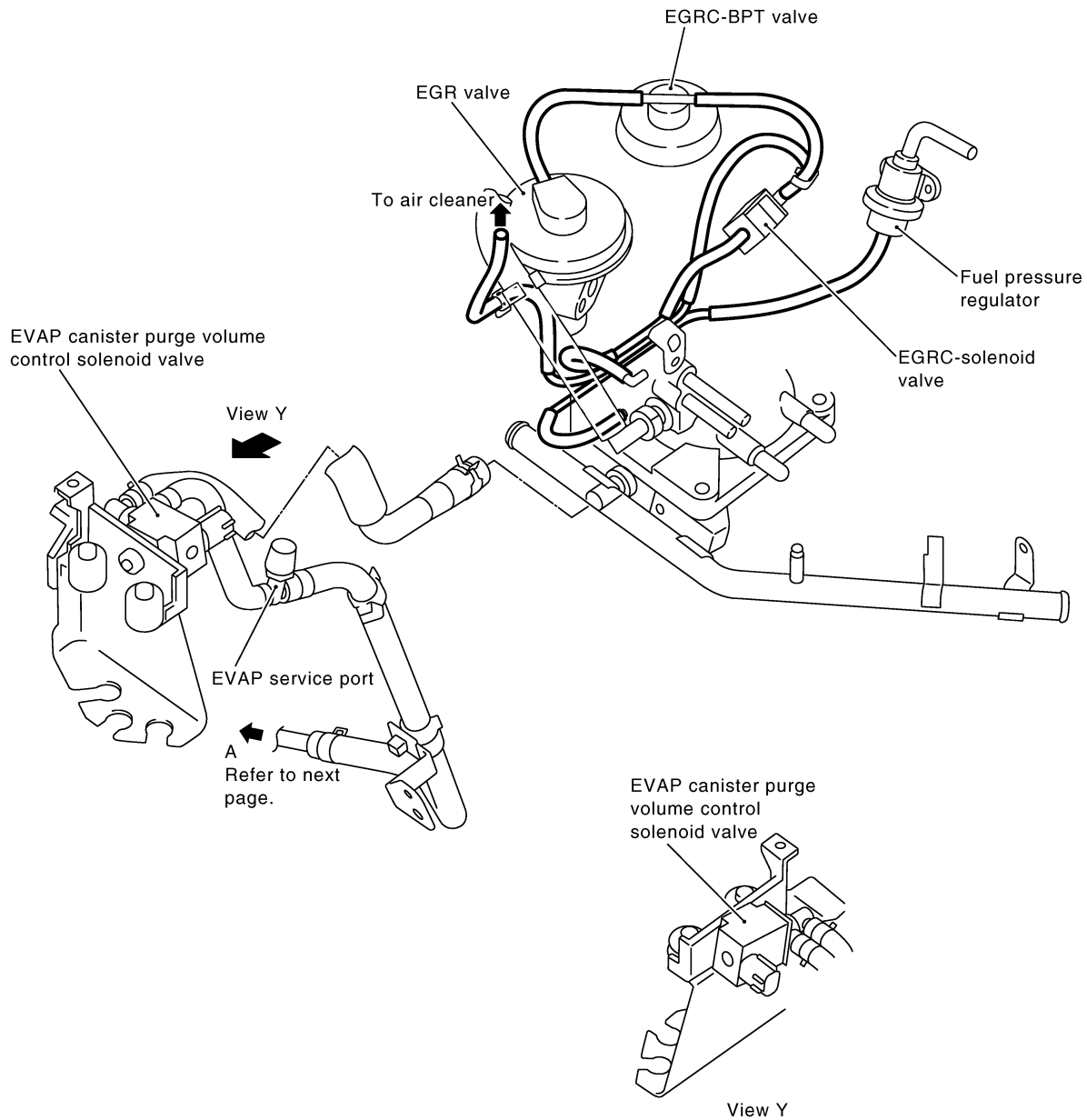
Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

-NEEC0020

NOTE:

Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.



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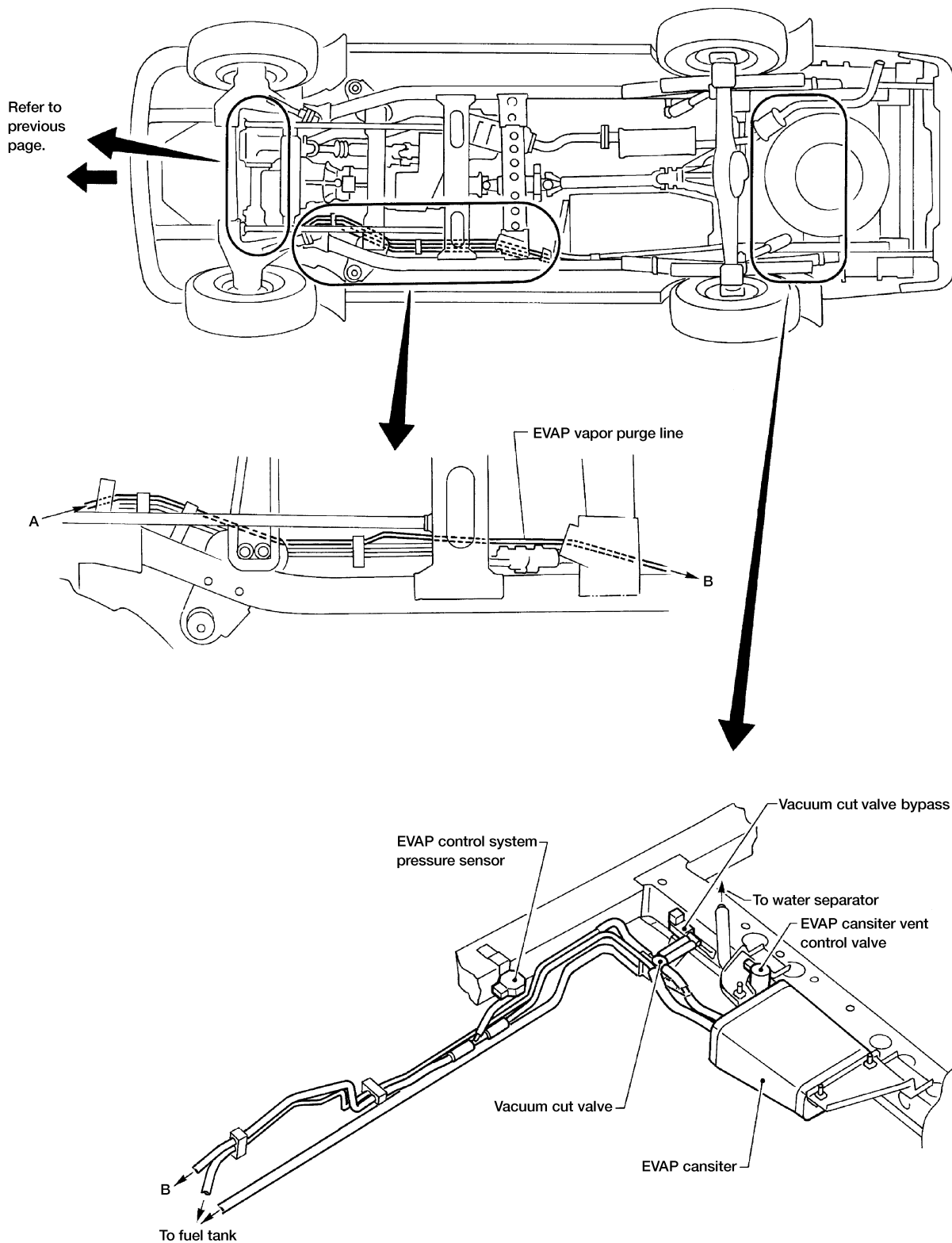
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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Evaporative Emission System (Cont'd)



WEC555

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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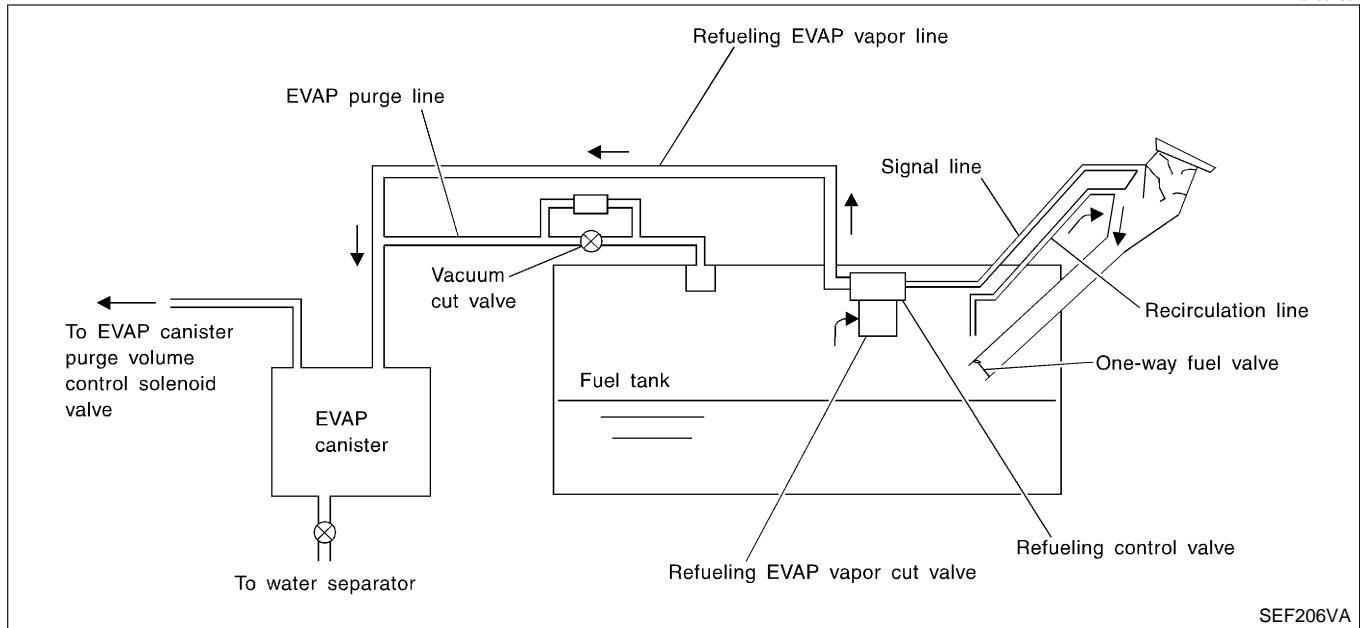
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NEEC1002

SYSTEM DESCRIPTION

NEEC1002S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: INFLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-57.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

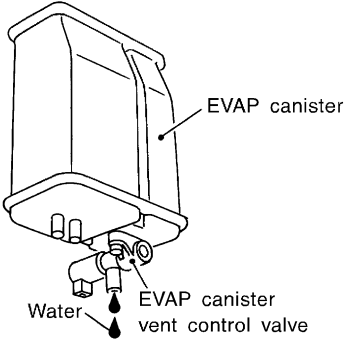
DIAGNOSTIC PROCEDURE

NEEC1002S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NEEC1002S0201

1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

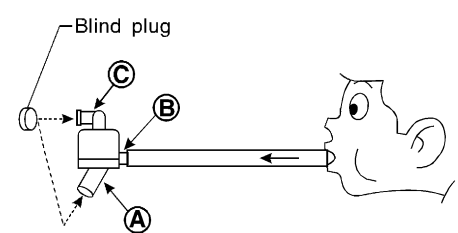
2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
	▶	GO TO 4.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 5.	
NG	▶	Replace water separator.	

5	DETECT MALFUNCTIONING PART	<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p> <p style="text-align: center;">▶</p> <p>Repair or replace EVAP hose.</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

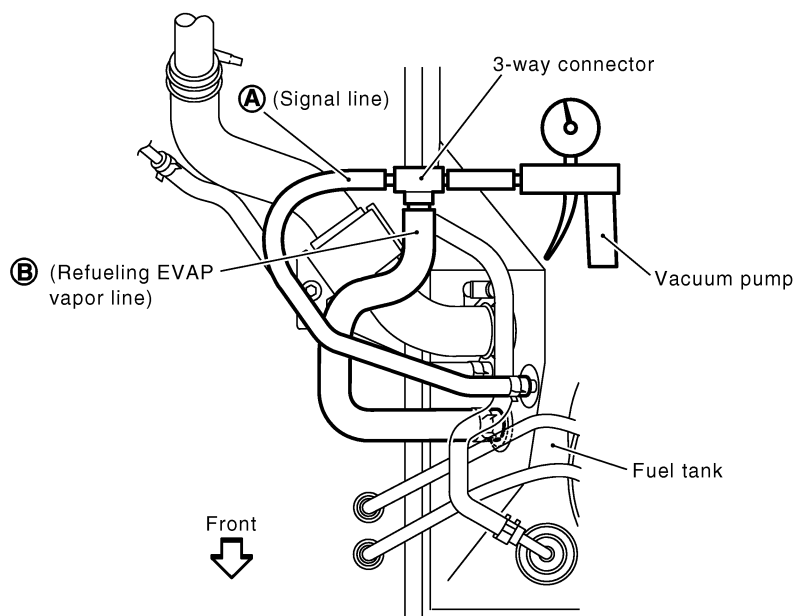
KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM."
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK



GO TO 8.

NG



Replace refueling EVAP vapor cut valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

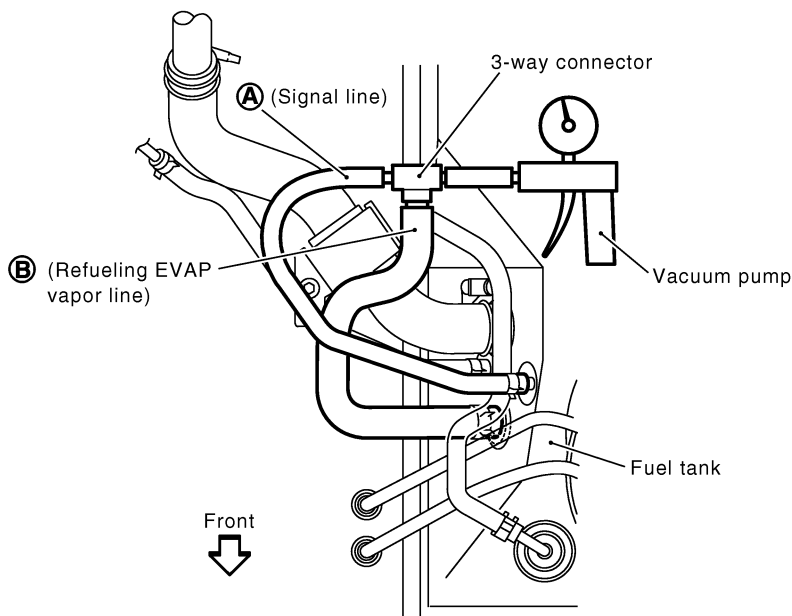
7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel gauge retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



OK or NG

SEF707Z

OK ► GO TO 8.

NG ► Replace refueling EVAP vapor cut valve with fuel tank.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. <div style="text-align: center; margin-top: 20px;"> </div> <p style="text-align: right; margin-right: 20px;">Front →</p> <p style="text-align: right; margin-right: 20px;">SEF706Z</p>
OK or NG		
OK	▶	INSPECTION END
NG	▶	Replace refueling control valve with fuel tank.

Symptom: Cannot Refuel/Fuel Odor From The Fuel Filler Opening Is Strong While Refueling.

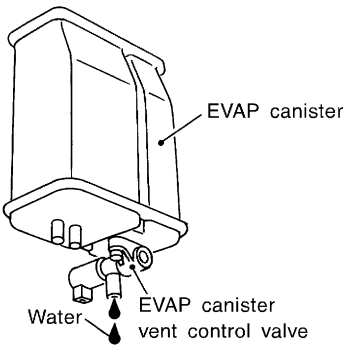
NEEC1002S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). <p style="text-align: center; margin-top: 20px;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	GO TO 3.

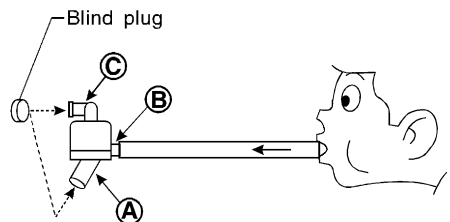
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
▶ GO TO 4.		

4	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
● Do not disassemble water separator.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.		
▶ Repair or replace EVAP hose.		

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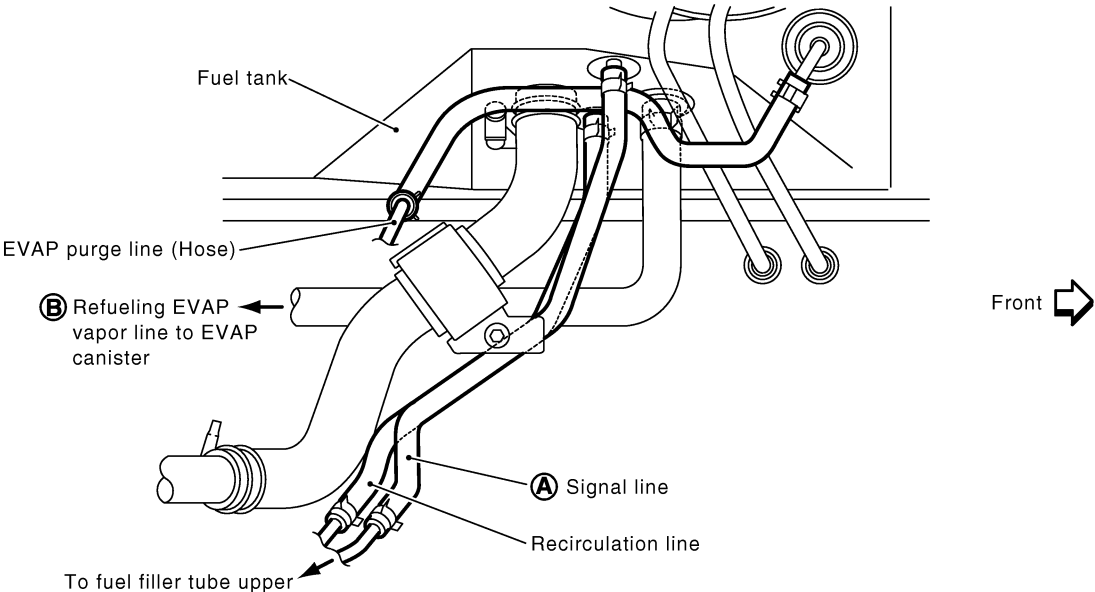
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

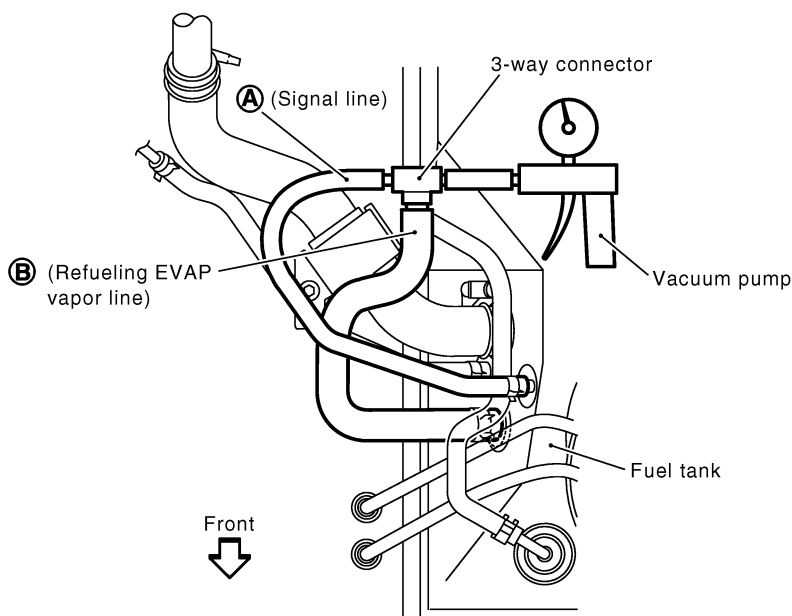
KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

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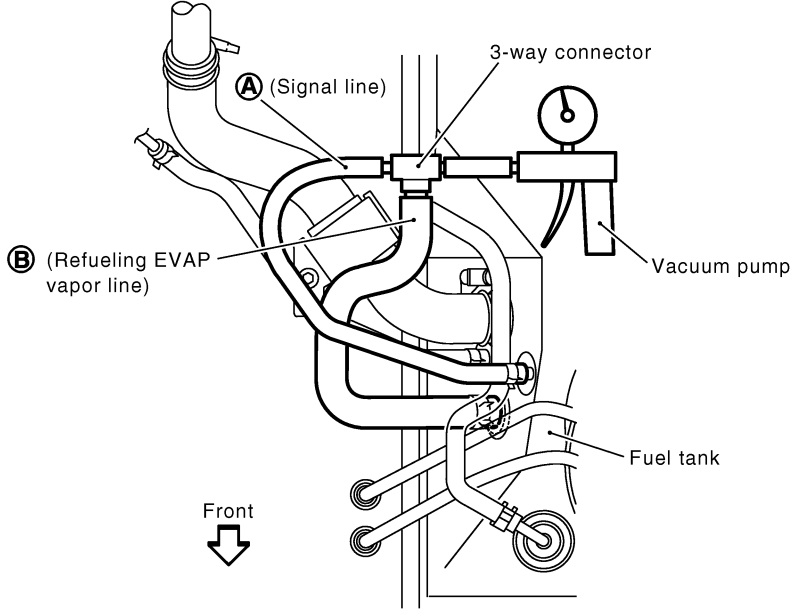
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel gauge retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel gauge retainer with fuel gauge unit. <p>Always replace O-ring with new one.</p> <ol style="list-style-type: none"> c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

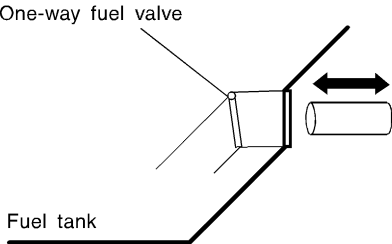
11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

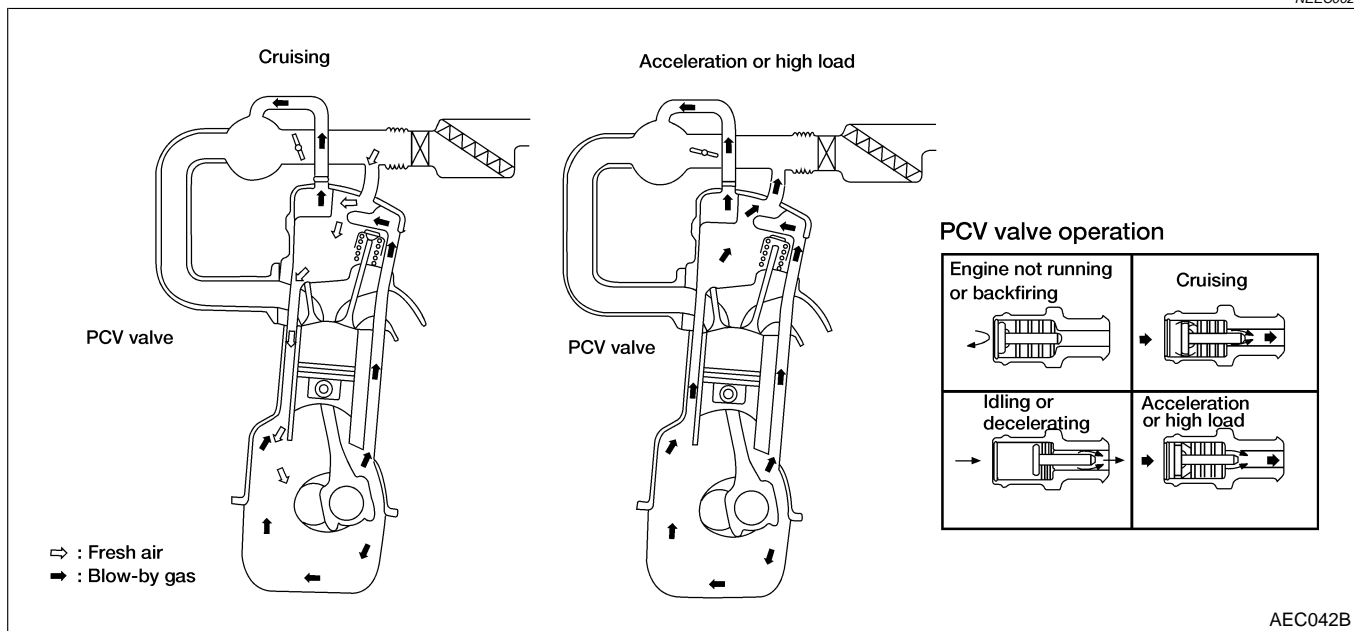
On Board Refueling Vapor Recovery (ORVR) (Cont'd)

13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Positive Crankcase Ventilation

DESCRIPTION

NEEC0022



This system returns blow-by gas to the intake collector.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

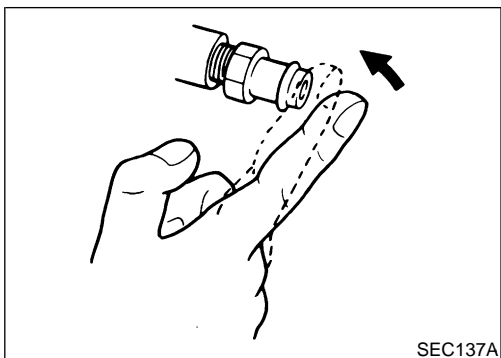
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.

Positive Crankcase Ventilation (Cont'd)



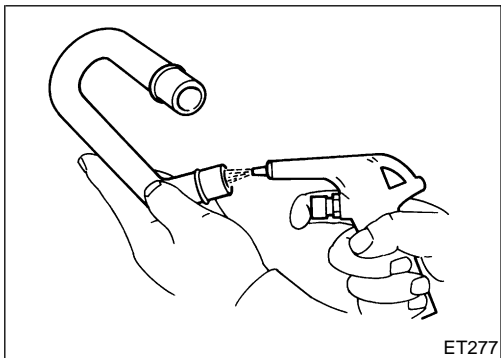
INSPECTION

PCV (Positive Crankcase Ventilation) Valve

NEEC0023

NEEC0023S01

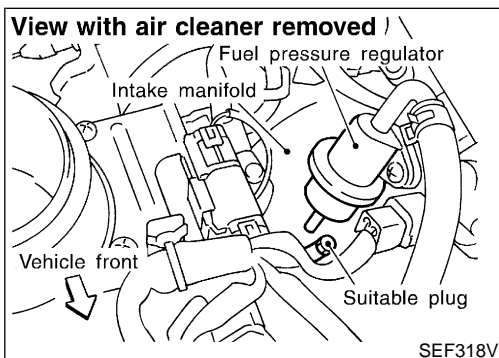
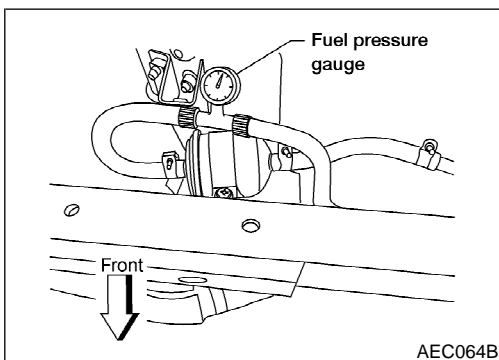
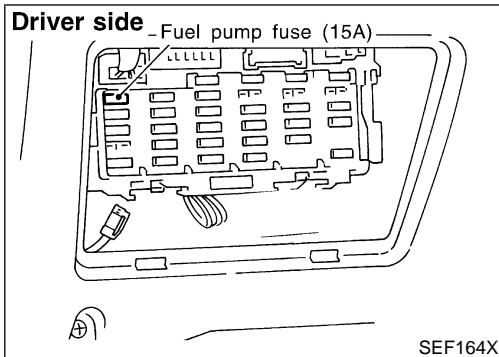
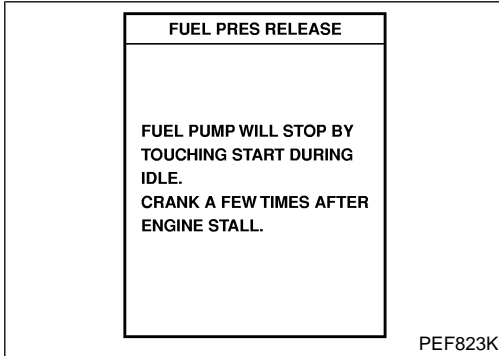
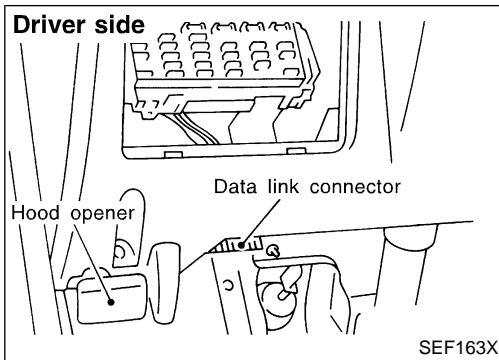
With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.



Ventilation Hose

NEEC0023S02

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



Fuel Pressure Release

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NEEC0024

Ⓜ WITH CONSULT-II

NEEC0024S01

1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.

ⓧ WITHOUT CONSULT-II

NEEC0024S02

1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF and reconnect fuel pump fuse.

Fuel Pressure Check

NEEC0025

- When reconnecting fuel line, always use new clamps.
- Make sure that clamp screw does not contact adjacent parts.
- Use a torque driver to tighten clamps.
- Use Pressure Gauge to check fuel pressure.
- Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idle speed:

With vacuum hose connected

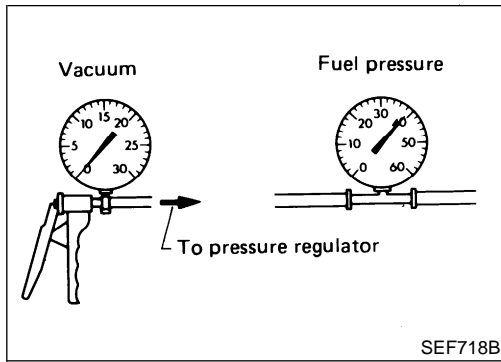
Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-58.

Fuel Pressure Regulator Check

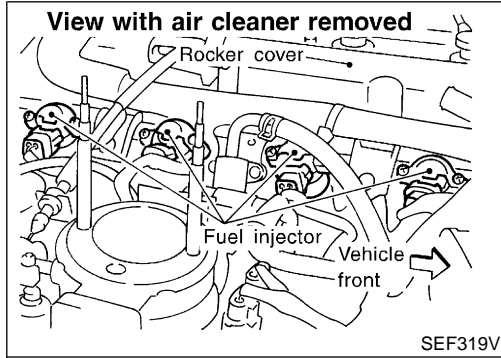


Fuel Pressure Regulator Check

NEEC0026

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



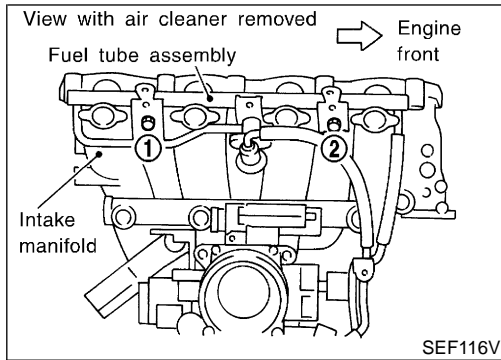
Injector

REMOVAL AND INSTALLATION

NEEC0027

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.
 - Push injector tail piece.
 - Do not pull on the connector.
4. Install injector to fuel tube assembly.
 - a. Clean exterior of injector tail piece.
 - b. Use new O-rings.

Always replace O-rings with new ones. Lubricate O-rings with a smear of engine oil.



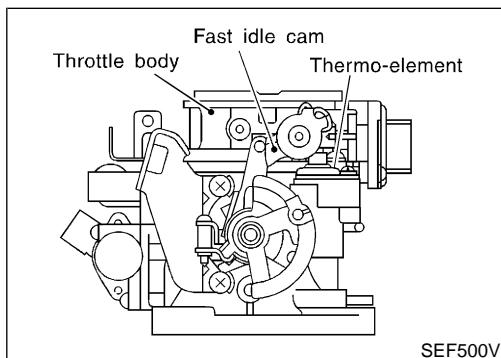
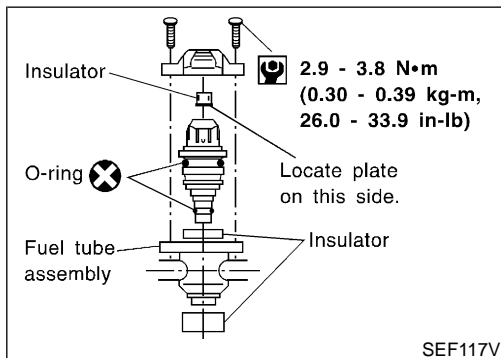
5. Install injectors with fuel tube assembly to intake manifold.

Tighten in numerical order shown in the figure.

 - a. First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
 - b. Then, tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).
6. Install fuel hoses to fuel tube assembly.
7. Reinstall any parts removed in reverse order of removal.

CAUTION:

After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.



Fast Idle Cam (FIC)

COMPONENT DESCRIPTION

NEEC0502

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is operated by engine coolant temperature.

For inspection refer to "TROUBLE DIAGNOSIS-BASIC INSPECTION", "Basic Inspection", EC-110.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NEEC0028

NEEC0028S01

PREPARATION

- **Make sure that the following parts are in good order.**
- a) **Battery**
- b) **Ignition system**
- c) **Engine oil and coolant levels**
- d) **Fuses**
- e) **ECM harness connector**
- f) **Vacuum hoses**
- g) **Air intake system**
(Oil filler cap, oil level gauge, etc.)
- h) **Fuel pressure**
- i) **Engine compression**
- j) **EGR valve operation**
- k) **Throttle valve**
- l) **EVAP system**
- **On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".**
- **On models equipped with automatic transmission, when checking idle speed, ignition timing and mixture ratio, checks should be carried out while shift lever is in "P" or "N" position.**
- **When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.**
- **Turn off headlamps, heater blower.**
- **Keep front wheels pointed straight ahead.**

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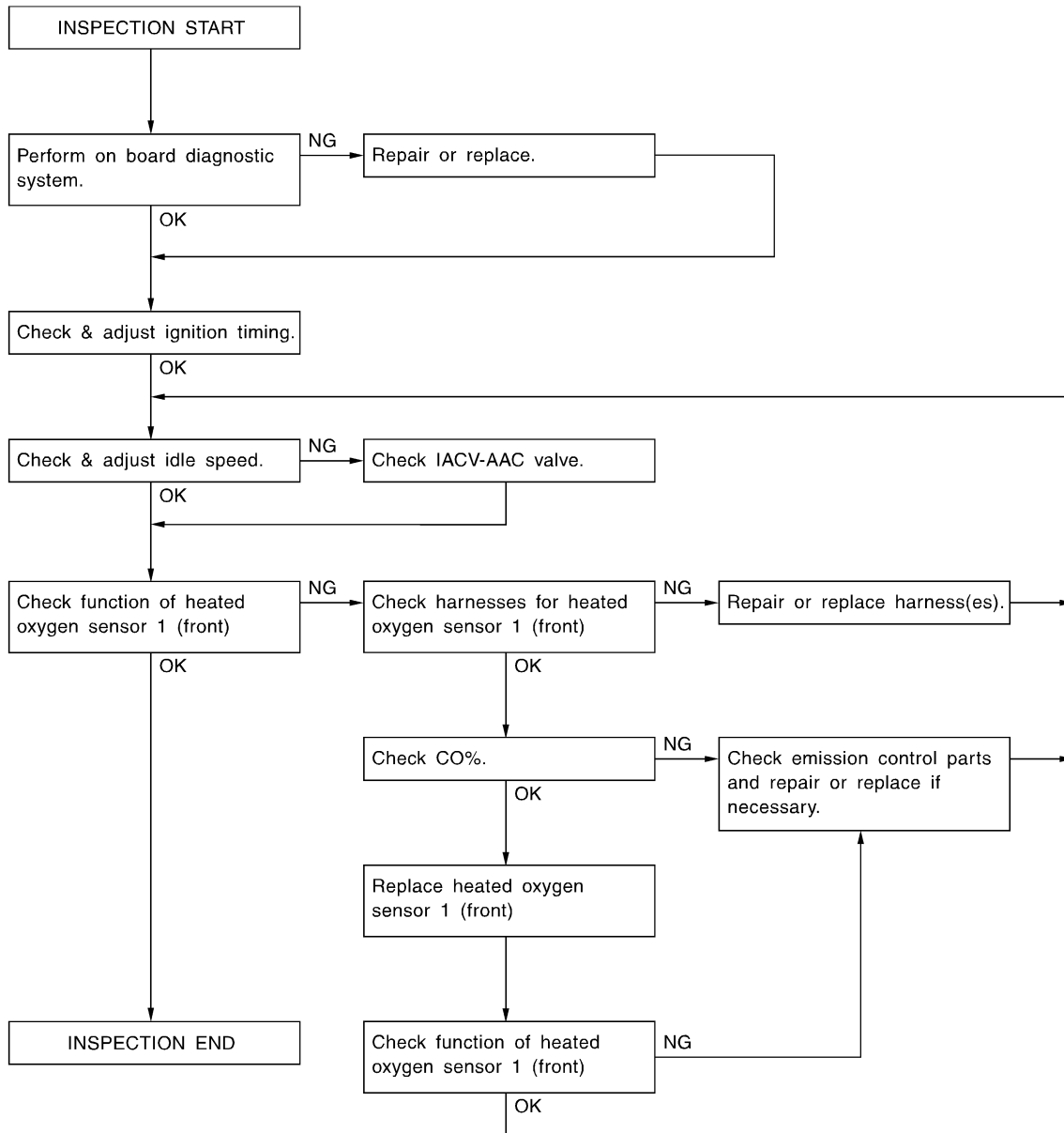
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Overall Inspection Sequence

NEEC0028S0101



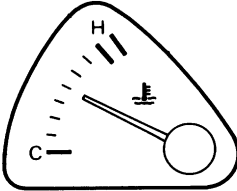
SEF554Y

NOTE:

If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

INSPECTION PROCEDURE

=NEEC0028S02

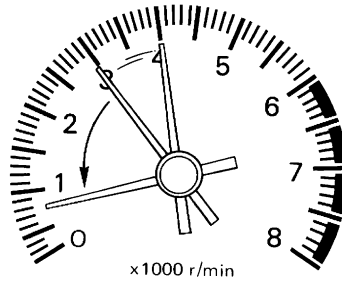
1	INSPECTION START	
	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and duct for leaks ● EGR valve operation ● Electrical connectors ● Gasket (intake manifold, cylinder head, exhaust system) ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine speed stays below 1,000 rpm.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right; margin-right: 20px;">SEF810K</p> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	<ul style="list-style-type: none"> ● GO TO 2. (With CONSULT-II) ● GO TO 3. (Without CONSULT-II)
NG	▶	<ol style="list-style-type: none"> 1. Repair or replace components as necessary. 2. GO TO 2. (With CONSULT-II) 3. GO TO 3. (Without CONSULT-II)

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2 CHECK IGNITION TIMING

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
4. Touch "START".

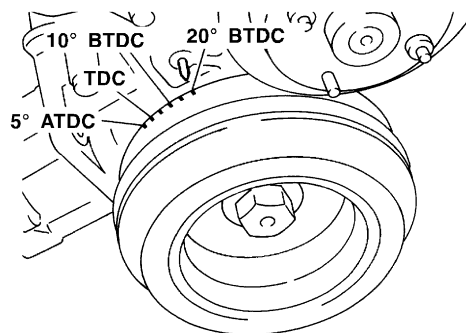
SEF978U

IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

PEF546N

5. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check ignition timing with a timing light.



SEF320V

M/T: 20°±2° BTDC
A/T: 20°±2° BTDC (in "P" or "N" position)

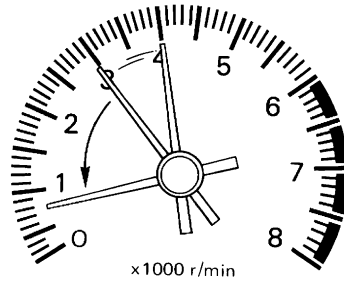
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

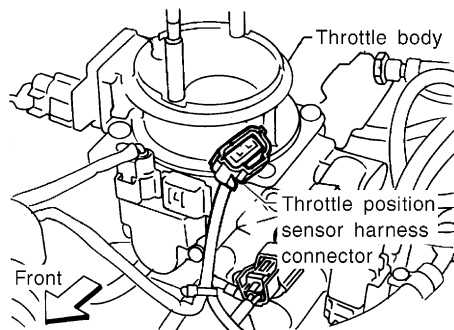
3 CHECK IGNITION TIMING

⊗ Without CONSULT-II

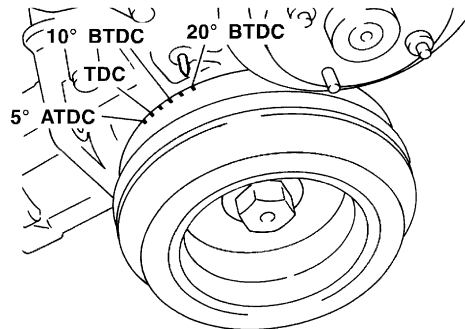
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
5. Check ignition timing with a timing light.

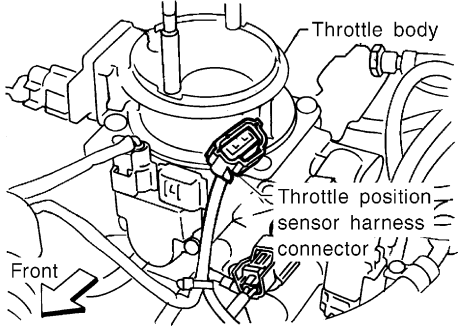


M/T: 20°±2° BTDC
A/T: 20°±2° BTDC (in "P" or "N" position)

OK or NG

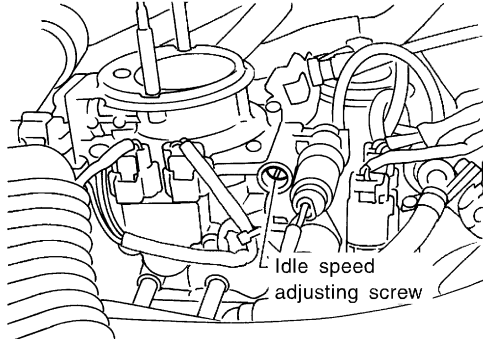
OK	▶	GO TO 5.
NG	▶	GO TO 4.

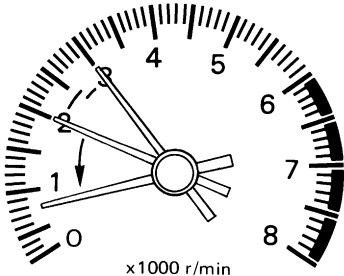
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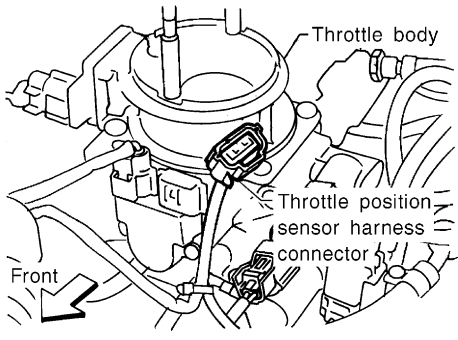
4	ADJUST IGNITION TIMING	
<p>☑ With CONSULT-II</p> <p>1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.</p>		
<p>☒ Without CONSULT-II</p> <p>1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.</p> <p>2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.</p>		
		
SEF265S		
Models with CONSULT-II ►		GO TO 2.
Models without CONSULT-II ►		GO TO 3.

5	CHECK BASE IDLE SPEED																							
<p>☑ With CONSULT-II</p> <p>1. Read idle speed in "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">IGNITION TIMING ADJ</td></tr> <tr><td colspan="2" style="text-align: center;">CONDITION SETTING</td></tr> <tr><td style="text-align: center;">IGN/T FEEDBACK</td><td style="text-align: center;">HOLD</td></tr> <tr><td colspan="2" style="text-align: center;">MONITOR</td></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td style="text-align: center;">IGN TIMING</td><td style="text-align: center;">XXX BTDC</td></tr> <tr><td style="text-align: center;">CLSD THL POS</td><td style="text-align: center;">ON</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			IGNITION TIMING ADJ		CONDITION SETTING		IGN/T FEEDBACK	HOLD	MONITOR		ENG SPEED	XXX rpm	IGN TIMING	XXX BTDC	CLSD THL POS	ON								
IGNITION TIMING ADJ																								
CONDITION SETTING																								
IGN/T FEEDBACK	HOLD																							
MONITOR																								
ENG SPEED	XXX rpm																							
IGN TIMING	XXX BTDC																							
CLSD THL POS	ON																							
SEF713Z																								
<p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p>																								
<p>☒ Without CONSULT-II</p> <p>1. Check idle speed.</p> <p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>																								
OK (With CONSULT-II) ►		GO TO 7.																						
OK (Without CONSULT-II) ►		GO TO 8.																						
NG ►		GO TO 6.																						

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6	ADJUST BASE IDLE SPEED
1. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw.	
 <p style="text-align: center;">Idle speed adjusting screw</p>	
<p style="color: blue;">M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p>	
SEF240SA	
Models with CONSULT-II ► GO TO 7. Models without CONSULT-II ► GO TO 8.	

7	CHECK TARGET IDLE SPEED						
With CONSULT-II 1. Touch "BACK" on CONSULT-II. 2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.							
							
SEF602K							
3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.							
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <td>MONITOR</td> <td>NO DTC</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						
SEF058Y							
OK or NG							
OK ► GO TO 10. NG ► GO TO 9.							

8	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>1. Turn off engine and connect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF265S</p> <p>2. Start engine. 3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed. 4. Check target idle speed. M/T: 800±50 rpm A/T: 800±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ GO TO 9.

9	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <p>1. Check IACV-AAC valve and replace if necessary. Refer to EC-434. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-434. 3. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)</p>	
▶	GO TO 10.

BASIC SERVICE PROCEDURE

KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL								
<p>☑ With CONSULT-II</p> <ol style="list-style-type: none"> 1. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 2. Run engine at about 2,000 rpm for about 2 minutes under no-load. 3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature) and check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds. <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="padding: 2px;">DATA MONITOR</th> </tr> <tr> <th style="padding: 2px;">MONITOR</th> <th style="padding: 2px;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">ENG SPEED</td> <td style="padding: 2px;">XXX rpm</td> </tr> <tr> <td style="padding: 2px;">HO2S1 MNTR (B1)</td> <td style="padding: 2px;">RICH</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF820Y</p> <p>1 cycle: RICH → LEAN → RICH 2 cycles: RICH → LEAN → RICH → LEAN → RICH</p>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	RICH
DATA MONITOR									
MONITOR	NO DTC								
ENG SPEED	XXX rpm								
HO2S1 MNTR (B1)	RICH								
<p>☒ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 50 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> <p style="text-align: center;">OK or NG</p>									
OK	▶ INSPECTION END								
NG	▶ GO TO 11.								

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11	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HARNESS
<p>1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) harness connector. 4. Then connect harness connector terminal for heated oxygen sensor 1 (front) to ground with a jumper wire.</p> <p style="text-align: center;">Heated oxygen sensor 1 (front) harness connector</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF508VA</p> <p>5. Check for continuity between terminal 50 of ECM harness connector and body ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF250P</p> <p>Continuity exists...OK Continuity does not exist...NG</p> <p style="text-align: center;">OK or NG</p>	
OK	<p>▶ 1. Connect ECM harness connector to ECM. 2. Connect battery ground cable. 3. GO TO 13.</p>
NG	<p>▶ 1. Repair or replace harness. 2. GO TO 12.</p>

12 PREPARATION FOR IDLE SPEED ADJUSTING
Ⓜ With CONSULT-II

1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".

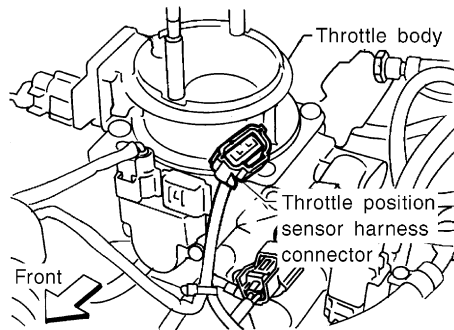
IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

PEF546N

ⓧ Without CONSULT-II

1. Stop engine and disconnect throttle position sensor harness connector.



SEF265S

2. Start engine.

► GO TO 6.

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13 PREPARATION FOR "CO" % CHECK

With CONSULT-II

1. Select "ENGINE COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DOWN".

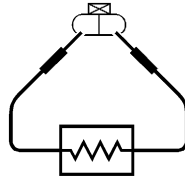
ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

1. Connect ECM harness connector to ECM.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



Engine coolant temperature sensor harness connector



4.4 kΩ resistor

SEF053RA

4. Connect battery ground cable.



GO TO 14.

BASIC SERVICE PROCEDURE

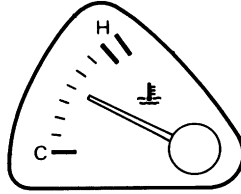
KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

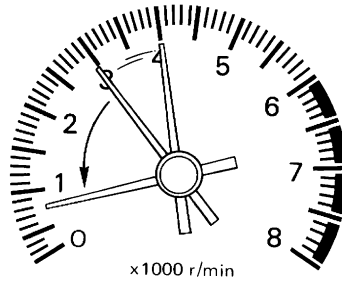
14 CHECK "CO" %

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to middle of gauge.
(Be sure to start engine after setting "COOLANT TEMP" or installing a 4.4 kΩ resistor.)



2. Rev engine two or three times under no-load, then run engine at idle speed.



3. Check "CO"%.

Idle CO: 2.9 - 10.8% and engine runs smoothly.

With CONSULT-II

After checking CO%, touch "BACK".

Without CONSULT-II

After checking CO%,

- a. Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
- b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK ► GO TO 15.

NG ► GO TO 16.

SEF810K

SEF978U

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BASIC SERVICE PROCEDURE

KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

15	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Replace heated oxygen sensor 1 (front). 2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.). Check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds. 1 cycle: RICH → LEAN → RICH 2 cycles: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 50 and ground. 6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 12.
NG		▶ GO TO 16.

16	DETECT MALFUNCTIONING PART	
<ol style="list-style-type: none"> 1. Connect heated oxygen sensor 1 (front) harness connector to heated oxygen sensor 1 (front). 2. Check fuel pressure regulator. Refer to EC-58. 3. Check mass air flow sensor and its circuit. Refer to EC-156. 4. Check injector and its circuit. Refer to EC-588. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-174, 193. 6. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 12.

- **If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.**

Introduction

NEEC0029

The ECM has an on board diagnostic system which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

The above information can be checked using procedures listed in the table below.

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
ECM*3	X	X*1	—	—	—	—
CONSULT-II	X	X	X	X	X	—
GST	X	X*2	X	—	X	X

*1: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

*2: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

*3: In diagnostic test mode II (Self-diagnostic results)

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-125.)

Two Trip Detection Logic

NEEC0030

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-125.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except "ECM"

Emission-related Diagnostic Information

NEEC0031

DTC AND 1ST TRIP DTC

NEEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory. Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-85.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-83. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to page EC-108. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to read DTC and 1st Trip DTC

NEEC0031S0101

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0".

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	MAF SEN/CIRCUIT [P0100]	0		MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NEEC0031S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure sensor at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-96.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Refer to EC-85.

SYSTEM READINESS TEST (SRT) CODE

NEEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that the status of srt be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “incomplete”, use the information in this service manual to set the SRT to “complete”.

In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate “complete” for each application system. Once set as “complete”, the SRT status remains “complete” until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer’s normal driving pattern and the SRT will indicate “incomplete” for these items.

NOTE:

The SRT will also indicate “incomplete” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates “complete” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “incomplete” for one or more of the SRT items, the vehicle is returned to the customer untested.

NOTE:

If MIL is “ON” during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “complete” for all test items. Therefore, it is important to check SRT (“complete”) and DTC (No DTCs) before the inspection.

This service manual contains the service procedure and support information to perform a comprehensive road test that enables the ECM to complete the SRT.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

SRT Item

NEEC0031S0308

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“complete”	“complete”	“complete”	“complete”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“incomplete”	“incomplete”	“complete”	“complete”
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=MIL “ON”)
		SRT of EGR	“incomplete”	“incomplete”	“incomplete”	“complete”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is OK.

– : Self-diagnosis is not carried out.

SRT Set Timing

NEEC0031S0310

SRT is set as “complete” after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table. When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “complete”.

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “complete” at the time the respective self-diagnoses have at least one OK result.

→ Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “complete”.

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as “incomplete” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

- The SRT will indicate “complete” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “complete” of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “complete” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “incomplete”.

NOTE:

SRT can be set as “complete” together with the DTC(s). Therefore, DTC check must always be carried out prior to the State emission inspection even though the SRT indicates “complete”.

How to Display SRT Code

NEEC0031S0301

1. **With CONSULT-II**
Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

2. **With GST**

Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.

"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT
EGR SYSTEM	INCMP

SEF713Y

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

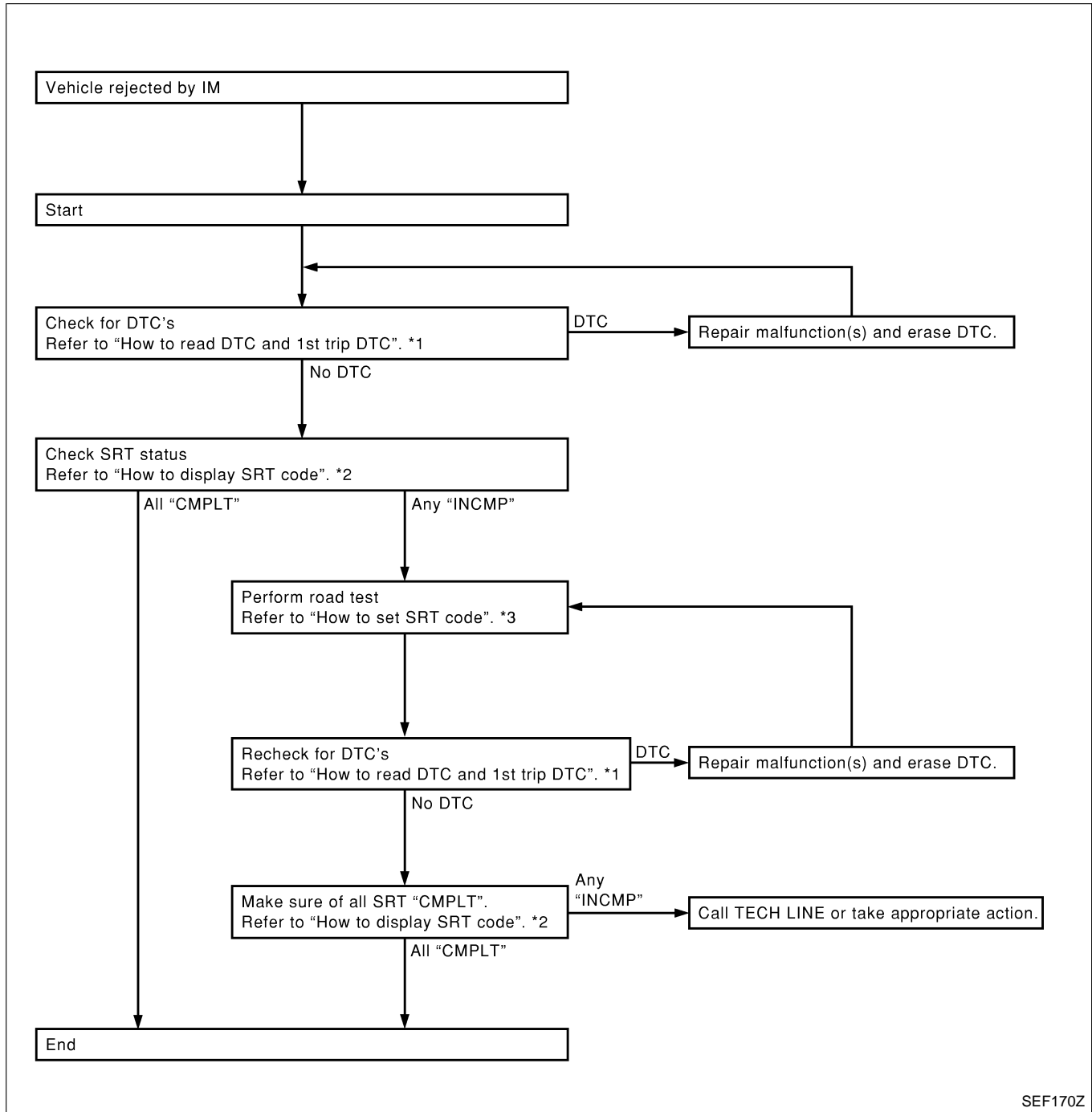
EL

IDX

SRT Service Procedure

=NEEC0031S0311

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating "incomplete", review the following flowchart diagnostic sequence.



SEF170Z

*1 EC-74

*2 EC-76

*3 EC-79

How to Set SRT Code

-NEEC0031S0302

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-76.

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on EC-80. The driving pattern should be performed one or more times to set all SRT codes.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

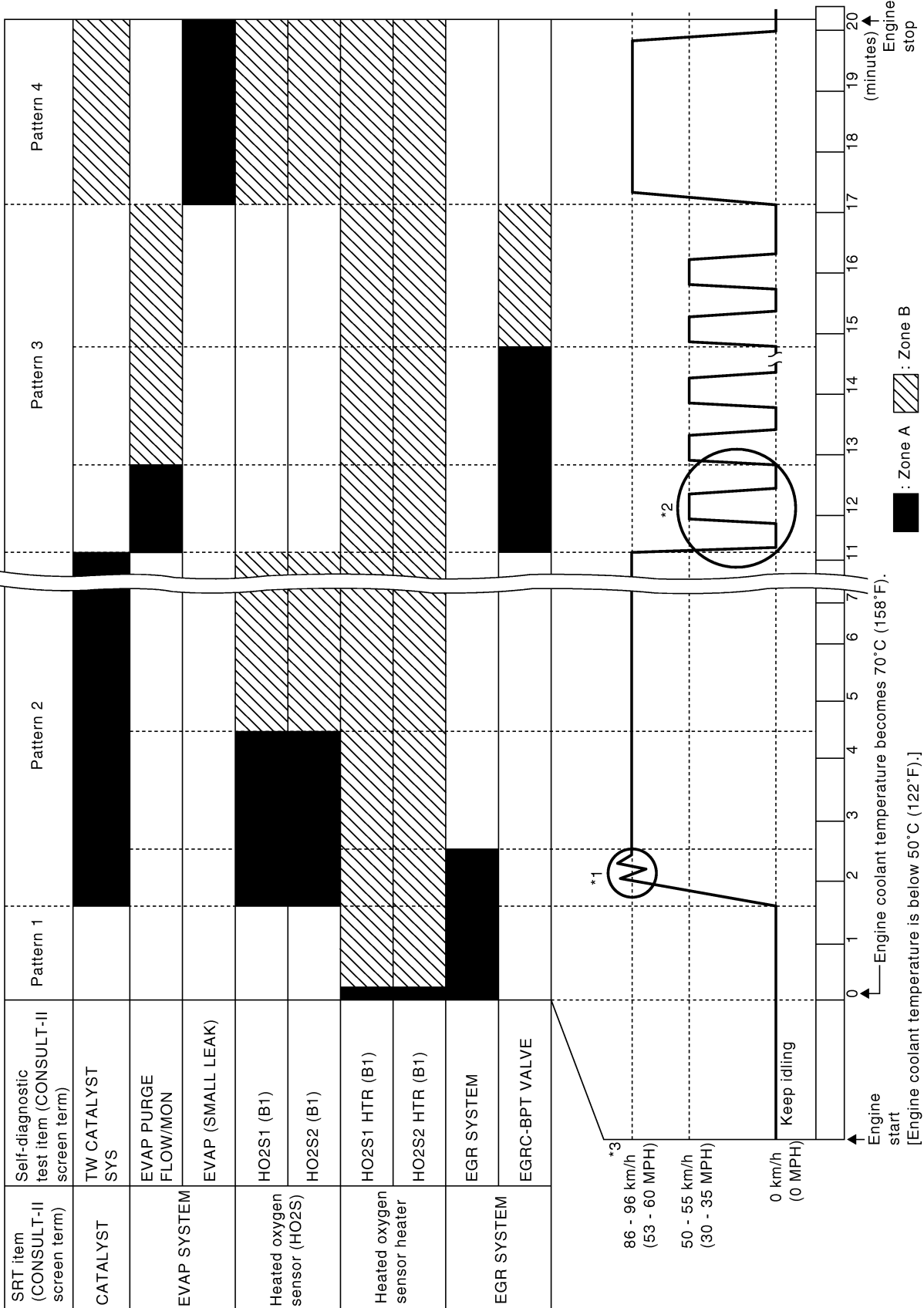
IDX

Driving Pattern

NEEC0031S0303

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.

Driving pattern



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest.
Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 59 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

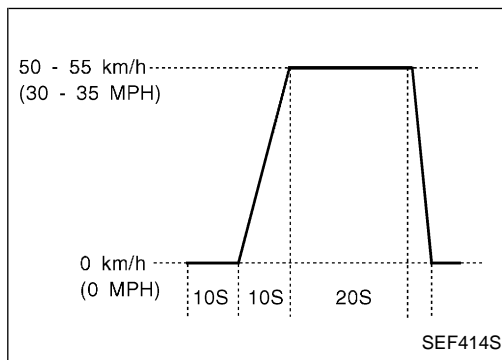
Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

- 1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
- 2) Repeat driving pattern shown below at least 10 times.
- **During acceleration, hold the accelerator pedal as steady as possible.**
- 3) Repeat steps 1 and 2 until the EGR system SRT is set.



*3: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the "D" position with the overdrive switch turned ON.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate. Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

NEEC0031S04

The following is the information specified in Mode 6 of SAE J1979. The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 heater (front)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 2 heater (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
1CH		06H	Max.	X	
O2 SENSOR HEATER	Heated oxygen sensor 1 heater (front)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 2 heater (rear)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NEEC0031S05

Items (CONSULT-II screen terms)	DTC*3	SRT code	Test value/Test limit (GST only)	1st trip DTC*3	Reference page
	CONSULT-II GST*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	P0000	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-156
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-166
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-168
COOLANT T SEN/CIRC	P0115	—	—	X	EC-174
THRTL POS SEN/CIRC	P0120	—	—	X	EC-179
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-193
HO2S1 (B1)	P0130	X	X	X*2	EC-198
HO2S1 (B1)	P0131	X	X	X*2	EC-206
HO2S1 (B1)	P0132	X	X	X*2	EC-213
HO2S1 (B1)	P0133	X	X	X*2	EC-220
HO2S1 (B1)	P0134	X	X	X*2	EC-231

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*3	SRT code	Test value/Test limit (GST only)	1st trip DTC*3	Reference page
	CONSULT-II GST*1				
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-238
HO2S2 (B1)	P0137	X	X	X*2	EC-243
HO2S2 (B1)	P0138	X	X	X*2	EC-253
HO2S2 (B1)	P0139	X	X	X*2	EC-263
HO2S2 (B1)	P0140	X	X	X*2	EC-273
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-281
FUEL SYS LEAN/BK1	P0171	—	—	X	EC-286
FUEL SYS RICH/BK1	P0172	—	—	X	EC-293
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-300
MULTI CYL MISFIRE	P0300	—	—	X	EC-306
CYL 1 MISFIRE	P0301	—	—	X	EC-306
CYL 2 MISFIRE	P0302	—	—	X	EC-306
CYL 3 MISFIRE	P0303	—	—	X	EC-306
CYL 4 MISFIRE	P0304	—	—	X	EC-306
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-315
CKP SEN/CIRCUIT	P0335	—	—	X	EC-319
CMP SEN/CIRCUIT	P0340	—	—	X	EC-325
EGR SYSTEM	P0400	X	X	X*2	EC-333
EGRC-BPT VALVE	P0402	X	X	X*2	EC-345
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-353
EVAP SMALL LEAK	P0440	X	X	X*2	EC-358
PURG VOLUME CONT/V	P0443	—	—	X	EC-375
VENT CONTROL VALVE	P0446	—	—	X	EC-383
EVAP SYS PRES SEN	P0450	—	—	X	EC-391
EVAP GROSS LEAK	P0455	X	X	X*3	EC-406
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-419
FUEL LEVEL SENSOR	P0461	—	—	X	EC-423
FUEL LEVL SEN/CIRC	P0464	—	—	X	EC-425
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-429
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-434
CLOSED TP SW/CIRC	P0510	—	—	X	EC-440
ECM	P0605	—	—	X	EC-447
THERMSTAT FNCTN	P1126	—	—	X	EC-449
CLOSED LOOP-B1	P1148	—	—	—	EC-451
CKP SENSOR (COG)	P1336	—	—	X	EC-453
EGRC SOLENOID/V	P1400	—	—	X	EC-459

Items (CONSULT-II screen terms)	DTC*3	SRT code	Test value/Test limit (GST only)	1st trip DTC*3	Reference page
	CONSULT-II GST*1				
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-466
EGR SYSTEM	P1402	X	X	X*2	EC-472
EVAP SMALL LEAK	P1440	X	X	X*2	EC-481
EVAP VERY SML LEAK	P1441	X*4	X	X*2	EC-483
PURG VOLUME CONT/V	P1444	—	—	X	EC-498
VENT CONTROL VALVE	P1446	—	—	X	EC-510
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-516
VENT CONTROL VALVE	P1448	—	—	X	EC-526
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-534
VC/V BYPASS/V	P1490	—	—	X	EC-537
VC CUT/V BYPASS/V	P1491	—	—	X	EC-544
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-555
TCC SOL/V	P1775	—	—	X	EC-564
TCC SOL/V	P1776	—	—	X	EC-570

- *1: These numbers are prescribed by SAE J2012.
- *2: These are not displayed with GST.
- *3: 1st trip DTC No. is the same as DTC No.
- *4: SRT code will not be set if the self-diag result is NG.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (With CONSULT-II)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "ENGINE".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the ECM will be erased.)

NEEC0031S06

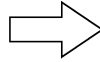
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Emission-related Diagnostic Information (Cont'd)

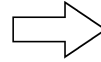
How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.

SELECT SYSTEM
ENGINE
A/T



SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

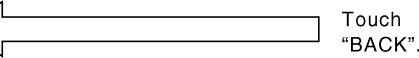
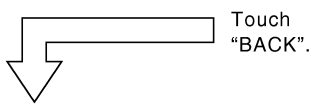


SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

2. Turn **CONSULT-II** "ON", and touch "A/T".

3. Touch "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the TCM will be erased.)



SELECT SYSTEM
ENGINE
A/T

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SELF DIAG RESULTS	
DTC RESULTS	TIME
SFT SOL A/CIRC [P0750]	0

5. Touch "ENGINE".

6. Touch "SELF-DIAG RESULTS".

7. Touch "ERASE". (The DTC in the ECM will be erased.)

SEF823YD

The emission-related diagnostic information can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to Erase DTC (With GST)

NEEC0031S0602

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Select Mode 4 with GST (Generic Scan Tool).

The emission-related diagnostic information in the ECM can be erased by selecting Mode 4 with GST (Generic Scan Tool).

NOTE:

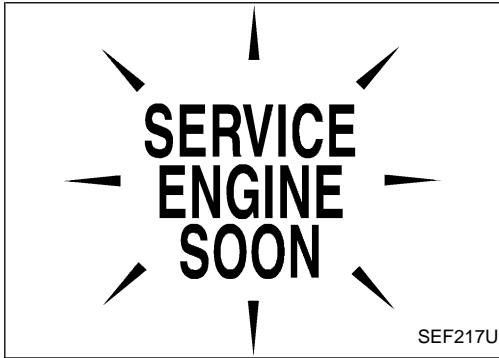
- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.
- The following data are cleared when the ECM memory is erased.
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NEEC0032



GI

MA

EM

LC

EC

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the MIL does not light up, refer to **EL-84**, "WARNING LAMPS" or see EC-615.
2. When the engine is started, the MIL should go off.
 - If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

FE




CL

On Board Diagnostic System Function

NEEC0032S01

The on board diagnostic system has the following two functions.

MT

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

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Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to **EL-84**, "WARNING LAMPS" or see EC-615.

NEEC0032S03

RS

Diagnostic Test Mode I — Malfunction Warning

NEEC0032S04

BT

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

HA

SC

OBD System Operation Chart

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DETECTABLE ITEMS

NEEC0033

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.

NEEC0033S01

EL

IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

OBD System Operation Chart (Cont'd)

- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-73.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

NEEC0033S02

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-90.

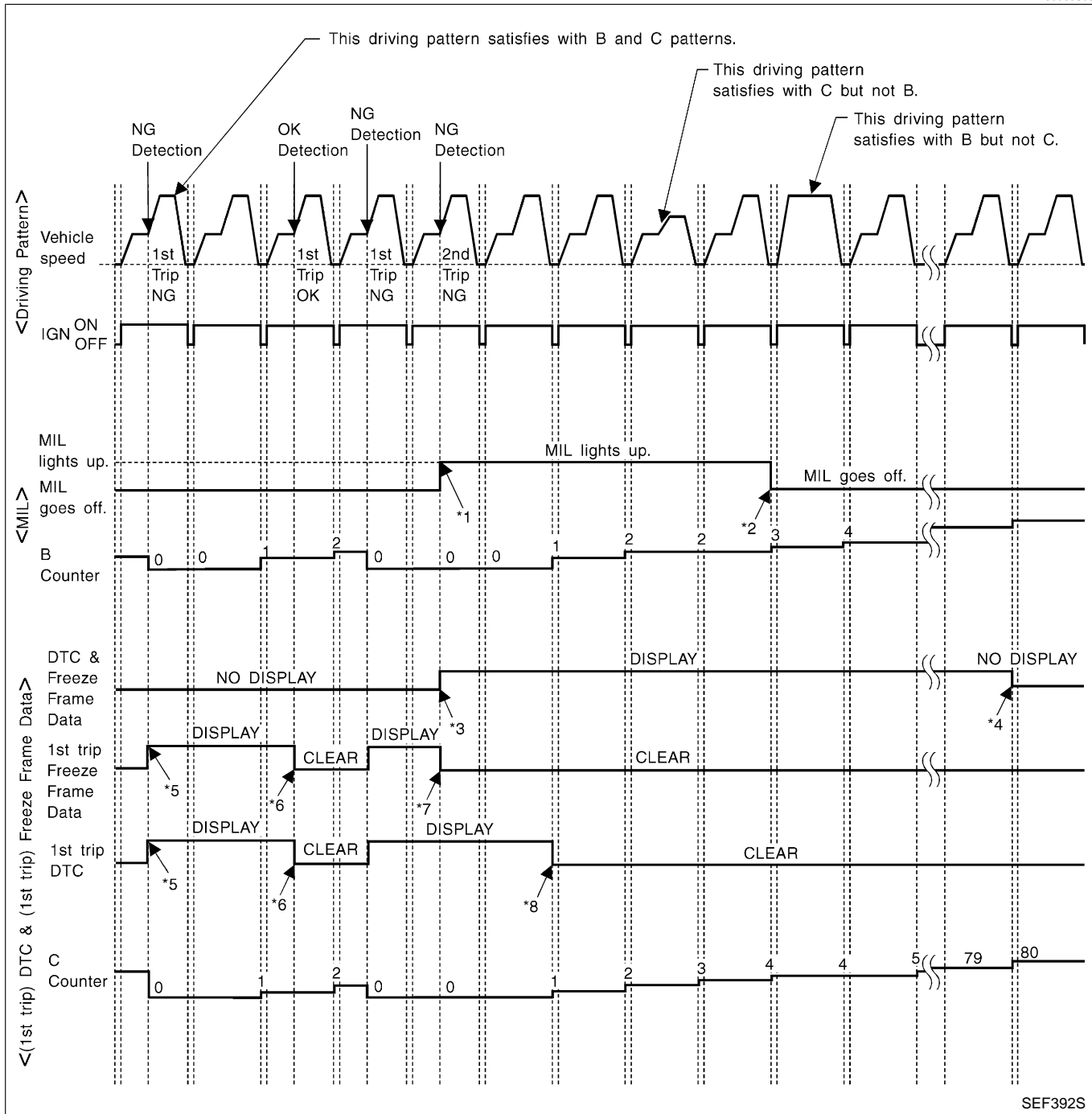
For details about patterns “A” and “B” under “Other”, see EC-92.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE” <EXHAUST QUALITY DETERIORATION>, “FUEL INJECTION SYSTEM”

NEEC0033S03



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame

- data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip

- freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

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EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

NEEC0033S04

Driving Pattern B

NEEC0033S0401

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

Driving Pattern C

NEEC0033S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

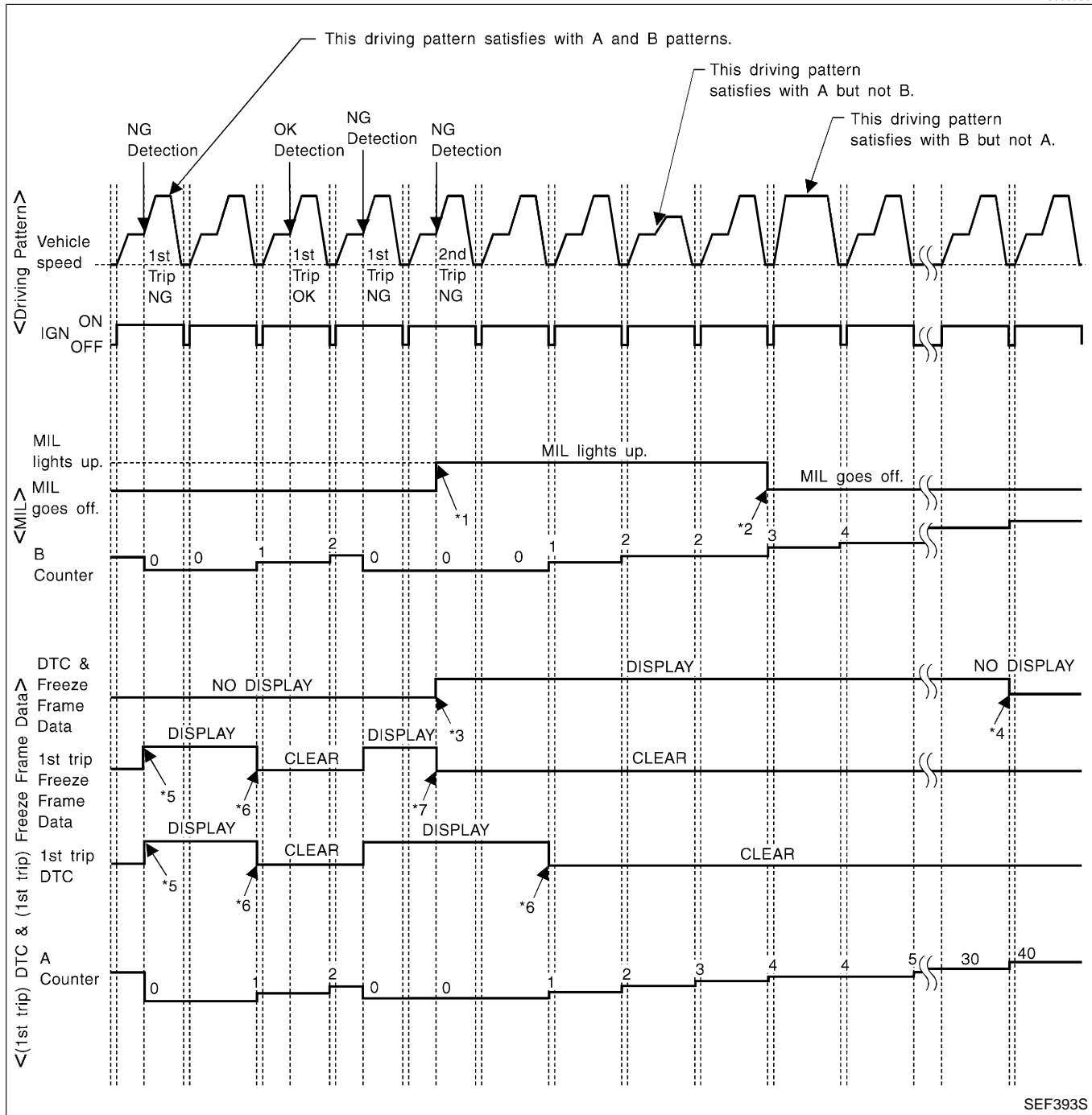
To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NEEC0033S05



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC

- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

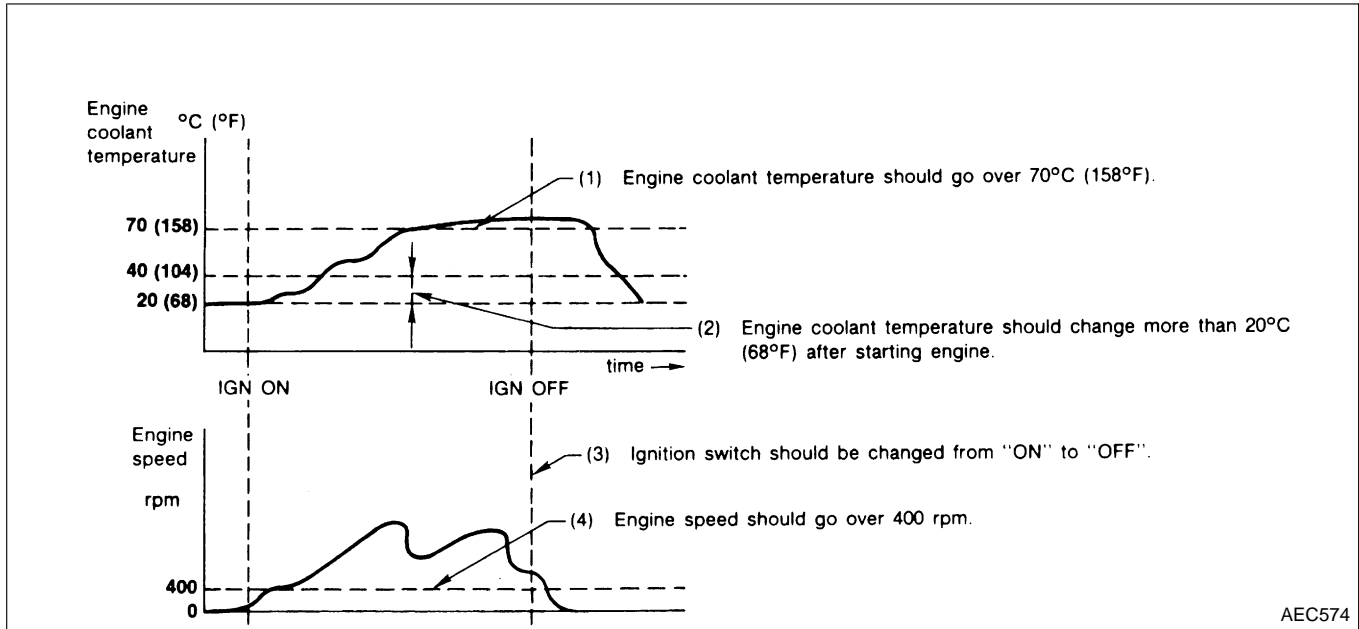
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EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NEEC0033S06

Driving Pattern A

NEEC0033S0601



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

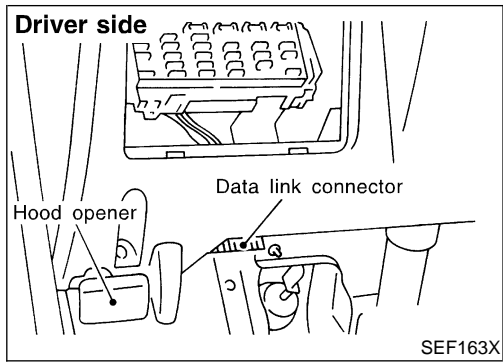
Driving Pattern B

NEEC0033S0602

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").



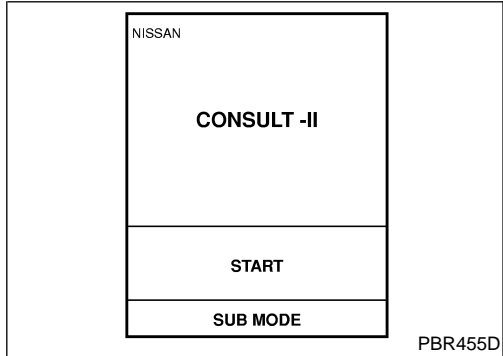
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

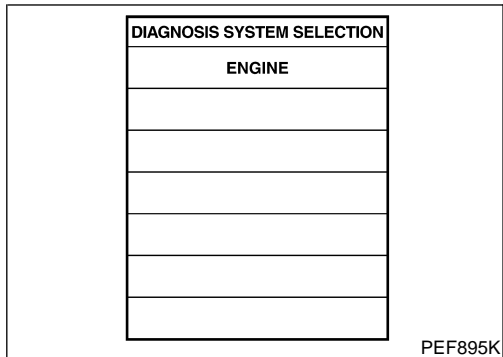
=NEEC0034

NEEC0034S01

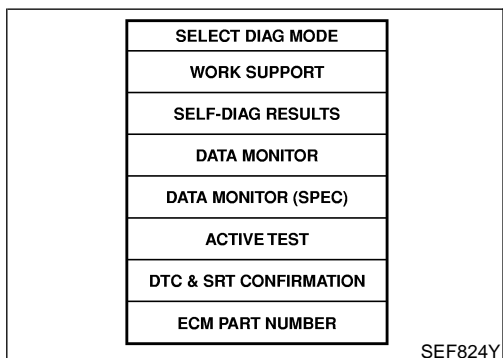
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located behind the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

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ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NEEC0034S02

Item		DIAGNOSTIC TEST MODE								
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION		
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT	
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X	X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X		X	X		X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor	X	X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X	X	X	X			
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Fuel level sensor		X		X	X			
		Ignition switch (start signal)				X				
		Closed throttle position switch		X		X				
		Closed throttle position switch (throttle position sensor signal)				X				
		Air conditioner switch				X				
		Park/Neutral position (PNP) switch		X		X				
		Power steering oil pressure switch				X				
Air conditioner pressure switch				X						
Battery voltage				X						
Ambient air temperature switch				X	X					

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Item		DIAGNOSTIC TEST MODE								
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION		
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT	
ENGINE CONTROL COMPONENT PARTS	OUT-PUT	Injectors				X	X	X		
	Power transistor (Ignition timing)	X	X (Ignition signal)			X	X	X		
	IACV-AAC valve	X	X			X	X	X		
	EVAP canister purge volume control solenoid valve		X			X	X	X		X
	Air conditioner relay					X	X			
	Fuel pump relay	X				X	X	X		
	EGRC-solenoid valve		X			X	X	X		
	Heated oxygen sensor 1 heater (front)		X			X	X		X	
	Heated oxygen sensor 2 heater (rear)		X			X	X		X	
	Torque converter clutch solenoid valve		X			X	X			X
	EVAP canister vent control valve		X			X	X	X		
	Vacuum cut valve bypass valve		X			X	X	X		X
	Calculated load value			X		X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-74.

FUNCTION

NEEC0034S03

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly. *1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for the basic fuel schedule, AFM, A/F, feedback control valve and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part numbers can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

1) Diagnostic trouble codes

CONSULT-II (Cont'd)

- 2) 1st trip diagnostic trouble codes
- 3) Freeze frame data
- 4) 1st trip freeze frame data
- 5) System readiness test (SRT) codes
- 6) Test values
- 7) Others

WORK SUPPORT MODE

NEEC0034S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> ● FOLLOW THE BASIC INSPECTION IN THE SERVICE MANUAL 	When adjusting the idle throttle position
IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR. 	When adjusting initial ignition timing
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	<p>OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> ● BATTERY VOLTAGE IS SUFFICIENT. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" <p>WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT-II WILL DISCONTINUE AND DISPLAY INSTRUCTIONS.</p> <p>NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN WHEN USING A CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> ● IDLE CONDITION 	When setting target idle speed

*: This function is not necessary in the usual service procedure.

SELF DIAGNOSTIC MODE

NEEC0034S05

DTC and 1st Trip DTC

NEEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-19.

Freeze Frame Data and 1st Trip Freeze Frame Data

NEEC0034S0502

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● Engine Control component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC" (EC-19).]

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Freeze frame data item*	Description
FUEL SYS-B1	<ul style="list-style-type: none"> “Fuel injection system status” at the moment a malfunction is detected is displayed. One mode in the following is displayed. <ul style="list-style-type: none"> “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	<ul style="list-style-type: none"> The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> “Short-term fuel trim” at the moment a malfunction is detected is displayed. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> “Long-term fuel trim” at the moment a malfunction is detected is displayed. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	<ul style="list-style-type: none"> The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

NEEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. 	<ul style="list-style-type: none"> Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 (front) is displayed. 	
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 (rear) is displayed. 	
HO2S1 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
FUEL T/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	
INT/A TEMP SE [°C] or [°F]	○	○	<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EGR TEMP SEN [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 	
EVAP SYS PRES [V]	○		<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
ABSOL PRES/SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 	
CLSD THL/P SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal. 		GI
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the PNP switch signal. 		MA
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal. 		EM
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		EC
INJ PULSE-B1 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	FE
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 		CL
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 		MT
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 		AT
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor. 		TF
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 		PD
PURG VOL C/V [%]			<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		AX
AIR COND RLY [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the air conditioner relay control condition determined by ECM according to the input signals. 		SU
EGRC SOL/V [ON/OFF] (FLOW/CUT)		○	<ul style="list-style-type: none"> Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. ON ... EGR valve is operational OFF ... EGR valve operation is cut-off 		BR
TCC SOL/V			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of torque converter clutch solenoid valve determined by ECM according to the input signals. 		ST
FUEL PUMP RLY [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 		RS

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> ● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON ... Open OFF ... Closed 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> ● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open 	
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> ● Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> ● Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	
VOLTAGE [V]			<ul style="list-style-type: none"> ● Voltage measured by the voltage probe. 	
Frequency [msec] or [Hz] or [%]			<ul style="list-style-type: none"> ● Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> ● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

NEEC0034S12

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> ● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor (PHASE). 	
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> ● The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> ● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			<ul style="list-style-type: none"> ● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> ● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> ● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> ● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

ACTIVE TEST MODE

NEEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Air conditioner switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature indication using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay
EGRC SOLENOID VALVE	<ul style="list-style-type: none"> Ignition switch: ON Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	EGRC-solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector EGRC-solenoid valve
PURG VOL CONT/V	<ul style="list-style-type: none"> Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control valve opening step using CONSULT-II. 	Engine speed changes according to the opening step.	<ul style="list-style-type: none"> Harness and connector EVAP canister purge volume control valve
FUEL T/TEMP SEN	<ul style="list-style-type: none"> Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector Solenoid valve

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DTC & SRT CONFIRMATION MODE

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SRT STATUS Mode

NEEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-75.

SRT Work Support Mode

NEEC0034S0803

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

NEEC0034S0802

TEST MODE	TEST ITEM	CONDITION	REFERENCE PAGE
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-358
	EVAP SML LEAK P1440		EC-481
	EVAP V/S LEAK P1441		EC-483
	PURG VOL CN/V P1444		EC-498
	PURGE FLOW P1447		EC-516
	VC CUT/V BP/V P1491		EC-544
	PURG CN/V & S/V P1493		EC-375
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-198
	HO2S1 (B1) P0131		EC-206
	HO2S1 (B1) P0132		EC-213
	HO2S1 (B1) P0133		EC-220
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-243
	HO2S2 (B1) P0138		EC-253
	HO2S2 (B1) P0139	EC-263	
EGR SYSTEM	EGR SYSTEM P0400	EC-333	
	EGRC-BPT/LV P0402	EC-345	
	EGR SYSTEM P1402	EC-472	

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NEEC0034S10

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

- 1) "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time.
In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.
The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "RECORDING Speed". Refer to CONSULT-II OPERATION MANUAL.
- 2) "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

1) "AUTO TRIG"

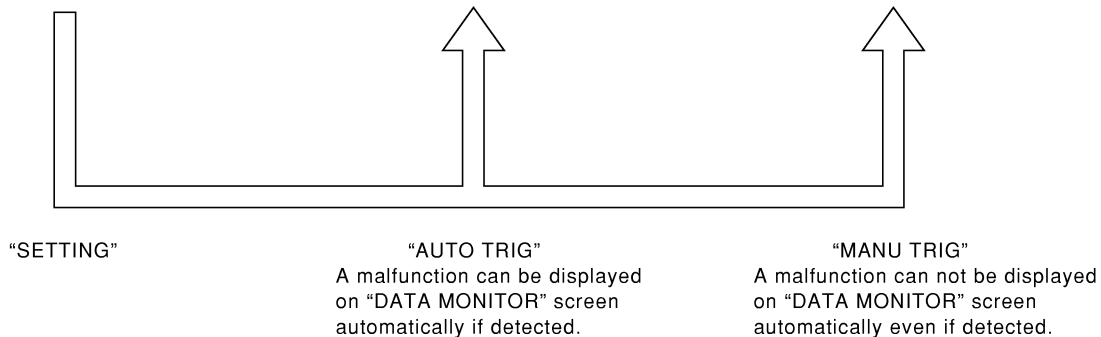
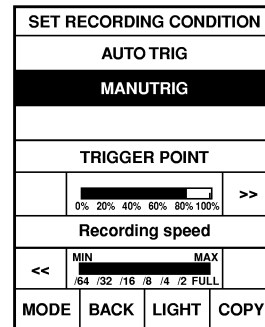
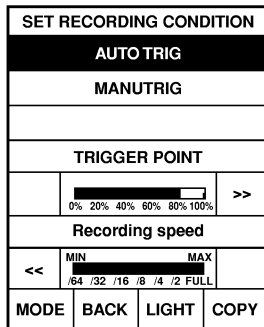
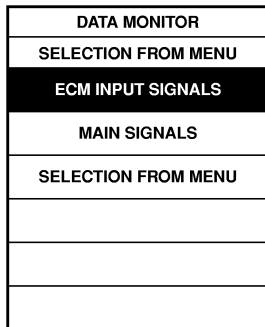
- While trying to detect the DTC/1st trip DTC by performing the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.

- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.

When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", **GI-24**.)

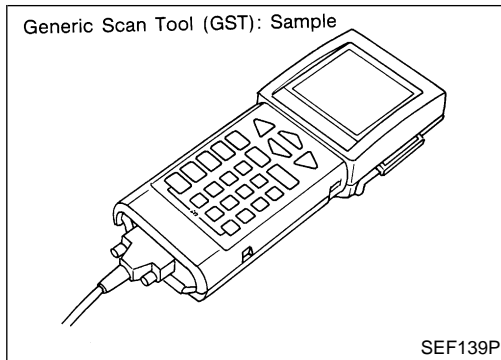
2) "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



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Generic Scan Tool (GST)

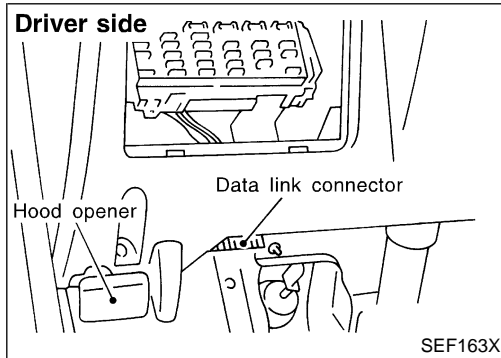


Generic Scan Tool (GST) DESCRIPTION

NEEC0035

NEEC0035S01

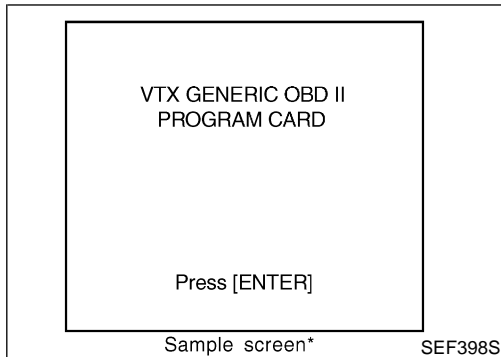
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



GST INSPECTION PROCEDURE

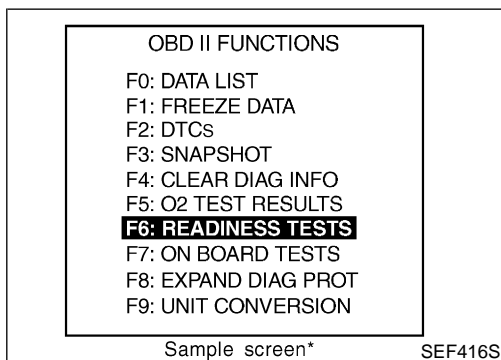
NEEC0035S02

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector for GST which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Generic Scan Tool (GST) (Cont'd)

FUNCTION

NEEC0035S03

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-96).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	—
MODE 9	(CALIBRATION ID)	This mode is to enable the off-board to request vehicle specific information such as Vehicle Identification Number (VIN) and Calibration ID.

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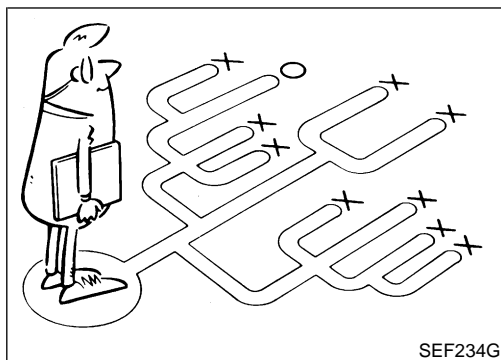
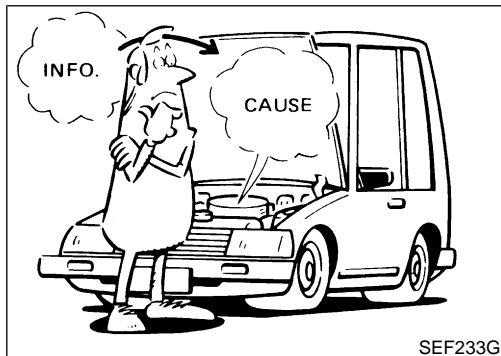
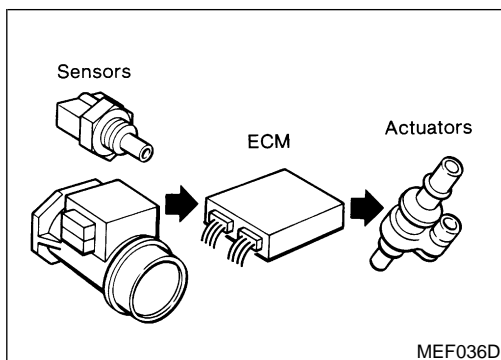
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KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
 Weather conditions,
 Symptoms

SEF907L

Introduction

NEEC0036

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-108.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on next page should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NEEC0036S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the malfunction indicator lamp to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

TROUBLE DIAGNOSIS — INTRODUCTION

KA24DE

Introduction (Cont'd)

Worksheet Sample

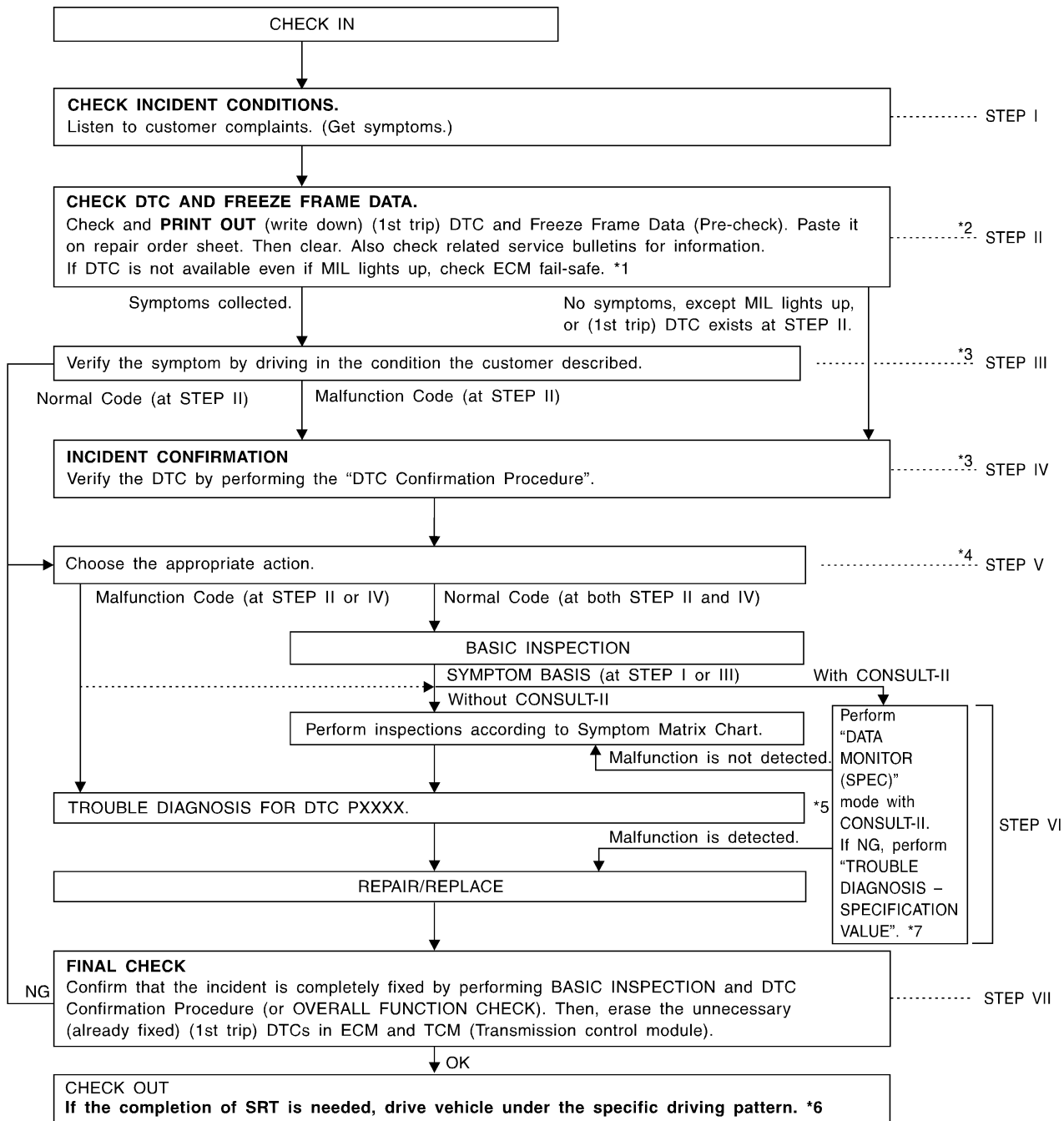
NEEC0036S0101

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	<input type="checkbox"/> Vehicle ran out of fuel causing misfire <input type="checkbox"/> Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	<input type="checkbox"/> Startability	<input type="checkbox"/> Impossible to start <input type="checkbox"/> No combustion <input type="checkbox"/> Partial combustion <input type="checkbox"/> Partial combustion affected by throttle position <input type="checkbox"/> Partial combustion NOT affected by throttle position <input type="checkbox"/> Possible but hard to start <input type="checkbox"/> Others []
	<input type="checkbox"/> Idling	<input type="checkbox"/> No fast idle <input type="checkbox"/> Unstable <input type="checkbox"/> High idle <input type="checkbox"/> Low idle <input type="checkbox"/> Others []
	<input type="checkbox"/> Driveability	<input type="checkbox"/> Stumble <input type="checkbox"/> Surge <input type="checkbox"/> Knock <input type="checkbox"/> Lack of power <input type="checkbox"/> Intake backfire <input type="checkbox"/> Exhaust backfire <input type="checkbox"/> Others []
	<input type="checkbox"/> Engine stall	<input type="checkbox"/> At the time of start <input type="checkbox"/> While idling <input type="checkbox"/> While accelerating <input type="checkbox"/> While decelerating <input type="checkbox"/> Just after stopping <input type="checkbox"/> While loading
Incident occurrence	<input type="checkbox"/> Just after delivery <input type="checkbox"/> Recently <input type="checkbox"/> In the morning <input type="checkbox"/> At night <input type="checkbox"/> In the daytime	
Frequency	<input type="checkbox"/> All the time <input type="checkbox"/> Under certain conditions <input type="checkbox"/> Sometimes	
Weather conditions	<input type="checkbox"/> Not affected	
	Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Raining <input type="checkbox"/> Snowing <input type="checkbox"/> Others []
	Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Humid °F
Engine conditions	<input type="checkbox"/> Cold <input type="checkbox"/> During warm-up <input type="checkbox"/> After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	<input type="checkbox"/> In town <input type="checkbox"/> In suburbs <input type="checkbox"/> Highway <input type="checkbox"/> Off road (up/down)	
Driving conditions	<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	<input type="checkbox"/> Turned on <input type="checkbox"/> Not turned on	

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Work Flow

NEEC0037



SEF510ZG

*1: If the incident cannot be duplicated, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.
 *2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit.

Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-149.
 *3: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t" refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-148.
 *4: If the malfunctioning part cannot

be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.
 *5: EC-125
 *6: EC-80
 *7: EC-144

DESCRIPTION FOR WORK FLOW

NEEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-107.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-85.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-126.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-110.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-144. (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-126.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-135. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection", GI-26 . Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" and confirm the normal code [Diagnostic trouble code No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-85.)

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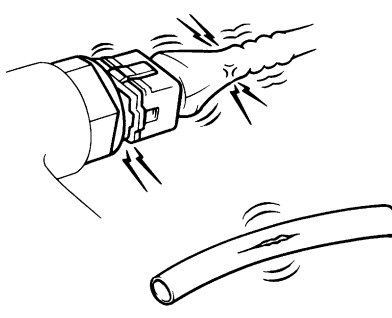
Basic Inspection

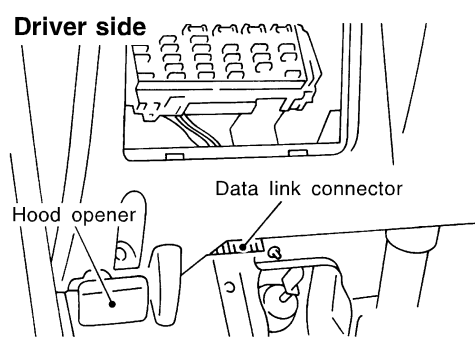
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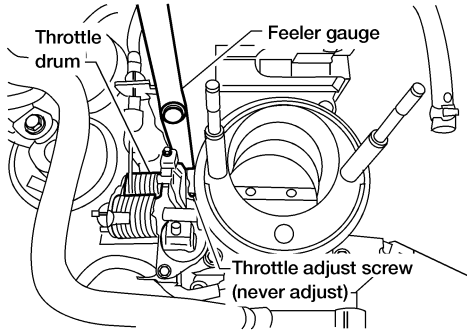
Precaution:


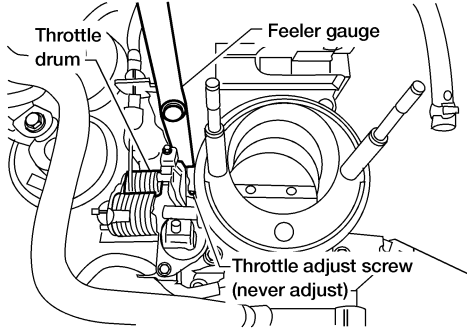
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1	INSPECTION START	<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts
		
SEF142I		
With CONSULT-II		▶ GO TO 2.
With GST		▶ GO TO 4.
No tools		▶ GO TO 5.

2	CONNECT CONSULT-II TO THE VEHICLE	<p>Connect "CONSULT-II" to the data link connector and select "ENGINE" from the menu. Refer to EC-93.</p>
		
SEF163X		
		▶ GO TO 3.

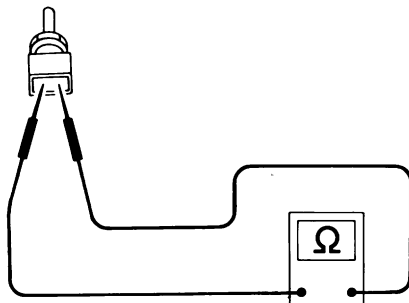
3	CHECK FI CAM FUNCTION	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", FE-3. 2. Warm up engine to 75°C (167°F). 3. Stop engine and wait at least 5 seconds, then turn ignition switch ON. 4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. 5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05 mm (0.0020 in), between stopper and throttle drum as shown in the figure. 		
		
AEC871A		
OK or NG		
OK	▶	GO TO 6.
NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", EM-12. 2. GO TO 6.

4	CHECK FI CAM FUNCTION	
<p> With GST</p> <ol style="list-style-type: none"> 1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", FE-3. 2. Warm up engine to 75°C (167°F). 3. Stop engine and wait at least 10 seconds, then turn ignition switch ON. 4. Select "MODE 1" with GST. 5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05 mm (0.0020 in), between stopper and throttle drum as shown in the figure. 		
		
AEC871A		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", EM-12. 2. With CONSULT-II: GO TO 6. Without CONSULT-II: GO TO 14.

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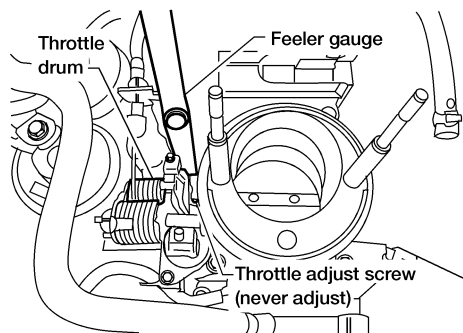
5 CHECK FI CAM FUNCTION**No Tools**

1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", **FE-3**.
2. Disconnect engine coolant temperature sensor harness connector and check resistance as shown in the figure.



SEF536H

3. Warm up engine until the resistance of coolant temperature sensor is 0.26 to 0.39 kΩ.
4. Turn ignition switch OFF.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), with the voltage between 1.10 to 1.36V, make sure that the clearance is less than 0.05 mm (0.0020 in), between stopper and throttle adjusting screw as shown in figure.



AEC871A

OK or NG

OK



GO TO 14.

NG



1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", **EM-12**.
2. GO TO 14.

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6 CHECK IGNITION TIMING

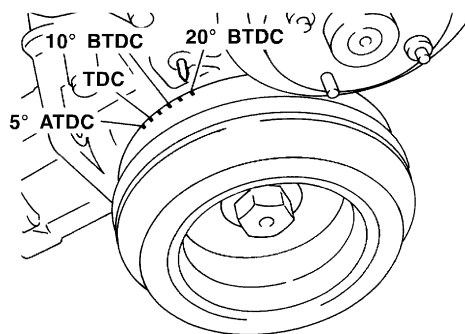
With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".

IGNITION TIMING ADJ
<p style="text-align: center;">IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</p>

PEF546N

4. Check ignition timing at idle using timing light.



SEF320V

Ignition timing:
 $20^{\circ} \pm 2^{\circ}$ BTDC (in "P" or "N" position)

OK or NG

OK



GO TO 7.

NG



1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59.
2. GO TO 7.

Basic Inspection (Cont'd)

7	CHECK BASE IDLE SPEED																							
<p>Ⓜ With CONSULT-II</p> <p>1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">IACV-AAC/V ADJ</td></tr> <tr><td colspan="2" style="text-align: center;">ADJ MONITOR</td></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">700 rpm</td></tr> <tr><td colspan="2" style="text-align: center;">CONDITION SETTING</td></tr> <tr><td style="text-align: center;">IACV-ACC/V</td><td style="text-align: center;">FIXED</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td colspan="2" style="text-align: center;">MONITOR</td></tr> <tr><td style="text-align: center;">COOLAN TEMP/S</td><td style="text-align: center;">XXX°C</td></tr> <tr><td style="text-align: center;">CLSD THL POS</td><td style="text-align: center;">XXX N</td></tr> <tr><td> </td><td> </td></tr> </table>			IACV-AAC/V ADJ		ADJ MONITOR		ENG SPEED	700 rpm	CONDITION SETTING		IACV-ACC/V	FIXED					MONITOR		COOLAN TEMP/S	XXX°C	CLSD THL POS	XXX N		
IACV-AAC/V ADJ																								
ADJ MONITOR																								
ENG SPEED	700 rpm																							
CONDITION SETTING																								
IACV-ACC/V	FIXED																							
MONITOR																								
COOLAN TEMP/S	XXX°C																							
CLSD THL POS	XXX N																							
SEF714Z																								
<p>2. Check idle speed. 750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>																								
OK	▶	GO TO 8.																						
NG	▶	<p>1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-59.</p> <p>2. GO TO 8.</p>																						

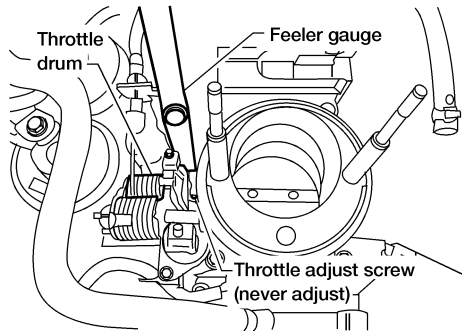
8 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

With CONSULT-II

NOTE:

Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Turn ignition switch ON.
5. Select "DATA MONITOR" mode with CONSULT-II.
6. Select "CLSD THL/P SW" from the menu.
7. Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



AEC871A

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.1 mm (0.004 in) feeler gauge.
 "CLSD THL/P SW" signal should remain "OFF" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 9.

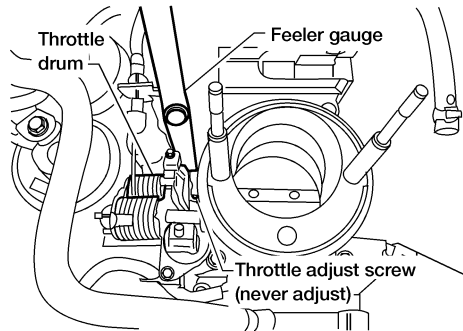
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9 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

With CONSULT-II

NOTE:

- Never adjust throttle adjust screw (TAS).
 - Do not touch throttle drum when checking "CLSD THL/P SW" signal.
Doing so may cause an incorrect adjustment.
1. Warm engine up to normal operating temperature.
 2. Check FI cam. Refer to procedure 3.
 3. Stop engine.
 4. Loosen throttle position sensor fixing bolts.
 5. Turn ignition switch ON.
 6. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
 7. Insert a 0.1 mm (0.004 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC871A

8. Open throttle valve and then close.
9. Check "CLSD THL/P SW" signal.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.
 If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2
<p> With CONSULT-II Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".</p> <div style="text-align: center;"> </div> <p style="text-align: right;">AEC872A</p>	
▶	GO TO 11.

11	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3						
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Temporarily tighten sensor body fixing bolts as follows. <ul style="list-style-type: none"> ● Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON" when tightening sensor body fixing bolts. <div style="text-align: center;"> </div> <p style="text-align: right;">AEC872A</p> <ol style="list-style-type: none"> 2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened. 3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge. 4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed. 5. Tighten throttle position sensor. 6. Check "CLSD THL/P SW" signal again. The signal remains "OFF" while closing throttle valve. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center; vertical-align: top;">OK</td> <td style="text-align: center; vertical-align: middle;">▶</td> <td>1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 12.</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">NG</td> <td style="text-align: center; vertical-align: middle;">▶</td> <td>GO TO 9.</td> </tr> </table>		OK	▶	1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 12.	NG	▶	GO TO 9.
OK	▶	1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 12.					
NG	▶	GO TO 9.					

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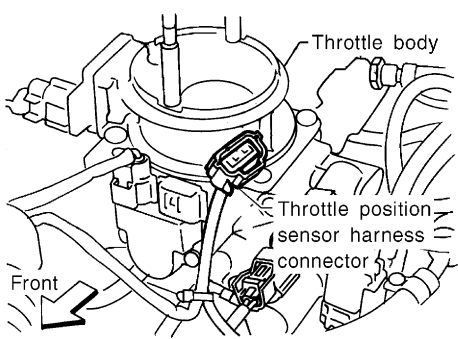
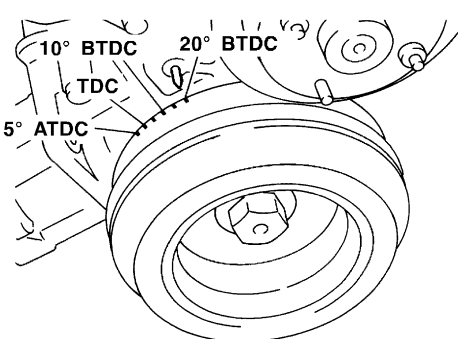
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12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY						
<p> With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Start engine. 2. Warm up engine to normal operating temperature. 3. Select "CLSD THL POS" in "DATA MONITOR" mode manual trigger. 4. Stop engine. (Turn ignition switch OFF.) 5. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 6. Turn ignition switch OFF and wait at least 5 seconds. 7. Repeat steps 5 and 6 until "CLSD THL POS" in "DATA MONITOR" mode with CONSULT-II changes to "ON". <div style="text-align: right; margin-top: 10px;">SEF864V</div>							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITORING</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">CLSD THL/P SW</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">SEF715Z</div>		DATA MONITOR		MONITORING	NO DTC	CLSD THL/P SW	ON
DATA MONITOR							
MONITORING	NO DTC						
CLSD THL/P SW	ON						
▶	GO TO 13.						

13	CHECK TARGET IDLE SPEED
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. 800±50 rpm (in "P" or "N" position) <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. Inspection end after adjust idle speed.

14	CHECK IGNITION TIMING
<p>⊗ Without CONSULT-II</p> <p>1. Warm up engine to normal operating temperature. 2. Stop engine and disconnect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF265S</p> <p>3. Start engine. 4. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed. 5. Check ignition timing at idle using timing light.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF320V</p> <p style="color: blue;">Ignition timing: 20°±2° BTDC (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 15.

15	CHECK BASE IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>Make sure that engine speed falls to the following speed. 750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ 1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 16.

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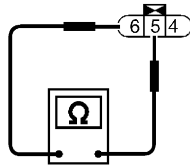
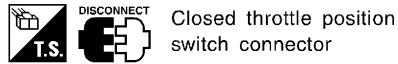
16	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)
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Without CONSULT-II

NOTE:

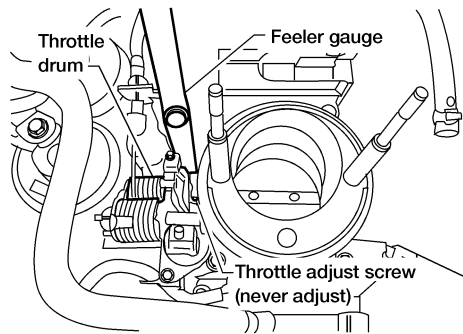
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector .
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following conditions.



SEF862V

- Insert the 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



AEC871A

“Continuity should exist” while inserting 0.1 mm (0.004 in) feeler gauge.
“Continuity should not exist” while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 17.

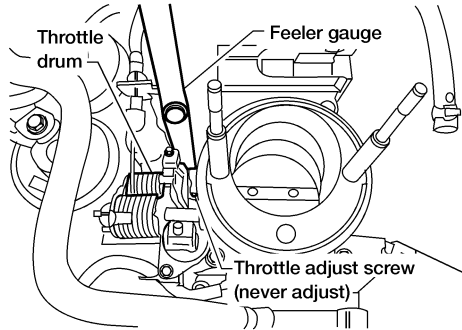
17 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

⊗ Without CONSULT-II

NOTE:

- Never adjust throttle adjust screw (TAS).
- Do not touch throttle drum when checking "continuity".
Doing so may cause an incorrect adjustment.

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Disconnect closed throttle position sensor harness connector.
6. Insert 0.1 mm (0.004 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.

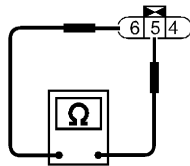


AEC871A

7. Open throttle valve then close.
8. Check continuity between closed throttle position switch terminal 5 and 6.



Closed throttle position switch connector



SEF862V

The continuity should not exist while closing the throttle position sensor body.

If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

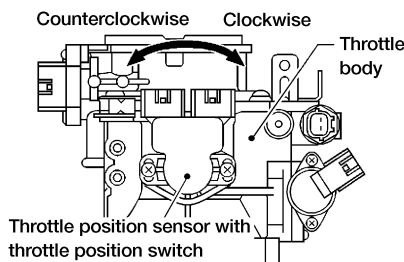
OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

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18 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2**⊗ Without CONSULT-II**

Turn throttle position sensor body counterclockwise until continuity does not exist.



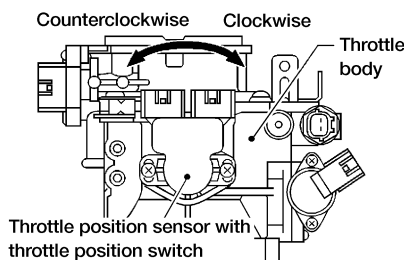
AEC872A

▶ GO TO 19.

19 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3**⊗ Without CONSULT-II**

1. Temporarily tighten sensor body fixing bolts as follows.

- Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.



AEC872A

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK ▶ GO TO 20.

NG ▶ GO TO 17.

20 REINSTALLATION**⊗ Without CONSULT-II**

1. Remove 0.3 mm (0.012 in) feeler gauge.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.

▶ GO TO 21.

21	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY
<p>⊗ Without CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Start engine. 2. Warm up engine to normal operating temperature. 3. Stop engine. (Turn ignition switch "OFF".) 4. Turn ignition switch "ON" and wait at least 5 seconds. 	
<p>5. Turn ignition switch "OFF" and wait at least 5 seconds.</p> <p>6. Repeat steps 4 and 5, 20 times.</p>	
▶	GO TO 22.

SEF864V

22	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 800±50 rpm (in "P" or "N" position) 	
OK or NG	
OK	▶ GO TO 23.
NG	▶ <ol style="list-style-type: none"> 1. Adjust target idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 23.

23	ERASE UNNECESSARY DTC
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", (EC-85) .</p>	
▶	INSPECTION END

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DTC Inspection Priority Chart

NEEC0039

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> ● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115, P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0180 Fuel tank temperature sensor ● P0325 Knock sensor ● P0340 Camshaft position sensor ● P0460, P0461, P0464, P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1126 Thermostat function ● P1400 EGRC-solenoid valve ● P1706 Park/neutral position switch
2	<ul style="list-style-type: none"> ● P0105 Absolute pressure sensor ● P0130 - P0134 Heated oxygen sensor 1 (front) ● P0135 Heated oxygen sensor 1 heater (front) ● P0137 - P0140 Heated oxygen sensor 2 (rear) ● P0141 Heated oxygen sensor 2 heater (rear) ● P0335, P1336 Crankshaft position sensor (OBD) ● P0443, P1444 EVAP canister purge volume control solenoid valve ● P0446, P1446, P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P1401 EGR temperature sensor ● P1447 EVAP control system purge flow monitoring ● P1490, P1491 Vacuum cut valve bypass valve ● P1775 Torque converter clutch solenoid valve (CIRCUIT) ● P1776 Torque converter clutch solenoid valve
3	<ul style="list-style-type: none"> ● P0172, P0171 Fuel injection system function ● P0300 - P0304 Misfire ● P0400, P1402 EGR function ● P0402 EGRC-BPT valve function ● P0420 Three way catalyst function ● P0440, P1440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P1148 Closed loop control ● P1441 EVAP control system (VERY SMALL LEAK)

Fail-safe Chart

=NEEC0040

The ECM enters fail-safe mode if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
CONSULT-II GST		Condition	Engine coolant temperature decided (CONSULT-II display)
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0110	Intake air temperature sensor	The ECM functions on the assumption that the intake air temperature is 25°C (77°F).	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned to ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0120	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.	
		Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.	
			ECM fail-safe operation
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart

Symptom Matrix Chart SYSTEM — ENGINE CONTROL SYSTEM

NEEC0041

NEEC0041S01

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-597
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-58
	Injector circuit	1	1	2	3	2		2	2			2			EC-589
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-40
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-55
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-59
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-434
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-610
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-59
	Ignition circuit	1	1	2	2	2		2	2			2			EC-579
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-459
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-333, 345, 472
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-149
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA-26

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-325
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-156
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-198, 206
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-174, 193
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-179
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-110
Vehicle speed sensor circuit		2	3		3						3			EC-429
Knock sensor circuit			2								3			EC-315
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-447, 125
Start signal circuit	2													EC-594
PNP switch circuit			3		3		3	3			3			EC-555
Power steering oil pressure switch circuit		2					3	3						EC-606

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NEEC0041S03

		SYMPTOM													Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel tank	5	5												FE-4	
	Fuel piping			5	5	5		5	5			5				
	Vapor lock															
	Valve deposit															
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5				5			
Air	Air duct		5	5											FE-3	
	Air cleaner															
	Air leakage from air duct (Mass air flow sensor — throttle body)				5	5		5	5	5			5			
	Throttle body, Throttle wire	5				5		5			5					
	Air leakage from intake manifold/Collector/Gasket															
Crank- ing	Battery	1	1	1		1		1	1					1	SC-2	
	Alternator circuit															
	Starter circuit	3										1				
	Flywheel/Drive plate	6														
	PNP switch	4														

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

		SYMPTOM												Reference page															
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)														
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA															
Engine	Cylinder head	5	5	5	5	5		5	5			4	5	3	EM-29, EM-44														
	Cylinder head gasket																												
	Cylinder block	6	6	6	6	6		6	6																				
	Piston																												
	Piston ring																												
	Connecting rod																												
	Bearing																												
	Crankshaft																												
Valve mechanism	Timing chain														5		5	5	5	5		5	5				5	3	EM-18, EM-29
	Camshaft																												
	Intake valve																												
	Exhaust valve																												
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5				5		FE-8														
	Three way catalyst																												
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5				5		MA-21, LC-6														
	Oil level (Low)/Filthy oil																												
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5						LC-10														
	Thermostat																												
	Water pump																												
	Water gallery																												
	Coolant level (low)/Contaminated coolant																												

1 - 6: The numbers refer to the order of inspection.

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CONSULT-II Reference Value in Data Monitor Mode

NEEC0042

Remarks:

- Specification data are reference values.
 - Specification data are output/input values which are detected or supplied by the ECM at the connector.
 - * Specification data may not be directly related to their components signals/values/operations.
- (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)
- If the real-time diagnosis results are NG, and the on board diagnostic system results are OK, when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 	Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	0.9 - 1.8V
	2,500 rpm	1.9 - 2.3V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 	More than 70°C (158°F)
HO2S1 (B1)	<ul style="list-style-type: none"> ● Engine: After warming up Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)		LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	<ul style="list-style-type: none"> ● Engine: After warming up Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 	Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) Throttle valve fully closed	0.2 - 0.8V
	Throttle valve fully opened	3.5 - 4.5V
EGR TEMP SEN	<ul style="list-style-type: none"> ● Engine: After warming up 	Less than 4.5V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 	OFF → ON → OFF
CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) Throttle valve: Idle position	ON
	Throttle valve: Slightly open	OFF
CLSD THL POS	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) Throttle valve: Idle position	ON
	Throttle valve: Slightly open	OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine A/C switch: OFF	OFF
	A/C switch: ON (Compressor operates.)	ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON Shift lever: "P" or "N"	ON
	Except above	OFF
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine Steering wheel in neutral position (forward direction)	OFF
	The steering wheel is turned	ON
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
INJ PULSE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 2.5 - 3.3 msec
		2,000 rpm 2.4 - 3.2 msec
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 0.8 - 1.2 msec
		2,000 rpm 0.8 - 1.2 msec
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle Approx. 20° BTDC
		2,000 rpm More than 25° BTDC
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle Approx. 30%
		2,000 rpm —
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● No-load 	Idle 0%
		2,000 rpm (More than 200 seconds after starting engine) —
A/F ALPHA-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm 50 - 159%
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 	Approx. 3.4V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	<ul style="list-style-type: none"> ● Except as shown above 	OFF
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle ON (Cut)
		Engine speed: Revving engine from idle to 3,000 rpm quickly. OFF (Flow)
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
HO2S1 HTR (B1)	<ul style="list-style-type: none"> ● Engine speed: Below 3,000 rpm (All models) For 6 seconds after engine speed exceeds 3,000 rpm (4WD models only) 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 3,000 rpm (2WD models) More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models) 	OFF
HO2S2 HTR (B1)	<ul style="list-style-type: none"> ● Engine speed: Idle after driving 2 minutes at 70 km/h (43 MPH) or more 	ON
	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	OFF
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 9.5 - 34.0%
		2,500 rpm 13.9 - 24.9%
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Engine: After warming up, engine stopped ● Ignition switch: ON 	Throttle valve: fully closed 0.0%
		Throttle valve: fully opened Approx. 80%

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 0.9 - 5.8 g·m/s
	2,500 rpm	7.5 - 13.2 g·m/s
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Engine: For 5 seconds after starting engine 	Approx. 4.4V
	<ul style="list-style-type: none"> ● Engine: More than 5 seconds after starting engine (After warming up) 	Approx. 1.2V

Major Sensor Reference Graph in Data Monitor Mode

NEEC0043

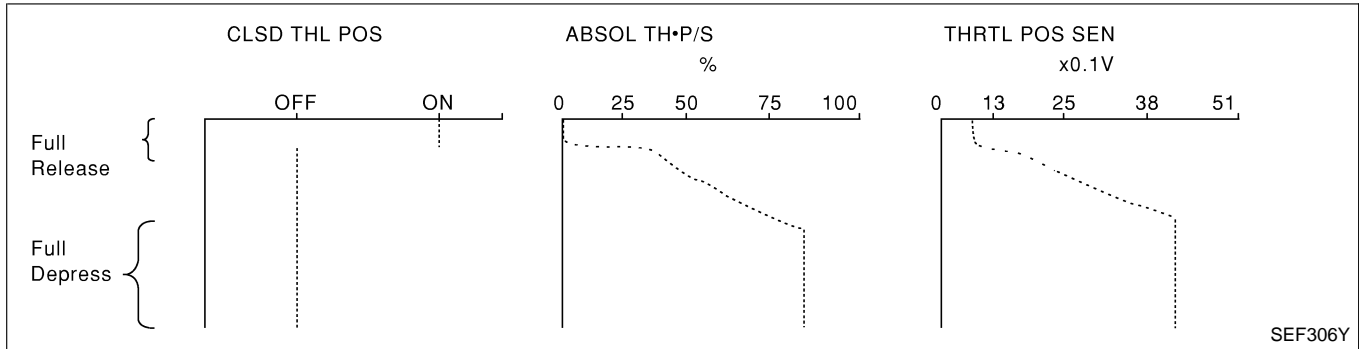
The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "MANU TRIG" in "DATA MONITOR" with CONSULT-II. "Trigger Point" is set to 100%, "Recording Speed" is set to MAX..)

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

NEEC0043S01

Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.

The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NEEC0043S02

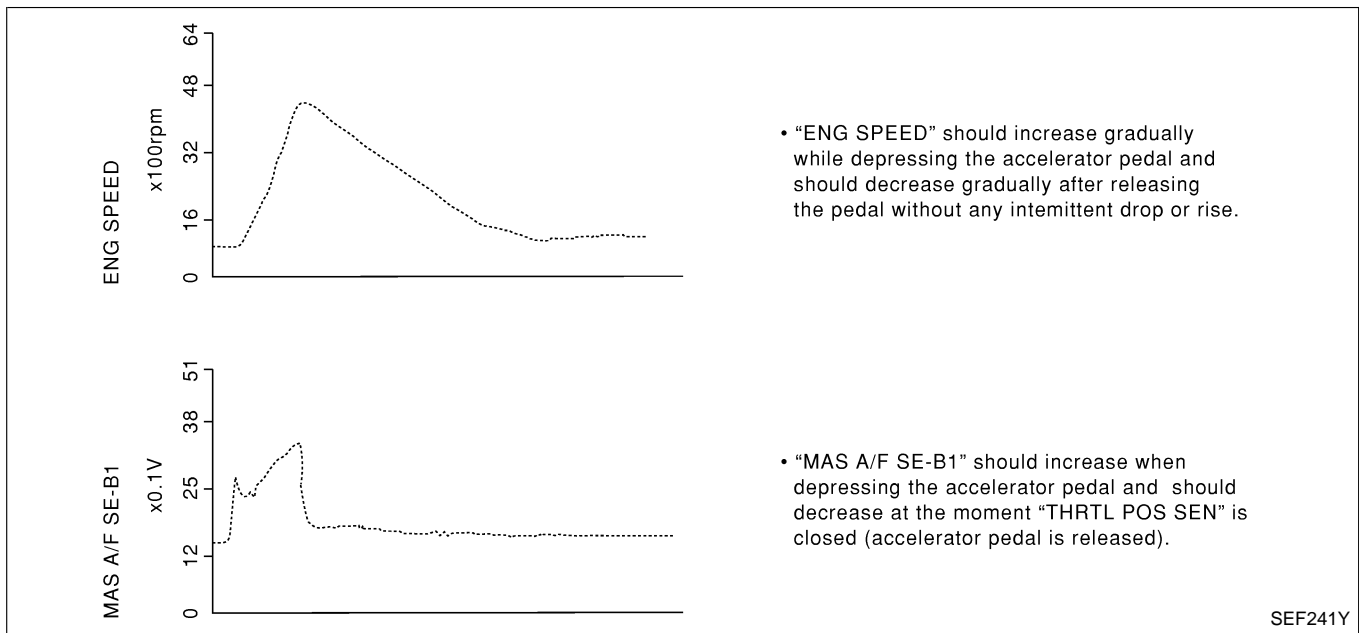
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.

Each value is for reference, the exact value may vary.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



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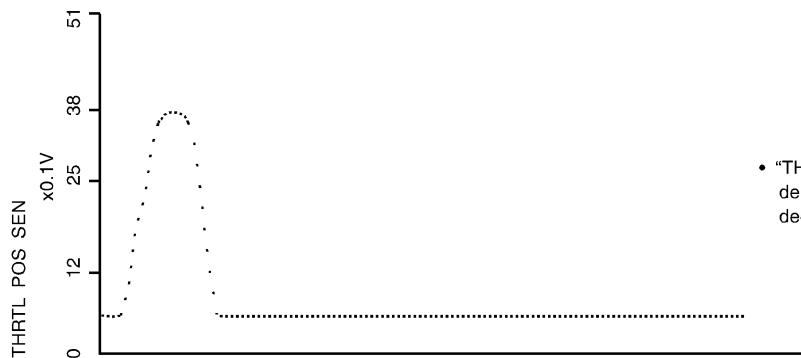
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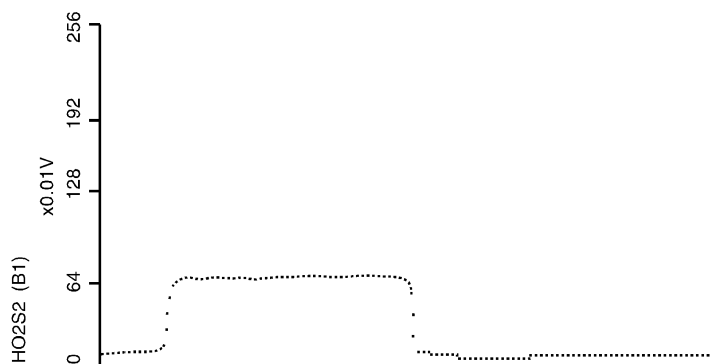
SC

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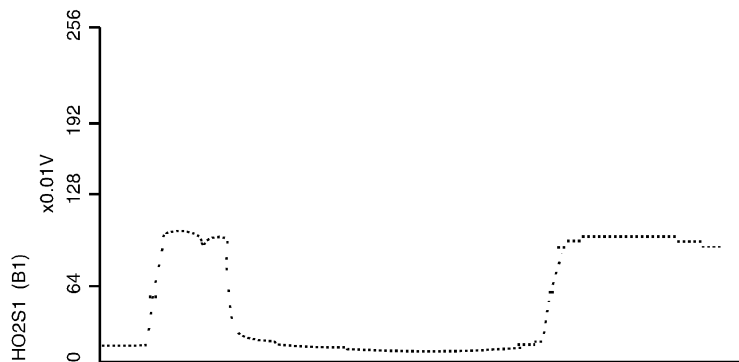
IDX



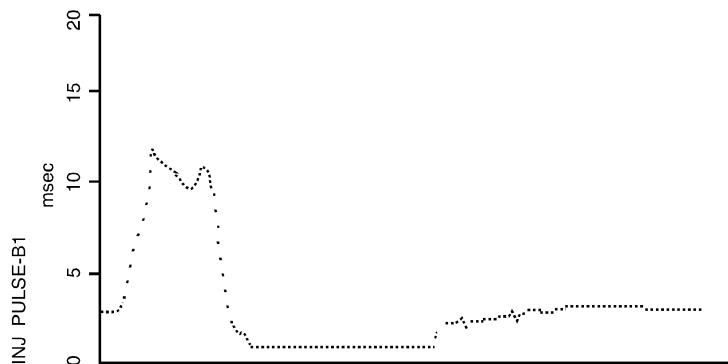
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



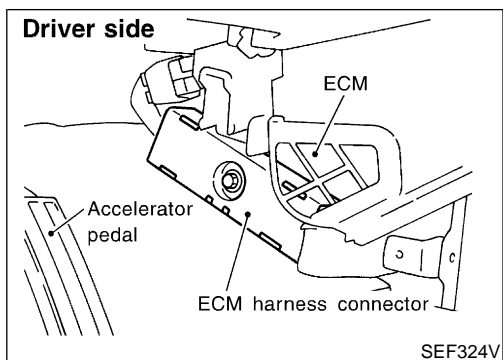
- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.



ECM Terminals and Reference Value

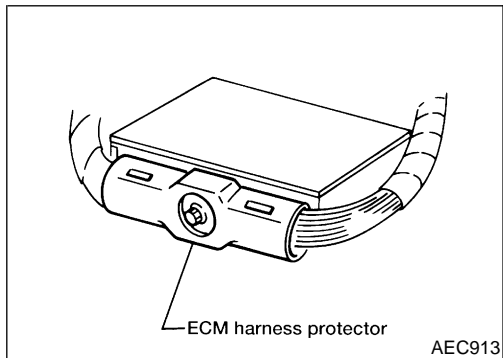
NEEC0044

PREPARATION

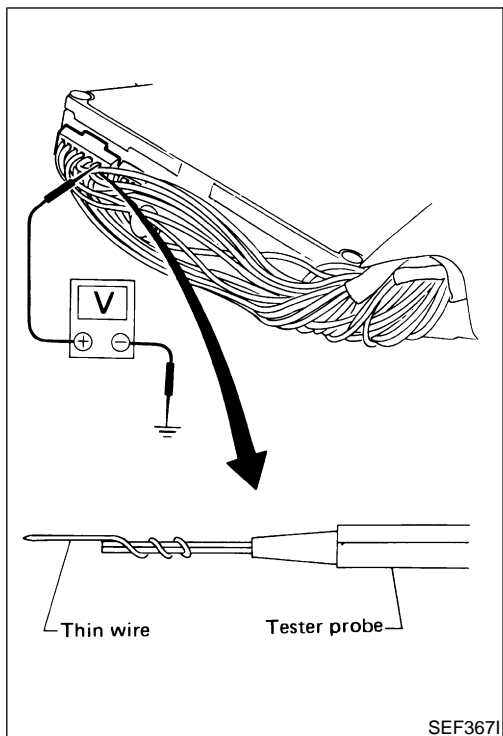
NEEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection:

- Remove instrument lower cover.



2. Remove ECM harness protector.



3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

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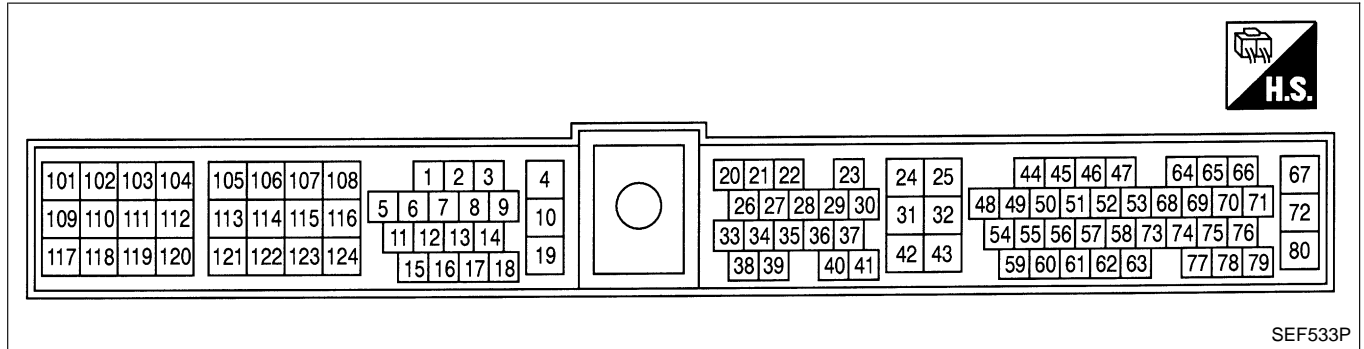
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ECM HARNESS CONNECTOR TERMINAL LAYOUT

NEEC0044S02


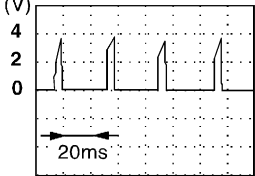
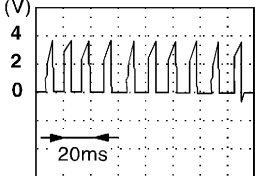
ECM INSPECTION TABLE

NEEC0044S03

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

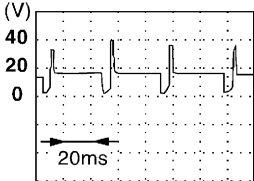
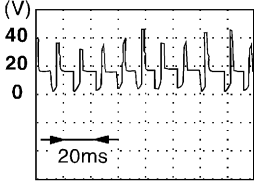
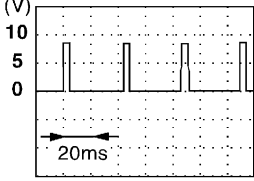
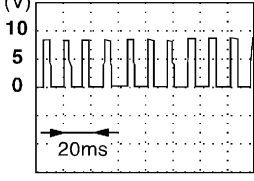
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 0.5V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.2 - 1.0V</p> 

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	B	Ignition check	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>12 - 14V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>12 - 13V</p> 
3	P/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 1V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.5 - 2V</p> 
4	LG/R	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	<p>0 - 1V</p>
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● More than a few seconds after turning ignition switch OFF 	<p>BATTERY VOLTAGE (11 - 14V)</p>

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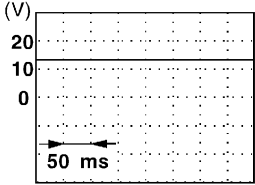
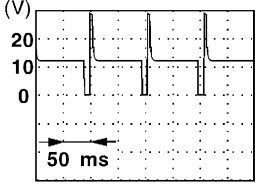
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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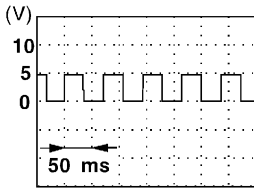
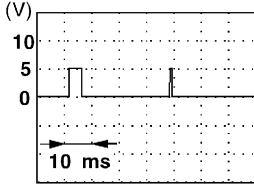
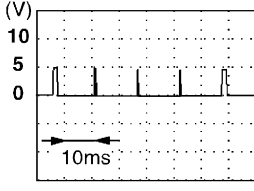
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine) 	<p>12 - 13V</p> 
10	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON. 	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON* *: Any mode except "OFF", ambient air temperature above 10°C (50°F). 	Approximately 0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	<p>[Ignition switch ON]</p>	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
20	L/OR	Start signal	<p>[Ignition switch ON]</p>	Approximately 0V
			<p>[Ignition switch START]</p>	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner dual-pressure switch	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both air conditioner switch and blower switch are ON (Compressor operates) 	Approximately 0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Air conditioner switch is OFF 	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● Gear position is "N" or "P" 	Approximately 0V
			<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● Except the above gear position 	Approximately 5V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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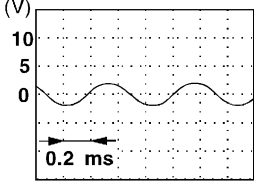
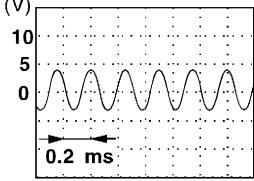
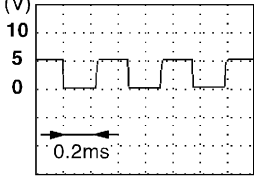
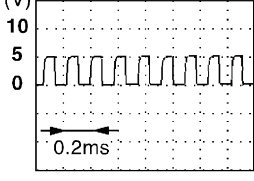
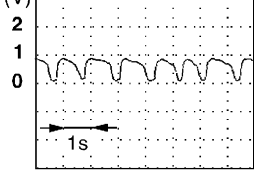
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
23	L	Throttle position sensor	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal fully released	0.2 - 0.8V	GI
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V	MA EM
24	W/G	Ignition switch	[Ignition switch OFF]	0V	LC
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)	EC
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground	FE
28	BR/W	Throttle position switch (Closed position)	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)	CL
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V	MT
29	G/B	Vehicle speed sensor	[Engine is running] ● Lift up the vehicle ● In 2nd gear position ● 40 km/h (25 MPH)	1 - 4V 	AT TF
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground	PD
39	GY/R	Power steering oil pressure switch	[Engine is running] ● Steering wheel is fully turned	Approximately 0V	AX
			[Engine is running] ● Steering wheel is not turned	Approximately 5V	SU
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V	BR
43	B/W	Sensors' ground	[Engine is running] ● Idle speed	Approximately 0V	ST
44	PU	Camshaft position sen- sor (Reference signal)	[Engine is running] ● Warm-up condition ● Idle speed	0.2 - 0.5V 	RS BT
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V 	HA SC EL

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0V 
49	LG	Camshaft position sensor (Position signal)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
50	B	Heated oxygen sensor 1 (front)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V 
54	R	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	0.9 - 1.8V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm	1.8 - 2.3V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

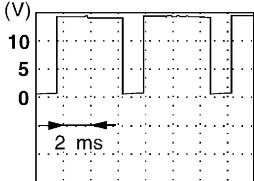
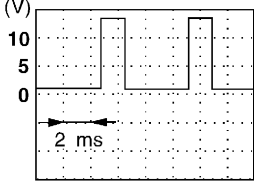
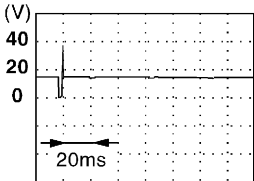
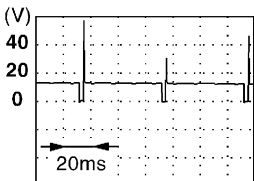
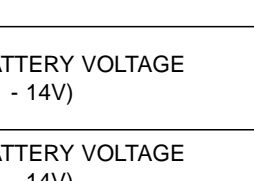
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	G	Mass air flow sensor ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2 (rear)	[Engine is running] ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V
63	G/OR	EGR temperature sensor	[Engine is running] ● Warm-up condition ● Idle speed	Less than 4.5V
			[Engine is running] ● Warm-up condition ● EGR system is operating	0 - 1.5V
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.4V
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
69	LG/R	Data link connector	[Ignition switch ON] ● CONSULT-II or GST is disconnected.	Approximately 2V
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>10.5 - 11.5V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>1 - 13V</p> 
102	W/B	Injector No. 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p> 
104	W/R	Injector No. 3		<p>BATTERY VOLTAGE (11 - 14V)</p> 
109	W/L	Injector No. 2	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p> 
111	W/PU	Injector No. 4		
103	G/W	EGRC-solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly 	BATTERY VOLTAGE (11 - 14V)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
115	L/Y	Torque converter clutch solenoid valve (A/T models only)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Approximately 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
117	B/P	Current return	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor heater 1 (front)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,000 rpm. (All models) 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,000 rpm. (2WD models) ● More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models) 	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor heater 2 (rear)	[Engine is running] <ul style="list-style-type: none"> ● Idle speed after driving 2 minutes at 70 km/h (43 MPH) or more 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine is not running 	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground

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Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

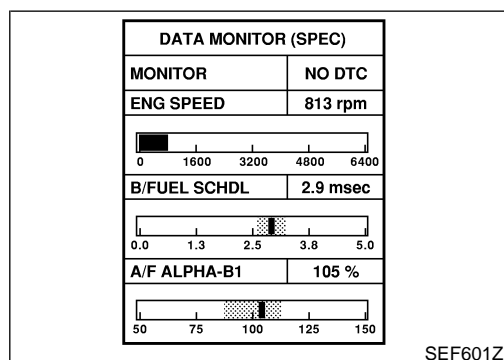
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T or CVT models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T or CVT fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



Inspection Procedure

NOTE:

Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

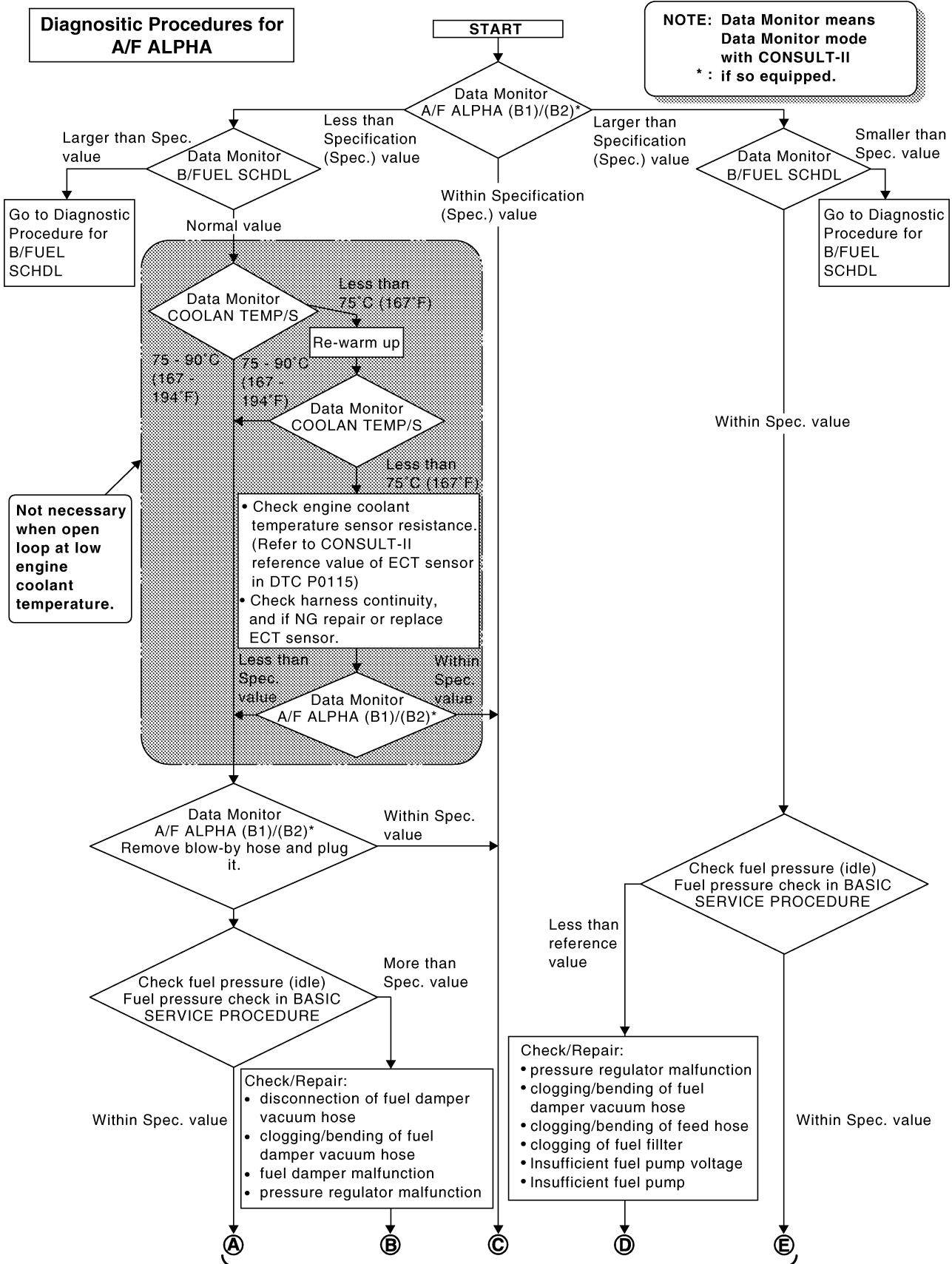
1. Perform “Basic Inspection”, EC-110.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-145.

Diagnostic Procedure

NEEC1006

Diagnostic Procedures for A/F ALPHA

NOTE: Data Monitor means Data Monitor mode with CONSULT-II * : if so equipped.

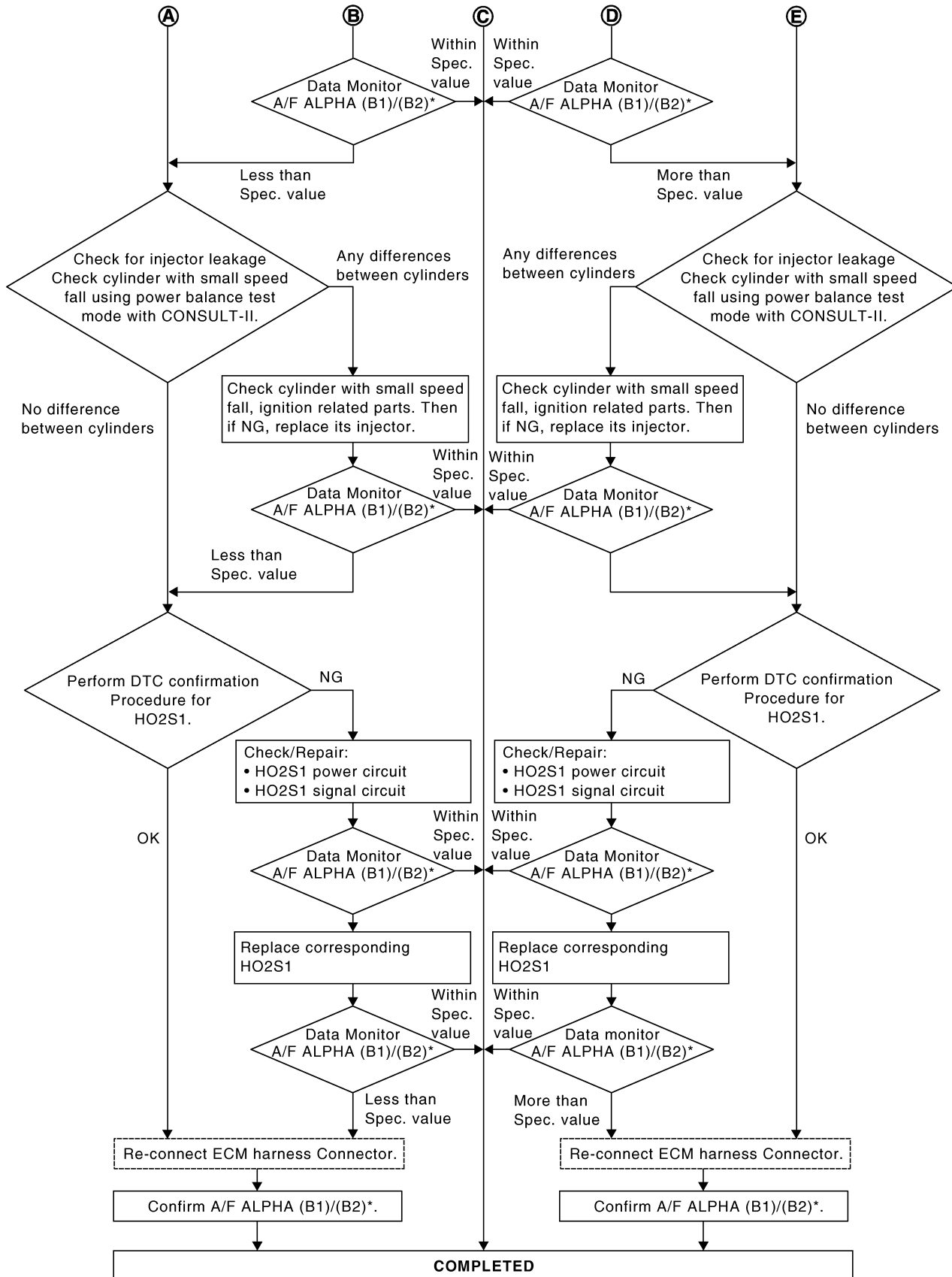


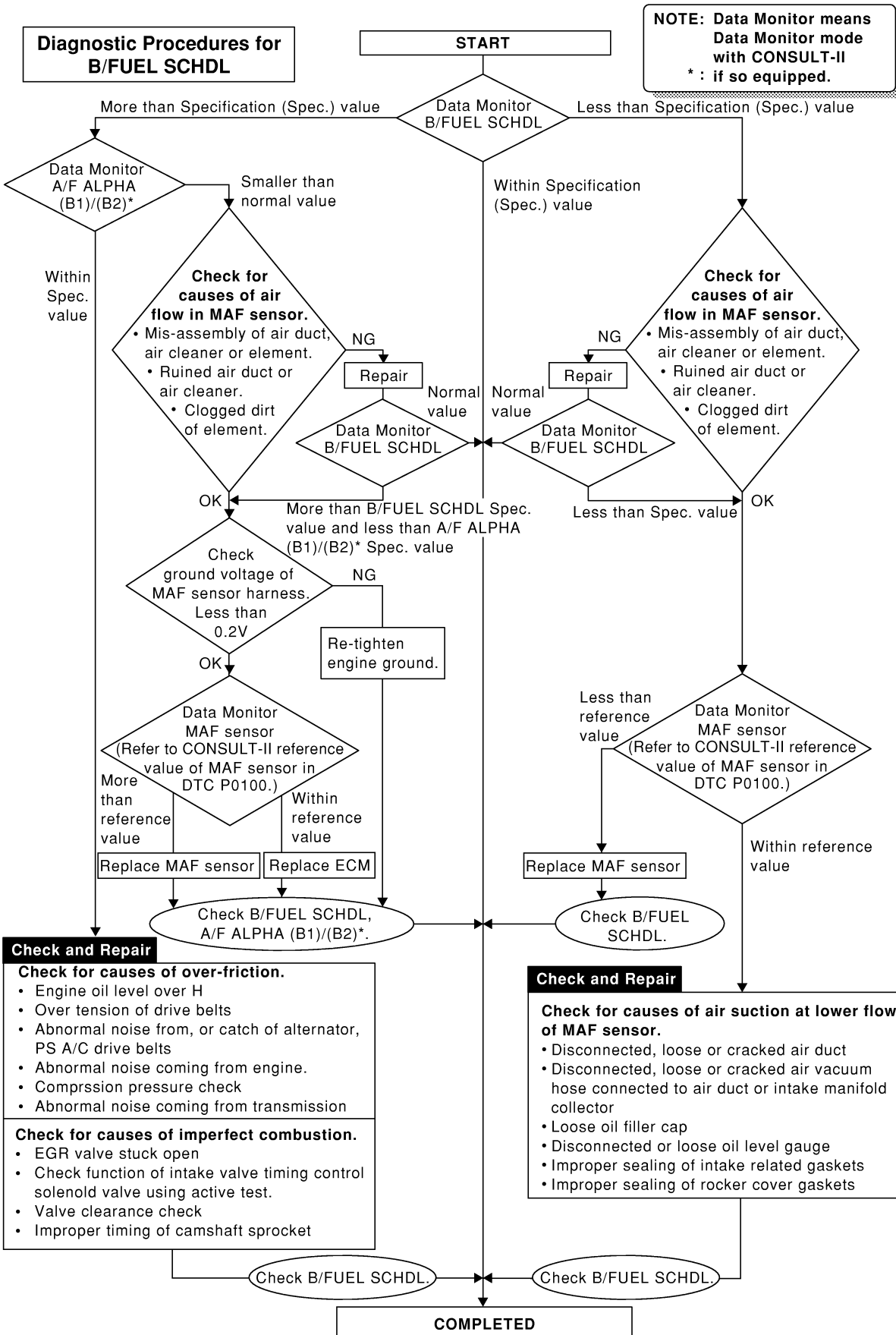
Not necessary when open loop at low engine coolant temperature.

(Go to next page.)

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Description

Description

NEEC0045

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC (1st trip) visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NEEC0045S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "1t".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

NEEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-85.	
	▶ GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-29 .	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

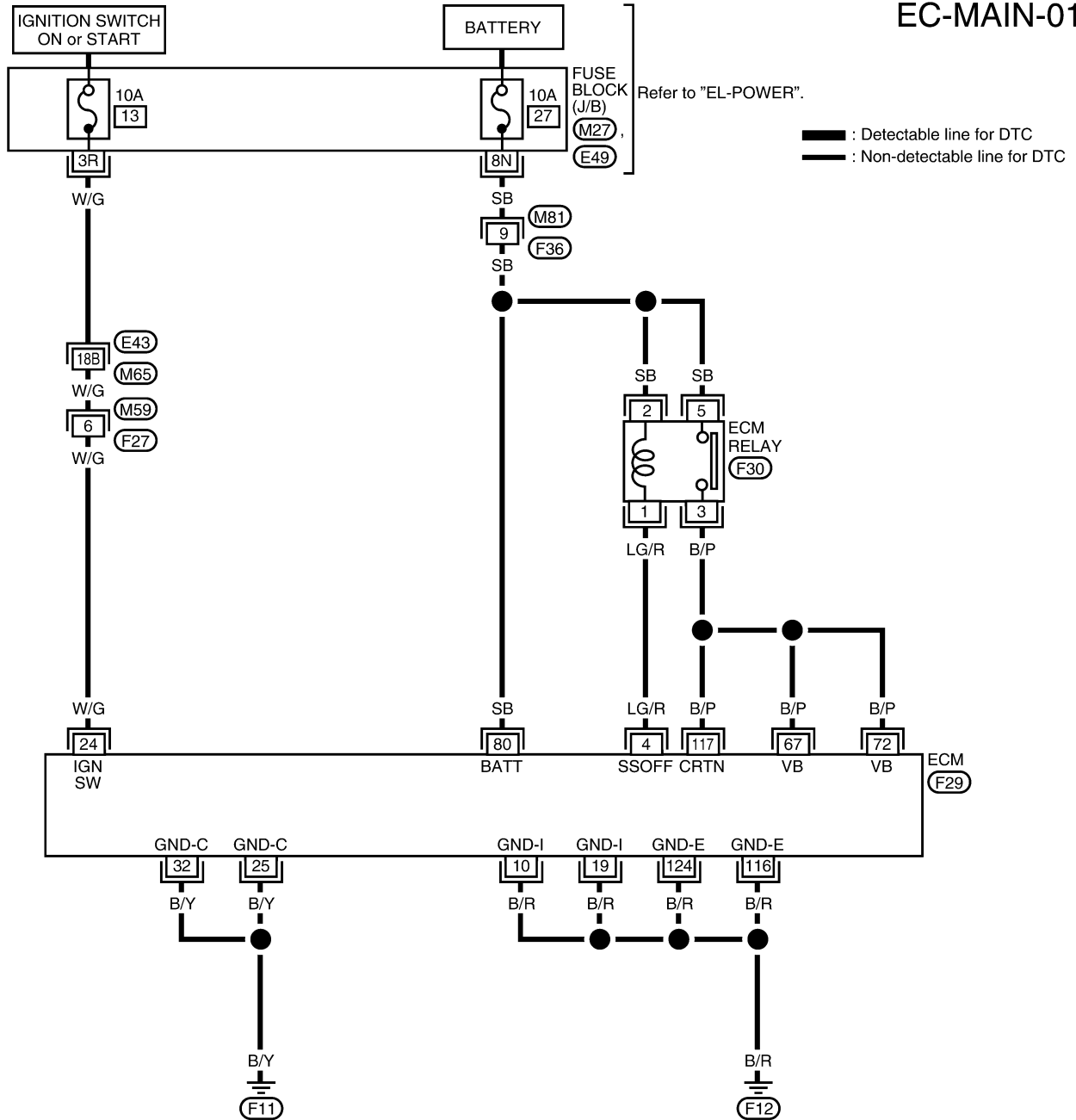
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", GI-24 .	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-21 .	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

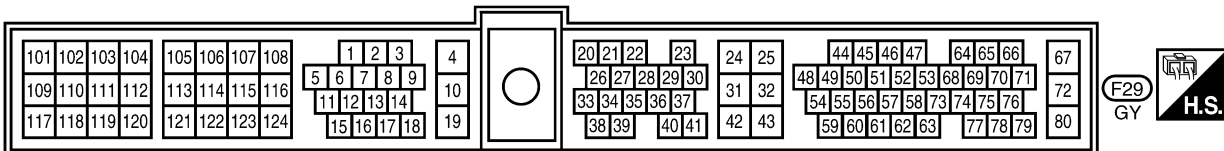
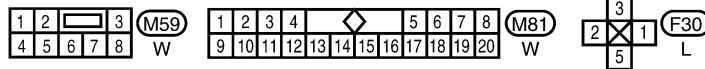
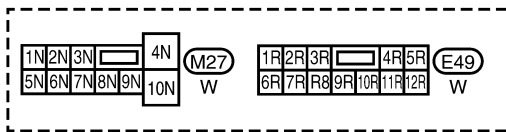
Main Power Supply and Ground Circuit WIRING DIAGRAM

NEEC0047

EC-MAIN-01



Refer to the following.
 M65, E43 - SUPER
 MULTIPLE JUNCTION (SMJ)



GI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

TROUBLE DIAGNOSIS FOR POWER SUPPLY

KA24DE

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NEEC0048

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/G	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground (Probe this terminal with (-) tester probe when measuring)
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

TROUBLE DIAGNOSIS FOR POWER SUPPLY

KA24DE

Main Power Supply and Ground Circuit (Cont'd)

DIAGNOSTIC PROCEDURE

-NEEC0049

1	INSPECTION START	
Start engine. Is engine running?		
Yes or No		
Yes	▶	GO TO 4.
No	▶	GO TO 2.

2	CHECK POWER SUPPLY-I	
<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF600P</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M65, E43 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between ECM and ignition switch 		
	▶	Repair harness or connectors.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

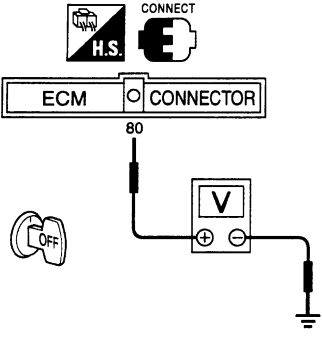
BT

HA

SC

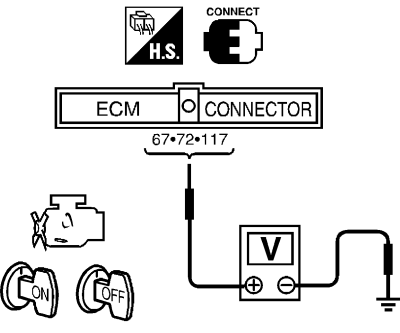
EL

IDX

4	CHECK POWER SUPPLY-II	
<p>1. Stop engine. 2. Check voltage between ECM harness connector F29 terminal 80 and ground with CONSULT-II or tester.</p>		
 <p style="color: blue; margin-left: 100px;">Voltage: Battery voltage</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

MEC698B

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F27, M59 ● 10A fuse ● Harness for open or short between ECM and fuse 		
▶		Repair harness or connectors.

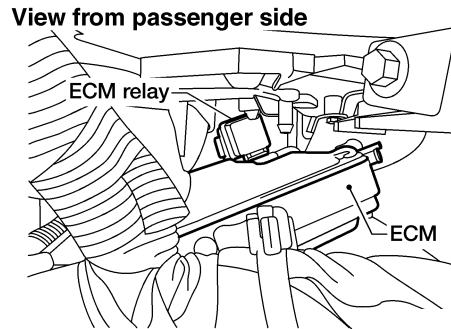
6	CHECK POWER SUPPLY-III	
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM harness connector F29 terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>		
 <p style="color: blue; margin-left: 100px;">Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p>		
OK or NG		
OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 7.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

SEF121V

GI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

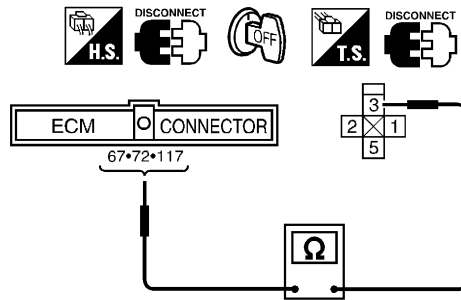
7 CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.



AEC927A

3. Check harness continuity between ECM harness connector F29 terminals 67, 72, 117 and relay harness connector F30 terminal 3.



SEF122V

Continuity should exist.

4. Also check harness for short to ground and short to power.


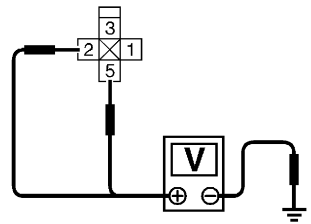
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

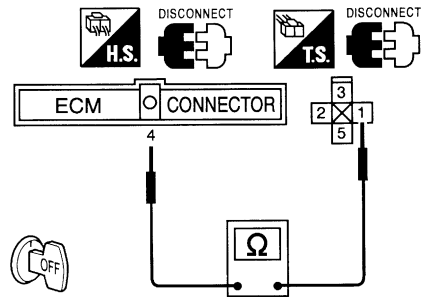
8 DETECT MALFUNCTIONING PART

Check harness for open or short between ECM relay and ECM.

- | | |
|---|--|
| ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |
|---|--|

9	CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND
<p>Check voltage between ECM relay terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
SEF120V	
OK	▶ GO TO 11.
NG	▶ GO TO 10.

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F27, M59 ● 10A fuse ● Harness for open or short between ECM relay and fuse 	
▶	Repair harness or connectors.

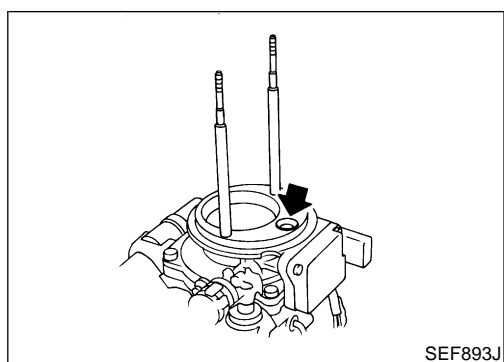
11	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Check harness continuity between ECM harness connector F29 terminal 4 and relay harness connector F30 terminal 1.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
SEF605P	
OK	▶ GO TO 12.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK ECM RELAY	<p>1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5.</p> <div style="text-align: center;"> </div> <p style="color: blue;">12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity</p> <p style="text-align: right;">SEF511P</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p>
OK	▶	GO TO 13.	MT
NG	▶	Replace ECM relay.	AT <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>

13	CHECK GROUND CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM harness connector F29 terminals 10, 19, 25, 32, 116, 124 and engine ground.</p> <div style="text-align: center;"> </div> <p style="color: blue;">Continuity should exist.</p> <p style="text-align: right;">SEF119V</p> <p style="text-align: center;">OK or NG</p>	<p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>
OK	▶	GO TO 14.	RS <p>BT</p>
NG	▶	Repair open circuit or short to power in harness or connectors.	HA <p>SC</p> <p>EL</p>

14	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
▶	INSPECTION END		<p>IDX</p>

Component Description



Component Description

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC0051

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	0.9 - 1.8V
	2,500 rpm	1.9 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	9.5 - 34.0%
	2,500 rpm	13.9 - 24.9%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	0.9 - 5.8 g·m/s
	2,500 rpm	7.5 - 13.2 g·m/s

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC0052

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	0.9 - 1.8V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NEEC0053

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0100	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.
		<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
		<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

NEEC0054

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

DATA MONITOR

MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC0054S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC0054S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

With GST

Follow the procedure "With CONSULT-II".

NOTE:

If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NEEC0054S03

NOTE:

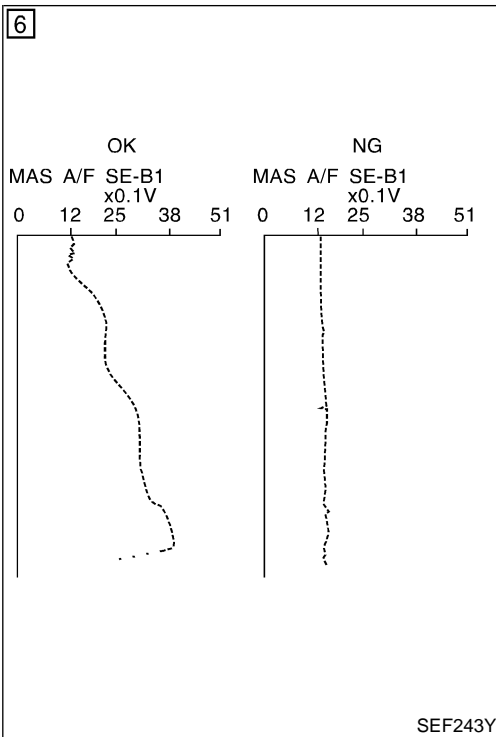
If engine will not start or stops soon wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION D

NEEC0054S04

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature. If engine cannot be started, go to "Diagnostic Procedure", EC-161.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-161.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

NEEC0055

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION D

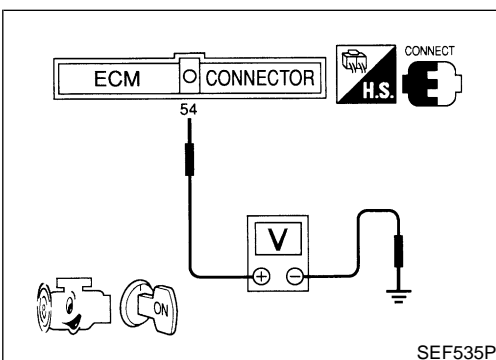
NEEC0055S01

With GST

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Select "MODE 1" with GST.
- 4) Check the mass air flow sensor signal with "MODE 1".
- 5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
- 6) If NG, go to "Diagnostic Procedure", EC-161.

No Tools

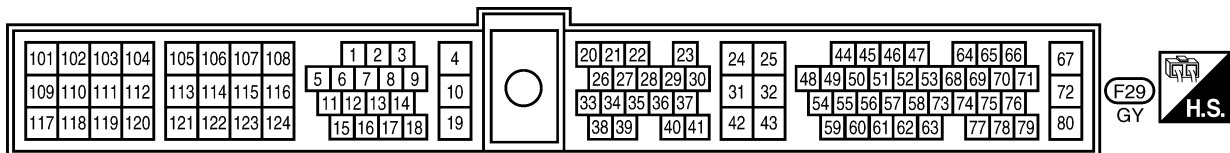
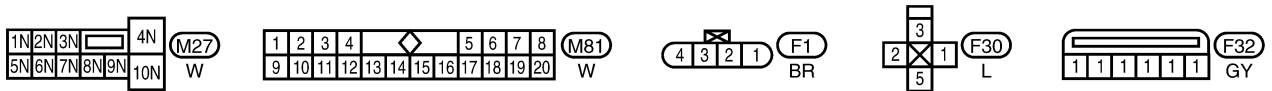
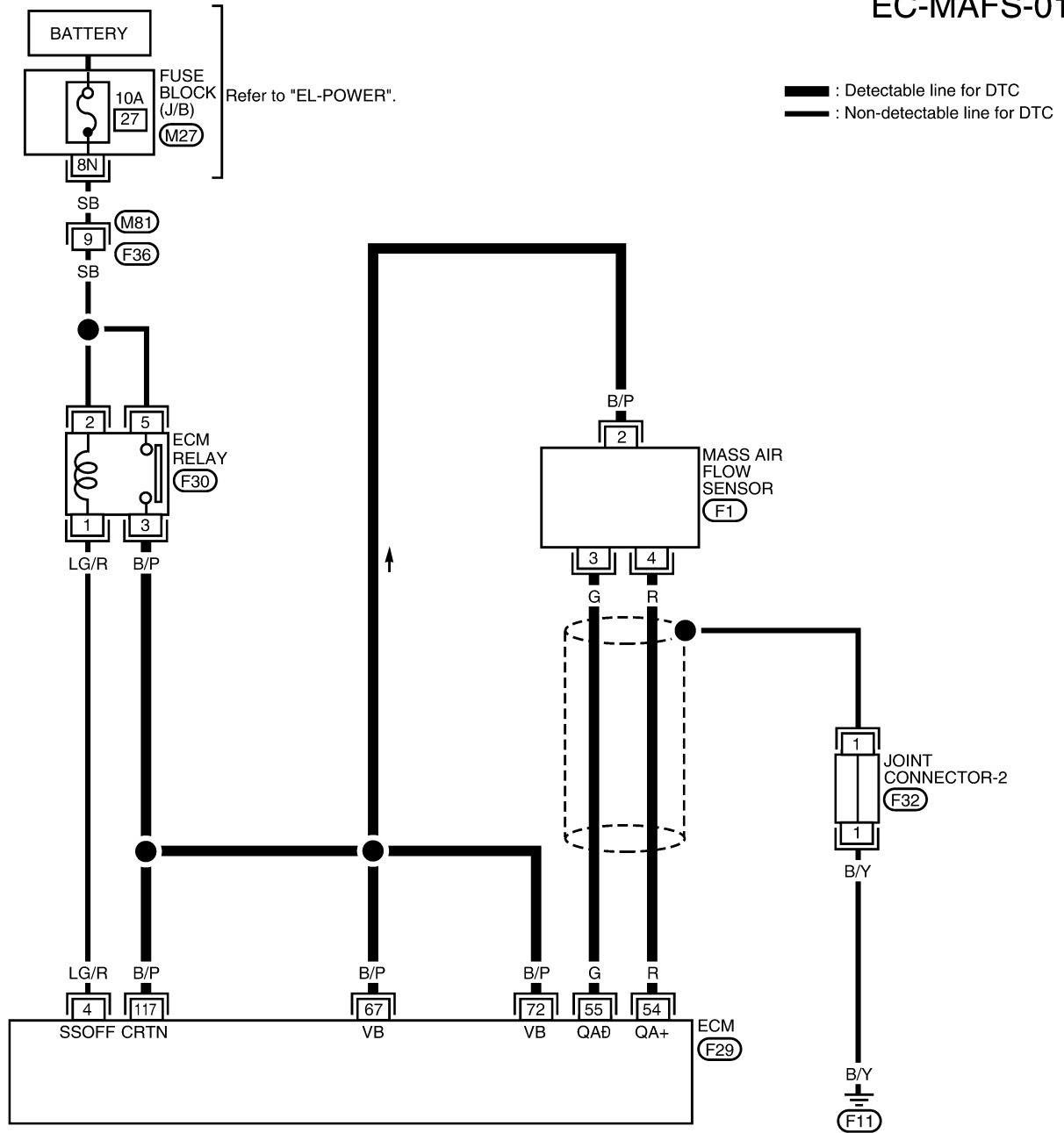
- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Check the voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.
- 4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-161.



Wiring Diagram

NEEC0056

EC-MAFS-01

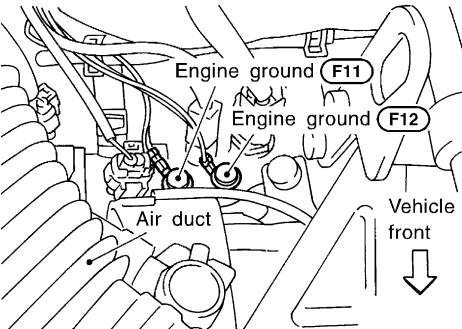


Diagnostic Procedure

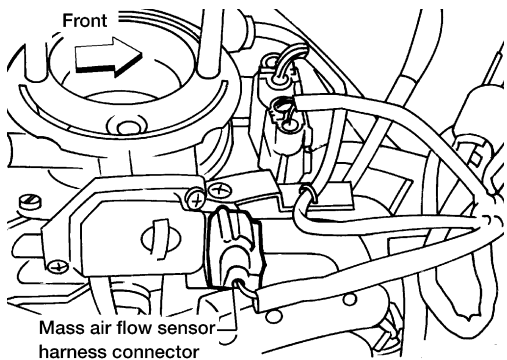
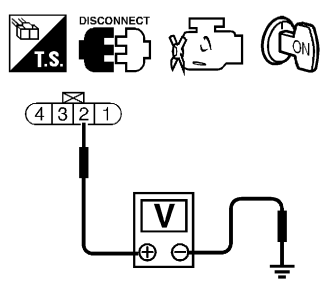
NEEC0057

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td style="text-align: center;">B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the followings for connection.		
<ul style="list-style-type: none"> ● Air duct ● Air cleaner ● Vacuum hoses ● Intake air passage between air duct to collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
		
SEF325V		
▶		GO TO 4.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

4	CHECK POWER SUPPLY		
<p>1. Disconnect Mass air flow sensor harness connector.</p> <div style="text-align: center;">  <p>Front</p> <p>Mass air flow sensor harness connector</p> </div>			
<p>2. Turn ignition switch ON.</p> <p>3. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p>			
			
<p>Voltage: Battery voltage</p>			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

AEC131A

SEF126V

5	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between Mass air flow sensor and ECM 			
		▶	Repair harness or connectors.

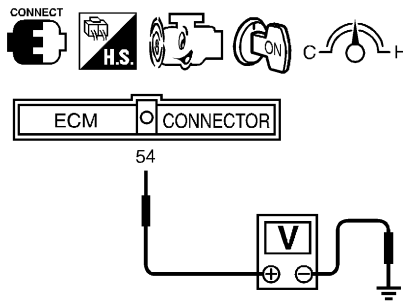
GI
 MA
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6	CHECK GROUND CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between Mass air flow sensor terminal 3 and ECM terminal 55. Refer to EC-160. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF124V</p> <p style="text-align: center; margin: 10px 0;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to power in harness or connectors.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	Repair open circuit or short to power in harness or connectors.
OK	▶	GO TO 7.						
NG	▶	Repair open circuit or short to power in harness or connectors.						

7	CHECK INPUT SIGNAL CIRCUIT	<ol style="list-style-type: none"> 1. Check harness continuity between terminal 4 and ECM terminal 54. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF125V</p> <p style="text-align: center; margin: 10px 0;">Continuity should exist.</p> <ol style="list-style-type: none"> 2. Also check harness for short to ground and short to power. <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 8.						
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.						

8 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



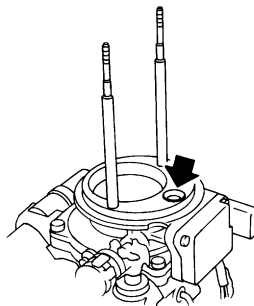
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

MTBL0326

4. If the voltage is out of specification, disconnect Mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove Mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF893J

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9 CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect joint connector-2.
3. Check the following.
 - Continuity between joint connector-1 terminal 1 and ground
 - Joint connector-2
(Refer to "HARNESS LAYOUT", *EL-239*)
Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

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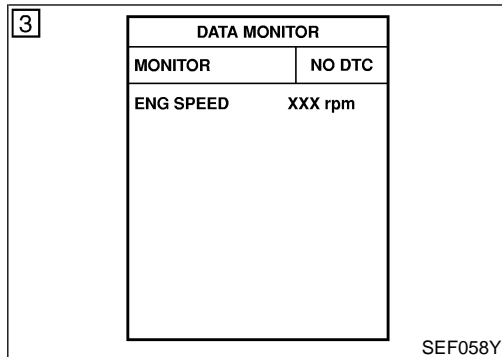
Component Description

The absolute pressure sensor detects ambient barometric pressure. The absolute pressure sensor is built into ECM. NEEC1007

On Board Diagnosis Logic

NEEC1008

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to the micro computer.	<ul style="list-style-type: none"> ● ECM



DTC Confirmation Procedure

NEEC1009

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-167.

With GST

Follow the procedure "With CONSULT-II" above.

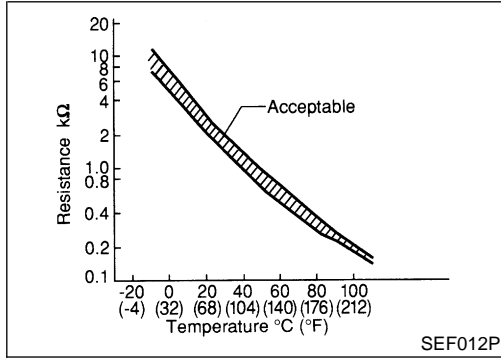
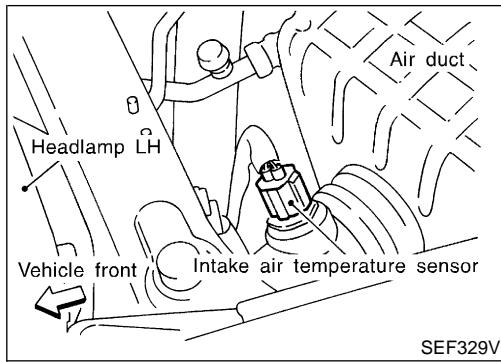
Diagnostic Procedure

NEEC1011

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0105 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0105 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

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Component Description



Component Description

NEEC0066

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0067

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0110	A)	An excessively low or high voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

Engine operating condition in fail-safe mode

The ECM functions on the assumption that the intake air temperature is 25°C (77°F).

DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-171.

With GST

Follow the procedure "With CONSULT-II".

5	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
 - a) Turn ignition switch ON.
 - b) Select "DATA MONITOR" mode with CONSULT-II.
 - c) Check the engine coolant temperature.
 - d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-171.

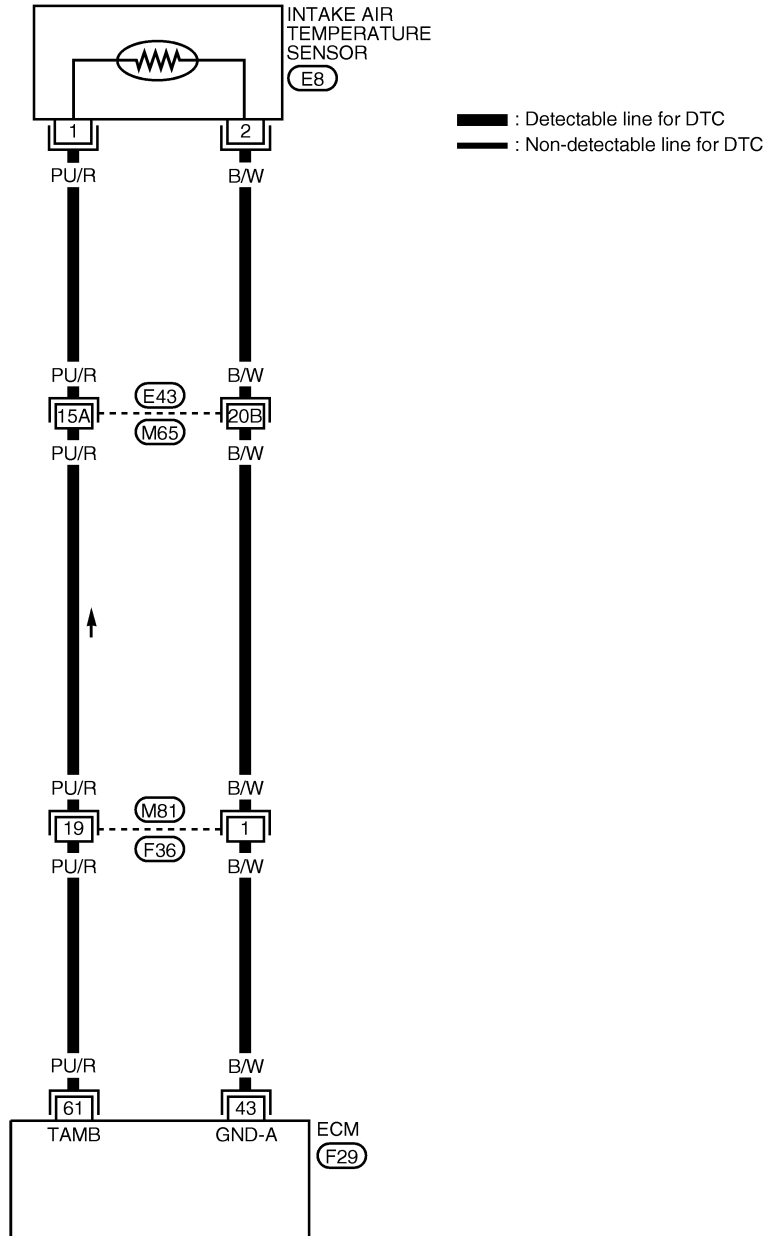
With GST

Follow the procedure "With CONSULT-II".

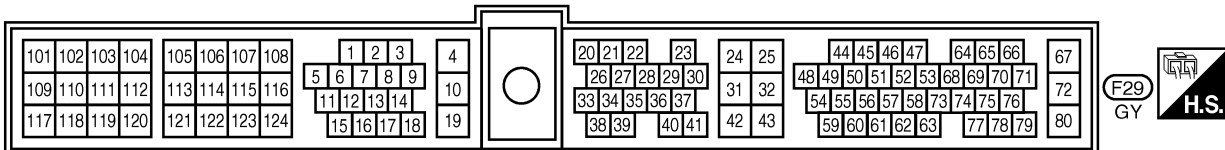
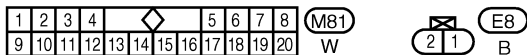
Wiring Diagram

NEEC0069

EC-IATS-01

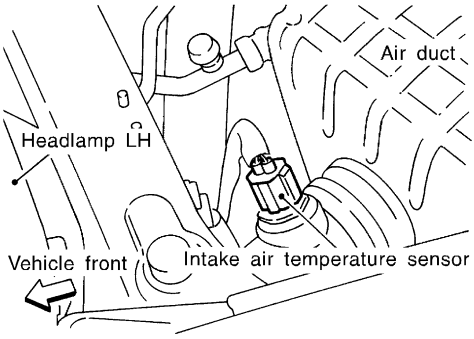
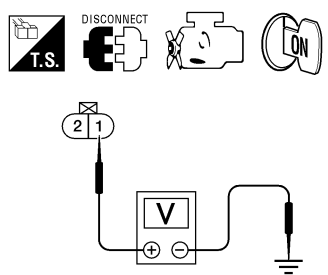


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NEEC0070

1	CHECK POWER SUPPLY		
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div>	GI MA EM LC EC FE CL MT AT TF PD AX
		<p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	SEF329V AEC570A
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

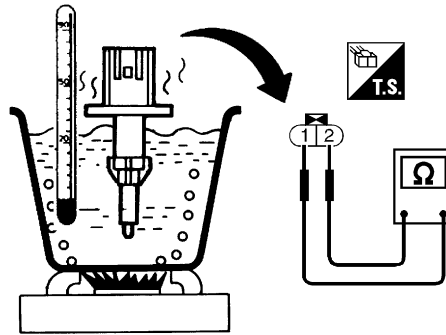
2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness connectors M59, F27 ● Harness for open or short between ECM and intake air temperature sensor 	SU BR ST RS BT HA SC EL IDX
		▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to the wiring diagram.</p> <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF102S</p> <p style="text-align: center; color: blue; font-weight: bold;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness connectors M59, F27 ● Harness for open or short between ECM and intake air temperature sensor 	
	▶	Repair open circuit or short to power in harness or connectors.	

5 CHECK INTAKE AIR TEMPERATURE SENSOR

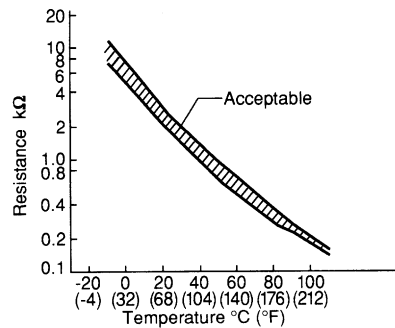
Check resistance as shown in the figure.



<Reference data>

EGR coolant temperature °C (°F)	Voltage* V	Resistance k Ω
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal ⑤9 (Engine coolant temperature sensor) and ECM terminal ③2 (ECM ground).


OK or NG

OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

 ▶ **INSPECTION END**

SEF205W

MTBL0327

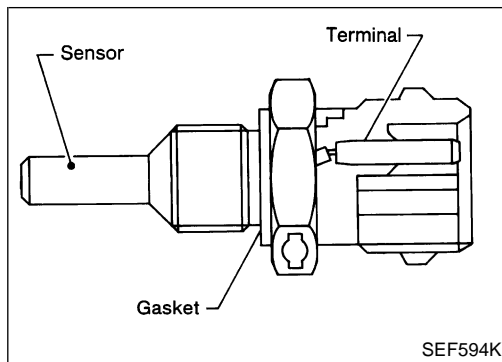
SEF012P

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DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

KA24DE

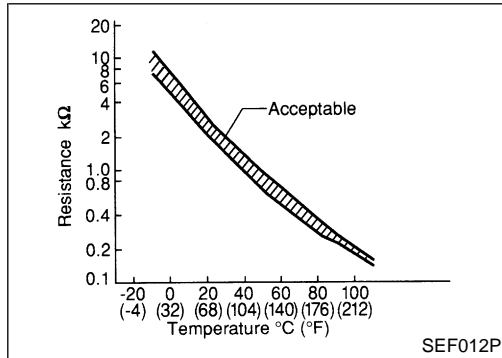
Component Description



Component Description

NEEC0072

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0073

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	● Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

NEEC0074

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0115	● An excessively high or low voltage from the sensor is sent to ECM.*	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

KA24DE

On Board Diagnosis Logic (Cont'd)

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned to ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

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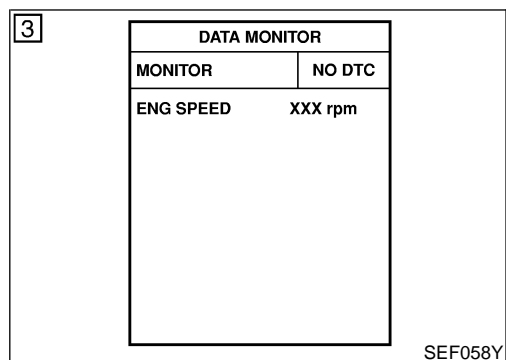
LC

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DTC Confirmation Procedure

NEEC0075

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-177.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

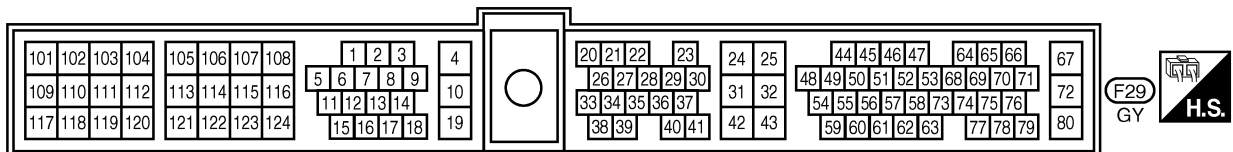
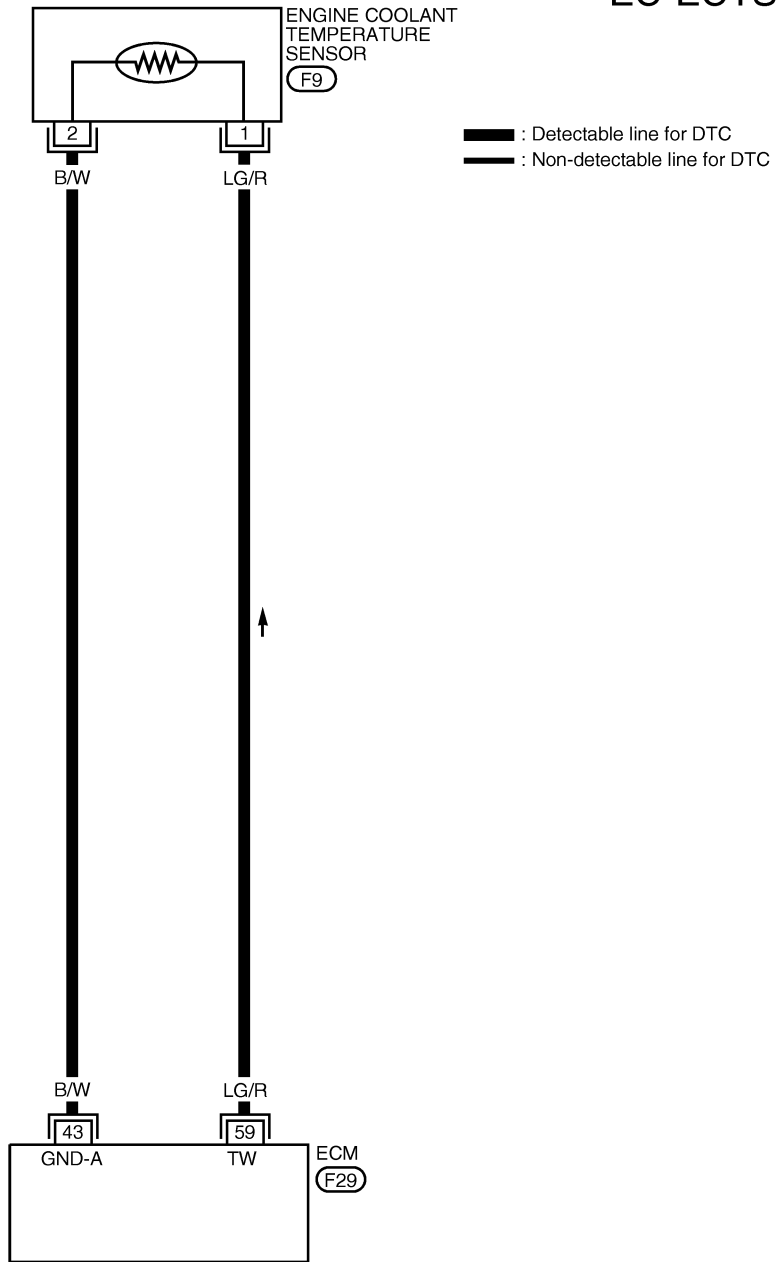
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0076

EC-ECTS-01



AEC984A

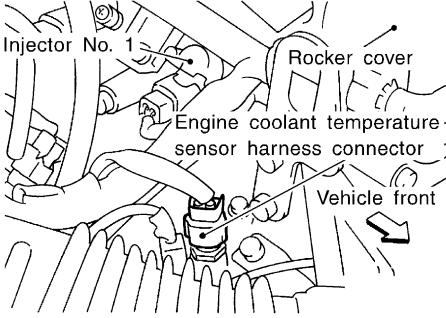
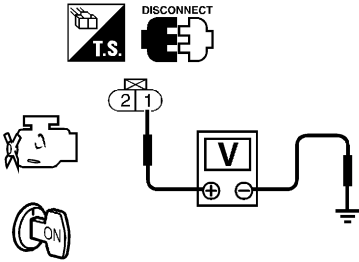
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0077

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p>		
		
<p>3. Turn ignition switch ON. 4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Approximately 5V</p>		
<p>OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF330V

SEF206W

2	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and engine coolant temperature sensor.		
		▶ Repair harness or connectors.

3	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to EC-176. Continuity should exist. 3. Also check harness for short to power.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and engine coolant temperature sensor.		
		▶ Repair open circuit or short to power in harness or connectors.

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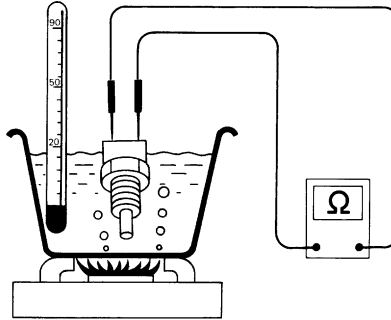
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

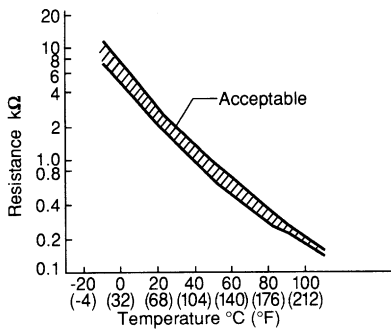
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0285

SEF012P

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

▶ **INSPECTION END**

Component Description

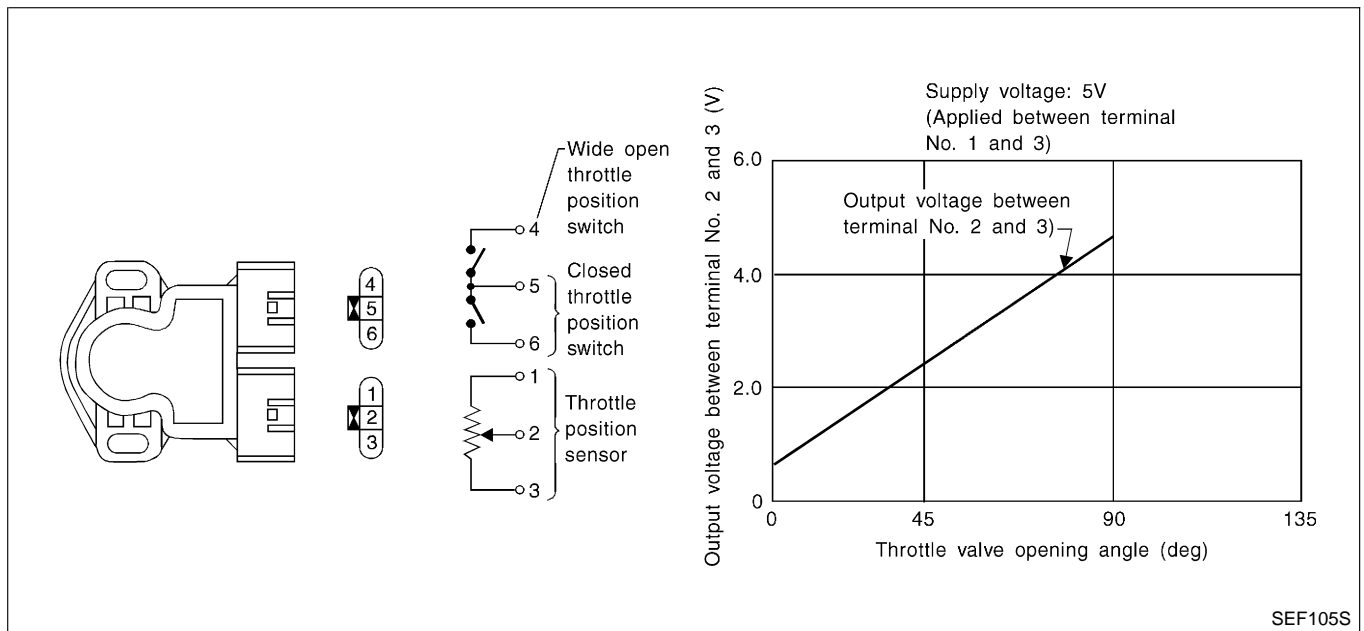
NEEC0079

NOTE:

If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-440.

The throttle position sensor responds to the accelerator pedal movement. This sensor is a type of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

NEEC0080

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL POS SEN	● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed 0.2 - 0.8V
	● Engine: After warming up	Throttle valve: fully opened 3.5 - 4.5V
ABSOL TH-P/S	● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed 0.0%
	● Engine: After warming up	Throttle valve: fully opened Approx. 80%

DTC P0120 THROTTLE POSITION SENSOR

KA24DE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NEEC0081

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	B/W	Sensors' ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NEEC0082

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0120	A)	An excessively low or high voltage from the sensor is sent to ECM.*	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

*: When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
When accelerating	Poor acceleration	

DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF

SEF065Y

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

With GST

Follow the procedure "With CONSULT-II".

No Tools

- 1) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC0083S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.

Selector lever	Suitable position except "N" (Higher gear position such as 3rd or 4th is better to keep low engine rpm.)
Accelerator pedal	Released
Vehicle speed	As slow as possible

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

With GST

Follow the procedure "With CONSULT-II".

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NEEC0083S03

CAUTION:

Always drive vehicle at a safe speed.

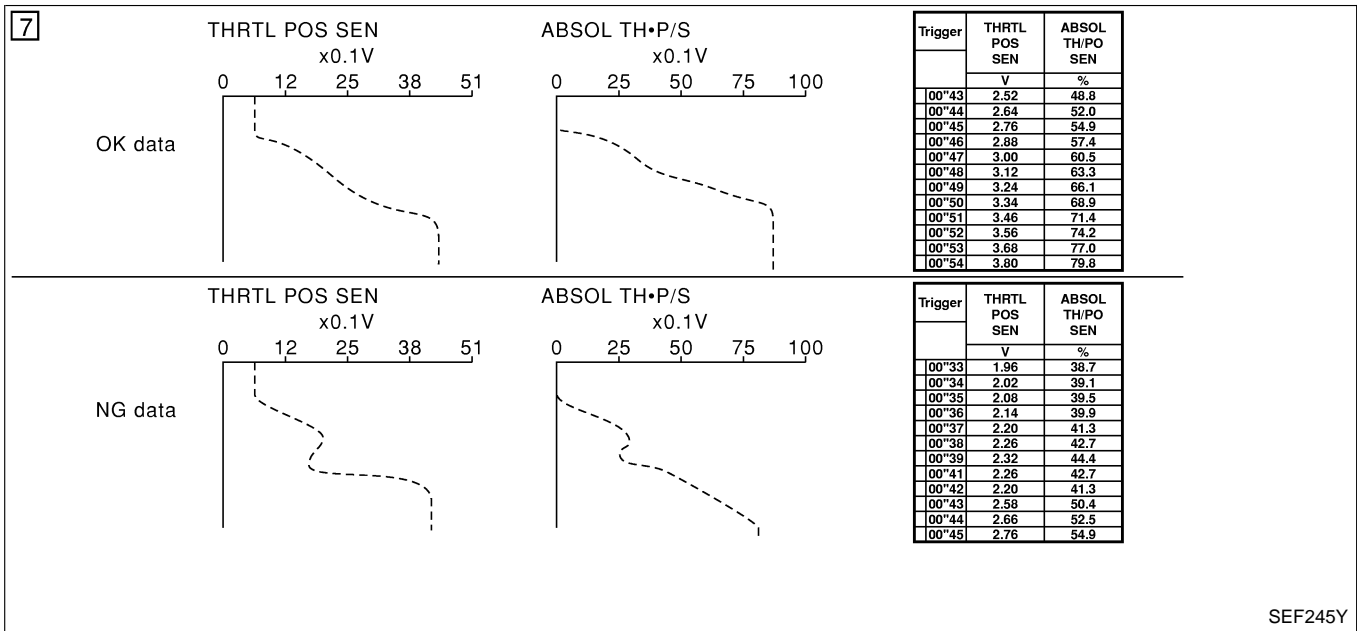
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
- 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
- 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
 If NG, go to "Diagnostic Procedure", EC-185.
 If OK, go to following step.

DTC P0120 THROTTLE POSITION SENSOR

KA24DE

DTC Confirmation Procedure (Cont'd)



9

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

SEF178Y

- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

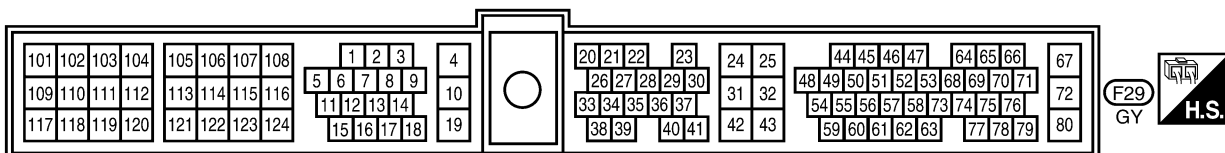
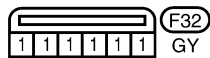
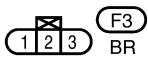
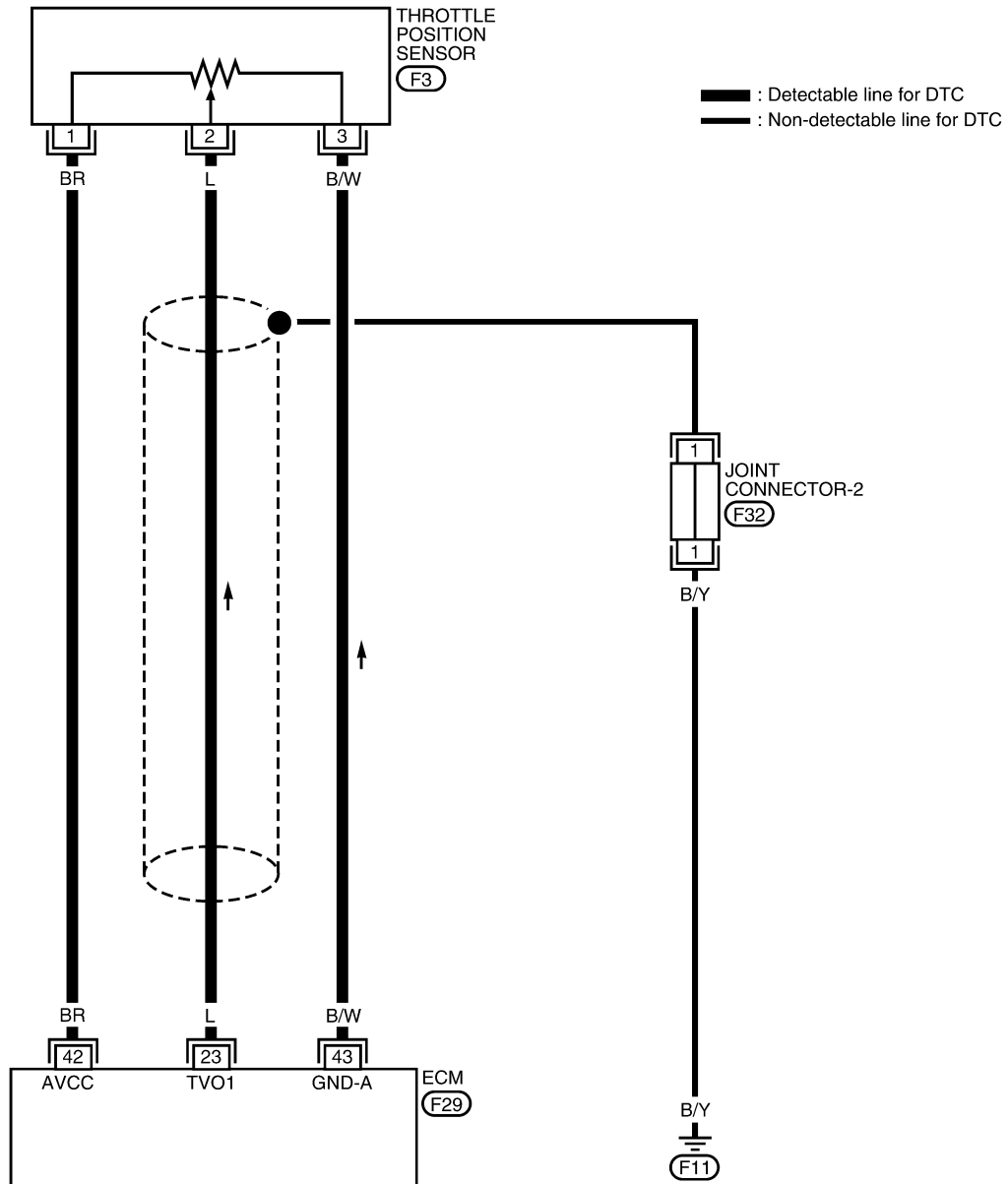
With GST
Follow the procedure "With CONSULT-II".

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Wiring Diagram

NEEC0084

EC-TPS-01



Diagnostic Procedure

NEEC0085

1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

GI
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2	ADJUST THROTTLE POSITION SENSOR											
1. Check the following items. Refer to "Basic Inspection", EC-110.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
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Target idle speed	800 ± 50 rpm (in "P" or "N" position)											
MTBL0328												
OK or NG												
OK	▶	GO TO 3.										

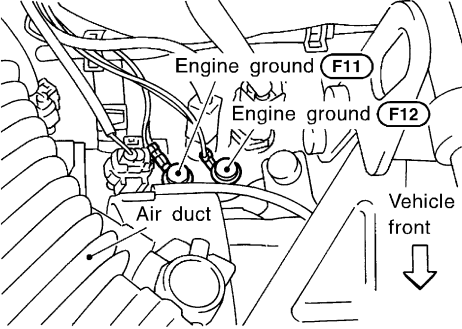
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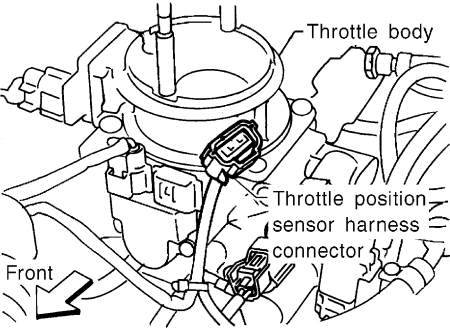
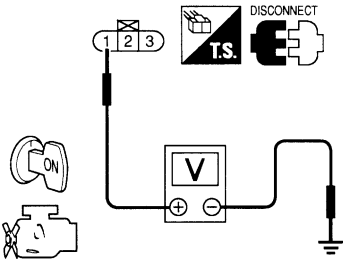
3	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Air cleaner ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

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4	RETIGHTEN GROUND SCREWS	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
			SEF325V
▶		GO TO 5.	

5	CHECK POWER SUPPLY	<ol style="list-style-type: none"> 1. Disconnect throttle position sensor harness connector. 	
			SEF265S
		<ol style="list-style-type: none"> 2. Turn ignition switch ON. 3. Check voltage between terminal 1 and ground with CONSULT-II or tester. 	
			SEF564P
		Voltage: Approximately 5V	
		OK or NG	
OK ▶		GO TO 6.	
NG ▶		Repair harness or connectors.	

6	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to the wiring diagram.</p>		
SEF565P		
<p>Continuity should exist.</p> <p>3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check harness for open or short between ECM and throttle position sensor.		
▶ Repair open circuit or short to power in harness or connectors.		

8	CHECK INPUT SIGNAL CIRCUIT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 23 and terminal 2. Refer to "Wiring Diagram", EC-184</p> <p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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9	CHECK THROTTLE POSITION SENSOR											
<p> With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and turn ignition switch ON. 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Check voltage of "THRTL POS SEN" under the following conditions. </p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
COOLAN TEMP/S	XXX °C											
THRTL POS SEN	XXX V											
<p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Throttle valve conditions</th> <th>Voltage V</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td>0.2 - 0.8 (a)</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open</td> <td>3.5 - 4.5 (b)</td> </tr> </tbody> </table>			Throttle valve conditions	Voltage V	Completely closed	0.2 - 0.8 (a)	Partially open	Between (a) and (b)	Completely open	3.5 - 4.5 (b)		
Throttle valve conditions	Voltage V											
Completely closed	0.2 - 0.8 (a)											
Partially open	Between (a) and (b)											
Completely open	3.5 - 4.5 (b)											
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.</p>												
OK or NG												
OK (Type B in step 1)	▶	GO TO 11.										
OK (Type A or C in step 1)	▶	GO TO 14.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-110.										

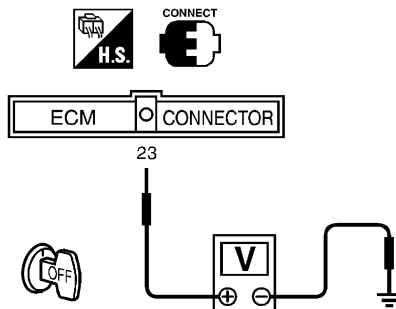
SEF179Y

MTBL0579

10 CHECK THROTTLE POSITION SENSOR

⊗ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.



NOTE:

Voltage measurement must be made with throttle position sensor installed in vehicle.

SEF767W

Throttle valve conditions	Voltage V
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

MTBL0579

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

OK or NG

OK (Type B in step 1)	▶	GO TO 11.
OK (Type A or C in step 1)	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-110.

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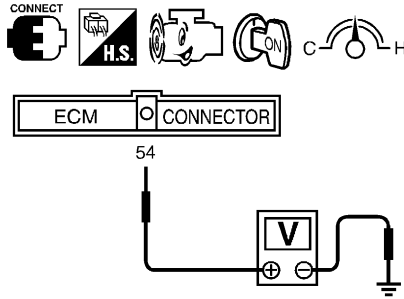
SC

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11 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



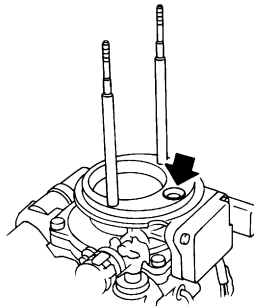
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

MTBL0326

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF893J

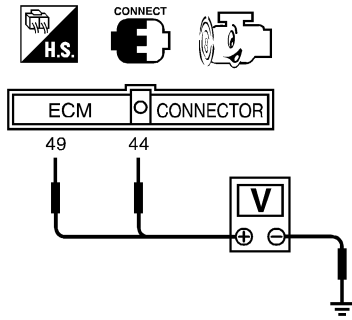
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

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12 CHECK CAMSHAFT POSITION SENSOR

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground, ECM terminal 44 and engine ground.


Terminal 44 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

SEF868Z

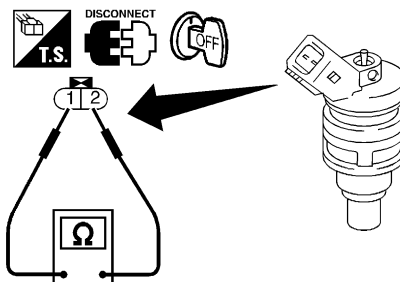
OK or NG

OK ► GO TO 13.

NG ► Replace distributor assembly with camshaft position sensor.

13 CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.


Resistance: 10 - 14Ω [at 25°C (77°F)]

SEF273W

OK or NG

OK ► GO TO 14.

NG ► Replace fuel injector.

DTC P0120 THROTTLE POSITION SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

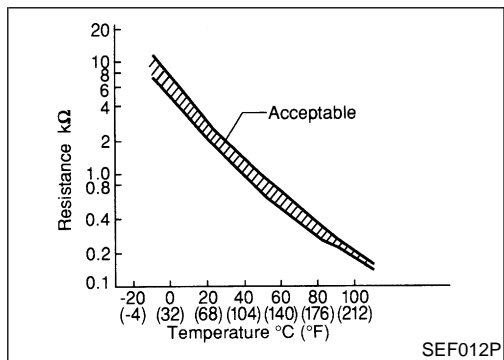
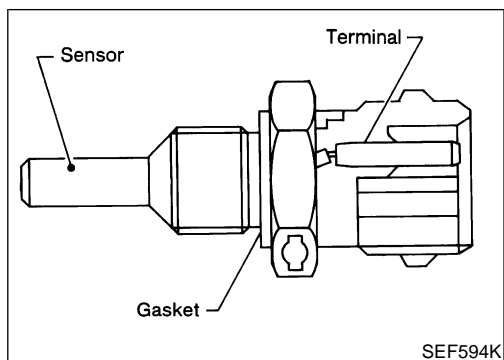
14	CHECK SHIELD CIRCUIT
<p>1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector-1 terminal 1 and ground● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-239</i>) <p>Continuity should exist.</p> <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ Repair open circuit or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

KA24DE

Component Description



Component Description

NEEC0087

NOTE:

If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-174.

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

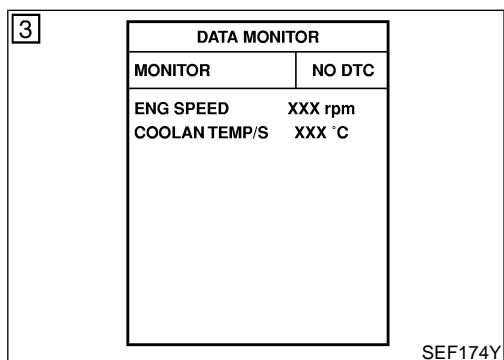
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0089

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125	<ul style="list-style-type: none"> Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat



DTC Confirmation Procedure

NEEC0090

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-II.

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

KA24DE

DTC Confirmation Procedure (Cont'd)

- 3) Start engine and run it for 65 minutes at idle speed.
If **“COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.**
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-196.



With GST

Follow the procedure “With CONSULT-II”.

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

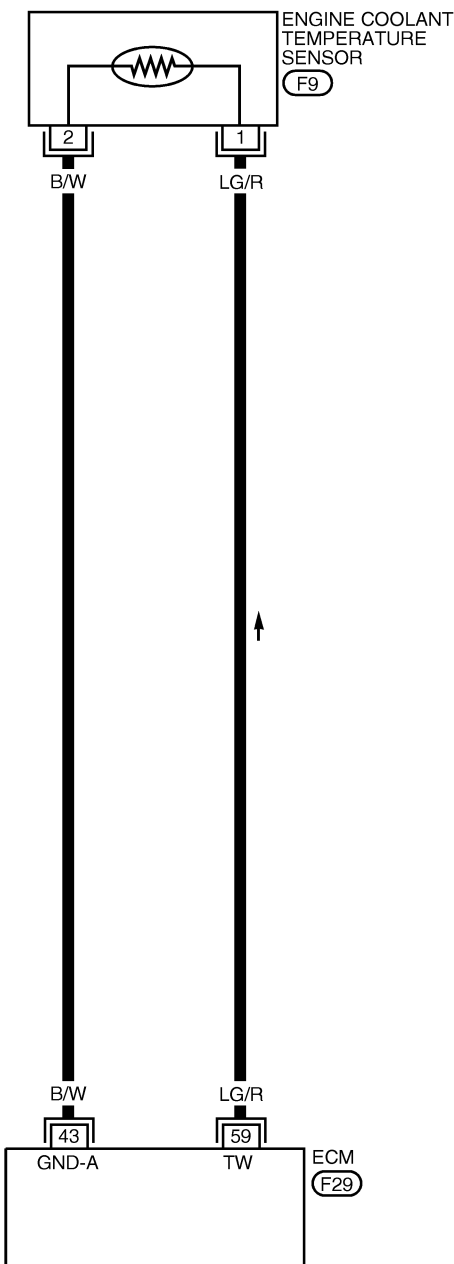
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0091

EC-ECTS-01



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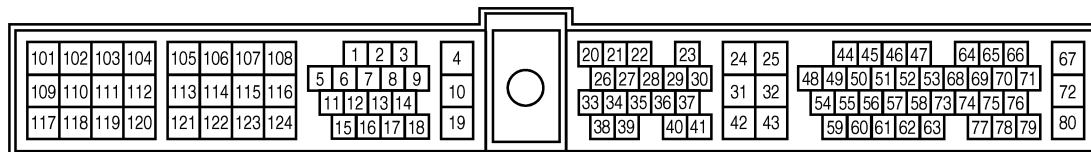
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AEC984A

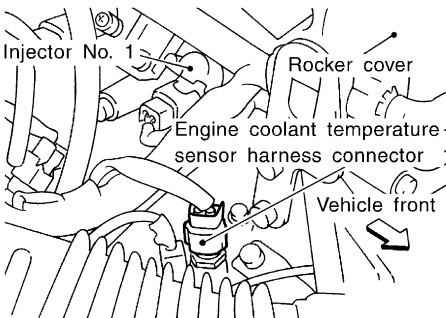
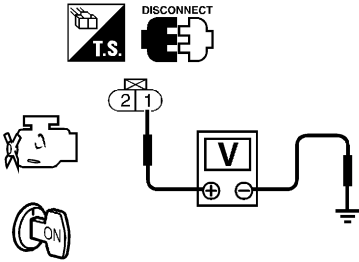
DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0092

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p>		
		
SEF330V		
<p>3. Turn ignition switch ON. 4. Check voltage between coolant temperature sensor connector F9 terminal 1 and ground with CONSULT-II or tester.</p>		
		
SEF206W		
Voltage: Approximately 5V		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair harness or connectors.	

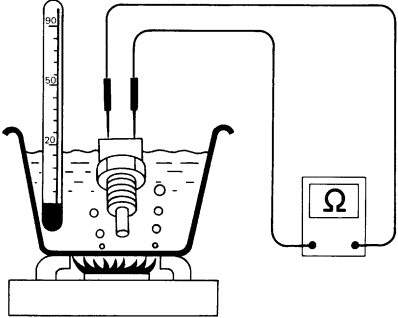
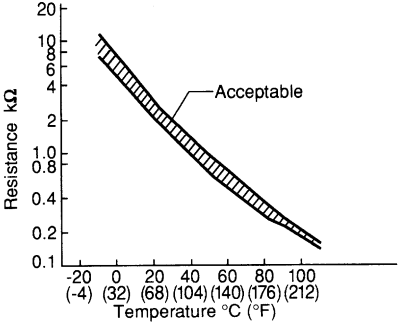
3	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between engine coolant temperature sensor connector F9 terminal 2 and engine ground. Refer to the wiring diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair open circuit or short to power in harness or connectors.	

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

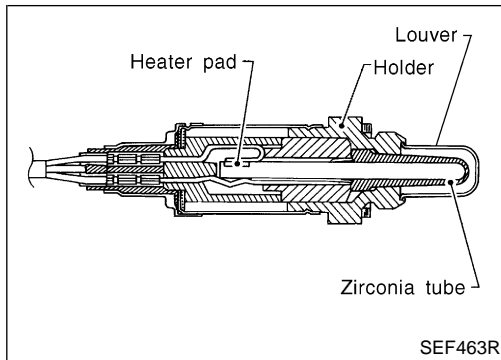
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR	<p>Check resistance as shown in the figure.</p> <div style="text-align: center;">  </div> <p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: center;">OK or NG</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; border-right: 1px solid black;">▶</td> <td style="padding: 5px;">GO TO 6.</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">NG</td> <td style="text-align: center; border-right: 1px solid black;">▶</td> <td style="padding: 5px;">Replace engine coolant temperature sensor.</td> </tr> </table>	Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260	OK	▶	GO TO 6.	NG	▶	Replace engine coolant temperature sensor.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p>
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OK	▶	GO TO 6.															
NG	▶	Replace engine coolant temperature sensor.															

6	CHECK THERMOSTAT OPERATION	<p>When the engine is cooled [lower than 76.5°C (170°F)], condition grasp lower radiator hose and confirm the engine coolant does not flow.</p> <p style="text-align: center;">OK or NG</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; border-right: 1px solid black;">▶</td> <td style="padding: 5px;">GO TO 7.</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">NG</td> <td style="text-align: center; border-right: 1px solid black;">▶</td> <td style="padding: 5px;">Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", LC-13.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", LC-13 .	<p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p>
OK	▶	GO TO 7.							
NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", LC-13 .							

7	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black; padding: 5px;"></td> <td style="width: 5%; text-align: center; border-right: 1px solid black;">▶</td> <td style="padding: 5px;">INSPECTION END</td> </tr> </table>		▶	INSPECTION END	<p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
	▶	INSPECTION END				

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

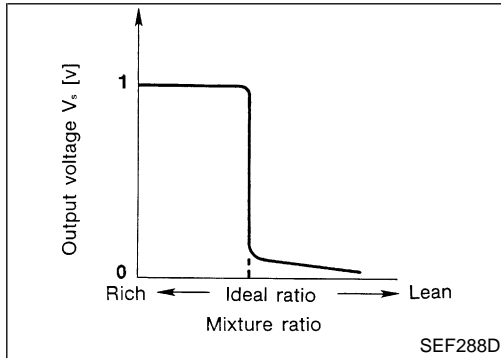
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0094



SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NEEC0095

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0096

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

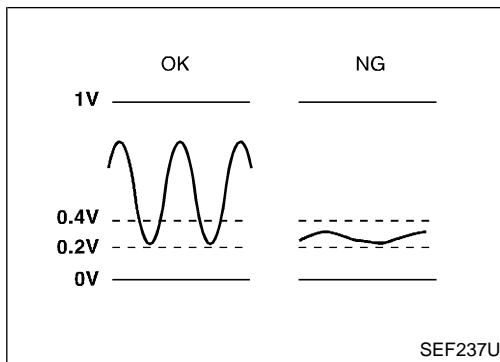
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front)	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>

SEF008W

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

On Board Diagnosis Logic



On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 ^{NEEC0097}(front) signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130	<ul style="list-style-type: none"> The voltage from the sensor is constantly approx. 0.3V. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1 (front)

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

On Board Diagnosis Logic (Cont'd)

5	HO2S1 (B1) P0130	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V
		SEF643Y

5	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V
		SEF644Y

5	HO2S1 (B1) P0130	
	COMPLETED	
		SEF645Y

DTC Confirmation Procedure

=NEEC0098

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

⑤ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1) P0130" of "HO2S1 (front)" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START".
- 4) Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 4.

- 5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 4,000 rpm
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	3.5 - 17 msec
Selector lever	Suitable position

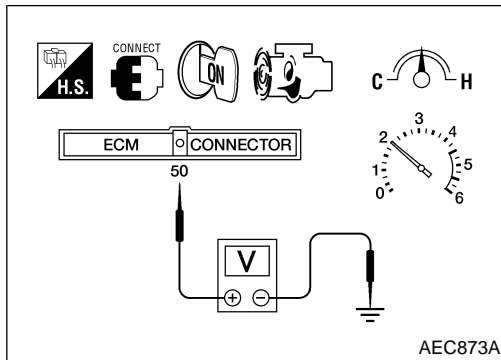
If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-203.

During this test, P1148 may be displayed on CONSULT-II screen.

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0099

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-203.

GI

MA

EM

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AX

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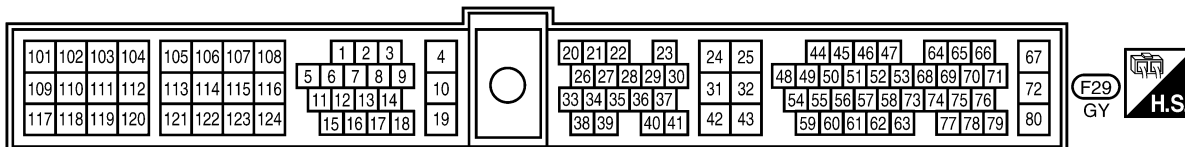
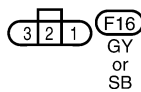
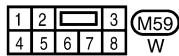
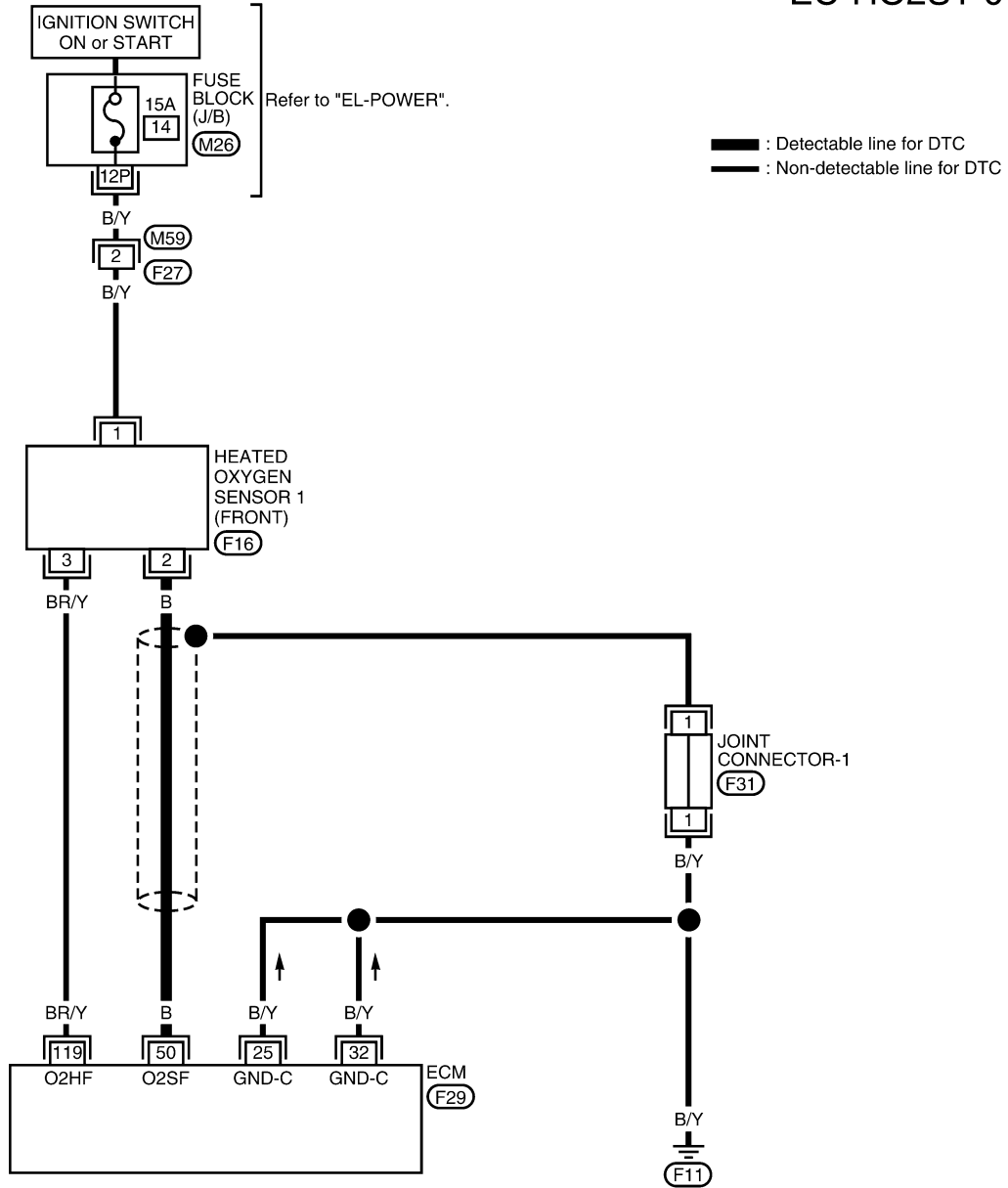
DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

Wiring Diagram

Wiring Diagram

NEEC0100

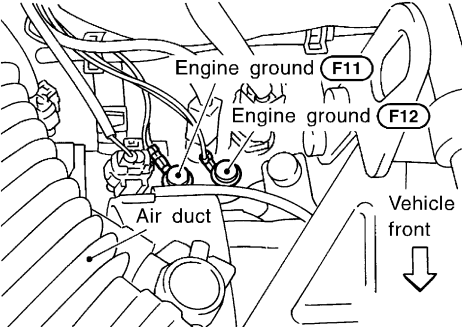
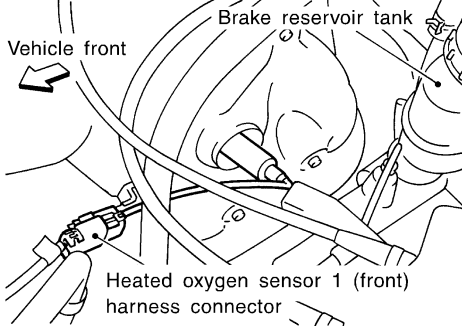
EC-HO2S1-01

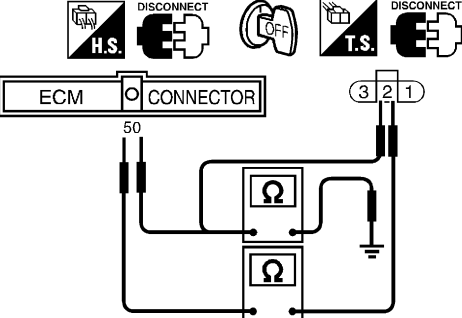


WEC150A

Diagnostic Procedure

NEEC0101

1	INSPECTION START	<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div> <p>3. Disconnect heated oxygen sensor 1 (front) harness connector.</p> <div style="text-align: center;">  </div>	<p>GI MA EM LC EC FE CL MT AT TF</p>
▶ GO TO 2.		<p>SEF325V SEF331VA</p>	

2	CHECK INPUT SIGNAL CIRCUIT	<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM harness connector F29 terminal 50 and terminal 2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Continuity should exist.</p> <p>3. Check harness continuity between ECM harness connector F29 terminal 50 (or terminal 2) and ground. Continuity should not exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>AX SU BR ST RS BT HA</p>
▶		<p>SEF141V</p>	
▶		<p>GO TO 3.</p>	
▶		<p>GO TO 4.</p>	
▶		<p>Repair open circuit or short to ground or short to power in harness or connectors.</p>	<p>SC EL IDX</p>

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

Diagnostic Procedure (Cont'd)

3 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

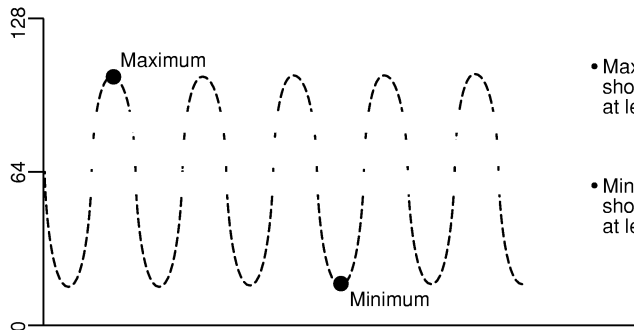
R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"
 L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

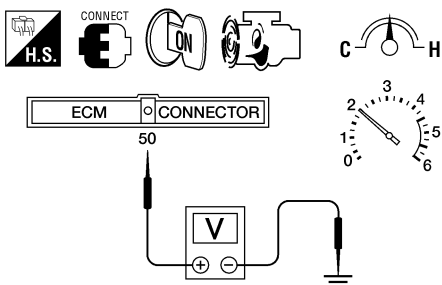
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0130 HEATED OXYGEN SENSOR 1 (FRONT) (CIRCUIT) KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground. 		
		
AEC873A		
<ol style="list-style-type: none"> Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V The maximum voltage is over 0.6V at least one time. The minimum voltage is below 0.3V at least one time. The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> 		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK SHIELD CIRCUIT	
<ol style="list-style-type: none"> Turn ignition switch OFF. Remove joint connector-1. Check the following. <ul style="list-style-type: none"> Continuity between joint connector-1 terminal 1 and ground Joint connector-1 (Refer to "HARNESS LAYOUT", EL-239.) Continuity should exist. Also check harness for short to power. Then reconnect joint connector. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to power in harness or connectors.

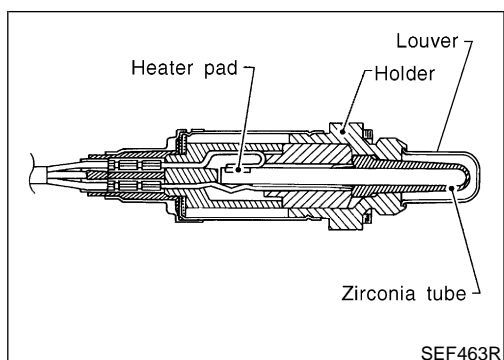
6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
	▶	INSPECTION END

GI
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DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

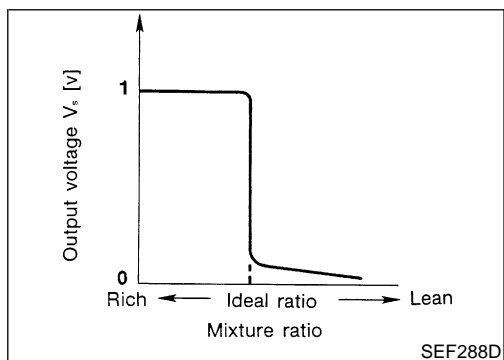
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0103



SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NEEC0104

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0105

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

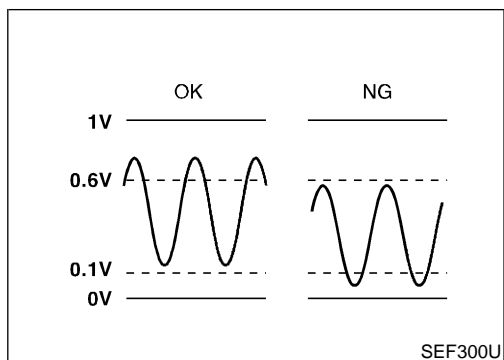
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front)	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> <p>SEF008W</p>

DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0106

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131	<ul style="list-style-type: none"> The maximum and minimum voltages from the sensor are not reached to the specified voltages. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 (front) Heated oxygen sensor 1 heater (front) Fuel pressure Injectors Intake air leaks

6	HO2S1 (B1) P0131	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V

SEF649Y

6	HO2S1 (B1) P0131	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V

SEF650Y

6	HO2S1 (B1) P0131	
	COMPLETED	

SEF651Y

DTC Confirmation Procedure

NEEC0107

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch ON and select “HO2S1 (B1) P0131” of “HO2S1 (front)” in “DTC WORK SUPPORT” mode with CONSULT-II.
- Touch “START”.
- Start engine and let it idle for at least 3.0 minutes.

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (Less than 62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Selector lever	Suitable position

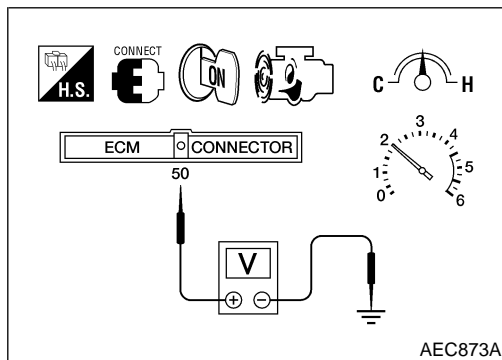
DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

DTC Confirmation Procedure (Cont'd)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-208.



Overall Function Check

NEEC0108

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-208.

Diagnostic Procedure

NEEC0109

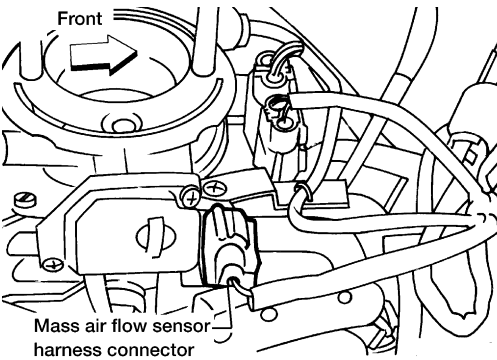
1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1 (front). 	
<p>Vehicle front Heated oxygen sensor 1 (front) Ⓜ 40 - 60 (4.1 - 6.1, 30 - 44) Ⓜ : N·m (kg-m, ft-lb)</p>	
<p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 2.

SEF332VA

DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

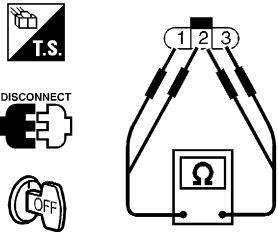
Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA.								
		<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 150px; margin: 0 auto;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px; text-align: center;">B1 100%</td> </tr> <tr> <td colspan="2" style="padding: 2px; text-align: center;">CLEAR</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF215Z</p>	WORK SUPPORT		SELF-LEARNING CONT	B1 100%	CLEAR		<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p>
WORK SUPPORT									
SELF-LEARNING CONT	B1 100%								
CLEAR									
		<p>4. Run engine for at least 10 minutes at idle speed.</p> <p>Is the 1st trip DTC P0171 detected? Is it difficult to start engine?</p>							
		<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">Mass air flow sensor harness connector</p> </div> <p style="text-align: right; margin-right: 20px;">AEC131A</p>	<p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p>						
		<ol style="list-style-type: none"> 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0171 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p>							
Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-286.							
No	▶	GO TO 3.	<p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>						

DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)
<p>Check resistance between terminals 3 and 1.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right; margin-right: 50px;">SEF220W</p> <p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II) ▶	GO TO 4.
OK (Without CONSULT-II) ▶	GO TO 5.
NG ▶	Replace heated oxygen sensor 1 (front).

DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

4 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

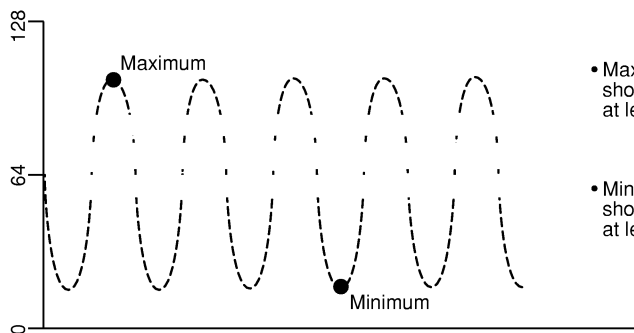
SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"

L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1 (front).

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

DTC P0131 HEATED OXYGEN SENSOR 1 (FRONT) (LEAN SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

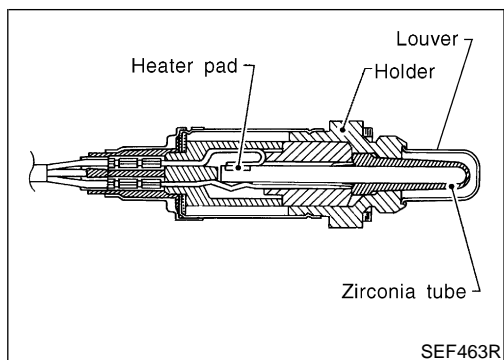
5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">AEC873A</p> <ol style="list-style-type: none"> 3. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; padding: 5px;">OK</td> <td style="width: 10%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 6.</td> </tr> <tr> <td style="padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">Replace heated oxygen sensor 1 (front).</td> </tr> </table>		OK	▶	GO TO 6.	NG	▶	Replace heated oxygen sensor 1 (front).
OK	▶	GO TO 6.					
NG	▶	Replace heated oxygen sensor 1 (front).					

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148. Refer to "Wiring Diagram", EC-202, for circuit.		
	▶	INSPECTION END

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

Component Description

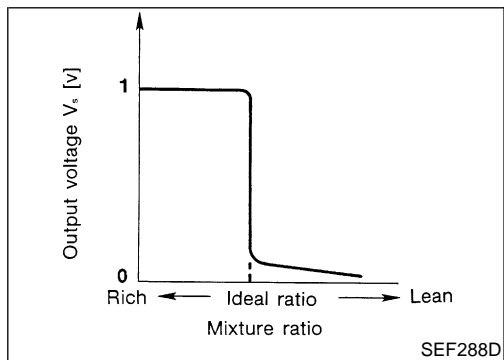


SEF463R

Component Description

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0111



SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NEEC0112

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0113

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

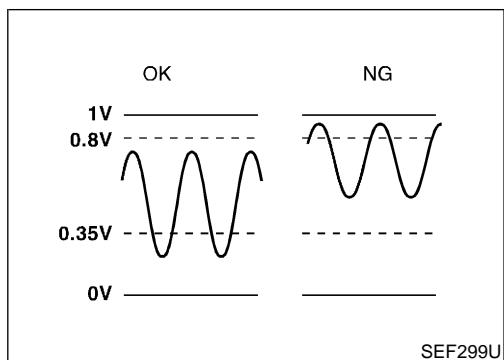
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V SEF008W

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

On Board Diagnosis Logic

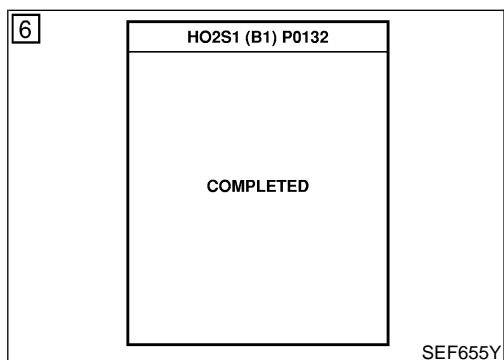
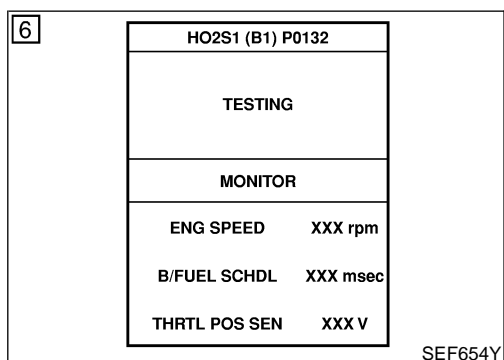
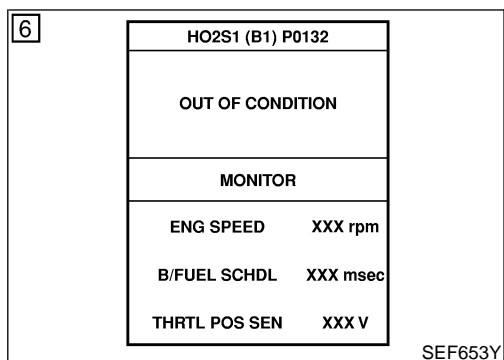


On Board Diagnosis Logic

NEEC0114

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	<ul style="list-style-type: none"> The maximum and minimum voltages from the sensor are beyond the specified voltages. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 (front) Heated oxygen sensor 1 heater (front) Fuel pressure Injectors



DTC Confirmation Procedure

NEEC0115

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch ON and select “HO2S1 (front) P0132” of “HO2S1 (front)” in “DTC WORK SUPPORT” mode with CONSULT-II.
- Touch “START”.
- Start engine and let it idle for at least 3.0 minutes.

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (Less than 62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Selector lever	Suitable position

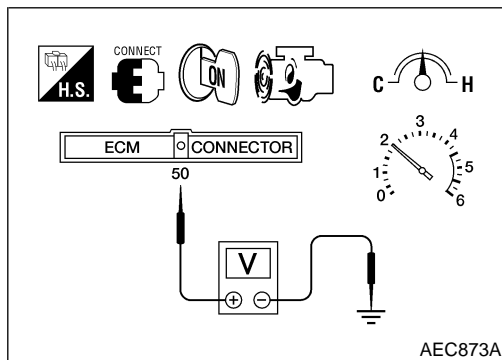
DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

DTC Confirmation Procedure (Cont'd)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-215.



Overall Function Check

NEEC0116

Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and ECM ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-215.

Diagnostic Procedure

NEEC0117

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1 (front). 	
<p>Vehicle front Heated oxygen sensor 1 (front)</p> <p>40 - 60 (4.1 - 6.1, 30 - 44)</p> <p>N·m (kg-m, ft-lb)</p>	
<p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 2.

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

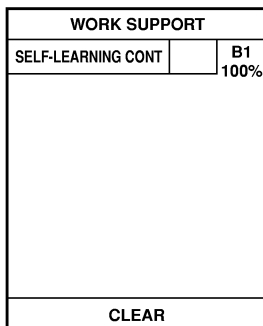
KA24DE

Diagnostic Procedure (Cont'd)

2 CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

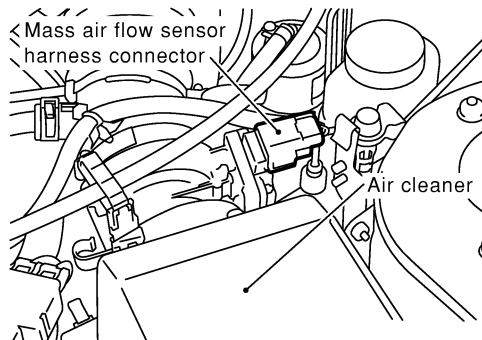


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



SEF293W

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-293.
No	▶	GO TO 3.

3 CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (front) harness connector.
3. Check harness connector for water.
Water should not exit.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	<p>Check resistance between terminals 3 and 1.</p> <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-top: 10px;">SEF220W</p> <p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF
	OK (With CONSULT-II) ►	GO TO 5.	
	OK (Without CONSULT-II) ►	GO TO 6.	
	NG ►	Replace heated oxygen sensor 1 (front).	

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

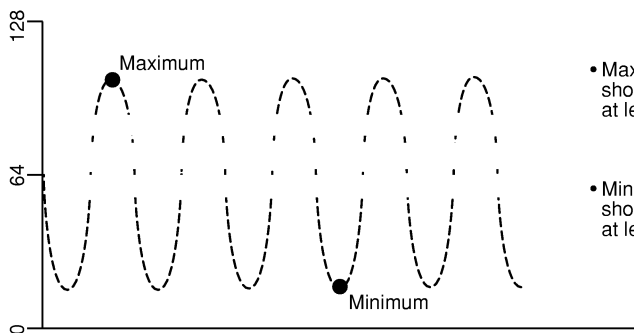
SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"

L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0132 HEATED OXYGEN SENSOR 1 (FRONT) (RICH SHIFT MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 3. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin-top: 10px;">OK or NG</p> 	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>	
	OK	▶	GO TO 7.	
	NG	▶	Replace heated oxygen sensor 1 (front).	<p>PD</p>

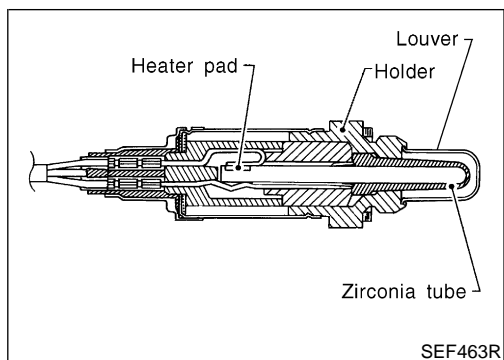
AEC873A

7	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148. Refer to "Wiring Diagram", EC-202, for circuit.</p>	<p>AX</p>
	▶	INSPECTION END	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>

DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

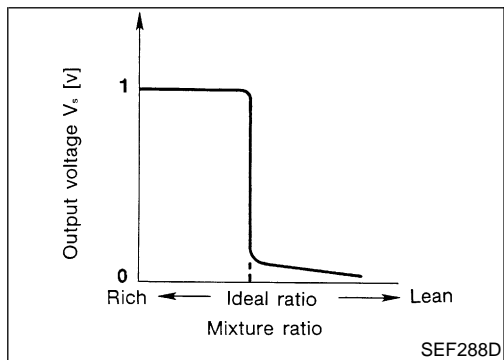
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0119



SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NEEC0120

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0121

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

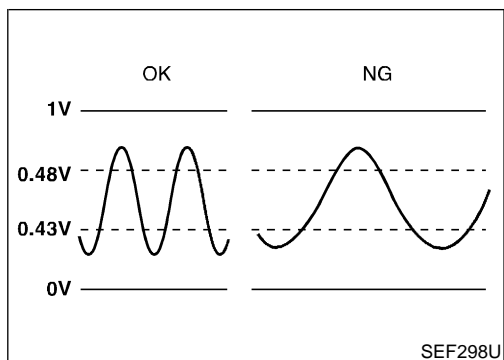
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front)	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> <p>SEF008W</p>

DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

On Board Diagnosis Logic

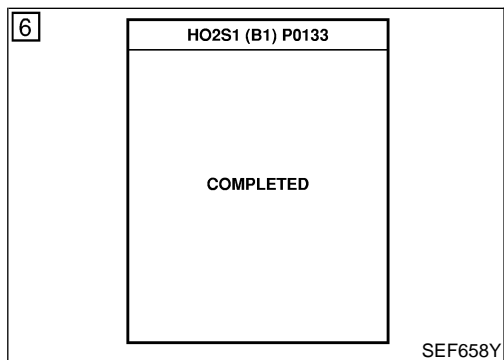
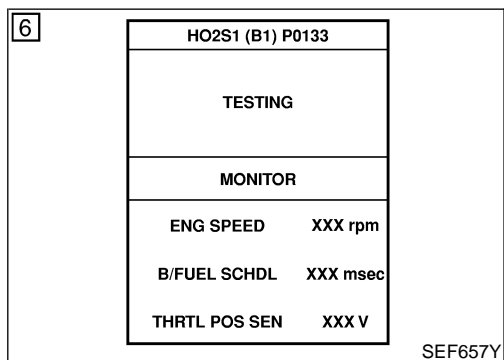
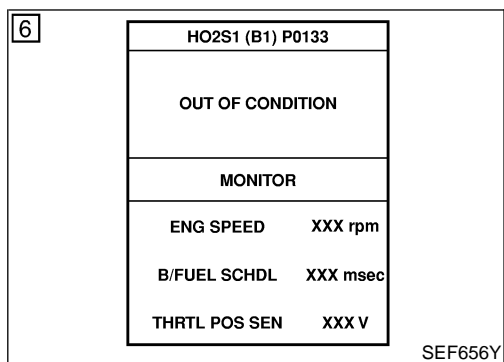


On Board Diagnosis Logic

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 (front) cycling time index] is inordinately long or not.

NEEC0122

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133	<ul style="list-style-type: none"> The response of the voltage signal from the sensor takes more than the specified time. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1 (front) Heated oxygen sensor 1 heater (front) Fuel pressure Injectors Intake air leaks Exhaust gas leaks PCV Mass air flow sensor



DTC Confirmation Procedure

NEEC0123

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch ON and select "HO2S1 (B1) P0133" of "HO2S1 (front)" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine and let it idle for at least 3.0 minutes.

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds.)

ENG SPEED	1,750 - 3,750 rpm
Vehicle speed	More than 80 km/h (More than 50 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
Selector lever	Suitable position

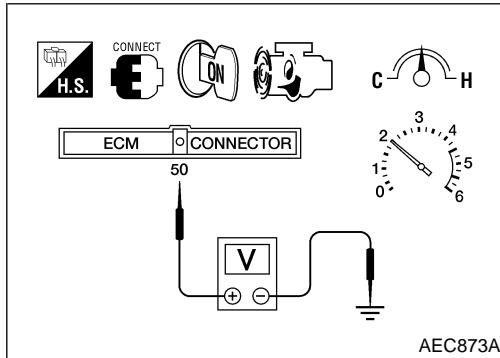
DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

DTC Confirmation Procedure (Cont'd)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-224.



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
- 4) If NG, go to "Diagnostic Procedure", EC-224.

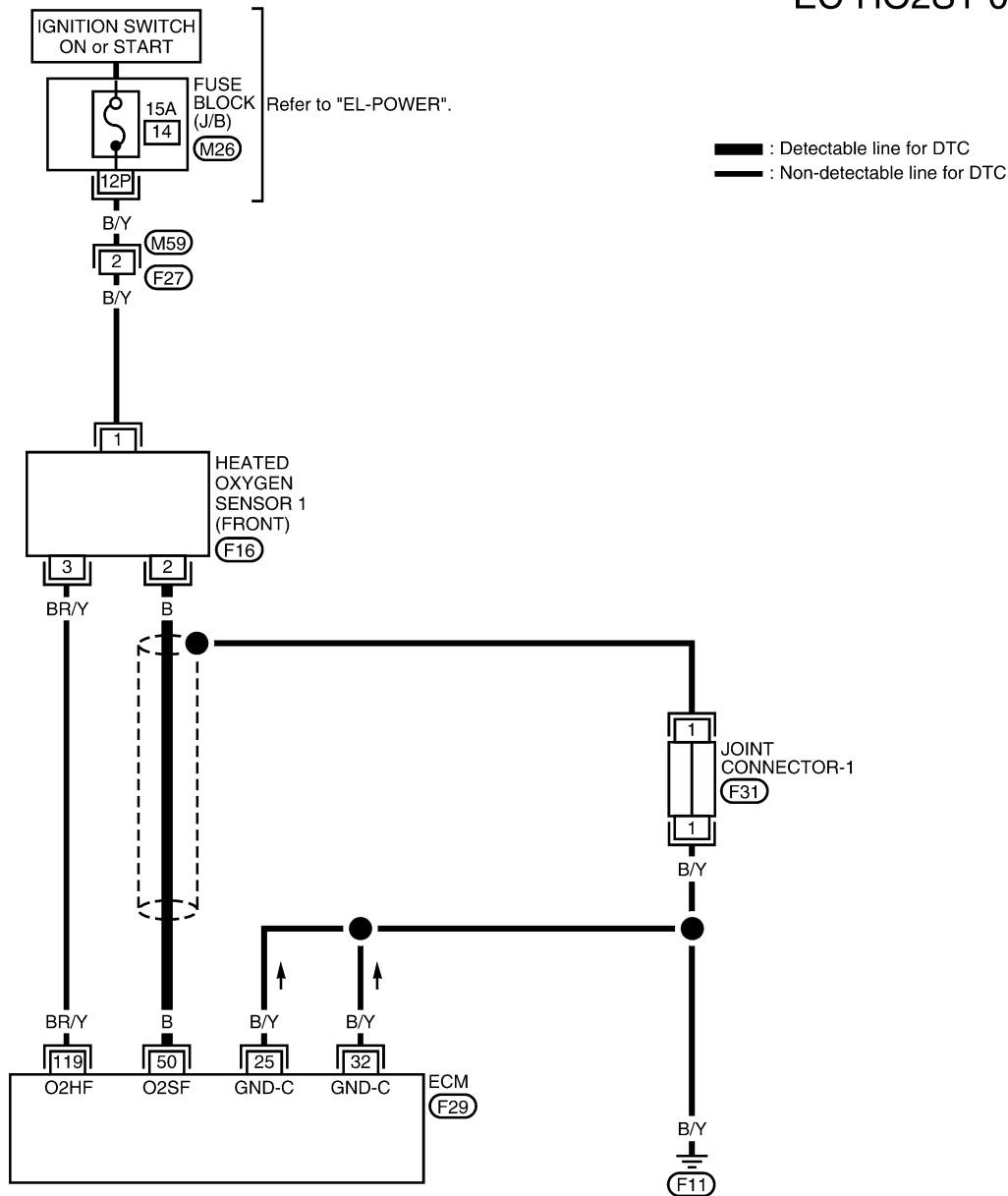
DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE
Wiring Diagram

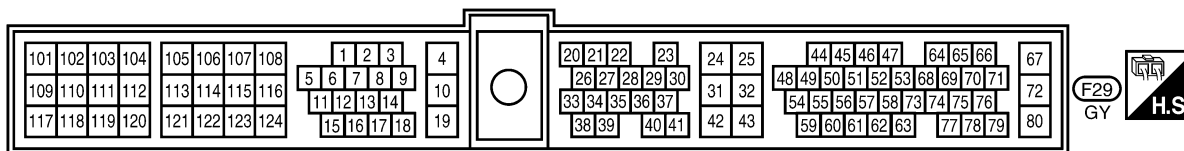
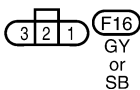
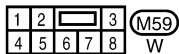
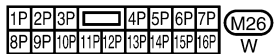
Wiring Diagram

NEEC0125

EC-HO2S1-01



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WEC150A

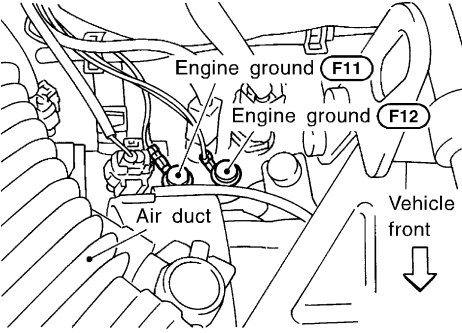
DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

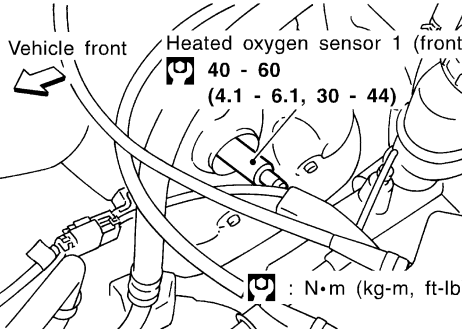
KA24DE

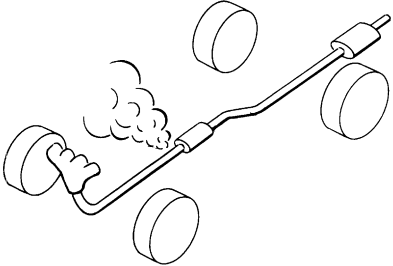
Diagnostic Procedure

Diagnostic Procedure

NEEC0126

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
SEF325V	
▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
Loosen and retighten heated oxygen sensor 1 (front).	
	
SEF332VA	
<p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 3.

3	CHECK EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>	
	
SEF099P	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

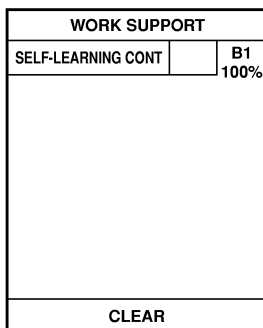
Diagnostic Procedure (Cont'd)

4	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak between the mass air flow sensor and the intake manifold.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace.

5	CLEAR THE SELF-LEARNING DATA	
----------	-------------------------------------	--

Ⓟ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

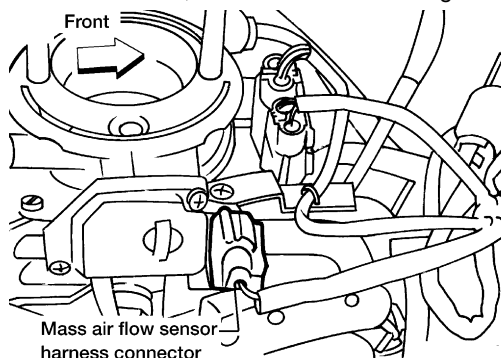


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

ⓧ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-286, 293.
No	▶	GO TO 6.

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DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK INPUT SIGNAL CIRCUIT	
<p>1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 50 and terminal 2.</p>		
SEF141V		
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.</p> <p>Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between terminals 3 and 1.</p>		
SEF220W		
<p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. 		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

8 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

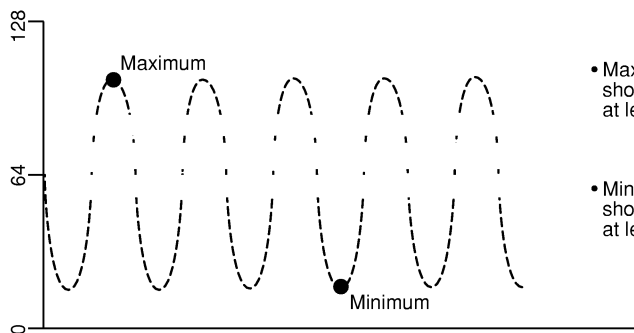
SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"

L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace heated oxygen sensor 1 (front).

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DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 3. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> 	
OK	▶ GO TO 10.
NG	▶ Replace heated oxygen sensor 1 (front).

AEC873A

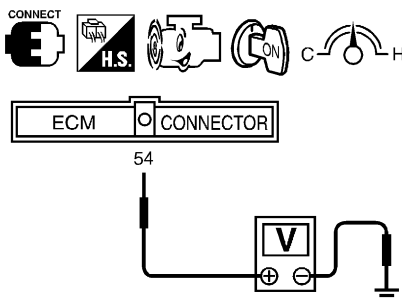
DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

10 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



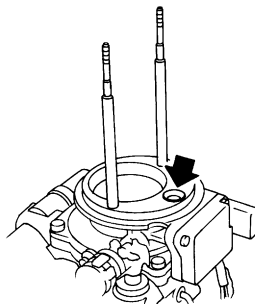
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

MTBL0326

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF893J

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

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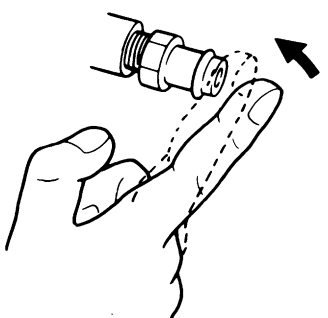
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DTC P0133 HEATED OXYGEN SENSOR 1 (FRONT) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK PCV VALVE		
<p>1. With engine running at idle, remove PCV valve from breather separator. 2. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.</p>			
			
SEC137A			
OK or NG			
OK		▶	GO TO 12.
NG		▶	Repair or replace PCV valve.

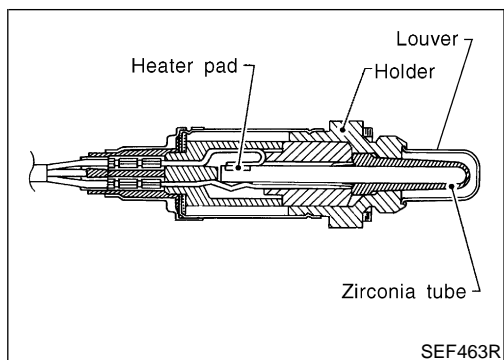
12	CHECK SHIELD CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-239</i>.) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p>			
OK or NG			
OK		▶	GO TO 13.
NG		▶	Repair open circuit, short to power in harness or connectors.

13	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.			
		▶	INSPECTION END

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE

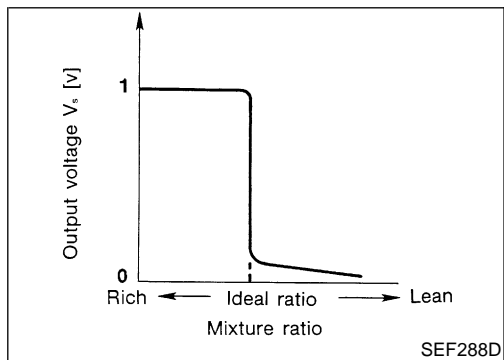
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0128



CONSULT-II Reference Value in Data Monitor Mode

NEEC0129

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0130

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

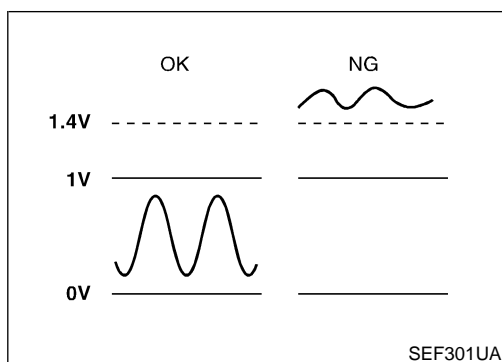
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front)	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> <p>SEF008W</p>

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

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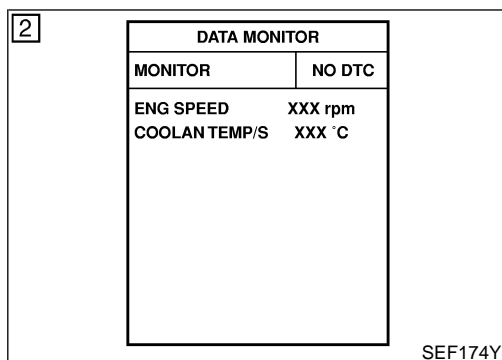
On Board Diagnosis Logic



On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high. NEEC0131

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1 (front)



DTC Confirmation Procedure

NEEC0132

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 35 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-234.

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Restart engine and let it idle for 35 seconds.
 - 4) Turn ignition switch OFF and wait at least 5 seconds.
 - 5) Restart engine and let it idle for 35 seconds.
 - 6) Select "MODE 3" with GST.
 - 7) If DTC is detected, go to "Diagnostic Procedure", EC-234.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

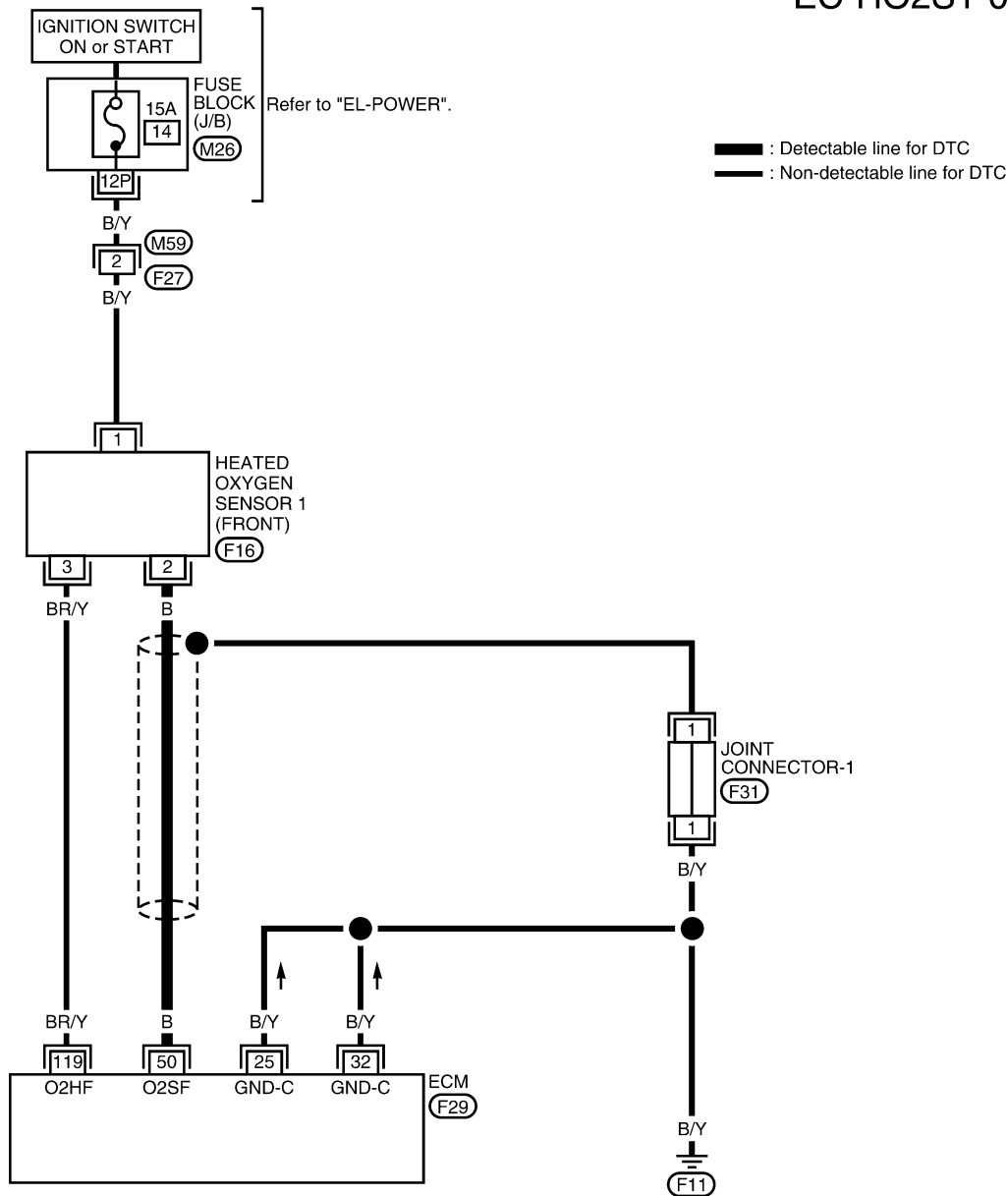
DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE
Wiring Diagram

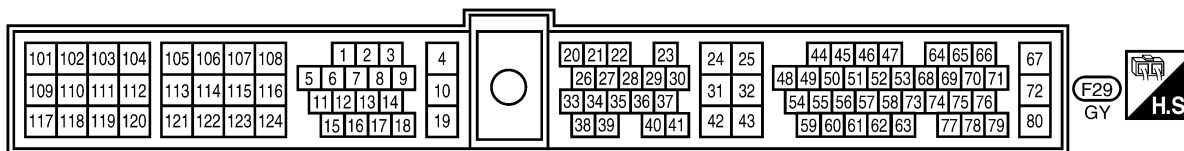
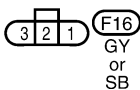
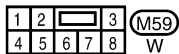
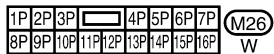
Wiring Diagram

NEEC0133

EC-HO2S1-01



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WEC150A

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0134

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1 (front).</p> <div style="text-align: center;"> <p>Vehicle front Heated oxygen sensor 1 (front) 40 - 60 (4.1 - 6.1, 30 - 44)</p> <p>⊗ : N·m (kg-m, ft-lb)</p> </div> <p style="color: blue;">Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p> <p style="text-align: right;">SEF332VA</p>	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.</p> <div style="text-align: center;"> <p>Vehicle front Brake reservoir tank Heated oxygen sensor 1 (front) harness connector</p> </div> <p style="text-align: right;">SEF331VA</p>	
<p>2. Check harness continuity between ECM terminal 50 and terminal 2.</p> <div style="text-align: center;"> <p>ECM CONNECTOR 3 2 1</p> <p>50</p> <p>Ω</p> <p>Ω</p> <p>⊗</p> </div> <p style="text-align: right;">SEF141V</p> <p style="color: blue;">Continuity should exist.</p>	
<p>3. Check harness continuity between ECM terminal 50 (or terminal 2) and ground. Continuity should not exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 1 (front) harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II) ▶		GO TO 4.
OK (Without CONSULT-II) ▶		GO TO 5.
NG ▶		Repair or replace harness connector.

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DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

4 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

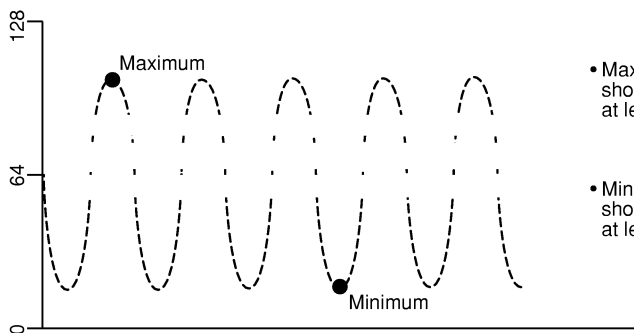
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"
L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0134 HEATED OXYGEN SENSOR 1 (FRONT) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 3. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> 	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>	
	OK	▶	GO TO 6.	
	NG	▶	Replace heated oxygen sensor 1 (front).	<p>PD</p>

6	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-239</i>.) Continuity should exist. 4. Also check harness for short to ground and short to power. Then reconnect joint connector. <p style="text-align: center;">OK or NG</p>	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>	
	OK	▶	GO TO 7.	
	NG	▶	Repair open circuit, short to power in harness or connectors.	<p>RS</p>

7	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	<p>BT</p>
	▶	INSPECTION END	<p>HA</p> <p>SC</p> <p>EL</p>

DTC P0135 HEATED OXYGEN SENSOR 1 HEATER (FRONT) KA24DE

Description

Description

NEEC0136

SYSTEM DESCRIPTION

NEEC0136S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)

The ECM performs ON/OFF control of the heated oxygen sensor 1 heater (front) corresponding to the engine operating condition.

OPERATION

NEEC0136S02

Engine speed	Heated oxygen sensor 1 heater (front)
Above 3,000 rpm	OFF
Below 3,000 rpm	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC0137

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 3,000 rpm	ON
	● Engine speed: Above 3,000 rpm	OFF

ECM Terminals and Reference Value

NEEC0138

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (front)	[Engine is running] ● Engine speed is below 3,000 rpm.	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0139

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135	<ul style="list-style-type: none"> ● The current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).] 	<ul style="list-style-type: none"> ● Harness or connectors [The heated oxygen sensor 1 heater (front) circuit is open or shorted.] ● Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NEEC0140

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-241.

With GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
 - 2) Turn ignition switch OFF and wait least 6 seconds at idle speed.
 - 3) Select "MODE 3" with GST.
 - 4) If DTC is detected, go to "Diagnostic Procedure", EC-241.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

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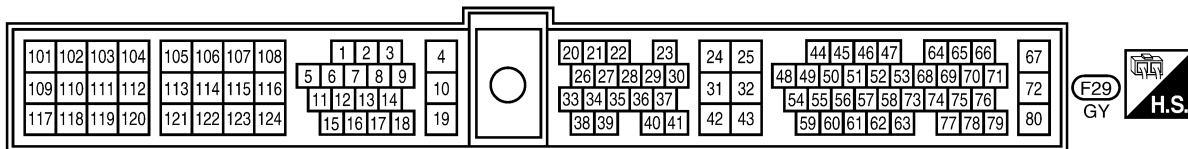
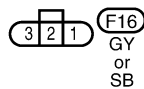
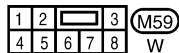
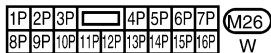
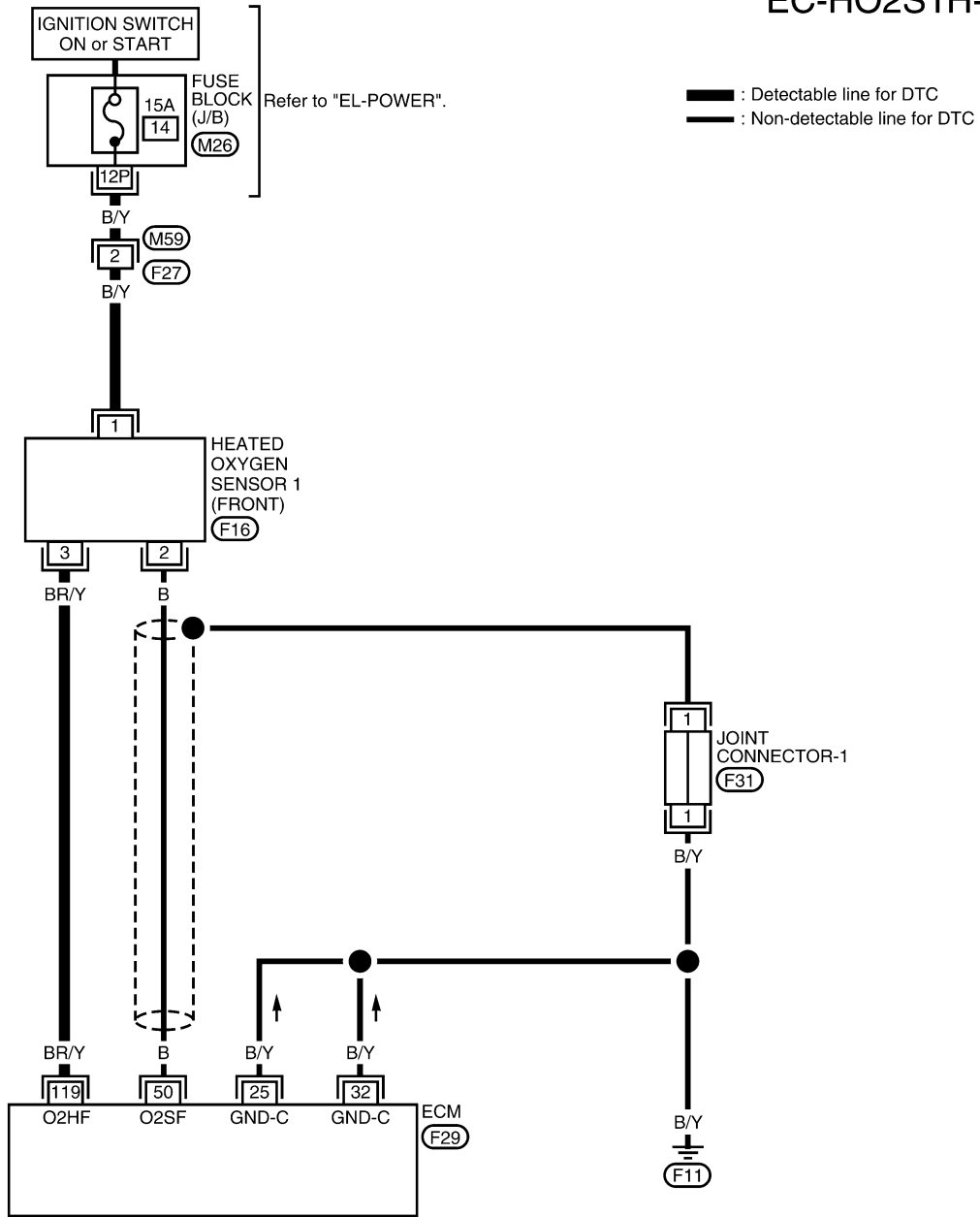
DTC P0135 HEATED OXYGEN SENSOR 1 HEATER (FRONT) KA24DE

Wiring Diagram

Wiring Diagram

NEEC0141

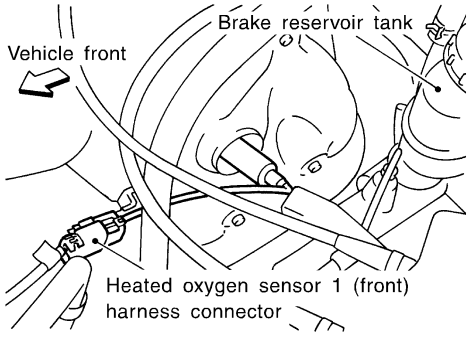
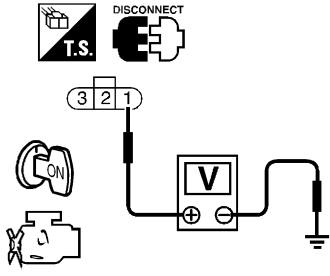
EC-HO2S1H-01



WEC151A

Diagnostic Procedure

NEEC0142

1	CHECK POWER SUPPLY		
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect heated oxygen sensor 1 (front) harness connector.</p>  <p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p>  <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>SEF331VA</p> <p>SEF213W</p>
	OK	▶ GO TO 3.	
	NG	▶ GO TO 2.	

2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● 15A fuse ● Harness for open or short between heated oxygen sensor 1 (front) and 15A fuse <p style="text-align: right;">▶ Repair harness or connectors.</p>	

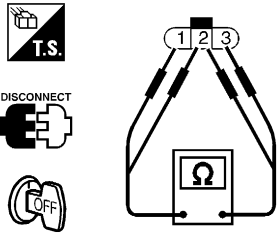
3	CHECK GROUND CIRCUIT		
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between heated oxygen sensor 1 (front) terminal 3 and ECM terminal 119. Refer to the wiring diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground or short to power.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 4.	
	NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.	

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DTC P0135 HEATED OXYGEN SENSOR 1 HEATER (FRONT)

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)
Check resistance between terminals 3 and 1.	
	
<p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none">● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Replace heated oxygen sensor 1 (front).

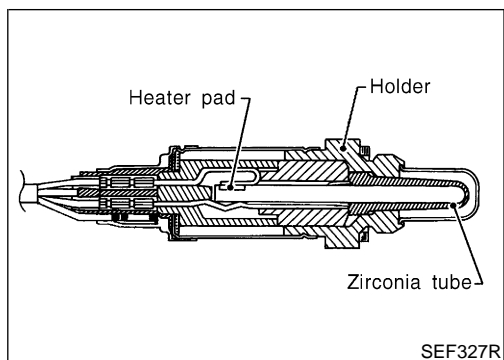
SEF220W

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Component Description



Component Description

NEEC0144

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0145

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

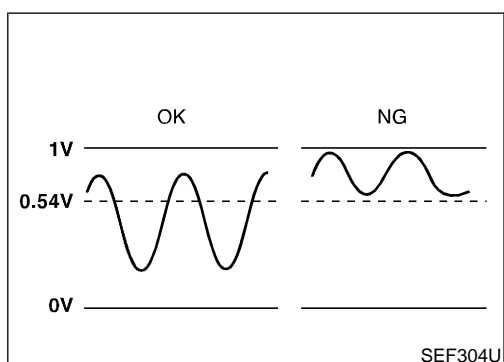
NEEC0146

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly 	0 - Approximately 1.0V



On Board Diagnosis Logic

NEEC0147

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137	<ul style="list-style-type: none"> The minimum voltage from the sensor does not reach the specified voltage. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2 (rear) Fuel pressure Injectors

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

On Board Diagnosis Logic (Cont'd)

6

HO2S2 (B1) P0137

WAIT
OPEN ENGINE HOOD.
KEEP ENGINE RUNNING AT
IDLE SPEED FOR MAXIMUM
OF 5 MINUTES.

SEF545Z

8

HO2S2 (B1) P0137

MAINTAIN
1800 - 2800 RPM UNTIL FINAL
RESULT APPEARS.

1800 rpm 2300 rpm 2800 rpm

SEF546Z

8

HO2S2 (B1) P0137

COMPLETED

SELF-DIAG RESULTS

SEF547Z

DTC Confirmation Procedure

NEEC0148

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

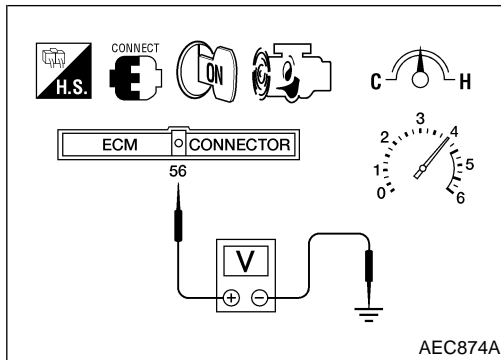
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S2 (B1) P0137", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-247.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
 - b) Turn ignition switch ON
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0149

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
- 4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.54V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should be below 0.54V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-247.

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DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

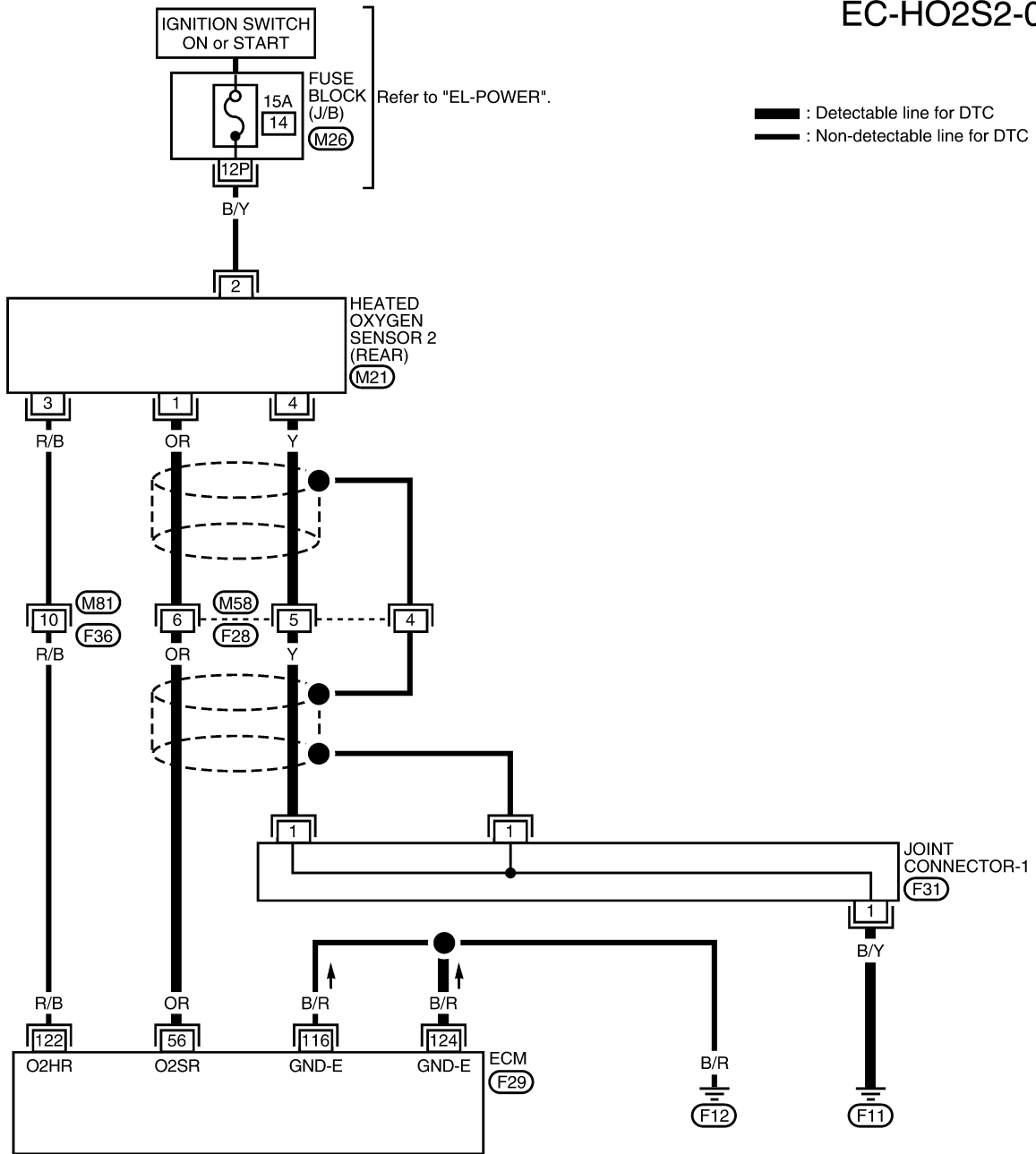
KA24DE

Wiring Diagram

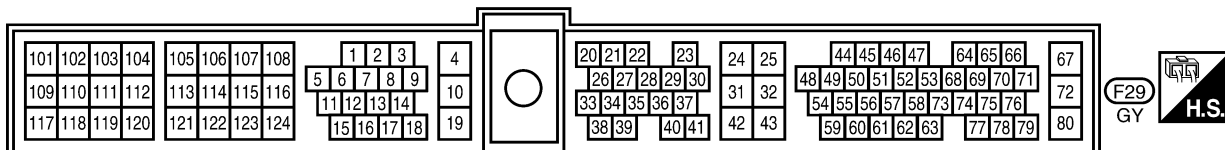
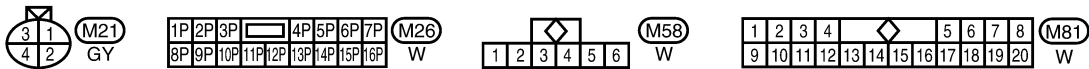
Wiring Diagram

NEEC0150

EC-HO2S2-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



WEC774

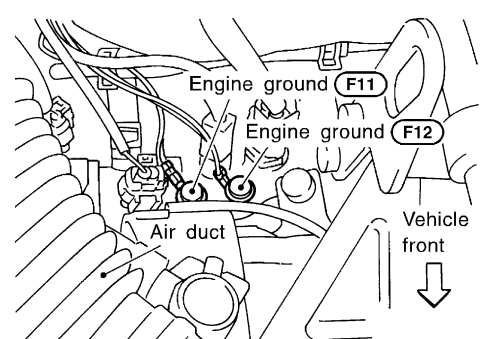
DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0151

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>  <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled F11 and F12. An air duct is also shown. An arrow points to the front of the vehicle.</p>	
▶	GO TO 2.

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DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

2	CLEAR THE SELF-LEARNING DATA
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Ⓜ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

WORK SUPPORT	
SELF-LEARNING CONT	B1 100%
CLEAR	

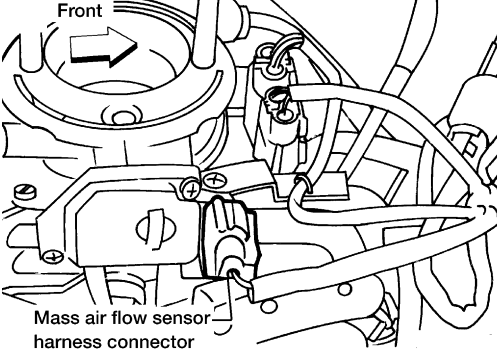
SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

ⓧ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



Front

Mass air flow sensor
harness connector

AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-293.
No	▶	GO TO 3.

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 56 and terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF157V</p> <p>Continuity should exist.</p> <p>4. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p>
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness for open or short between heated oxygen sensor 2 (rear) and ECM <p style="text-align: right;">▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	<p>AT</p> <p>TF</p> <p>PD</p>
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5	CHECK GROUND CIRCUIT	<p>1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-246.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
OK (With CONSULT-II)	▶	GO TO 6.	
OK (Without CONSULT-II)	▶	GO TO 7.	
NG	▶	GO TO 4.	

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

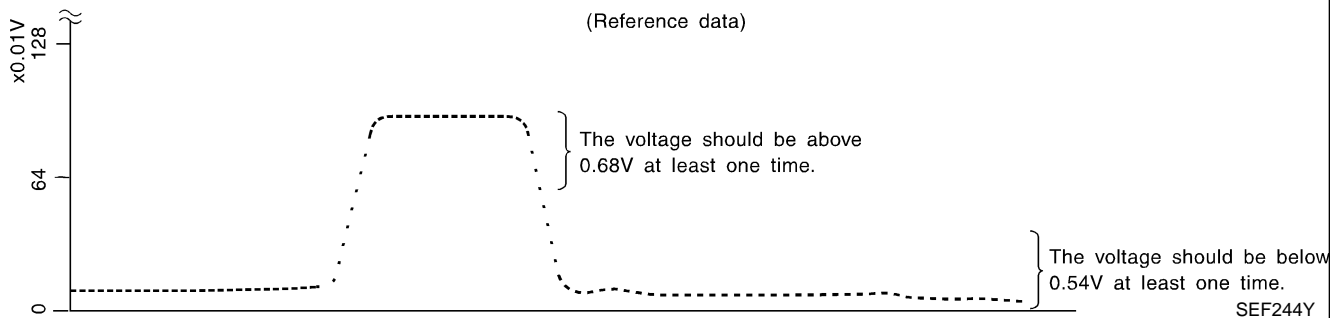
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



OK ▶ GO TO 8.

NG ▶ Replace heated oxygen sensor 2 (rear).

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">AEC874A</p> <ol style="list-style-type: none"> 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 8.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Replace heated oxygen sensor 2 (rear).</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace heated oxygen sensor 2 (rear).	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
OK	▶	GO TO 8.							
NG	▶	Replace heated oxygen sensor 2 (rear).							

8	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF698Z</p> <p>Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 10.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 9.</td> </tr> </table>	OK	▶	GO TO 10.	NG	▶	GO TO 9.	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 10.							
NG	▶	GO TO 9.							

DTC P0137 HEATED OXYGEN SENSOR 2 (REAR) (MIN. VOLTAGE MONITORING)

KA24DE

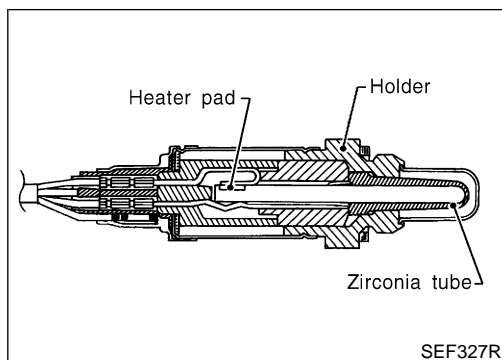
Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas. NEEC0153

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0154

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	● Engine: After warming up Revsing engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

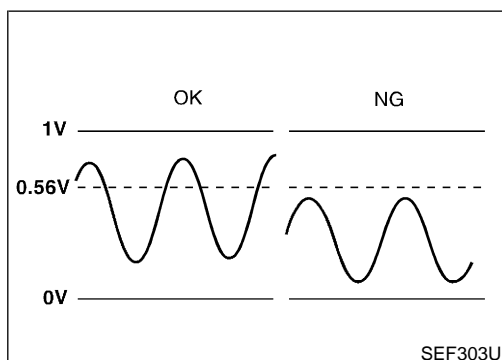
NEEC0155

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear)	[Engine is running] ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



On Board Diagnosis Logic

NEEC0156

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	● The maximum voltage from the sensor does not reach the specified voltage.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 (rear) ● Fuel pressure ● Injectors ● Intake air leaks

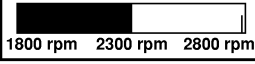
DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

On Board Diagnosis Logic (Cont'd)

HO2S2 (B1) P0138
WAIT OPEN ENGINE HOOD. KEEP ENGINE RUNNING AT IDLE SPEED FOR MAXIMUM OF 5 MINUTES.

SEF663Y

HO2S2 (B1) P0138
MAINTAIN 1800 - 2800 RPM UNTIL FINAL RESULT APPEARS.
 1800 rpm 2300 rpm 2800 rpm

SEF664Y

HO2S2 (B1) P0138
COMPLETED
SELF-DIAG RESULTS

SEF665Y

DTC Confirmation Procedure

NEEC0157

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

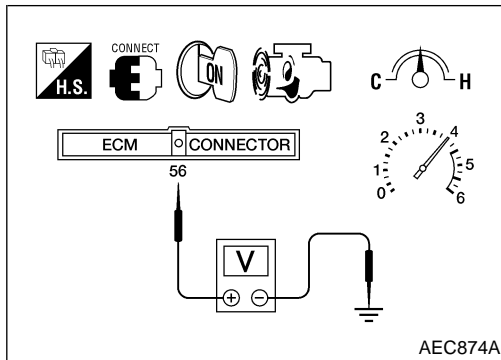
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S1 (B1) P0138", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-257.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).

DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0158

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
- 4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.56V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position .
The voltage should be above 0.56V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-257.

GI

MA

EM

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DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

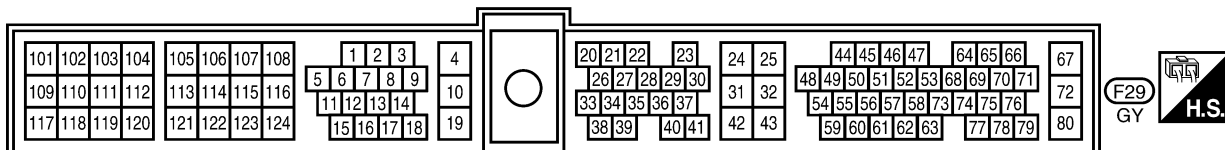
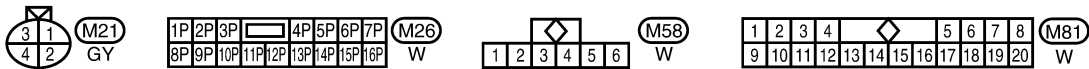
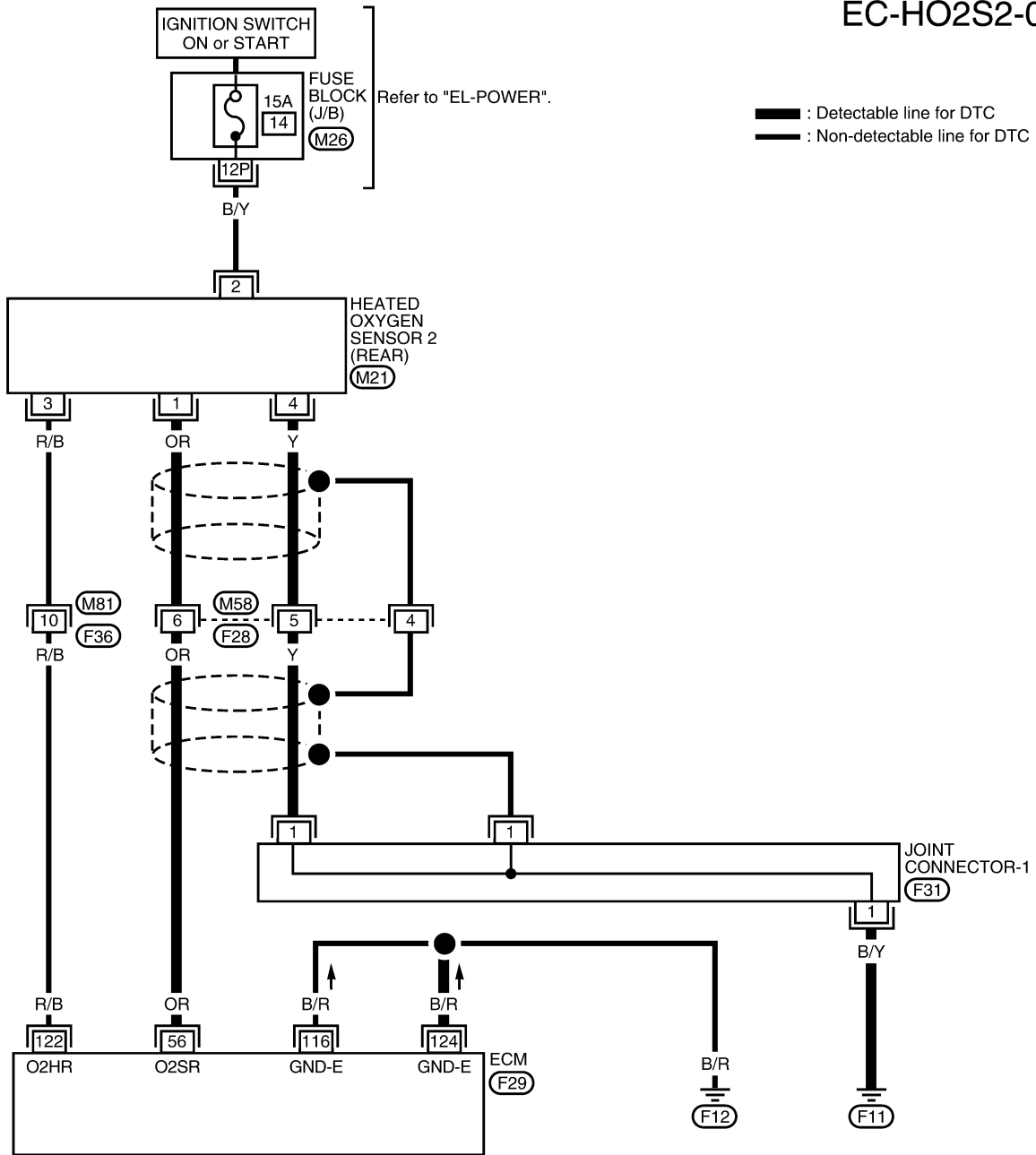
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0159

EC-HO2S2-01



WEC774

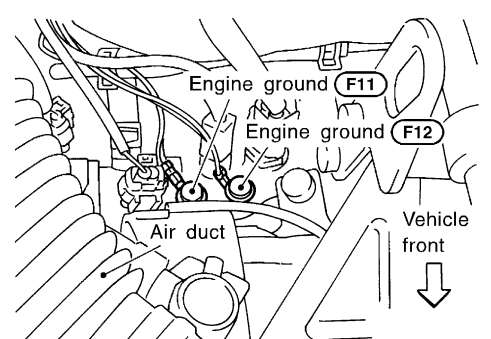
DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0160

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>  <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled F11 and F12. An air duct is also shown. An arrow points to the front of the vehicle.</p>	
▶	GO TO 2.

SEF325V

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MA

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DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

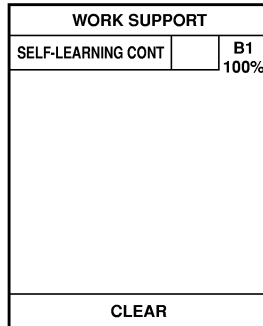
KA24DE

Diagnostic Procedure (Cont'd)

2 CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

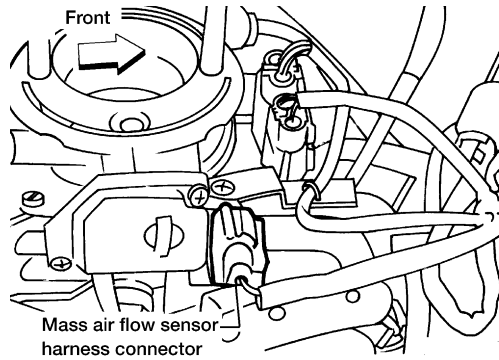


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-286.
No	▶	GO TO 3.

DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT	<p>1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.</p> <p>2. Check harness continuity between ECM harness connector F29 terminal 56 and terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF157V</p> <p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	GO TO 4.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p>
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness for open or short between ECM and heated oxygen sensor 2 (rear) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		▶	Repair open circuit or short to ground or short to power in harness or connectors.	<p>AT</p> <p>TF</p> <p>PD</p>
	▶	Repair open circuit or short to ground or short to power in harness or connectors.				

5	CHECK GROUND CIRCUIT	<p>1. Check harness continuity between heated oxygen sensor 2 (rear) connector M21 terminal 4 and engine ground. Refer to "Wiring Diagram", EC-256.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK (With CONSULT-II)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>OK (Without CONSULT-II)</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to power in harness or connectors.</td> </tr> </table>	OK (With CONSULT-II)	▶	GO TO 6.	OK (Without CONSULT-II)	▶	GO TO 7.	NG	▶	Repair open circuit or short to power in harness or connectors.	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK (With CONSULT-II)	▶	GO TO 6.										
OK (Without CONSULT-II)	▶	GO TO 7.										
NG	▶	Repair open circuit or short to power in harness or connectors.										

DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

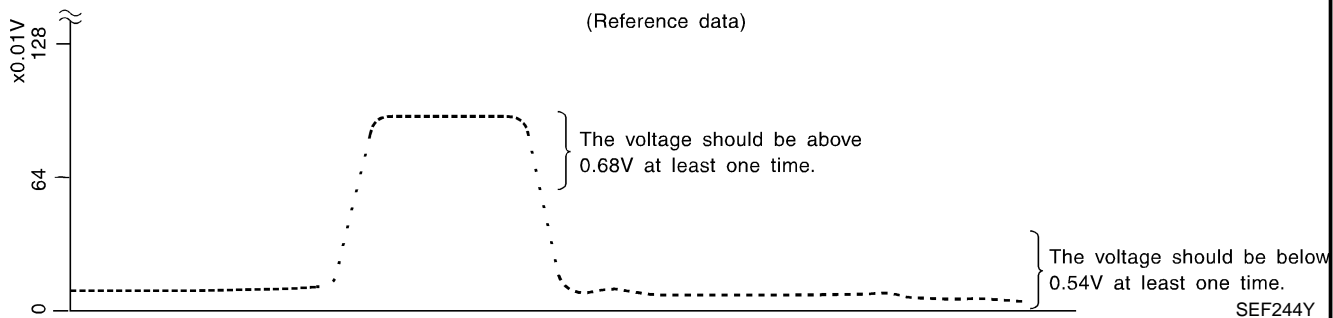
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



OK or NG

OK ▶ GO TO 8.

NG ▶ Replace heated oxygen sensor 2 (rear).

DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with "O/D" OFF (A/T). The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 2 (rear).</td> </tr> </table>		OK	▶	GO TO 8.	NG	▶	Replace heated oxygen sensor 2 (rear).
OK	▶	GO TO 8.					
NG	▶	Replace heated oxygen sensor 2 (rear).					

AEC874A

8	CHECK SHIELD CIRCUIT						
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center; color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 10.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 9.</td> </tr> </table>		OK	▶	GO TO 10.	NG	▶	GO TO 9.
OK	▶	GO TO 10.					
NG	▶	GO TO 9.					

SEF698Z

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DTC P0138 HEATED OXYGEN SENSOR 2 (REAR) (MAX. VOLTAGE MONITORING)

KA24DE

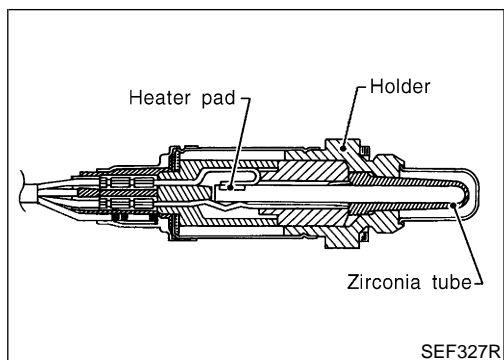
Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas. NEEC0162

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revsing engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH

ECM Terminals and Reference Value

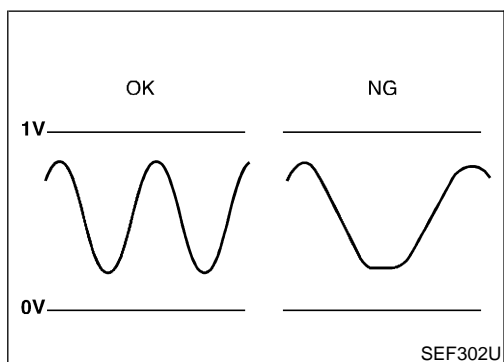
NEEC0164

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear)	[Engine is running] ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm	0 - Approximately 1.0V



On Board Diagnosis Logic

NEEC0165

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	● It takes more than the specified time for the sensor to respond between rich and lean.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 (rear) ● Fuel pressure ● Injectors ● Intake air leaks

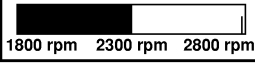
DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

On Board Diagnosis Logic (Cont'd)

HO2S2 (B1) P0139
WAIT OPEN ENGINE HOOD. KEEP ENGINE RUNNING AT IDLE SPEED FOR MAXIMUM OF 5 MINUTES.

SEF666Y

HO2S2 (B1) P0139
MAINTAIN 1800 - 2800 RPM UNTIL FINAL RESULT APPEARS.
 1800 rpm 2300 rpm 2800 rpm

SEF667Y

HO2S2 (B1) P0139
COMPLETED
SELF-DIAG RESULTS

SEF668Y

DTC Confirmation Procedure

NEEC0166

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

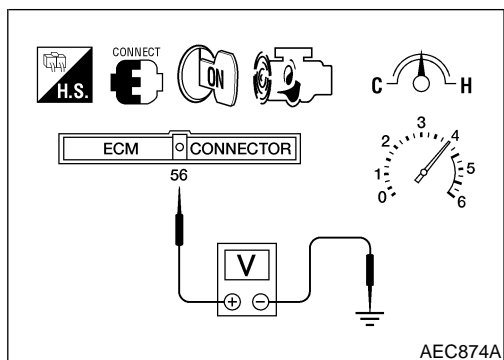
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S2 (B1) P0139", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-267.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
 - b) Turn ignition switch ON
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0167

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-267.

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DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

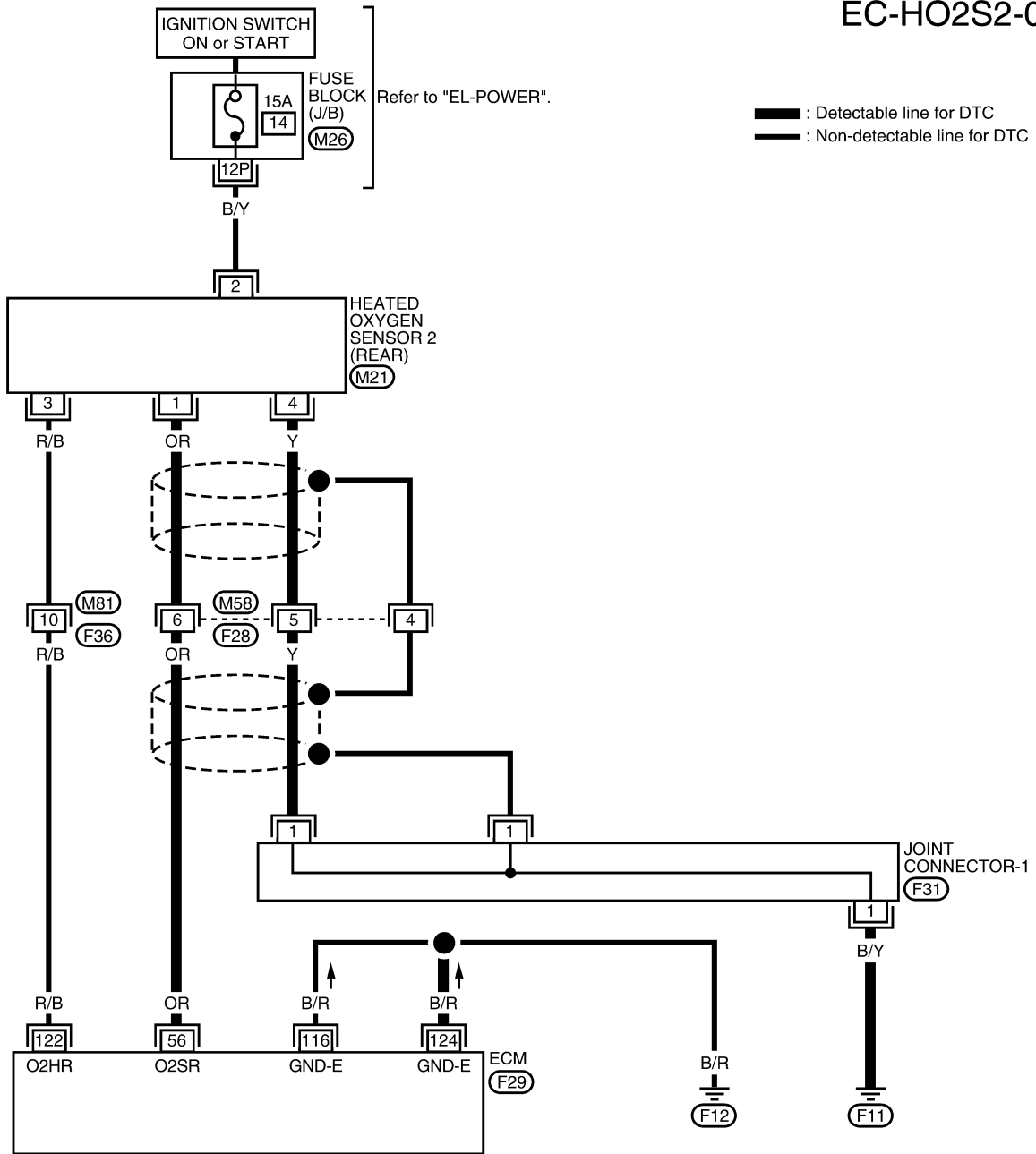
KA24DE

Wiring Diagram

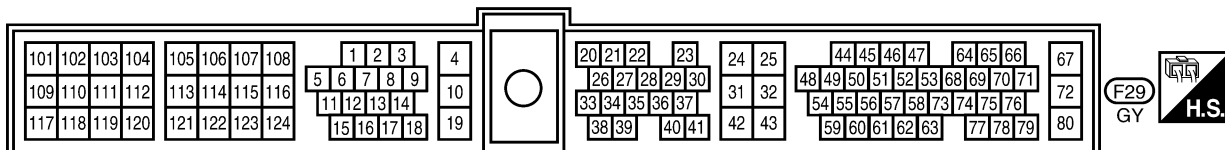
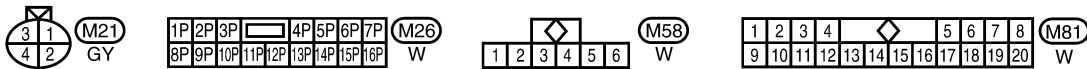
Wiring Diagram

NEEC0168

EC-HO2S2-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



WEC774

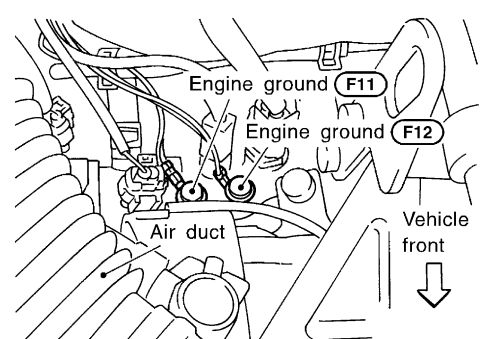
DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0169

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>  <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled F11 and F12. An air duct is also shown. An arrow labeled 'Vehicle front' points downwards.</p>	
<p>▶ GO TO 2.</p>	

SEF325V

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DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

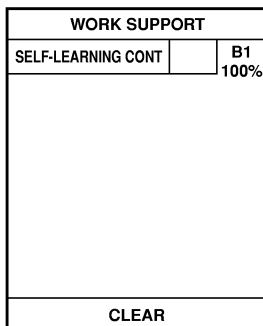
KA24DE

Diagnostic Procedure (Cont'd)

2 CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

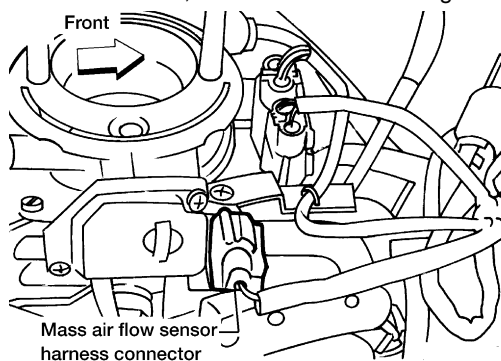


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-85.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-286 or EC-293.
No	▶	GO TO 3.

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT	<p>1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 56 and terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF157V</p> <p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	GO TO 4.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p>
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness for open or short between heated oxygen sensor 2 (rear) and ECM <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		▶	Repair open circuit or short to ground or short to power in harness or connectors.	<p>AT</p> <p>TF</p> <p>PD</p>
	▶	Repair open circuit or short to ground or short to power in harness or connectors.				

5	CHECK GROUND CIRCUIT	<p>1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to the wiring diagram.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK (With CONSULT-II)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>OK (Without CONSULT-II)</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK (With CONSULT-II)	▶	GO TO 6.	OK (Without CONSULT-II)	▶	GO TO 7.	NG	▶	GO TO 4.	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK (With CONSULT-II)	▶	GO TO 6.										
OK (Without CONSULT-II)	▶	GO TO 7.										
NG	▶	GO TO 4.										

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

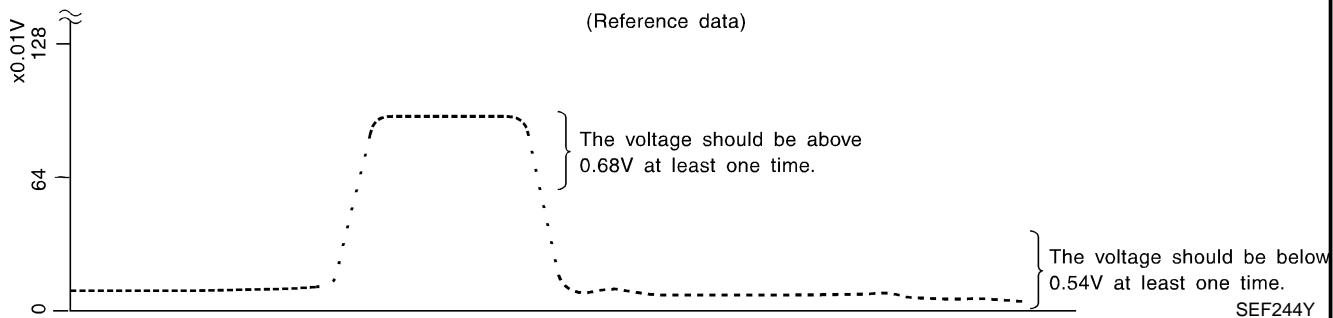
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



OK or NG

OK ▶ GO TO 8.

NG ▶ Replace heated oxygen sensor 2 (rear).

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF
OK	▶	GO TO 8.	PD
NG	▶	Replace heated oxygen sensor 2 (rear).	AX

8	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center; margin-top: 10px;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 10.	SC
NG	▶	GO TO 9.	EL IDX

DTC P0139 HEATED OXYGEN SENSOR 2 (REAR) (RESPONSE MONITORING)

KA24DE

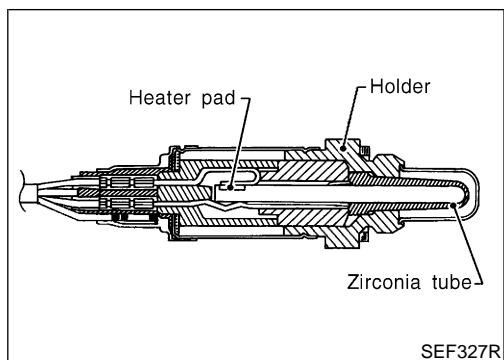
Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas. NEEC0171

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0172

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

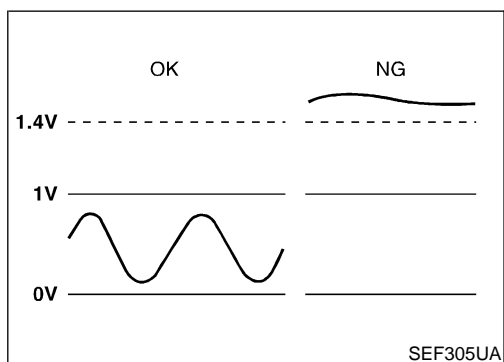
NEEC0173

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm 	0 - Approximately 1.0V



On Board Diagnosis Logic

NEEC0174

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2 (rear)

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

DTC Confirmation Procedure

5	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec	

SEF189Y

DTC Confirmation Procedure

NEEC0175

NOTE:

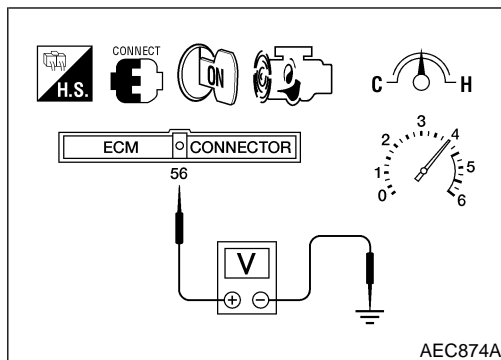
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,100 - 3,600 rpm
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-276.



Overall Function Check

NEEC0176

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
- 4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 1.4V during this procedure.
- 5) If NG, go to "Diagnostic Procedure", EC-276.

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE
Wiring Diagram

Wiring Diagram

NEEC0177

EC-HO2S2-01

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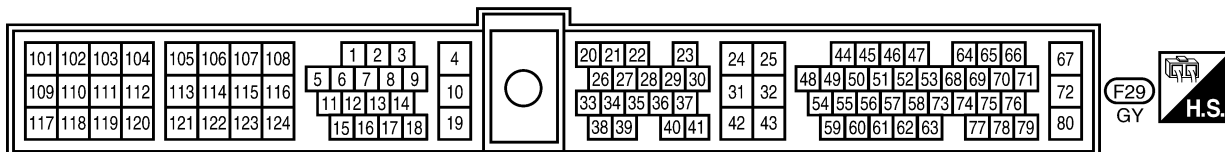
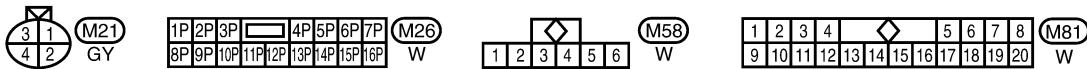
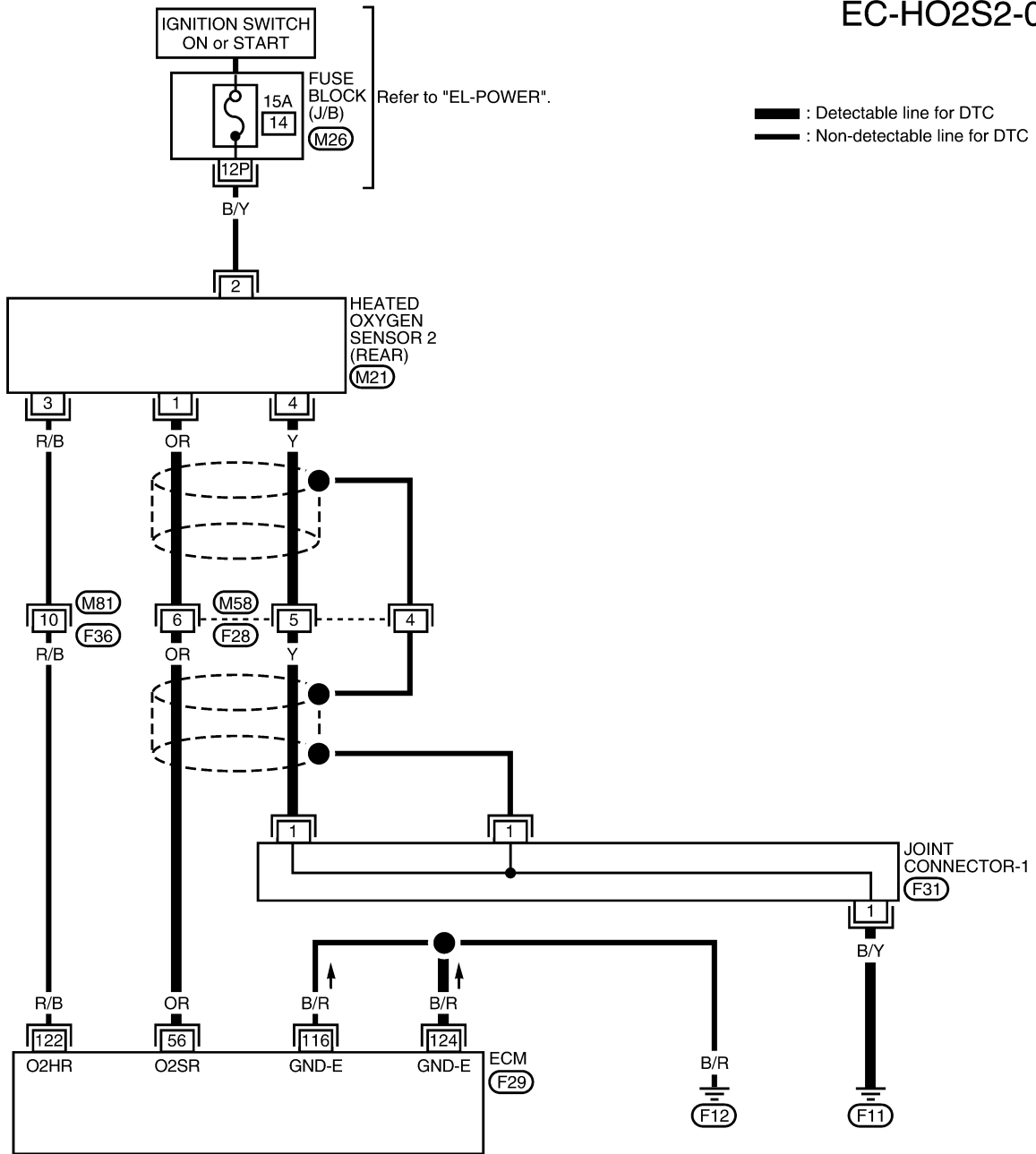
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WEC774

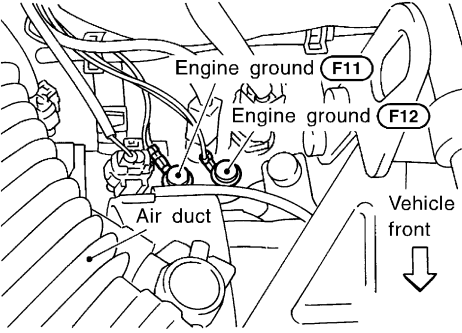
DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

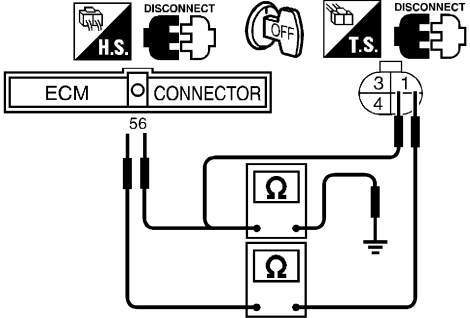
KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0178

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
SEF325V	
▶ GO TO 2.	

2	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector. 2. Check harness continuity between ECM terminal 56 and terminal 1.</p>	
	
SEF157V	
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground. Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness for open or short between heated oxygen sensor 2 (rear) and ECM 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT	
<p>1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-275. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connectors.

5	CHECK HARNESS CONNECTOR	
<p>Check heated oxygen sensor 2 (rear) harness connector for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness connector.

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DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

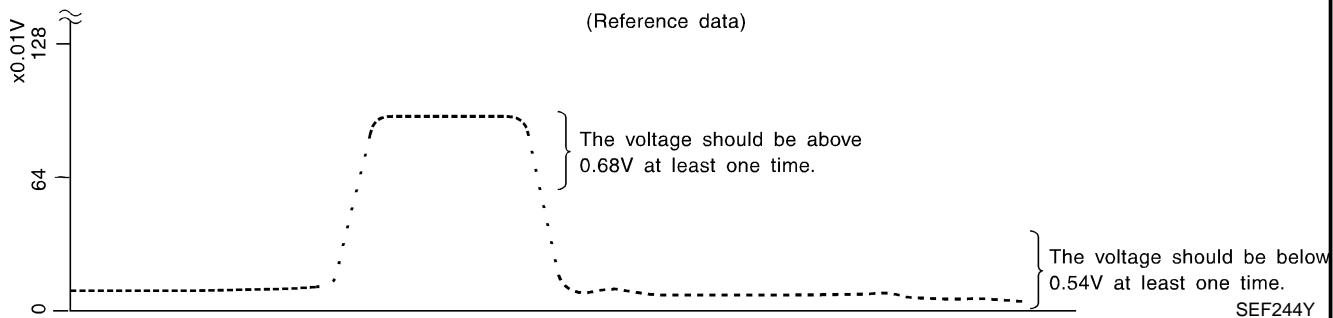
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



OK or NG

OK ► GO TO 8.

NG ► Replace heated oxygen sensor 2 (rear).

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) The voltage should be above 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 8.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Replace heated oxygen sensor 2 (rear).</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace heated oxygen sensor 2 (rear).	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
OK	▶	GO TO 8.							
NG	▶	Replace heated oxygen sensor 2 (rear).							

8	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-top: 10px;">SEF698Z</p> <p>Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 10.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 9.</td> </tr> </table>	OK	▶	GO TO 10.	NG	▶	GO TO 9.	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 10.							
NG	▶	GO TO 9.							

DTC P0140 HEATED OXYGEN SENSOR 2 (REAR) (HIGH VOLTAGE)

KA24DE

Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P0141 HEATED OXYGEN SENSOR 2 HEATER (REAR)

KA24DE
Description

Description

NEEC0180

SYSTEM DESCRIPTION

NEEC0180S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)

The ECM performs ON/OFF control of the heated oxygen sensor 2 (rear) heater corresponding to the engine speed.

OPERATION

NEEC0180S02

Engine condition	Heated oxygen sensor 2 heater (rear)
Ignition switch ON Engine stopped	OFF
Engine is running.	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC0181

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	<ul style="list-style-type: none"> Engine speed: Idle [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more] 	ON
	<ul style="list-style-type: none"> Ignition switch ON (Engine stopped) 	OFF

ECM Terminals and Reference Value

NEEC0182

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (rear)	[Engine is running] <ul style="list-style-type: none"> After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V
			[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0183

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141	<ul style="list-style-type: none"> The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).] 	<ul style="list-style-type: none"> Harness or connectors [The heated oxygen sensor 2 heater (rear) circuit is open or shorted.] Heated oxygen sensor 2 heater (rear)

DTC Confirmation Procedure

NEEC0184

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is in between 10.5V at idle.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V

SEF175Y

 **With CONSULT-II**

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-284.

 **With GST**

- 1) Start engine.
- 2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle and let engine idle for at least 6 seconds.
- 4) Turn ignition switch OFF and wait at least 10 seconds.
- 5) Start engine.
- 6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 7) Stop vehicle and let engine idle for at least 6 seconds.
- 8) Select "MODE 3" with GST.
- 9) If DTC is detected, go to "Diagnostic Procedure", EC-284.

When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

DTC P0141 HEATED OXYGEN SENSOR 2 HEATER (REAR)

KA24DE

Wiring Diagram

Wiring Diagram

NEEC0185

EC-HO2S2H-01

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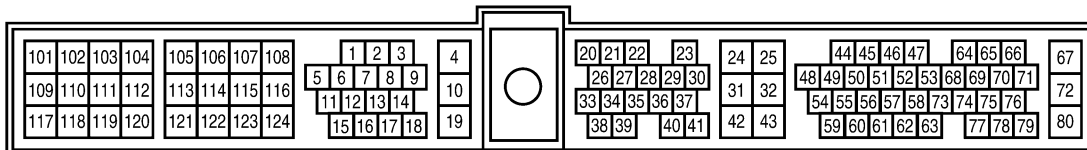
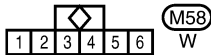
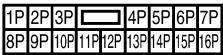
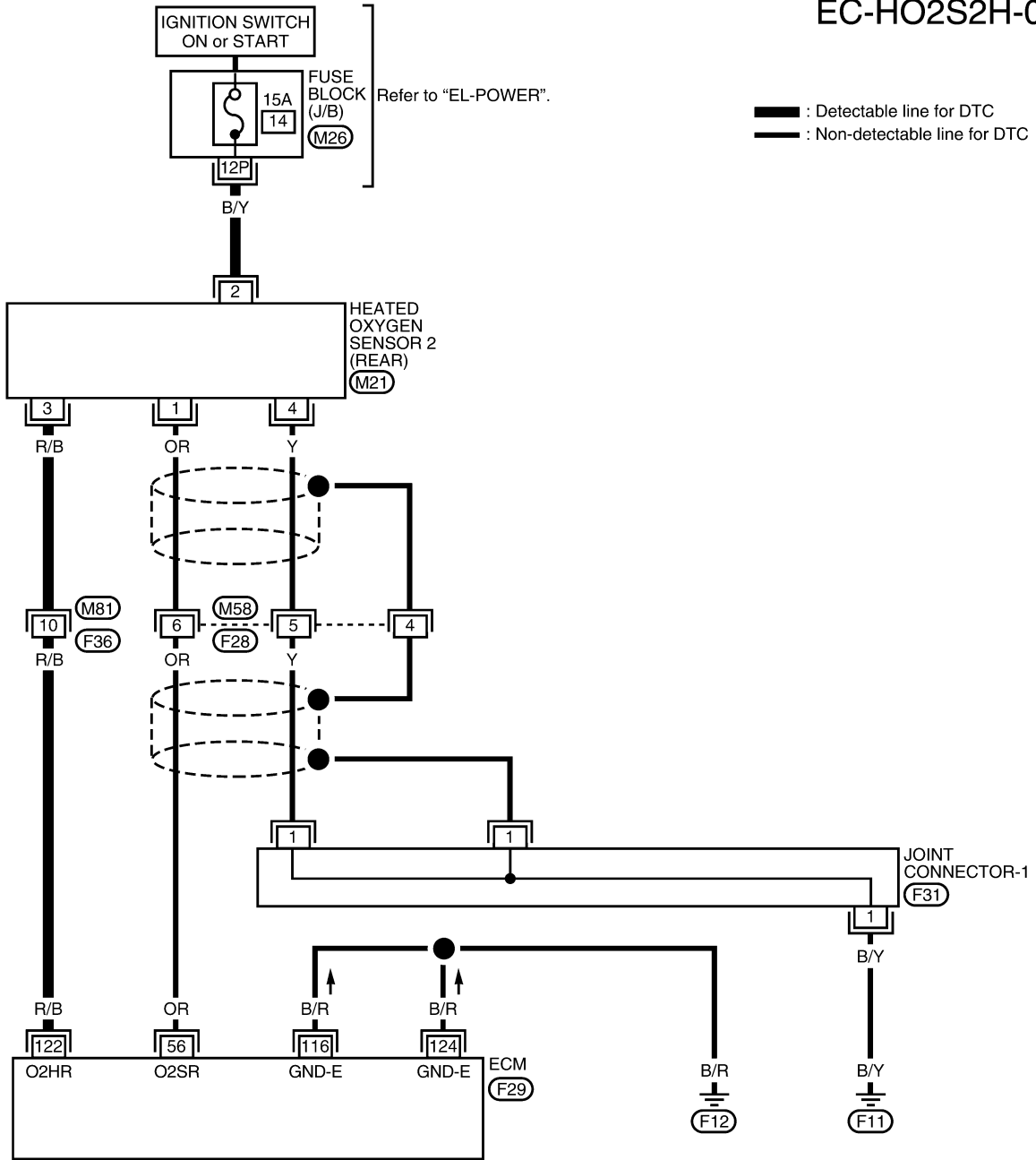
BT

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WEC775

Diagnostic Procedure

NEEC0186

1	CHECK POWER SUPPLY
<p>1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 2 (rear) harness connector. 3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground.</p> <div style="text-align: center;"> <p style="color: blue; font-weight: bold;">Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF218W</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● 15A fuse ● Harness for open or short between heated oxygen sensor 2 (rear) and 15A fuse 	
▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between heated oxygen sensor 2 (rear) terminal 3 and ECM terminal 122. Refer to the wiring diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between heated oxygen sensor 2 (rear) heater and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0141 HEATED OXYGEN SENSOR 2 HEATER (REAR)

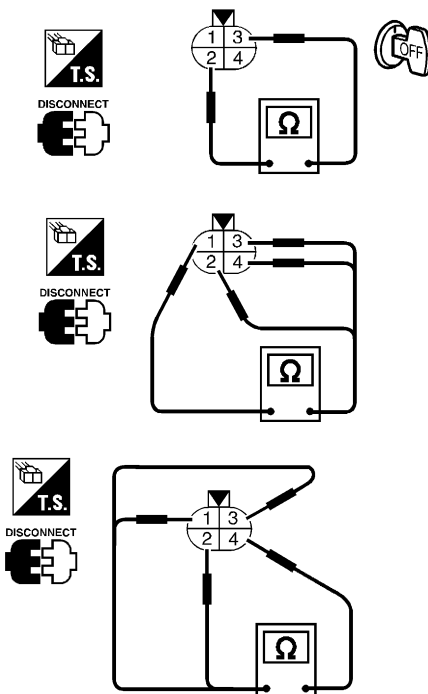
KA24DE

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

SEF221W

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

MTBL0330

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

▶ **INSPECTION END**

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DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

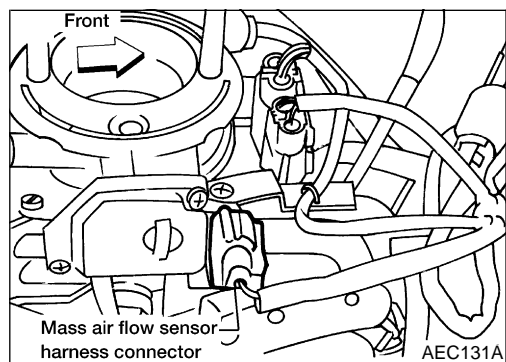
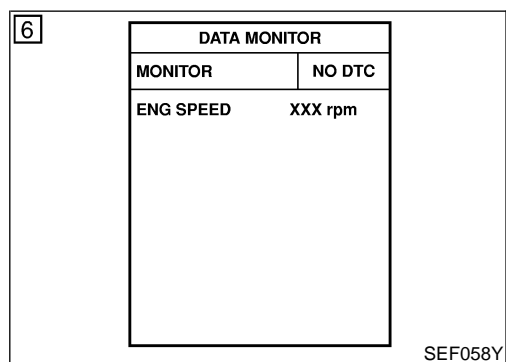
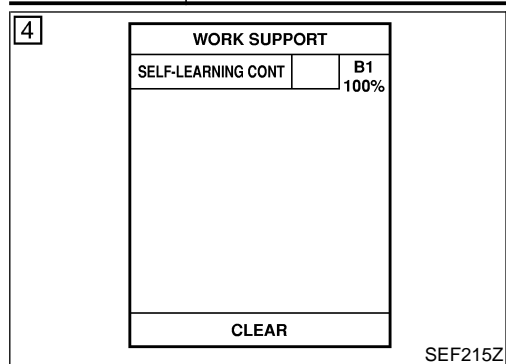
NEEC0188

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	<ul style="list-style-type: none"> Intake air leaks Heated oxygen sensor 1 (front) Injectors Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor



DTC Confirmation Procedure

NEEC0189

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-289.
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-289. If engine does not start, visually check for exhaust and intake air leak.

With GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
- Select "MODE 4" with GST and erase the 1st trip DTC P0100.

DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

DTC Confirmation Procedure (Cont'd)

- 7) Start engine again and run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-289.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-289. If engine does not start, visually check for exhaust and intake air leak.

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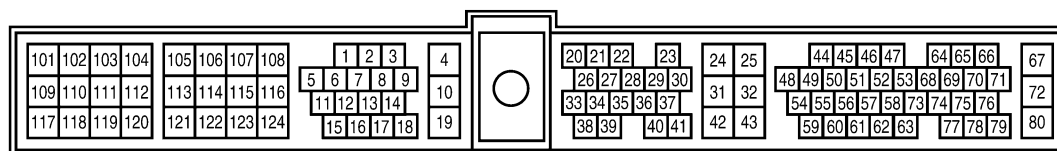
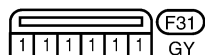
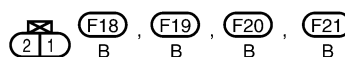
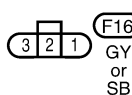
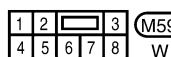
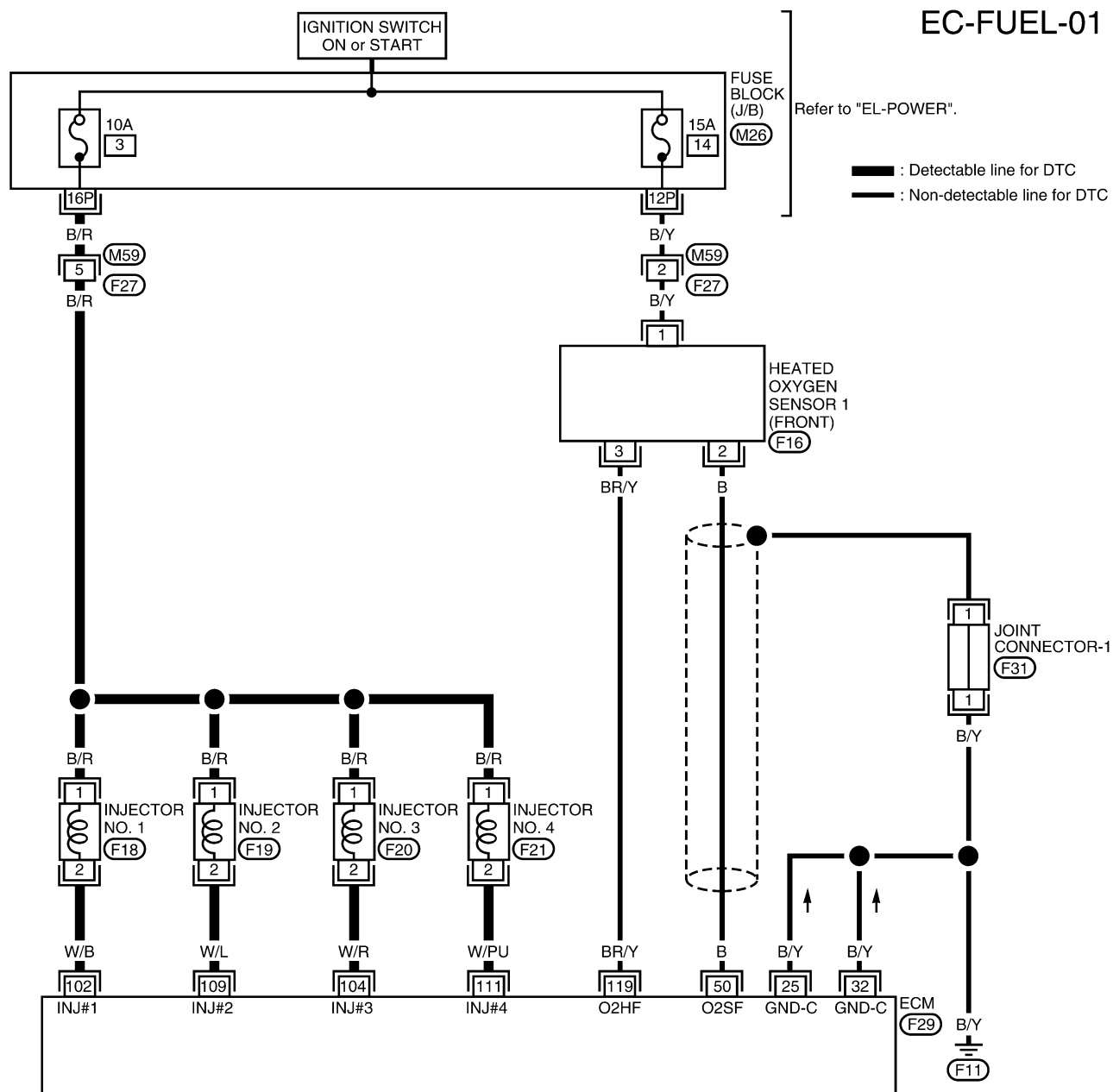
DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

Wiring Diagram

Wiring Diagram

NEEC0190



WEC152A

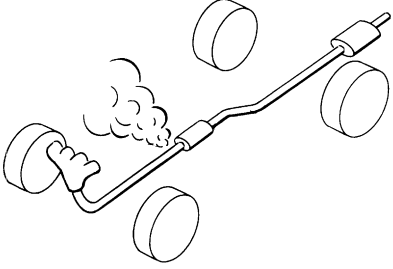
DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0191

1	CHECK EXHAUST AIR LEAK		
		<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p> <div style="text-align: center;">  </div>	SEF099P
		OK or NG	
OK	▶	GO TO 2.	
NG	▶	Repair or replace.	

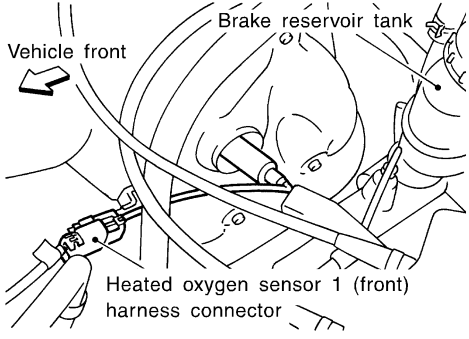
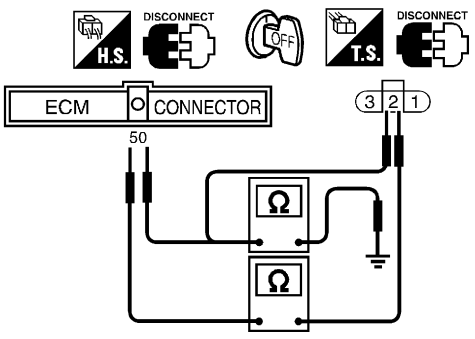
2	CHECK FOR INTAKE AIR LEAK		
		Listen for an intake air leak between the mass air flow sensor and the intake manifold.	
		OK or NG	
OK	▶	GO TO 3.	
NG	▶	Repair or replace.	

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DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.</p>	
	
<p>3. Check harness continuity between ECM terminal 50 and terminal 2.</p>	
	
<p>Continuity should exist.</p> <p>4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.</p> <p>Continuity should not exist.</p> <p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

SEF331VA

SEF141V

4	CHECK FUEL PRESSURE
<p>1. Release fuel pressure to zero. Refer to EC-57.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p>At idling:</p> <p style="padding-left: 20px;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="padding-left: 20px;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit Refer to EC-597. ● Fuel pressure regulator Refer to EC-58. ● Fuel lines Refer to "ENGINE MAINTENANCE", MA-19. ● Fuel filter for clogging 	
▶	Repair or replace.

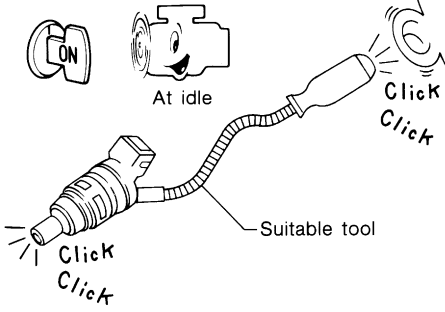
DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK MASS AIR FLOW SENSOR	
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. at idling: 0.9 - 5.8 g-m/sec at 2,500 rpm: 7.5 - 13.2 g-m/sec 		
<p>Ⓢ With GST</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check mass air flow sensor signal in MODE 1 with GST. at idling: 0.9 - 5.8 g-m/sec at 2,500 rpm: 7.5 - 13.2 g-m/sec 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-156.

GI
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7	CHECK FUNCTION OF INJECTORS																	
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
SEF981Z																		
<p>4. Make sure that each circuit produces a momentary engine speed drop.</p>																		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound. 																		
																		
Clicking noise should be heard.																		
OK or NG																		
OK	▶	GO TO 8.																
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-589.																

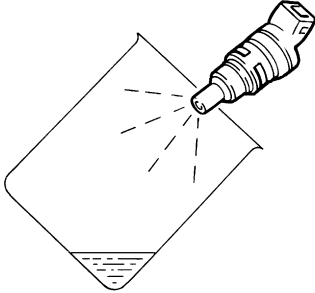
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DTC P0171 FUEL INJECTION SYSTEM FUNCTION (LEAN SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

8	REMOVE INJECTOR
<ol style="list-style-type: none">1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.2. Turn ignition switch OFF.3. Remove injector with fuel tube assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.	
	▶ GO TO 9.

9	CHECK INJECTOR
<ol style="list-style-type: none">1. Disconnect all ignition coil harness connectors.2. Place pans or saucers under each injector.3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.	
	
<p>Fuel should be sprayed evenly for each cylinder.</p> <p>OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

SEF595Q

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END

DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

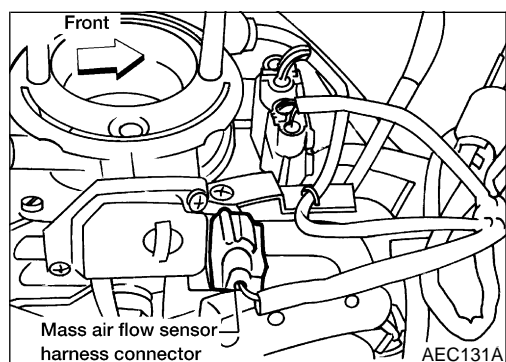
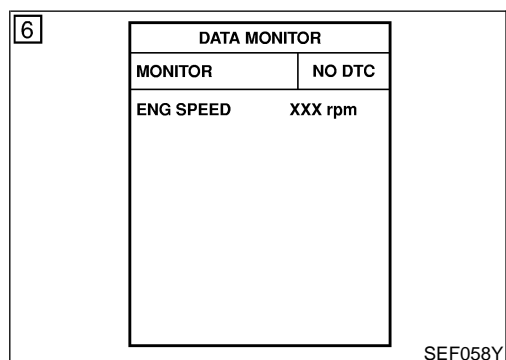
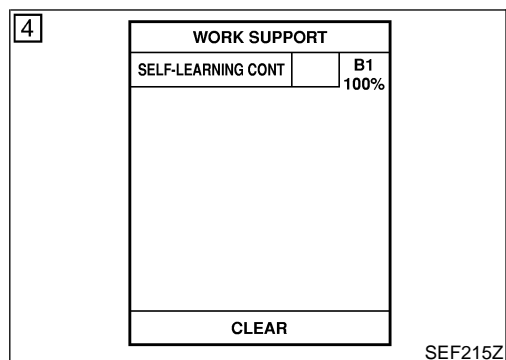
NEEC0192

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> Heated oxygen sensor 1 (front) Injectors Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor



DTC Confirmation Procedure

NEEC0193

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-296.
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-296. If engine does not start, remove ignition plugs and check for fouling, etc.

Ⓜ With GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
- Select "MODE 4" with GST and erase the 1st trip DTC P0100.

DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE

DTC Confirmation Procedure (Cont'd)

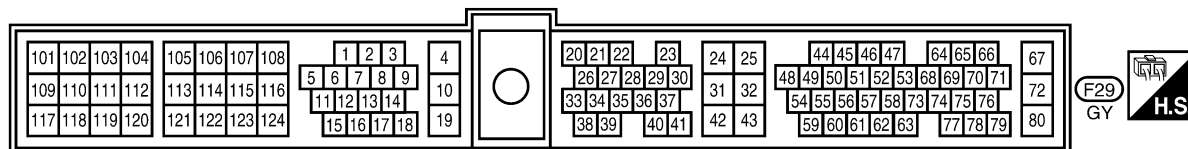
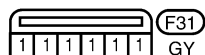
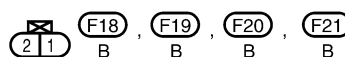
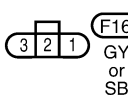
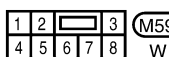
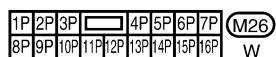
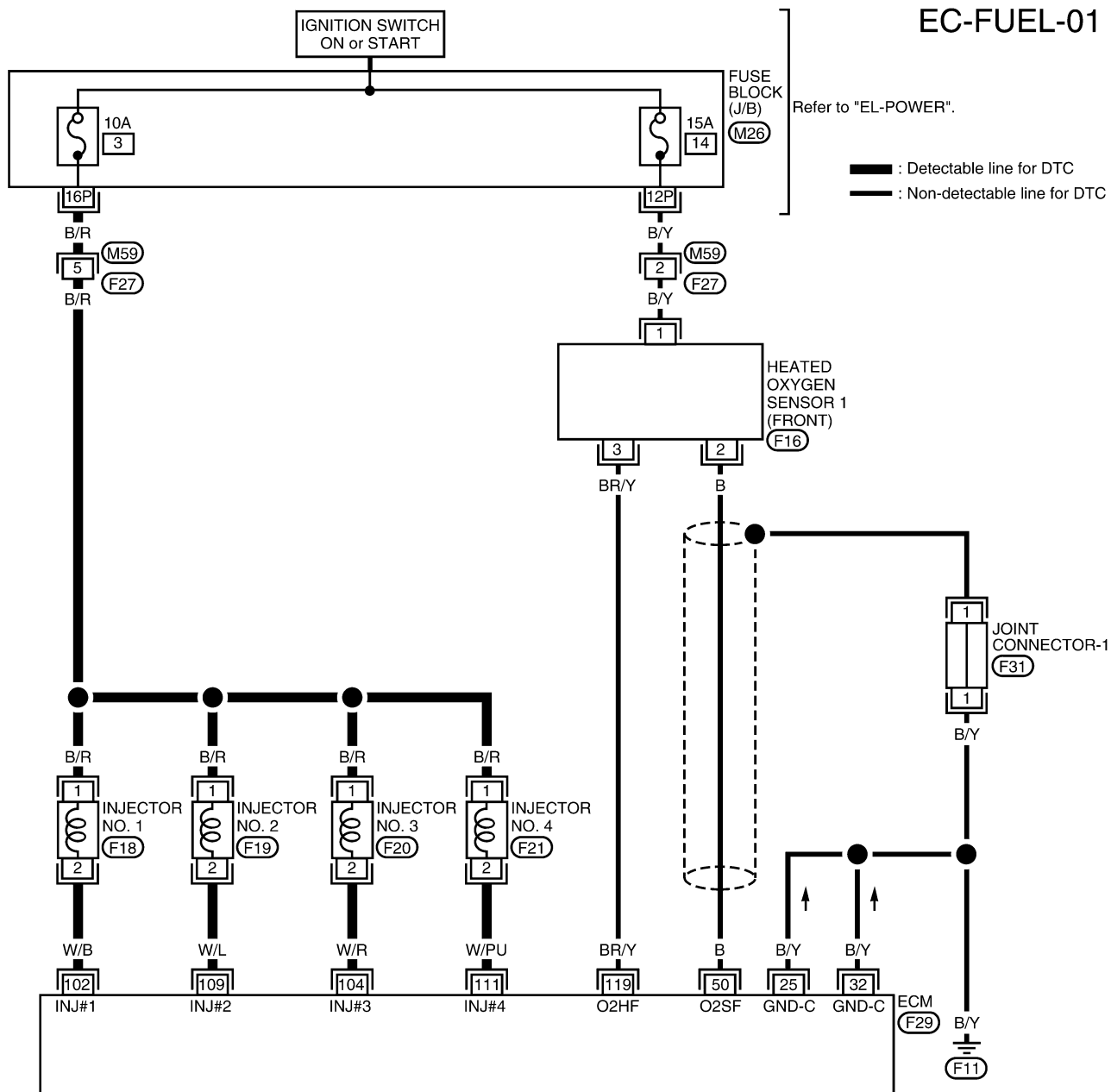
- 7) Start engine again and run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-296.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-296. If engine does not start, remove ignition plugs and check for fouling, etc.

DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE
Wiring Diagram

Wiring Diagram

NEEC0194



WEC152A

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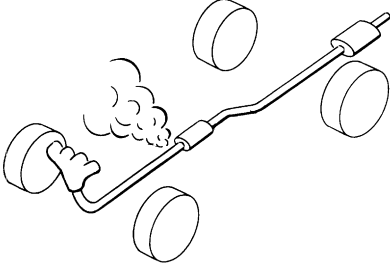
DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

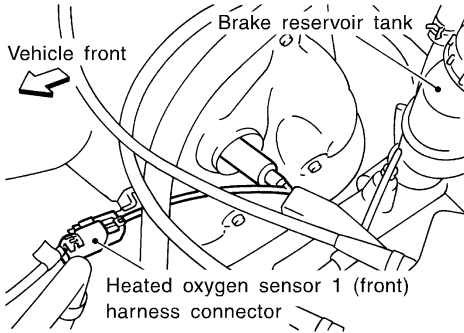
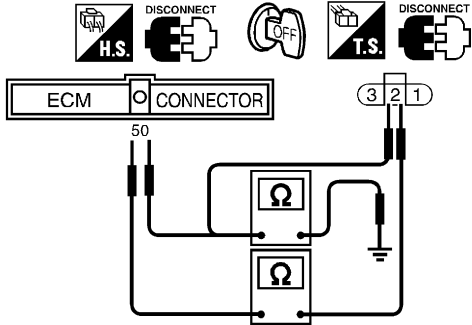
KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0195

1	CHECK FOR EXHAUST AIR LEAK	<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF099P</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF331VA</p> <p>3. Check harness continuity between ECM terminal 50 and terminal 2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF141V</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground. Continuity should not exist.</p> <p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.



DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-57.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="margin-left: 20px;">At idling:</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is connected. Approximately 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is disconnected. Approximately 294 kPa (3.0 kg/cm², 43 psi)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-597.) ● Fuel pressure regulator (Refer to EC-58.) 		
▶		Repair or replace.

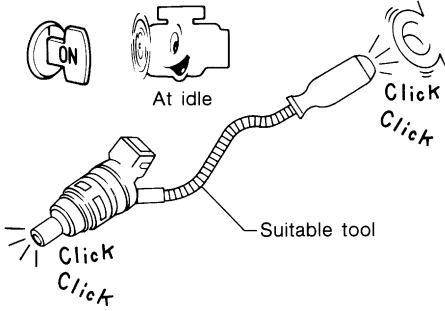
5	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.</p> <p style="margin-left: 20px;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="margin-left: 20px;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p>		
<p> With GST</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check mass air flow sensor signal in MODE 1 with GST.</p> <p style="margin-left: 20px;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="margin-left: 20px;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-161.

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DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK FUNCTION OF INJECTORS																
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX %																
SEF981Z																	
<p>4. Make sure that each circuit produces a momentary engine speed drop.</p>																	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound. 																	
																	
MEC703B																	
<p>Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>																	
OK	▶	GO TO 7.															
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-589.															

7	REMOVE INJECTOR
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Remove injector assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. 	
▶ GO TO 8.	

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Disconnect all injector harness connectors. 2. Disconnect all ignition coil harness connectors. 3. Prepare pans or saucers under each injectors. 4. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

DTC P0172 FUEL INJECTION SYSTEM FUNCTION (RICH SIDE)

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

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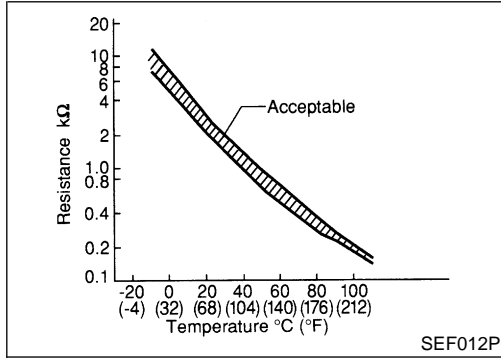
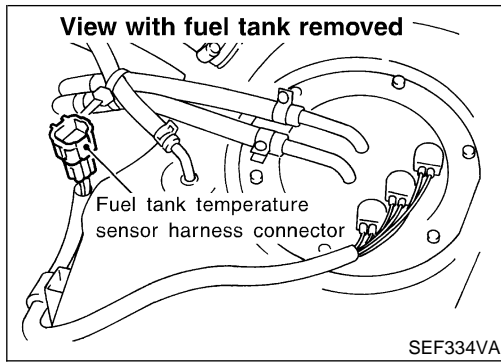
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Component Description



Component Description

NEEC0196

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0197

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180	<ul style="list-style-type: none"> An excessively high or low voltage is sent to ECM. Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Fuel tank temperature sensor

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NEEC0198

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-303.
If the result is OK, go to following step.

NOTE:

If "COOLAN TEMP/S" is already less than 60°C (140°F) before step 4), the result will be OK. If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.

- 4) Check "COOLAN TEMP/S" signal.
If the signal is less than 60°C (140°F), the result will be OK.
If the signal is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" signal is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-303.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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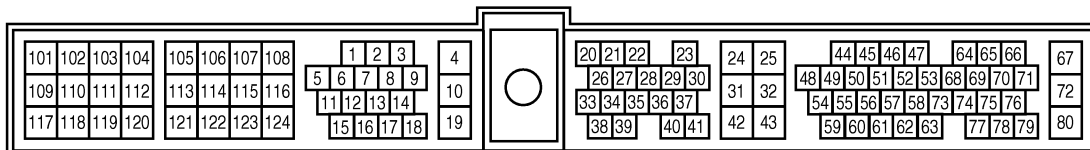
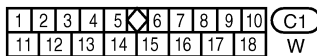
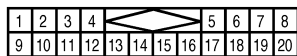
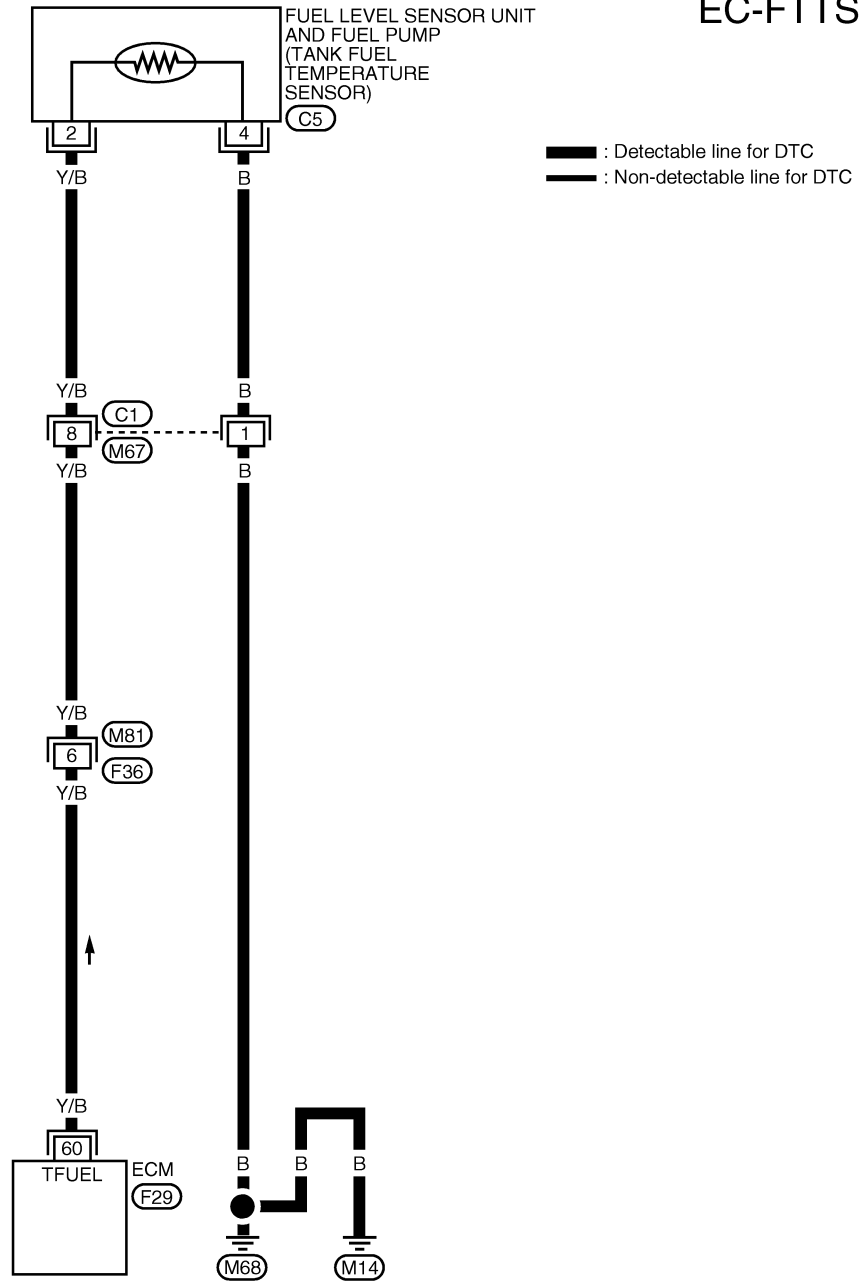
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Wiring Diagram

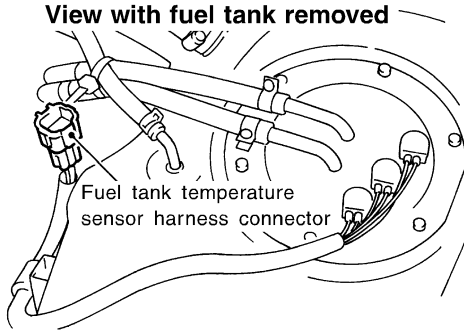
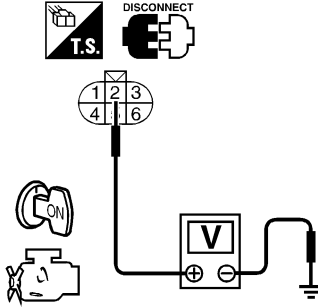
NEEC0199

EC-FTTS-01



Diagnostic Procedure

NEEC1075

1	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect fuel level sensor unit harness connector.</p> <div style="text-align: center;"> <p>View with fuel tank removed</p>  <p>Fuel tank temperature sensor harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Approximately 5V</p> <p>OK or NG</p> </div>	<p>SEF334VA</p> <p>SEF850Z</p>
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 	
	▶	Repair harness or connector.	

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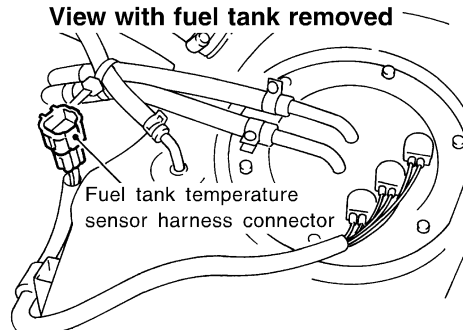
3	CHECK GROUND CIRCUIT		
<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between terminal 4 and body ground.</p>			
<p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p>			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

SEF851Z

4	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness for open or short between ECM and body ground 			
		▶	Repair open circuit or short to power in harness or connectors.

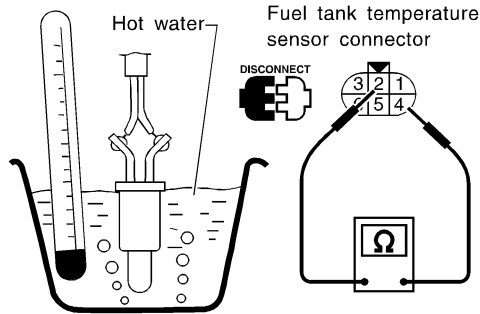
5 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



SEF334VA

2. Check resistance by heating with hot water or heat gun as shown in the figure.



SEF852Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0291

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

▶ **INSPECTION END**

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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0202

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, the ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**
 On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
 When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
 If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
 If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
- Two Trip Detection Logic (Exhaust quality deterioration)**
 For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
 A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	<ul style="list-style-type: none"> Multiple cylinders misfire. 	<ul style="list-style-type: none"> Improper spark plug Insufficient compression
P0301	<ul style="list-style-type: none"> No. 1 cylinder misfires. 	<ul style="list-style-type: none"> Incorrect fuel pressure EGR valve The injector circuit is open or shorted
P0302	<ul style="list-style-type: none"> No. 2 cylinder misfires. 	<ul style="list-style-type: none"> Injectors Intake air leak
P0303	<ul style="list-style-type: none"> No. 3 cylinder misfires. 	<ul style="list-style-type: none"> The ignition secondary circuit is open or shorted Lack of fuel Drive plate/Flywheel
P0304	<ul style="list-style-type: none"> No. 4 cylinder misfires. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 (front) Incorrect distributor rotor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NEEC0203

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-307.

With GST

Follow the procedure "With CONSULT-II".

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0204

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

GI

MA

EM

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

LC

EC

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3	CHECK EGR FUNCTION	
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-472.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

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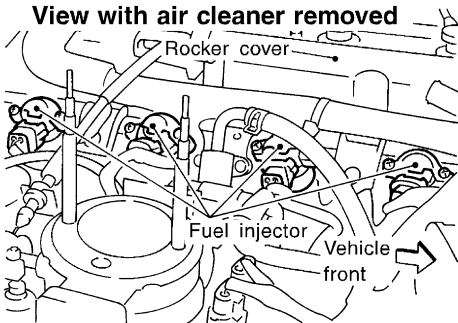
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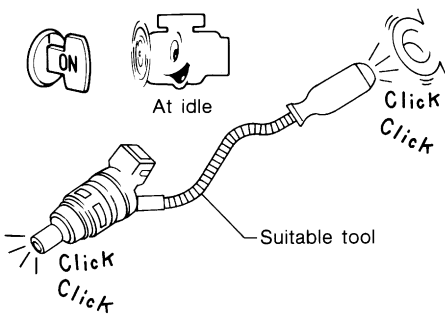
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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

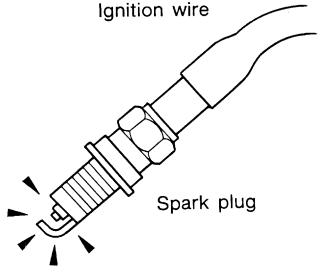
4	PERFORM POWER BALANCE TEST																
<p>With CONSULT-II</p> <p>1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr><td colspan="2">ACTIVE TEST</td></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><td colspan="2">MONITOR</td></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> <p style="text-align: right;">SEF981Z</p> <p>2. Is there any cylinder which does not produce a momentary engine speed drop?</p>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX %																
<p>Without CONSULT-II</p> <p>When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p style="text-align: right;">SEF319V</p> <p style="text-align: center;">Yes or No</p>																	
Yes	▶ GO TO 5.																
No	▶ GO TO 8.																

5	CHECK INJECTOR
<p>Does each injector make an operating sound at idle?</p> <div style="text-align: center;">  </div> <p style="text-align: right;">MEC703B</p> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 6.
No	▶ Check injector(s) and circuit(s). Refer to EC-589.

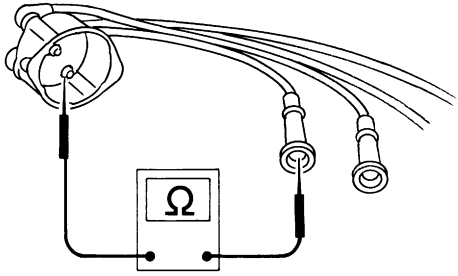
DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. 		
		
SEF282G		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

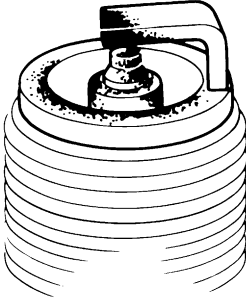
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7	CHECK IGNITION WIRES	
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 		
		
SEF174P		
<p>Resistance: 13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p>		
OK or NG		
OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-579.
NG	▶	Replace.

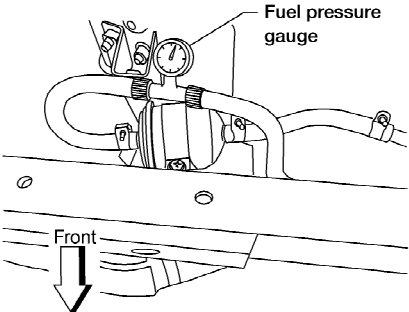
DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

8	CHECK SPARK PLUGS		
Remove the spark plugs and check for fouling, etc.			
			
SEF156I			
OK or NG			
OK	▶	GO TO 9.	
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", MA-17 .	

9	CHECK COMPRESSION PRESSURE		
Refer to EM-15 .			
● Check compression pressure.			
Standard:			
1,226 kPa (12.5 kg/cm ² , 178 psi)/300 rpm			
Minimum:			
1,030 kPa (10.5 kg/cm ² , 149 psi)/300 rpm			
Difference between each cylinder:			
98 kPa (1.0 kg/cm ² , 14 psi)/300 rpm			
OK or NG			
OK	▶	GO TO 10.	
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.	

10	CHECK FUEL PRESSURE		
1. Install any parts removed.			
2. Release fuel pressure to zero. Refer to EC-57.			
3. Install fuel pressure gauge and check fuel pressure.			
			
AEC064B			
At idle: Approx. 235 kPa (2.4 kg/cm², 34 psi)			
OK or NG			
OK	▶	GO TO 12.	
NG	▶	GO TO 11.	

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

11	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit Refer to EC-597. ● Fuel pressure regulator Refer to EC-58. ● Fuel lines Refer to "ENGINE MAINTENANCE", MA-19. ● Fuel filter for clogging 	
	Repair or replace.

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12	CHECK IGNITION TIMING										
<p>1. Check the following items. Refer to "Basic Inspection", EC-110.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0328</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	20° ± 2° BTDC										
Base idle speed	750 ± 50 rpm (in "P" or "N" position)										
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF										
Target idle speed	800 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II)	GO TO 13.										
OK (Without CONSULT-II)	GO TO 14.										
NG	Adjust ignition timing.										

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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

13 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

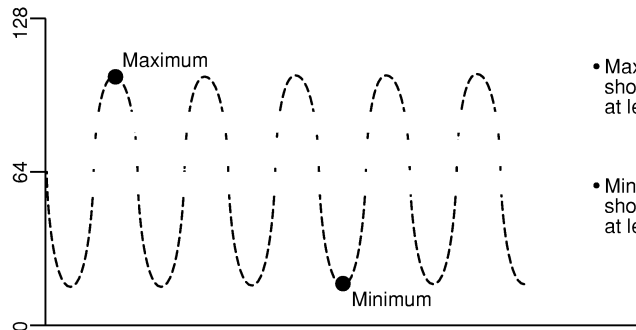
R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

R = "HO2S1 MNTR (B1)", "RICH"
 L = "HO2S1 MNTR (B1)", "LEAN"

- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
<p>⊗ Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and ECM ground.</p>		
AEC873A		
<p>3. Check the following with engine speed held at 2,000 rpm constant under no load.</p> <ul style="list-style-type: none"> ● Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II [HEATED OXYGEN SENSOR 1 MONITOR]. ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 15.
NG	▶	Replace heated oxygen sensor 1 (front).

15	CHECK MASS AIR FLOW SENSOR	
<p>Ⓜ With CONSULT-II</p> <p>Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.</p> <p style="color: blue;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="color: blue;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p>		
<p>Ⓜ With GST</p> <p>Check mass air flow sensor signal in MODE 1 with GST.</p> <p style="color: blue;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="color: blue;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	CHECK CONNECTORS	
<p>Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-156.</p> <p style="text-align: center;">OK or NG</p>		
NG	▶	Repair or replace it.

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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

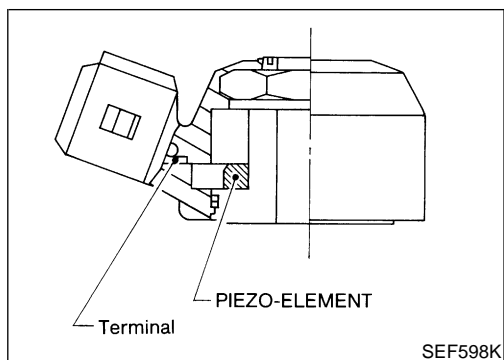
KA24DE

Diagnostic Procedure (Cont'd)

17	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-126.	
OK or NG	
OK	▶ GO TO 18.
NG	▶ Repair or replace.

18	ERASE THE 1ST TRIP DTC
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-85.	
	▶ GO TO 19.

19	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

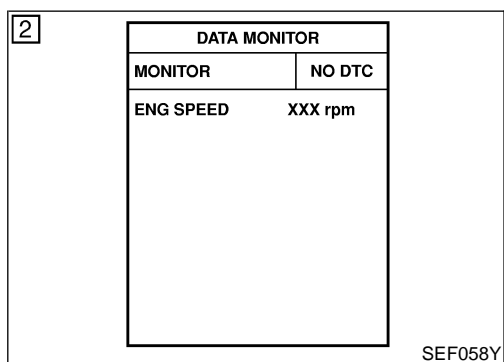
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.4V

On Board Diagnosis Logic

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0325	● An excessively low or high voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

④ **With CONSULT-II**

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-317.

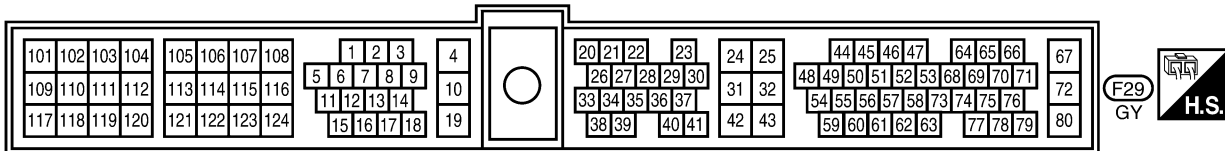
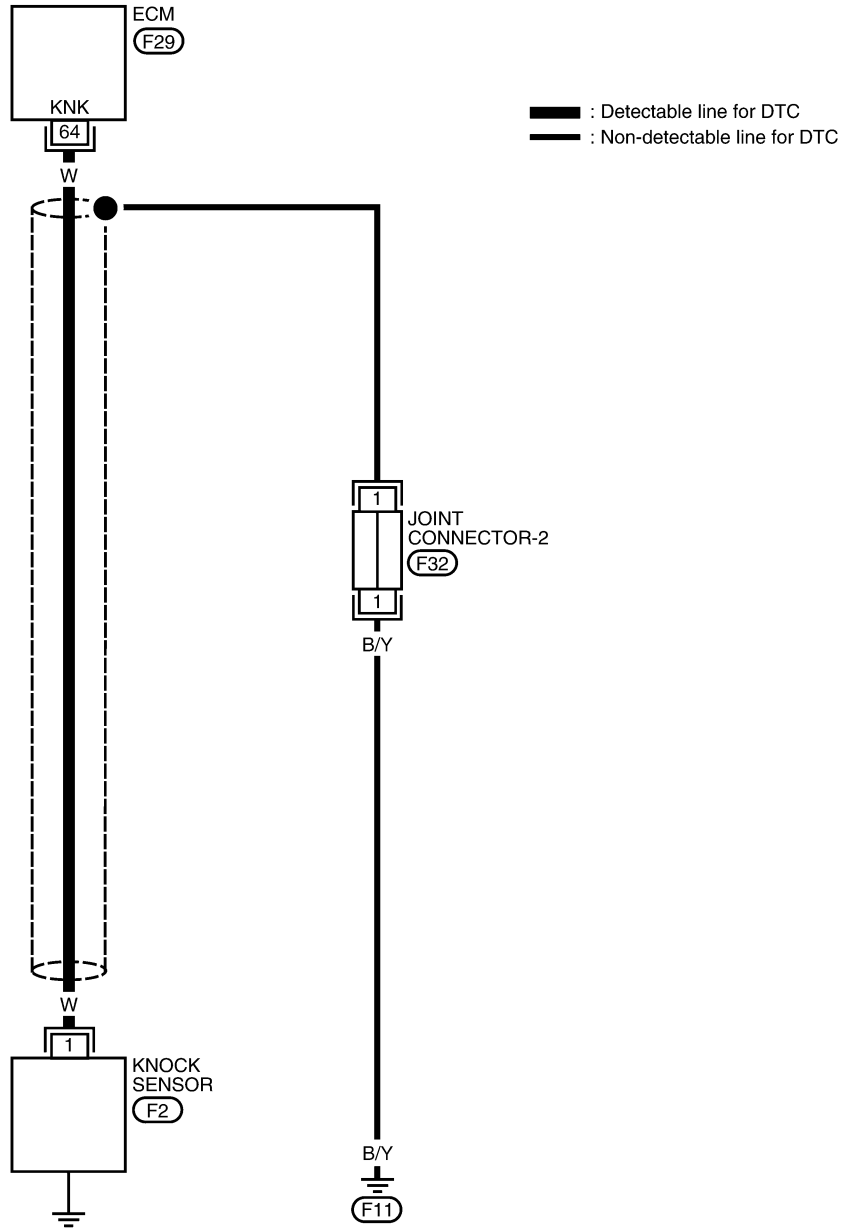
④ **With GST**

Follow the procedure "With CONSULT-II".

Wiring Diagram

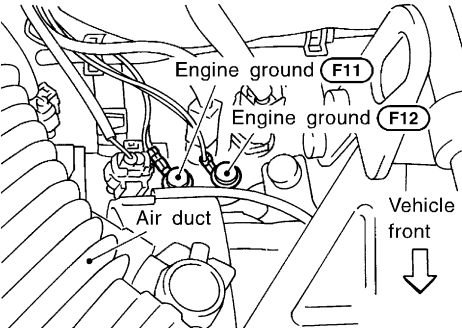
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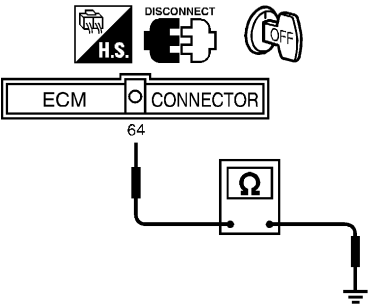


Diagnostic Procedure

NEEC0211

1	RETIGHTEN GROUND SCREWS
Loosen and retighten engine ground screws.	
	
SEF325V	
▶	GO TO 2.

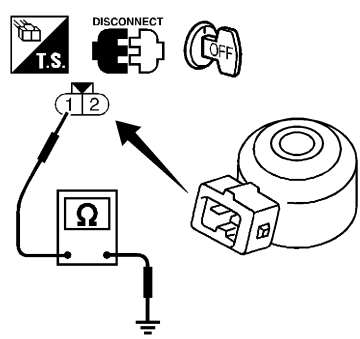
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2	CHECK INPUT SIGNAL CIRCUIT-1
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 64 and ground.	
	
SEF173V	
<p>Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)] It is necessary to use an ohmmeter which can measure more than 10 MΩ.</p> 4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

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3	DETECT MALFUNCTIONING PART
Check the harness for open or short between knock sensor and ECM.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

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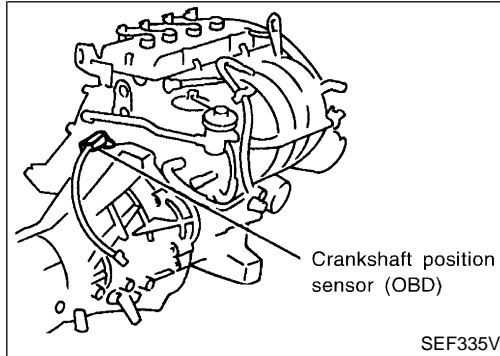
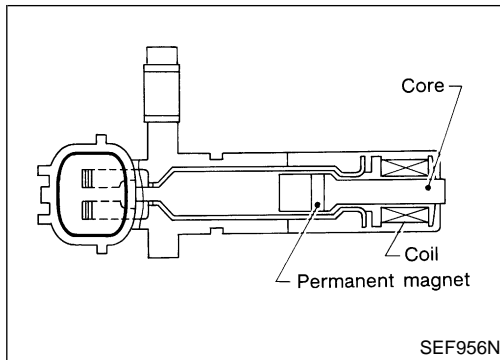
4	CHECK KNOCK SENSOR		
<p>Use an ohmmeter which can measure more than 10 MΩ.</p> <ol style="list-style-type: none"> 1. Disconnect knock sensor harness connector. 2. Check resistance between terminal 1 and ground. 			
			
<p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> <p>CAUTION: Discard any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 5.
NG		▶	Replace knock sensor.

SEF174V

5	CHECK SHIELD CIRCUIT		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following. Refer to the wiring diagram. <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 2 and ground ● Joint connector-1 (Refer to "HARNESS LAYOUT", EL-239.) <p style="margin-left: 20px;">Continuity should exist.</p> 4. Also check harness for short to power. 5. Then reconnect harness connectors. 			
OK or NG			
OK		▶	GO TO 7.
NG		▶	GO TO 6.

6	DETECT MALFUNCTIONING PART		
Check the joint connector-2. (Refer to "HARNESS LAYOUT", EL-239 .)			
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.			
		▶	INSPECTION END



Component Description

NEEC0213

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NEEC0214

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	
			[Engine is running] ● Engine speed is 2,000 rpm	

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On Board Diagnosis Logic

NEEC0215

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD) ● Dead battery

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DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) KA24DE

DTC Confirmation Procedure

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC0216

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-322.

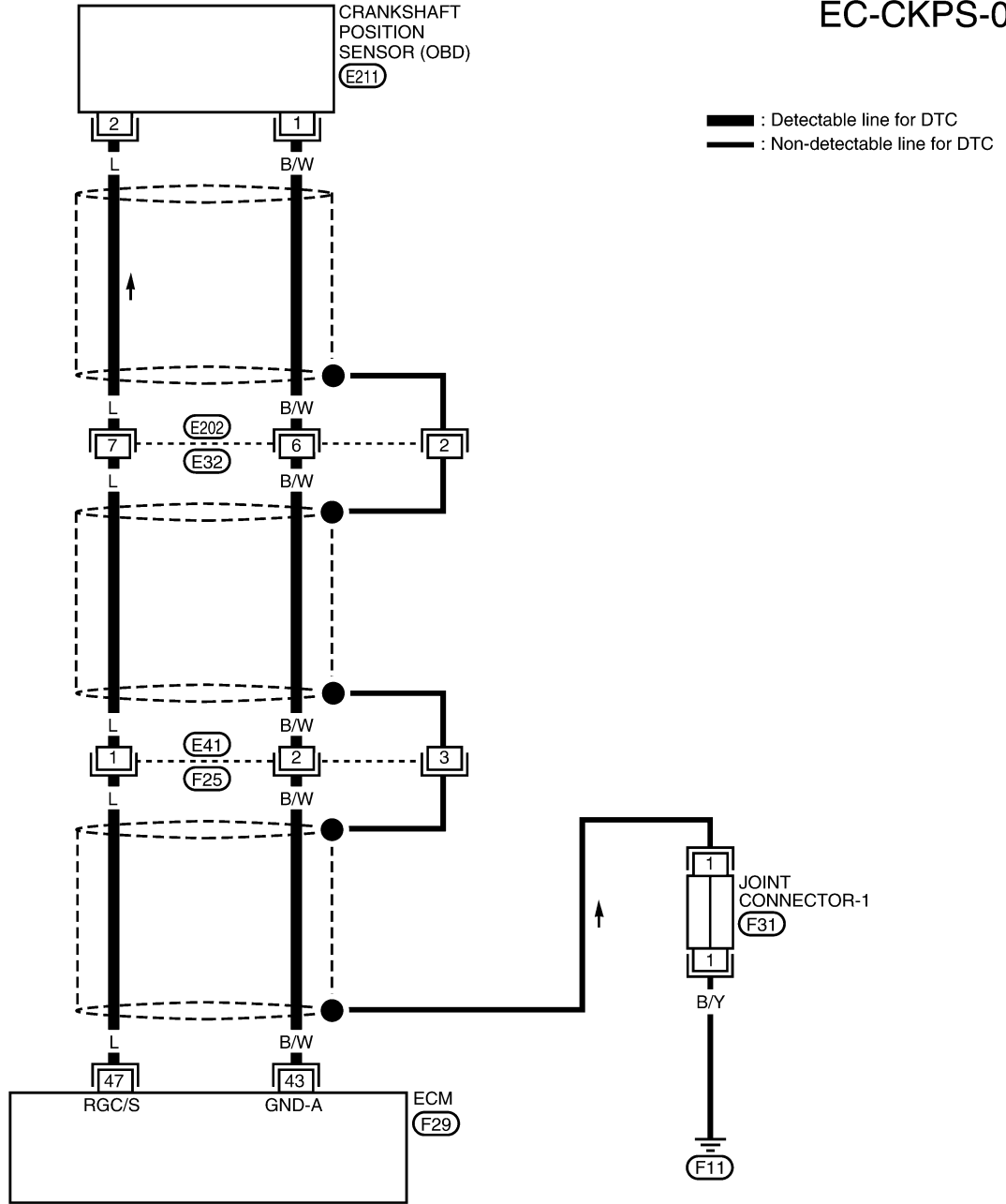
With GST

Follow the procedure "With CONSULT-II".

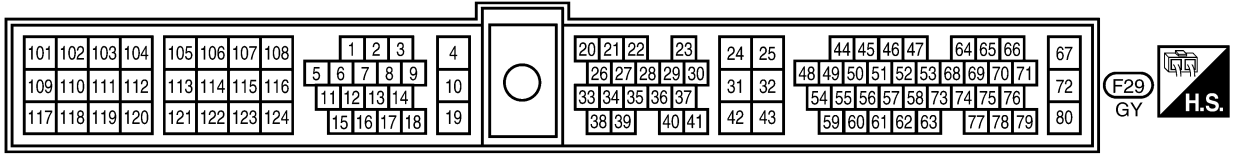
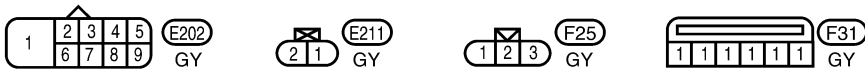
Wiring Diagram

NEEC0217

EC-CKPS-01

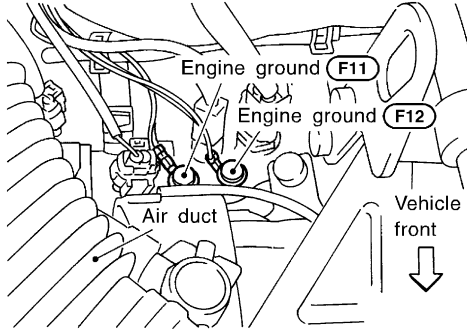


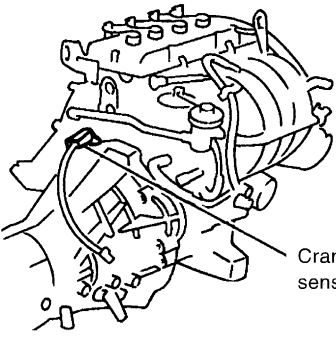
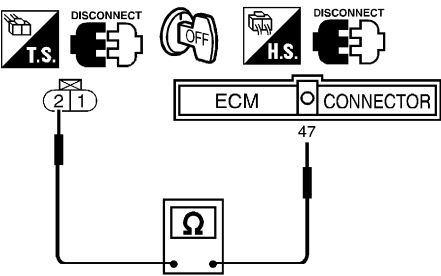
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Diagnostic Procedure

NEEC0218

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
SEF325V	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p>	
	
SEF335V	
<p>2. Check continuity between ECM terminal 47 and terminal 2.</p>	
	
SEF175V	
<p>Continuity should exist.</p>	
<p>3. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

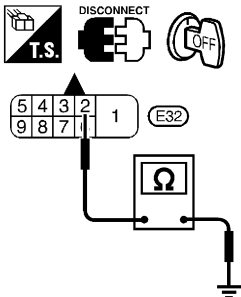
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) KA24DE

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT
1. Reconnect ECM harness connector. 2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the wiring diagram. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT
1. Turn ignition switch OFF. 2. Disconnect harness connector E32. 3. Check harness continuity between harness connector E32 terminal 2 and ground.	
	
Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect harness connectors.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

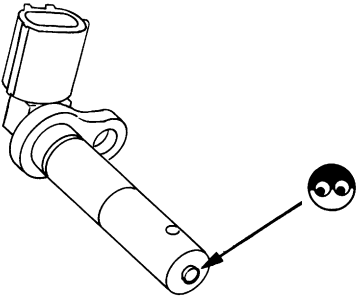
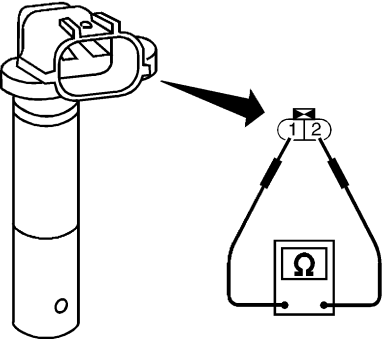
SEF177V

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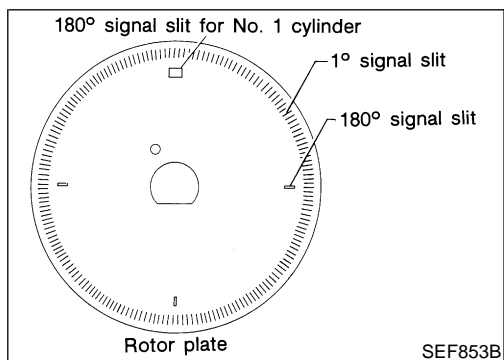
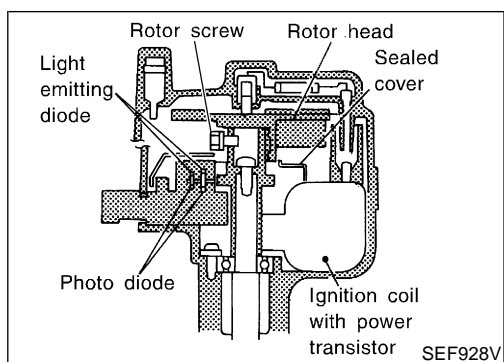
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) KA24DE

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.) ● Harness for open or short between harness connector E32 and Engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

8	CHECK CRANKSHAFT POSITION SENSOR (OBD)
1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.	
	
SEF960N	
5. Check resistance as shown in the figure.	
	
SEF231W	
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p>OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace crankshaft position sensor (OBD).

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END



Component Description

NEEC0220

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the engine control system are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 4 slits for a 180° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

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ECM Terminals and Reference Value

NEEC0221

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

AT

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TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] (Warm-up condition) ● Idle speed	0.2 - 0.5V
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V

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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sen- sor (Position signal)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 2.6V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	Approximately 2.5 - 2.6V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0222

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0340	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	<ul style="list-style-type: none"> ● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to SC-10.) ● Starting system circuit (Refer to SC-14.) ● Dead (Weak) battery
	B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

=NEEC0223

Perform “Procedure for malfunction A” first. If DTC cannot be confirmed, perform “Procedure for malfunction B and C”.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC0223S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-329.

With GST

Follow the procedure “With CONSULT-II”.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NEEC0223S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-329.

With GST

Follow the procedure “With CONSULT-II”.

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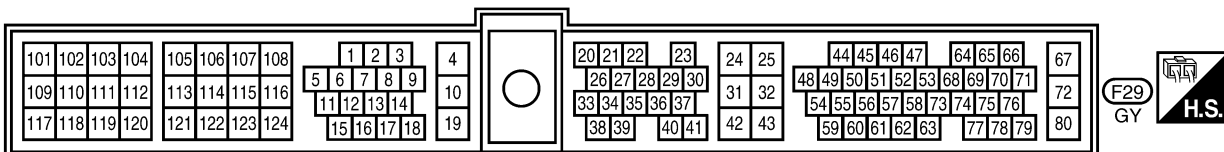
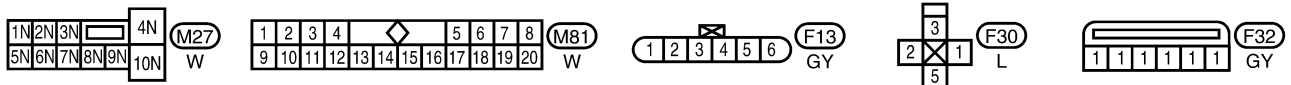
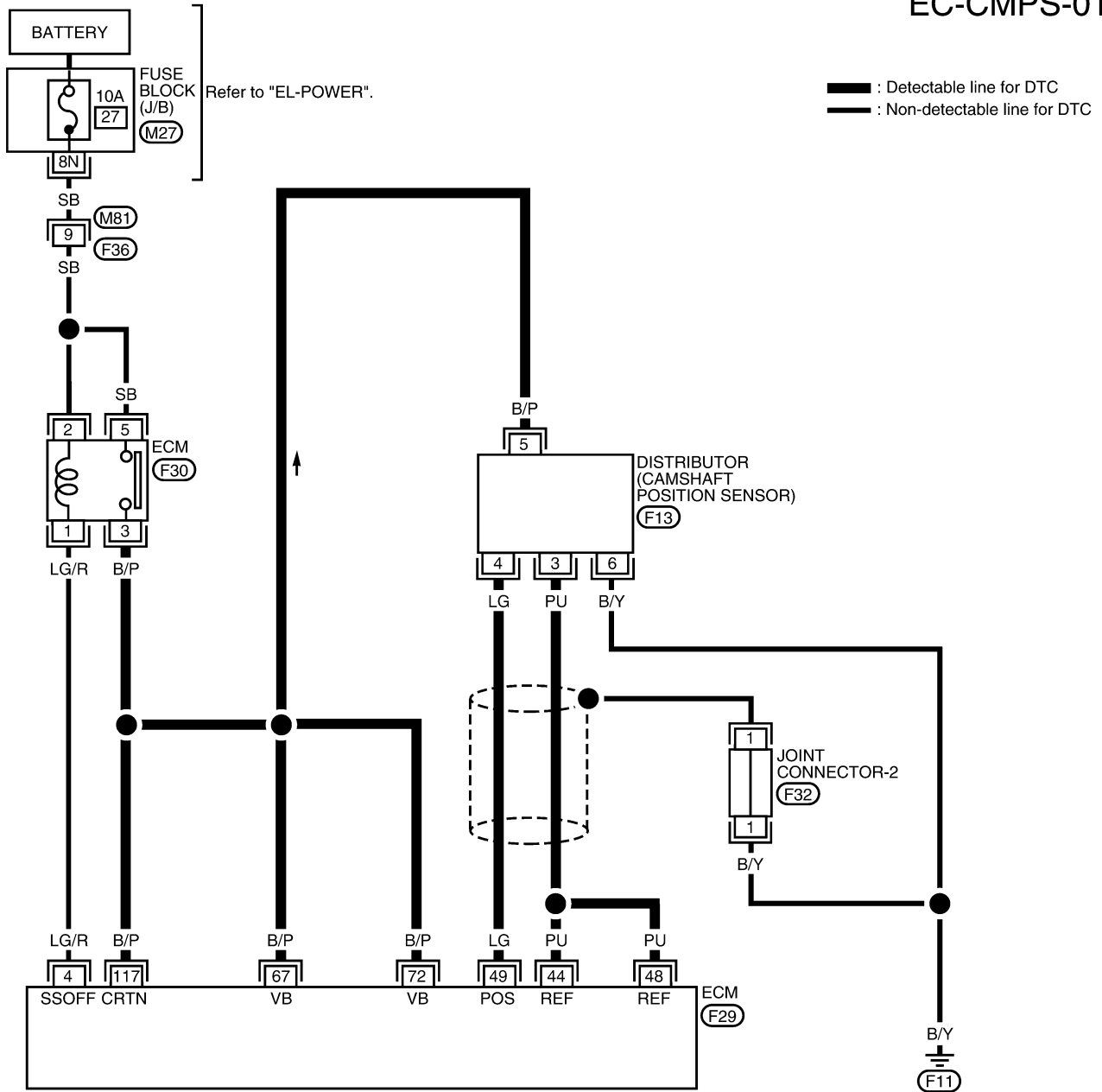
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Wiring Diagram

NEEC0224

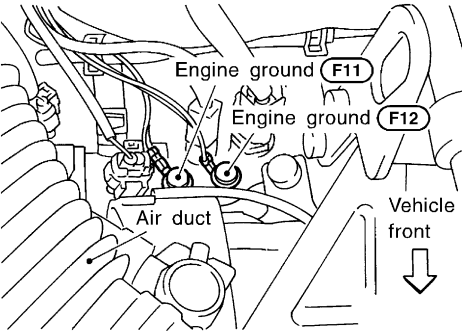
EC-CMPS-01



Diagnostic Procedure

NEEC0225

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?)		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to EL section.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.		
		
<small>SEF325V</small>		
	▶	GO TO 3.

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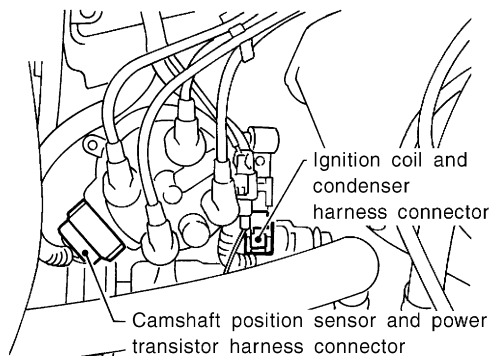
DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

KA24DE

Diagnostic Procedure (Cont'd)

3 CHECK POWER SUPPLY

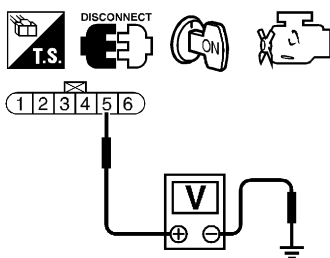
1. Disconnect camshaft position sensor harness connector.



SEF128S

2. Turn ignition switch ON.

3. Check voltage between terminal 5 and ground with CONSULT-II or tester.



SEF040S

Voltage: Battery voltage

OK or NG

OK ► GO TO 5.

NG ► GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

► Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK INPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44.</p>	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

SEF178V

6	CHECK GROUND CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between distributor (camshaft position sensor) terminal 6 and engine ground. Refer to the wiring diagram.</p> <p style="text-align: center;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p>	
<p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ Repair open circuit or short to power in harness or connectors.

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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK CAMSHAFT POSITION SENSOR	
<p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check voltage between ECM terminal 49 and engine ground, ECM terminal 44 and engine ground.</p>		
Terminal 44 and engine ground		
	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		
Terminal 49 and engine ground		
	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		
SEF868Z		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace camshaft position sensor.

8	CHECK SHIELD CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-1.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 2 and ground ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-253</i>.) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-1.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit, short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶		INSPECTION END

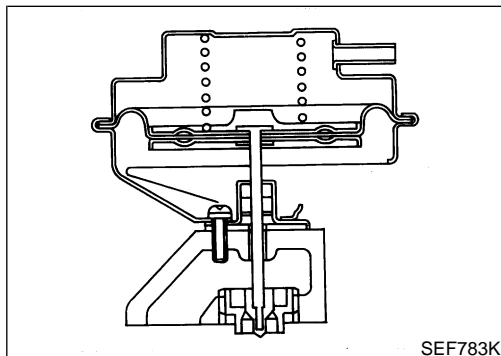
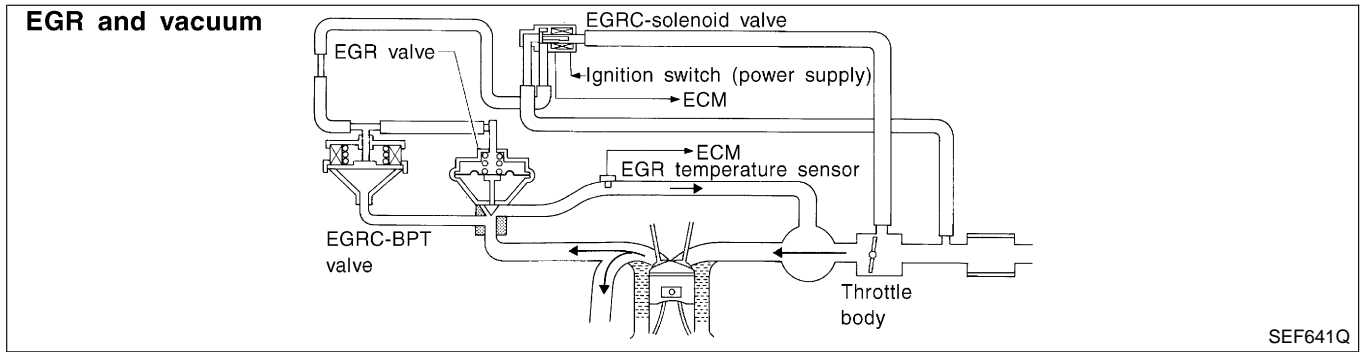
Description SYSTEM DESCRIPTION

NEEC0227
NEEC0227S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve is cut. This causes the vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low intake air temperature



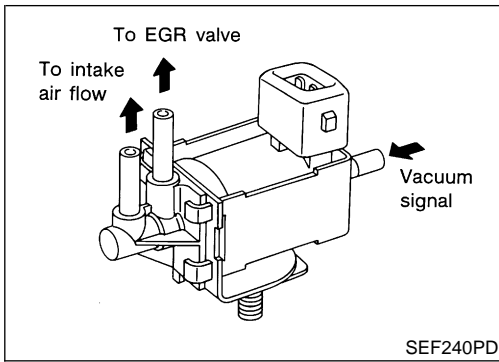
COMPONENT DESCRIPTION

Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

NEEC0227S02
NEEC0227S0201

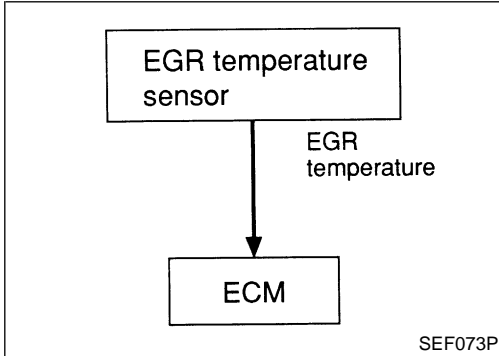
Description (Cont'd)



EGRC-Solenoid Valve

NEEC0227S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



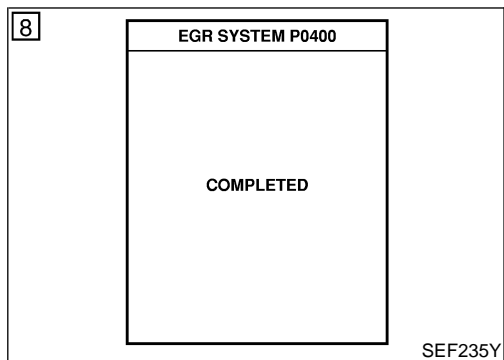
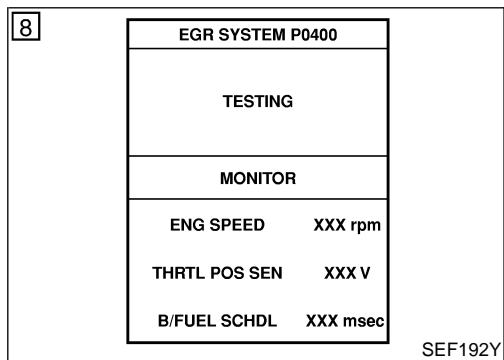
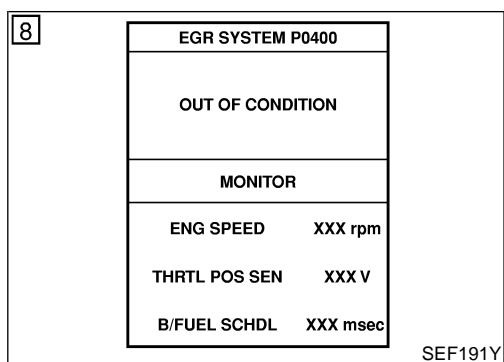
On Board Diagnosis Logic

NEEC0228

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400	<ul style="list-style-type: none"> No EGR flow is detected under conditions that call for EGR. 	<ul style="list-style-type: none"> EGR valve stuck closed EGRC-BPT valve Vacuum hose EGRC-solenoid valve EGR passage EGR temperature sensor Exhaust gas leaks

NEEC0229



DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is “NG”.

TESTING CONDITION:

For best results, perform the test at a temperature above 5°C (41°F).

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II and confirm it is within the range listed below.

COOLAN TEMP/S: Less than 40°C (104°F)

If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- 3) Start engine and let it idle monitoring “COOLAN TEMP/S” value. When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
- 4) Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 5) Touch “START”.
- 6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
If “COMPLETED” appears on CONSULT-II screen, go to step 9.
If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
- 7) Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
- 8) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 30 seconds or more.)

ENG SPEED	2,000 - 2,800 rpm
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	7.0 - 10.0 msec
THRTL POS SEN	(X + 0.23) – (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 9) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-338.

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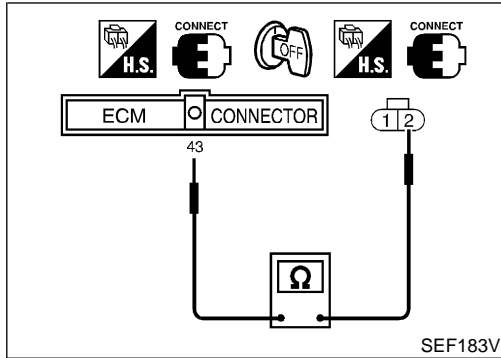
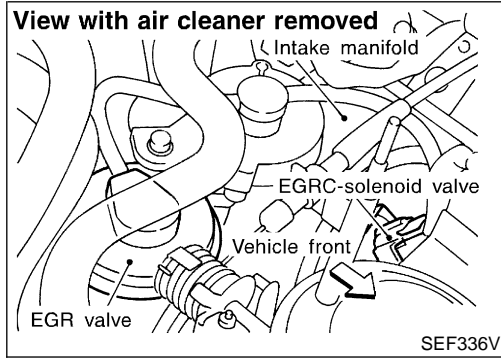
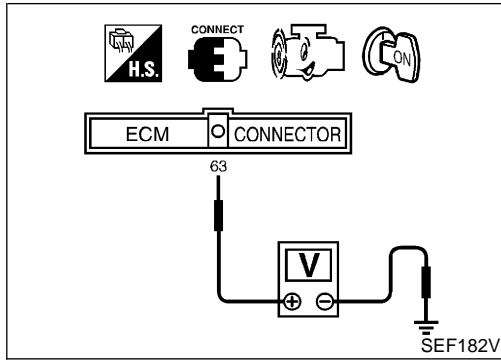
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Overall Function Check

NEEC0230

Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the EGR valve lifting when revving engine from 2,000 rpm to 4,000 rpm quickly under no load using the following methods.

- Disconnect EGRC-solenoid valve harness connector. (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

EGR valve should lift up and down without sticking.

If NG, go to "Diagnostic Procedure", EC-338.

- 3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.

Less than 4.5V should exist.

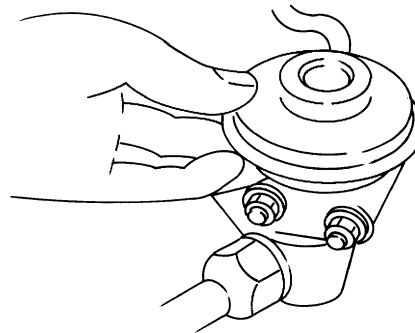
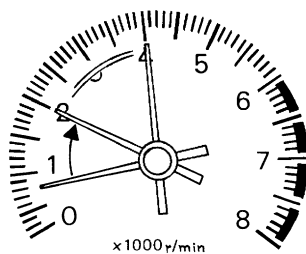
If NG, go to next step.

- 4) Turn ignition switch OFF.
- 5) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43 (ECM ground).

Continuity should exist.

- 6) Check "EGR TEMPERATURE SENSOR". Refer to "CHECK EGR TEMPERATURE SENSOR" in "Diagnostic Procedure".

Overall function check



Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

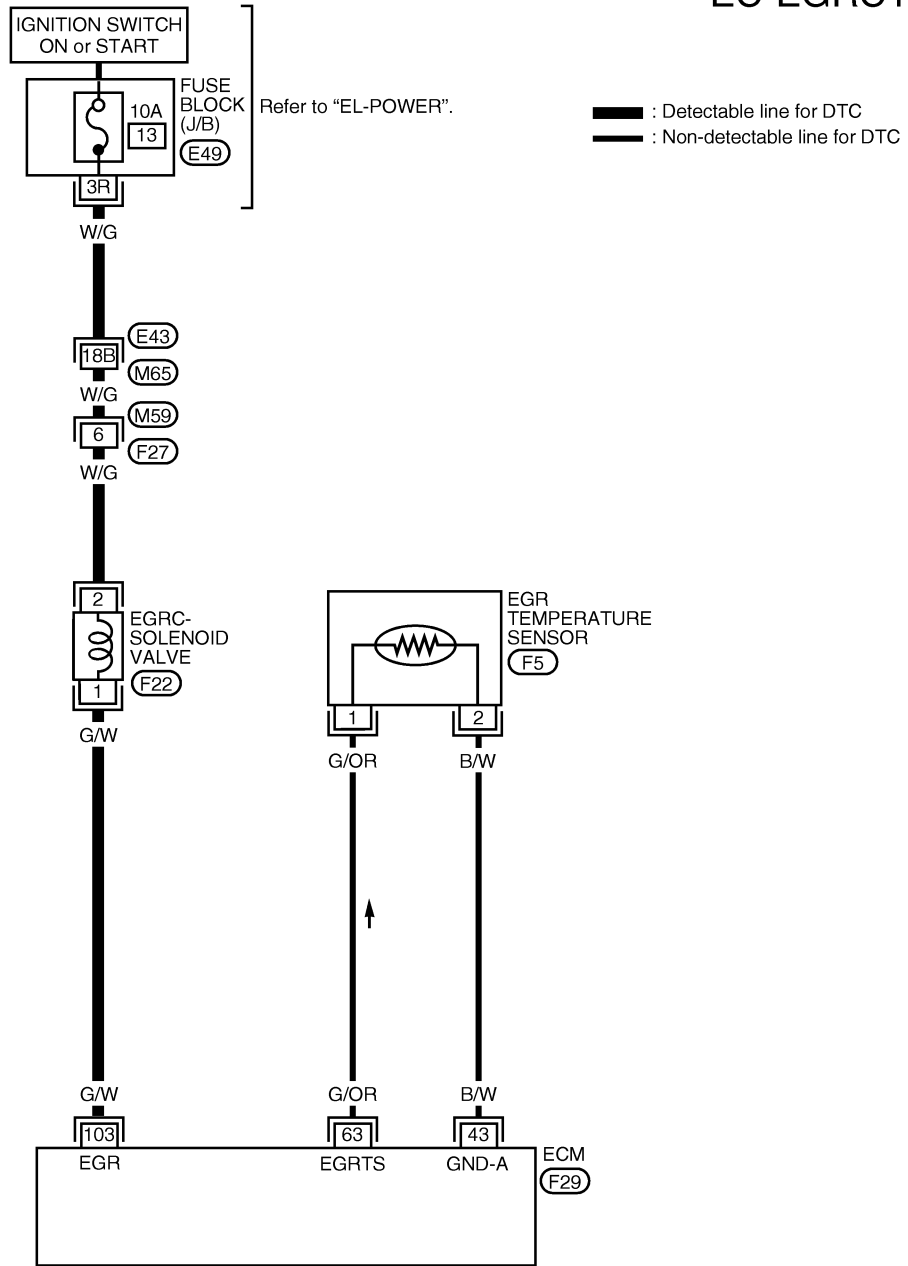
DTC P0400 EGR FUNCTION (CLOSE)

KA24DE
Wiring Diagram

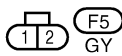
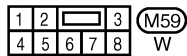
Wiring Diagram

NEEC0231

EC-EGRC1-01

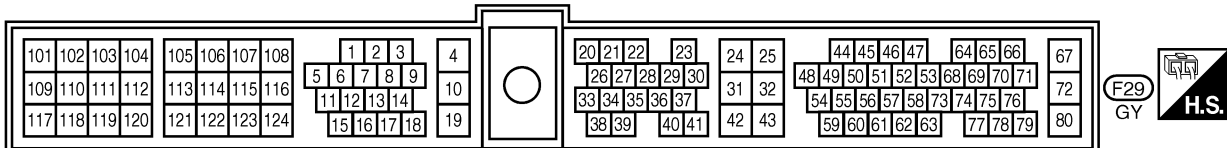


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Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

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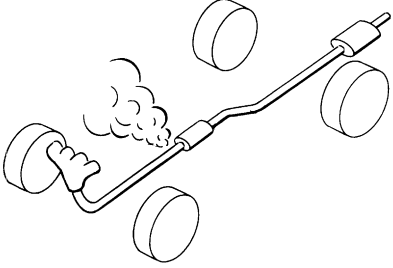


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Diagnostic Procedure

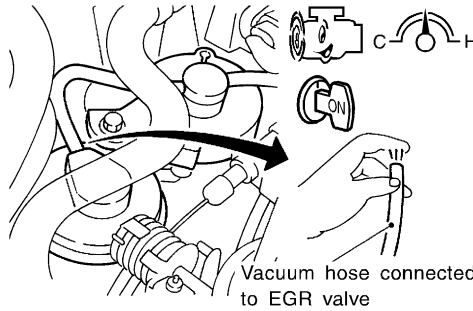
NEEC0232

1	CHECK EXHAUST SYSTEM	
<p>1. Start engine. 2. Check exhaust pipes and muffler for leaks.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF099P</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

2 CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF337V

Vacuum should not exist at idle.

4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT-II and turn the solenoid valve ON.
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.

ACTIVE TEST	
EGRC SOL/V (EGR)	ON CUT
MONITOR	
ENG SPEED	XXX rpm

SEF716Z

Vacuum should exist when revving engine.

OK or NG

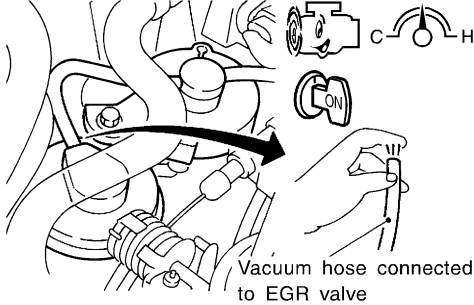
OK	▶	GO TO 4.
NG	▶	GO TO 5.

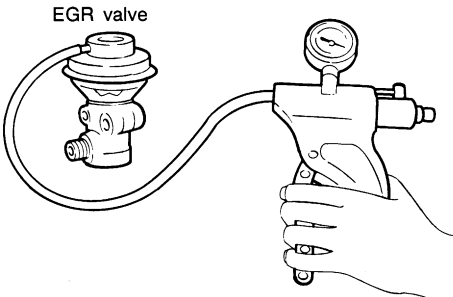
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DTC P0400 EGR FUNCTION (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM SOURCE TO EGR VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Warm engine up to normal operating temperature. 2. Disconnect vacuum hose to EGR valve. 3. Check for vacuum existence at idle. 	
	
SEF337V	
<p>Vacuum should not exist at idle.</p> <ol style="list-style-type: none"> 4. Disconnect EGRC-solenoid valve harness connector. (The 1st trip DTC for EGRC-solenoid valve will be displayed, but ignore it.) 5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm. <p>Vacuum should exist when revving engine.</p>	
OK or NG	
OK	▶▶ GO TO 4.
NG	▶▶ GO TO 5.

4	CHECK EGR VALVE
<ul style="list-style-type: none"> ● Apply vacuum to EGR vacuum port with a hand vacuum pump. 	
	
MEF137D	
<p>EGR valve spring should lift.</p> <ul style="list-style-type: none"> ● Check for sticking. 	
OK or NG	
OK	▶▶ GO TO 11.
NG	▶▶ Repair or replace EGR valve.

DTC P0400 EGR FUNCTION (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM HOSE	
<p>1. Turn ignition switch OFF. 2. Check vacuum hose for clogging, cracks or improper connection.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF109L</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace vacuum hose.

6	CHECK EGRC-SOLENOID VALVE OPERATION																					
<p>Ⓜ With CONSULT-II 1. Turn ignition switch ON. 2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V (EGR)</th> <th>ON CUT</th> </tr> </thead> <tbody> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div> <p style="text-align: right;">SEF716Z</p> <p>Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>			ACTIVE TEST		EGRC SOL/V (EGR)	ON CUT	MONITOR		ENG SPEED	XXX rpm												
ACTIVE TEST																						
EGRC SOL/V (EGR)	ON CUT																					
MONITOR																						
ENG SPEED	XXX rpm																					
OK	▶	GO TO 8.																				
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.																				

7	CHECK EGRC-SOLENOID VALVE OPERATION	
<p>ⓧ Without CONSULT-II Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.) Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.


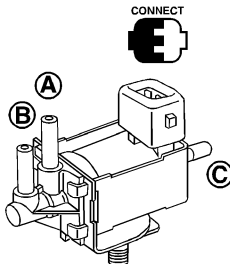
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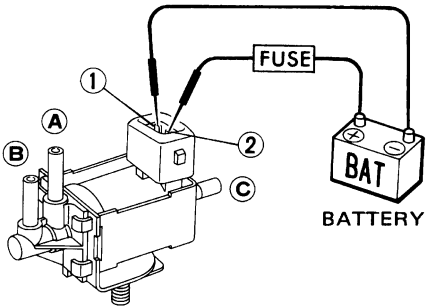
DTC P0400 EGR FUNCTION (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

8	DETECT MALFUNCTION PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK EGRC-SOLENOID VALVE																									
<p> With CONSULT-II Check air passage continuity. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.</p>																										
	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> <tr> <td style="text-align: center;">EGRC SOL/V (EGR)</td> <td style="text-align: center;">ON CUT</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </thead> </table> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition EGRC SOLENOID VALVE</th> <th style="text-align: center;">Air passage continuity between A and B</th> <th style="text-align: center;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	ACTIVE TEST		EGRC SOL/V (EGR)	ON CUT	MONITOR		ENG SPEED	XXX rpm									Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C	ON	Yes	No	OFF	No	Yes
ACTIVE TEST																										
EGRC SOL/V (EGR)	ON CUT																									
MONITOR																										
ENG SPEED	XXX rpm																									
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C																								
ON	Yes	No																								
OFF	No	Yes																								
SEF717Z																										

<p> Without CONSULT-II Check air passage continuity shown in the figure.</p>										
	AEC919									
<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> <th style="text-align: center;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	Air passage continuity between A and C	12V direct current supply between terminals 1 and 2	Yes	No	No supply	No	Yes
Condition	Air passage continuity between A and B	Air passage continuity between A and C								
12V direct current supply between terminals 1 and 2	Yes	No								
No supply	No	Yes								
MTBL0283										
<p>If NG or operation takes more than 1 second, replace solenoid valve.</p> <p style="text-align: center;">OK or NG</p>										

OK	▶	GO TO 10.
NG	▶	If NG or operation takes more than 1 second, replace solenoid valve.

DTC P0400 EGR FUNCTION (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EGRC-BPT VALVE	
<p>1. Plug one of two ports of EGRC-BPT valve.</p> <p>2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.</p>		
<p style="text-align: center;">↑ Apply pressure</p>		
<p>3. If a leakage is noted, replace the valve.</p> <p style="text-align: right;">SEF083P</p>		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EGRC-BPT valve.

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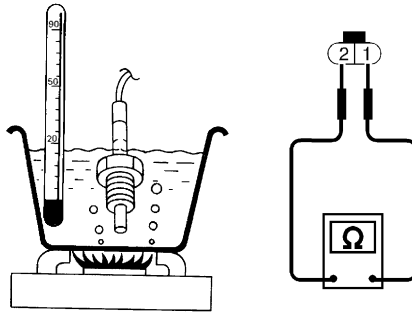
DTC P0400 EGR FUNCTION (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

11 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

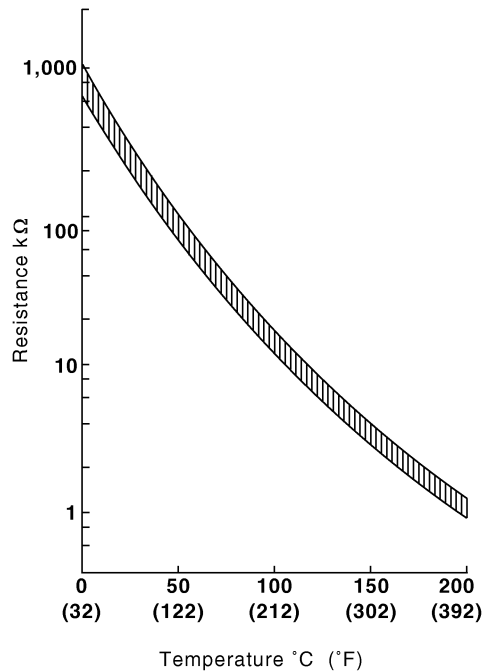


<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance M Ω
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

SEF643Q

MTBL0549



SEF068XB

OK or NG

OK ► GO TO 12.

NG ► Replace EGR temperature sensor.

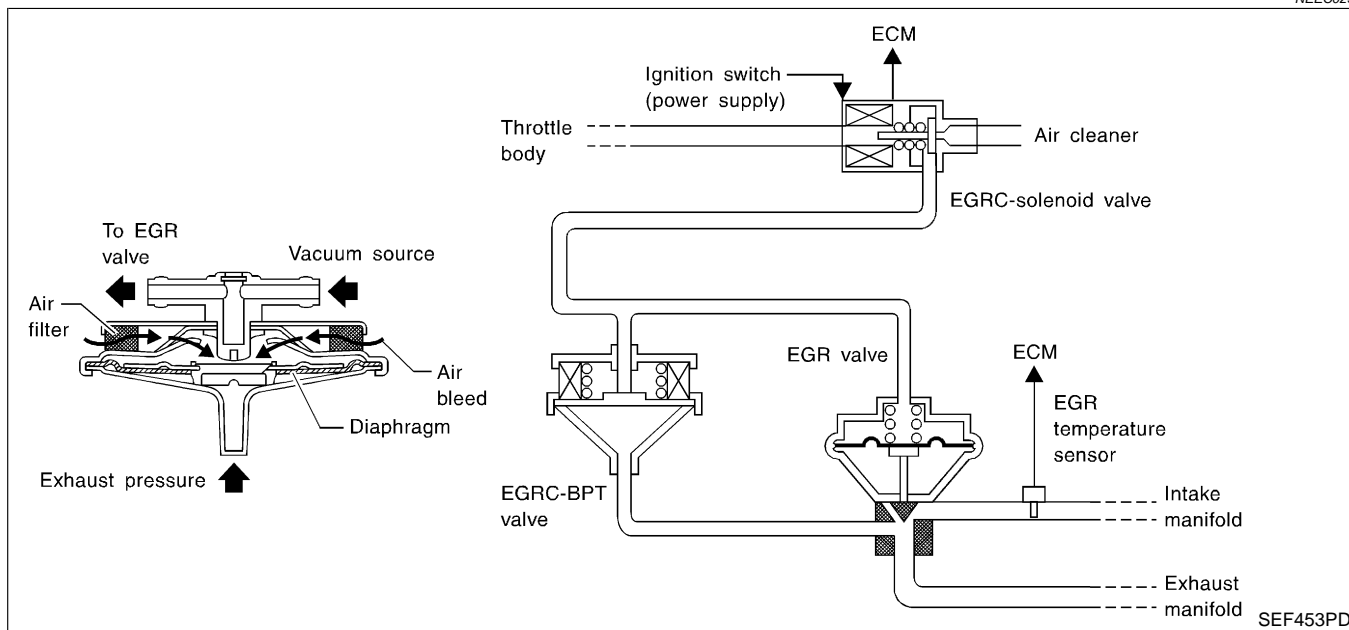
12 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

► INSPECTION END

Description

NEEC0234



SEF453PD

SYSTEM DESCRIPTION

NEEC0234S01

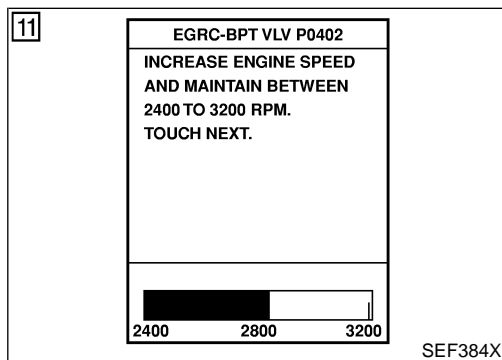
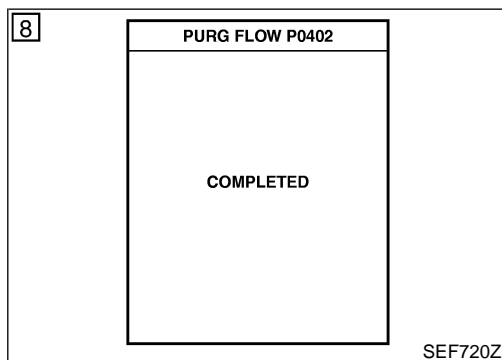
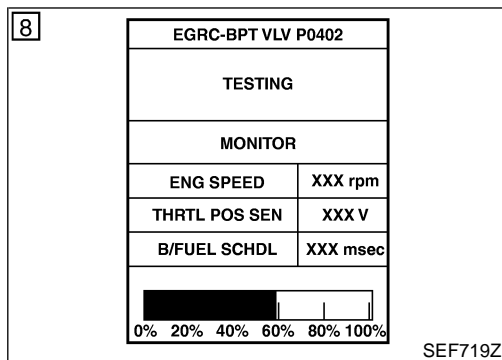
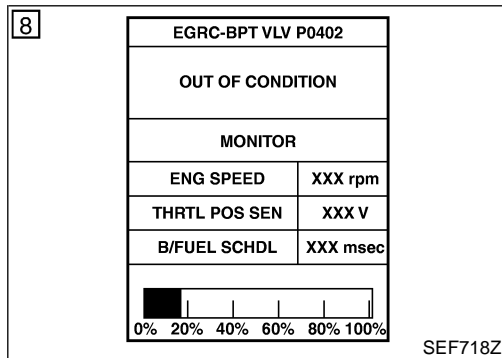
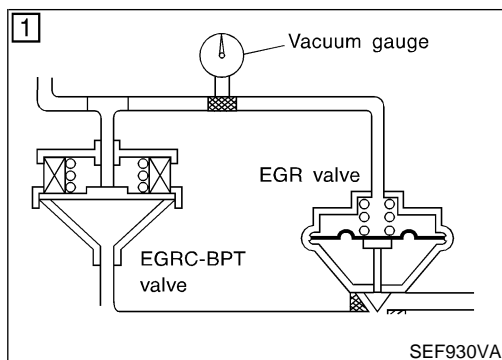
The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

On Board Diagnosis Logic

NEEC0235

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402	<ul style="list-style-type: none"> The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> EGRC-BPT valve EGR valve Loose or disconnected rubber tube Blocked rubber tube Camshaft position sensor Blocked exhaust system Orifice Mass air flow sensor EGRC-solenoid valve



DTC Confirmation Procedure

NEEC0236

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

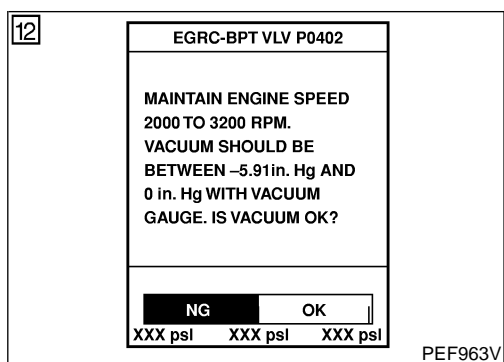
With CONSULT-II

- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Stop engine and wait at least 5 seconds.
- 4) Turn ignition switch ON and select "EGRC-BPT/V P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Start engine and let it idle.
- 6) Touch "START".
- 7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
- 8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

Selector lever	Suitable position
ENG SPEED	1,400 - 2,000 rpm (M/T) 1,400 - 1,800 rpm (A/T)
Vehicle speed	30 - 100 km/h (19 - 62 MPH) (M/T) 30 - 55 km/h (19 - 34 MPH) (A/T)
B/FUEL SCHDL	5 - 7.5 msec (M/T) 5.5 - 8.0 msec (A/T)
THRTL POS SEN	(X - (X + 0.88) V) X = Voltage value measured at step 7

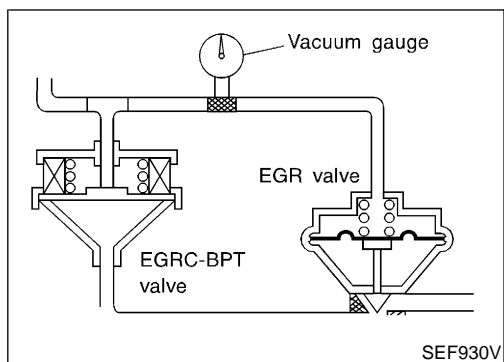
NOTE:

- The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.
 - If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.
 - If "TESTING" does not appear on CONSULT-II screen, retry from step 2.
- 9) If CONSULT-II instructs to carry out "Overall Function Check", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-348.
 - 10) Open engine hood.
 - 11) Raise engine speed to 2,400 to 3,200 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.



- 12) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to -20 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
 If NG, go to "Diagnostic Procedure", EC-348.
 If OK, touch "YES" on the CONSULT-II screen.
- 13) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
 EGR valve should lift up, and go down without sticking when the engine is returned to idle.
 If NG, check EGR valve.
 If OK, touch "YES" or the CONSULT-II screen.
- 14) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
 If NG, repair or replace.
 If OK, touch "YES" on the CONSULT-II screen.

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Overall Function Check

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
- 2) Lift up vehicle.
- 3) Start engine and shift to 1st gear position.
- 4) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to -20 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
 If NG, go to "Diagnostic Procedure", EC-348.
 If OK, go to next step.
- 5) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
 EGR valve should lift up, and go down without sticking when the engine is returned to idle.
- 6) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
- 7) If NG, go to "Diagnostic Procedure", EC-348.

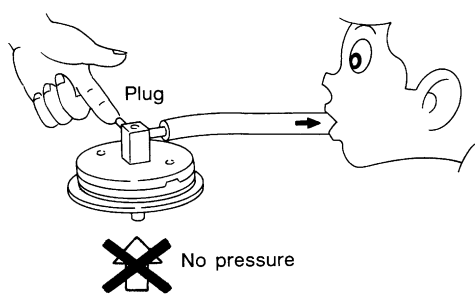
Diagnostic Procedure

=NEEC0238

1	CHECK HOSE	
Check vacuum hose for clogging and improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace vacuum hose.

2	CHECK EXHAUST SYSTEM	
Check exhaust system for collapse.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

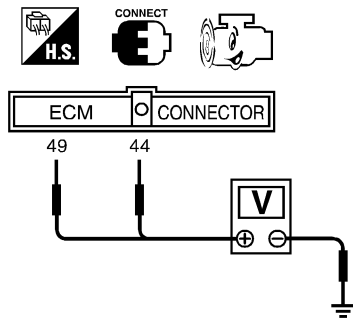
3	CHECK ORIFICE	
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace vacuum hose.

4	CHECK EGRC-BPT VALVE	
<p>1. Plug one of two ports of EGRC-BPT valve.</p> <p>2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.</p> <p>Leakage should exist.</p>		
		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EGRC-BPT valve.

SEF172P

5 CHECK CAMSHAFT POSITION SENSOR

1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground, ECM terminal 44 and engine ground.


Terminal 44 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

SEF868Z

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor.

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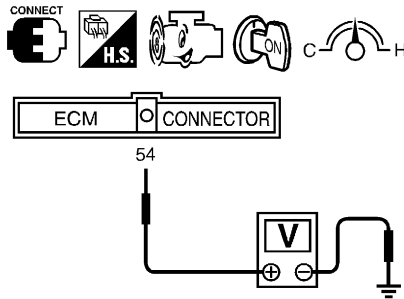
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6 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



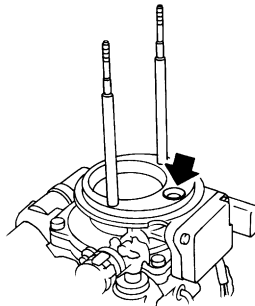
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

MTBL0326

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF893J

OK or NG

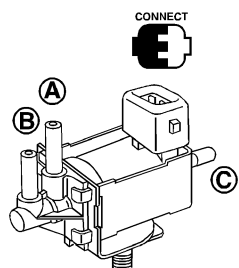
OK	▶	GO TO 7.
NG	▶	Replace mass air flow sensor.

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7 CHECK EGRC-SOLENOID VALVE

With CONSULT-II

Check air passage continuity.
Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



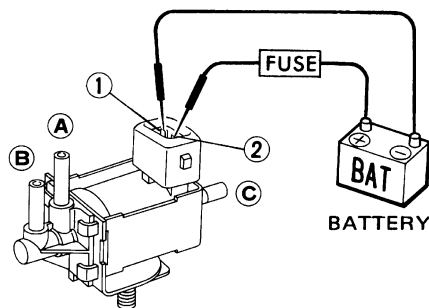
ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

SEF717Z

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC919

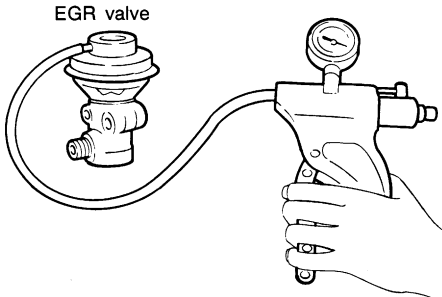
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL0283

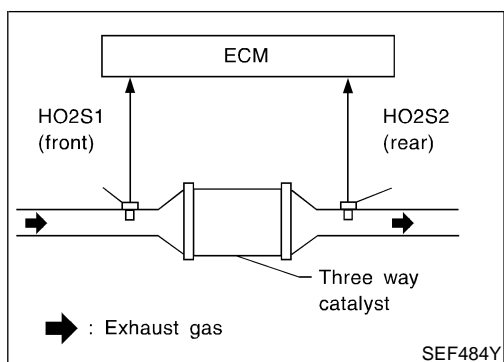
If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

8	CHECK EGR VALVE	
<ul style="list-style-type: none"> ● Apply vacuum to EGR vacuum port with a hand vacuum pump. 		
		
<p>EGR valve spring should lift.</p> <ul style="list-style-type: none"> ● Check for sticking. 		
MEF137D		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
	▶	INSPECTION END



On Board Diagnosis Logic

NEEC1050

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 (front) and 2 (rear).

A three way catalyst* with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the three way catalyst* malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	<ul style="list-style-type: none"> • Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> • Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

3

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF671Y

7

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
O2 SEN HEATER	CMPLT
O2 SENSOR	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF672Y

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NEEC1051

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

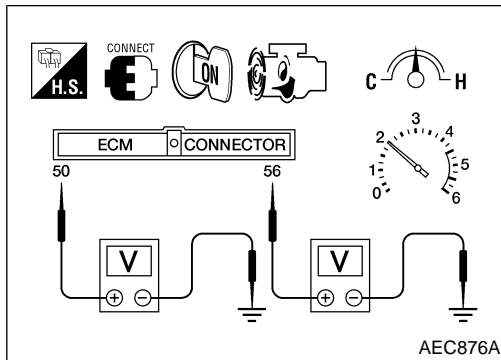
TESTING CONDITION:

- Open engine hood before conducting following procedure.
- Do not hold engine speed more than specified minutes below.

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
- 3) Start engine.
- 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release then accelerator pedal completely. If "INCMP" of "CATALYST" changes to "CMPLT", go to step 7.
- 5) Wait 5 seconds at idle.
- 6) Rev engine up to 2,500 to 3,500 rpm and hold it until "INCMP" of "CATALYST" changes to "CMPLT". (It will take maximum of approximately 5 minute.)
- 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II. If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-283. If not "COMPLT" stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and then retest from step 1).

Overall Function Check



Overall Function Check

NEEC0242

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 [Heated oxygen sensor 1 (front) signal], 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is much less than that of ECM terminal 50 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 (rear) voltage switching frequency

B: Heated oxygen sensor 1 (front) voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:

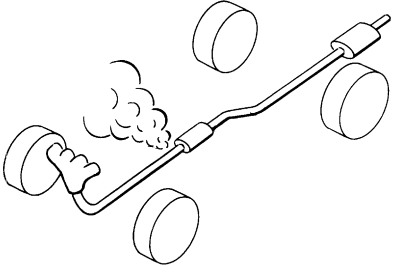
If the voltage at terminal 50 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-198.)

Diagnostic Procedure

=NEEC0243

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

 GI
MA
EM

2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.		
		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

 LC
EC
FE
CL
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AT

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

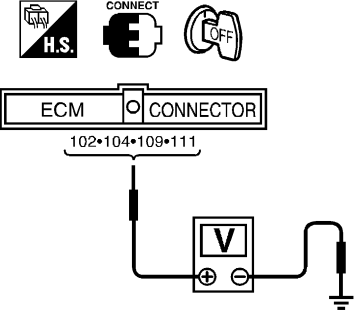
 PD
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SU

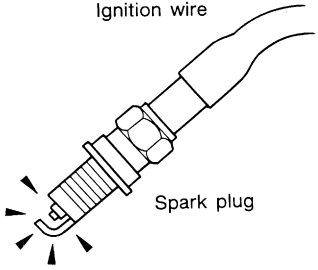
4	CHECK IGNITION TIMING											
1. Check the following items. Refer to "Basic Inspection", EC-110.												
<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
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Target idle speed	800 ± 50 rpm (in "P" or "N" position)											
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

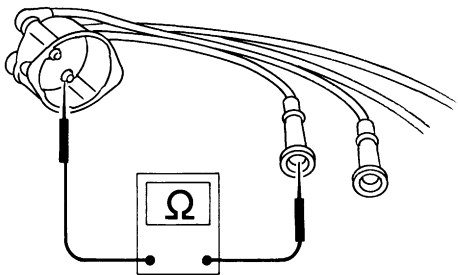
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MTBL0328

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IDX

5	CHECK INJECTORS	<ol style="list-style-type: none"> 1. Refer to Wiring Diagram for Injectors, EC-589. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 109 and 111 and ground with CONSULT-II or tester. 	
			
<p>Battery voltage should exist.</p> <p style="text-align: right;">SEF189V</p>			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-590.	

6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. 	
			
SEF282G			
OK or NG			
OK	▶	GO TO 8.	
NG	▶	GO TO 7.	

7	CHECK IGNITION WIRES	<p>1. Inspect wires for cracks, damage, burned terminals and for improper fit.</p> <p>2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF174P</p> <p>Resistance: 13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center; padding: 2px;">EC</p> <p>FE</p> <p>CL</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>Check ignition coil, power transistor and their circuits. Refer to EC-579.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace.</td> </tr> </table>		OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-579.	NG	▶	Replace.	<p>MT</p>
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-579.						
NG	▶	Replace.						

8	CHECK INJECTOR	<p>1. Turn ignition switch OFF.</p> <p>2. Remove injector assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery.</p> <p>3. Disconnect camshaft position sensor harness connector.</p> <p>4. Turn ignition switch ON. Make sure fuel does not drip from injector.</p> <p style="text-align: center;">OK or NG</p>	<p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK (Does not drip.)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG (Drips.)</td> <td style="text-align: center;">▶</td> <td>Replace the injector(s) from which fuel is dripping.</td> </tr> </table>		OK (Does not drip.)	▶	GO TO 9.	NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.	<p>SU</p>
OK (Does not drip.)	▶	GO TO 9.						
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.						

9	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	<p>BR</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Trouble is fixed.</td> <td style="width: 5%; text-align: center;">▶</td> <td>INSPECTION END</td> </tr> <tr> <td>Trouble is not fixed.</td> <td style="text-align: center;">▶</td> <td>Replace three way catalyst.</td> </tr> </table>		Trouble is fixed.	▶	INSPECTION END	Trouble is not fixed.	▶	Replace three way catalyst.	<p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
Trouble is fixed.	▶	INSPECTION END						
Trouble is not fixed.	▶	Replace three way catalyst.						

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0244

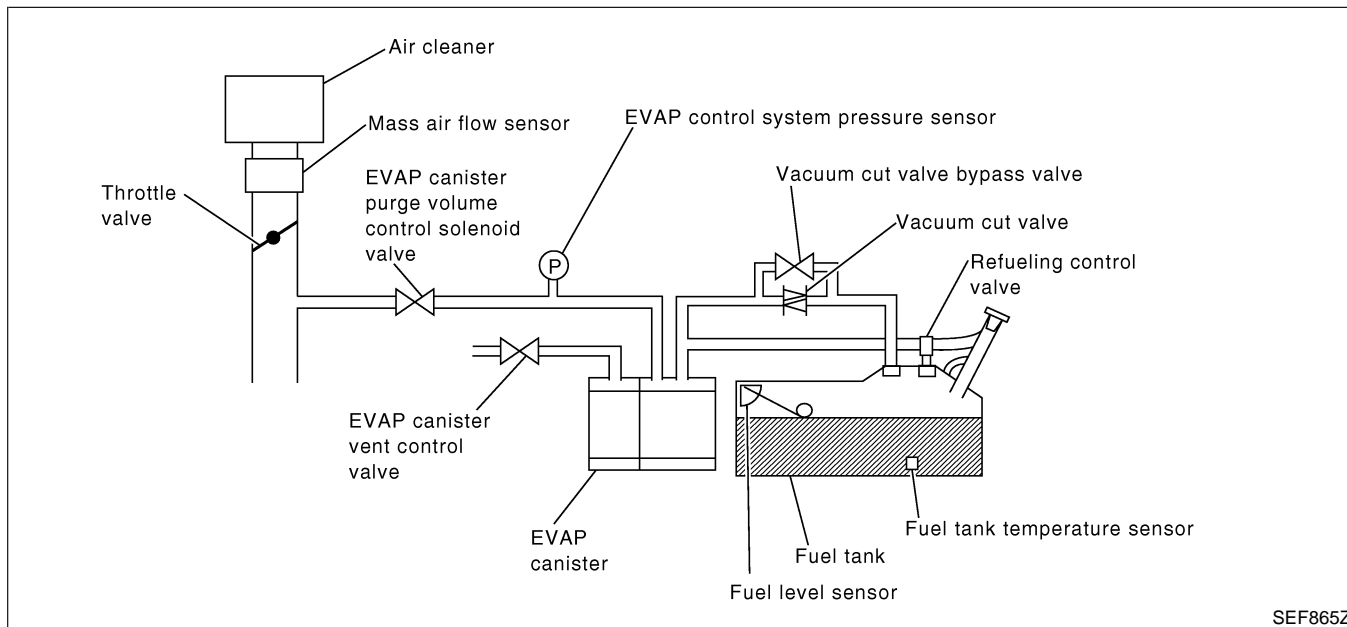
NOTE:

If DTC P0440 OR P1440 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See EC-526.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



SEF865Z

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

On Board Diagnosis Logic (Cont'd)

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent. ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Absolute pressure sensor ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged. ● Water separator ● EVAP canister is saturated with water. ● EVAP control system pressure sensor ● Fuel level sensor and the circuit ● Refueling control valve ● ORVR system leaks

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CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

On Board Diagnosis Logic (Cont'd)

EVAP SML LEAK P0440/P1440
<p>1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS. -FUEL LEVEL: 1/4-3/4 -AMBIENT TEMP: 0-30 C(32-86F) -OPEN ENGINE HOOD. 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART. 3)TOUCH START.</p>

SEF565X

EVAP SML LEAK P0440/P1440
<p>WAIT 2 TO 10 MINUTES. KEEP ENGINE RUNNING AT IDLE SPEED.</p>

SEF566X

EVAP SML LEAK P0440/P1440
OK
SELF-DIAG RESULTS
NO DTC DETECTED. FURTHER TESTING MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NEEC0245

NOTE:

- If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-526.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

- 5) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

- If the engine cannot be maintained within the range on CONSULT-II screen, go to “Basic Inspection”, EC-110.
- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-362.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

With GST

- 1) Start engine.
- 2) Drive vehicle according to “Driving pattern”, EC-80.

NOTE:

Be sure to read the explanation of “Driving pattern” on EC-80 before driving vehicle.

- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving pattern”, EC-80.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P1447 is displayed on the screen, go to “Diagnostic Procedure”, EC-518.
 - If P0440 is displayed on the screen, go to “Diagnostic Procedure”, EC-362.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

DTC Confirmation Procedure (Cont'd)

- If P1440 is displayed on the screen, go to “Diagnostic Procedure”, EC-481.
 - If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.
- 10) Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 5.

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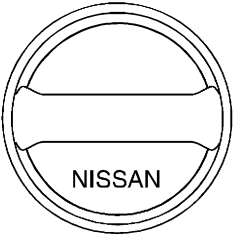
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

=NEEC0246

1	CHECK FUEL FILLER CAP DESIGN
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.	
	
SEF915U	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly rotating the cap clockwise.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ <ul style="list-style-type: none">• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.• Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

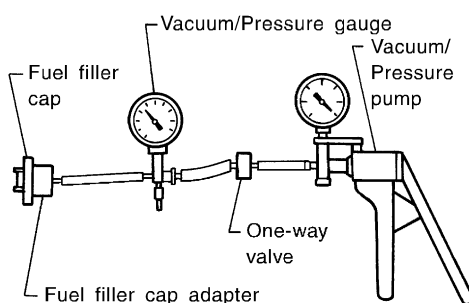
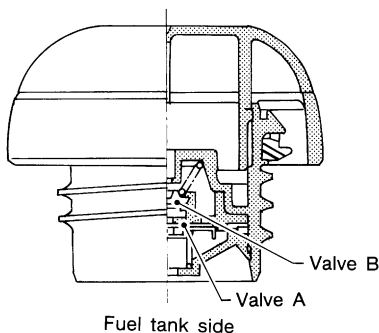
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

4 CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



Pressure:

16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)

Vacuum:

-6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)

CAUTION:

Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

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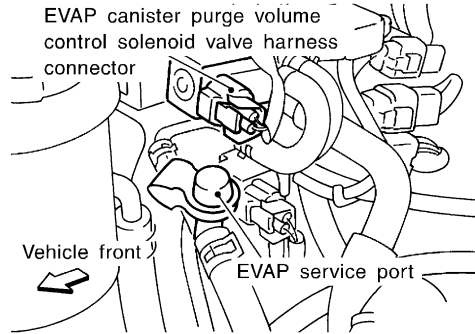
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

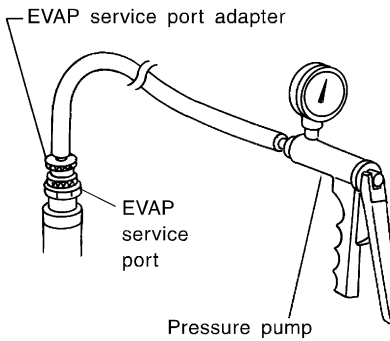
Diagnostic Procedure (Cont'd)

5 INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF339V



SEF462UE

NOTE:

- Improper installation of service port may cause leaking.

Models with CONSULT-II ►	GO TO 6.
Models without CONSULT-II ►	GO TO 7.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

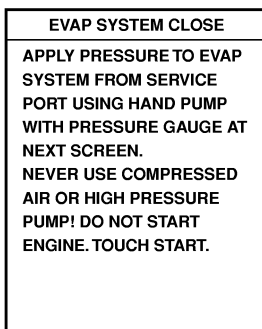
KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.

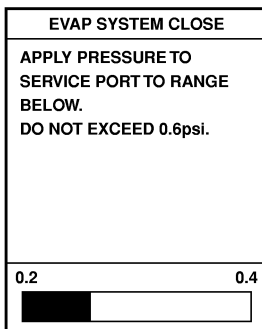


PEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.

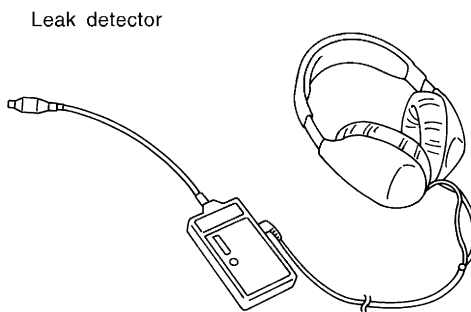
NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

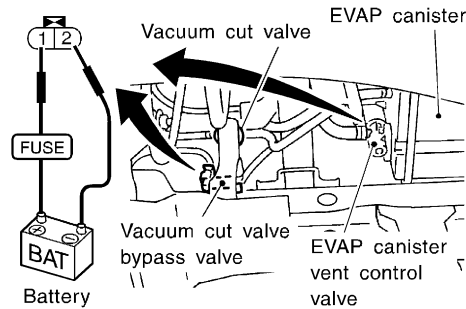
KA24DE

Diagnostic Procedure (Cont'd)

7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

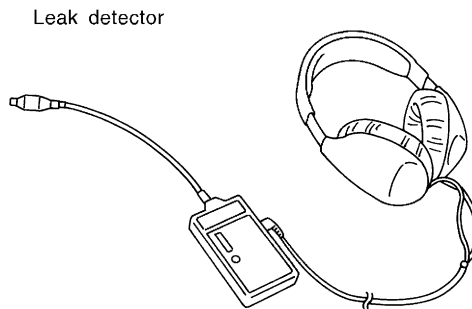


SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.) Shown in the above figure.
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).

NOTE:

- Never use compressed air or a high pressure pump.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.
5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;"> <p style="font-size: small;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; font-size: x-small;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. ● Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 9.	
NG	▶	Replace water separator.	

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	<p>Refer to "DTC Confirmation Procedure", EC-384.</p> <p style="text-align: center;">OK or NG</p>	AT TF PD
OK	▶	GO TO 10.	
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.	

10	CHECK IF EVAP CANISTER IS SATURATED WITH WATER	<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;"> <p style="font-size: small;">Water</p> </div> <p style="text-align: right; font-size: x-small;">SEF596U</p> <p style="text-align: center;">Yes or No</p>	AX SU BR ST RS BT HA SC EL IDX
Yes	▶	GO TO 11.	
No (With CONSULT-II)	▶	GO TO 13.	
No (Without CONSULT-II)	▶	GO TO 14.	

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
1. Visually check the EVAP canister for damage.		
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">LEAN</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
<ol style="list-style-type: none"> 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum. Vacuum should exist. 																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

SEF595Y

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 60 seconds. 5. Check vacuum hose for vacuum. Vacuum should exist. 		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.		
OK or NG		
OK (With CONSULT-II) ▶	GO TO 16.	
OK (Without CONSULT-II) ▶	GO TO 17.	
NG ▶	Repair or reconnect the hose.	

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. If OK, inspection end. If NG, go to following step.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
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MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
<p>3. Check air passage continuity.</p>																						
SEF801Y																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition PURG VOL CONT/V value</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No														
Condition PURG VOL CONT/V value	Air passage continuity between A and B																					
100.0%	Yes																					
0.0%	No																					
MTBL0302																						
OK or NG																						
OK ▶	GO TO 18.																					
NG ▶	Replace EVAP canister purge volume control solenoid valve.																					

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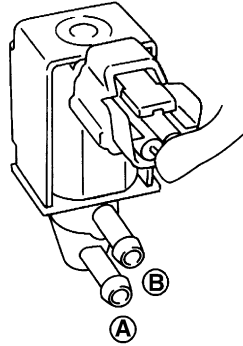
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

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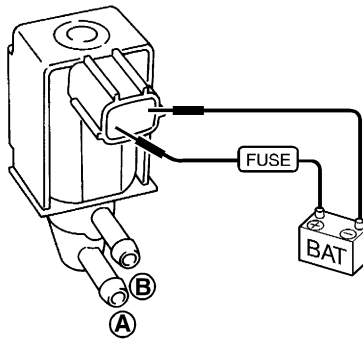
Diagnostic Procedure (Cont'd)

17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II
Check air passage continuity.



SEF660U



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

MTBL0303

OK or NG

OK



GO TO 18.

NG



Replace EVAP canister purge volume control solenoid valve.

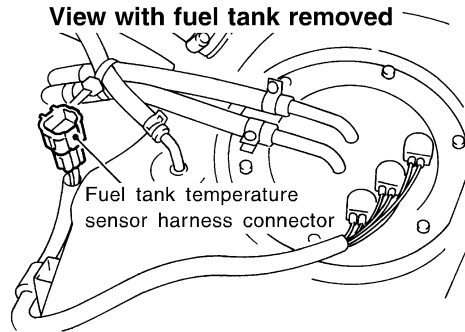
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

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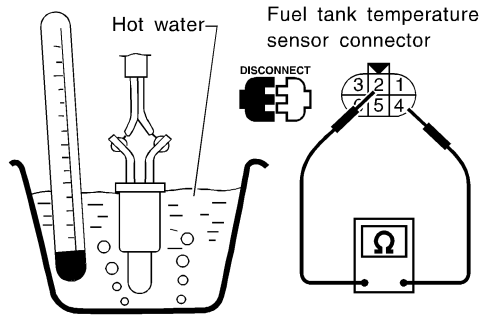
Diagnostic Procedure (Cont'd)

18 CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.



SEF334VA



SEF852Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0291

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel tank temperature sensor.

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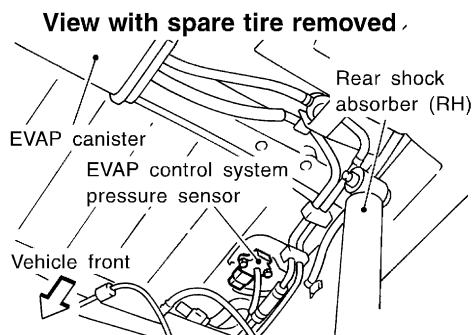
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

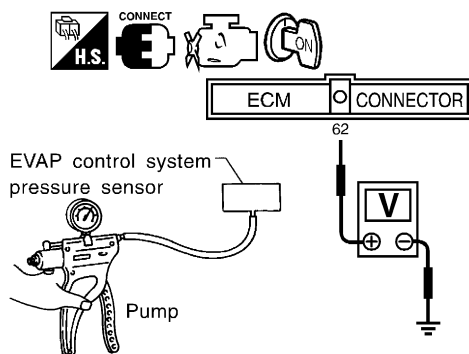
19 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



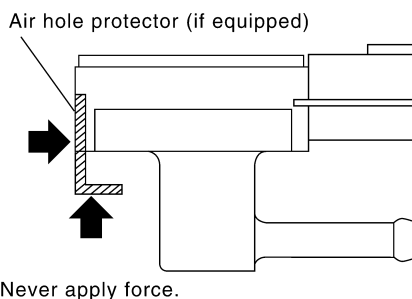
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

20	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.		
OK or NG		
OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

GI
MA
EM

21	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
▶		
GO TO 22.		

LC

22	CHECK REFUELING EVAP VAPOR LINE	
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-45.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

EC

FE

CL

MT

23	CHECK SIGNAL LINE AND RECIRCULATION LINE	
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

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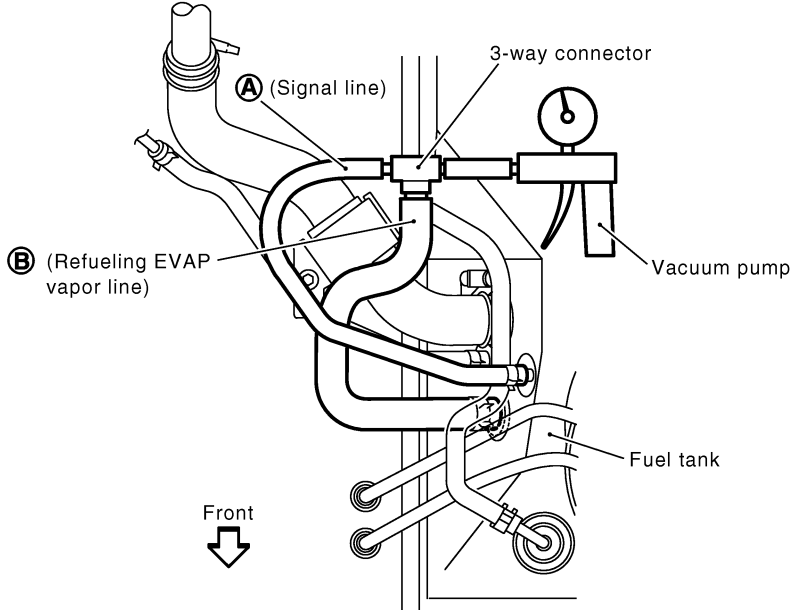
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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

KA24DE

Diagnostic Procedure (Cont'd)

24	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	
			
		OK or NG	
OK		▶	GO TO 25.
NG		▶	Replace refueling control valve with fuel tank.

SEF707Z

25	CHECK FUEL LEVEL SENSOR	<ol style="list-style-type: none"> 1. Remove fuel level sensor assembly. Refer to FE-4. 2. Refer to "FUEL LEVEL SENSOR CHECK", EL-82 	
		OK or NG	
OK		▶	GO TO 26.
NG		▶	Replace fuel level sensor.

26	CHECK INTERMITTENT INCIDENT	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
		▶	INSPECTION END

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

Description

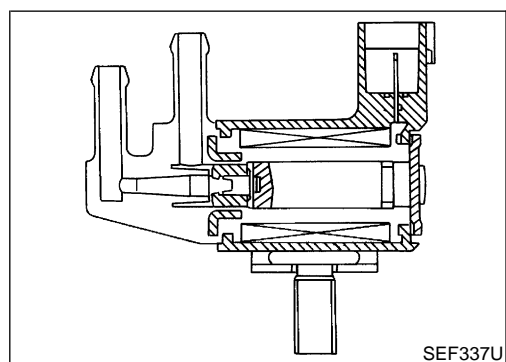
Description SYSTEM DESCRIPTION

NEEC0248

NEEC0248S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC0248S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0249

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
		2,000 rpm
		0%
		—

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

ECM Terminals and Reference Value

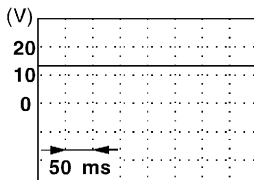
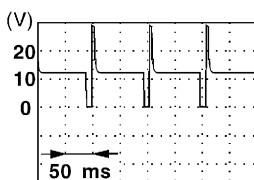
ECM Terminals and Reference Value

NEEC0250

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self-shut-off)	[Engine is running] [Ignition switch OFF] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	0 - 1V
			[Ignition switch OFF] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0251

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0443	An improper voltage signal is sent to ECM through the valve.	<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

DTC Confirmation Procedure

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

=NEEC0252

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 30 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-379

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

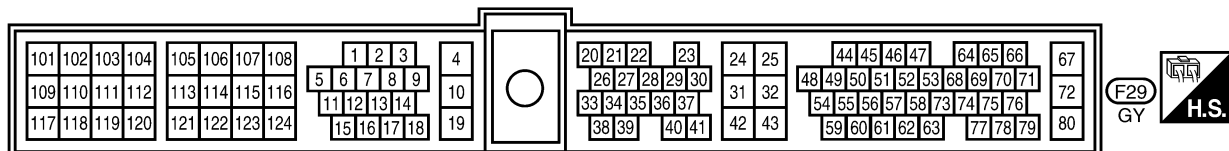
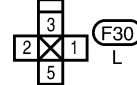
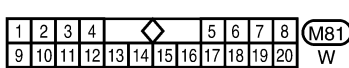
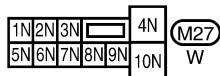
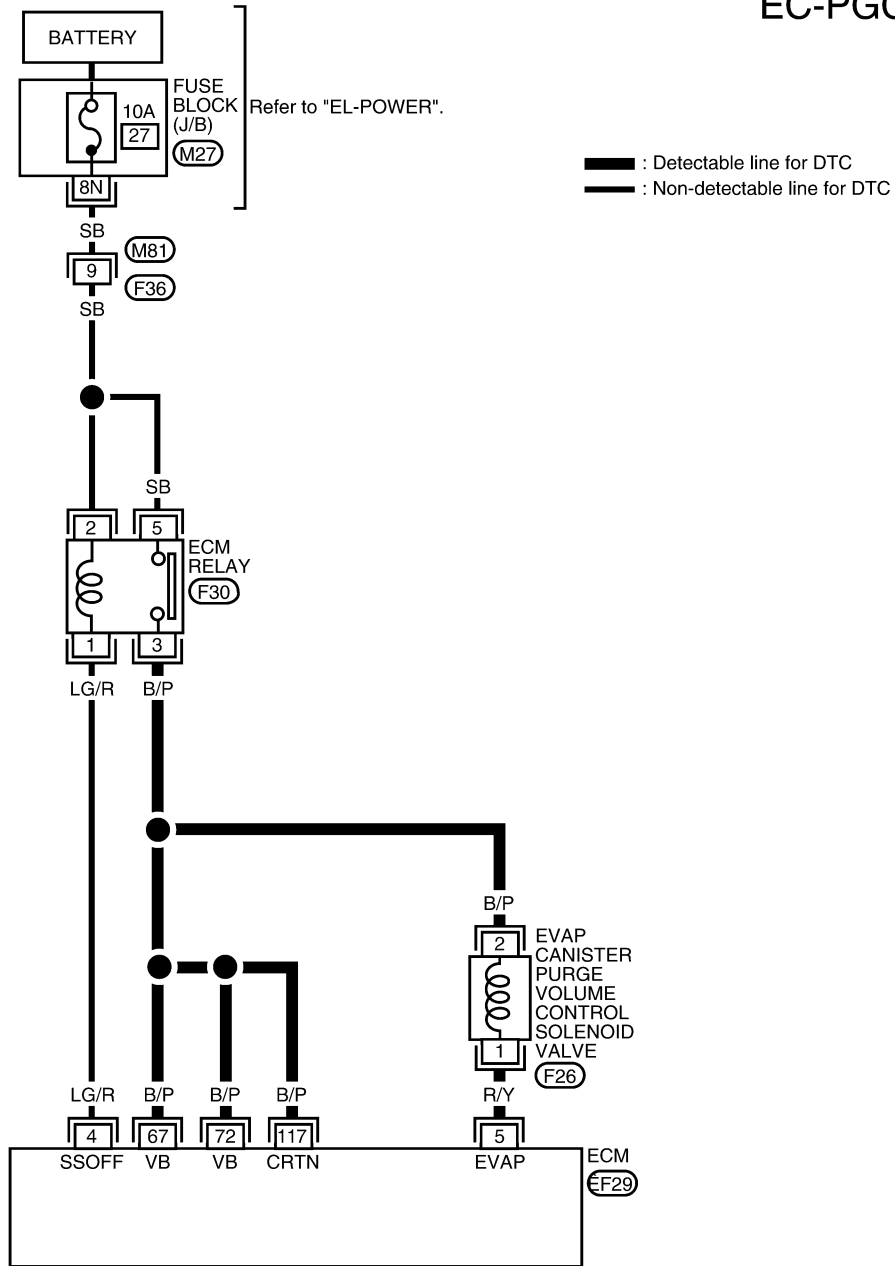
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0253

EC-PGC/V-01



LEC484

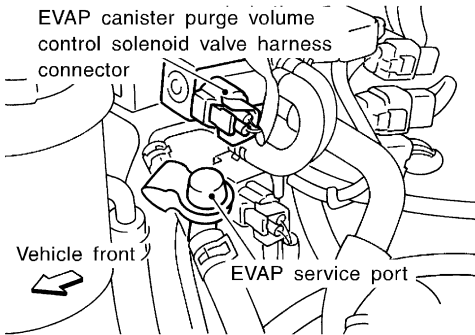
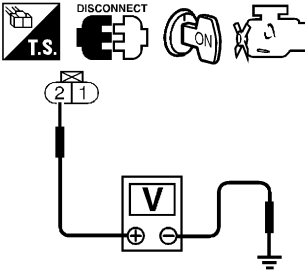
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0254

1	CHECK POWER SUPPLY		
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>EVAP canister purge volume control solenoid valve harness connector</p> <p>Vehicle front</p> <p>EVAP service port</p> </div> <p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <p style="color: blue;">Voltage: Battery voltage</p> <div style="text-align: center;">  <p>DISCONNECT</p> <p>T.S.</p> <p>2 1</p> <p>V</p> </div> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

SEF339V

SEF192V

2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
		▶	Repair harness or connectors.

IDX

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and terminal 1. Continuity should exist.</p>		
<p>If OK, check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
	OK (With CONSULT-II) ▶	GO TO 5.
	OK (Without CONSULT-II) ▶	GO TO 6.
	NG ▶	GO TO 4.

SEF193V

4	DETECT MALFUNCTIONING PART	
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

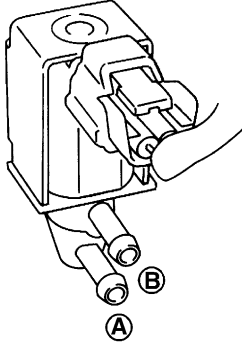
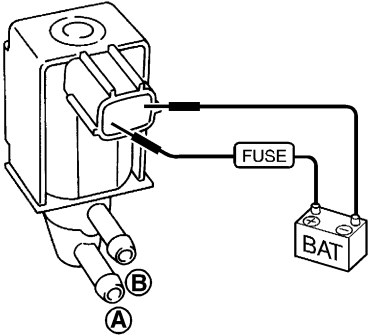
5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. If OK, inspection end. If NG, go to following step.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
<p>3. Check air passage continuity.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th style="width: 50%;">Condition PURG VOL CONT/V value</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No														
Condition PURG VOL CONT/V value	Air passage continuity between A and B																					
100.0%	Yes																					
0.0%	No																					
SEF801Y																						
MTBL0302																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	Replace EVAP canister purge volume control solenoid valve.																				

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

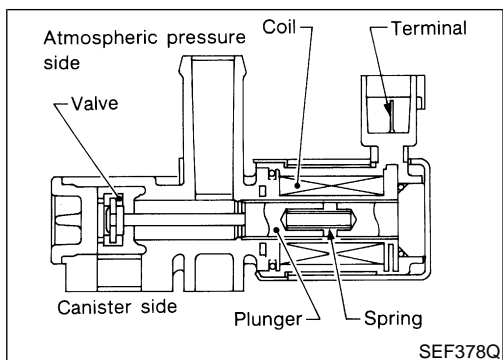
6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE						
<p> Without CONSULT-II Check air passage continuity.</p>							
							
SEF660U							
							
SEF661U							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals	Yes						
No supply	No						
MTBL0303							
OK or NG							
OK	▶	GO TO 7.					
NG	▶	Replace EVAP canister purge volume control solenoid valve.					

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶ INSPECTION END	

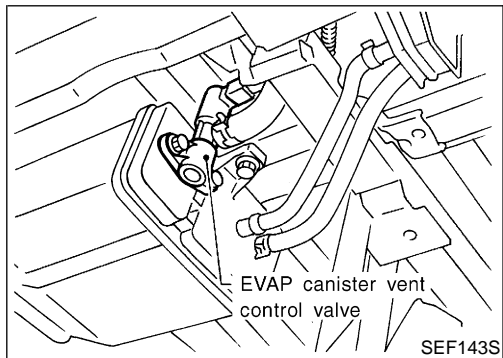
DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

Component Description



SEF378Q



SEF143S

Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC0256

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

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CONSULT-II Reference Value in Data Monitor Mode

NEEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NEEC0258

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0259

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446	<ul style="list-style-type: none"> An improper voltage signal is sent to ECM through EVAP canister vent control valve. 	<ul style="list-style-type: none"> Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) EVAP canister vent control valve

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

DTC Confirmation Procedure

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC0260

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-386.

With GST

Follow the procedure "With CONSULT-II".

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

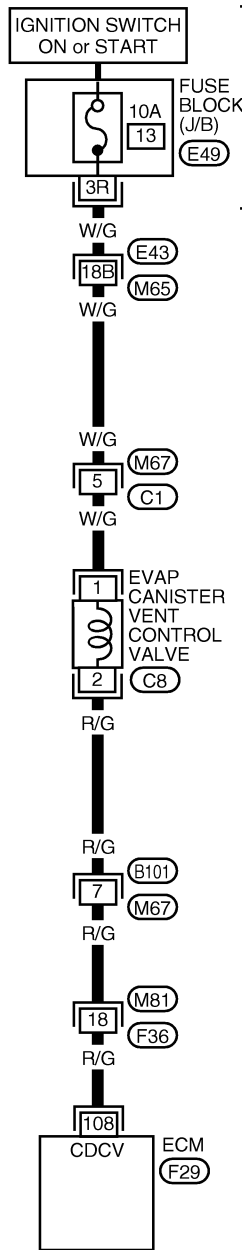
KA24DE

Wiring Diagram

Wiring Diagram

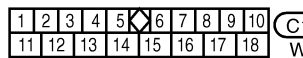
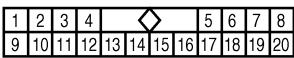
NEEC0261

EC-VENT/V-01

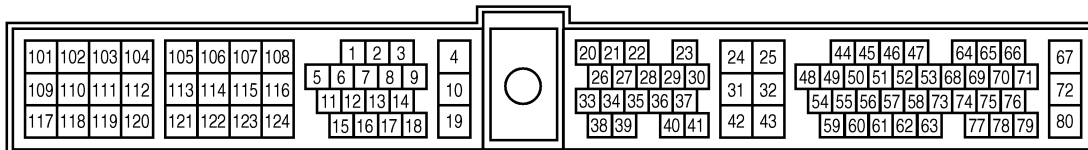


Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC527

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DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC1052

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

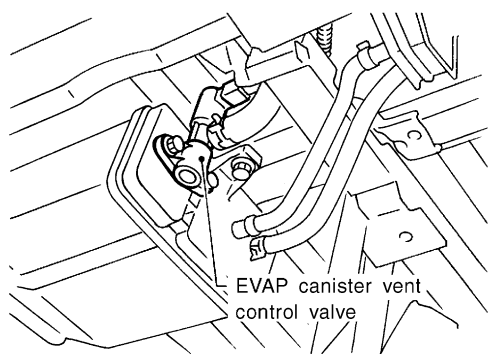
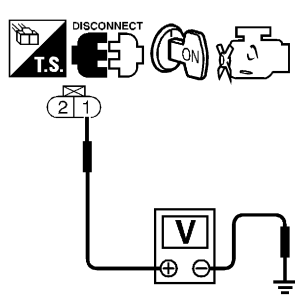
2	CHECK CIRCUIT																					
<p>1. Turn ignition switch ON.</p> <p>2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 (B1)	XXX V	THRTL POS SEN	XXX V						
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 (B1)	XXX V																					
THRTL POS SEN	XXX V																					
<p>3. Make sure that ratcheting sound is heard from the vent control valve.</p> <p style="text-align: center;">OK or NG</p>																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF802Y

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY		
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect EVAP canister vent control valve harness connector.</p>	GI MA EM LC
		 <p style="text-align: center;">EVAP canister vent control valve</p>	
		<p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p>	EC FE CL MT AT TF
			SEF143S SEF240W
		Voltage: Battery voltage	
		OK or NG	
OK	▶	GO TO 5.	PD
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M67, C1 ● 10A fuse ● Harness for open or short between EVAP canister vent control valve and 10A fuse 	AX SU BR
		▶	ST RS BT HA SC EL IDX
		Repair harness or connectors.	

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 108 and terminal 2.</p>	
SEF241W	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

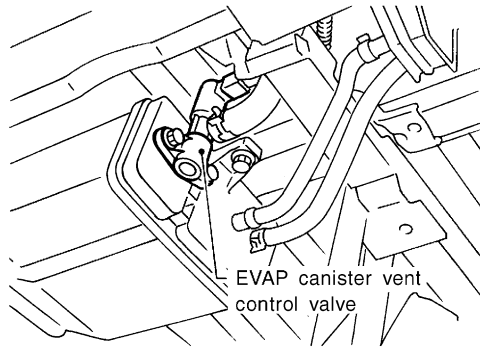
Diagnostic Procedure (Cont'd)

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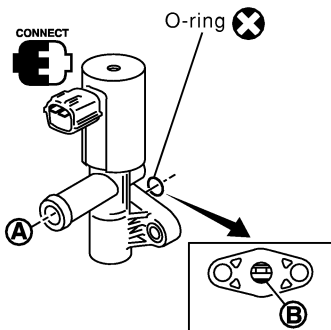
7 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

Check air passage continuity.
Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister vent control valve and O-ring.

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

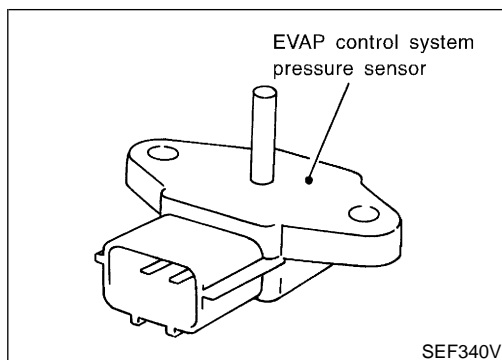
8	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING						
<p> Without CONSULT-II Check air passage continuity under the following conditions.</p>							
AEC783A							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	No supply	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
No supply	Yes						
MTBL0297							
<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.</p>							
OK or NG							
OK	▶ GO TO 9.						
NG	▶ Replace EVAP canister vent control valve and O-ring.						

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

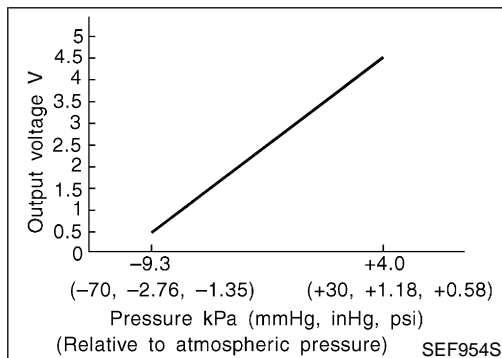
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NEEC0264



SEF340V

SEF954S

CONSULT-II Reference Value in Data Monitor Mode

NEEC0265

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NEEC0266

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	B/W	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0267

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450	<ul style="list-style-type: none">● An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	<ul style="list-style-type: none">● Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.)● Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection.● EVAP control system pressure sensor● EVAP canister vent control valve● EVAP canister purge volume control solenoid valve● EVAP canister● Rubber hose from EVAP canister vent control valve to water separator

6	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	FUEL T/TMP SE	XXX °C

SEF194Y

DTC Confirmation Procedure

=NEEC0268

NOTE:

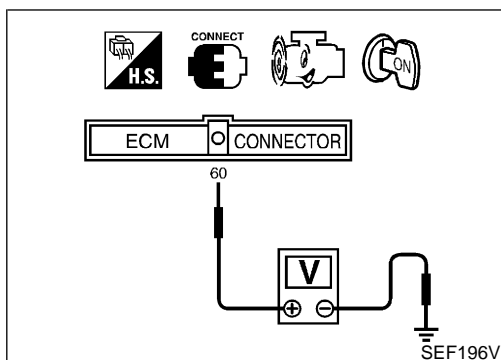
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform test at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that “TANK F/TEMP SE” is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-395.



With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and wait at least 11 seconds.
- 5) Select “MODE 7” with GST.
- 6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-395.

No Tools

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and wait at least 11 seconds.
- 5) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 6) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-395.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

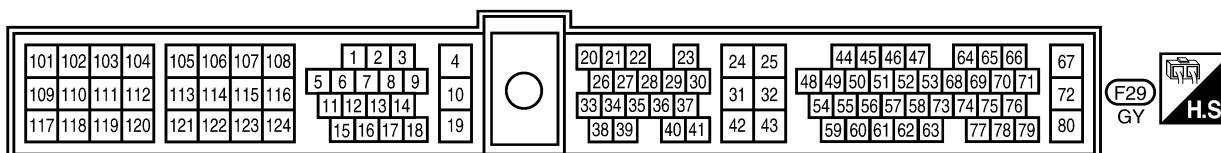
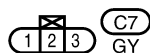
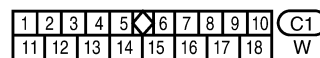
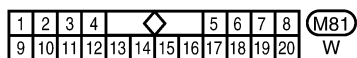
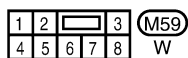
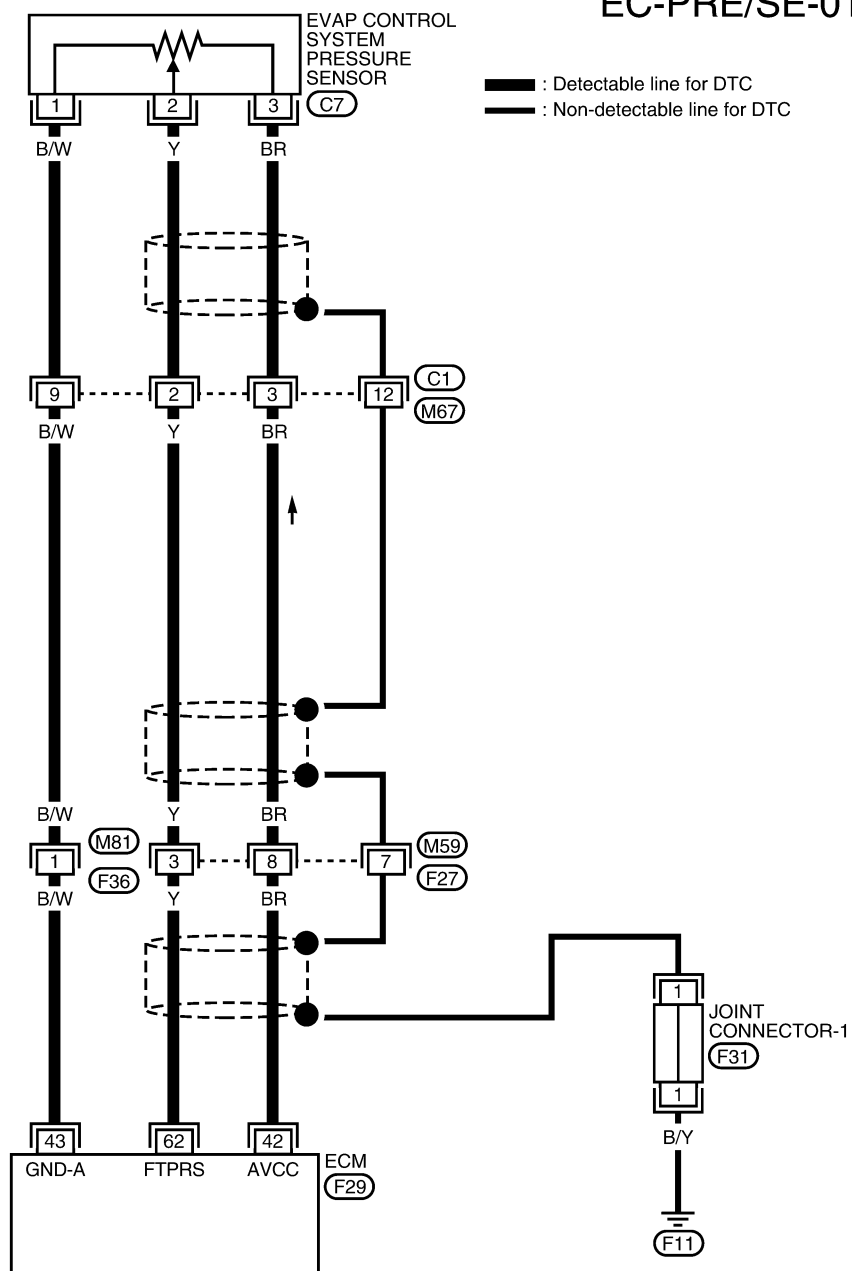
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0269

EC-PRE/SE-01



WEC780

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

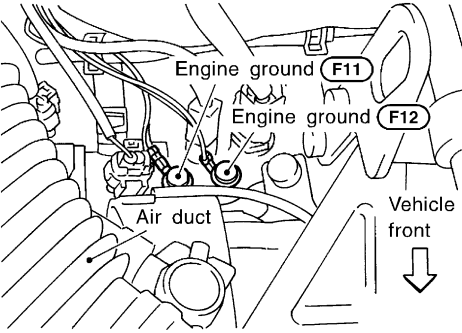
Diagnostic Procedure

Diagnostic Procedure

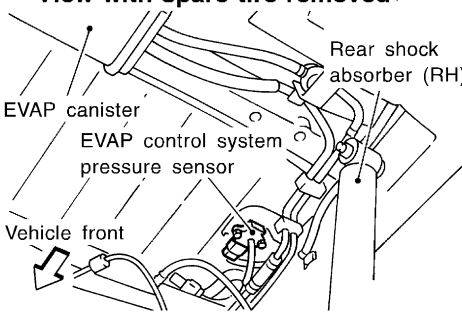
NEEC1053

1	CHECK RUBBER TUBE CONNECTED TO THE SENSOR	
Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

GI
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2	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
		
SEF325V		
		▶ GO TO 3.

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3	CHECK HARNESS CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
<p>View with spare tire removed.</p> 		
SEF341V		
2. Check sensor harness connector for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

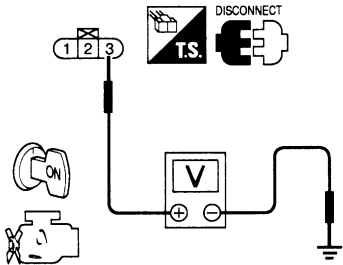
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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

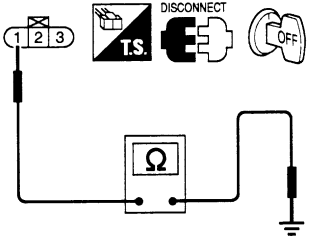
KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK POWER SUPPLY		
<p>1. Turn ignition switch ON. 2. Check voltage between terminal 3 and engine ground with CONSULT-II or tester.</p>			
			
<p>Voltage: Approximately 5V</p>			
<p>OK or NG</p>			
OK		▶	GO TO 6.
NG		▶	GO TO 5.

SEF410Q

5	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Harness connectors M81, F36 ● Harness for open or short between EVAP control system pressure sensor and ECM 			
		▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground.</p>			
			
<p>Continuity should exist.</p>			
<p>3. Also check harness for short to power.</p>			
<p>OK or NG</p>			
OK		▶	GO TO 8.
NG		▶	GO TO 7.

SEF411Q

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP control system pressure sensor and ECM 	
▶ Repair open circuit or short to power in harness or connectors.	

GI
MA

8	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 62 and terminal 2.</p>	
SEF412Q	
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 10.
OK (Without CONSULT-II)	▶ GO TO 11.
NG	▶ GO TO 9.

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9	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. Check air passage continuity. If OK, inspection end. If NG, go to following step.</p>																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																					
PURG VOL CONT/V	XXX %																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
HO2S1 MNTR (B1)	LEAN																				
THRTL POS SEN	XXX V																				
SEF801Y																					
<p>3. Check air passage continuity.</p>																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition PURG VOL CONT/V value</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No														
Condition PURG VOL CONT/V value	Air passage continuity between A and B																				
100.0%	Yes																				
0.0%	No																				
MTBL0302																					
OK or NG																					
OK	▶ GO TO 12.																				
NG	▶ Replace EVAP canister purge volume control solenoid valve.																				

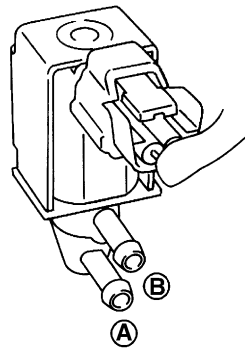
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

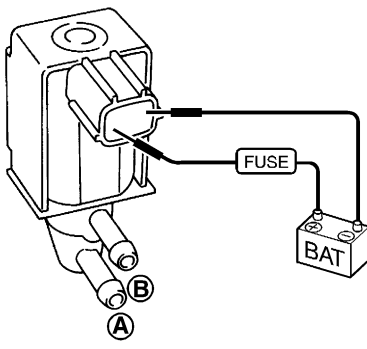
Diagnostic Procedure (Cont'd)

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II
Check air passage continuity.



SEF660U



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

MTBL0303

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

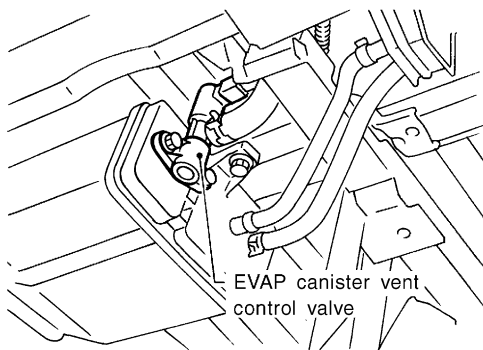
Diagnostic Procedure (Cont'd)

12 CHECK EVAP CANISTER VENT CONTROL VALVE

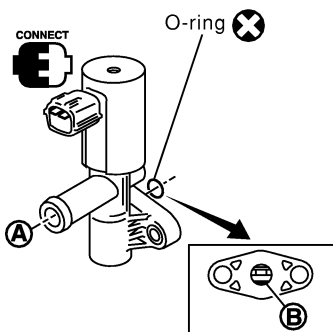
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK ▶ GO TO 14.

NG ▶ Replace EVAP canister vent control valve.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

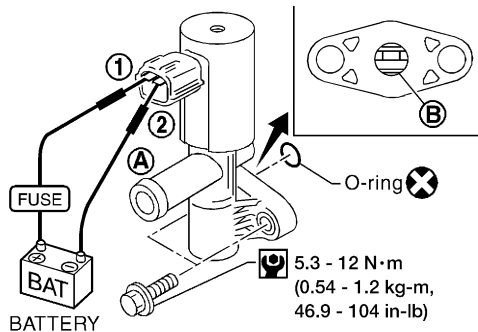
KA24DE

Diagnostic Procedure (Cont'd)

13 CHECK EVAP CANISTER VENT CONTROL VALVE

⊗ Without CONSULT-II

Check air passage continuity under the following conditions.



AEC783A

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
No supply	Yes

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK ► GO TO 14.

NG ► Replace EVAP canister vent control valve.

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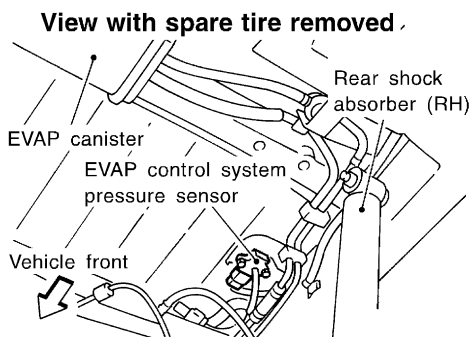
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

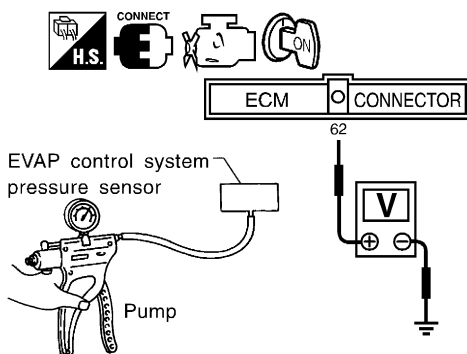
14 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



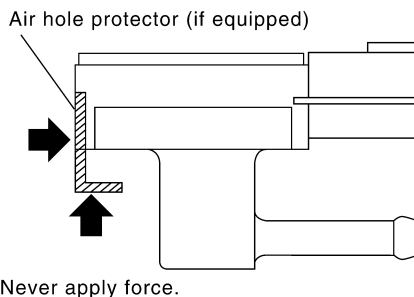
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

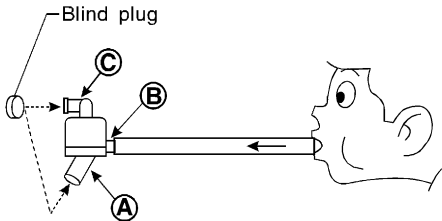
OK or NG

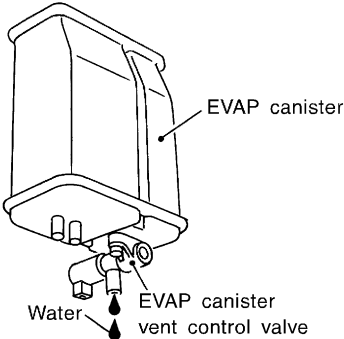
OK	▶	GO TO 15.
NG	▶	Replace EVAP control system pressure sensor.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

15	CHECK RUBBER TUBE FOR CLOGGING
<p>Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.</p> <p>Check water separator.</p> <ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p>	
OK or NG	
OK	▶ GO TO 16.
NG	▶ Clean, repair or replace rubber tube and/or water separator.

16	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> </div> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 17.
No	▶ GO TO 19.

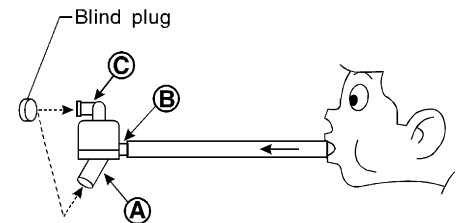
17	CHECK EVAP CANISTER
<p>Weigh the EVAP canister with EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 19.
NG	▶ GO TO 18.

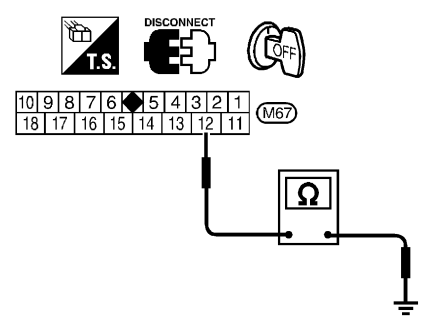
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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

18	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. <ol style="list-style-type: none"> a. Check visually for insect nests in the water separator air inlet. b. Check visually for cracks or flaws in the appearance. c. Check visually for cracks or flaws in the hose. d. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <ol style="list-style-type: none"> e. In case of NG in items 2 - 4, replace the parts. <ul style="list-style-type: none"> ● Do not disassemble water separator. 			
<table style="width: 100%; border: none;"> <tr> <td style="width: 20%; text-align: center;">▶</td> <td style="border: none;">Repair hose or replace EVAP canister or water separator.</td> </tr> </table>		▶	Repair hose or replace EVAP canister or water separator.
▶	Repair hose or replace EVAP canister or water separator.		

19	CHECK SHIELD CIRCUIT						
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Reconnect disconnected harness connectors. 3. Disconnect harness connectors M67. 4. Check harness continuity between harness connector M67 terminal 12 and ground. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF197V</p> <p style="text-align: center; color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 5. Also check harness for short to power. 6. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border: none;"> <tr> <td style="width: 20%; text-align: center;">OK</td> <td style="border: none;">▶</td> <td style="border: none;">GO TO 21.</td> </tr> <tr> <td style="text-align: center;">NG</td> <td style="border: none;">▶</td> <td style="border: none;">GO TO 20.</td> </tr> </table>		OK	▶	GO TO 21.	NG	▶	GO TO 20.
OK	▶	GO TO 21.					
NG	▶	GO TO 20.					

20	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Joint connector-1 (Refer to "HARNESS LAYOUT", EL-239.) ● Harness for open or short between harness connector M67 and engine ground 			
<table style="width: 100%; border: none;"> <tr> <td style="width: 20%; text-align: center;">▶</td> <td style="border: none;">Repair open circuit, short to power in harness or connectors.</td> </tr> </table>		▶	Repair open circuit, short to power in harness or connectors.
▶	Repair open circuit, short to power in harness or connectors.		

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

21	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

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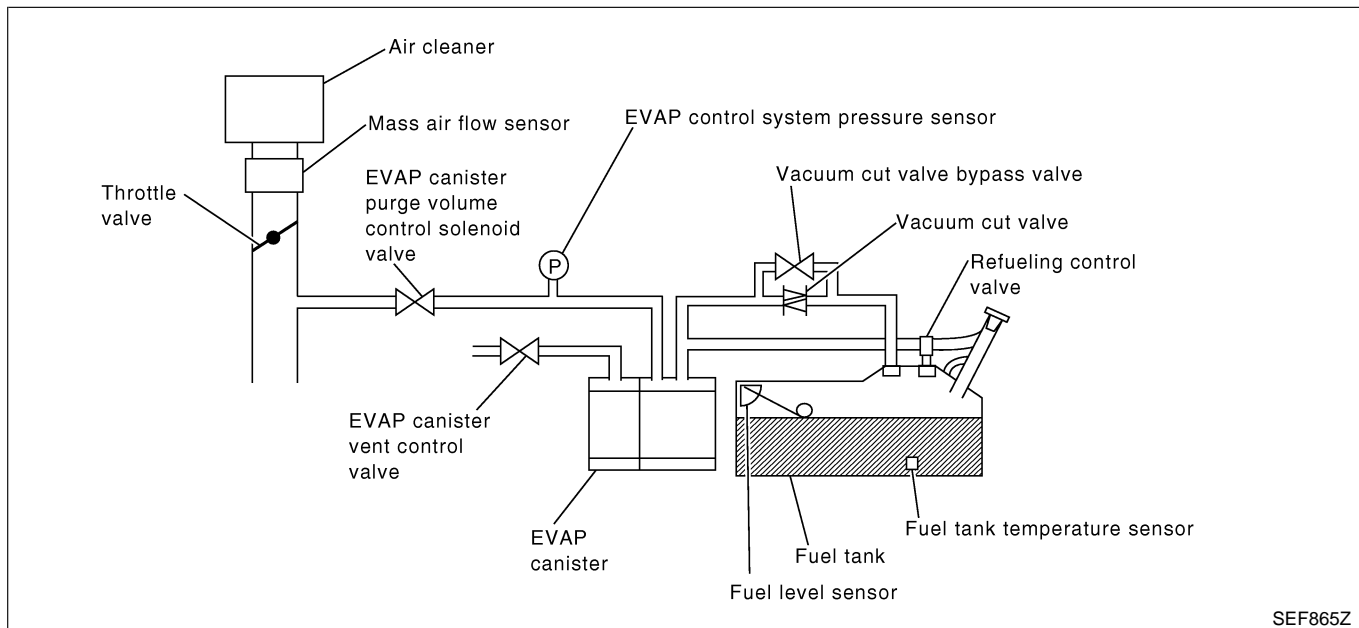
On Board Diagnosis Logic

NEEC0951

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-517.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



SEF865Z

Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC0951S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor

- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor

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6
EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEF565X

5
EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

5
EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)

1600 rpm 1850 rpm 2100 rpm

SEF874X

6
EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NEEC0952

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-527.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.
- It is better that the fuel level is low.

Ⓜ With CONSULT-II

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
- 6) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-110.

- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455] is displayed. If it is displayed, refer to “Diagnostic Procedure”, EC-408.
 If P0440 is displayed, perform “Diagnostic Procedure” for DTC P0440.

Ⓜ With GST

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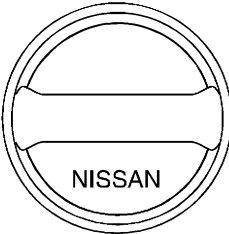
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NOTE:

- Be sure to read the explanation of “Driving Pattern” on EC-80 before driving vehicle.
- It is better that the fuel level is low.
- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-80.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch “OFF” and wait at least 5 seconds.
- 6) Start engine.
- It is not necessary to cool engine down before driving.**
- 7) Drive vehicle again according to the “Driving Pattern”, EC-80.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
- If P0455 is displayed on the screen, go to “Diagnostic Procedure”, EC-408.
- If P0440 is displayed on the screen, go to “Diagnostic Procedure”, EC-362.
- If P1447 is displayed on the screen, go to “Diagnostic Procedure”, EC-518.
- If P0440, P0455 and P1447 are not displayed on the screen, go to the following step.
- 10) Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NEEC0953

1	CHECK FUEL FILLER CAP DESIGN	
<p>1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right; font-size: small;">SEF915U</p>		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

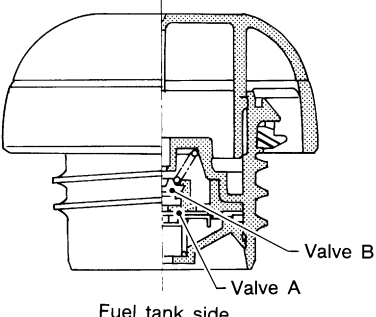
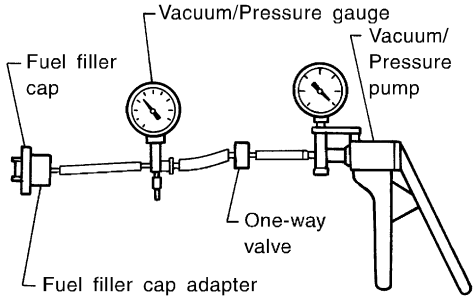
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

KA24DE

Diagnostic Procedure (Cont'd)

2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly by rotating the cap clockwise.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ <ul style="list-style-type: none"> • Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)
<ol style="list-style-type: none"> 1. Wipe clean valve housing. 2. Check valve opening pressure and vacuum. 	
 <p style="text-align: center;">Fuel tank side</p>	
SEF427N	
	
SEF943S	
<p>Pressure: 16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Replace fuel filler cap with a genuine one.

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection or disconnection. Refer to "Evaporative Emission System", EC-40.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 7.

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-384.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

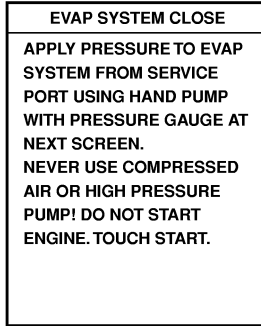
8	INSTALL THE PRESSURE PUMP	
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.		
SEF339V		
<p>NOTE: Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.</p>		
Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.
SEF916U		

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9 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.

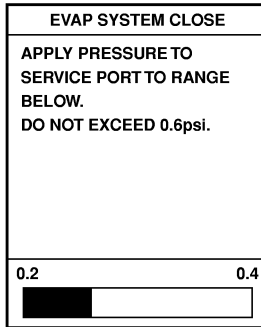


PEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

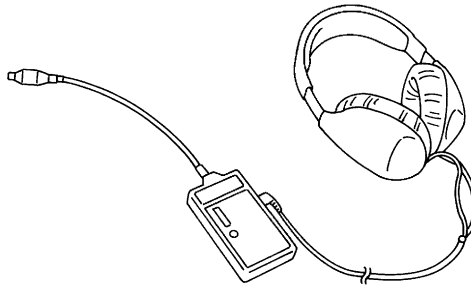
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Leak detector



SEF200U

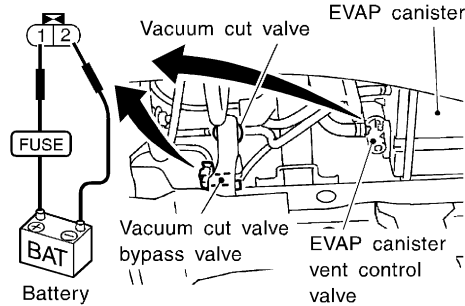
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)

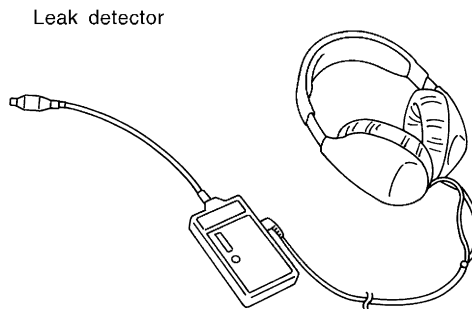


SEF503V

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF595Y																						
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

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12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="margin-left: 20px;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

14 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

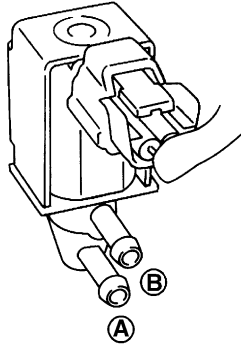
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

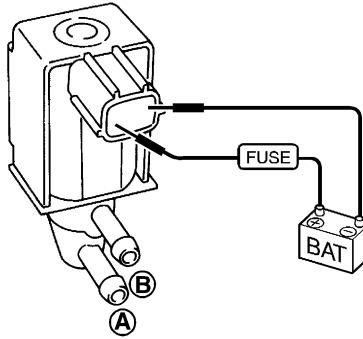
MTBL0241

OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 16. |
| NG | ▶ | Replace EVAP canister purge volume control solenoid valve. |

15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

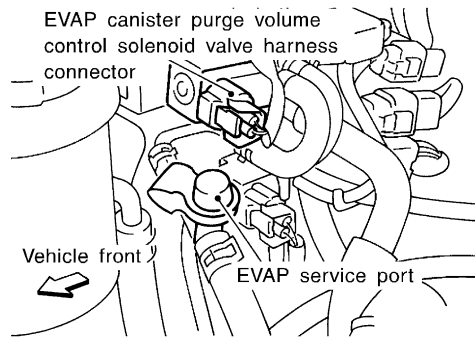
⊗ Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



SEF339V

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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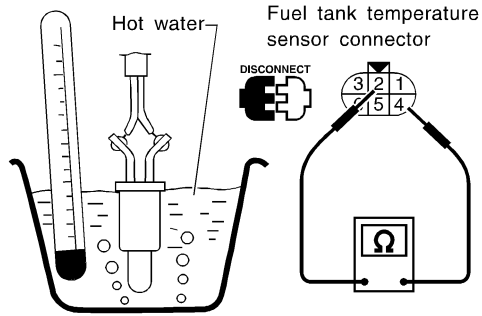
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16 CHECK FUEL TANK TEMPERATURE SENSOR

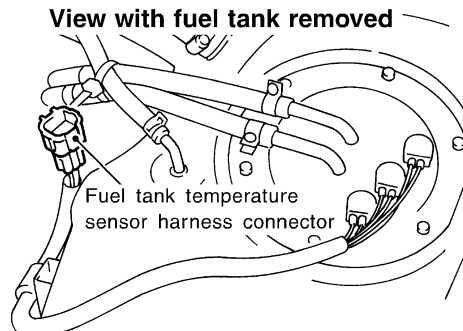
Check resistance by heating with hot water or heat gun as shown in the figure.



SEF852Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234



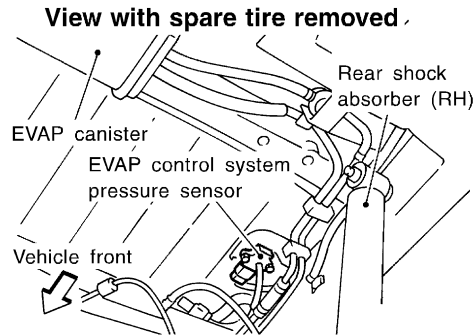
SEF334VA

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor, FE-4 .

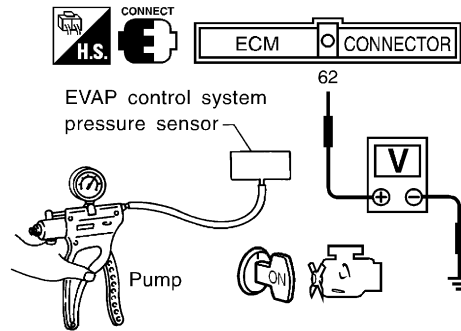
17 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



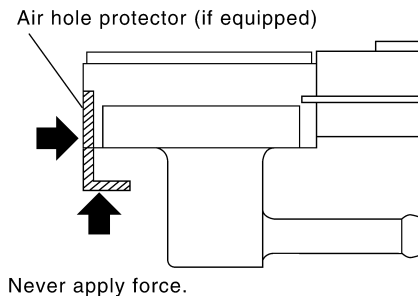
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

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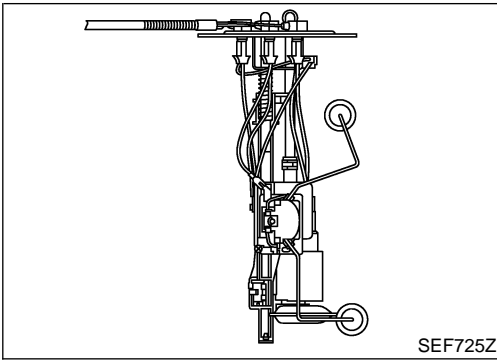
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

KA24DE

Diagnostic Procedure (Cont'd)

18	CHECK FUEL LEVEL SENSOR
1. Remove fuel level sensor assembly. Refer to FE-5 .	
2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", EL-82 .	
OK or NG	
OK	▶ GO TO 19.
NG	▶ Replace fuel level sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1012} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NEEC1013}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) ^{NEEC1014}
- Fuel level sensor

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. ^{NEEC1015}

Ⓟ WITH CONSULT-II

- 1) Turn ignition switch "ON". ^{NEEC1015S01}
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes. ^{RS}
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421. ^{BT}

Ⓞ WITH GST

Follow the procedure "WITH CONSULT-II" above. ^{NEEC1015S02}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

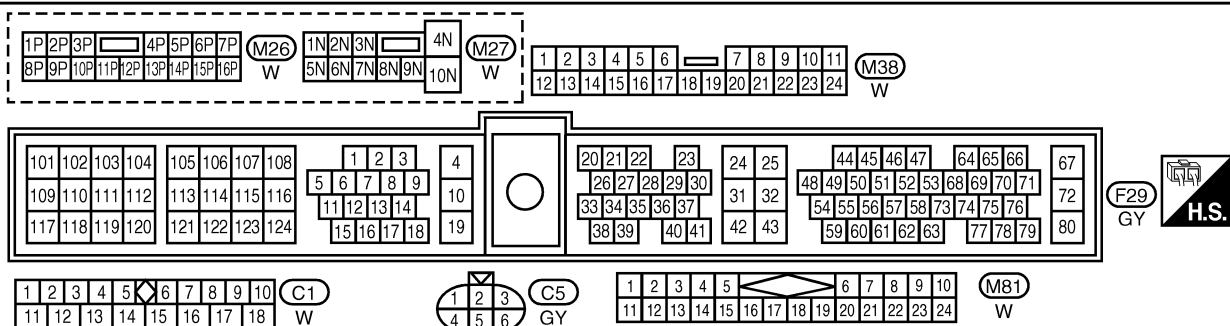
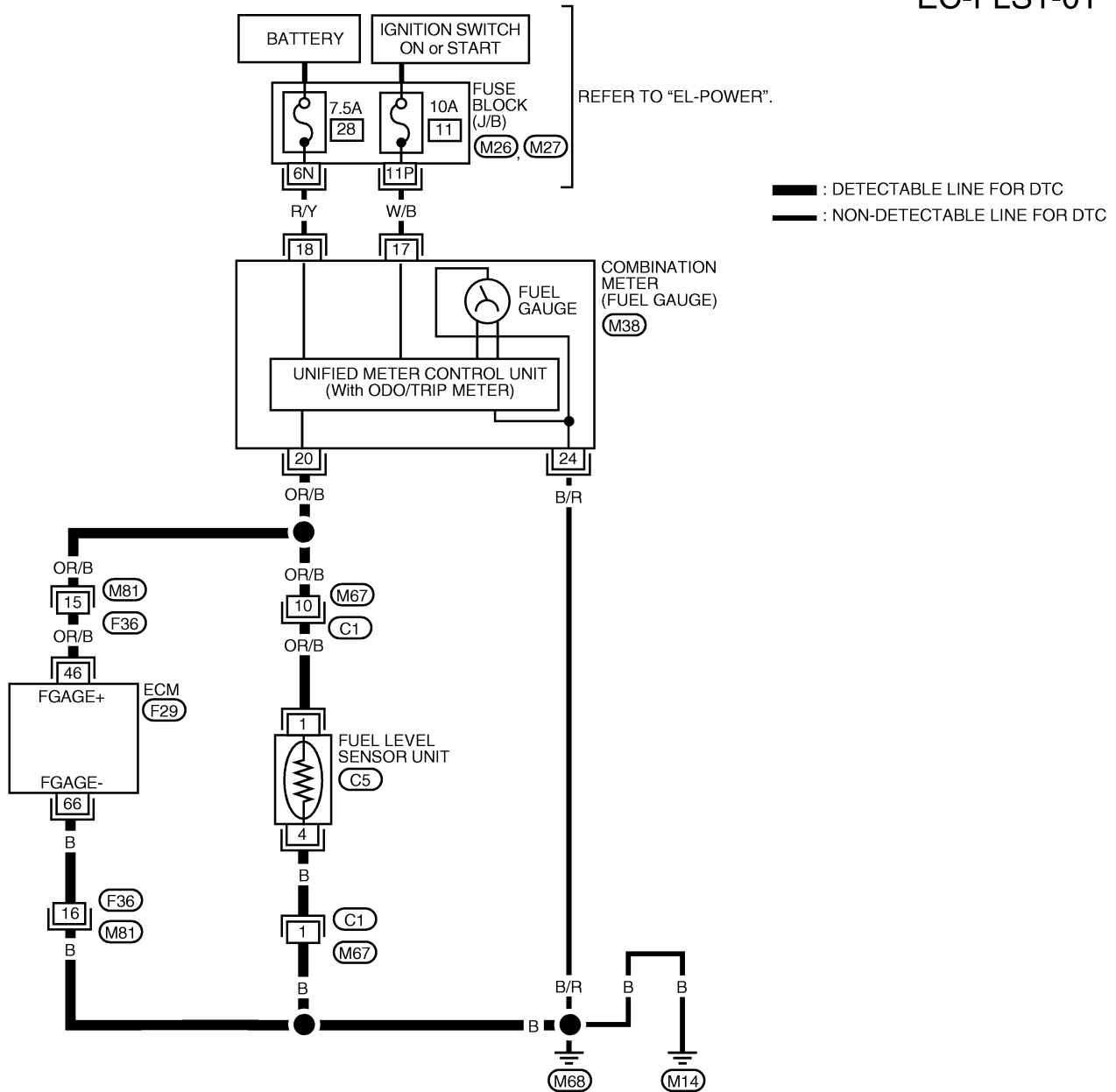
SEF195Y

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Wiring Diagram

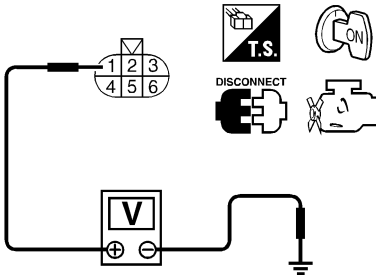
NEEC1016

EC-FLS1-01



Diagnostic Procedure

=NEEC1017

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit and fuel pump terminal 1 and ground with CONSULT-II or a tester.</p>		
		
<p>Voltage: Battery voltage</p>		
<p>OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF863Z

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● 7.5A fuse ● Harness for open or short between combination meter and fuel level sensor until and fuel pump 		
		▶ Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

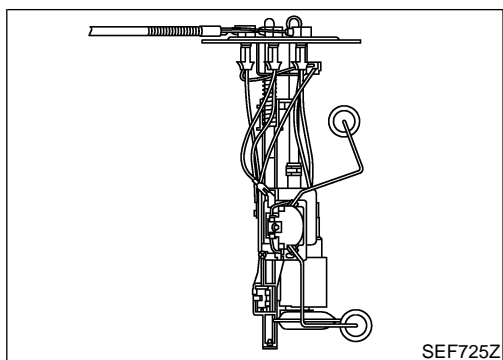
4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 1, ECM terminal 66 and fuel level sensor unit terminal 4. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

KA24DE

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness connectors M67, C1● Harness connectors F36, M81● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.
6	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.
7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END



SEF725Z

Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM. =NEEC1018

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

Driving long distances naturally affect fuel gauge level. This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance. NEEC1019

Possible Cause

- Harness or connectors (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. NEEC1021

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-5, "Fuel Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

Ⓜ WITH CONSULT-II

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

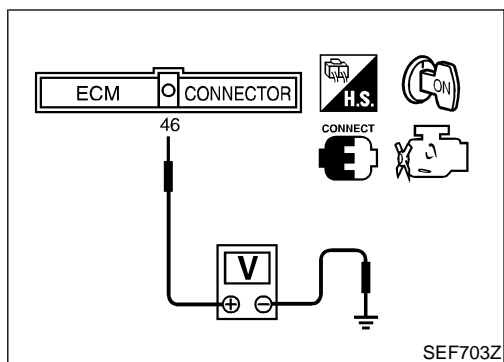
- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-56.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

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- 5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



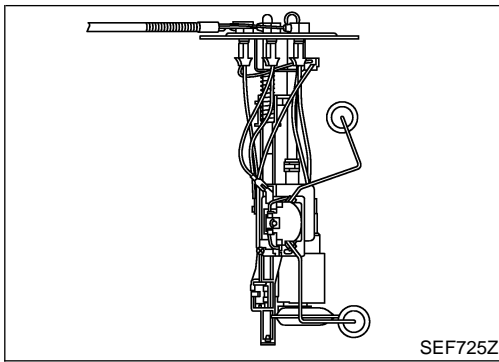
WITH GST

NEEC1021S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-56.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1022} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

ECM receives two signals from the fuel level sensor circuit. ^{NEEC1023} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

Possible Cause

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) ^{NEEC1024}
- Fuel level sensor

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

Ⓟ WITH CONSULT-II

- 1) Turn ignition switch "ON". ^{NEEC1025S01}
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-427.

Ⓢ WITH GST

Follow the procedure "WITH CONSULT-II" above. ^{NEEC1025S02}

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

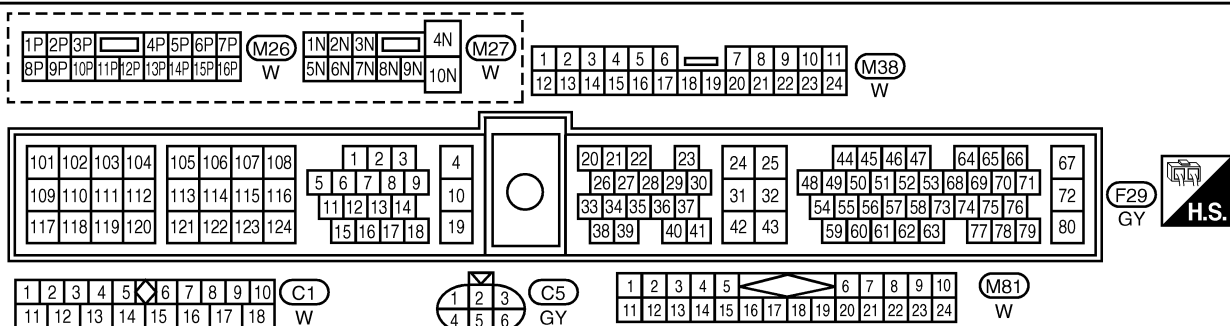
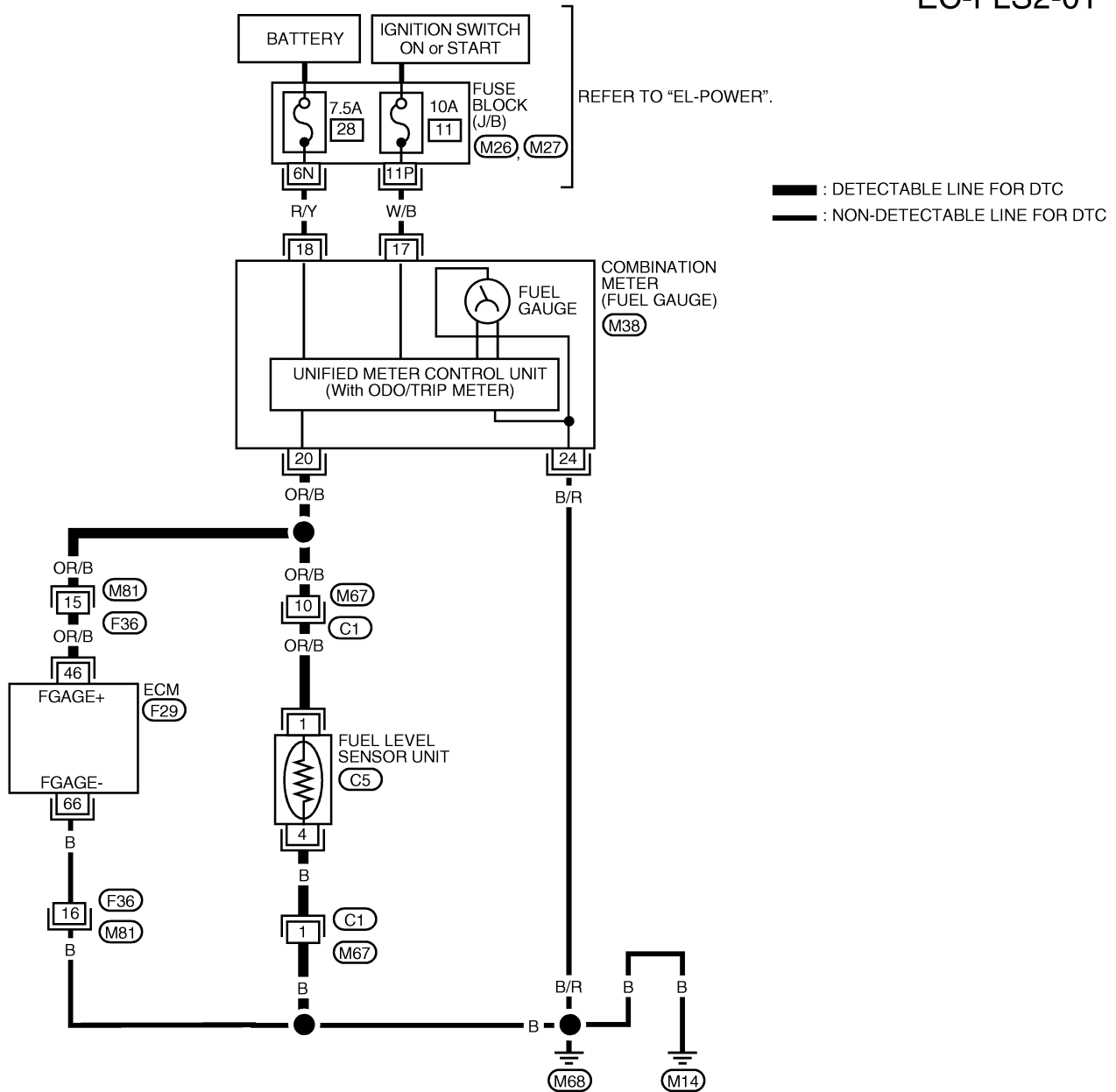
KA24DE

Wiring Diagram

Wiring Diagram

NEEC1026

EC-FLS2-01



LEC535

Diagnostic Procedure

=NEEC1027

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 1 and ground, ECM terminal 46 and ground with CONSULT-II or tester.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF864Z</p> <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 and M81, F36 ● 7.5A fuse ● Harness for open or short between combination meter and fuel level sensor until 	
	▶	Repair or replace harness or connectors.	

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	AT TF PD AX SU BR ST
OK	▶	GO TO 4.	
NG	▶	Repair open circuit or short to power in harness or connectors.	

4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	RS BT HA SC EL IDX
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

KA24DE

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness connectors M67, C1● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to power in harness on connectors.

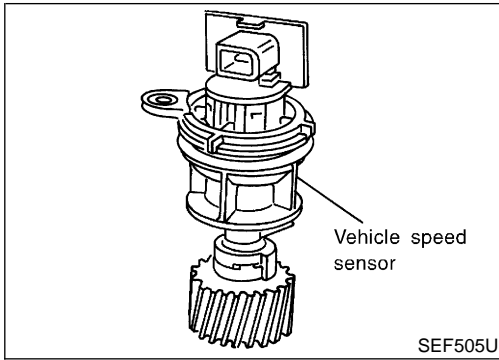
6	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶ INSPECTION END

DTC P0500 VEHICLE SPEED SENSOR (VSS)

KA24DE

Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Lift up the vehicle • In 2nd gear position • Vehicle speed is 40 km/h (25 MPH) 	<p>1 - 4V</p> <p>SEF003W</p>

On Board Diagnosis Logic

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	<ul style="list-style-type: none"> • The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. 	<ul style="list-style-type: none"> • Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

6

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

With CONSULT-II

- 1) Start engine
- 2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 3) If NG, go to "Diagnostic Procedure", EC-433. If OK, go to following step.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Warm engine up to normal operating temperature.
- 6) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,800 - 6,000 rpm (M/T) 1,600 - 6,000 rpm (A/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7 - 15 msec (M/T) 6 - 16 msec (A/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-433.

FUEL SYS #1	CLOSED
FUEL SYS #2	CLOSED
CALC LOAD	19%
COOLANT TEMP	93°C
SHORT FT #1	1%
LONG FT #1	0%
SHORT FT #2	3%
LONG FT #2	0%
ENGINE SPD	2037RPM
VEHICLE SPD	12MPH
IGN ADVANCE	38.0°
INTAKE AIR	43°C

SEF568P

Overall Function Check

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed. NEEC0276

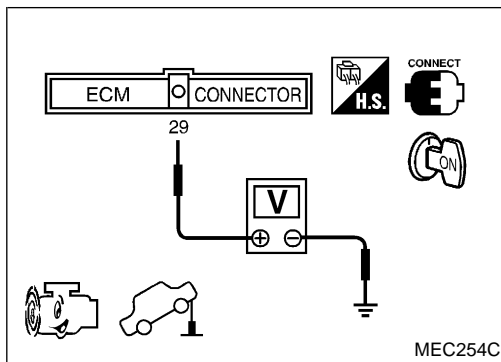
With GST

- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-433.

DTC P0500 VEHICLE SPEED SENSOR (VSS)

KA24DE

Overall Function Check (Cont'd)



No Tools

- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read the voltage signal between ECM terminal 29 (Vehicle speed sensor signal) and ground with oscilloscope.
- 4) Verify that the oscilloscope screen shows the signal wave as shown at "ECM Terminals and Reference Value", EC-429.
- 5) If NG, go to "Diagnostic Procedure", EC-433.

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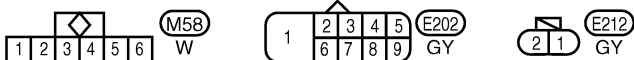
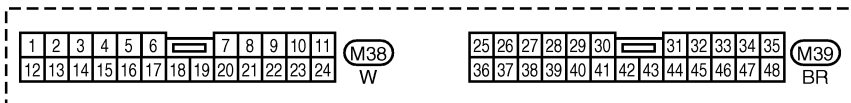
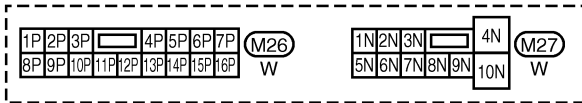
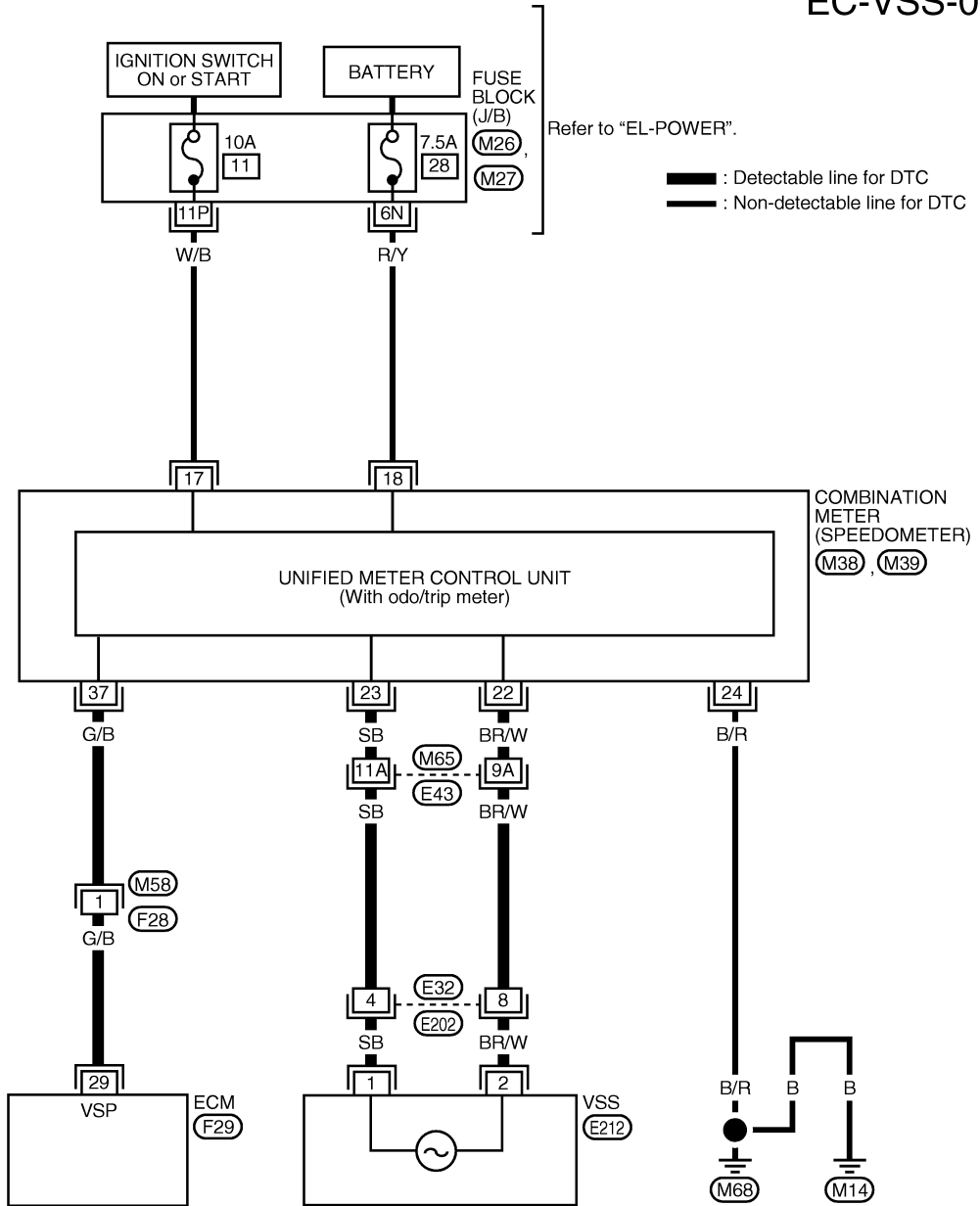
EL

IDX

Wiring Diagram

NEEC0277

EC-VSS-01



Refer to the following.

(M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)

(F29) - ELECTRICAL UNITS

Diagnostic Procedure

NEEC1054

1	CHECK INPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector and combination meter harness connector M39.</p> <p>3. Check harness continuity between ECM terminal 29 and meter terminal 37.</p>	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

SEF853Z

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and combination meter 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK SPEEDOMETER FUNCTION
<p>Make sure that speedometer functions properly.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors E32, E202 ● Harness for open or short between combination meter and vehicle speed sensor 	
▶	Repair harness or connectors. Check vehicle speed sensor and its circuit. Refer to EL-79 .

5	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	
▶	INSPECTION END

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DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

KA24DE

Description

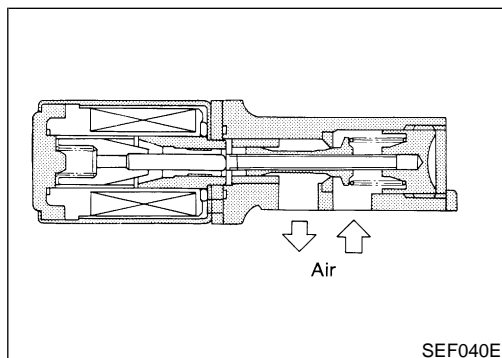
Description SYSTEM DESCRIPTION

NEEC0279

NEEC0279S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
PNP switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Absolute pressure sensor	Ambient barometric pressure		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NEEC0279S02

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

KA24DE

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC0280

MONITOR ITEM	CONDITION	SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
		Approx. 30%
		—

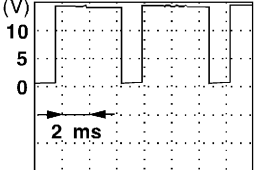
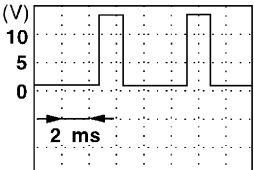
ECM Terminals and Reference Value

NEEC0281

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	10.5 - 11.5V  <p style="text-align: right;"><small>SEF015W</small></p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	1 - 13V  <p style="text-align: right;"><small>SEF016W</small></p>

On Board Diagnosis Logic

NEEC0282

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

DTC Confirmation Procedure

=NEEC0283

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform “Procedure for malfunction A” first. If DTC cannot be confirmed, perform “Procedure for malfunction B”.**

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC0283S01

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 10.5V with ignition switch ON.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it at idle at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-438.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NEEC0283S02

TESTING CONDITION:

- **Before performing the following procedure, make sure battery voltage is more than 11V at idle.**
- **Always perform at a temperature above -10°C (14°F).**

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 6 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-438.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

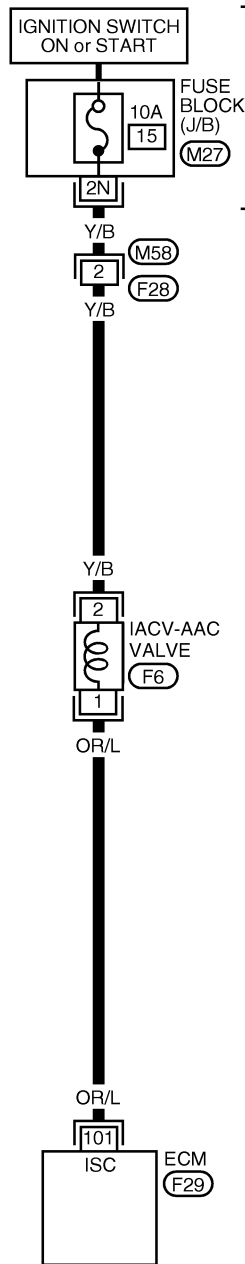
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Wiring Diagram

Wiring Diagram

NEEC0284

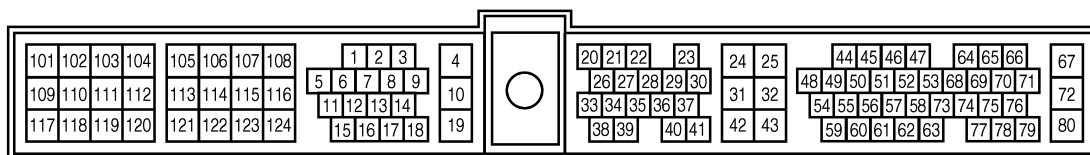
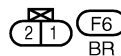
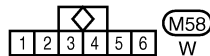
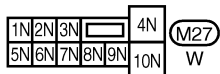
EC-AAC/V-01



Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC

- GI
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- EM
- LC
- EC**
- FE
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- MT
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- PD
- AX
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- BR
- ST



- RS
- BT
- HA
- SC
- EL
- IDX

AEC001B

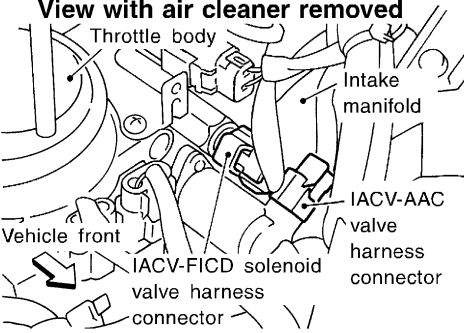
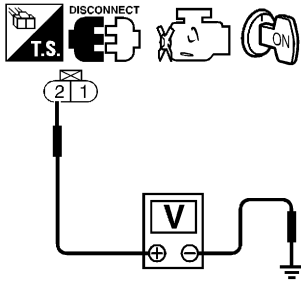
DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0285

1	CHECK POWER SUPPLY		
		<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>SEF342V</p> <p>SEF247W</p>
	OK	▶ GO TO 3.	
	NG	▶ GO TO 2.	

2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● 10A fuse ● Harness for open or short between IACV-AAC valve harness connector and 10A fuse 	
		▶ Repair harness or connectors.	

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and terminal 1.</p>		
SEF248W		
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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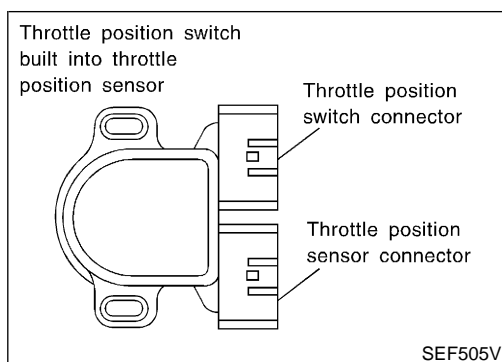
4	CHECK IACV-AAC VALVE	
<p>Disconnect IACV-AAC valve harness connector.</p> <ul style="list-style-type: none"> • Check IACV-AAC valve resistance. 		
SEF249W		
<p>Resistance: Approximately 10 Ω [at 25°C (77°F)]</p> <ul style="list-style-type: none"> • Check plunger for seizing or sticking. • Check for broken spring. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Replace IACV-AAC valve.

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5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶		INSPECTION END

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Component Description



Component Description

NEEC0287

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

ECM Terminals and Reference Value

NEEC0288

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NEEC0289

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	<ul style="list-style-type: none"> Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened. 	<ul style="list-style-type: none"> Harness or connectors (The closed throttle position switch circuit is shorted.) Closed throttle position switch Throttle position sensor

=NEEC0290

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “CLSD THL/P SW” in “DATA MONITOR” mode with CONSULT-II and check the value under the following conditions.

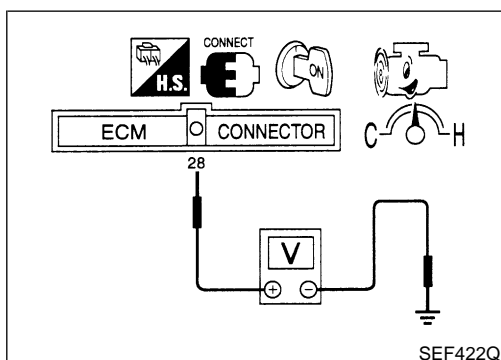
Condition	Voltage
At idle	ON
At 2,000 rpm	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-443.
If OK, go to following step.

- 3) Select “DATA MONITOR” mode with CONSULT-II.
- 4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving pattern	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-443.



Overall Function Check

=NEEC0291

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

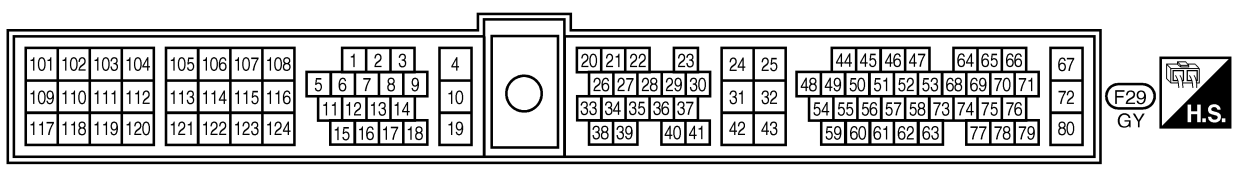
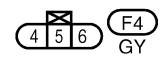
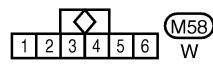
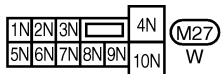
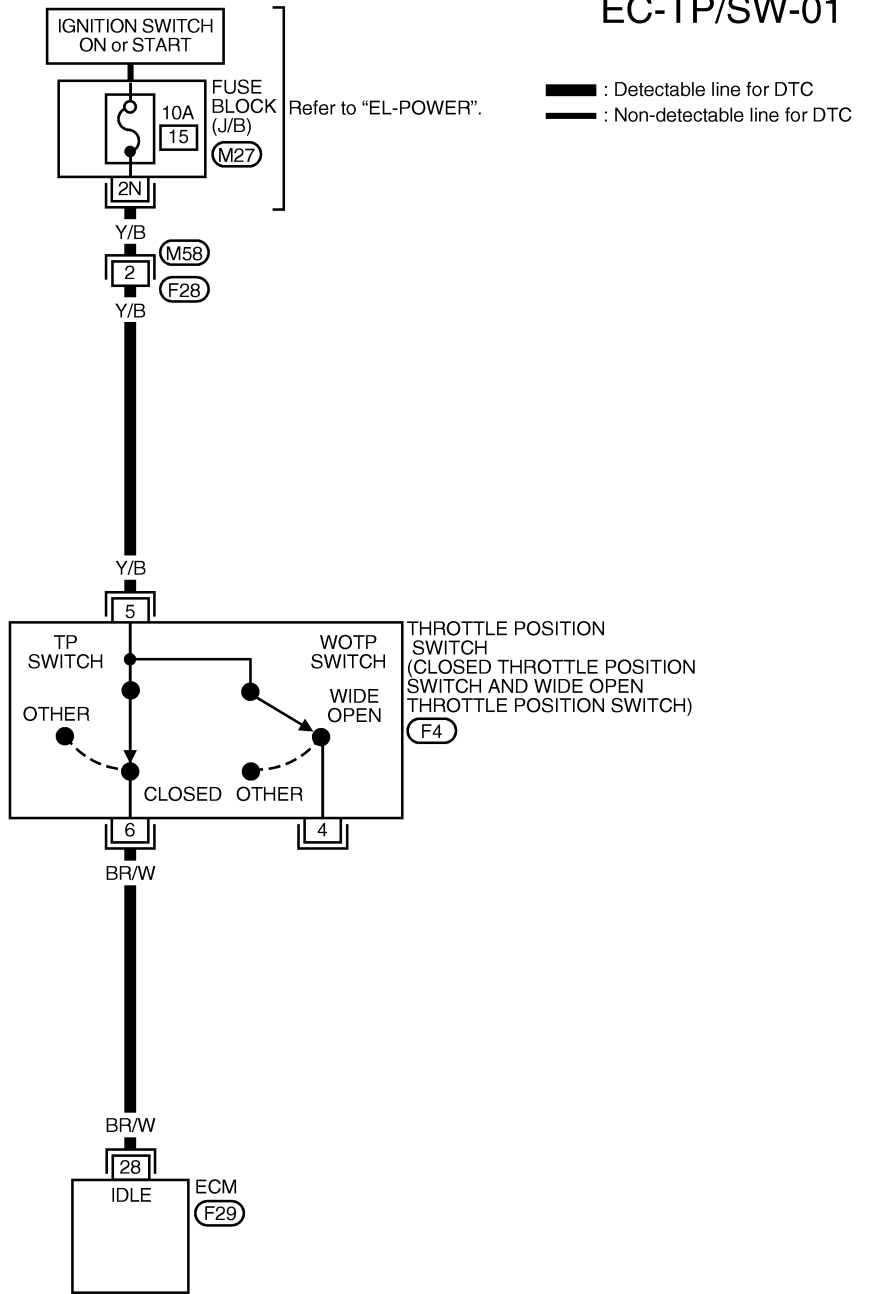
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0 - 1V

- 3) If NG, go to “Diagnostic Procedure”, EC-443.

Wiring Diagram

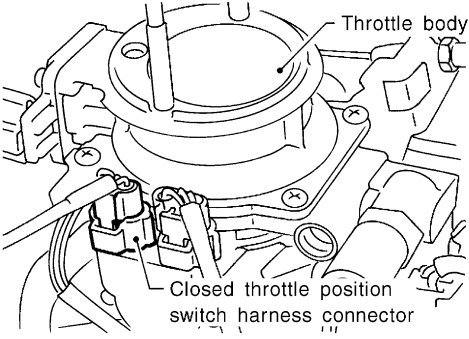
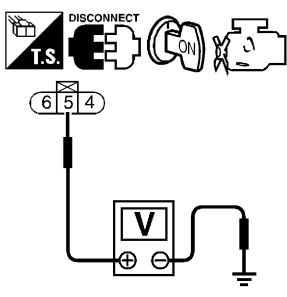
NEEC0292

EC-TP/SW-01



Diagnostic Procedure

NEEC0293

1	CHECK POWER SUPPLY								
		<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; color: blue; margin: 5px 0;">Voltage: Battery voltage</p> <p style="text-align: center; margin: 5px 0;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX						
		<table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td style="width: 75%;">GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	GO TO 2.	SEF158S SEF250W
OK	▶	GO TO 3.							
NG	▶	GO TO 2.							

2	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● 10A fuse ● Harness for open or short between throttle position switch and 10A fuse 	
		▶ Repair harness or connectors.	

3	CHECK INPUT SIGNAL CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and terminal 6. 	
AEC571A	
<p style="color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between throttle position switch and ECM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	ADJUST THROTTLE POSITION SWITCH IDLE POSITION										
1. Check the following items. Refer to "Basic Inspection", EC-110.											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>		Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	20° ± 2° BTDC										
Base idle speed	750 ± 50 rpm (in "P" or "N" position)										
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Target idle speed	800 ± 50 rpm (in "P" or "N" position)										
MTBL0328											
▶	GO TO 6.										

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6 CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check indication of "CLSD THL/P SW" under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

SEF721Z

NOTE:

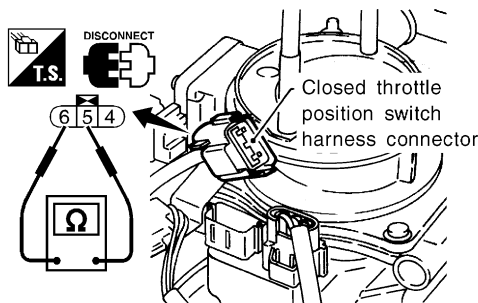
Measurement must be made with closed throttle position switch installed in vehicle.

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals 5 and 6 under the following conditions.



SEF159S

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0299

NOTE:

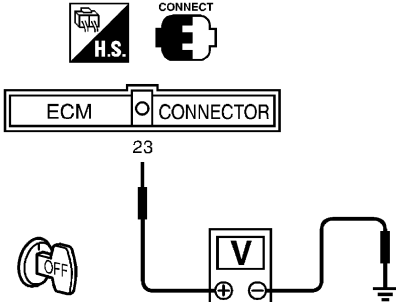
Continuity measurement must be made with closed throttle position switch installed in vehicle.

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.

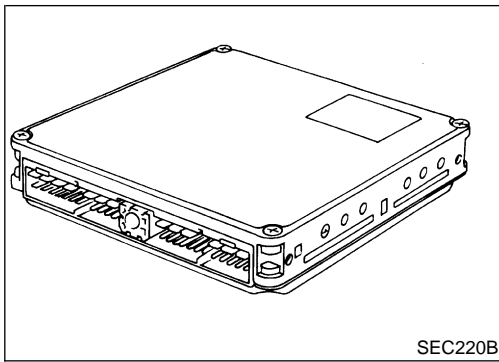
5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

7	CHECK THROTTLE POSITION SENSOR										
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and turn ignition switch ON. 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Check voltage of "THRTL POS SEN" under the following conditions. 											
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>VHCL SPEED SE</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	COOLAN TEMP/S	XXX °C	VHCL SPEED SE	XXX km/h	THRTL POS SEN	XXX V
DATA MONITOR											
MONITOR	NO DTC										
COOLAN TEMP/S	XXX °C										
VHCL SPEED SE	XXX km/h										
THRTL POS SEN	XXX V										
SEF198Y											
<p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.</p> <ol style="list-style-type: none"> 5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor. 											
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and turn ignition switch ON. 3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions. 											
											
SEF767W											
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Throttle valve conditions</th> <th>Voltage V</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td>0.15 - 0.85 (a)</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open</td> <td>3.5 - 4.7 (b)</td> </tr> </tbody> </table>		Throttle valve conditions	Voltage V	Completely closed	0.15 - 0.85 (a)	Partially open	Between (a) and (b)	Completely open	3.5 - 4.7 (b)		
Throttle valve conditions	Voltage V										
Completely closed	0.15 - 0.85 (a)										
Partially open	Between (a) and (b)										
Completely open	3.5 - 4.7 (b)										
MTBL0329											
<p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-110.</p> <ol style="list-style-type: none"> 4. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor. 											
OK or NG											
OK	▶	GO TO 8.									
NG	▶	Replace throttle position sensor.									

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶ INSPECTION END	



Component Description

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The ECM controls the engine.

NEEC0295

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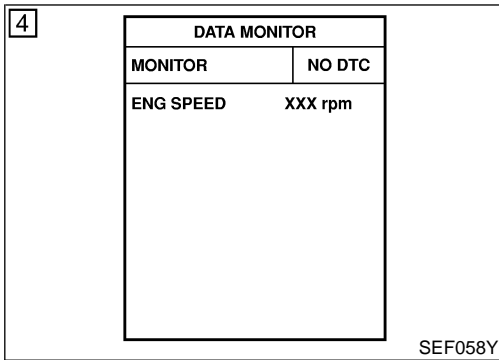
On Board Diagnosis Logic

NEEC0296

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	<ul style="list-style-type: none"> ECM calculation function is malfunctioning. 	<ul style="list-style-type: none"> ECM

EC
FE

CL
MT



DTC Confirmation Procedure

NEEC0297

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 30 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-448.

AT
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PD
AX

With GST

Follow the procedure "With CONSULT-II".

SU
BR
ST



RS
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EL
IDX

Diagnostic Procedure

NEEC0298

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

On Board Diagnosis Logic

NEEC1028

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

GI

MA

EM

LC

Possible Cause

NEEC1029

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

EC

FE

CL

MT

DTC Confirmation Procedure

NEEC1030

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

AT

TF

TESTING CONDITION:

- For best results, perform at ambient temperature of **-10°C (14°F) or higher.**
- For best results, perform at engine coolant temperature of **-10°C (14°F) to 60°C (140°F).**

PD

AX

WITH CONSULT-II

NEEC1030S01

- 1) Replace thermostat with new one. Refer to **LC-13**, “Thermostat”. Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
- 2) Turn ignition switch “ON”.
- 3) Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
- 4) Check that the “COOLAN TEMP/S” is above 60°C (140°F). If it is below 60°C (140°F), go to following step. If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

SU

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RS

BT

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)
---------------	-----------------------------

If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-450.

HA

WITH GST

NEEC1030S02

- 1) Follow the procedure “WITH CONSULT-II” above.

SC

EL

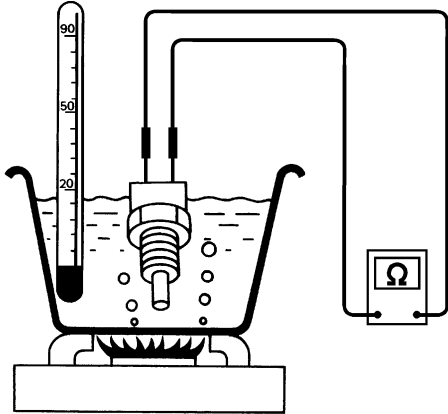
IDX

Diagnostic Procedure

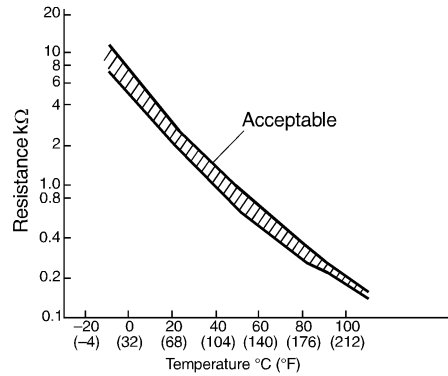
NEEC1031

1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.


<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK


INSPECTION END

NG



Replace engine coolant temperature sensor.

On Board Diagnosis Logic

NEEC0307

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	<ul style="list-style-type: none"> The closed loop control function does not operate even when vehicle is driving in the specified condition. 	<ul style="list-style-type: none"> The heated oxygen sensor 1 (front) circuit is open or shorted. Heated oxygen sensor 1 (front) Heated oxygen sensor 1 heater (front)

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
VHCL SPEED SE	XXX km/h

SEF682Y

DTC Confirmation Procedure

NEEC0308

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Never raise engine speed above 3,000 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 4.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

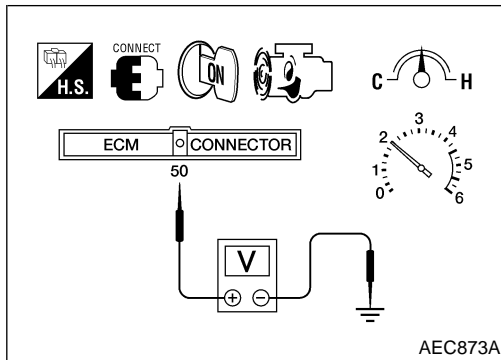
- Start engine and warm it up to normal operating temperature.
- Select "DATA MONITOR" mode with CONSULT-II.
- Hold engine speed at 2,000 rpm and check the following.
 - "HO2S1 (B1)" voltage should go above 0.70V at least once.
 - "HO2S1 (B1)" voltage should go below 0.21V at least once. If the result is NG, perform "Diagnosis Procedure", EC-452. If the result is OK, perform the following step.
- Let engine idle at least 3 minutes.
- Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	4.0 msec or more
ENG SPEED	1,800 - 3,000 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 DTC may be displayed on CONSULT-II screen.

- If DTC is detected, go to "Diagnostic Procedure", EC-452.

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed. NEEC0309

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-452.

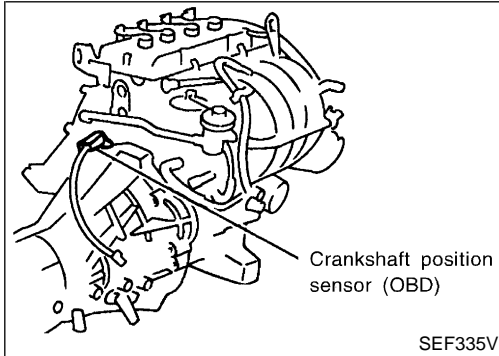
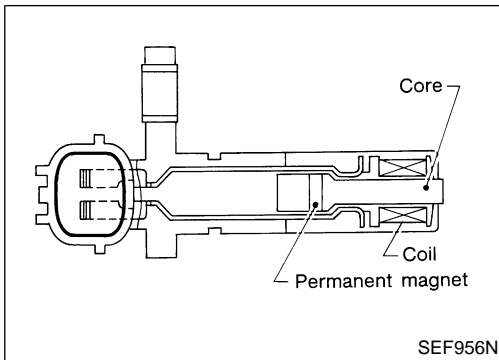
Diagnostic Procedure

Refer to "Diagnostic Procedure" for DTC P0133, EC-224. NEEC0310

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

KA24DE

Component Description



Component Description

NEEC0327

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

GI

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ECM Terminals and Reference Value

NEEC0328

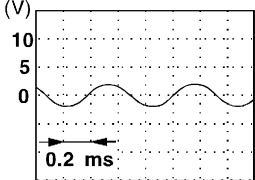
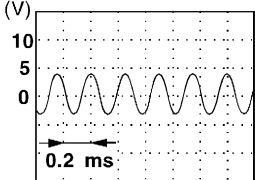
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

AT

TF

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	B/W	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
53	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	Approx. 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approx. 0V 

PD

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BT

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IDX

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0329

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336	<ul style="list-style-type: none"> ● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. 	<ul style="list-style-type: none"> ● Harness or connectors ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel

DATA MONITOR

MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC0330

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-456.

With GST

Follow the procedure "With CONSULT-II".

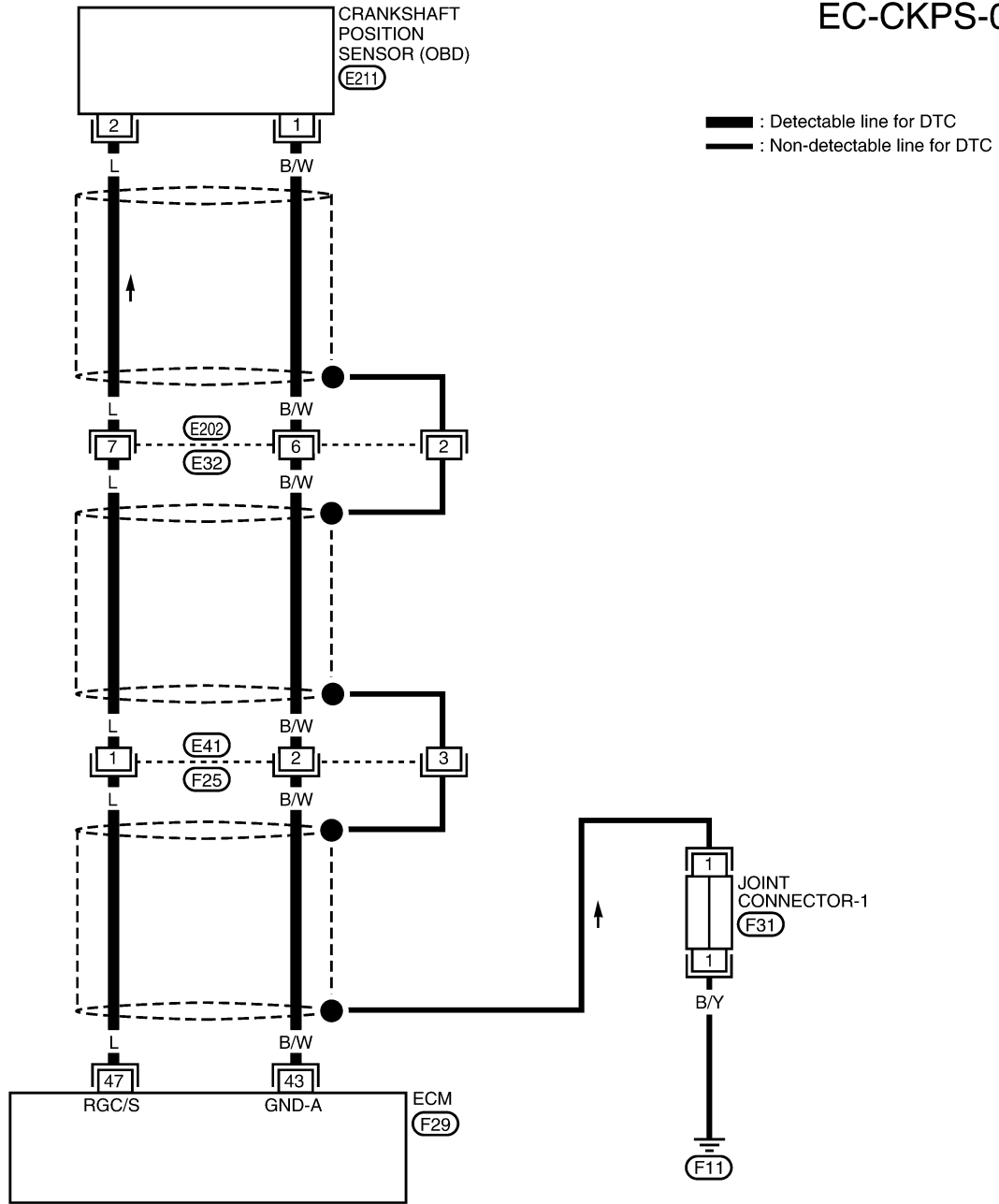
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

KA24DE
Wiring Diagram

Wiring Diagram

NEEC0331

EC-CKPS-01



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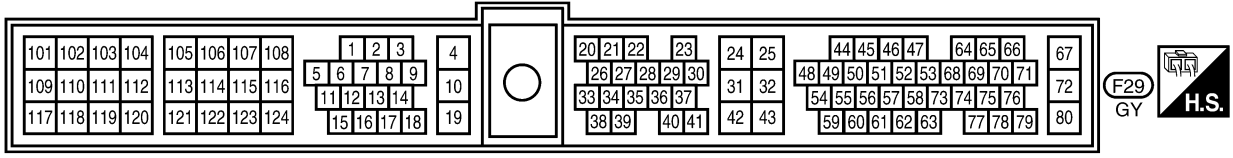
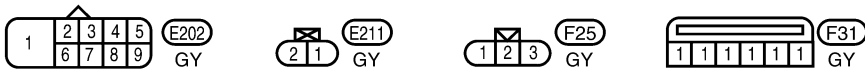
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WEC778

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

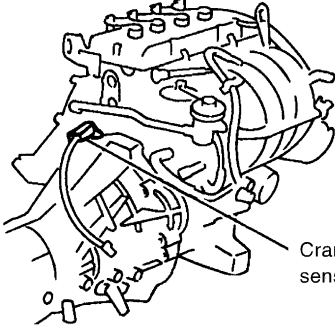
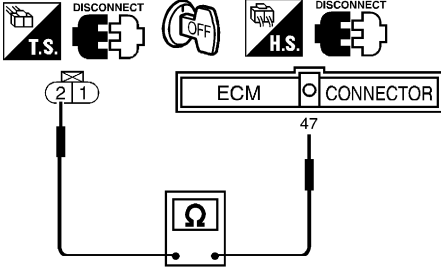
KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0332

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.	
 <p style="margin-left: 300px;">Crankshaft position sensor (OBD)</p>	
SEF335V	
2. Check continuity between ECM terminal 47 and terminal 2.	
	
SEF175V	
<p style="color: blue;">Continuity should exist.</p>	
3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

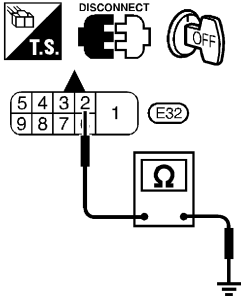
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT	
<p>1. Reconnect ECM harness connectors.</p> <p>2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the wiring diagram.</p> <p style="color: blue; margin-left: 20px;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect harness connectors E32.</p> <p>3. Check harness continuity between harness connector E32 terminal 2 and ground.</p>		
		
Continuity should exist		
<p>4. Also check harness for short to power.</p> <p>5. Then reconnect harness connectors.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-239</i>.) ● Harness for open or short between harness connector E32 and engine ground 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

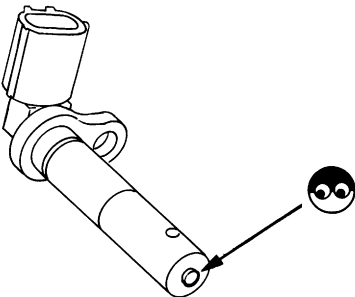
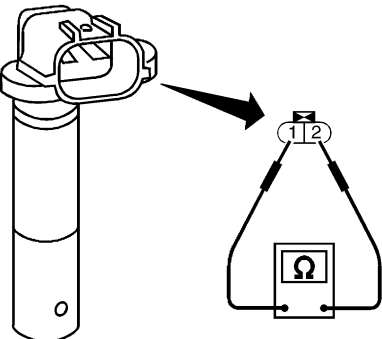
8	CHECK IMPROPER INSTALLATION	
Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.		
Trouble is not fixed.		▶ GO TO 9.

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DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

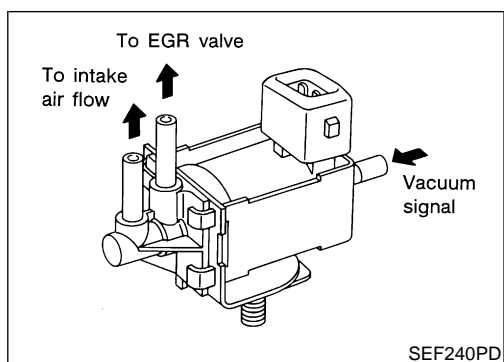
KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK CRANKSHAFT POSITION SENSOR (OBD)	<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 5. Check resistance as shown in the figure. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; color: blue; font-weight: bold;">Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	<p>SEF960N</p> <p>SEF231W</p>
	OK	▶	GO TO 10.
	NG	▶	Replace crankshaft position sensor (OBD).

10	CHECK GEAR TOOTH	<p>Visually check for chipping flywheel or drive plate gear tooth (cog).</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	
	OK	▶	GO TO 11.
	NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	
	▶	INSPECTION END	



Component Description

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC0335

MONITOR ITEM	CONDITION	SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" (A/T models) ● No-load	Idle ON
		Rev engine up from idle to 3,000 rpm quickly. OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC0336

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	0 - 1V
			[Engine is running] ● Warm-up condition ● M/T models: Lift up drive wheels and shift to 1st gear position. ● Rev engine up from 2,000 to 4,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0337

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400	● The improper voltage signal is sent to ECM through EGRC-solenoid valve.	● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) ● EGRC-solenoid valve

2

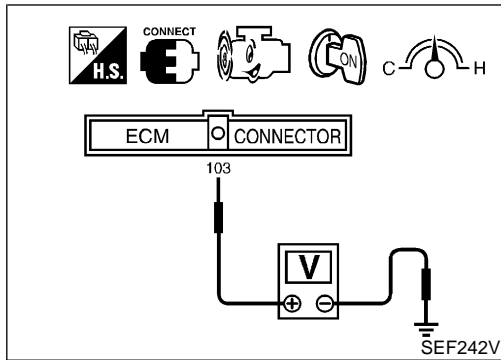
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF201Y



DTC Confirmation Procedure

NEEC0338

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,000 rpm
B/FUEL SCHDL	Less than 12.6 msec
VHCL SPEED SE	Suitable speed

- 4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-462.

Ⓜ With GST

- Follow the procedure with "CONSULT-II".

Overall Function Check

NEEC0521

Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 103 and ground at idle.

Voltage: 0 - 1V

- 3) Check that the voltage changes to battery voltage and returns to 0 - 1V when revving the engine from idle to 3,000 rpm quickly.
- 4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-462.

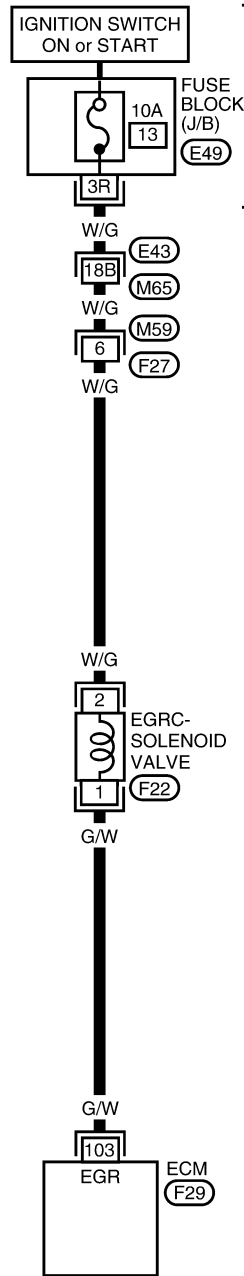
DTC P1400 EGRC-SOLENOID VALVE

KA24DE
Wiring Diagram

Wiring Diagram

NEEC0339

EC-EGRC/V-01



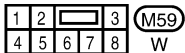
Refer to "EL-POWER".

— : Detectable line for DTC
— : Non-detectable line for DTC

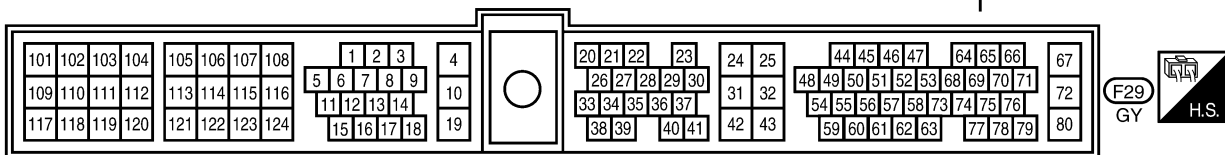
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Refer to the following.
(M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)

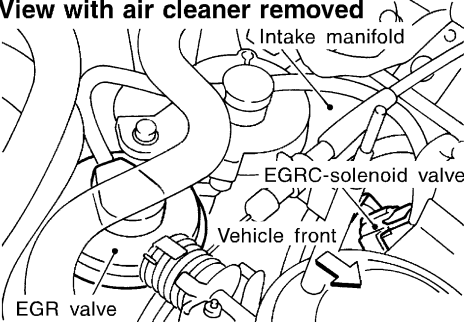
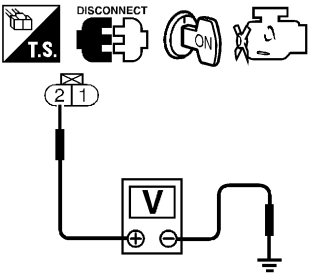


LEC487

Diagnostic Procedure

NEEC0340

1	CHECK EGRC-SOLENOID VALVE																									
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON.</p> <p>2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.</p>																										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		EGRC SOL/V	ON	MONITOR		ENG SPEED	XXX rpm																
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MONITOR																										
ENG SPEED	XXX rpm																									
<small>SEF722Z</small>																										
<p> Without CONSULT-II</p> <p>1. Start engine and rev engine up to 3,000 rpm quickly.</p> <p>2. When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the EGRC-solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)</p>																										
OK or NG																										
OK (With CONSULT-II)	▶	GO TO 5.																								
OK (Without CONSULT-II)	▶	GO TO 6.																								
NG	▶	GO TO 2.																								

2	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect EGRC-solenoid valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>SEF336V</p> <p>SEF192V</p>
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between EGRC-solenoid valve and 10A fuse 	
	▶	Repair harness or connectors.	

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4	CHECK OUTPUT SIGNAL CIRCUIT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 103 and terminal 1.	
<p style="color: blue;">Continuity should exist.</p> 4. Also check harness for short to ground and short to power.	
OK or NG	
OK (With CONSULT-II)	▶ GO TO 6.
OK (Without CONSULT-II)	▶ GO TO 7.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the harness for open or short between EGRC-solenoid valve and ECM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK EGRC-SOLENOID VALVE																											
④ With CONSULT-II Check air passage continuity. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.																												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> <tr> <td style="text-align: center;">EGRC SOL/V</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">(EGR)</td> <td style="text-align: center;">CUT</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </thead> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Condition EGRC SOLENOID VALVE</th> <th style="text-align: center;">Air passage continuity between A and B</th> <th style="text-align: center;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm									Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C	ON	Yes	No	OFF	No	Yes
ACTIVE TEST																												
EGRC SOL/V	ON																											
(EGR)	CUT																											
MONITOR																												
ENG SPEED	XXX rpm																											
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C																										
ON	Yes	No																										
OFF	No	Yes																										
OK or NG																												
OK	▶ GO TO 8.																											
NG	▶ Replace EGRC-solenoid valve.																											

DTC P1400 EGRC-SOLENOID VALVE

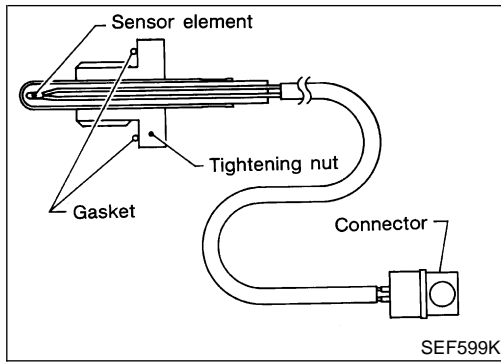
KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK EGRC-SOLENOID VALVE	<p> Without CONSULT-II Check air passage continuity shown in the figure.</p> <div style="text-align: center;"> </div> <table border="1" style="margin: 20px auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> <th style="padding: 5px;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center; padding: 5px;">Yes</td> <td style="text-align: center; padding: 5px;">No</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="text-align: center; padding: 5px;">No</td> <td style="text-align: center; padding: 5px;">Yes</td> </tr> </tbody> </table> <p style="text-align: right; margin-top: 10px;">AEC919</p> <p>If NG or operation takes more than 1 second, replace solenoid valve.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 8.</td> </tr> <tr> <td style="padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">Replace EGRC-solenoid valve.</td> </tr> </table>	Condition	Air passage continuity between A and B	Air passage continuity between A and C	12V direct current supply between terminals 1 and 2	Yes	No	No supply	No	Yes	OK	▶	GO TO 8.	NG	▶	Replace EGRC-solenoid valve.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
Condition	Air passage continuity between A and B	Air passage continuity between A and C																
12V direct current supply between terminals 1 and 2	Yes	No																
No supply	No	Yes																
OK	▶	GO TO 8.																
NG	▶	Replace EGRC-solenoid valve.																

8	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="text-align: center;">▶</td> <td>INSPECTION END</td> </tr> </table>		▶	INSPECTION END	<p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
	▶	INSPECTION END				

Component Description



Component Description

NEEC0342

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

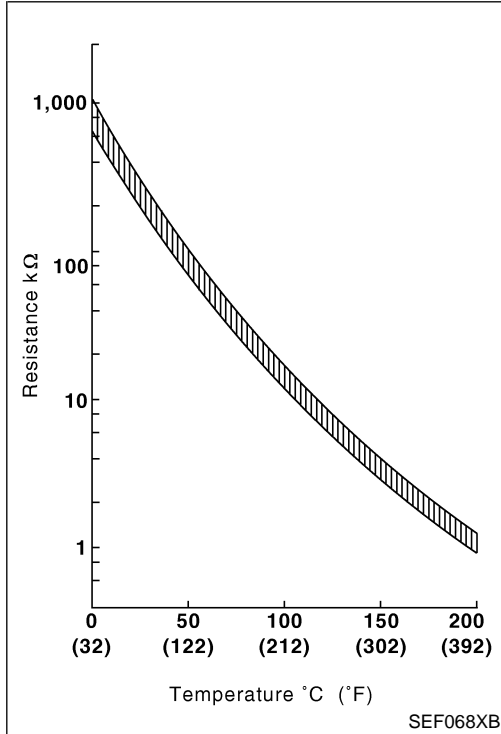
<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ground.

When EGR system is operating.

Voltage: 0 - 1.5V



On Board Diagnosis Logic

NEEC0343

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P1401	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NEEC0344

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NEEC0344S01

With CONSULT-II

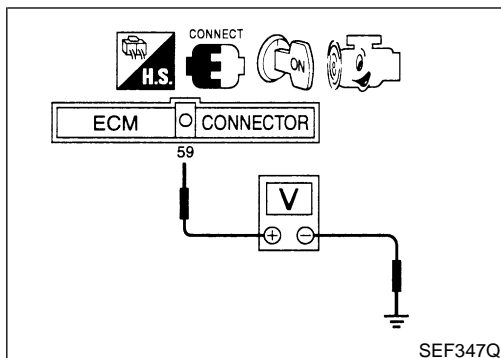
- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Verify that engine coolant temperature is less than 50°C (122°F).

If the engine coolant temperature is above the range, cool the engine down.

- 4) Start engine and let it idle for at least 8 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-470.

With GST

- Follow the procedure "With CONSULT-II".



9

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF201Y

PROCEDURE FOR MALFUNCTION B

NEEC0344S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at a temperature above 5°C (41°F).

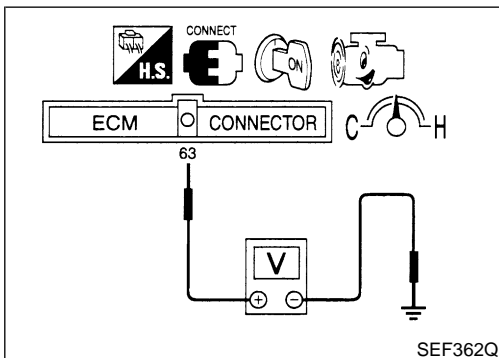
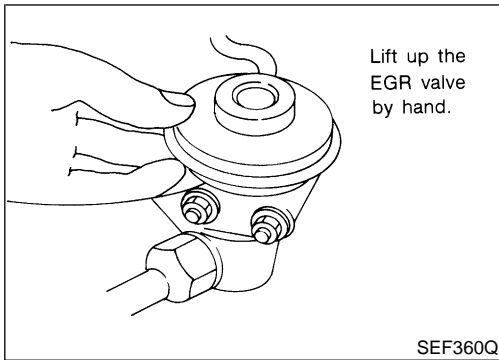
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting.
If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-472.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
Voltage should decrease to less than 1.0V.
If the result is NG, go to "Diagnostic Procedure", EC-470.
If the result is OK, go to following step.
- 6) Turn ignition switch OFF and wait at least 5 seconds.
- 7) Turn ignition switch ON.
- 8) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
- 9) Start engine.

10) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	2,000 - 2,800 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10.5 msec
THRTL POS SEN	(X + 0.23) – (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

11) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-470.



Overall Function Check

Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

NEEC0345

PROCEDURE FOR MALFUNCTION B

NEEC0345S01

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting. If NG, perform trouble diagnosis for DTC P1402. Refer to EC-473.
- 4) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
Voltage should decrease to less than 1.0V.
- 5) If NG, go to “Diagnostic Procedure”, EC-470.
If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-333, 459.

DTC P1401 EGR TEMPERATURE SENSOR

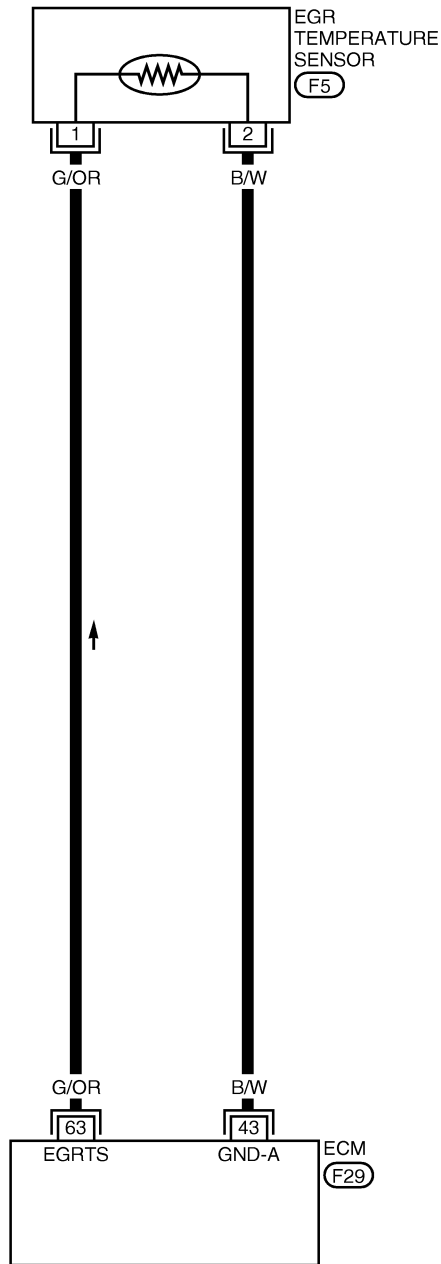
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Wiring Diagram

Wiring Diagram

NEEC0346

EC-EGR/TS-01



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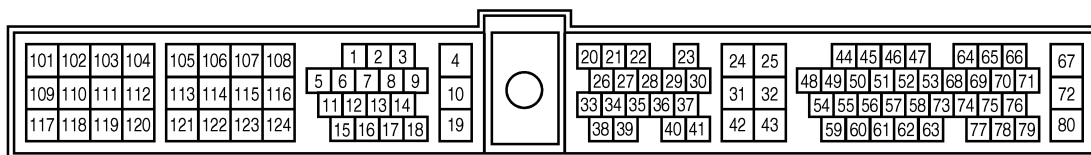
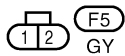
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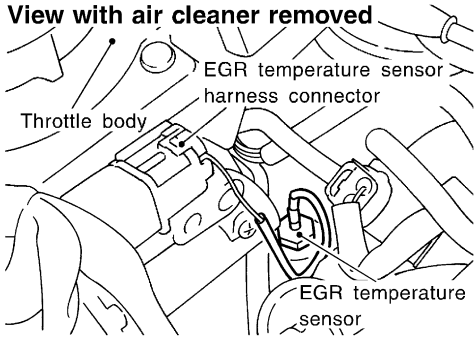
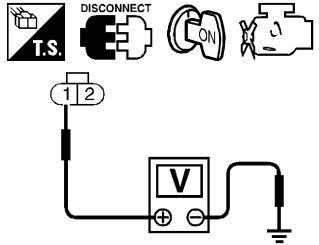
IDX



AEC006B

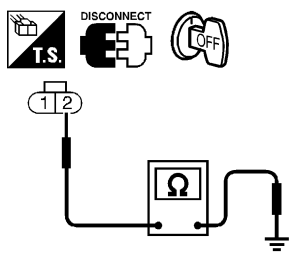
Diagnostic Procedure

NEEC0347

1	CHECK POWER SUPPLY		
<p>1. Turn ignition switch OFF. 2. Disconnect EGR temperature sensor harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Approximately 5V</p> <p>OK or NG</p>			
OK		▶	GO TO 2.
NG		▶	Repair harness or connectors.

SEF345V

SEF263W

2	CHECK GROUND CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to the wiring diagram.</p> <div style="text-align: center;">  </div> <p>Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p>OK or NG</p>			
OK		▶	GO TO 4.
NG		▶	GO TO 3.

SEF264W

3	DETECT MALFUNCTIONING PART		
<p>Check the harness for open or short between EGR temperature sensor and ECM.</p>			
		▶	Repair open circuit or short to ground or short to power in harness or connector.

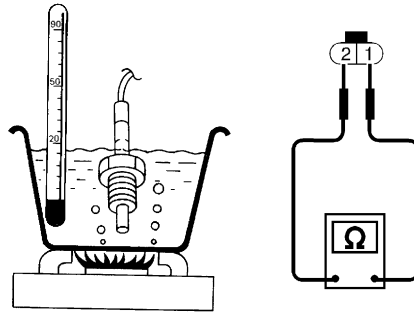
DTC P1401 EGR TEMPERATURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

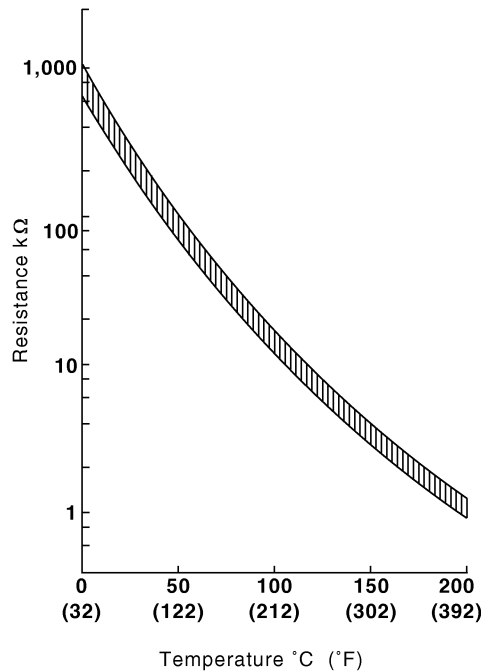
4 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.



<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance M.Ω
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015



OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

▶ **INSPECTION END**

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SEF643Q

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Description SYSTEM DESCRIPTION

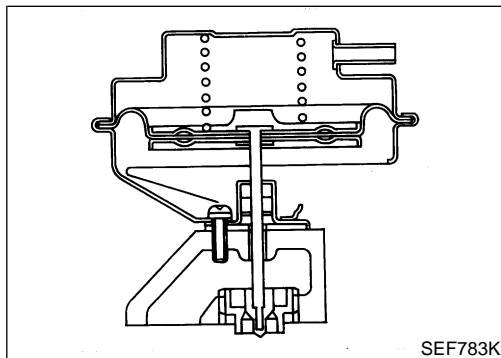
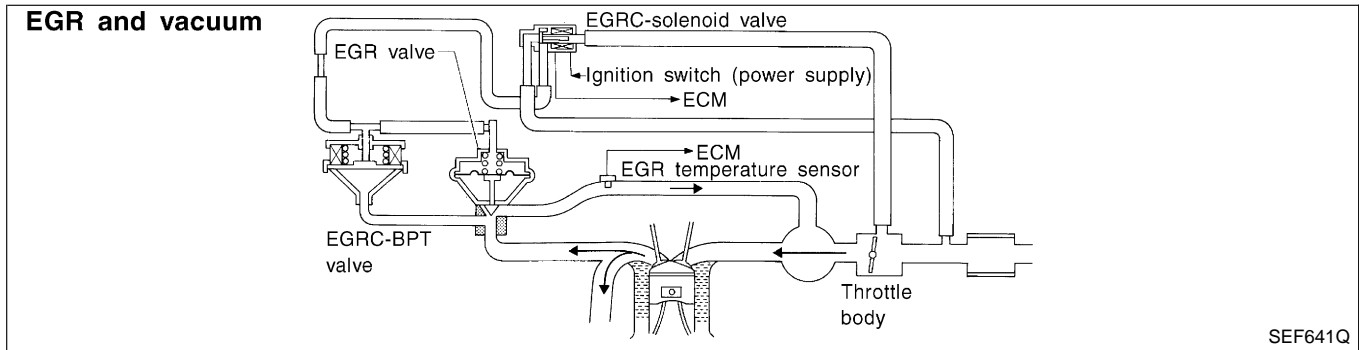
NEEC0349

NEEC0349S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current through the solenoid valve is cut. This causes the vacuum to be cut. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



COMPONENT DESCRIPTION

NEEC0349S02

Exhaust Gas Recirculation (EGR) Valve

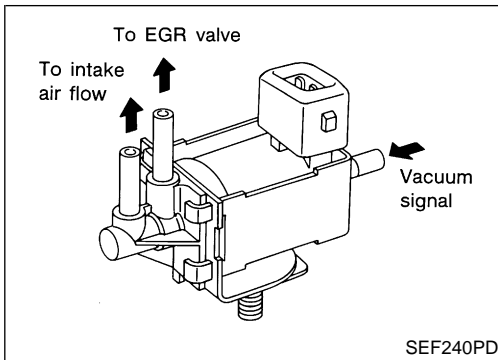
NEEC0349S0201

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

DTC P1402 EGR FUNCTION (OPEN)

KA24DE

Description (Cont'd)

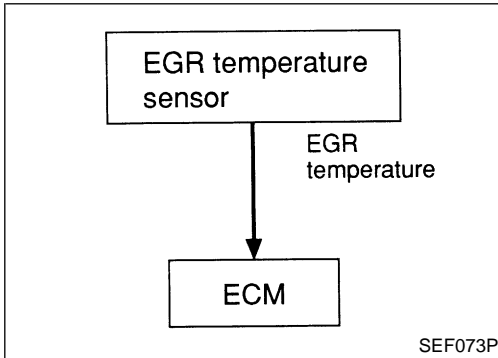


EGRC-solenoid Valve

NEEC0349S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve).

When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.



On Board Diagnosis Logic

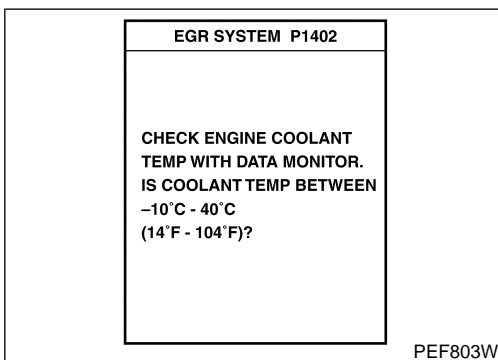
NEEC0350

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

NOTE:

Diagnosis for this DTC will occur when engine coolant temperature is approx. 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (Start engine) at the engine coolant temperature below 40°C (104°F) when starting DTC confirmation procedure.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402	<ul style="list-style-type: none"> EGR flow is detected under conditions that do not call for EGR. 	<ul style="list-style-type: none"> EGRC-solenoid valve EGR valve leaking or stuck open EGR temperature sensor EGRC-BPT valve



DTC Confirmation Procedure

NEEC0351

NOTE:

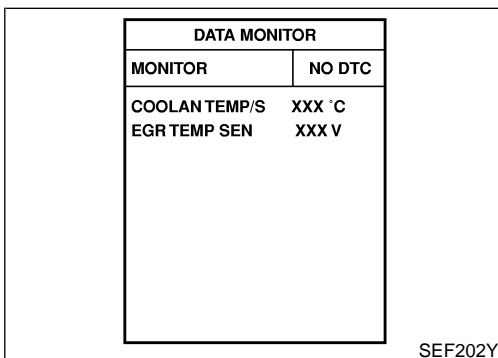
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.
COOLAN TEMP/S: -10 to 60°C (14 to 140°F)*
EGR TEMP SEN: Less than 3.7V

If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

*: Although CONSULT-II screen displays "-10 to 60°C (14 to 140°F)" as a range of engine coolant temperature, ignore it.



DTC P1402 EGR FUNCTION (OPEN)

KA24DE

DTC Confirmation Procedure (Cont'd)

4	EGR SYSTEM P1402
	OUT OF CONDITION
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
B/FUEL SCHDL XXX msec	

SEF203Y

4	EGR SYSTEM P1402
	TESTING
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
B/FUEL SCHDL XXX msec	

SEF204Y

4	EGR SYSTEM P1402
	COMPLETED

SEF236Y

With CONSULT-II

- 1) Turn ignition switch OFF and wait at least 5 seconds, then turn ignition switch ON.
- 2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START". Follow instruction of CONSULT-II.
- 4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 60 seconds or more.)

If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of -10 to 60°C (14 to 140°F). Retry from step 1.

- 5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-476.

With GST

- 1) Turn ignition switch ON and select "MODE 1" with GST.
- 2) Check that engine coolant temperature is within the range of -10 to 35°C (14 to 95°F).
- 3) Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
- 4) Start engine and let it idle for at least 60 seconds.
- 5) Stop engine.
- 6) Perform from step 1 to 4.
- 7) Select "MODE 3" with GST.
- 8) If DTC is detected, go to "Diagnostic Procedure", EC-476.

DTC P1402 EGR FUNCTION (OPEN)

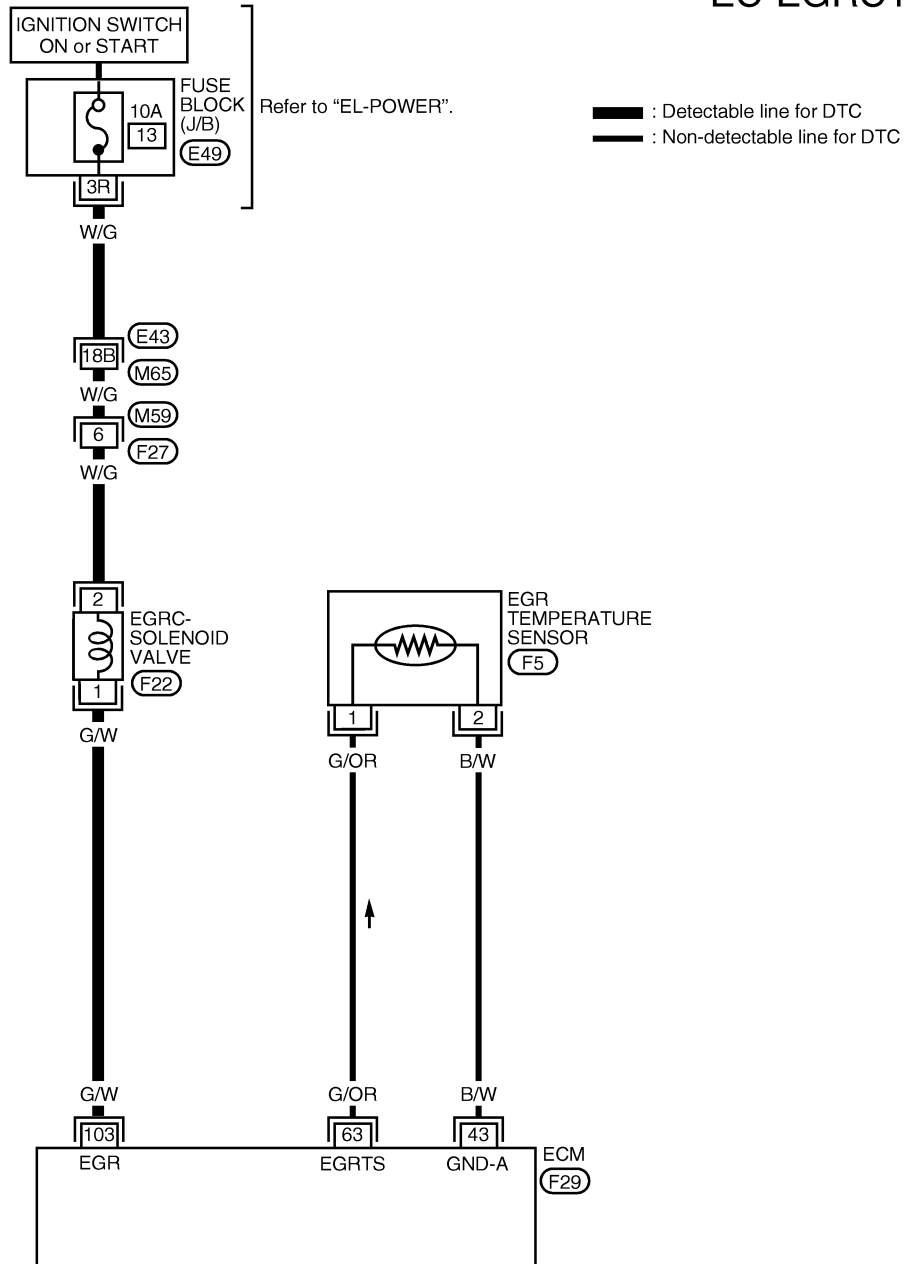
KA24DE

Wiring Diagram

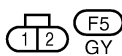
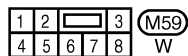
Wiring Diagram

NEEC0352

EC-EGRC1-01

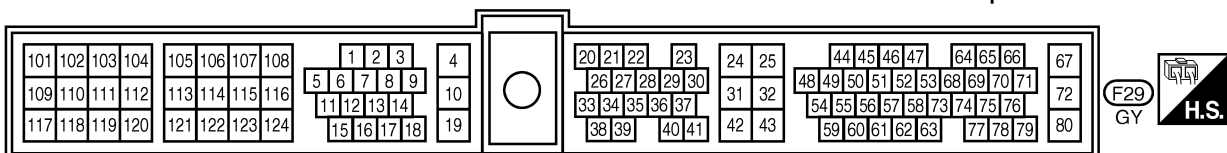


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Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

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HA

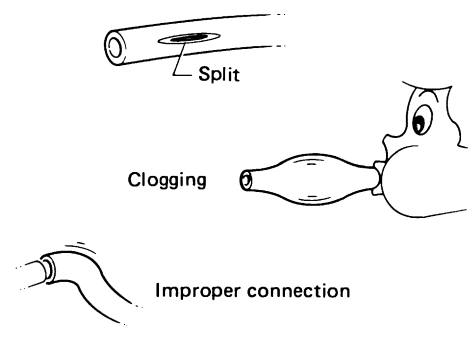


AEC995A

IDX

Diagnostic Procedure

NEEC0353

1	CHECK VACUUM HOSE	
Check vacuum hose for clogging, cracks or improper connection. Refer to "Vacuum Hose Drawing", EC-33.		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or replace vacuum hose.

SEF109L

2	CHECK EGRC-SOLENOID VALVE CIRCUIT																							
(P) With CONSULT-II 1. Turn ignition switch ON. 2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.																								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th>(EGR)</th> <th>CUT</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm												
ACTIVE TEST																								
EGRC SOL/V	ON																							
(EGR)	CUT																							
MONITOR																								
ENG SPEED	XXX rpm																							
Clicking noise should be heard.																								
OK or NG																								
OK	▶	GO TO 5.																						
NG	▶	GO TO 4.																						

SEF716Z

3	CHECK EGRC-SOLENOID VALVE CIRCUIT	
(X) Without CONSULT-II 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Turn ignition switch ON. 4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.


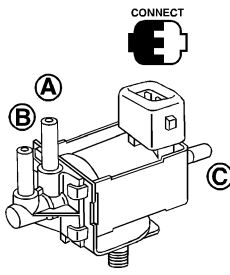
DTC P1402 EGR FUNCTION (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connector.

GI
MA
EM
LC

5	CHECK EGRC-SOLENOID VALVE																																
<p> With CONSULT-II Check air passage continuity. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.</p>																																	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 1;"> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th>(EGR)</th> <th>CUT</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div> <div style="flex: 2; margin-left: 20px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Condition EGRC SOLENOID VALVE</th> <th style="width: 33%;">Air passage continuity between A and B</th> <th style="width: 33%;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td>OFF</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> </div> </div>			ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm													Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C	ON	Yes	No	OFF	No	Yes
ACTIVE TEST																																	
EGRC SOL/V	ON																																
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ENG SPEED	XXX rpm																																
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C																															
ON	Yes	No																															
OFF	No	Yes																															
SEF717Z																																	
OK or NG																																	
OK	▶	GO TO 7.																															
NG	▶	Replace EGRC-solenoid valve.																															

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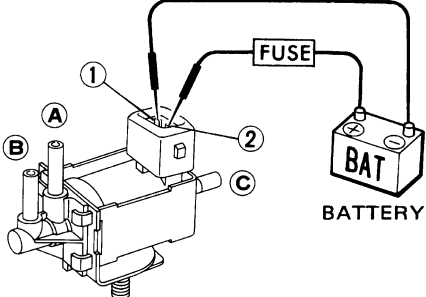
DTC P1402 EGR FUNCTION (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK EGRC-SOLENOID VALVE

⊗ Without CONSULT-II
Check air passage continuity shown in the figure.



Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

AEC919

If NG or operation takes more than 1 second, replace solenoid valve.

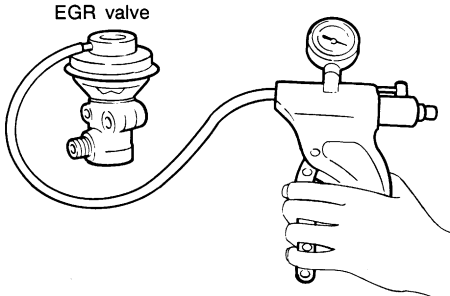
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGRC-solenoid valve.

MTBL0283

7 CHECK EGR VALVE

- Apply vacuum to EGR vacuum port with a hand vacuum pump.



EGR valve spring should lift.

- Check for sticking.

MEF137D

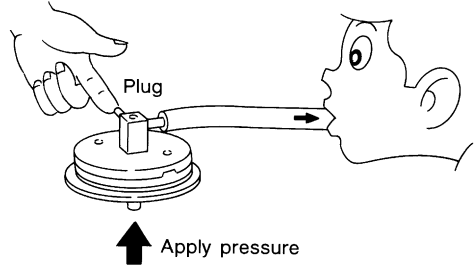
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR valve.

DTC P1402 EGR FUNCTION (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

8	CHECK EGRC-BPT VALVE	
<p>1. Plug one of two ports of EGRC-BPT valve.</p> <p>2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.</p>		
		
<p>3. If a leakage is noted, replace the valve.</p>		
SEF083P		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EGRC-BPT valve.

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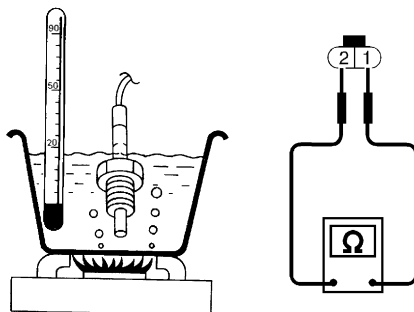
DTC P1402 EGR FUNCTION (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

9 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

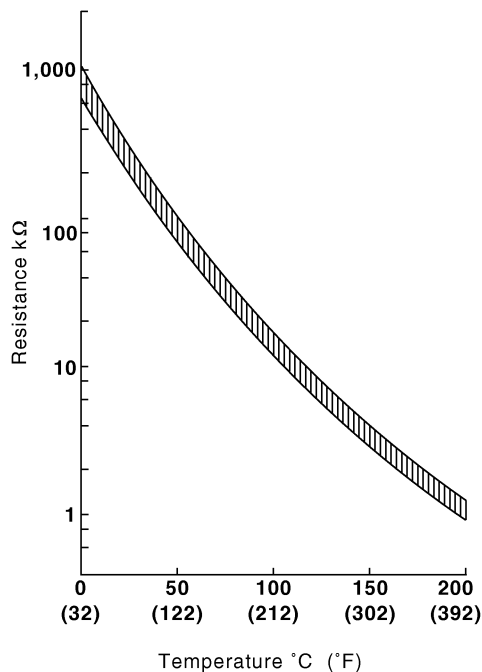


<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

SEF643Q

MTBL0549



SEF068XB

OK or NG

OK ► GO TO 10.

NG ► Replace EGR temperature sensor.

10 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

► INSPECTION END

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1055

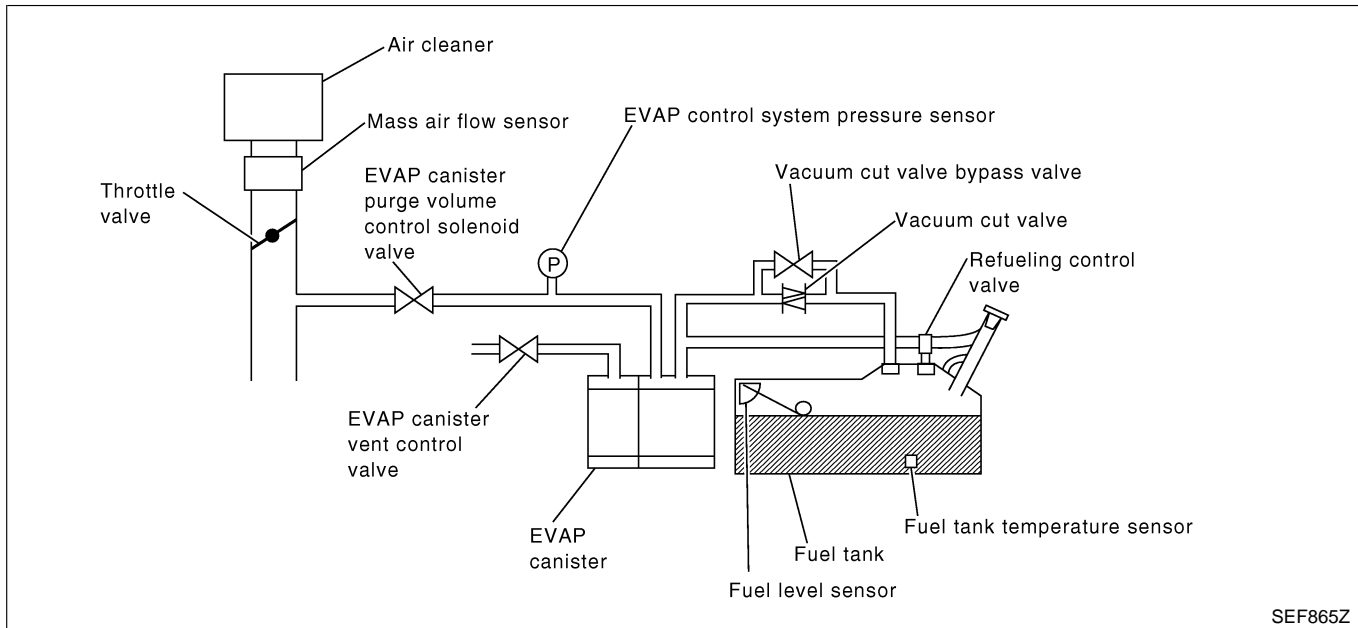
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-526.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

Possible Cause

NEEC1056

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

KA24DE

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)
(NEGATIVE PRESSURE)", EC-484. NEEC1057

Diagnostic Procedure

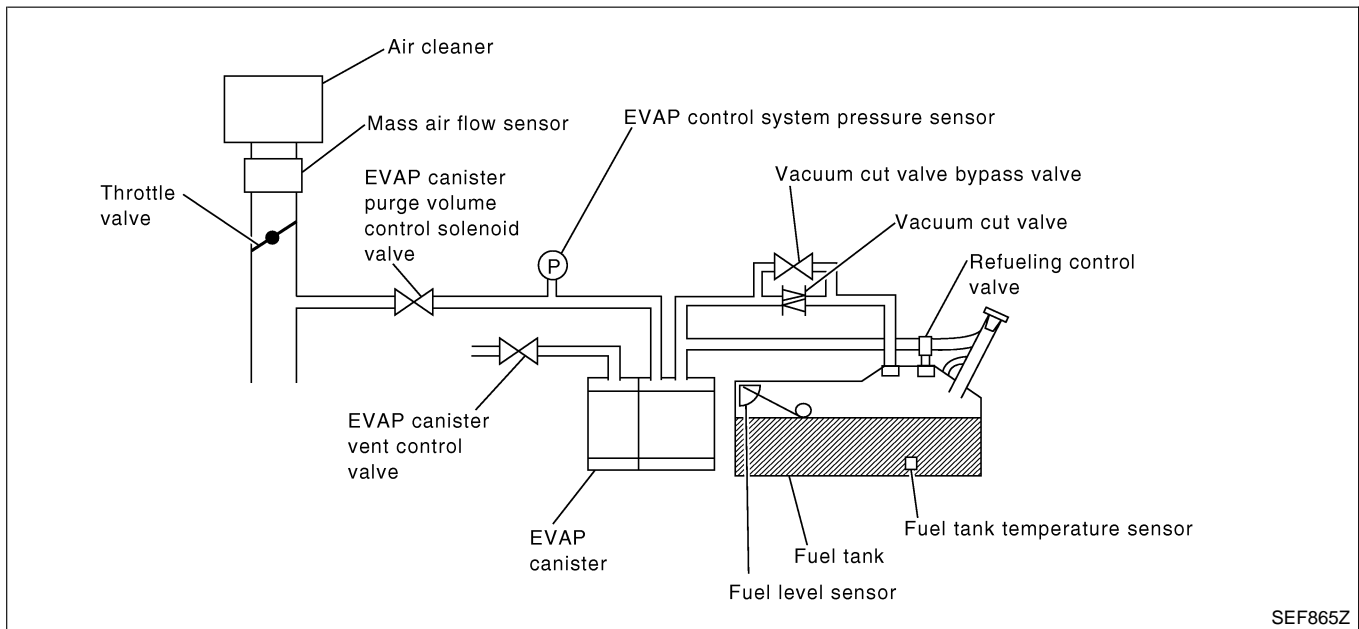
Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)
(NEGATIVE PRESSURE)", EC-486. NEEC1058

On Board Diagnosis Logic

NEEC1032

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

Possible Cause

NEEC1033

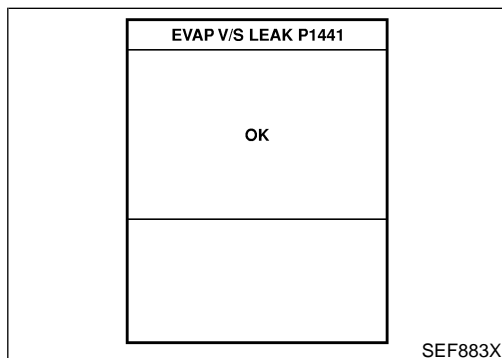
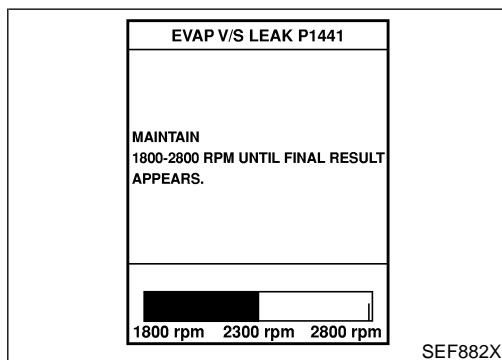
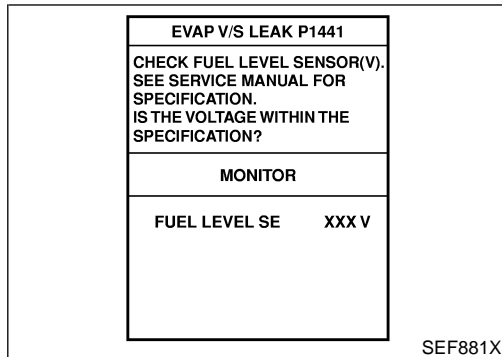
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

KA24DE

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Fuel level sensor and the circuit



DTC Confirmation Procedure

NEEC1034

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.

FUEL LEVEL SE: 1.16 - 0.25V

COOLAN TEMP/S: 0 - 32°C (32 - 90°F)

FUEL T/TMP SE: 0 - 32°C (32 - 90°F)

INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch “OFF” and leave the vehicle in a cool

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) KA24DE

DTC Confirmation Procedure (Cont'd)

place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).

- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON".
- 5) Select "EVAP VERY/SML LEAK P1441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
Follow the instruction displayed.
- 6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-486.

NOTE:

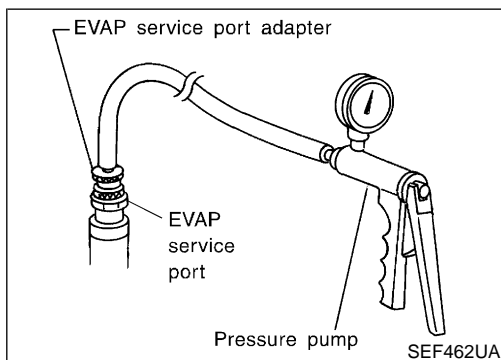
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-110.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

OVERALL FUNCTION CHECK

NEEC1034S01

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.



CAUTION:

- Never use compressed air, doing so may damage the EVAP system.
 - Do not start engine.
 - Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch "ON".
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

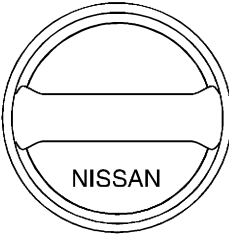
If NG, go to diagnostic procedure, EC-486.

NOTE:

For more information, refer to GST instruction manual.

Diagnostic Procedure

NEEC1035

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

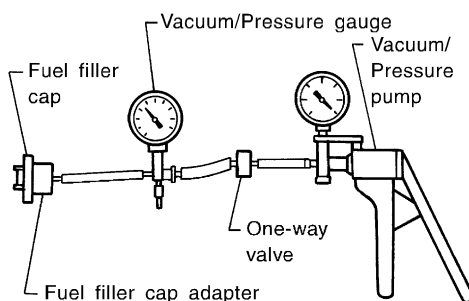
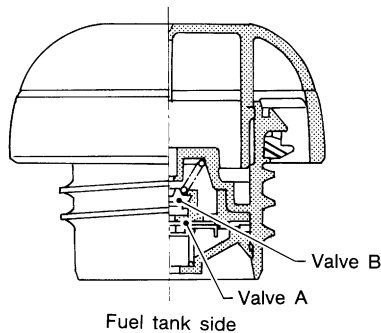
SEF915U

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF427N

SEF943S

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

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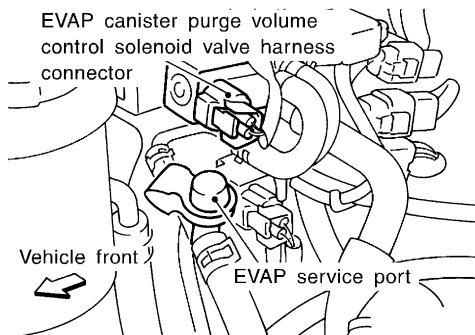
DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

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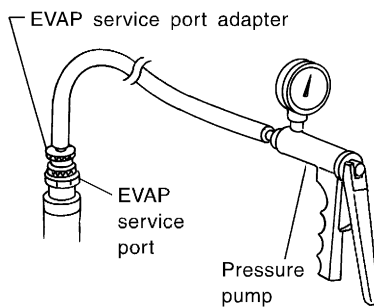
Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF339V



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ► GO TO 6.

Models without CON-
SULT-II ► GO TO 7.

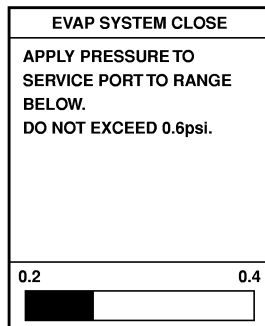
6 CHECK FOR EVAP LEAK

Ⓜ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

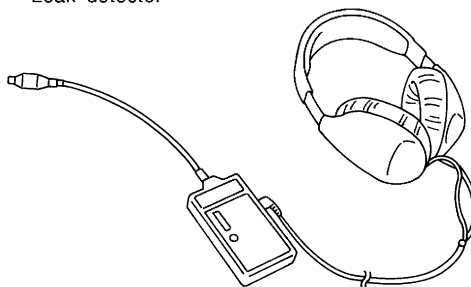
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

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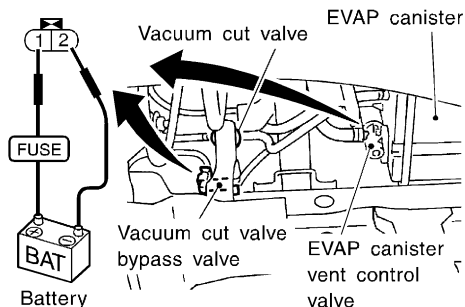
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7 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

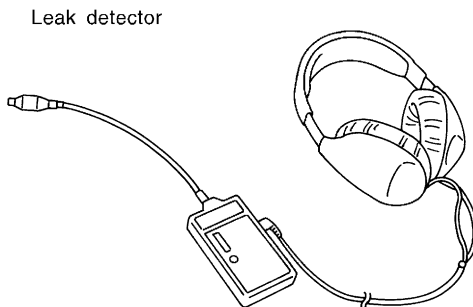


SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;"> <p>* (A) : Bottom hole (To atmosphere) * (B) : Emergency tube (From EVAP canister) * (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
<p>Refer to "DTC Confirmation Procedure", EC-338.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister?</p> <div style="text-align: center;"> <p style="text-align: right;">SEF596U</p> </div> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

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Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">ACTIVE TEST</th></tr> <tr><td style="text-align: center;">PURG VOL CONT/V</td><td style="text-align: center;">XXX %</td></tr> <tr><th colspan="2" style="text-align: center;">MONITOR</th></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td style="text-align: center;">A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td style="text-align: center;">A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td style="text-align: center;">HO2S1 MNTR (B1)</td><td style="text-align: center;">LEAN</td></tr> <tr><td style="text-align: center;">HO2S1 MNTR (B2)</td><td style="text-align: center;">LEAN</td></tr> <tr><td style="text-align: center;">THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) KA24DE

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">RICH</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
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OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

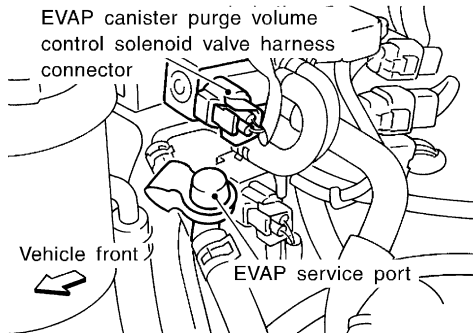
KA24DE

Diagnostic Procedure (Cont'd)

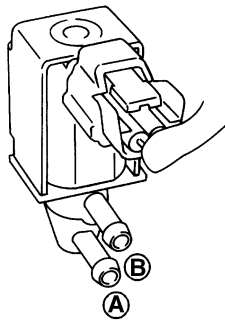
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V

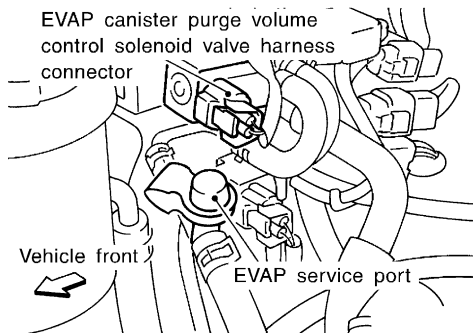


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

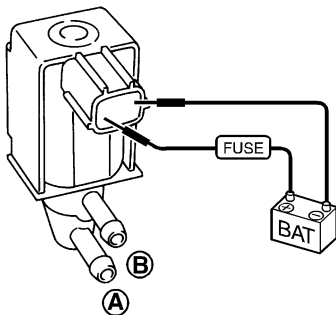
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK



GO TO 18.

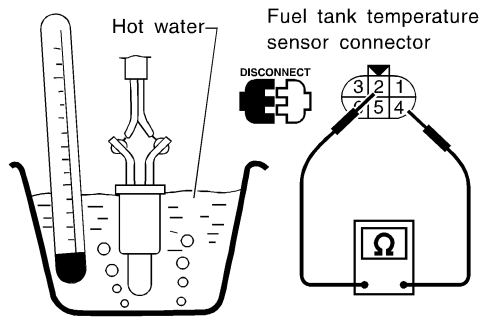
NG



Replace EVAP canister purge volume control solenoid valve.

18 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 2 and 4 by heating with hot water or heat gun as shown in the figure.



SEF852Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0291

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

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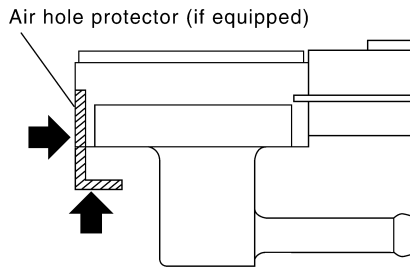
Diagnostic Procedure (Cont'd)

19 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

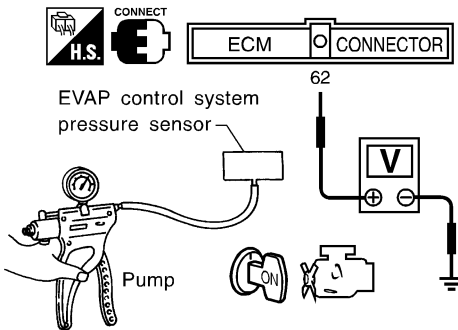
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.

5. Check input voltage between ECM terminal 62 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

SEF705Z

CAUTION:

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK ► GO TO 20.

NG ► Replace EVAP control system pressure sensor.

20 CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-40.

OK or NG

OK ► GO TO 21.

NG ► Repair or reconnect the hose.

21 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

► GO TO 22.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) KA24DE

Diagnostic Procedure (Cont'd)

22	CHECK FUEL LEVEL SENSOR	
Refer to EL-82 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Replace fuel level sensor unit.

23	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
	▶	INSPECTION END

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Description

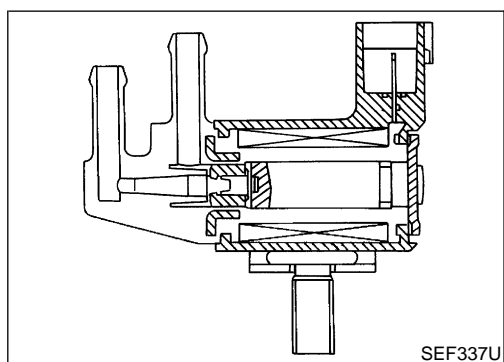
Description SYSTEM DESCRIPTION

NEEC0359

NEEC0359S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC0359S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0360

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch "OFF" Shift lever: "N" No-load 	Idle (Vehicle stopped)	0%
		2,000 rpm (200 seconds after starting engine)	—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

ECM Terminals and Reference Value

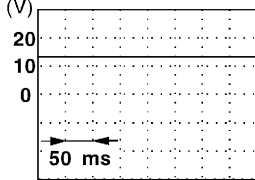
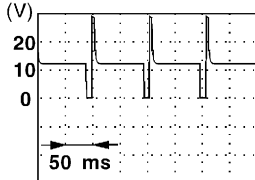
ECM Terminals and Reference Value

NEEC0361

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self-shut-off)	[Engine is running] [Ignition switch "OFF"] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch "OFF" 	0 - 1V
			[Ignition switch "OFF"] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch "OFF" 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0362

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul style="list-style-type: none"> ● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

DTC Confirmation Procedure

DTC Confirmation Procedure

=NEEC0363

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DATA MONITOR	
MONITORING	NO FAIL
CMPS~RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
TANK F/TMP SE	XXX °C

PEF195V

PURG VOL CN/V P1444	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF205Y

PURG VOL CN/V P1444	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF206Y

PURG VOL CN/V P1444	
COMPLETED	

SEF237Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Check that TANK F/TEMP SE is 0°C (32°F) or more.
- 6) Select "PURG VOL C/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Touch "START".
- 8) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for at least 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
- 9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-502.

With GST

Follow the procedure "With CONSULT-II".

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

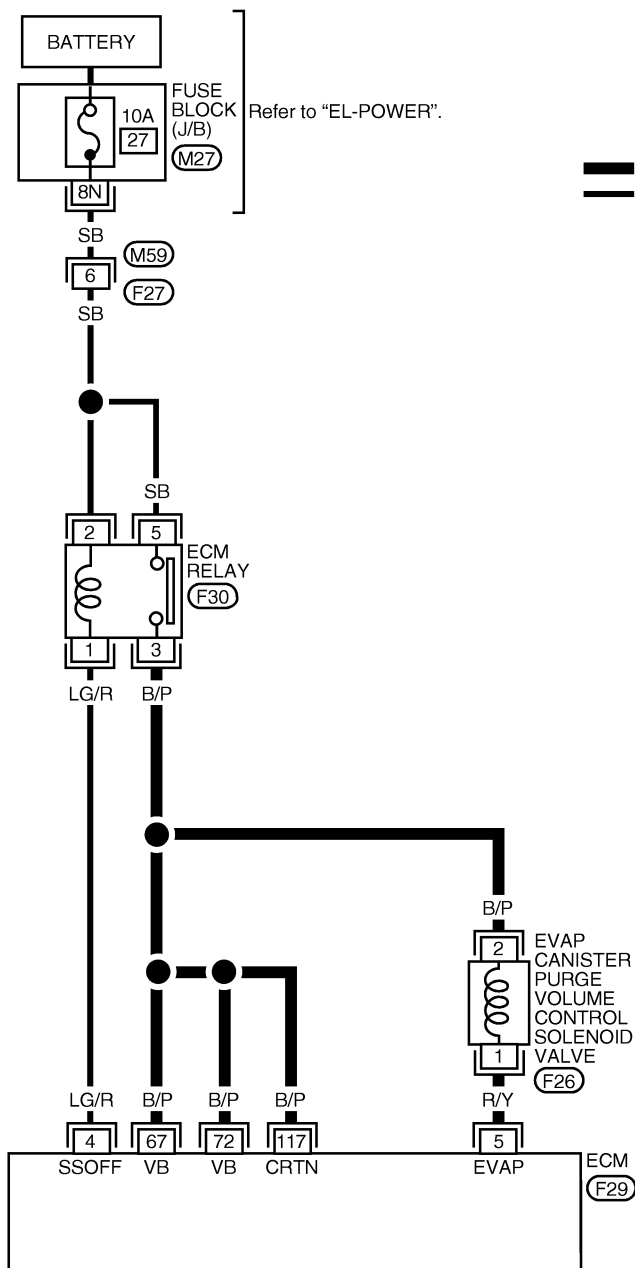
KA24DE

Wiring Diagram

Wiring Diagram

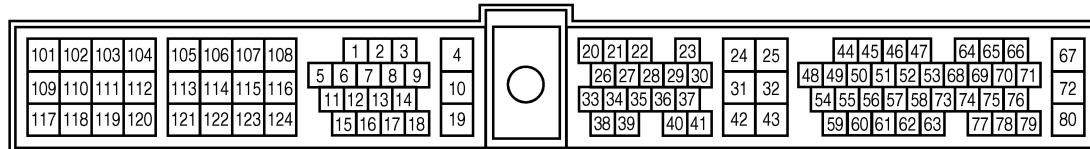
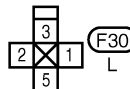
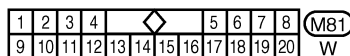
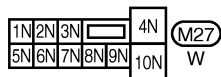
NEEC0504

EC-PGC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

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AEC996A

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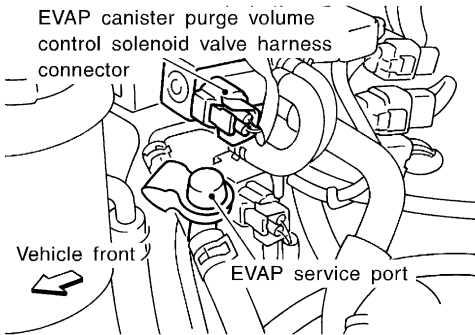
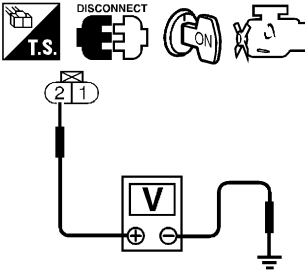
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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Diagnostic Procedure

Diagnostic Procedure

=NEEC0364

1	CHECK POWER SUPPLY	
		<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>EVAP canister purge volume control solenoid valve harness connector</p> <p>Vehicle front</p> <p>EVAP service port</p> </div> <p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.</p> <p style="color: blue;">Voltage: Battery voltage</p> <div style="text-align: center;">  </div> <p style="text-align: center;">OK or NG</p>
		SEF339V
		SEF192V
	OK	▶ GO TO 3.
	NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART	
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
		▶ Repair harness or connectors.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 5 and terminal 1.</p> <p style="margin-left: 20px;">Continuity should exist.</p>	
SEF193V	
<p>If OK, check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.</p>	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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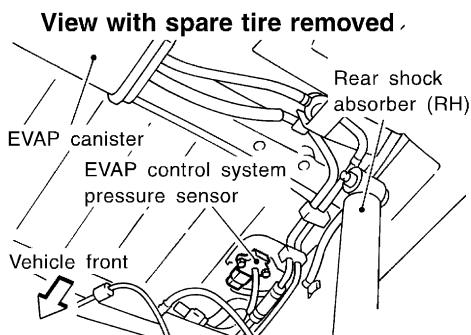
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

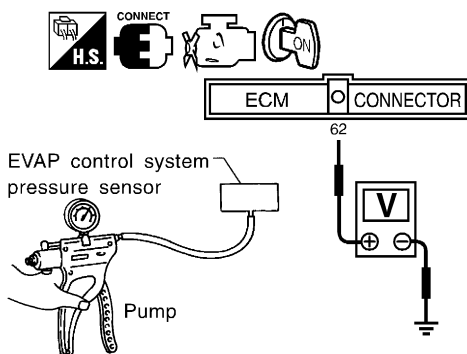
5 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



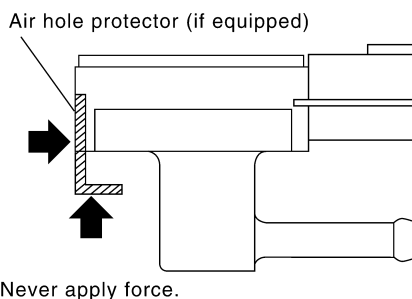
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. Check air passage continuity. If OK, inspection end. If NG, go to following step.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
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THRTL POS SEN	XXX V																					
<p>3. Check air passage continuity.</p>																						
SEF801Y																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition PURG VOL CONT/V value</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No														
Condition PURG VOL CONT/V value	Air passage continuity between A and B																					
100.0%	Yes																					
0.0%	No																					
MTBL0302																						
OK or NG																						
OK	▶	GO TO 8.																				
NG	▶	Replace EVAP canister purge volume control solenoid valve.																				

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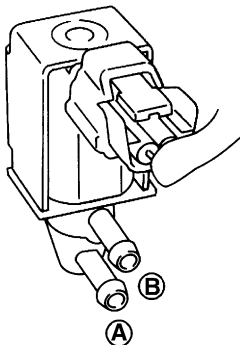
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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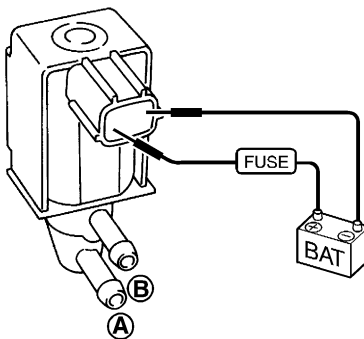
Diagnostic Procedure (Cont'd)

7 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II
Check air passage continuity.



SEF660U



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals	Yes
No supply	No

MTBL0303

OK or NG

OK ▶ GO TO 9.

NG ▶ Replace EVAP canister purge volume control solenoid valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

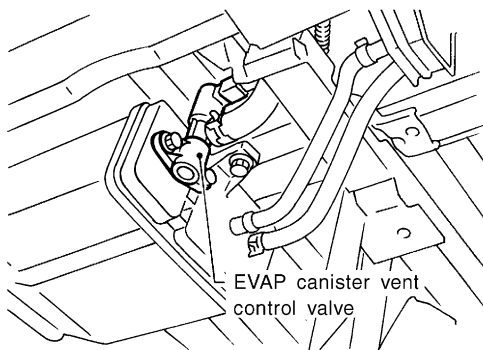
Diagnostic Procedure (Cont'd)

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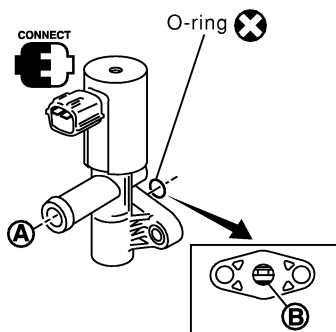
8 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

Check air passage continuity.
Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister vent control valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

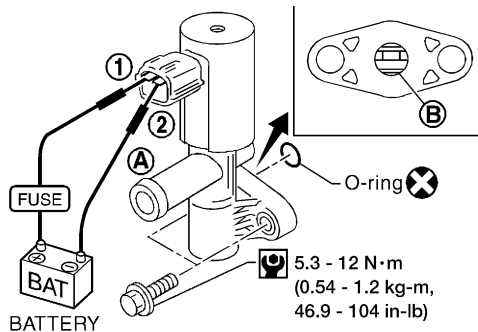
KA24DE

Diagnostic Procedure (Cont'd)

9 CHECK EVAP CANISTER VENT CONTROL VALVE

⊗ Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
No supply	Yes

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

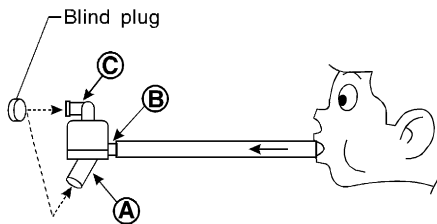
OK ► GO TO 10.

NG ► Replace EVAP canister vent control valve.

10 CHECK RUBBER TUBE

Check for obstructed water separator and rubber tube connected to EVAP canister vent control valve and clean the rubber tube using air blower. Check water separator.

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.



- * (A) : Bottom hole (To atmosphere)
- (B) : Emergency tube (From EVAP canister)
- (C) : Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

● **Do not disassemble water separator.**

OK or NG

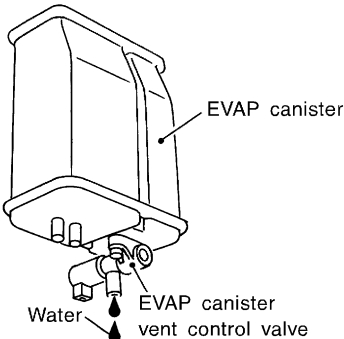
OK ► GO TO 11.

NG ► Clean, repair or replace rubber tube and/or water separator.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached.</p> <p>2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 12.
No	▶	GO TO 14.

GI

MA

EM

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12	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

MT

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13	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

PD

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14	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>		
▶		INSPECTION END

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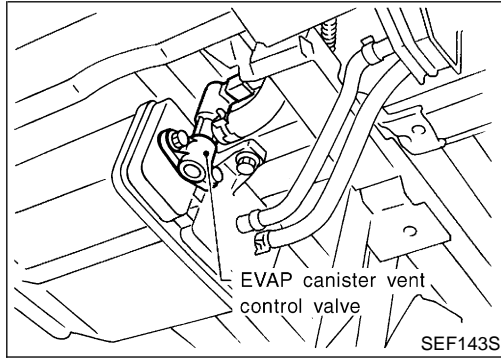
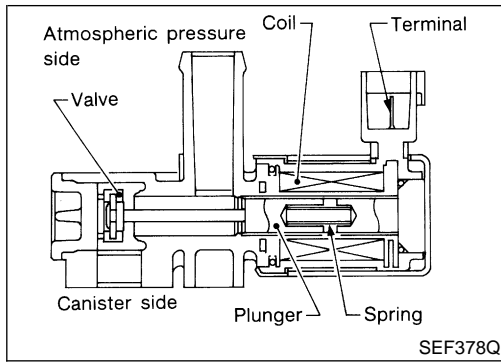
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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC0366

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values. NEEC0367

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC0368

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446	<ul style="list-style-type: none"> ● EVAP canister vent control valve remains closed under specified driving conditions. 	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

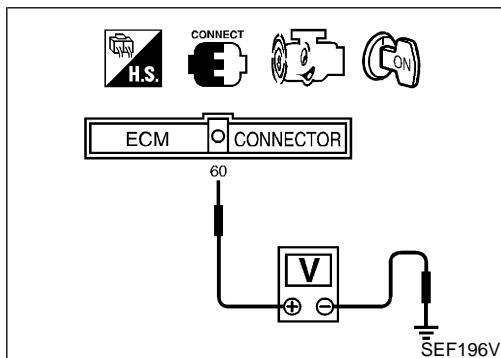
DTC Confirmation Procedure

NEEC0370

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y



DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above 0°C (32°F).

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Check that TANK F/TMP SE is 0°C (32°F) or more.
- 6) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
- 7) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE" on EC-512.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
- 4) Select "MODE 7" with GST.
- 5) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE" on EC-512.

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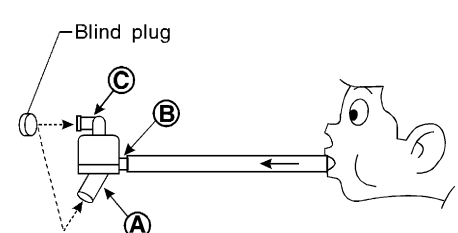
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

=NEEC0371

1	CHECK RUBBER TUBE FOR CLOGGING	<p>Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.</p> <p>Check water separator.</p> <ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center;">  <p style="margin-left: 100px;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p>
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

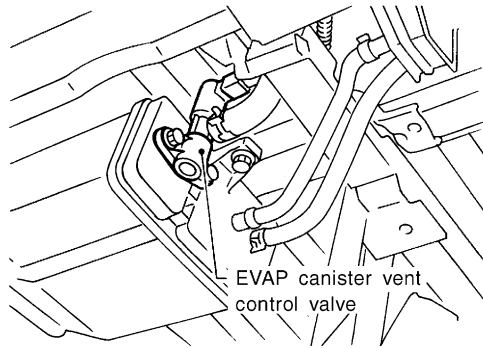
Diagnostic Procedure (Cont'd)

2 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

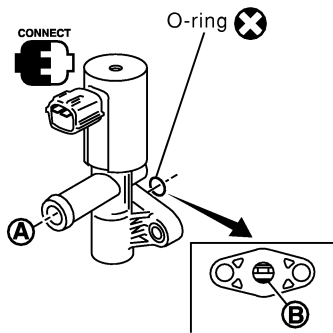
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING						
<p> Without CONSULT-II Check air passage continuity shown in the figure.</p>							
AEC783A							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	No supply	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
No supply	Yes						
MTBL0297							
<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.</p> <p style="text-align: center;">OK or NG</p>							
OK	▶	GO TO 4.					
NG	▶	Replace EVAP canister vent control valve and O-ring.					

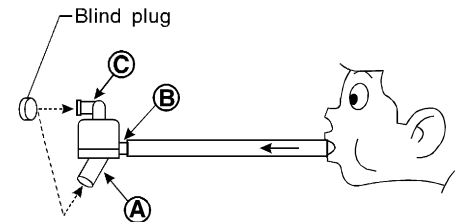
4	CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p>		
SEF596U		
Yes or No		
Yes	▶	GO TO 5.
No	▶	GO TO 7.

5	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

KA24DE

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ol style="list-style-type: none"> 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. <ol style="list-style-type: none"> a. Check visually for insect nests in the water separator air inlet. b. Check visually for cracks or flaws in the appearance. c. Check visually for cracks or flaws in the hose. d. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; margin-top: 10px;">SEF829T</p>	GI MA EM LC EC FE CL MT
		<p>e. In case of NG in items 2 - 4, replace the parts.</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. 	
	▶	Repair hose or replace EVAP canister or water separator.	

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	<p>Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p> <p style="text-align: center;">OK or NG</p>	AT TF
	▶	GO TO 8.	
	▶	Install hose properly or replace it.	PD

8	CHECK HARNESS CONNECTOR	<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. Water should not exist. <p style="text-align: center;">OK or NG</p>	AX SU BR
	▶	GO TO 9.	
	▶	Replace EVAP control system pressure sensor.	ST

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT	<p>Refer to "DTC Confirmation Procedure", EC-393.</p> <p style="text-align: center;">OK or NG</p>	RS
	▶	GO TO 10.	BT
	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.	HA

10	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	SC
	▶	INSPECTION END	EL

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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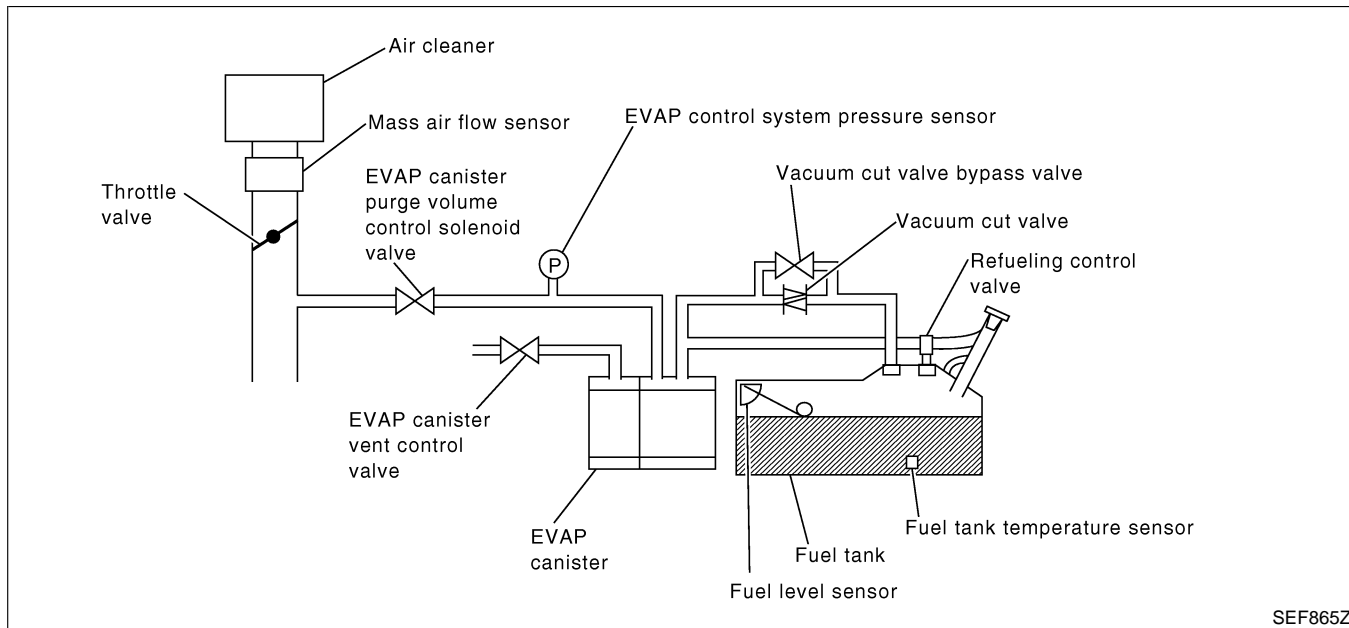
System Description

System Description

NEEC0373

NOTE:

If both DTC P0510 and P1447 are displayed, perform trouble diagnosis for "DTC P0510" first. (See EC-440.)



SEF865Z

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NEEC0374

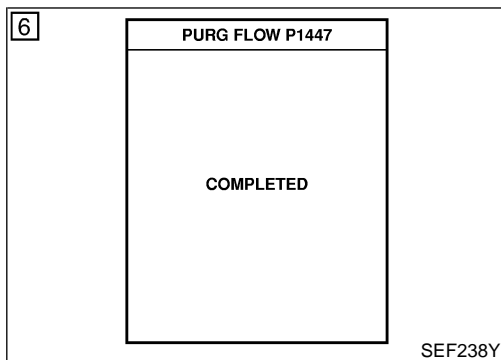
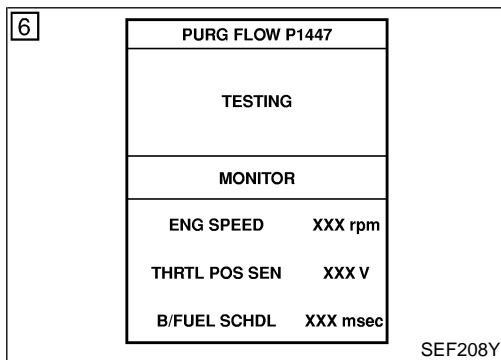
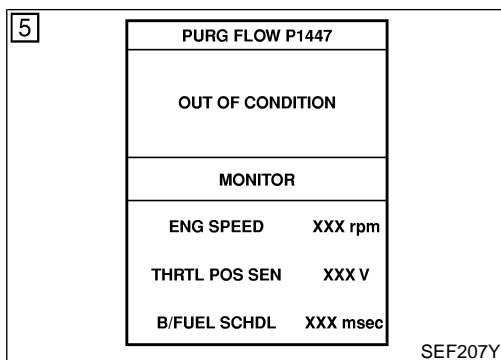
Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447	<ul style="list-style-type: none"> ● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. 	<ul style="list-style-type: none"> ● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

On Board Diagnosis Logic (Cont'd)



DTC Confirmation Procedure

NEEC0375

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results perform test at a temperature of 5°C (41°F) or more.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

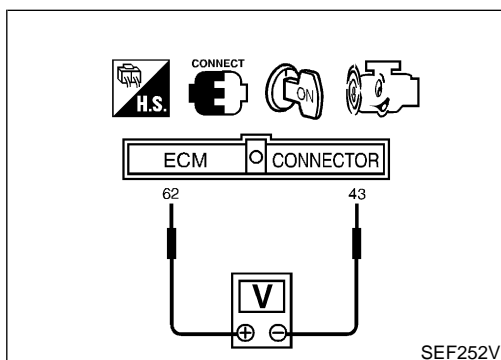
With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Start engine and let it idle for at least 60 seconds.
- Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-II.
- Touch "START".
If "COMPLETED" is displayed, go to step 7.
- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,750 rpm
Engine coolant temperature	More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2.

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure".



Overall Function Check

NEEC0376

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- Lift up drive wheels.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF, wait at least 5 seconds.
- Start engine and wait at least 60 seconds.
- Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and 43 (ground).

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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Overall Function Check (Cont'd)

- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch: ON
Steering wheel: Fully turned
Headlamp switch: ON
Rear window defogger switch: ON
Engine speed: Approx. 3,000 rpm
Gear position:

Any position other than "Neutral" or "Reverse"

Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.

Diagnostic Procedure

NEEC0377

1	CHECK EVAP CANISTER	
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

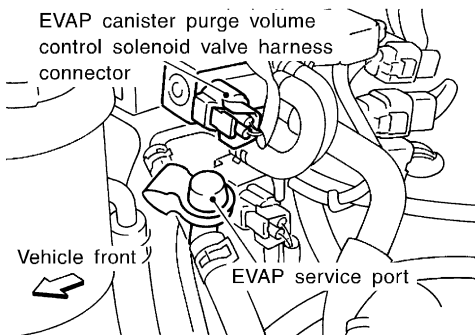
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Diagnostic Procedure (Cont'd)

2 CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF339V

2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.
 - 100.0%: Vacuum should exist.**
 - 0.0%: Vacuum should not exist.**

OK or NG

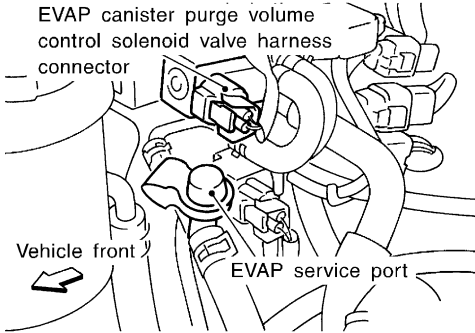
OK	▶	GO TO 8.
NG	▶	GO TO 4.

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;">  <p style="font-size: small;">EVAP canister purge volume control solenoid valve harness connector</p> <p style="font-size: small;">Vehicle front</p> <p style="font-size: small;">EVAP service port</p> </div> <p style="text-align: right; font-size: x-small;">SEF339V</p> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 60 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 8.	
NG	▶	GO TO 4.	

4	CHECK EVAP PURGE LINE	<p>Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 5.	
NG	▶	Repair it.	

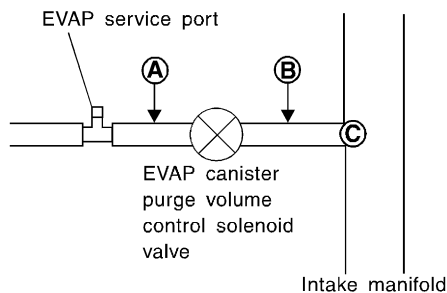
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

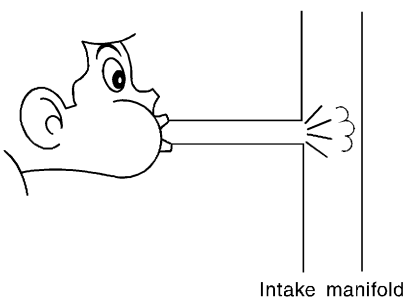
Diagnostic Procedure (Cont'd)

5 CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



OK or NG

SEF367U

SEF368U

OK (With CONSULT-II) ► GO TO 6.

OK (Without CONSULT-II) ► GO TO 7.

NG ► Repair or clean hoses and/or purge port.

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.
If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

OK or NG

SEF723Z

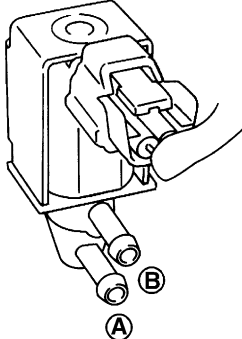
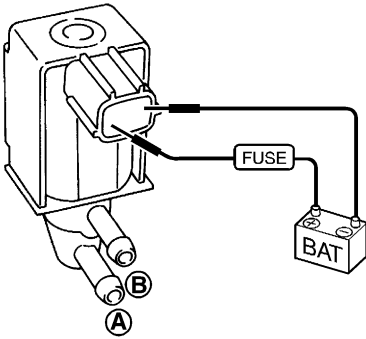
OK ► GO TO 8.

NG ► Replace EVAP canister purge volume control solenoid valve.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

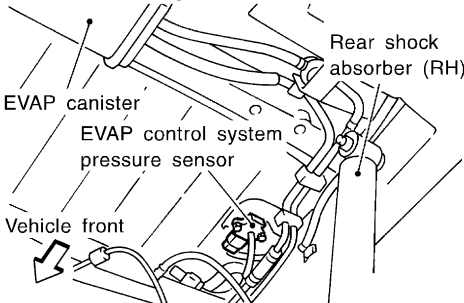
7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE						
<p> Without CONSULT-II Check air passage continuity.</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;">SEF660U</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;">  <div style="text-align: right;">SEF661U</div> </div> <table border="1" style="margin: 20px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals</td> <td style="padding: 5px;">Yes</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="padding: 5px;">No</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">MTBL0303</div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals	Yes						
No supply	No						
OK or NG							
OK	▶ GO TO 8.						
NG	▶ Replace EVAP canister purge volume control solenoid valve.						

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;"> <p>View with spare tire removed.</p>  </div>			
<p>2. Check connectors for water. Water should not exist.</p>			
OK or NG			
OK		▶	GO TO 10.
NG		▶	Replace EVAP control system pressure sensor.

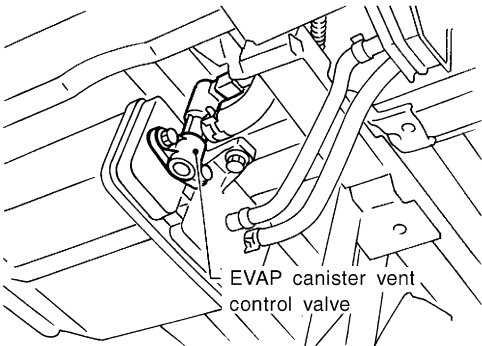
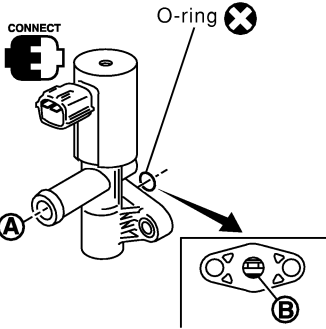
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT		
<p>Refer to "DTC Confirmation Procedure" for DTC P0450, EC-393.</p>			
OK or NG			
OK (With CONSULT-II)		▶	GO TO 11.
OK (Without CONSULT-II)		▶	GO TO 12.
NG		▶	Replace EVAP control system pressure sensor.

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER VENT CONTROL VALVE																												
<p> With CONSULT-II Check air passage continuity. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.</p>																													
		 <p>EVAP canister vent control valve</p>	SEF143S																										
 <p>CONNECT </p> <p>O-ring </p> <p>A</p> <p>B</p>	<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 (B1)	XXX V	THRTL POS SEN	XXX V							<table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes	SEF803Y
ACTIVE TEST																													
VENT CONTROL/V	OFF																												
MONITOR																													
ENG SPEED	XXX rpm																												
A/F ALPHA-B1	XXX %																												
HO2S1 (B1)	XXX V																												
THRTL POS SEN	XXX V																												
Condition VENT CONTROL/V	Air passage continuity between A and B																												
ON	No																												
OFF	Yes																												
OK or NG																													
OK	▶	GO TO 13.																											
NG	▶	Replace EVAP canister vent control valve.																											

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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Diagnostic Procedure (Cont'd)

12	CHECK EVAP CANISTER VENT CONTROL VALVE												
<p> Without CONSULT-II Check air passage continuity shown in the figure.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">AEC783A</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0297</p> <p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace EVAP canister vent control valve.</td> </tr> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	No supply	Yes	OK	▶	GO TO 13.	NG	▶	Replace EVAP canister vent control valve.
Condition	Air passage continuity between A and B												
12V direct current supply between terminals 1 and 2	No												
No supply	Yes												
OK	▶	GO TO 13.											
NG	▶	Replace EVAP canister vent control valve.											

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13	CHECK EVAP PURGE LINE						
<p>Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace it.</td> </tr> </table>		OK	▶	GO TO 14.	NG	▶	Replace it.
OK	▶	GO TO 14.					
NG	▶	Replace it.					

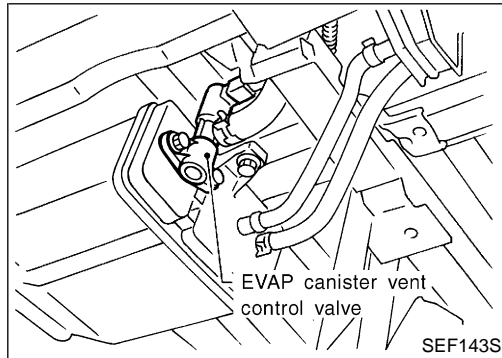
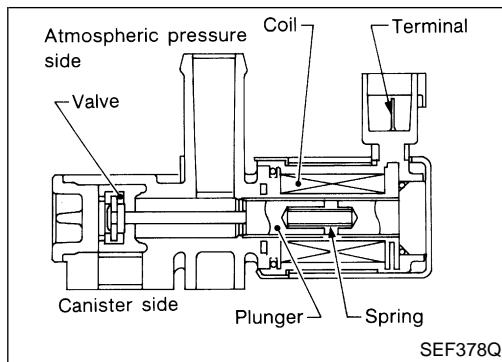
14	CLEAN EVAP PURGE LINE			
<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 15.</td> </tr> </table>			▶	GO TO 15.
	▶	GO TO 15.		

15	CHECK INTERMITTENT INCIDENT			
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>INSPECTION END</td> </tr> </table>			▶	INSPECTION END
	▶	INSPECTION END		

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

Component Description



Component Description

NEEC0379

NOTE:

If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0380

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NEEC0381

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0382

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448	<ul style="list-style-type: none"> ● EVAP canister vent control valve remains opened under specified driving conditions. 	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● EVAP control system pressure sensor ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water. ● Vacuum cut valve

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

On Board Diagnosis Logic (Cont'd)

NEEC0383

5
EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEF565X

5
EVAP SML LEAK P0440/P1440

WAIT
 2 TO 10 MINUTES.
 KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

6
EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
 FURTHER TESTING MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NOTE:

- If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- It is better that the fuel level is low.

- 1) Turn ignition switch ON.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

- 5) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

- If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After “TANK F/TMP SE” becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)
 - If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic Inspection”, EC-110.
 - The engine idle portion of this test (See illustration at left.) will take approximately 5 minutes.
- 6) Make sure that “OK” is displayed.
 If “NG” is displayed, go to following step.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn “ON”.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch “ON” and “OFF” alternately.

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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

DTC Confirmation Procedure (Cont'd)

10	ACTIVE TEST	
	VENT CONTROL/V	OFF
	MONITOR	
	ENG SPEED	XXX rpm
	A/F ALPHA-B1	XXX %
	HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V	

SEF805Y

11) Make sure of the following.

Condition	Air passage continuity between A and B
Touching "ON"	No
Touching "OFF"	Yes

If the result is NG, go to "Diagnostic Procedure", EC-528.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-362.

5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)

AEC783A

Overall Function Check

NEEC0384

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-528.
If the result is OK, perform trouble diagnosis for DTC P0440. Refer to EC-358.

Diagnostic Procedure

NEEC0385

1	CHECK RUBBER TUBE	
1. Turn ignition switch OFF. 2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or clean rubber tube.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

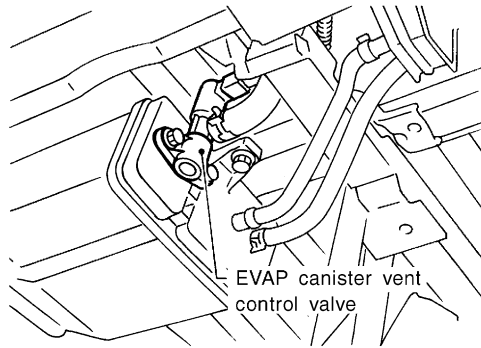
Diagnostic Procedure (Cont'd)

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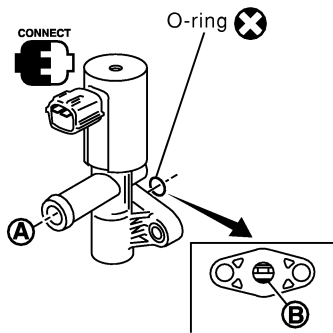
2 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

Check air passage continuity.
Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

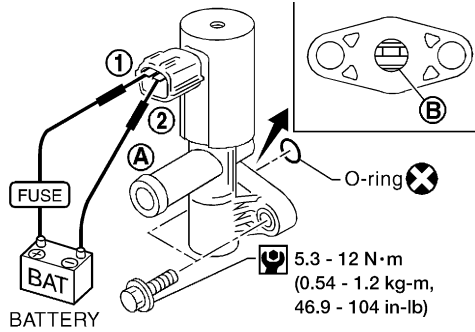
KA24DE

Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

 **Without CONSULT-II**

Check air passage continuity shown in the figure.



AEC783A

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
No supply	Yes

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

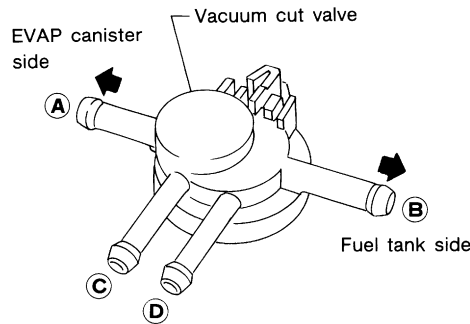
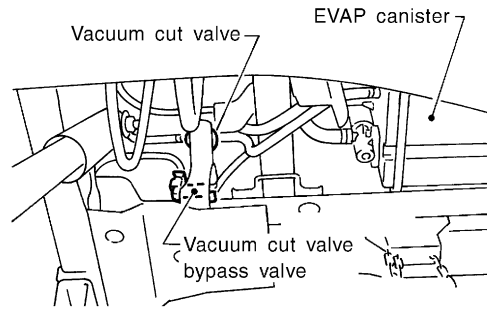
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

4 CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF186S

SEF379Q

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

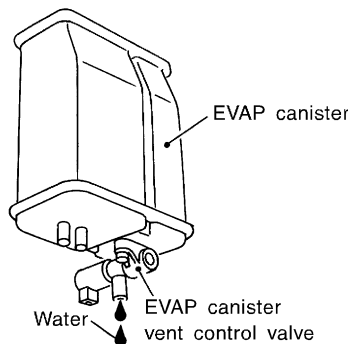
OK or NG

OK ► GO TO 5.

NG ► Replace vacuum cut valve.

5 CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with the vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes ► GO TO 8.

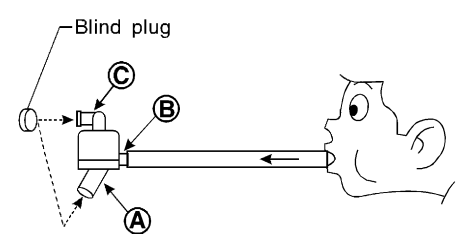
No ► GO TO 6.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK EVAP CANISTER	
Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0lb).		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following.		
<ol style="list-style-type: none"> 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. <ol style="list-style-type: none"> a. Check visually for insect nests in the water separator air inlet. b. Check visually for cracks or flaws in the appearance. c. Check visually for cracks or flaws in the hose. d. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
e. In case of NG in items 2 - 4, replace the parts.		
● Do not disassemble water separator.		
	▶	Repair hose or replace EVAP canister or water separator.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Install hose property or replace it.

9	CHECK HARNESS CONNECTOR	
<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. Water should not exist. 		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Perform "DTC Confirmation Procedure", EC-393.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

11	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
	▶	INSPECTION END

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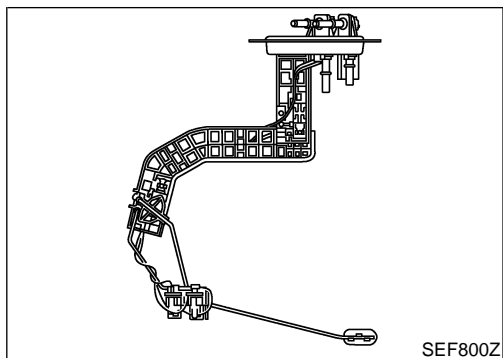
EL

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DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

KA24DE

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1036} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

ECM receives two signals from the fuel level sensor. ^{NEEC1037}

One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.) ^{NEEC1038}

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. ^{NEEC1039}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

- 1) Turn ignition switch "ON". ^{NEEC1039S01}
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-536.

WITH GST

Follow the procedure "WITH CONSULT-II" above. ^{NEEC1039S02}

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

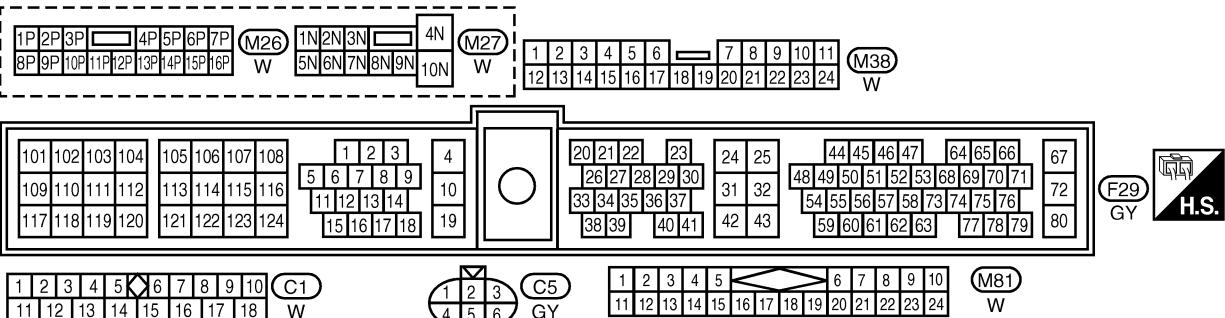
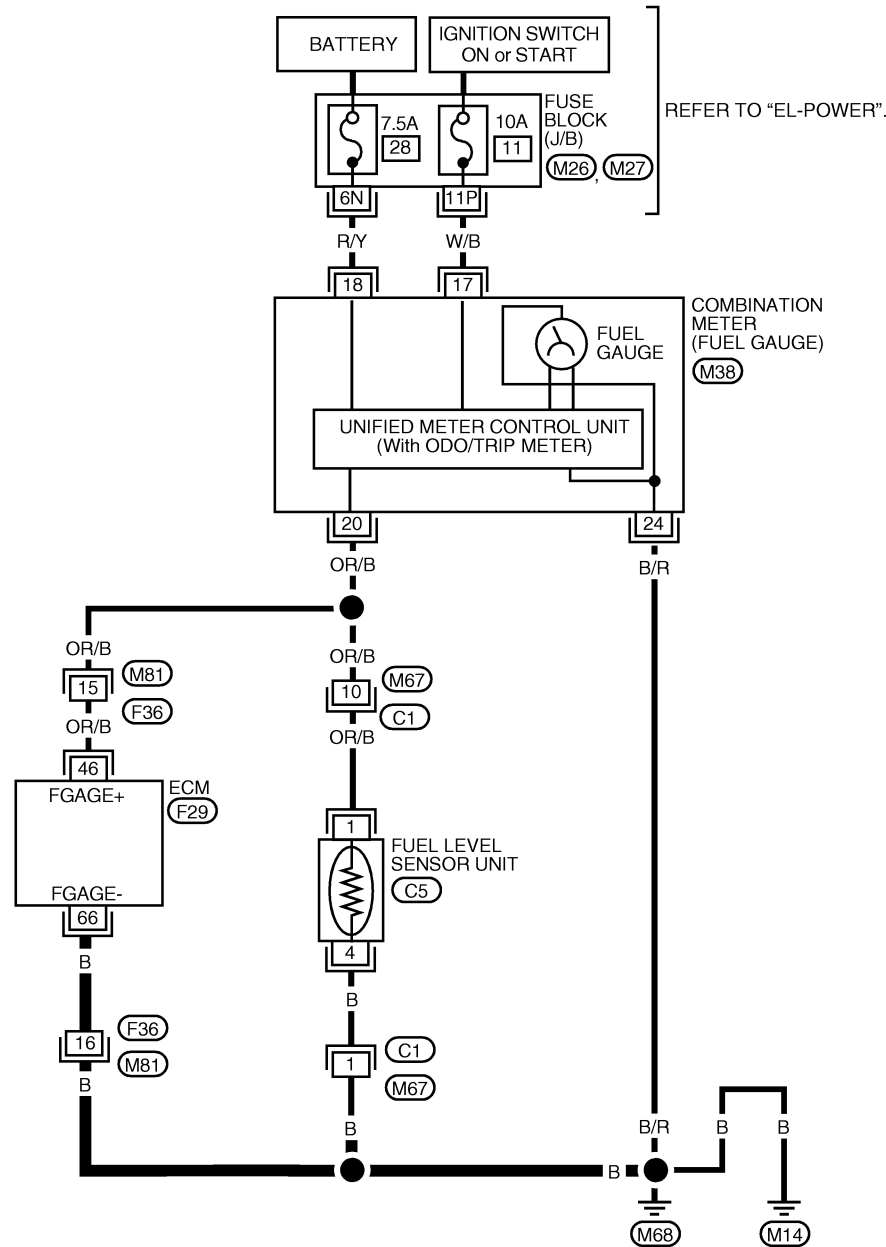
KA24DE
Wiring Diagram

Wiring Diagram

NEEC1040

EC-FLS3-01

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DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

=NEEC1041

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 66 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

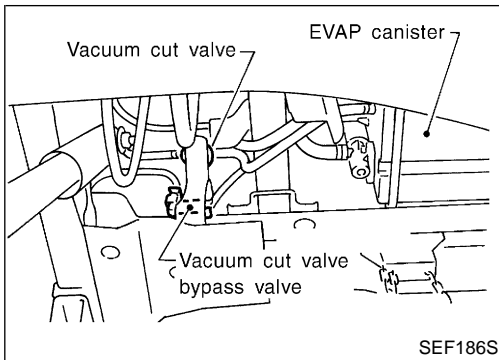
2	DETECT MALFUNCTIONING PART	
<p>1. Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M67, B101 ● Harness for open and short between ECM and body ground 		
	▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR	
Refer to EL-82 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148		
OK or NG		
	▶	INSPECTION END

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

KA24DE
Description



Description

COMPONENT DESCRIPTION

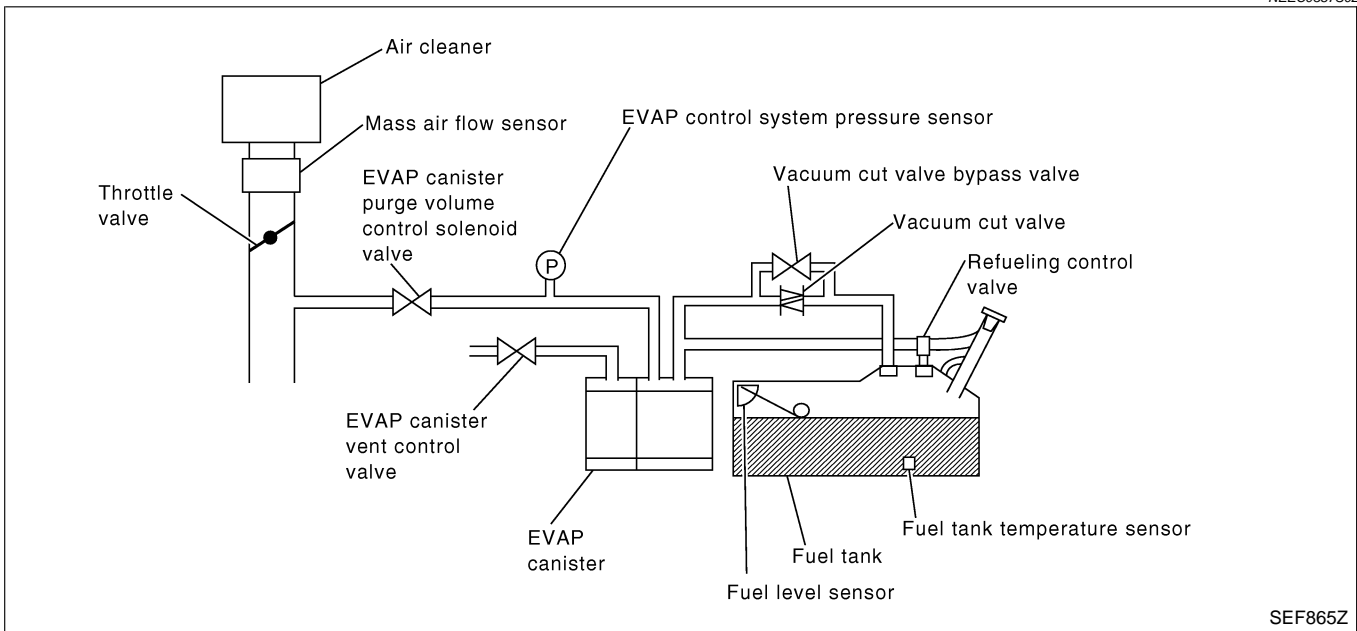
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0390

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490	<ul style="list-style-type: none">An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	<ul style="list-style-type: none">Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.)Vacuum cut valve bypass valve

DTC Confirmation Procedure

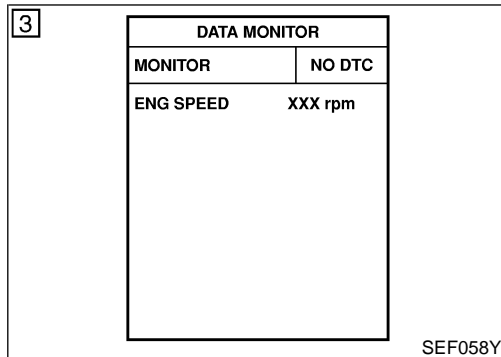
NEEC0391

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.



With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-540.

With GST

Follow the procedure "With CONSULT-II".

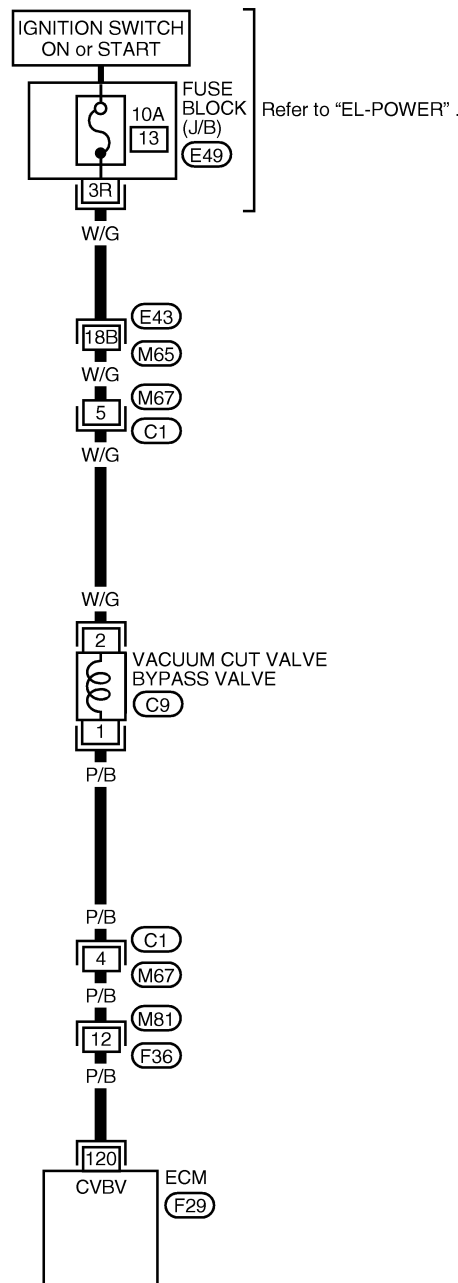
DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

Wiring Diagram

Wiring Diagram

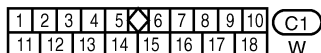
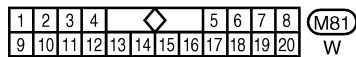
NEEC0392

EC-BYPS/V-01



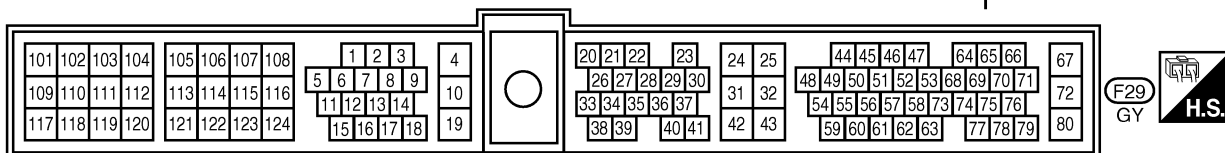
Refer to "EL-POWER".
 : Detectable line for DTC
 : Non-detectable line for DTC

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Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

RS
BT
HA



SC
EL

LEC530

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC0393

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p>1. Turn ignition switch ON. 2. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="font-size: small;">VC/V BYPASS/V</td> <td style="font-size: small;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="font-size: small;">ENG SPEED</td> <td style="font-size: small;">XXX rpm</td> </tr> <tr> <td style="font-size: small;">A/F ALPHA-B1</td> <td style="font-size: small;">XXX %</td> </tr> <tr> <td style="font-size: small;">HO2S1 MNTR (B1)</td> <td style="font-size: small;">RICH</td> </tr> <tr> <td style="font-size: small;">THRTL POS SEN</td> <td style="font-size: small;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	RICH	THRTL POS SEN	XXX V						
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	RICH																					
THRTL POS SEN	XXX V																					
SEF806Y																						
3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

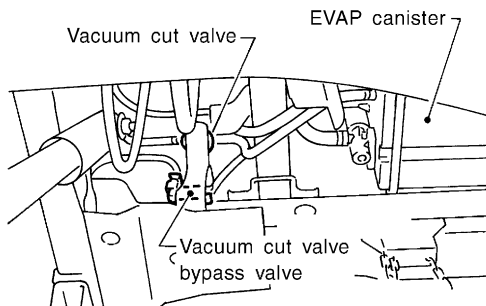
DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

Diagnostic Procedure (Cont'd)

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IDX

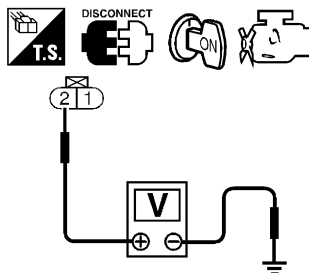
3 CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF186S

3. Turn ignition switch ON.
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF192V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M67, C1
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and 10A fuse

▶ Repair harness or connectors.

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 120 and terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF253V</p> <p style="color: blue; text-align: center;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness connectors M81, F36 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

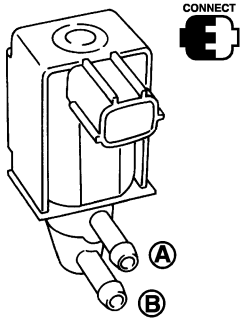
DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) KA24DE

Diagnostic Procedure (Cont'd)

7 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

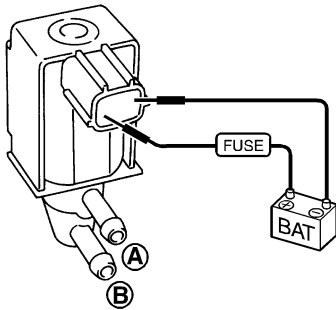
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

SEF557Y

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

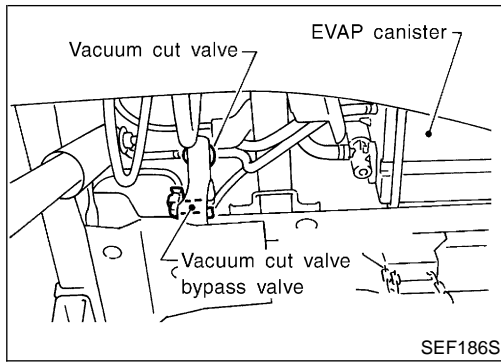
8 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

▶ **INSPECTION END**

GI
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Description



Description

COMPONENT DESCRIPTION

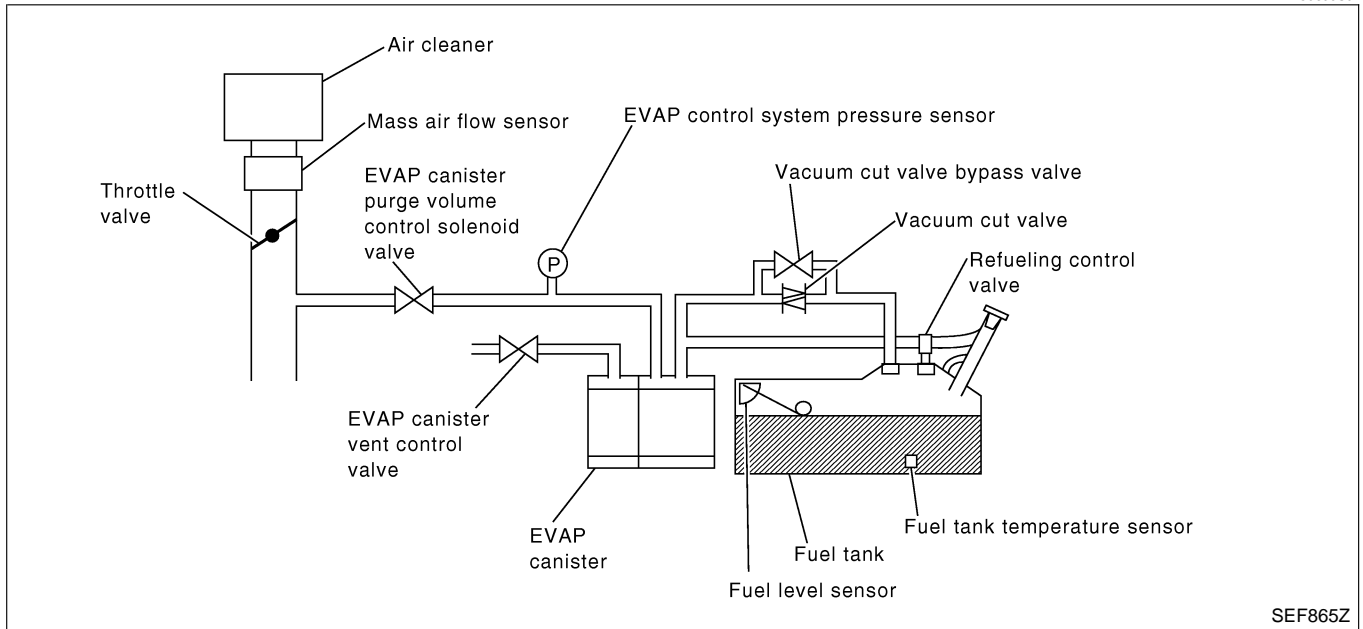
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0398

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491	Vacuum cut valve bypass valve does not operate properly.	<ul style="list-style-type: none"> ● Vacuum cut valve bypass valve ● Vacuum cut valve ● Bypass hoses for clogging ● EVAP control system pressure sensor ● EVAP canister vent control valve ● Hose between fuel tank and vacuum cut valve clogged ● Hose between vacuum cut valve and EVAP canister clogged ● EVAP canister ● EVAP purge port of fuel tank for clogging

GI

MA

EM

LC

EC

FE

CL

MT

7	VC CUT/V BP/V P1491
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

NEEC0399

AT

7	VC CUT/V BP/V P1491
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

TF

PD

AX

SU

BR

ST

RS

7	VC CUT/V BP/V P1491
COMPLETED	

SEF239Y

BT

HA

SC

EL

IDX

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform test at a temperature of 5 to 30°C (41 to 86°F).
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

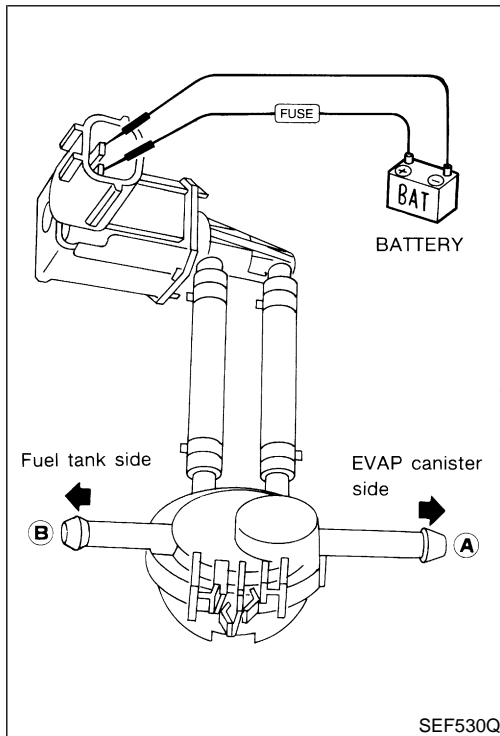
Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and let it idle for at least 60 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	More than 1,000 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 10 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure".



Overall Function Check

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

NEEC0400

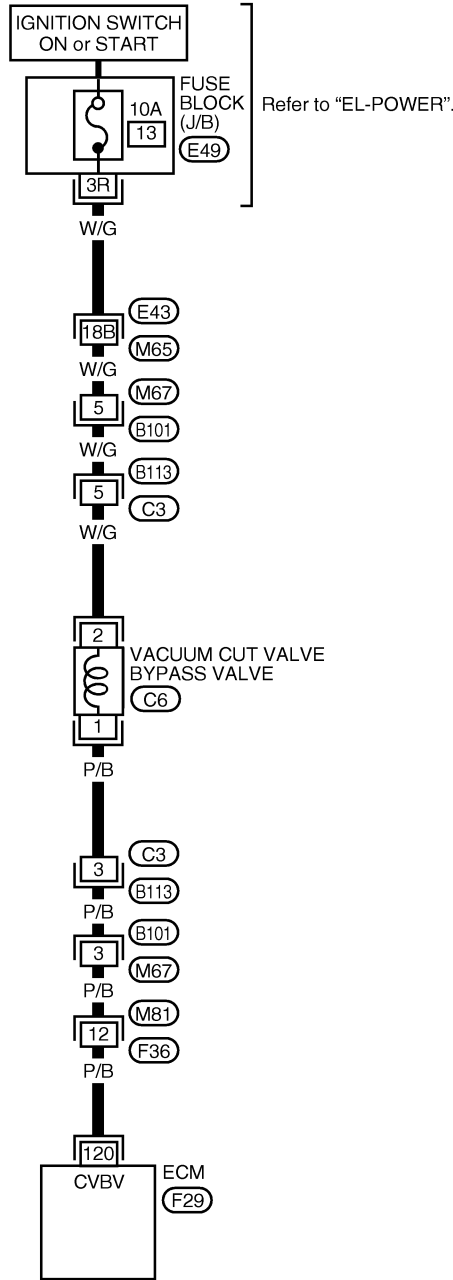
⊗ Without CONSULT-II

1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B**.
7. Blow air in port **B** and check that air flows freely out of port **A**.
8. If NG, go to "DIAGNOSTIC PROCEDURE" on EC-548.

Wiring Diagram

NEEC0505

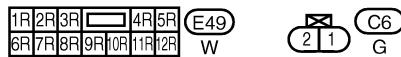
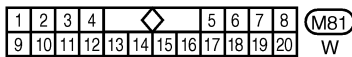
EC-BYPS/V-01



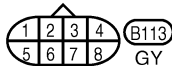
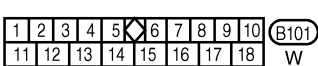
Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC

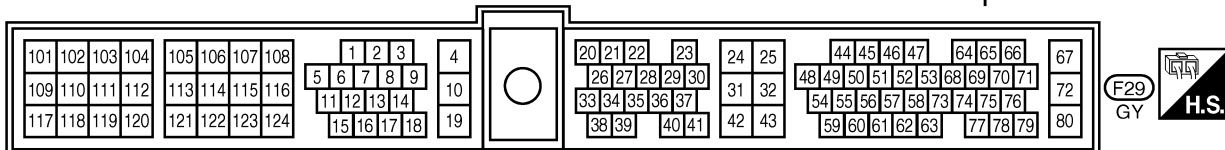
- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
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- SU
- BR
- ST



Refer to the following.
 M65, E43 - SUPER
 MULTIPLE JUNCTION (SMJ)



- RS
- BT
- HA

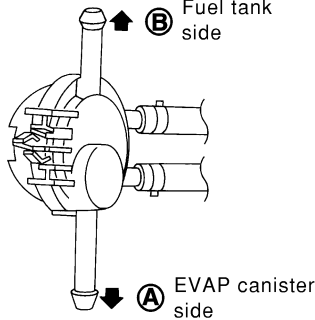


AEC007B

Diagnostic Procedure

NEEC0401

1	INSPECTION START		
Do you have CONSULT-II?			
Yes or No			
Yes	▶	GO TO 2.	
No	▶	GO TO 3.	

2	CHECK COMPONENT																						
<p>With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Turn ignition switch ON. 7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 																							
		<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	RICH	THRTL POS SEN	XXX V						
ACTIVE TEST																							
VC/V BYPASS/V	OFF																						
MONITOR																							
ENG SPEED	XXX rpm																						
A/F ALPHA-B1	XXX %																						
HO2S1 MNTR (B1)	RICH																						
THRTL POS SEN	XXX V																						
OK or NG																							
OK	▶	GO TO 4.																					
NG	▶	GO TO 5.																					

SEF808Y

3	CHECK COMPONENT
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 5.

4	CHECK EVAP PURGE LINE
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-40. 	
OK or NG	
OK	▶ GO TO 8.
NG (Step 1)	▶ Repair it.
NG (Step 2)	▶ Clean EVAP purge port.
NG (Step 3)	▶ Replace EVAP canister.

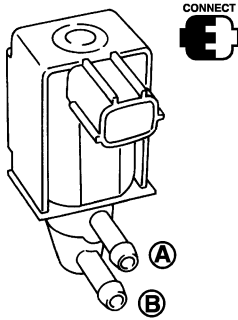
5	CHECK BYPASS HOSE
Check bypass hoses for clogging.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or replace hoses.

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6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRRTL POS SEN	XXX V

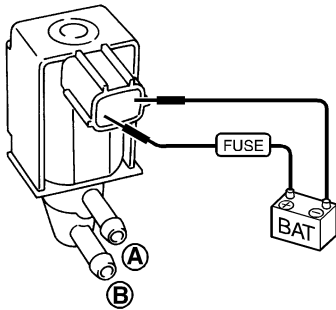
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

SEF557Y

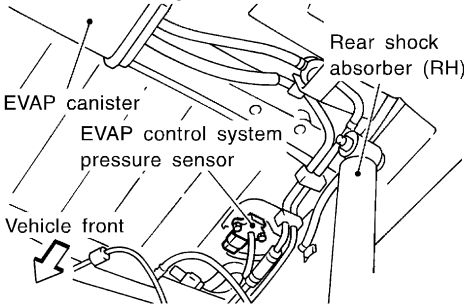
If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

7	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF186S</p> <p style="text-align: right;">SEF379Q</p> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace vacuum cut valve.	GI MA EM LC EC FE CL MT AT TF PD AX SU
OK	▶	GO TO 8.							
NG	▶	Replace vacuum cut valve.							

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Repair it	BR ST RS BT HA SC EL IDX
OK	▶	GO TO 9.							
NG	▶	Repair it							

9	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;"> <p>View with spare tire removed.</p>  </div>			
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 10.
NG		▶	Replace EVAP control system pressure sensor.

SEF341V

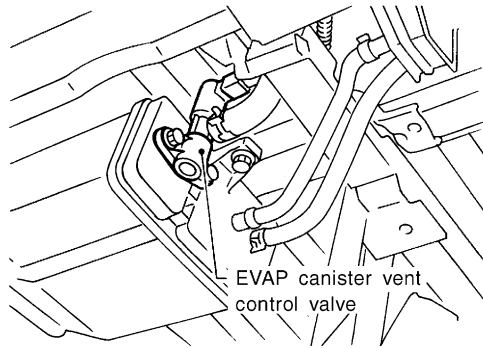
10	CHECK COMPONENT AND CIRCUIT		
<p>(EVAP control system pressure sensor) Refer to "DTC Confirmation Procedure" for DTC P0450, EC-393.</p> <p style="text-align: center;">OK or NG</p>			
OK (With CONSULT-II)		▶	GO TO 11.
OK (Without CONSULT-II)		▶	GO TO 12.
NG		▶	Replace EVAP control system pressure sensor.

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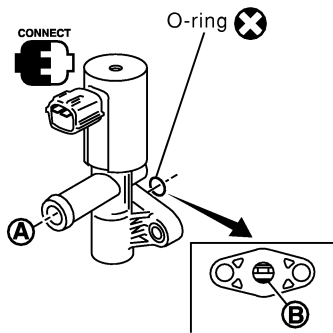
11 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

Check air passage continuity.
Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

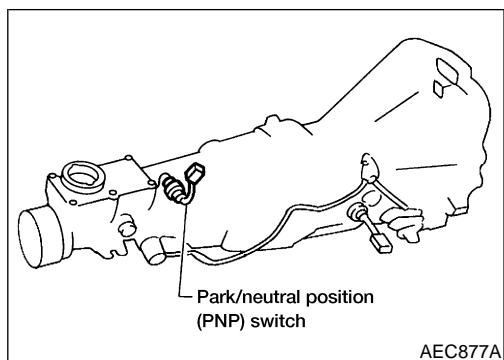
12	CHECK EVAP CANISTER VENT CONTROL VALVE						
<p> Without CONSULT-II Check air passage continuity shown in the figure.</p>							
AEC783A							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	No supply	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
No supply	Yes						
MTBL0297							
<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.</p>							
OK or NG							
OK	▶ GO TO 13.						
NG	▶ Replace EVAP canister vent control valve.						

13	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Component Description



Component Description

When the gear position is "N", park/neutral position (PNP) switch is "ON".

ECM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC0425

MONITOR ITEM	CONDITION	SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "N" ON
		Except above OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC0426

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	PNP switch	[Ignition switch "ON"] ● Gear position is "Neutral position"	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NEEC0427

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	● The signal of the PNP switch is not changed in the process of engine starting and driving.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

DTC Confirmation Procedure

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NEEC0428

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
"N"	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-559 (M/T models), EC-561 (A/T models).

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and warm it up to normal operating temperature.
- 5) Maintain the following conditions for at least 60 consecutive seconds.

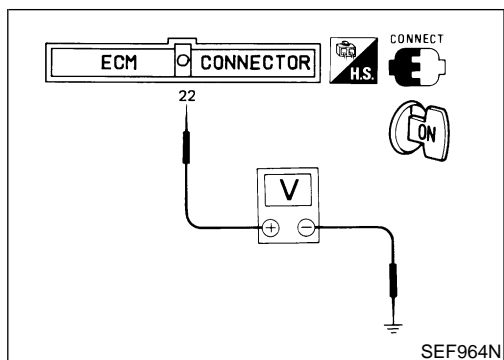
ENG SPEED	1,400 - 4,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.5 - 17 msec
VHCL SPEED SE	More than 64 km/h (More than 40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-559 (M/T models), EC-561 (A/T models).

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0429

⊗ Without CONSULT-II

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
"N" position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-559 (M/T models), EC-561 (A/T models).

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Wiring Diagram

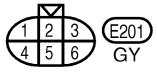
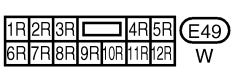
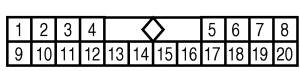
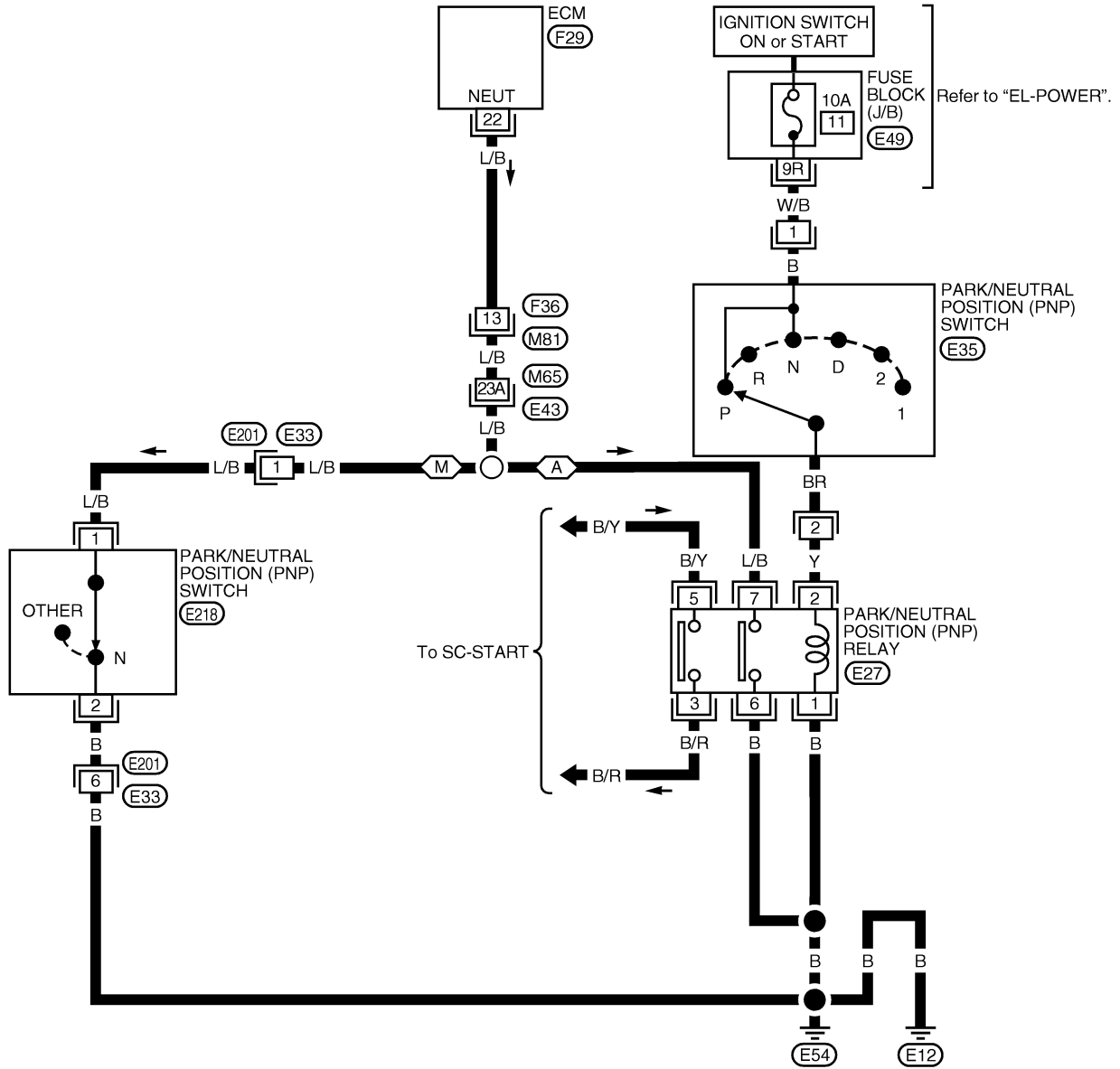
Wiring Diagram

NEEC0430

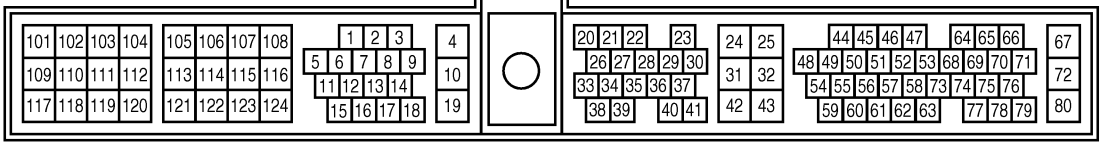
EC-PNP/SW-01

- A : With A/T
- M : With M/T

- : Detectable line for DTC
- : Non-detectable line for DTC



Refer to the following.
M65, E43 - SUPER MULTIPLE JUNCTION (SMJ)



LEC531

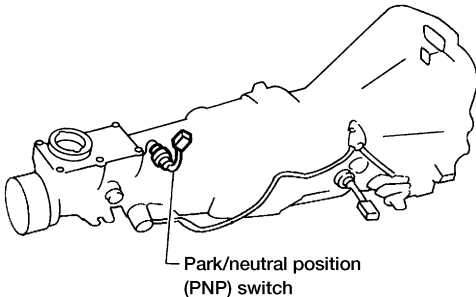
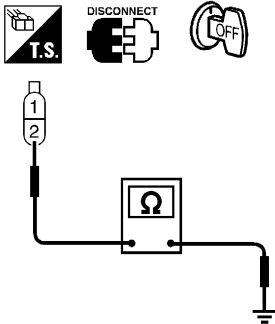
DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Diagnostic Procedure For M/T Models

Diagnostic Procedure For M/T Models

NEEC1059

1	CHECK GROUND CIRCUIT		
		<p>1. Turn ignition switch OFF. 2. Disconnect park neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p style="text-align: right;">AEC877A</p> <p>3. Check harness continuity between terminal 2 and body ground.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF218V</p> <p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
OK	▶	GO TO 3.	AX
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E33, E201 ● Harness for open or short between PNP switch and body ground 	<p>SU</p> <p>BR</p>
	▶	Repair open circuit or short to power in harness or connectors.	ST

IDX

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Diagnostic Procedure For M/T Models (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT		
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and terminal 1.</p>			
SEF219V			
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness connectors E33, E201 ● Harness for open or short between ECM and PNP switch 			
▶		Repair open circuit or short to ground or short to power in harness or connectors.	

5	CHECK PNP SWITCH		
Refer to MT-8 .			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	Replace PNP switch.	

6	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.			
▶		INSPECTION END	

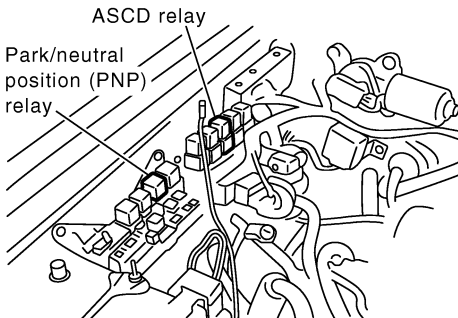
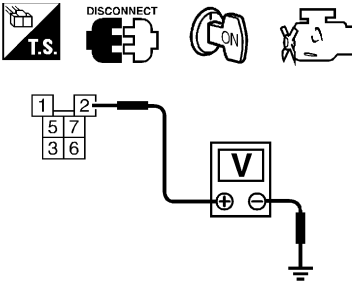
DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

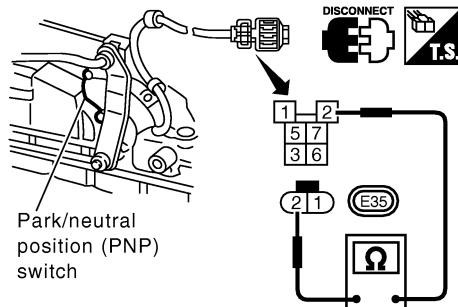
Diagnostic Procedure For A/T Models

Diagnostic Procedure For A/T Models

NEEC1060

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I	
<p>1. Turn ignition switch "OFF". 2. Disconnect park/neutral position (PNP) relay.</p> <div style="text-align: center;">  <p>ASCD relay Park/neutral position (PNP) relay</p> </div> <p>3. Turn ignition switch "ON". 4. Shift selector lever to "P" or "N" position. 5. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>		
OK		▶ GO TO 6.
NG		▶ GO TO 2.

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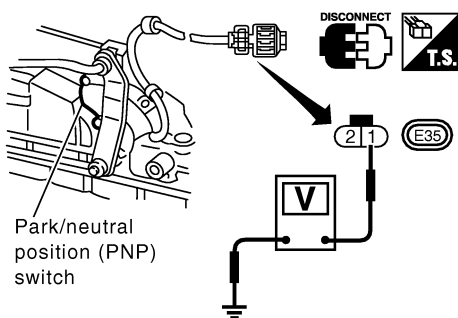
2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II	
<p>1. Turn ignition switch "OFF". 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p>3. Check harness continuity between park/neutral position (PNP) switch terminal 2 and park/neutral position (PNP) relay terminal 2. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 3.
NG		▶ Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

KA24DE

Diagnostic Procedure For A/T Models (Cont'd)

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III	
<p>1. Turn ignition switch "OFF". 2. Check voltage between park/neutral position (PNP) switch terminal 1 and ground with CONSULT-II or tester.</p>		
 <p style="margin-left: 100px;">Park/neutral position (PNP) switch</p>		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

SEF855Z

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between park/neutral position (PNP) switch and fuse 		
▶		Repair open circuit or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to "Component Inspection", "TROUBLE DIAGNOSES", AT-51 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) switch.

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between relay terminals 1, 6 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for and short to power.</p>		
OK or NG		
OK	▶	GO TO 8.
NG (With theft warning system)	▶	GO TO 7.
NG (Without theft warning system)	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

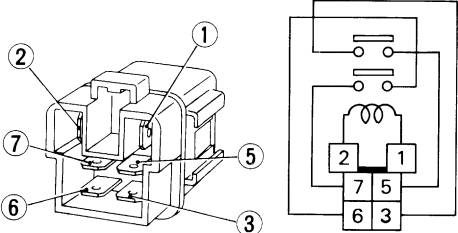
KA24DE

Diagnostic Procedure For A/T Models (Cont'd)

7	DETECT MALFUNCTIONING PART	
Check the circuit between park/neutral position (PNP) relay and body ground. Refer to "STARTING SYSTEM", SC-10 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Repair or replace.

8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and relay terminal 7. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between ECM and park/neutral position (PNP) relay 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY	
1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2. 2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.		
		
<p style="color: blue;">12V (1 and 2) applied: Continuity should exist. No voltage applied: Continuity should not exist.</p>		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶ INSPECTION END		

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DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

KA24DE

System Description

System Description

NEEC1061

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Torque converter lock-up control	Torque converter clutch solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		

The ECM controls torque converter clutch solenoid valve to cancel the lock-up condition of A/T. When the solenoid valve is **turned on**, lock-up is **cancelled**. When the solenoid valve is turned off, A/T lock-up is operational.

Conditions for lock-up cancel:

Torque converter clutch solenoid valve is turned "ON" when;

- Throttle valve is fully closed (during idling or deceleration)
- Engine coolant temperature is below 40°C (104°F)
- Engine is stopped

Conditions for lock-up operation:

- Under 55 to 63 km/h (34 to 39 MPH) (2/8 throttle on flat road), lock-up does not operate even when the torque converter clutch solenoid valve is "OFF".
- Over 58 to 66 km/h (36 to 41 MPH) (2/8 throttle on flat road), lock-up should operate because the torque converter clutch solenoid valve is "OFF".

To confirm vehicle lock-up, the torque converter clutch solenoid valve must be in operation ("ON" during idle and deceleration, and "OFF" during acceleration) and engine speed should drop. When the accelerator pedal is depressed (less than 2/8) in lock-up, the engine speed should not change abruptly. If there is a big jump in engine speed, there will be no lock up.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1062

MONITOR ITEM	CONDITON	SPECIFICATION
TCC SOL/V	● Engine: After warming up	Idle ON
		2,000 rpm OFF

ECM Terminals and Reference Value

NEEC1063

Specification data are reference values and measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/Y	Torque converter clutch solenoid valve (A/T models only)	[Engine is running] ● Idle Speed	Approximately 1V
			● [Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1064

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1775	<ul style="list-style-type: none">An excessively low voltage from the solenoid is sent to ECM.	<ul style="list-style-type: none">Harness or connectors (The circuit is open or shorted).Torque converter clutch solenoid valve

GI

MA

EM

LC

DTC Confirmation Procedure

NEEC1065

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) if 1st trip DTC is detected, go to "Diagnostic Procedure", EC-565.

With GST

Follow the procedure "With CONSULT-II".

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DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

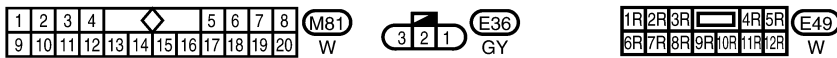
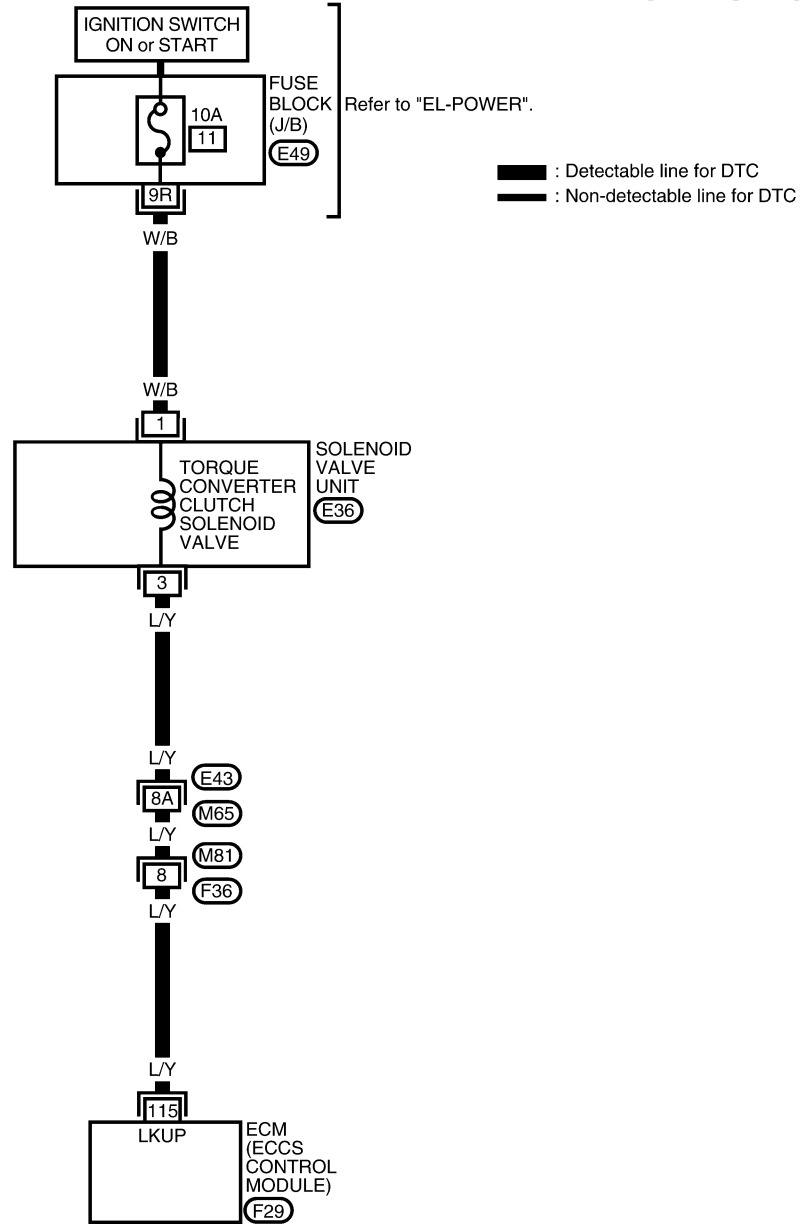
KA24DE

Wiring Diagram

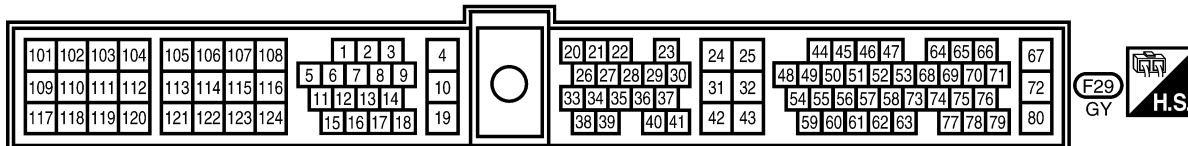
Wiring Diagram

NEEC1066

EC-LKUP-01



Refer to the following.
M65, E43 - SUPER MULTIPLE JUNCTION (SMJ)



WEC817

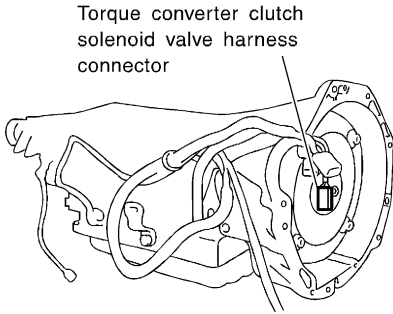
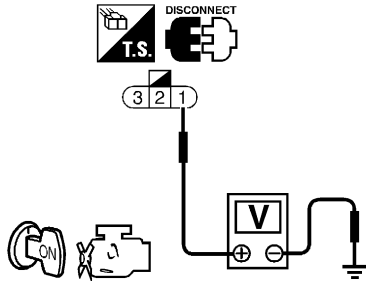
DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NEEC1067

1	CHECK POWER SUPPLY		
		<p>1. Disconnect torque converter clutch solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Torque converter clutch solenoid valve harness connector</p> </div> <p>2. Turn ignition switch "ON".</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

SEF507V

SEF422V

2	DETECT MALFUNCTIONING PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● 10A fuse ● Harness continuity between torque converter clutch solenoid valve and 10A fuse 	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
		▶	Repair harness or connectors.

IDX

DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check voltage between terminal 115 and terminal 3.</p>		
<p>Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

SEF232V

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F34 ● Harness continuity between torque converter clutch solenoid valve and ECM 	
▶	
Repair open circuit, short to ground or short to power in harness or connectors.	

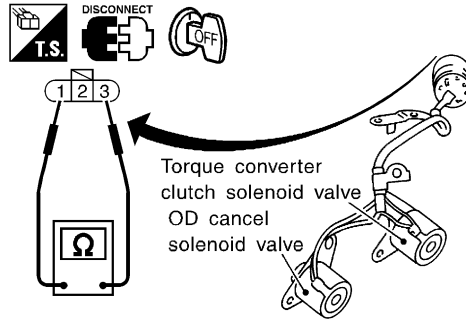
DTC P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE
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1. Check resistance between torque converter clutch solenoid valve terminals 1 and 3.

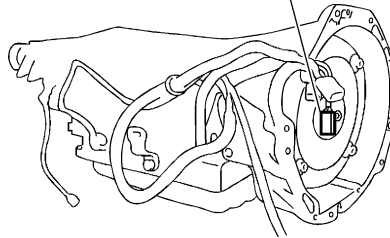


SEF233V

Resistance: Approximately 25Ω [at 25°C (77°F)]

2. Remove torque converter clutch solenoid valve. Refer to **AT-63** "ON-VEHICLE SERVICE".
3. Supply the solenoid valve terminals 1 and 3 with battery voltage and check the solenoid valve operation.

Torque converter clutch solenoid valve harness connector



SEF507V

Torque converter clutch solenoid valve should be operated.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace torque converter clutch solenoid valve.

6	CHECK INTERMITTENT INCIDENT
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Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.

	▶	INSPECTION END
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DTC P1776 TORQUE CONVERTER CLUTCH SOLENOID VALVE

KA24DE

System Description

System Description

NEEC1068

ECM controls torque converter clutch solenoid valve with the signals below.

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Torque converter lock-up control	Torque converter clutch solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor *1	Vehicle speed		

*1: This signal is used only for diagnosis.

The ECM controls torque converter clutch solenoid valve to cancel the lock-up condition of A/T. When the solenoid valve is **turned on**, lock-up is **cancelled**. When the solenoid valve is turned off, A/T lock-up is operational.

Conditions for lock-up cancel:

Torque converter clutch solenoid valve is turned "ON" when;

- Throttle valve is fully closed (during idling or deceleration)
- Engine coolant temperature is below 40°C (104°F)
- Engine is stopped

Conditions for lock-up operation:

- Under 55 to 63 km/h (34 to 39 MPH) (2/8 throttle on flat road), lock-up does not operate even when the torque converter clutch solenoid valve is "OFF".
- Over 58 to 66 km/h (36 to 41 MPH) (2/8 throttle on flat road), lock-up should operate because the torque converter clutch solenoid valve is "OFF".

To confirm vehicle lock-up, the torque converter clutch solenoid valve must be in operation ("ON" during idle and deceleration, and "OFF" during acceleration) and engine speed should drop. When the accelerator pedal is depressed (less than 2/8) in lock-up, the engine speed should not change abruptly. If there is a big jump in engine speed, there will be no lock up.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1069

MONITOR ITEM	CONDITON	SPECIFICATION
TCC SOL/V	● Engine: After warming up	Idle
		2,000 rpm
		ON
		OFF

DTC P1776 TORQUE CONVERTER CLUTCH SOLENOID VALVE

KA24DE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NEEC1070

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/Y	Torque converter clutch solenoid valve (A/T models only)	[Engine is running] ● Idle Speed	Approximately 1V
			● [Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC1071

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1776	● A/T torque converter slip has occurred in lock-up condition.	● Torque converter clutch solenoid valve ● A/T hydraulic control system ● Torque converter

TCS S/V FNCTN P1776	
OUT OF CONDITION	
MONITOR	
CMPS~RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF859U

TCC S/V FNCTN P1776	
TESTING	
MONITOR	
CMPS~RPM(REF)	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

PEF235V

TCC S/V FNCTN P1776	
COMPLETED	

PEF861U

DTC Confirmation Procedure

NEEC1072

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

④ With Consult-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine.
- 4) Select "TCC S/V FNCTN P1776" of "A/T (TCC S/V) in DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds.)

Selector lever	D (OD "ON")	
Vehicle speed	76 - 100 km/h (47 - 62 MPH)	
ENG SPEED	Single cab model	Less than 2,150 rpm
	King cab model	Less than 2,300 rpm
B/FUEL SCHDL	7 - 16 msec	
THRTL POS SEN	Less than 1.3V	

If "TESTING" is not displayed after 5 minutes, retry from step 2).

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG"

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DTC P1776 TORQUE CONVERTER CLUTCH SOLENOID VALVE

KA24DE

DTC Confirmation Procedure (Cont'd)

RESULTS".

If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-571.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

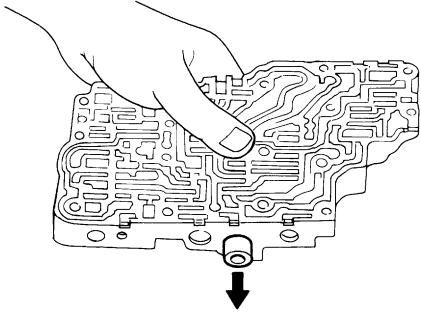
NEEC1073

1	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE
<p>1. Check resistance between torque converter clutch solenoid valve terminals 1 and 3.</p> <div style="text-align: center;"> <p style="margin-left: 100px;">Torque converter clutch solenoid valve OD cancel solenoid valve</p> </div> <p style="text-align: right;">SEF233V</p> <p>Resistance: Approximately 25Ω [at 25°C (77°F)]</p> <p>2. Remove torque converter clutch solenoid valve. Refer to AT-63, "ON-VEHICLE SERVICE".</p> <p>3. Supply the solenoid valve terminals 1 and 3 with battery voltage and check the solenoid valve operation.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF234V</p> <p>Torque converter clutch solenoid valve should be operated.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 2.
NG	▶ Replace torque converter clutch solenoid valve.

DTC P1776 TORQUE CONVERTER CLUTCH SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

2	CHECK TORQUE CONVERTER CLUTCH CONTROL VALVE	
<p>1. Disassemble torque converter clutch control valve assembly. Refer to AT-90, "REPAIR FOR COMPONENTS PARTS".</p> <p>2. Check torque converter clutch control valve.</p> <ul style="list-style-type: none"> ● Valve, and sleeve slide along valve bore under their own weight. ● Valve, and sleeve are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. 		
		
SAT740H		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Replace torque converter clutch control valve.

3	CHECK VEHICLE SPEED SENSOR SIGNAL	
Check vehicle speed signal with CONSULT-II or speedometer if it shows an actual vehicle speed.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Check The following: Vehicle speed sensor, Vehicle speed sensor driven gear. If NG, replace parts

4	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶		INSPECTION END

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On Board Diagnosis Logic

NEEC0488

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

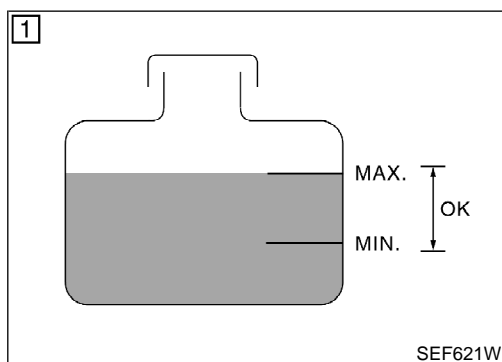
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
OVERHEAT	<ul style="list-style-type: none"> Engine coolant temperature reaches an abnormally high temperature. 	<ul style="list-style-type: none"> Harness or connectors (The cooling fan circuit is open or shorted.) Cooling fan Radiator hose Radiator Radiator cap Water pump Thermostat <p>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-578.</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to *MA-15*, "Anti-freeze Coolant Mixture Ratio".
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.



Overall Function Check

NEEC0489

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

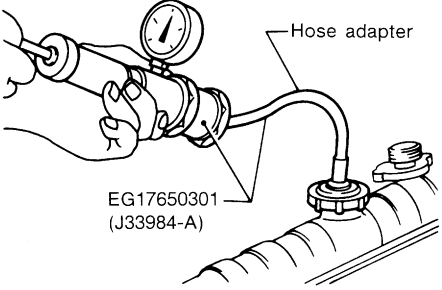
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

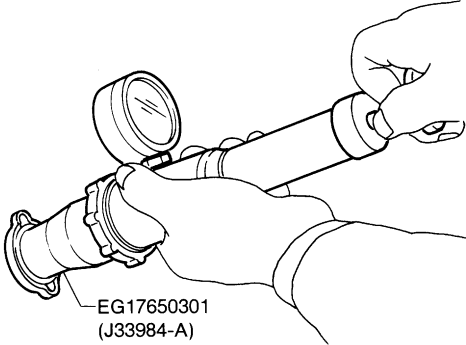
④ With CONSULT-II

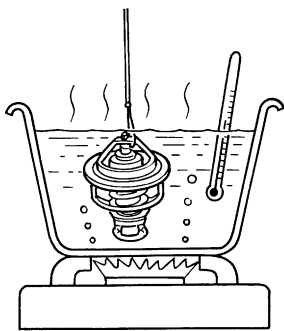
- Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.** If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-575.
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-575.

Diagnostic Procedure

NEEC0491

1	CHECK COOLING SYSTEM FOR LEAK	<p>Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.6 kg/cm², 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Hose adapter</p> <p style="margin-left: 100px;">EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC754A</p> <p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF
OK	▶	GO TO 2.	
NG	▶	Check the following for leak. <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to LC-12 , "Water Pump".	

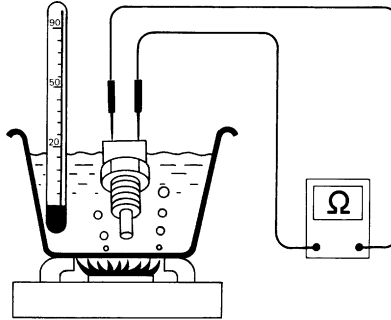
2	CHECK RADIATOR CAP	<p>Apply pressure to cap with a tester.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC755A</p> <p>Radiator cap relief pressure: 78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>	PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 3.	
NG	▶	Replace radiator cap.	

3	CHECK THERMOSTAT	<p>1. Check valve seating condition at normal room temperatures. It should seat tightly.</p> <p>2. Check valve opening temperature and valve lift.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 20px;">SLC343</p> <p>Valve opening temperature: 76.5°C (170°F) [standard]</p> <p>Valve lift: More than 8 mm/90°C (0.31 in/194°F)</p> <p>3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-13, "Thermostat".</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 4.
NG	▶	Replace thermostat.

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4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

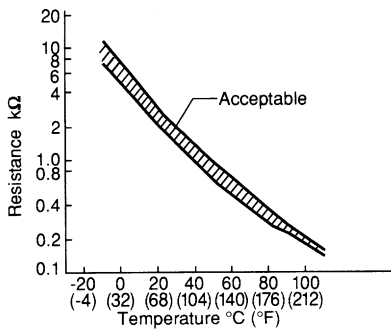
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0285

SEF012P

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-578.

▶ **INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

TROUBLE DIAGNOSIS FOR OVERHEAT

KA24DE

Main 11 Causes of Overheating

Main 11 Causes of Overheating

NEEC0492

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-17 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	78 - 98 kPa (0.8 - 1.0 kg/cm ² , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-11 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-11 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-13 , "Thermostat" and LC-14 , "Radiator".
OFF	7	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	8	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-17 , "Changing Engine Coolant".
OFF*4	9	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-16 , "ENGINE MAINTENANCE".
OFF	10	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-31 , "Inspection".
	11	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-45 , "Inspection".

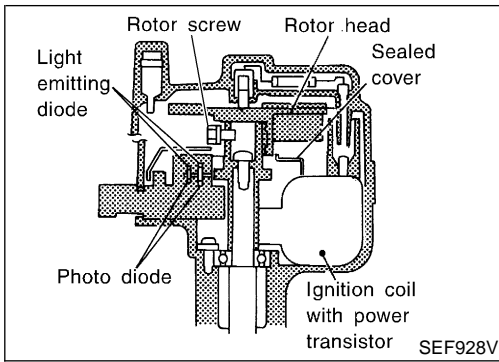
*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-17**, OVERHEATING CAUSE ANALYSIS".



Component Description

IGNITION COIL & POWER TRANSISTOR

NEEC0319
NEEC0319S01

The ignition signal from the ECM is sent to the power transistor. The power transistor switches the ignition coil primary circuit on and off. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be tightened properly.

 : 3.3 - 3.9 N·m (0.34 - 0.40 kg·m, 29.5 - 34.7 in·lb)

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CONSULT-II Reference Value in Data Monitor Mode

NEEC0320

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

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IGNITION SIGNAL

KA24DE

ECM Terminals and Reference Value

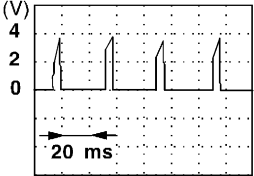
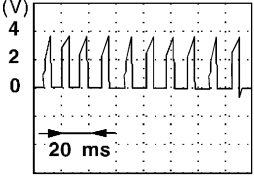

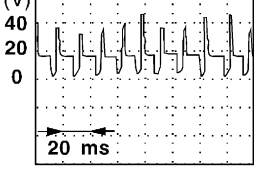
ECM Terminals and Reference Value

=NEEC0321

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 0.5V</p>  <p>SEF996V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.2 - 1.0V</p>  <p>SEF997V</p>
2	B	Ignition check	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>12 - 14V</p>  <p>SEF998V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>12 - 13V</p>  <p>SEF999V</p>

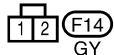
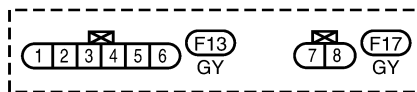
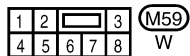
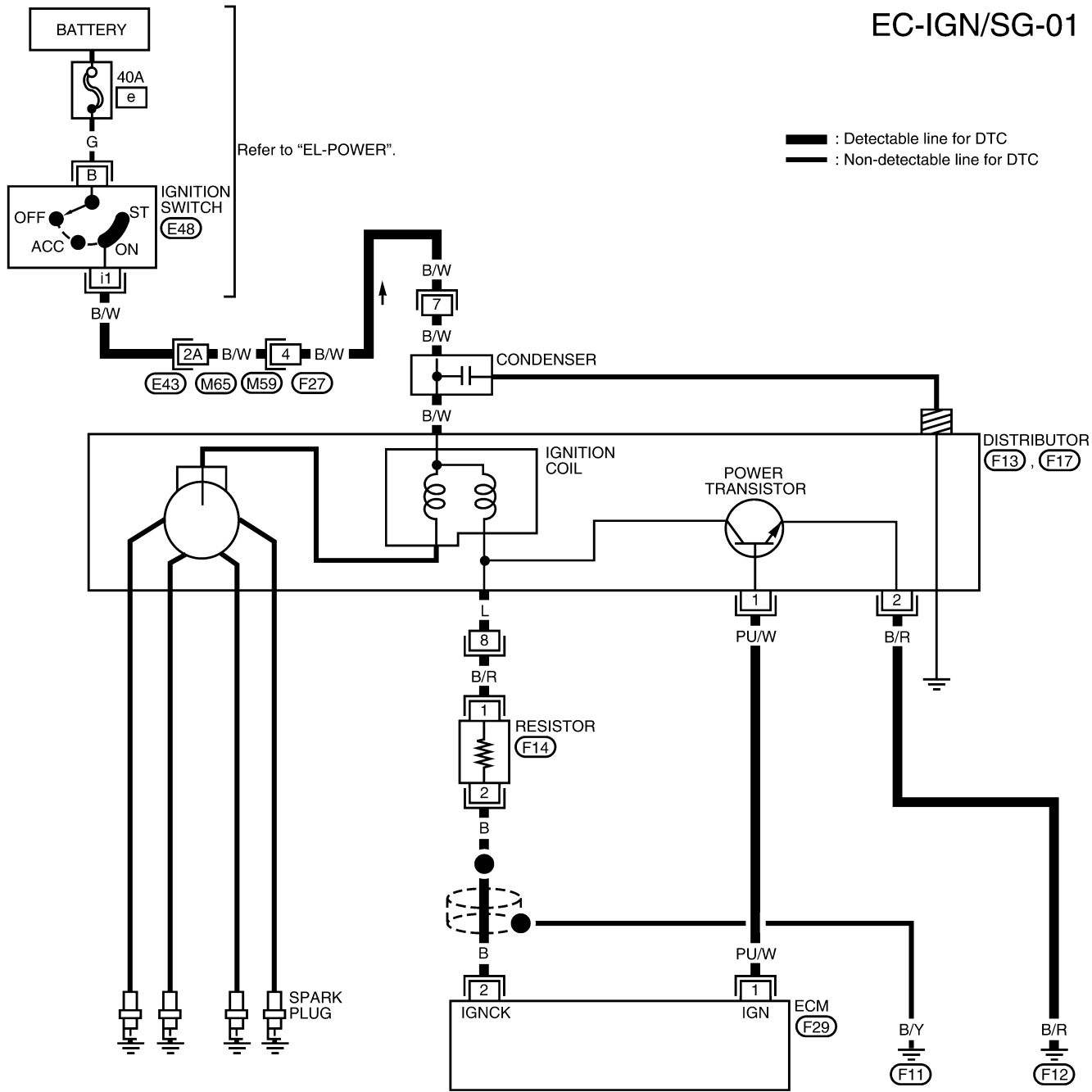
IGNITION SIGNAL

KA24DE
Wiring Diagram

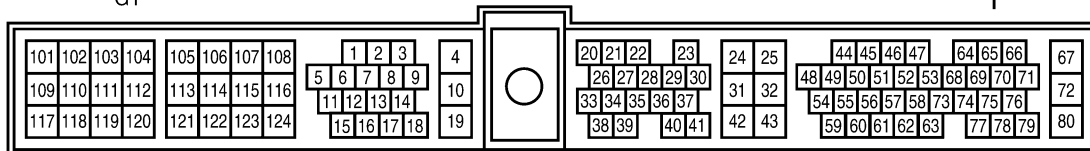
Wiring Diagram

NEEC0324

EC-IGN/SG-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



WEC781

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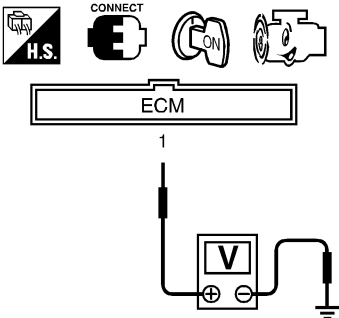
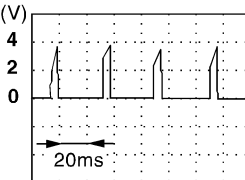
Diagnostic Procedure

NEEC0325

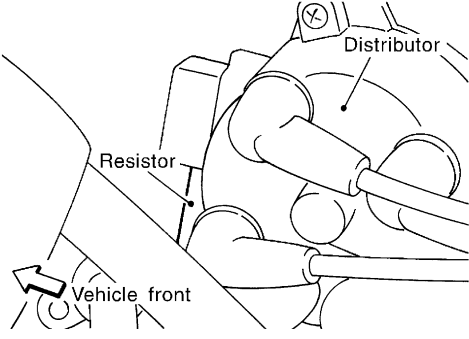
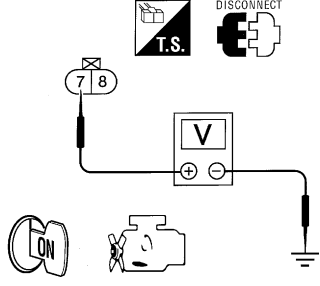
1	INSPECTION START	
Turn ignition switch "OFF", and restart engine. Is engine running?		
Yes or No		
Yes (With CONSULT-II)	▶	GO TO 2.
Yes (Without CONSULT-II)	▶	GO TO 3.
No	▶	GO TO 4.

2	CHECK OVERALL FUNCTION																	
(P) With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">MAS A/F SE-B1</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">IACV-AAC/V</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
OK or NG																		
OK	▶	INSPECTION END																
NG	▶	GO TO 7.																

SEF981Z

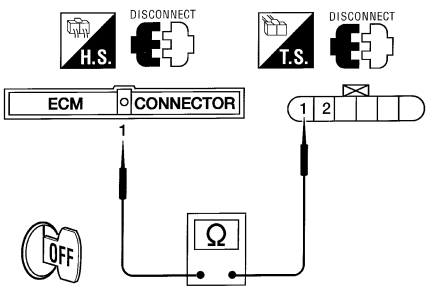
3	CHECK OVERALL FUNCTION	
(X) Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
		
		
OK or NG		
OK	▶	INSPECTION END
NG	▶	GO TO 7.

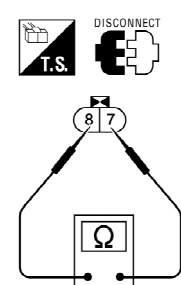
SEF984Z

4	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ignition coil harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Distributor</p> <p style="margin-left: 100px;">Resistor</p> <p style="margin-left: 100px;">Vehicle front</p> </div> <p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 7 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-left: 50px;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch <p style="text-align: right;">▶ Repair harness or connectors.</p>	
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6	CHECK GROUND CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect power transistor harness connector.</p> <p>3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to the wiring diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 7.	
NG	▶	Repair open circuit or short to power in harness or connectors.	

7	CHECK INPUT SIGNAL CIRCUIT		
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. 			
			
AEC700			
<p style="color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 3. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 8.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

8	CHECK IGNITION COIL								
<ol style="list-style-type: none"> 1. Disconnect ignition coil harness connector. 2. Remove distributor cap. 3. Check resistance as shown in the figure. 									
									
AEC150A									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Terminal</th> <th style="padding: 5px;">Resistance [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">7 - 8</td> <td style="text-align: center; padding: 5px;">Less than 1Ω</td> </tr> <tr> <td style="text-align: center; padding: 5px;">7 - 9</td> <td style="text-align: center; padding: 5px;">7 - 13Ω</td> </tr> </tbody> </table>				Terminal	Resistance [at 25°C (77°F)]	7 - 8	Less than 1Ω	7 - 9	7 - 13Ω
Terminal	Resistance [at 25°C (77°F)]								
7 - 8	Less than 1Ω								
7 - 9	7 - 13Ω								
MTBL0300									
<p>If NG, replace distributor assembly as a unit.</p> <p style="text-align: center;">OK or NG</p>									
OK	▶	GO TO 9.							
NG	▶	Replace distributor assembly as a unit.							

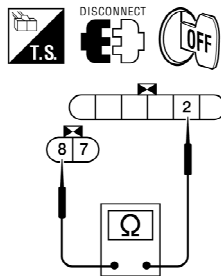
IGNITION SIGNAL

KA24DE

Diagnostic Procedure (Cont'd)

9 CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



AEC151A

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0301

OK or NG

OK ► GO TO 10.

NG ► Replace distributor assembly.

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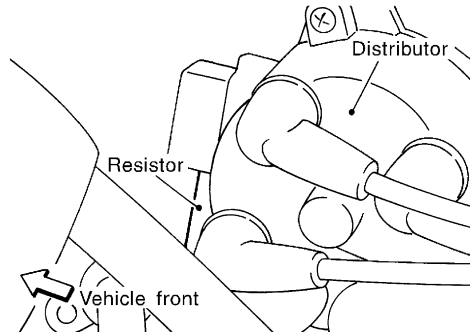
SC

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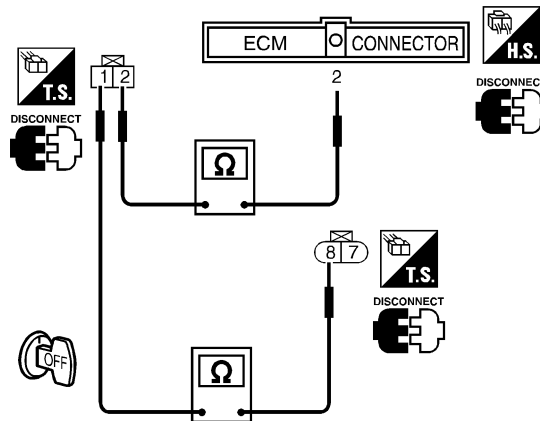
IDX

10 CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.



5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.



Continuity should exist.

7. Also check harness for short to ground and short to power.

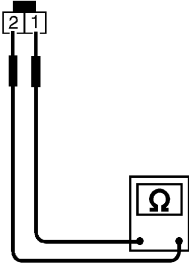
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

IGNITION SIGNAL

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK RESISTOR	
1. Disconnect resistor harness connector. 2. Check resistance between terminals 1 and 2.		
		
Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]		SEF240V
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace resistor.

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12	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
	▶	INSPECTION END

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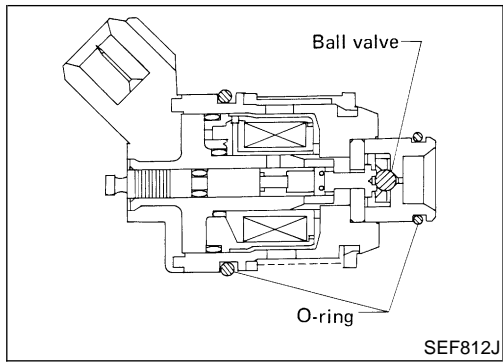
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Component Description



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM^{NEEC0435} supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC0437

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 109 111	W/B W/R W/L W/PU	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p> <p style="text-align: right;">SEF011W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p> <p style="text-align: right;">SEF012W</p>

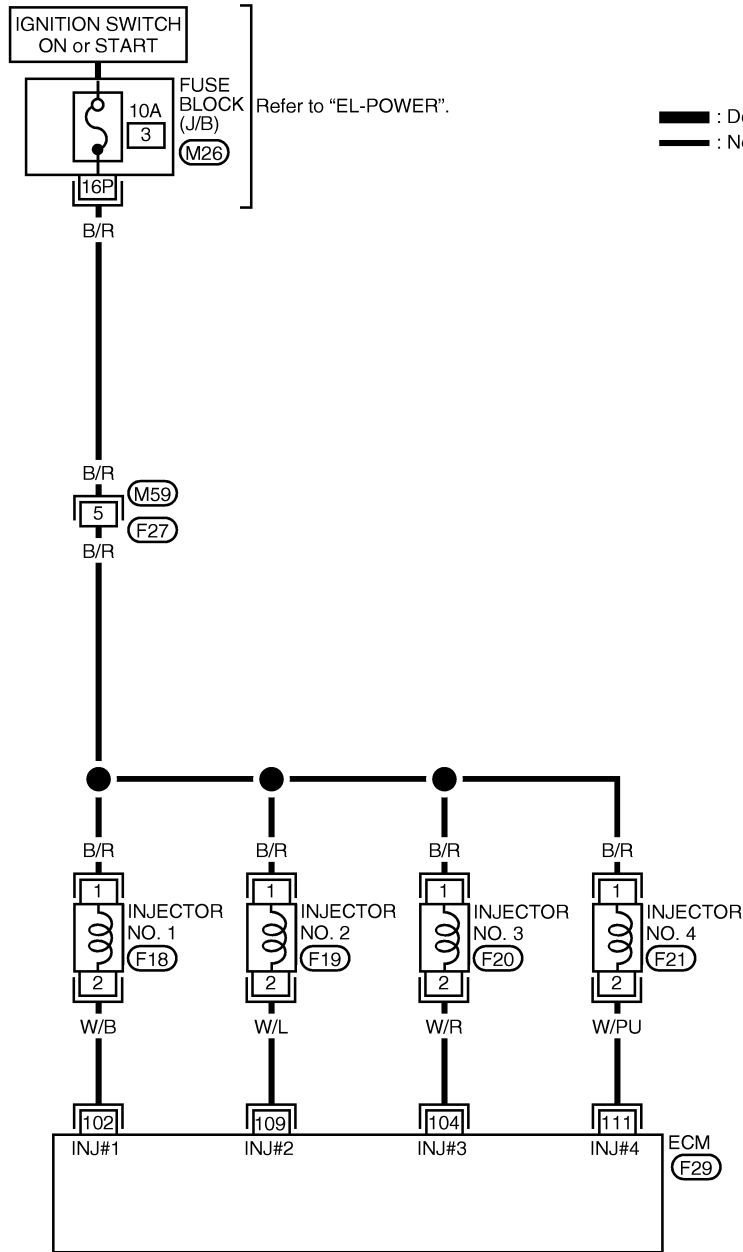
INJECTOR

KA24DE
Wiring Diagram

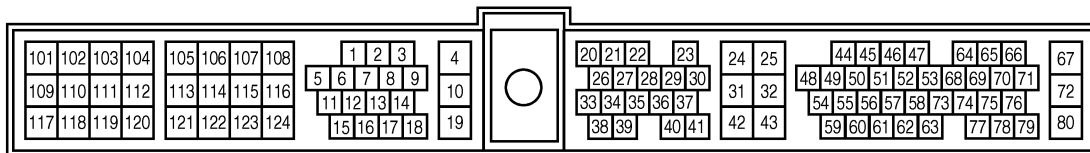
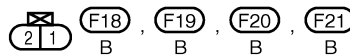
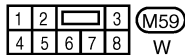
Wiring Diagram

NEEC0434

EC-INJECT-01



— : Detectable line for DTC
— : Non-detectable line for DTC



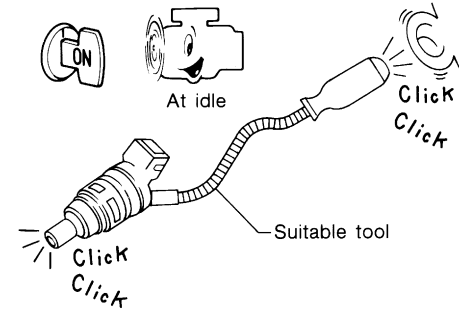


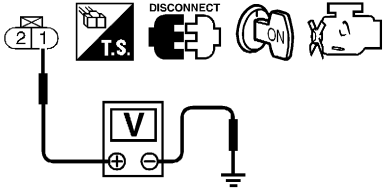
AEC009B

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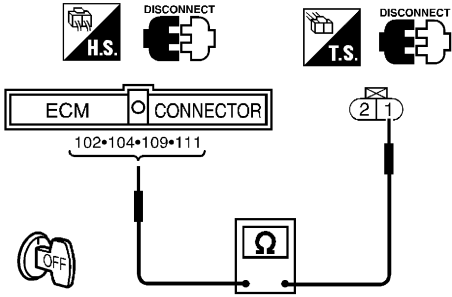
Diagnostic Procedure

NEEC0438

1	CHECK OVERALL FUNCTION																
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX %																
<small>SEF981Z</small>																	
<ol style="list-style-type: none"> 3. Make sure that each circuit produces a momentary engine speed drop. 																	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Listen to each injector operating sound. 																	
																	
<p>Clicking noise should be heard.</p> <p>OK or NG</p>																	
<small>MEC703B</small>																	
OK	▶ INSPECTION END																
NG	▶ GO TO 2.																

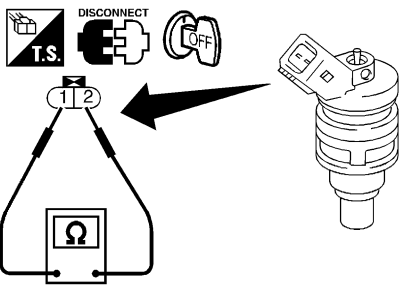
2	CHECK POWER SUPPLY	<p>1. Stop engine. 2. Disconnect injector harness connector. 3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	SEF271W
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● 10A fuse ● Harness connectors F27, M59 ● 10A fuse ● Harness for open or short between injector and fuse 	
	▶	Repair harness or connectors.	

4	CHECK OUTPUT SIGNAL CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between injector harness connector terminal 1 and ECM terminals 102, 104, 109, 111.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>	SEF223V
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the harness for open or short between ECM and injector.</p>	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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6	CHECK INJECTOR	<p>1. Disconnect injector harness connector.</p> <p>2. Check resistance between terminals as shown in the figure.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Resistance: 7.3 - 9.9Ω [at 25°C (77°F)]</p> <p style="text-align: right;">SEF273W</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 7.	
NG	▶	Replace injector.	

7	CHECK INTERMITTENT INCIDENT	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶	INSPECTION END	

START SIGNAL

KA24DE

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC0441

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NEEC0442

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch "ON"]	Approximately 0V
			[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)

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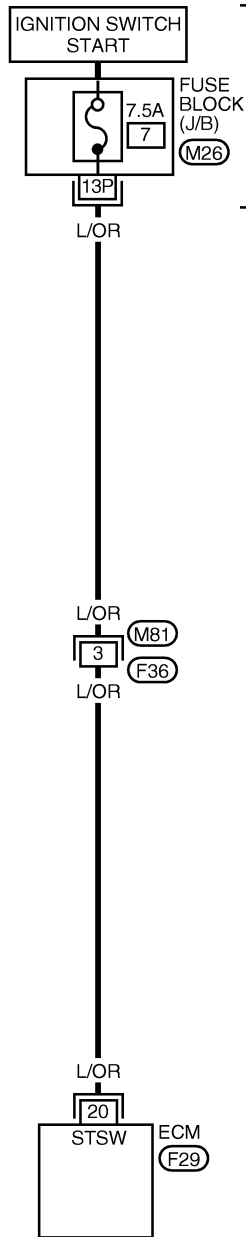
EL

IDX

Wiring Diagram

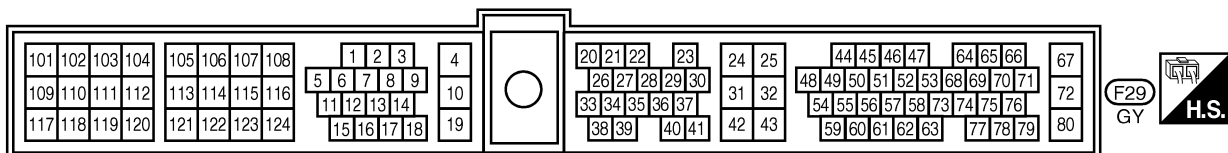
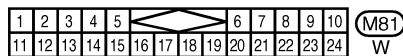
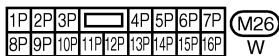
NEEC0440

EC-S/SIG-01



Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC



START SIGNAL

KA24DE


Diagnostic Procedure

Diagnostic Procedure


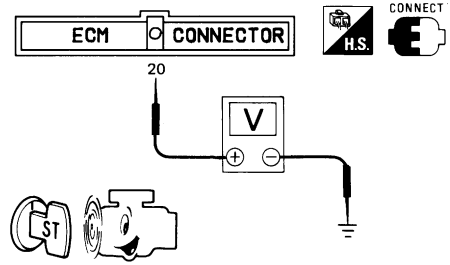
=NEEC0443

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
MA
EM

2	CHECK OVERALL FUNCTION							
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON. 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
START SIGNAL	OFF							
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON
Condition	"START SIGNAL"							
Ignition switch "ON"	OFF							
Ignition switch "START"	ON							
SEF227Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

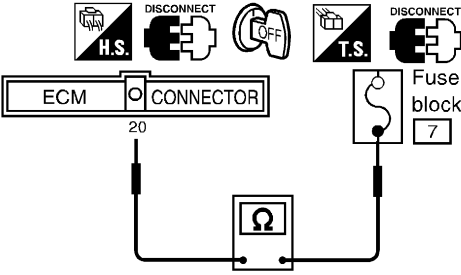
LC
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3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>1. Turn ignition switch to START. 2. Check voltage between ECM terminal 20 and ground under the following conditions.</p>								
								
SEF109P								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Except above</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Except above	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Except above	Approximately 0V							
MTBL0143								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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4	DETECT MALFUNCTIONING PART	
Check the 7.5A fuse.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace 7.5A fuse.

5	CHECK INPUT SIGNAL CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and 7.5A fuse. 3. Check harness continuity between ECM terminal 20 and fuse block. 		
		
SEF224V		
<p style="color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuse block 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶		INSPECTION END

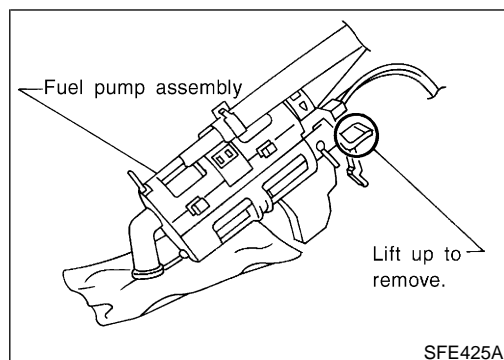
System Description

NEEC0444

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds.
Engine running and cranking	Operates.
Except as shown above	Stops.



Component Description

NEEC0501

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NEEC0445

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON (Operates for 5 seconds) Engine running and cranking 	ON
	<ul style="list-style-type: none"> Except as shown above 	OFF

ECM Terminals and Reference Value

=NEEC0446

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch "ON"] ● For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

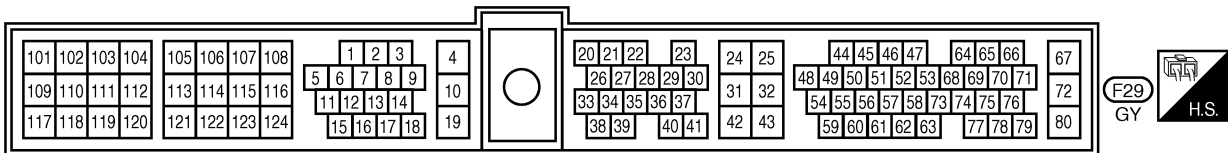
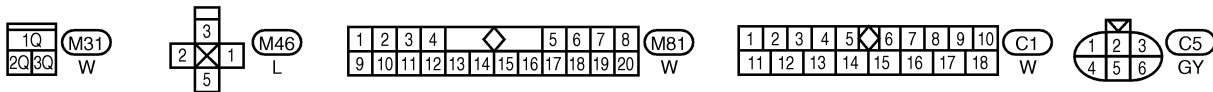
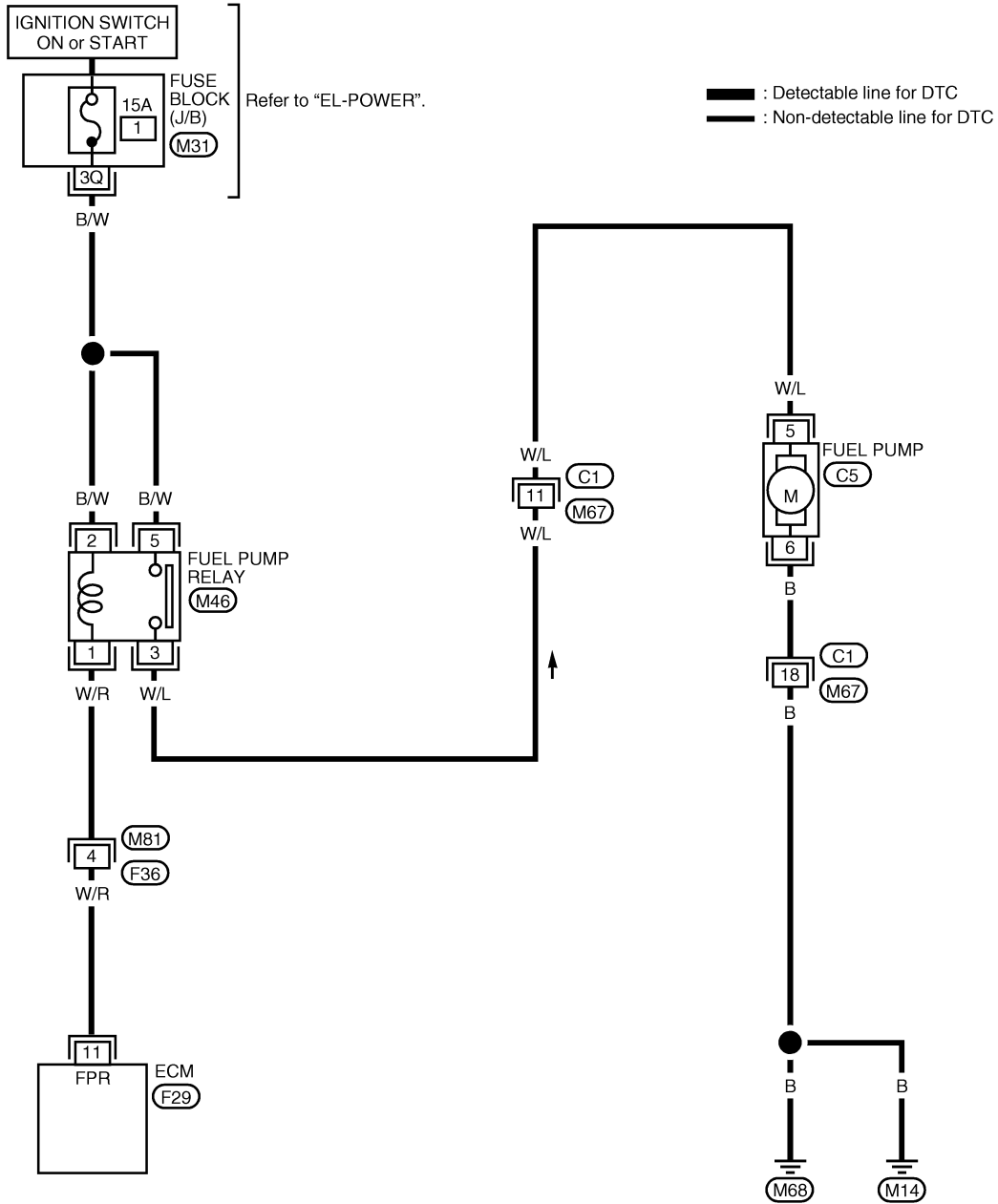
FUEL PUMP

KA24DE
Wiring Diagram

Wiring Diagram

NEEC0447

EC-F/PUMP-01

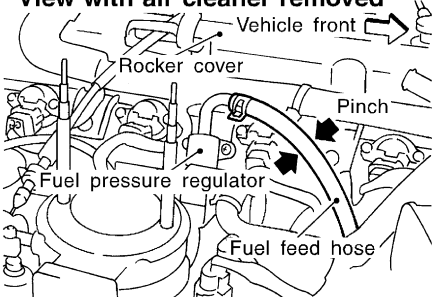


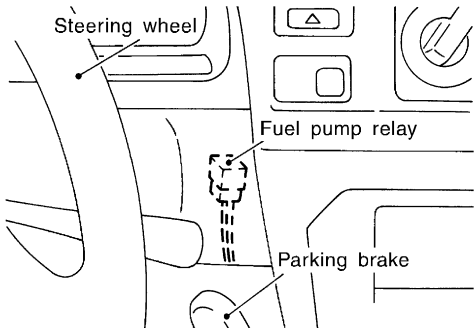
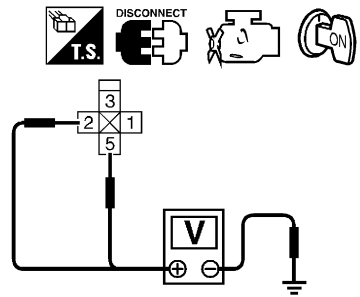
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Diagnostic Procedure

NEEC1074

1	CHECK OVERALL FUNCTION	<p>1. Turn ignition switch ON. 2. Pinch fuel feed hose with two fingers.</p> <p style="text-align: center;">View with air cleaner removed</p>  <p style="text-align: right;">SEF348V</p> <p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	INSPECTION END	
NG	▶	GO TO 2.	

2	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect fuel pump relay.</p>  <p style="text-align: right;">SEF349V</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p>  <p style="text-align: right;">SEF225V</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3 DETECT MALFUNCTIONING PART

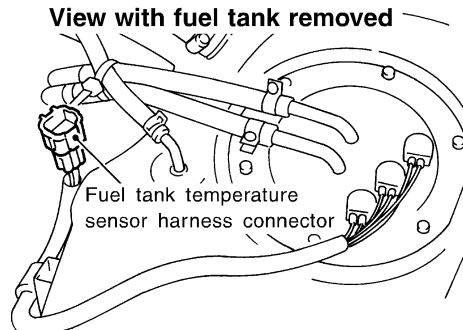
Check the following.

- 15A fuse
- Harness for open or short between fuse and fuel pump relay

▶ Repair harness or connectors.

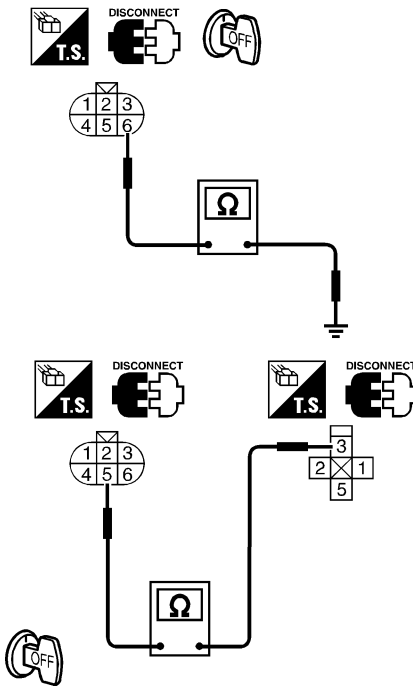
4 CHECK POWER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



SEF334VA

3. Check harness continuity between terminal 6 and body ground, terminal 5 and fuel pump relay connector terminal 3.



SEF858Z

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK ▶ GO TO 6.

NG ▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay connector terminal 1.	
SEF227V	
<p style="color: blue;">Continuity should exist.</p> 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	GO TO 8.
NG	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness for open or short between ECM and fuel pump relay 	
NG	Repair open circuit or short to ground or short to power in harness or connectors.

8 CHECK FUEL PUMP RELAY
With CONSULT-II

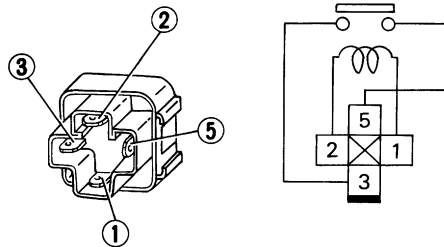
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF724Z

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

MTBL0306

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

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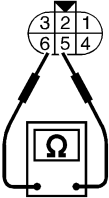
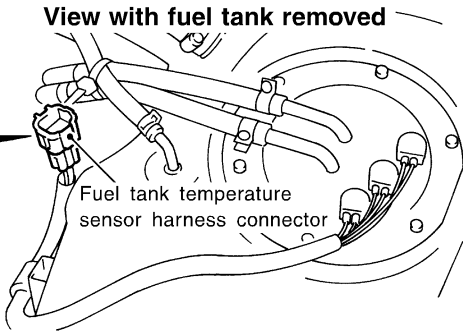
BT

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9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector.</p> <div style="display: flex; align-items: center; justify-content: space-around;"> <div style="text-align: center;"> <p>DISCONNECT</p>  </div> <div style="text-align: center;"> <p>T.S.</p>  </div> <div style="text-align: center;"> <p>OFF</p>  </div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;">  <div style="margin: 0 20px; font-size: 2em;">←</div>  </div> <p style="margin-top: 10px;">2. Check resistance between terminals 5 and 6. Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 10.	
NG	▶	Replace fuel pump.	

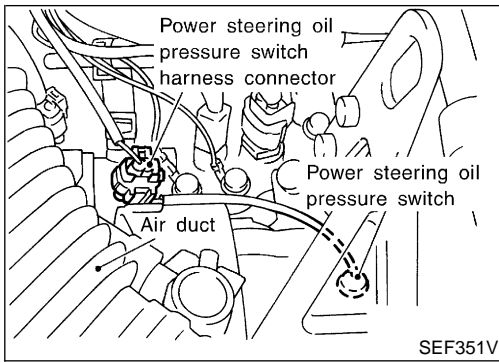
SEF846Z

10	CHECK INTERMITTENT INCIDENT	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶	INSPECTION END	

POWER STEERING OIL PRESSURE SWITCH

KA24DE

Component Description



Component Description

NEEC0451

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0452

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction) OFF
		The steering wheel is fully turned ON

ECM Terminals and Reference Value

NEEC0453

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is fully turned 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not turned 	Approximately 5V

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POWER STEERING OIL PRESSURE SWITCH

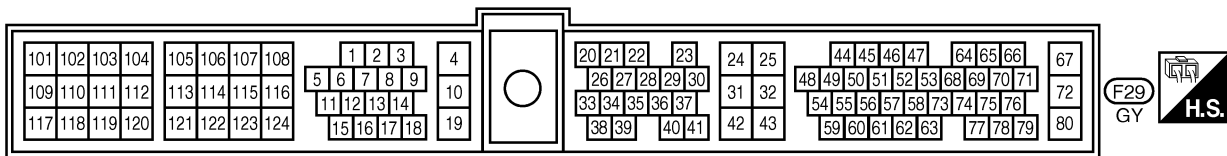
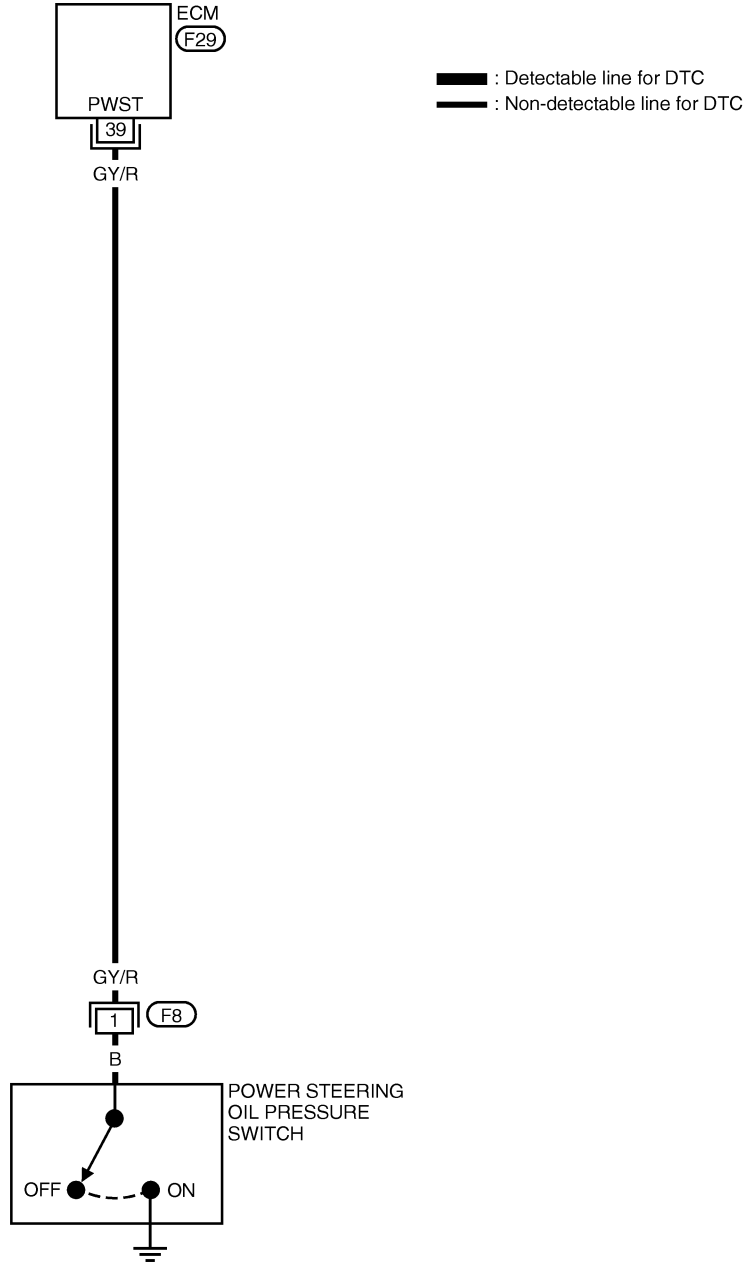
KA24DE

Wiring Diagram

Wiring Diagram

NEEC0450

EC-PST/SW-01



AEC012B

Diagnostic Procedure

=NEEC0454

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION							
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>								
<table border="1" style="margin: auto;"> <tr><th colspan="2">DATA MONITOR</th></tr> <tr><th>MONITOR</th><th>NO DTC</th></tr> <tr><td>PW/ST SIGNAL</td><td>OFF</td></tr> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
PW/ST SIGNAL	OFF							
<table border="1" style="margin: auto;"> <tr><td>Steering is in neutral position</td><td>OFF</td></tr> <tr><td>Steering is turned</td><td>ON</td></tr> </table>			Steering is in neutral position	OFF	Steering is turned	ON		
Steering is in neutral position	OFF							
Steering is turned	ON							
SEF228Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check voltage between ECM terminal 39 and ground under the following conditions.</p>								
SEF662P								
<table border="1" style="margin: auto;"> <thead> <tr><th>Condition</th><th>Voltage</th></tr> </thead> <tbody> <tr><td>When steering wheel is turned quickly</td><td>Approximately 0V</td></tr> <tr><td>Except above</td><td>Approximately 5V</td></tr> </tbody> </table>			Condition	Voltage	When steering wheel is turned quickly	Approximately 0V	Except above	Approximately 5V
Condition	Voltage							
When steering wheel is turned quickly	Approximately 0V							
Except above	Approximately 5V							
MTBL0142								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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POWER STEERING OIL PRESSURE SWITCH

KA24DE

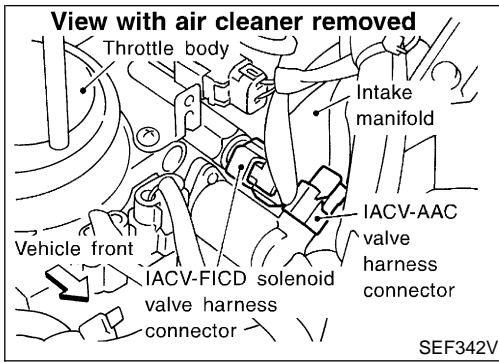
Diagnostic Procedure (Cont'd)

4	CHECK INPUT SIGNAL CIRCUIT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 39 and terminal 1.</p>		
SEF662P		
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and power steering oil pressure switch.		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

6	CHECK POWER STEERING OIL PRESSURE SWITCH							
<p>1. Disconnect power steering oil pressure switch harness connector then start engine. 2. Check continuity between terminals 1 and ground.</p>								
SEF230V								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Conditions</th> <th style="width: 40%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Steering wheel is being turned</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Steering wheel is not being turned</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Conditions	Continuity	Steering wheel is being turned	Yes	Steering wheel is not being turned	No
Conditions	Continuity							
Steering wheel is being turned	Yes							
Steering wheel is not being turned	No							
MTBL0307								
OK or NG								
OK	▶	GO TO 7.						
NG	▶	Replace power steering oil pressure switch.						

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.		
▶	INSPECTION END	



Component Description

When the air conditioner is on, the IAC valve-FICD solenoid valve supplies additional air to adjust to the increased load.

NEEC0462

GI
MA
EM
LC

ECM Terminals and Reference Value

NEEC0463

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

EC
FE

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Air conditioner relay	[Engine is running] ● Both A/C switch and blower switch are ON★	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner dual-pres- sure switch	[Engine is running] ● Both air conditioner switch and blower switch are ON (Compressor operates)	Approximately 0V
			[Engine is running] ● Air conditioner switch is OFF	BATTERY VOLTAGE (11 - 14V)

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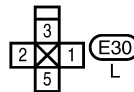
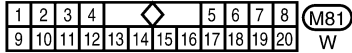
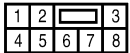
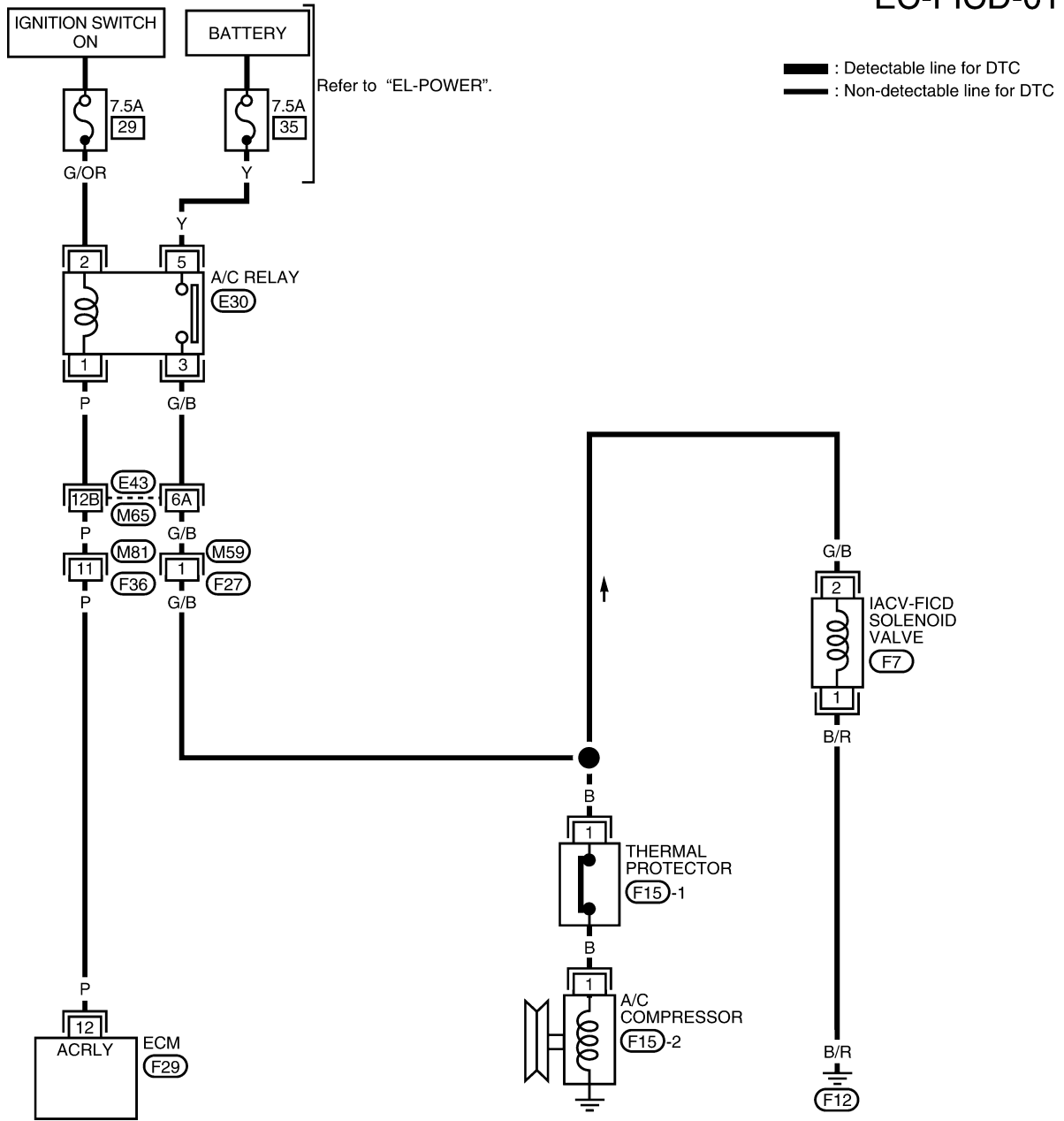
★ Ambient air temperature above 10°C (50°F) and in any mode except OFF.

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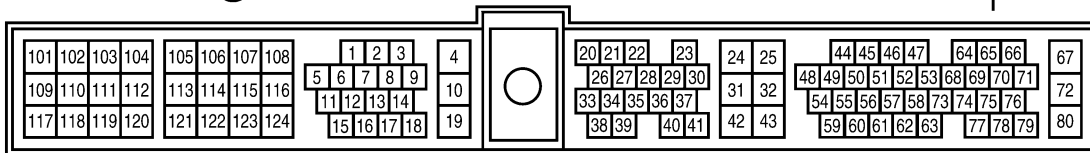
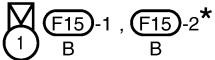
Wiring Diagram

NEEC0461

EC-FICD-01



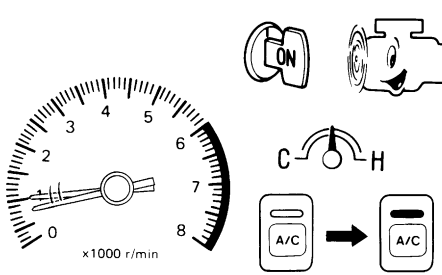
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



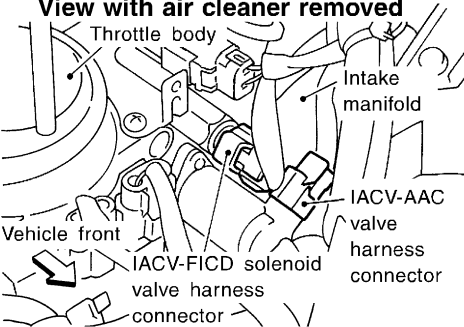
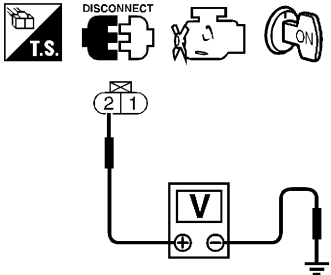
* : This connector is not shown in "HARNESS LAYOUT" of EL section.

Diagnostic Procedure

=NEEC0464

1	CHECK OVERALL FUNCTION	<ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 800±50 rpm If NG, adjust idle speed. 3. Push air conditioner switch ON and turn fan switch to 4-speed. 4. Recheck idle speed. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 20px;">MEF634E</p> <p style="text-align: center; margin-top: 10px;">875 rpm or more</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC EC FE CL MT AT
OK	▶	INSPECTION END	
NG	▶	GO TO 2.	

2	CHECK AIR CONDITIONER FUNCTION	<p>Check if air conditioner compressor functions normally.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 3.	
NG	▶	Refer to "Symptom Table" in "TROUBLE DIAGNOSIS", HA-28 .	

3	CHECK POWER SUPPLY	<p>1. Stop engine. 2. Disconnect IACV-FICD solenoid valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Start engine, then push A/C switch ON and turn fan switch to 4-speed. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	SEF342V
			SEF133V
	OK	▶	GO TO 5.
	NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness connector M59, F27 ● Harness for open or short between IACV-FICD solenoid valve harness connector and air conditioner relay 	
		▶	Repair open circuit, short to ground or short to power in harness or connectors.

IACV-FICD SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK GROUND CIRCUIT
<ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect ambient air temperature switch harness connector. 4. Check harness continuity between solenoid valve terminal 1 and body ground. 	
SEF134V	
<p>Continuity should exist.</p> <p>5. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the harness for open or short between IACV-FICD solenoid valve and body ground.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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IACV-FICD SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

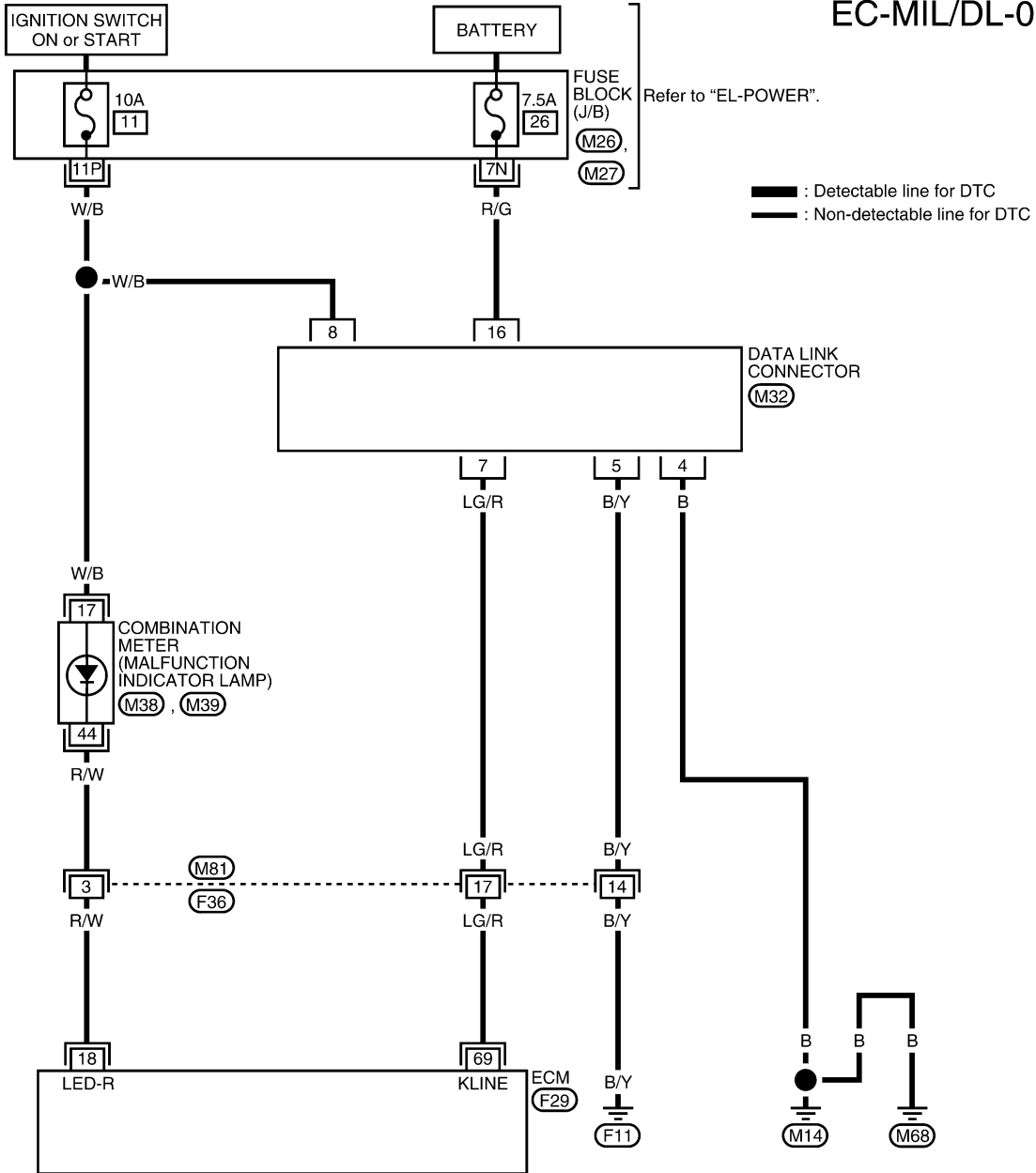
7	CHECK IACV-FICD SOLENOID VALVE	<p>Disconnect IACV-FICD solenoid valve harness connector.</p> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> ● Check for clicking sound when applying 12V direct current to terminals. ● Check plunger for seizing or sticking. ● Check for broken spring. <div style="text-align: center;"> </div> <p style="text-align: right;">SEF231V</p>	
OK or NG			SEF097K
OK	▶	GO TO 8.	
NG	▶	Replace IACV-FICD solenoid valve.	

8	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.</p>	
	▶	INSPECTION END	

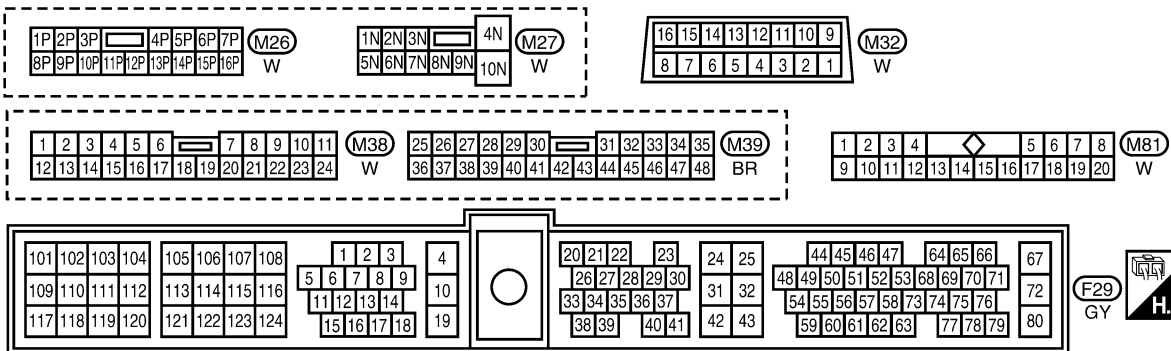
Wiring Diagram

NEEC0466

EC-MIL/DL-01



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IDX



Fuel Pressure Regulator

NEEC0467

Fuel pressure at idling kPa (kg/cm ² , psi)	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NEEC0468

Base idle speed*1 rpm	No-load*4 (in "P" or "N" position)	750±50
Target idle speed*2 rpm	No-load*4 (in "P" or "N" position)	800±50
Air conditioner: ON rpm	In "P" or "N" position	875 or more
Ignition timing*1	In "P" or "N" position	20°±2° BTDC

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Throttle position sensor harness connector disconnected

*4: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NEEC0469

Primary voltage V	Battery voltage 12
Primary resistance [at 20°C (68°F)] Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)] kΩ	Approximately 10

Mass Air Flow Sensor

NEEC0470

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	0.9 - 1.8*
Mass air flow (Using CONSULT-II or GST) g-m/sec	0.9 - 5.8 at idle* 7.5 - 13.2 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NEEC0471

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

EGR Temperature Sensor

NEEC0472

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

NEEC0473

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0
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SERVICE DATA AND SPECIFICATIONS (SDS)

KA24DE

IACV-AAC Valve

IACV-AAC Valve

NEEC0474

Resistance [at 25°C (77°F)] Ω	Approximately 10.0
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GI

Injector

NEEC0475

Resistance [at 25°C (77°F)] Ω	7.3 - 9.9
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MA

Resistor

NEEC0476

Resistance [at 25°C (77°F)] Ω	Approximately 2.2
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EM

LC

Throttle Position Sensor

NEEC0477

Throttle valve conditions	Voltage (at normal operating temp., engine off, ignition switch on)
Completely closed (a)	0.2 - 0.8V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.5V

EC

FE

Heated Oxygen Sensor 1 Heater (Front)

NEEC0478

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3
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CL

MT

Calculated Load Value

NEEC0479

	Calculated load value % (Using CONSULT-II or GST)
At idle	9.5 - 34.0%
At 2,500 rpm	13.9 - 24.9%

AT

TF

Intake Air Temperature Sensor

NEEC0480

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

PD

AX

SU

Heated Oxygen Sensor 2 Heater (Rear)

NEEC0483

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3
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BR

Crankshaft Position Sensor (OBD)

NEEC0484

Resistance [at 20°C (68°F)] Ω	512 - 632
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ST

RS

Fuel Tank Temperature Sensor

NEEC0485

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

BT

HA

SC

EL

IDX

Alphabetical & P No. Index for DTC

NEEC0522

NEEC0522S01

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access ECM	—	EC-730
ABSL PRES SEN	P0105	EC-769
AIR TEMP SEN/CIRC	P0110	EC-771
A/T 1ST GR FNCTN	P0731	AT-272
A/T 2ND GR FNCTN	P0732	AT-278
A/T 3RD GR FNCTN	P0733	AT-284
A/T 4TH GR FNCTN	P0734	AT-290
A/T COMM LINE	P0600*4	EC-1061
A/T DIAG COMM LINE	P1605	EC-1171
A/T TCC S/V FNCTN	P0744	AT-304
ATF TEMP SEN/CIRC	P0710	AT-256
CAM POS SEN/CIRC	P0340	EC-967
CLOSED LOOP-B1	P1148	EC-1070
CLOSED LOOP-B2	P1168	EC-1070
CLOSED TP SW/CIRC	P0510	EC-1054
COOLANT T SEN/CIRC*2	P0115	EC-776
*COOLANT T SEN/CIRC	P0125	EC-794
CPS/CIRC (OBD) COG	P1336	EC-1089
CPS/CIRCUIT (OBD)	P0335	EC-961
CYL 1 MISFIRE	P0301	EC-948
CYL 2 MISFIRE	P0302	EC-948
CYL 3 MISFIRE	P0303	EC-948
CYL 4 MISFIRE	P0304	EC-948
CYL 5 MISFIRE	P0305	EC-948
CYL 6 MISFIRE	P0306	EC-948
ECM	P0605	EC-1066
ENGINE SPEED SIG	P0725	AT-267
ENG OVER TEMP	P0217	EC-927
ENG OVER TEMP	P1217*4	EC-1072
EVAP GROSS LEAK	P0455	EC-1018
EVAP PURG FLOW/MON	P1447	EC-1132
EVAP SYS PRES SEN	P0450	EC-1007
EVAP SMALL LEAK	P0440	EC-979
EVAP VERY SMALL LEAK	P1441	EC-1098
FUEL LEVL SEN/CIRC	P0464	EC-1039

TROUBLE DIAGNOSIS — INDEX

VG33E

Alphabetical & P No. Index for DTC (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	Reference page	
FUEL LEVL SEN/CIRC	P1464	EC-1152	GI
FUEL LEVEL SENSOR	P0461	EC-1037	MA
FUEL LV SE (SLOSH)	P0460	EC-1032	EM
FUEL SYS LEAN/BK1	P0171	EC-905	LC
FUEL SYS LEAN/BK2	P0174	EC-905	EC
FUEL SYS RICH/BK1	P0172	EC-914	FE
FUEL SYS RICH/BK2	P0175	EC-914	CL
FUEL TEMP SEN/CIRC	P0180	EC-922	MT
HO2S1 HTR (B1)	P0135	EC-850	AT
HO2S1 HTR (B2)	P0155	EC-850	TF
HO2S1 (B1)	P0130	EC-799	PD
HO2S1 (B1)	P0131	EC-810	AX
HO2S1 (B1)	P0132	EC-819	SU
HO2S1 (B1)	P0133	EC-828	BR
HO2S1 (B1)	P0134	EC-842	ST
HO2S1 (B2)	P0150	EC-799	RS
HO2S1 (B2)	P0151	EC-810	BT
HO2S1 (B2)	P0152	EC-819	HA
HO2S1 (B2)	P0153	EC-828	SC
HO2S1 (B2)	P0154	EC-842	EL
HO2S2 (B1)	P0137	EC-857	IDX
HO2S2 (B1)	P0138	EC-867	
HO2S2 (B1)	P0139	EC-877	
HO2S2 (B1)	P0140	EC-887	
HO2S2 (B2)	P0157	EC-857	
HO2S2 (B2)	P0158	EC-867	
HO2S2 (B2)	P0159	EC-877	
HO2S2 (B2)	P0160	EC-887	
HO2S2 HTR (B1)	P0141	EC-897	
HO2S2 HTR (B2)	P0161	EC-897	
IACV/AAC VLV/CIRC	P0505	EC-1048	
KNOCK SENSOR	P0325*4	EC-957	
L/PRES SOL/CIRC	P0745	AT-313	
MAF SEN/CIRCUIT*2	P0100	EC-760	
MULTI CYL MISFIRE	P0300	EC-948	
NO SELF DIAGNOSTIC FAILURE INDICATED	P0000	—	
O/R CLTCH S/CIRC	P1760	AT-337	

TROUBLE DIAGNOSIS — INDEX

VG33E

Alphabetical & P No. Index for DTC (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	Reference page
P-N POS SW/CIRCUIT	P0705	EC-1174
PNP SW/CIRC	P0705	AT-250
PURG VOLUME CONT/V	P0443	EC-994
PURG VOLUME CONT/V	P1444	EC-1113
SFT SOL A/CIRC*2	P0750	AT-318
SFT SOL B/CIRC*2	P0755	AT-323
TCC SOLENOID/CIRC	P0740	AT-299
THERMOSTAT FNCTN	P1126	EC-1068
TP SEN/CIRC A/T*2	P1705	AT-328
TRTL POS SEN/CIRC*2	P0120	EC-781
TW CATALYST SYS-B1	P0420	EC-974
TW CATALYST SYS-B2	P0430	EC-974
VC CUT/V BYPASS/V	P1491	EC-1162
VC/V BYPASS/V	P1490	EC-1156
VEH SPEED SEN/CIRC*3	P0500	EC-1044
VEH SPD SEN/CIRC*3	P0720	AT-262
VENT CONTROL VALVE	P0446	EC-1001
VENT CONTROL VALVE	P1446	EC-1125
VENT CONTROL VALVE	P1448	EC-1144

*1: 1st trip DTC No. is the same as DTC No.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: This DTC is displayed with CONSULT-II only.

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

TROUBLE DIAGNOSIS — INDEX

VG33E

Alphabetical & P No. Index for DTC (Cont'd)

P NO. INDEX FOR DTC

—NEEC0522S02

DTC*1	Items (CONSULT-II screen terms)	Reference page	
—	Unable to access ECM	EC-730	GI
P0000	NO SELF DIAGNOSTIC FAILURE INDICATED	—	MA
P0100	MAF SEN/CIRCUIT*2	EC-760	EM
P0105	ABSL PRES SEN/CIRC	EC-769	LC
P0110	AIR TEMP SEN/CIRC	EC-771	EC
P0115	COOLANT T SEN/CIRC*2	EC-776	FE
P0120	THRTL POS SEN/CIRC*2	EC-781	CL
P0125	*COOLANT T SEN/CIRC	EC-794	MT
P0130	HO2S1 (B1)	EC-799	AT
P0131	HO2S1 (B1)	EC-810	TF
P0132	HO2S1 (B1)	EC-819	PD
P0133	HO2S1 (B1)	EC-828	AX
P0134	HO2S1 (B1)	EC-842	SU
P0135	HO2S1 HTR (B1)	EC-850	BR
P0137	HO2S2 (B1)	EC-857	ST
P0138	HO2S2 (B1)	EC-867	RS
P0139	HO2S2 (B1)	EC-877	BT
P0140	HO2S2 (B1)	EC-887	HA
P0141	HO2S2 HTR (B1)	EC-897	SC
P0150	HO2S1 (B2)	EC-799	EL
P0151	HO2S1 (B2)	EC-810	ID
P0152	HO2S1 (B2)	EC-819	IX
P0153	HO2S1 (B2)	EC-828	
P0154	HO2S1 (B2)	EC-842	
P0155	HO2S1 HTR (B2)	EC-850	
P0157	HO2S2 (B2)	EC-857	
P0158	HO2S2 (B2)	EC-867	
P0159	HO2S2 (B2)	EC-877	
P0160	HO2S2 (B2)	EC-887	
P0161	HO2S2 HTR (B2)	EC-897	
P0171	FUEL SYS LEAN/BK1	EC-905	
P0172	FUEL SYS RICH/BK1	EC-914	
P0174	FUEL SYS LEAN/BK2	EC-905	
P0175	FUEL SYS RICH/BK2	EC-914	
P0180	FUEL TEMP SEN/CIRC	EC-922	
P0217	ENG OVER TEMP	EC-927	

TROUBLE DIAGNOSIS — INDEX

VG33E

Alphabetical & P No. Index for DTC (Cont'd)

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0300	MULTI CYL MISFIRE	EC-948
P0301	CYL 1 MISFIRE	EC-948
P0302	CYL 2 MISFIRE	EC-948
P0303	CYL 3 MISFIRE	EC-948
P0304	CYL 4 MISFIRE	EC-948
P0305	CYL 5 MISFIRE	EC-948
P0306	CYL 6 MISFIRE	EC-948
P0325*4	KNOCK SENSOR	EC-957
P0335	CPS/CIRCUIT (OBD)	EC-961
P0340	CAM POS SEN/CIRC	EC-967
P0420	TW CATALYST SYS-B1	EC-974
P0430	TW CATALYST SYS-B2	EC-974
P0440	EVAP SMALL LEAK	EC-979
P0443	PURG VOLUME CONT/V	EC-994
P0455	EVAP GROSS LEAK	EC-1018
P0446	VENT CONTROL VALVE	EC-1001
P0450	EVAP SYS PRES SEN	EC-1007
P0455	EVAP GROSS LEAK	EC-1018
P0460	FUEL LV SE (SLOSH)	EC-1098
P0461	FUEL LEVEL SENSOR	EC-1037
P0464	FUEL LEVEL SEN/CIRC	EC-1039
P0500	VEH SPEED SEN/CIRC*4	EC-1044
P0505	IACV/AAC VLV/CIRC	EC-1048
P0510	CLOSED TP SW/CIRC	EC-1054
P0600*4	A/T COMM LINE	EC-1061
P0605	ECM	EC-1066
P0705	PNP SW/CIRC	AT-250
P0710	ATF TEMP SEN/CIRC	AT-256
P0720	VEH SPD SEN/CIRC A/T*4	AT-262
P0725	ENGINE SPEED SIG	AT-267
P0731	A/T 1ST GR FNCTN	AT-272
P0732	A/T 2ND GR FNCTN	AT-278
P0733	A/T 3RD GR FNCTN	AT-284
P0734	A/T 4TH GR FNCTN	AT-290
P0740	TCC SOLENOID/CIRC	AT-299
P0744	A/T TCC S/V FNCTN	AT-304
P0745	L/PRESS SOL/CIRC	AT-313

TROUBLE DIAGNOSIS — INDEX

VG33E

Alphabetical & P No. Index for DTC (Cont'd)

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0750	SFT SOL A/CIRC*2	AT-318
P0755	SFT SOL B/CIRC*2	AT-323
P1126	THERMOSTAT FNCTN	EC-1068
P1148	CLOSED LOOP-B1	EC-1070
P1168	CLOSED LOOP-B2	EC-1070
P1217*4	ENG OVER TEMP	EC-1072
P1336	CPS/CIRC (OBD) COG	EC-1089
P1441	EVAP VERY SMALL LEAK	EC-1098
P1444	PURG VOLUME CONT/V	EC-1113
P1446	VENT CONTROL VALVE	EC-1125
P1447	EVAP PURG FLOW/MON	EC-1132
P1448	VENT CONTROL VALVE	EC-1144
P1464	FUEL LEVL SEN/CIRC	EC-1152
P1490	VC/V BYPASS/V	EC-1156
P1491	VC CUT/V BYPASS/V	EC-1162
P1605	A/T DIAG COMM LINE	EC-1171
P1705	TP SEN/CIRC A/T*2	AT-328
P1706	P-N POS SW/CIRCUIT	EC-1174
P1760	O/R CLUTCH SOL/CIRC	AT-337

*1: 1st trip DTC No. is the same as DTC No.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: This DTC is displayed with CONSULT-II only.

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

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Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

NEEC0523

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.
- The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.

Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NEEC0524

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to *EL-5*, "HARNESS CONNECTOR".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

Engine Fuel & Emission Control System

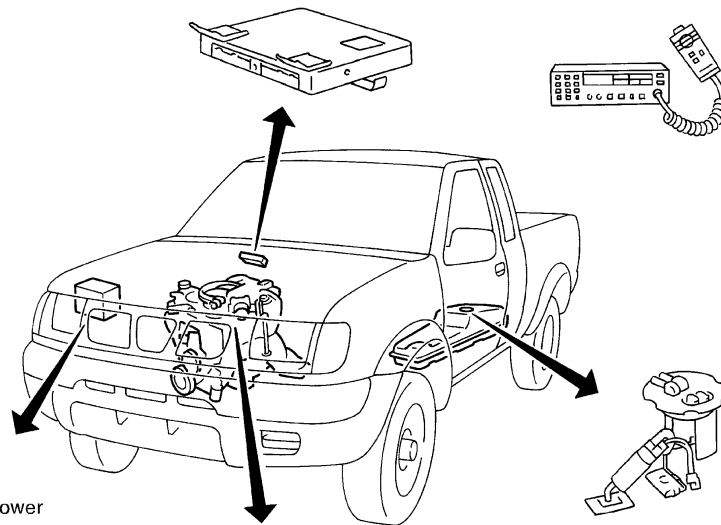
NEEC0525

ECM

- Do not disassemble ECM.
- Do not turn on board diagnostic test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
- 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

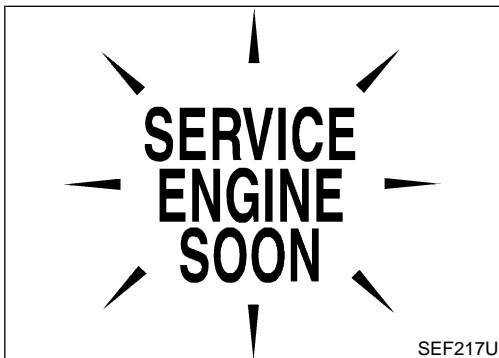
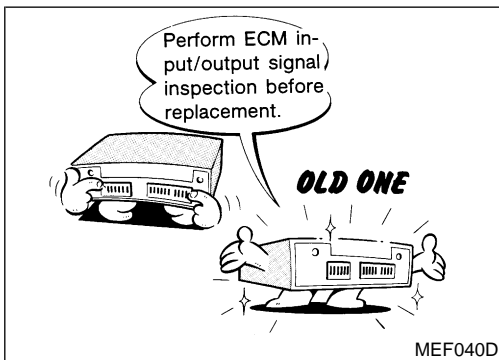
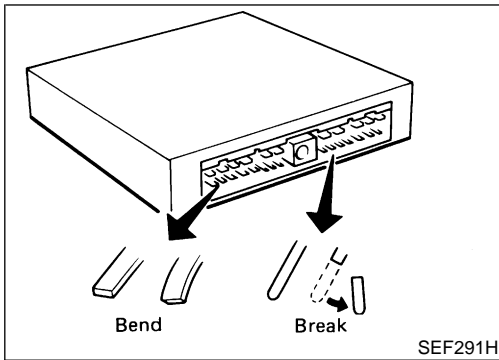
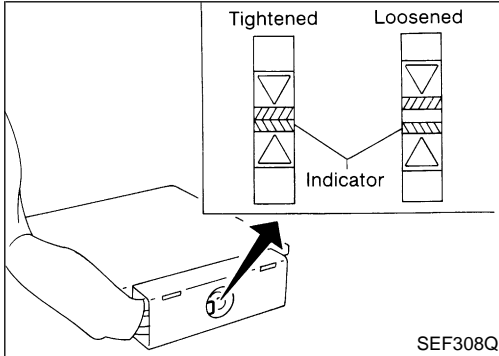
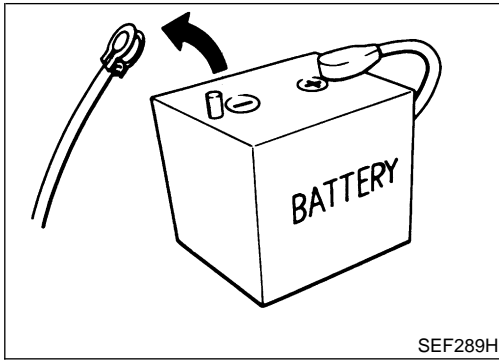
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.


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Precautions

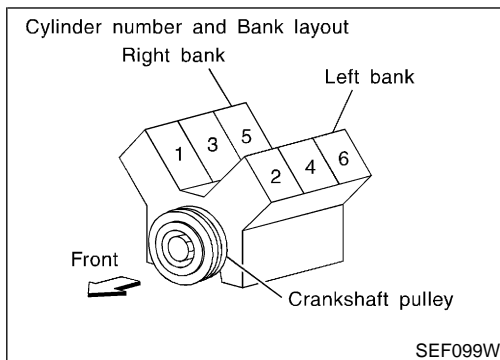
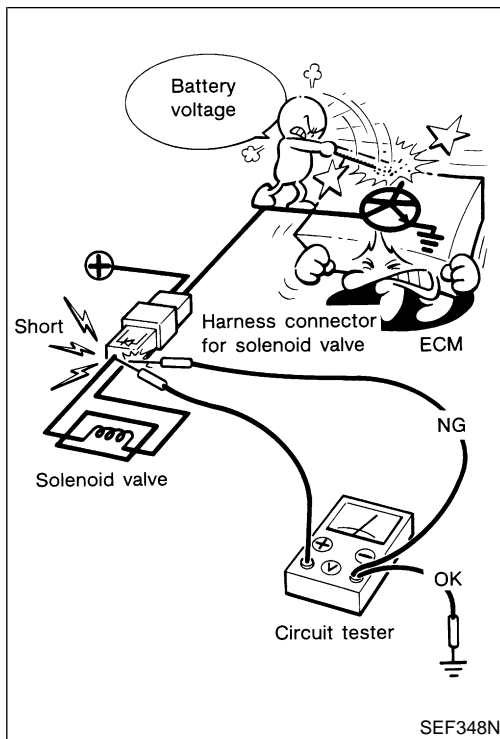
NEEC0526

- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 -  : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-740.
- After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”. The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed.

PRECAUTIONS

VG33E

Precautions (Cont'd)



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

- Regarding model D22, “-B1” indicates the right bank and “-B2” indicates the left bank as shown in the figure.

Wiring Diagrams and Trouble Diagnosis

When you read Wiring diagrams, refer to the following:

- **GI-11**, “HOW TO READ WIRING DIAGRAMS”
- **EL-9**, “POWER SUPPLY ROUTING”

When you perform trouble diagnosis, refer to the following:

- **GI-34**, “How to Follow Test Groups in Trouble Diagnoses”
- **GI-23**, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

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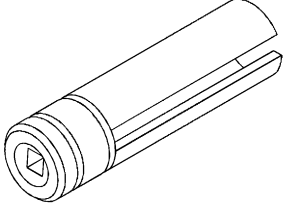
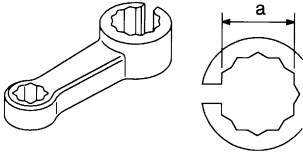
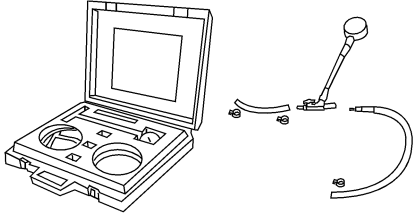
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Special Service Tools

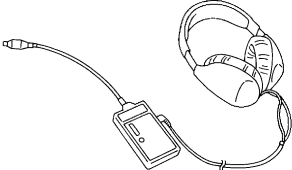
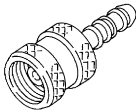
NEEC0528

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench		Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
	NT379	
KV10114400 (J-38365) Heated oxygen sensor wrench		Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)
	NT636	
(J-44321) Fuel pressure gauge kit		Checking fuel pressure
	LEC642	

Commercial Service Tools

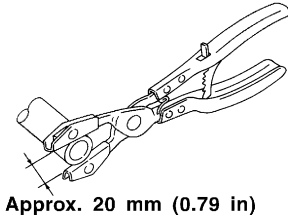
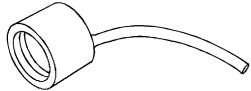
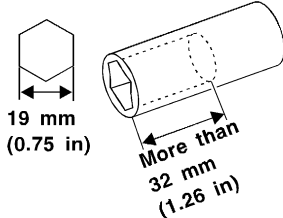
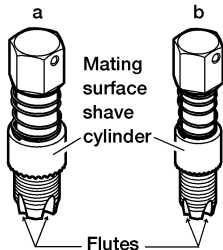
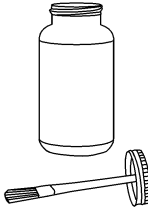
NEEC0529

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)		Locating the EVAP leak
	NT703	
EVAP service port adapter (J41413-OBD)		Applying positive pressure through EVAP service port
	NT704	

PREPARATION

VG33E

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description	
Hose clipper	 <p>Approx. 20 mm (0.79 in)</p> <p>NT720</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p>
Fuel filler cap adapter	 <p>NT653</p>	<p>EC</p> <p>FE</p> <p>CL</p>
Socket wrench	 <p>19 mm (0.75 in)</p> <p>More than 32 mm (1.26 in)</p> <p>NT705</p>	<p>MT</p> <p>AT</p> <p>TF</p>
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 <p>a</p> <p>b</p> <p>Mating surface shave cylinder</p> <p>Flutes</p> <p>AEM488</p>	<p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p>
Anti-seize lubricant (Permatex [®] 133AR or equivalent meeting MIL specification MIL-A-907)	 <p>AEM489</p>	<p>ST</p> <p>RS</p> <p>BT</p>

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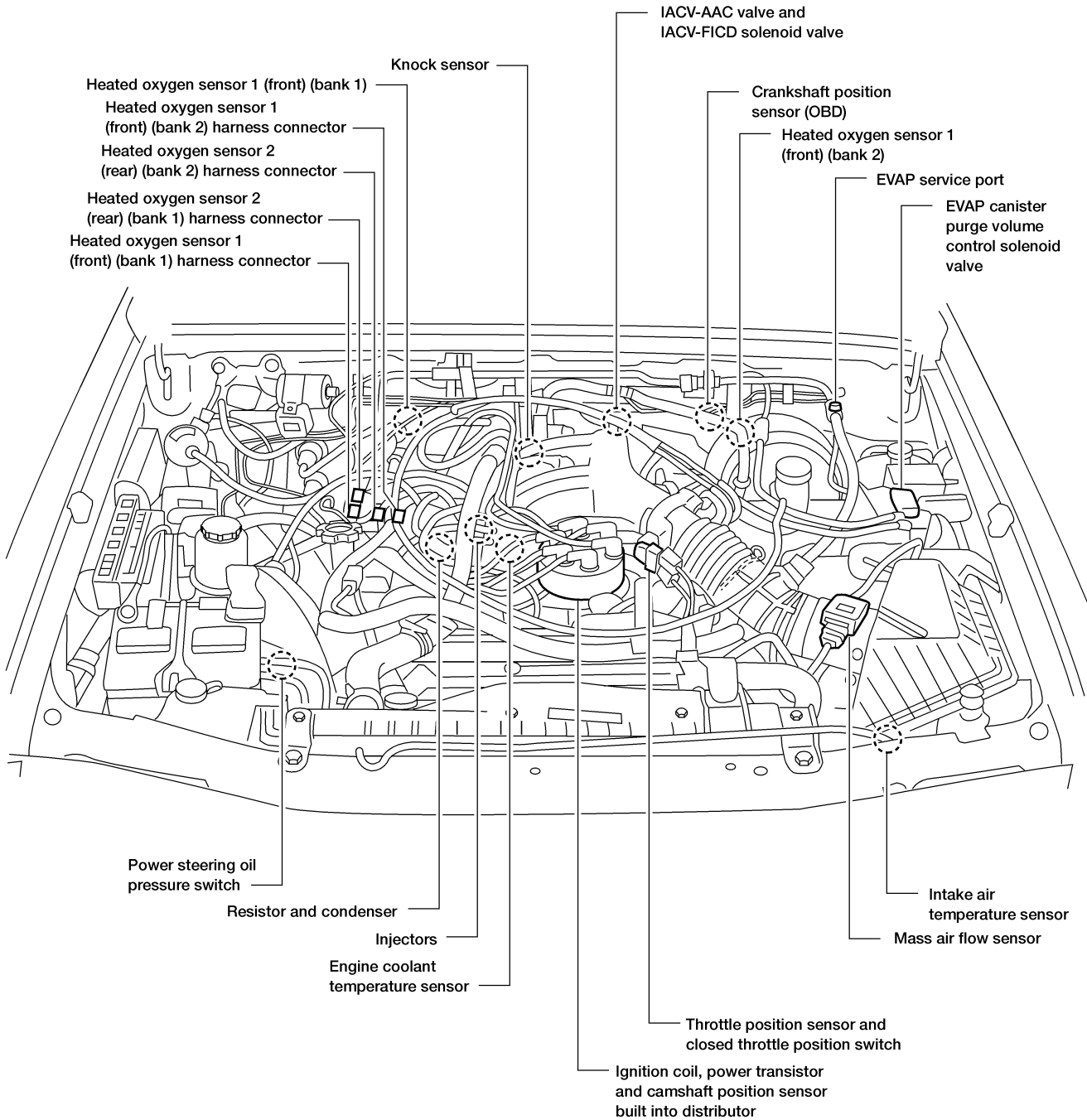
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Engine Control Component Parts Location

NEEC0530



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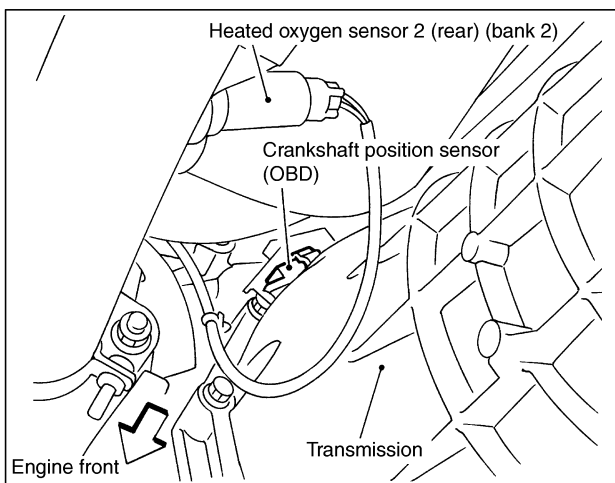
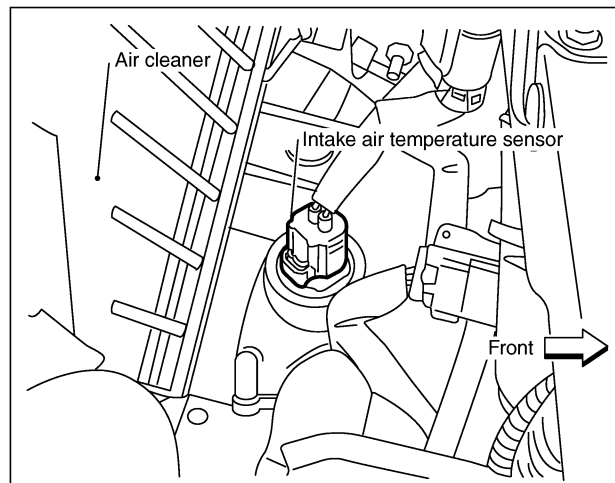
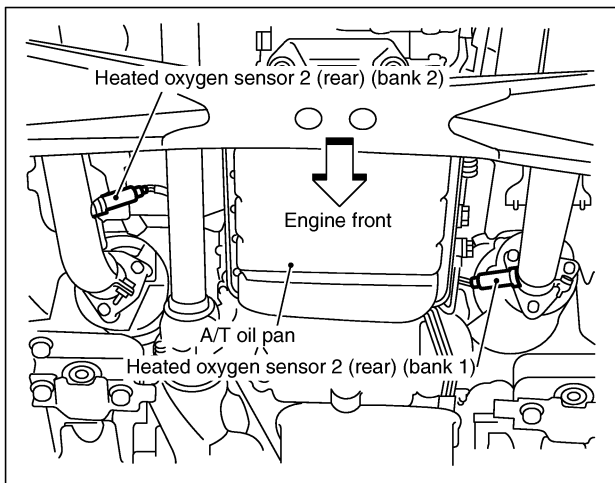
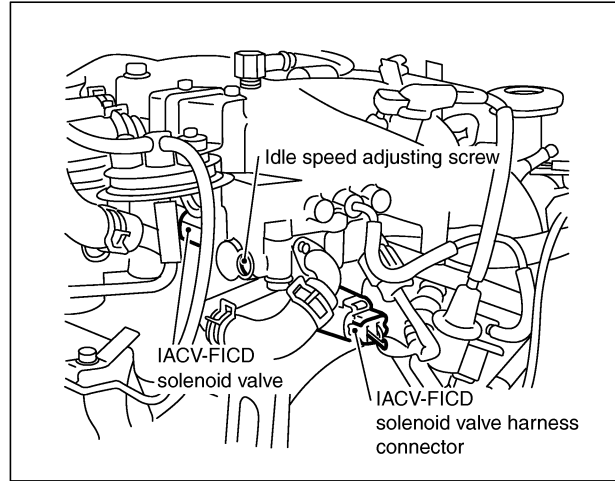
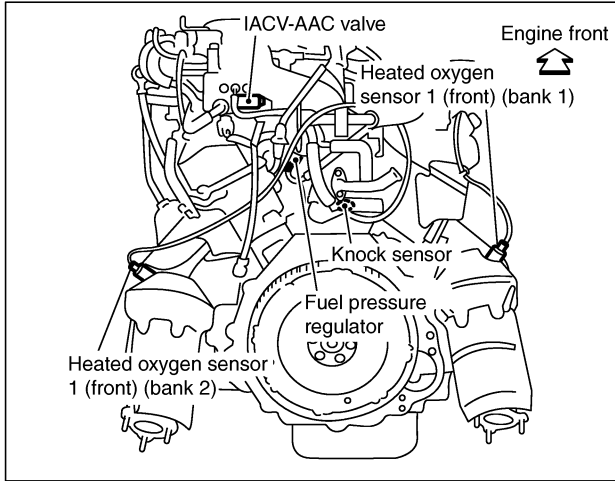
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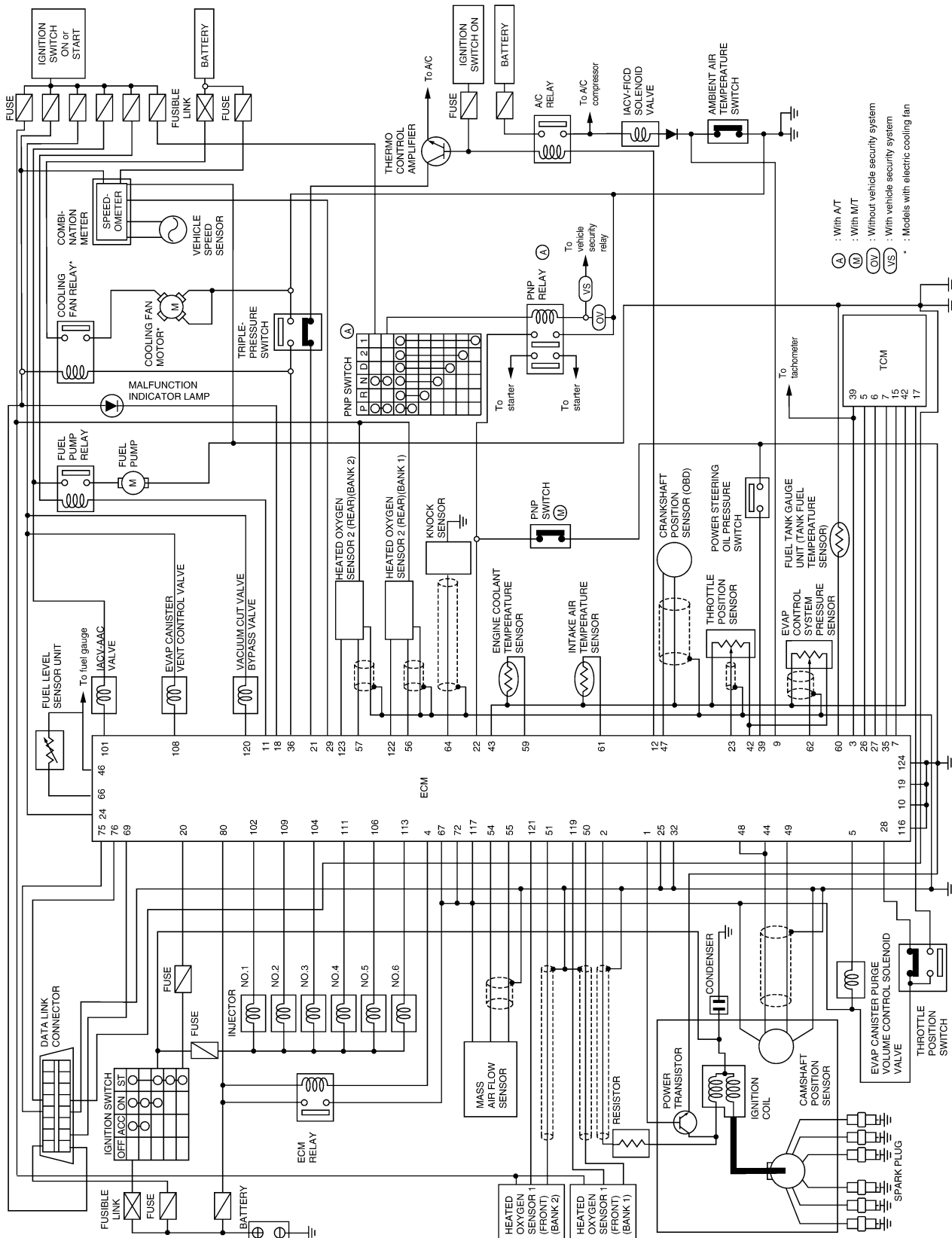
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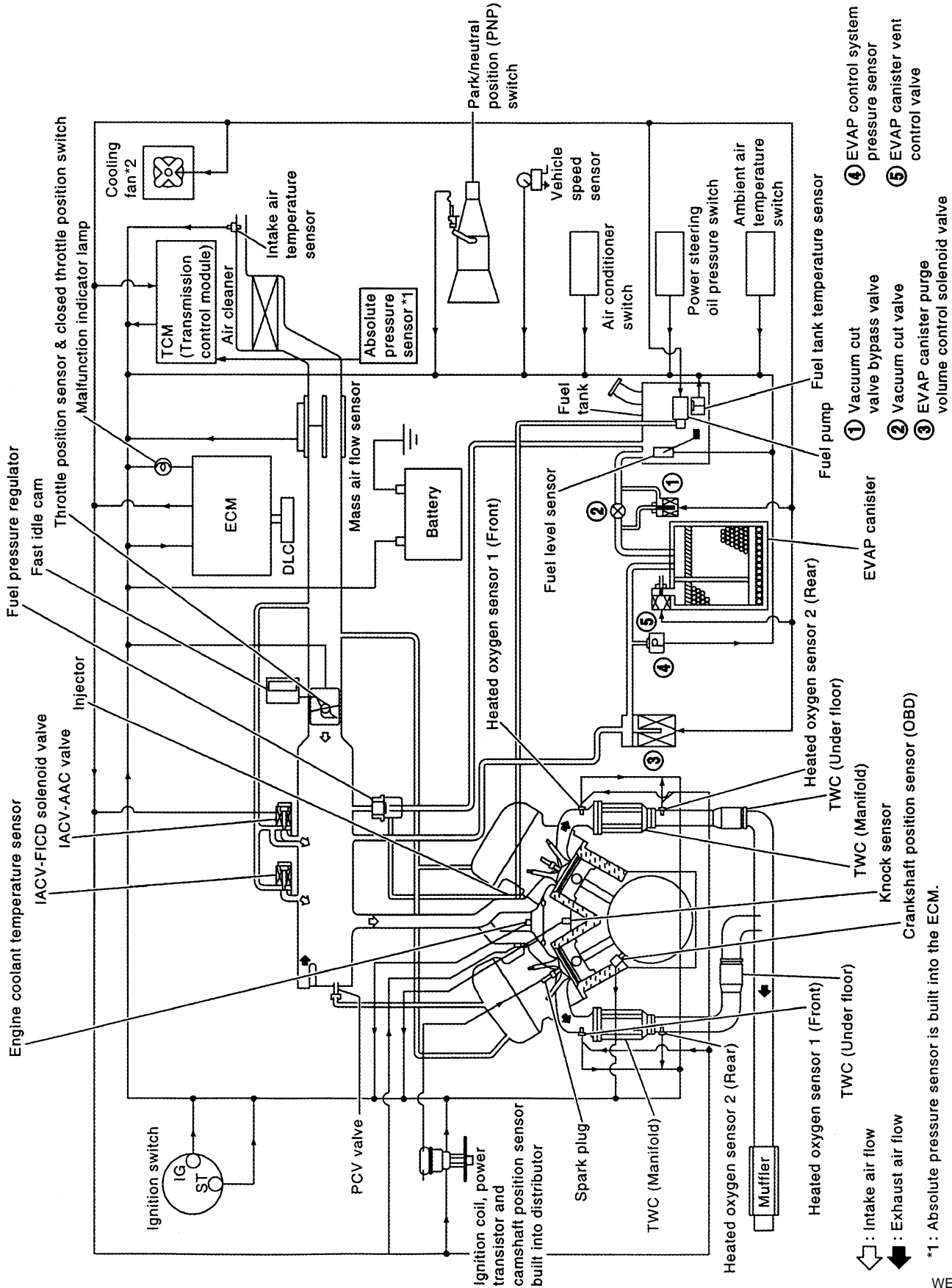
Circuit Diagram

NEEC0531



System Diagram

NEEC0532

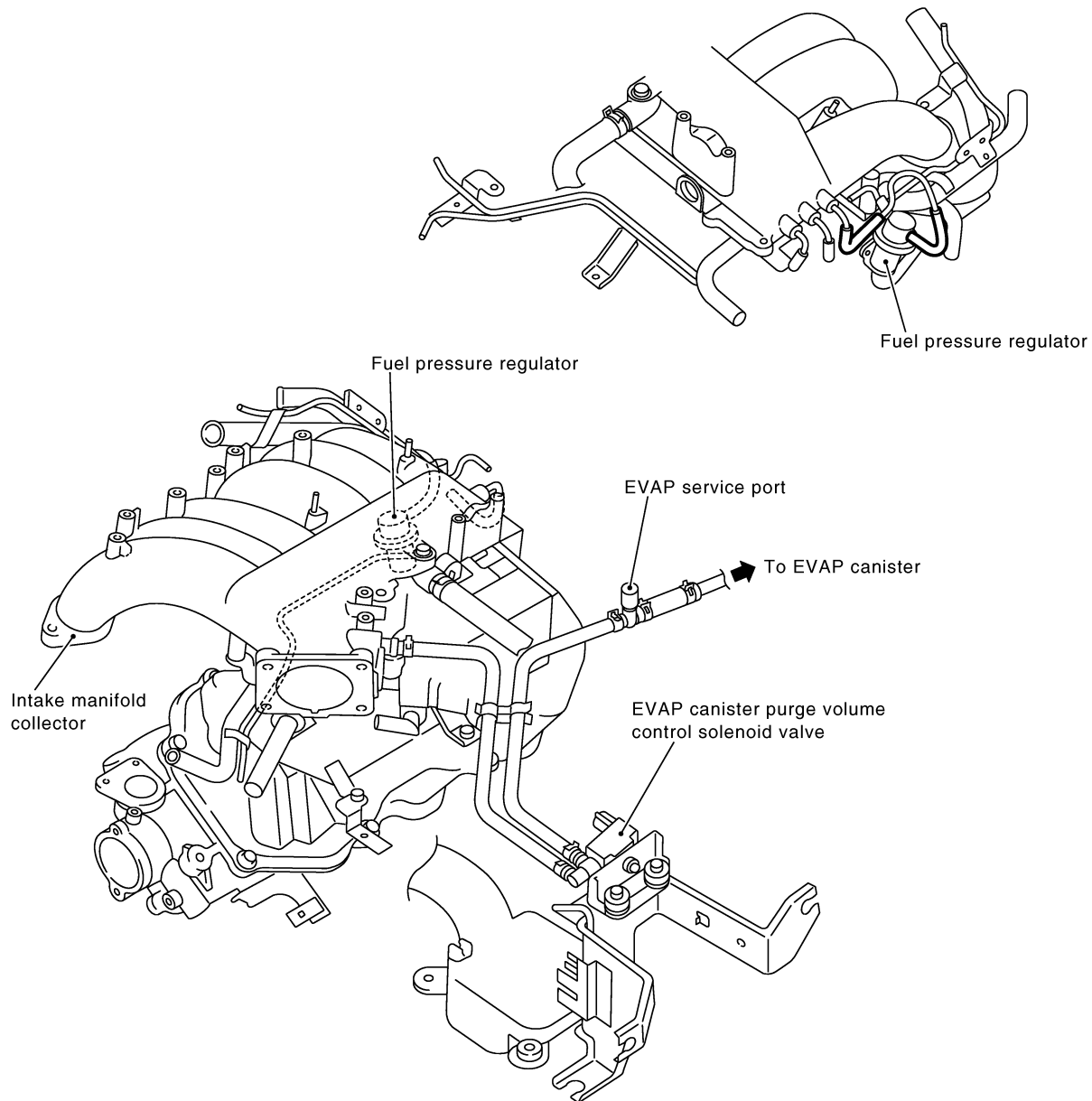


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Vacuum Hose Drawing

NEEC0533

Refer to "System Diagram", EC-633 for Vacuum Control System.



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF794Z

System Chart

NEEC0534

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 (front) ● Ignition switch ● Throttle position sensor ● Closed throttle position switch *4 ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● Intake air temperature sensor ● Absolute pressure sensor (Built into ECM) ● EVAP control system pressure sensor *1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Fuel tank temperature sensor *1 ● Crankshaft position sensor (OBD) *1 ● Rear heated oxygen sensor *3 ● TCM (Transmission control module) *2 ● Ambient air temperature switch 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control *5	Cooling fan relays*5
ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve 	

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

*2: The DTC related to A/T will be sent to ECM.

*3: This sensor is not used to control the engine system under normal conditions.

*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

*5: Models with electric cooling fan.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NEEC0535

NEEC0535S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor (Built into ECM)	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

* Under normal conditions, this sensor is not for engine control operation.

Basic Multiport Fuel Injection System

NEEC0535S02

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the camshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NEEC0535S03

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

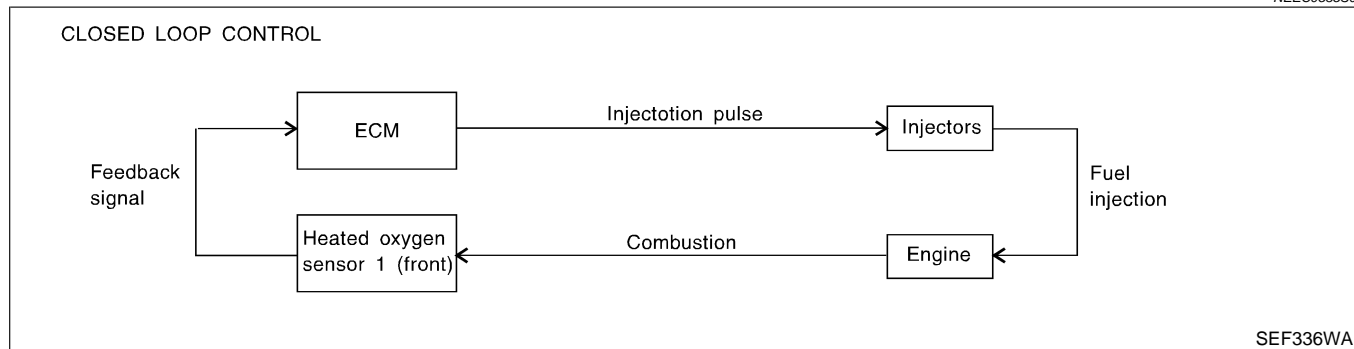
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D"
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NEEC0535S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-799. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 (rear) is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NEEC0535S05

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

Mixture Ratio Self-learning Control

NEEC0535S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

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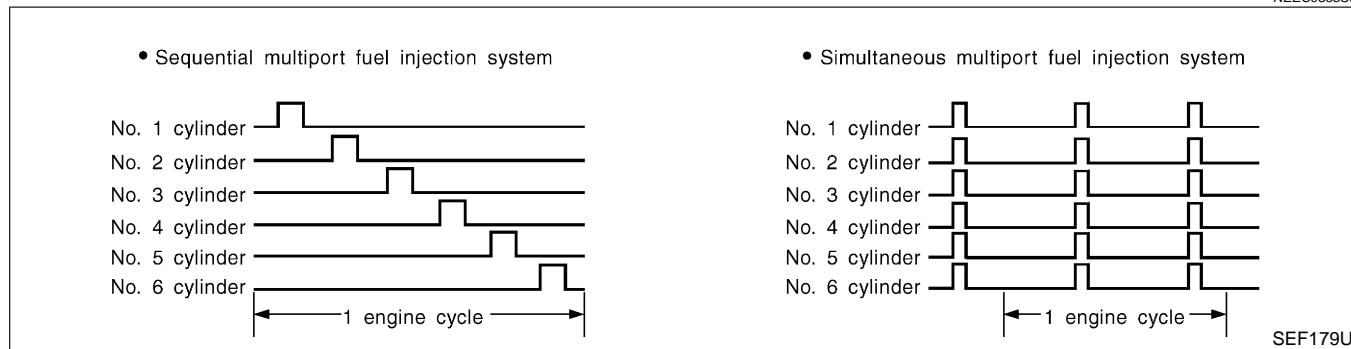
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Multiport Fuel Injection (MFI) System (Cont'd)

Fuel Injection Timing

NEEC0535S07



SEF179U

Two types of systems are used.

Sequential Multiport Fuel Injection System

NEEC0535S0701

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

NEEC0535S0702

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NEEC0535S08

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

NEEC0536

NEEC0536S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

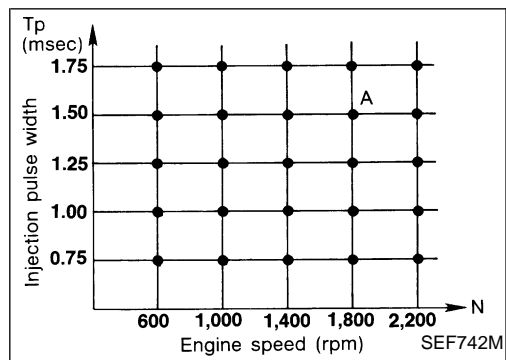
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Distributor Ignition (DI) System (Cont'd)

System Description

NEEC0536S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

e.g., N: 1,800 rpm, Tp: 1.50 msec

A °BTDC

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

NEEC0537

NEEC0537S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NEEC0537S02

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

DTC P0217 Coolant Overtemperature Enrichment Protection (Without Electric Cooling Fan)

DTC P0217 Coolant Overtemperature Enrichment Protection (Without Electric Cooling Fan)

DESCRIPTION

Input/Output Signal Chart

NEEC0538

NEEC0538S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

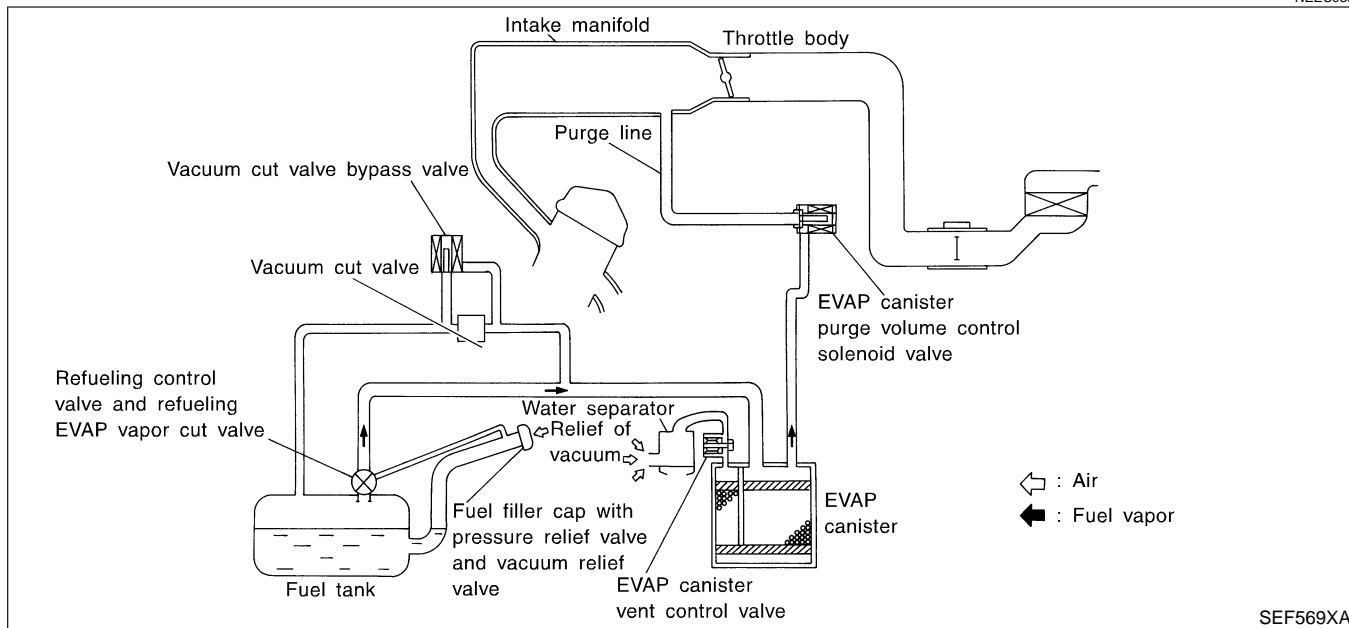
NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-636.

Evaporative Emission System

DESCRIPTION

NEEC0539



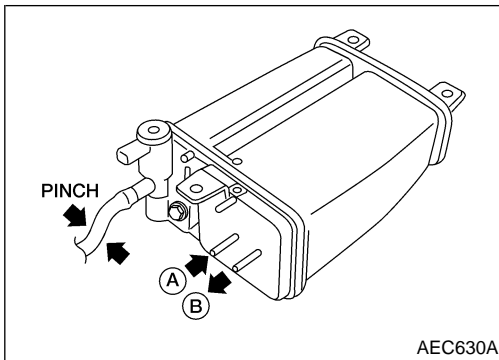
SEF569XA

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases. EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



AEC630A

INSPECTION

EVAP Canister

NEEC0540

NEEC0540S01

Check EVAP canister as follows:

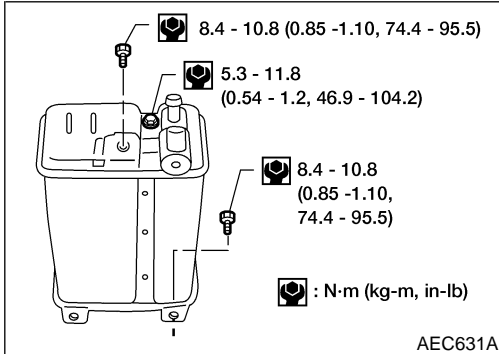
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.

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Tightening Torque

NEEC0540S02

Tighten EVAP canister as shown in the figure.

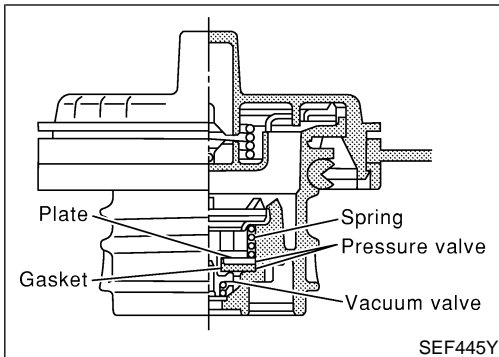
Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

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SEF445Y

Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

NEEC0540S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

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CAUTION:

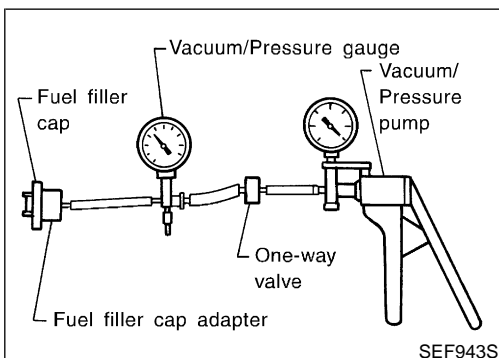
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come ON

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SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NEEC0540S04

Refer to EC-1162.

BT

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

NEEC0540S05

Refer to EC-994.

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Tank Fuel Temperature Sensor

NEEC0540S06

Refer to EC-922.

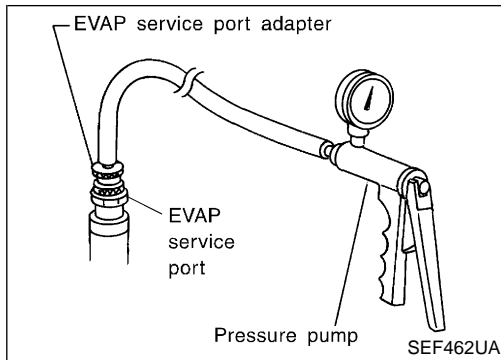
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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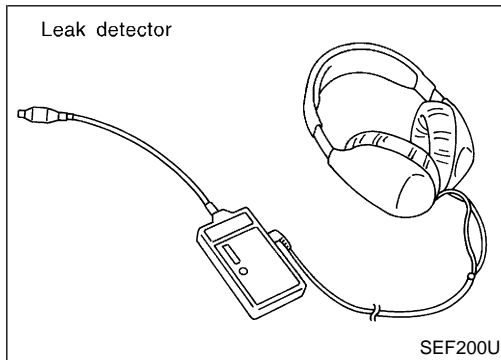
Evaporative Emission System (Cont'd)



Evap Service Port

NEEC0540S07

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

NEEC0540S08

CAUTION:

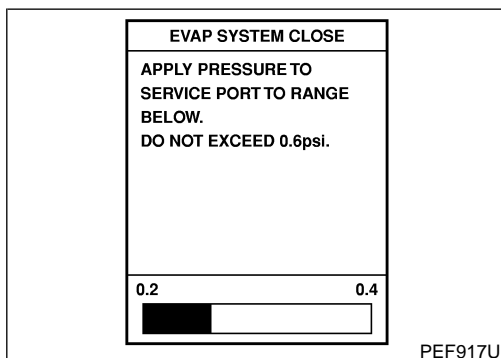
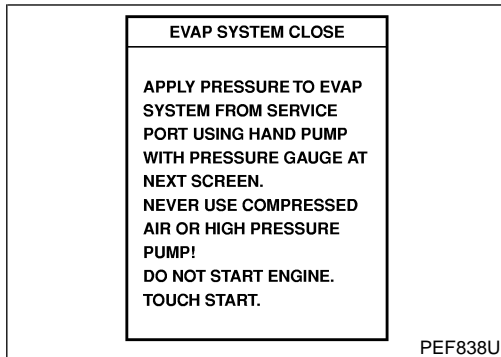
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

Ⓜ With CONSULT-II

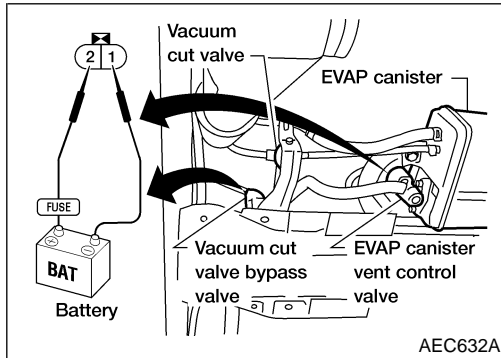
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose to the EVAP service port adapter.
- 3) Turn ignition switch ON.
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



⊗ Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
- 3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 5) Remove EVAP service port adapter and hose with pressure pump.
- 6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

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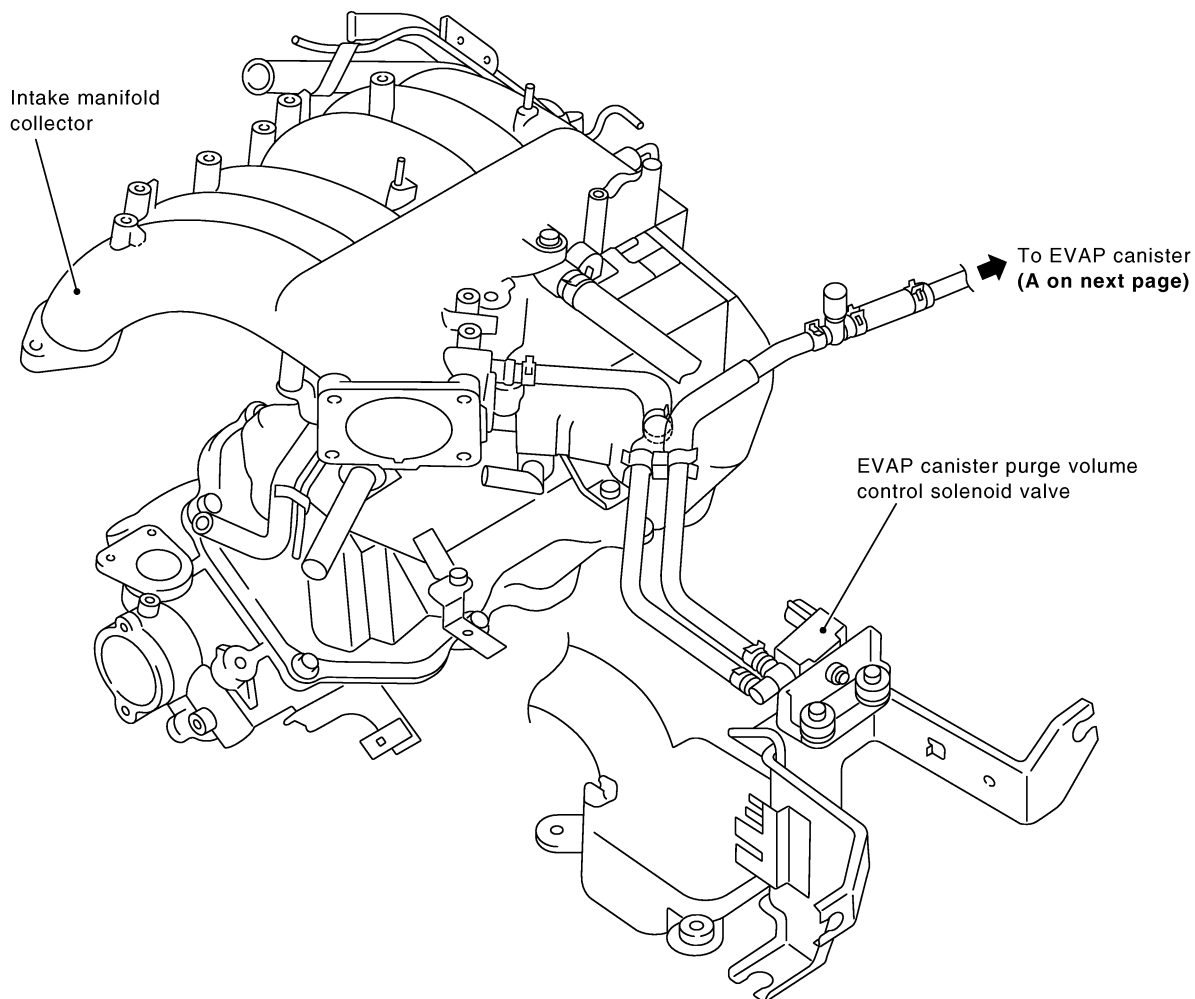
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

NEEC0541



NOTE:

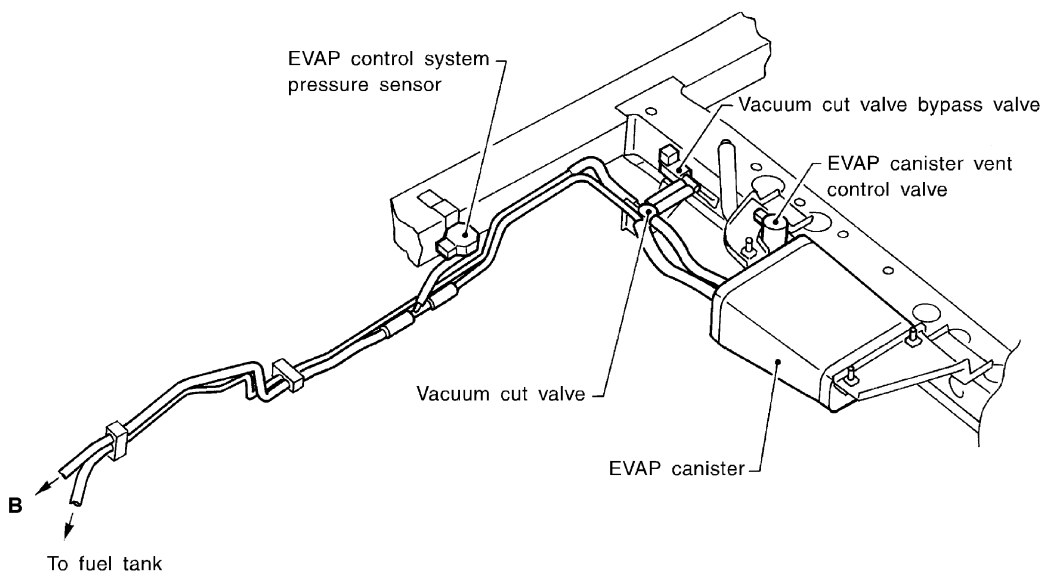
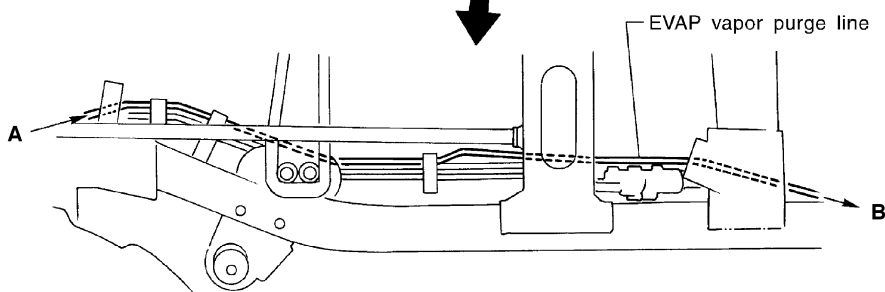
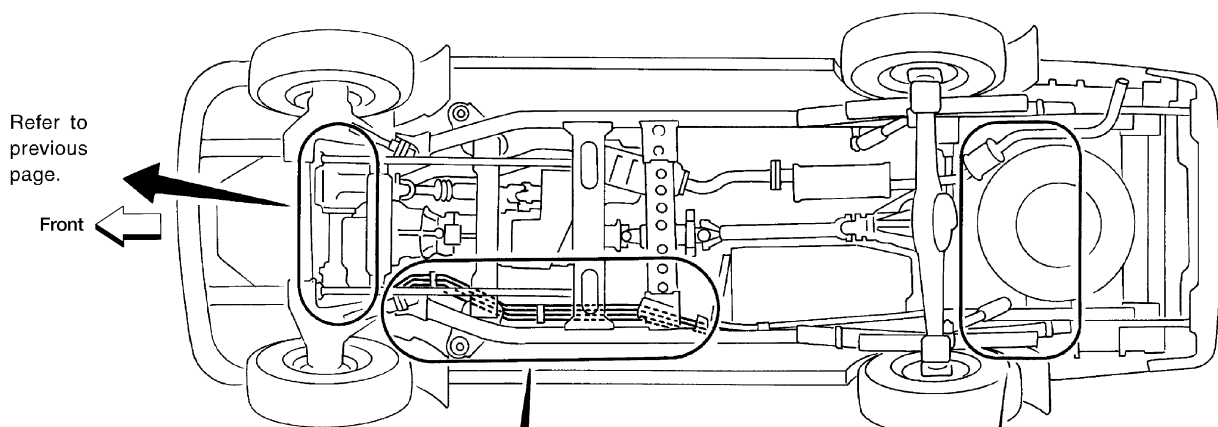
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF795Z

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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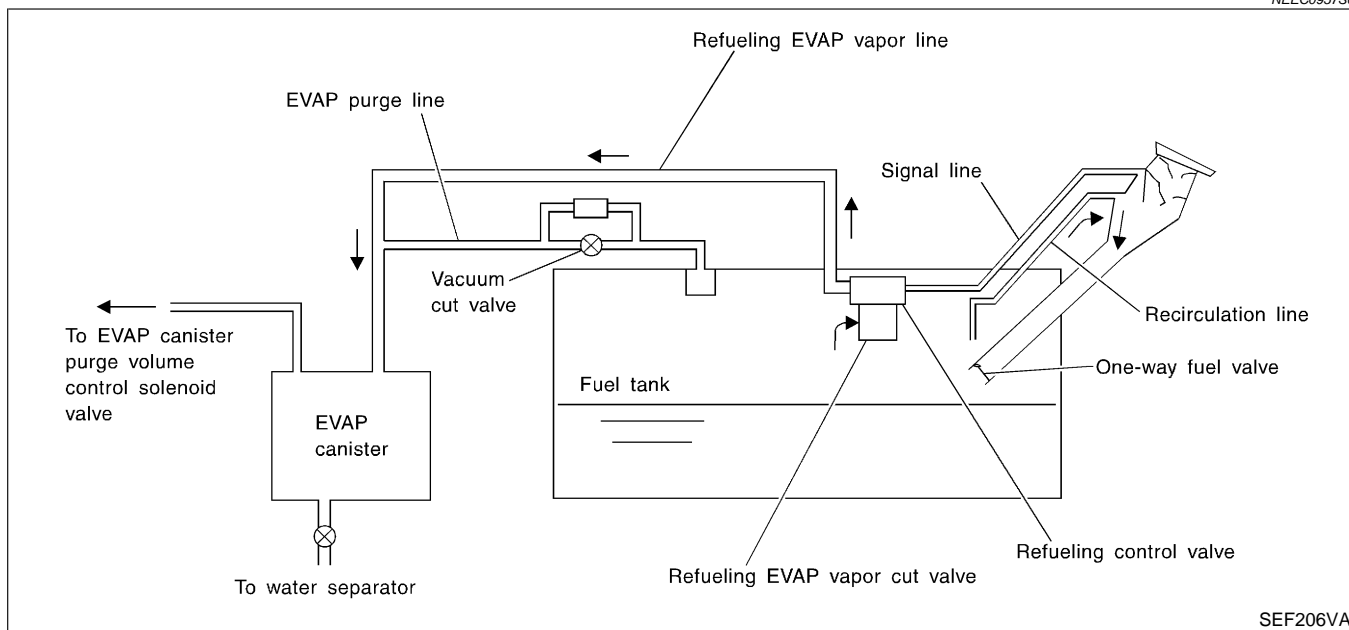
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NEEC0957

SYSTEM DESCRIPTION

NEEC0957S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a “CAUTION: INFLAMMABLE” sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

Before removing fuel line parts, carry out the following procedures:

- a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to “Fuel Pressure Release”, EC-658.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
 - Do not kink or twist hose and tube when they are installed.
 - Do not tighten hose and clamps excessively to avoid damaging hoses.
 - After installation, run engine and check for fuel leaks at connection.
 - Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

DIAGNOSTIC PROCEDURE

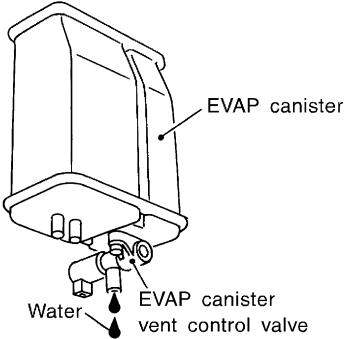
NEEC0957S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NEEC0957S0201

1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

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2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
<small>SEF596U</small>		
Yes or No		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

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3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
	▶	GO TO 4.

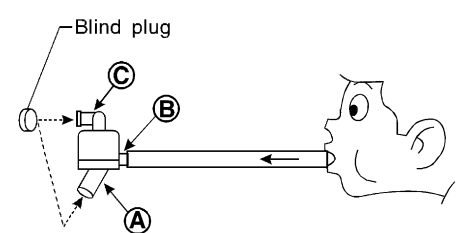
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Replace water separator.

5	DETECT MALFUNCTIONING PART
<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p>	
▶	Repair or replace EVAP hose.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

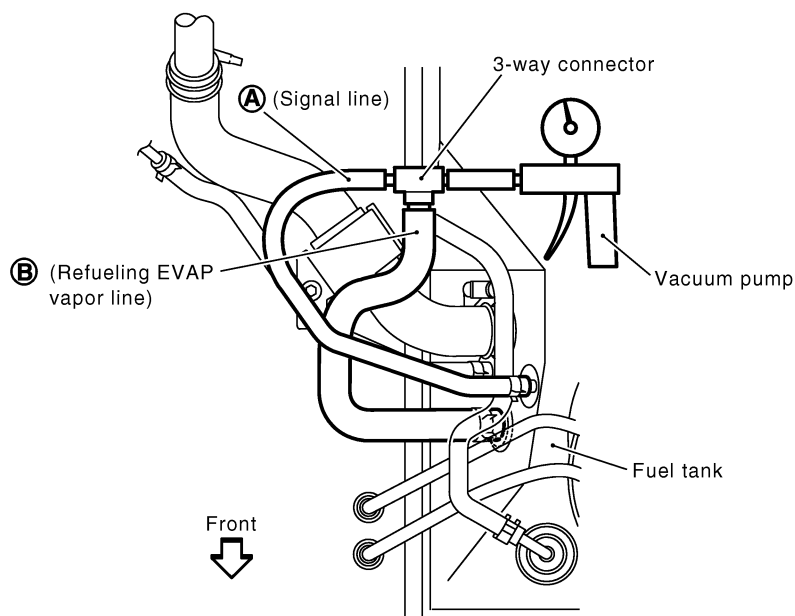
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM."
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

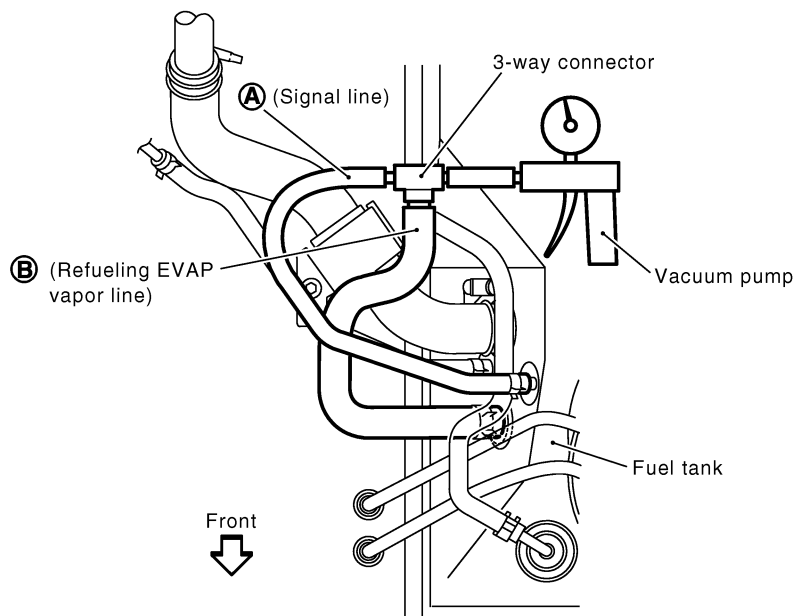
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel gauge retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. <div style="text-align: center; margin-top: 20px;"> </div> <p style="text-align: right; margin-top: 10px;">SEF706Z</p>	GI MA EM LC EC FE CL MT AT TF
OK or NG			
OK	▶	INSPECTION END	
NG	▶	Replace refueling control valve with fuel tank.	

Symptom: Cannot Refuel/Fuel Odor From The Fuel Filler Opening Is Strong While Refueling.

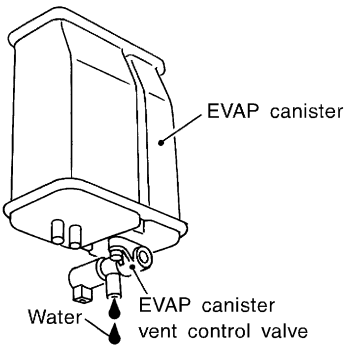
NEEC0957S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). <p style="text-align: center; margin-top: 10px;">OK or NG</p>	AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 2.	
NG	▶	GO TO 3.	

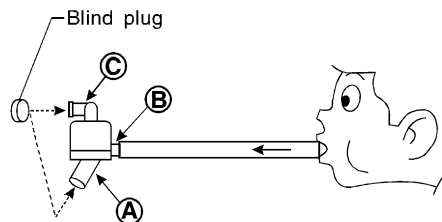
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
▶		
GO TO 4.		

4	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
<ul style="list-style-type: none"> ● Do not disassemble water separator. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.		
▶		
Repair or replace EVAP hose.		

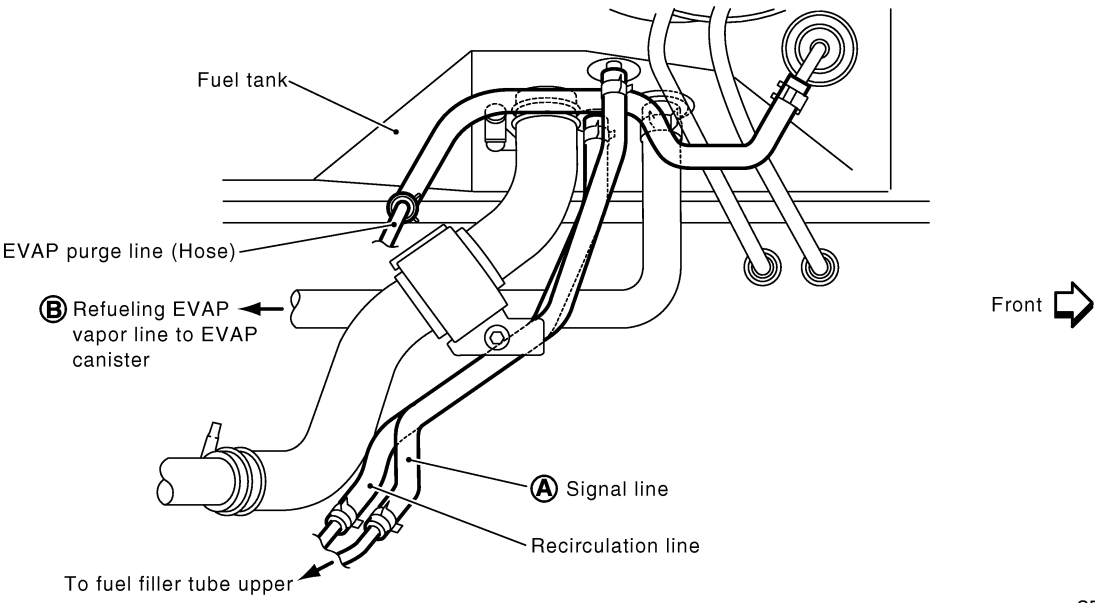
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

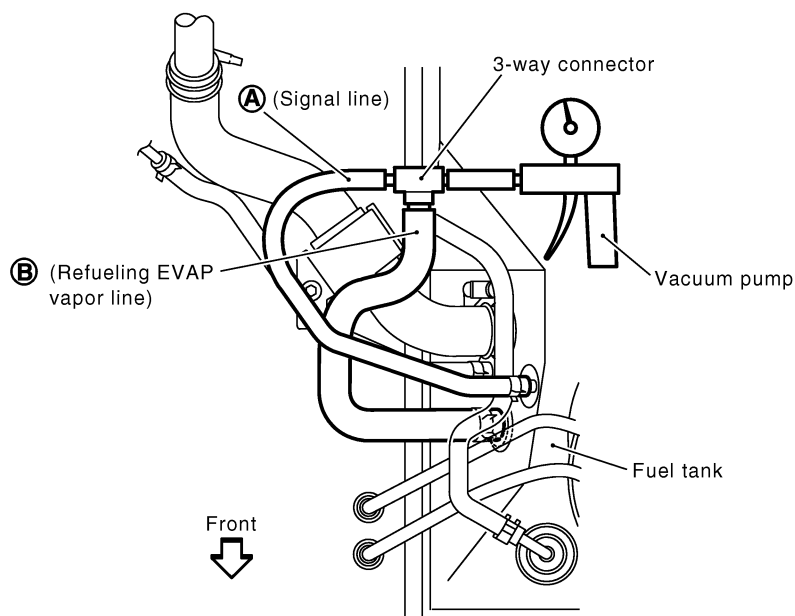
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

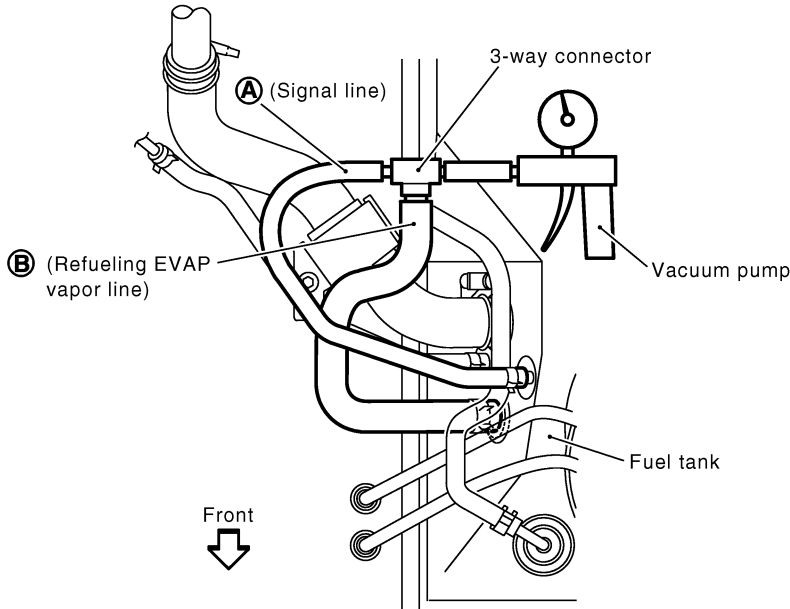
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel gauge retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel gauge retainer with fuel gauge unit. <p>Always replace O-ring with new one.</p> <ol style="list-style-type: none"> c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

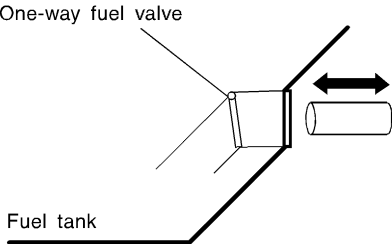
12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

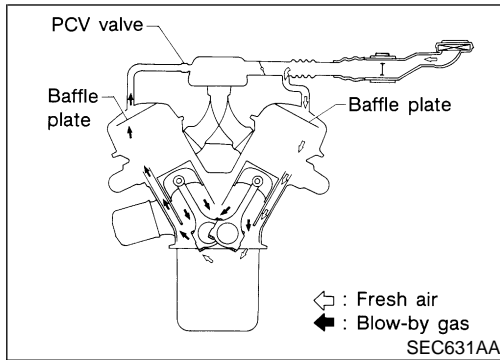
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

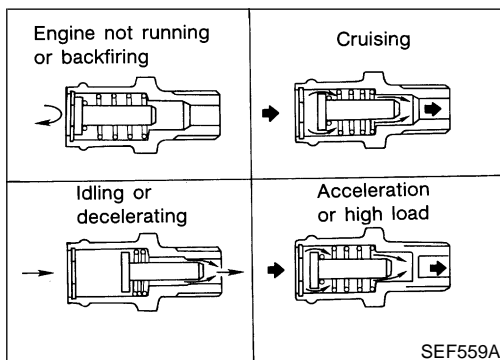
13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;">  <p>One-way fuel valve</p> <p>Fuel tank</p> </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Positive Crankcase Ventilation DESCRIPTION

NEEC0542

This system returns blow-by gas to the intake manifold. The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction. On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



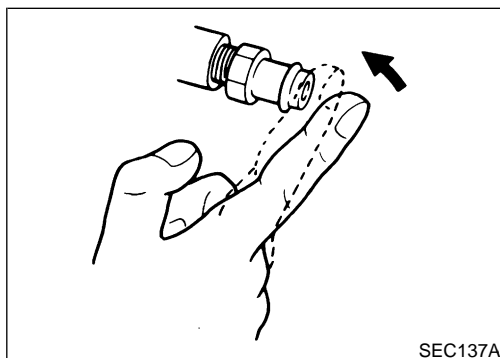
INSPECTION

NEEC0543

PCV (Positive Crankcase Ventilation) Valve

NEEC0543S01

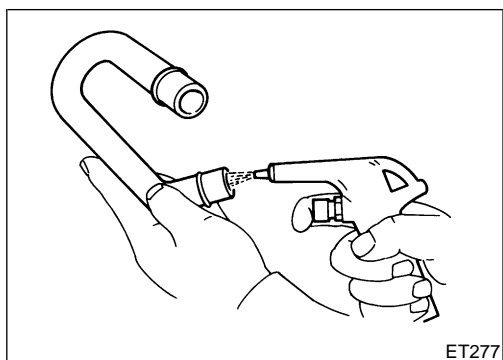
With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Positive Crankcase Ventilation (Cont'd)



PCV Valve Ventilation Hose

NEEC0543S02

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

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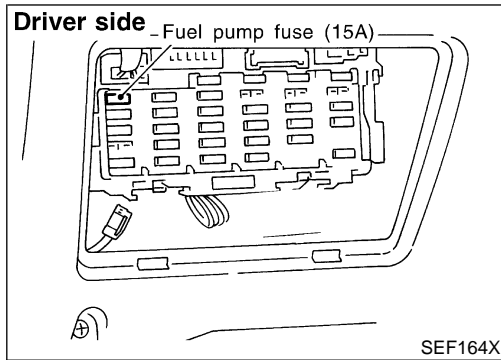
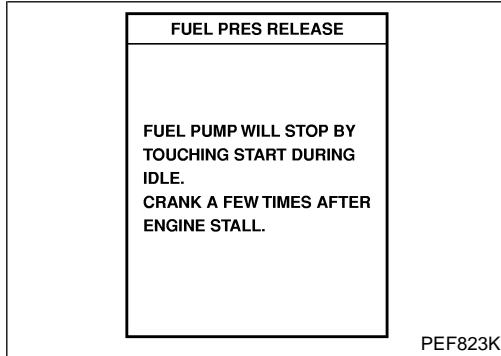
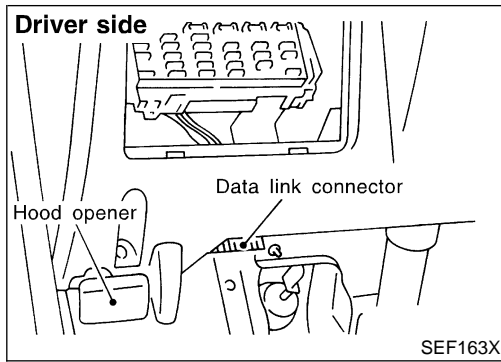
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Fuel Pressure Release



Fuel Pressure Release

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NEEC0544

WITH CONSULT-II

NEEC0544S01

1. Turn ignition switch ON.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

WITHOUT CONSULT-II

NEEC0544S02

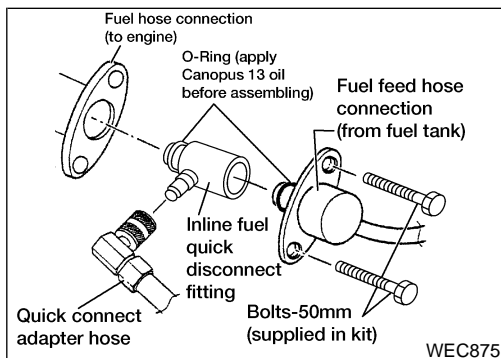
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

NEEC0545

- Use Fuel Pressure Gauge J-44321 to check fuel pressure.
- Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the the fuel hose (to engine).



3. Connect the fuel pressure test gauge (quick connect adapter hose) to quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

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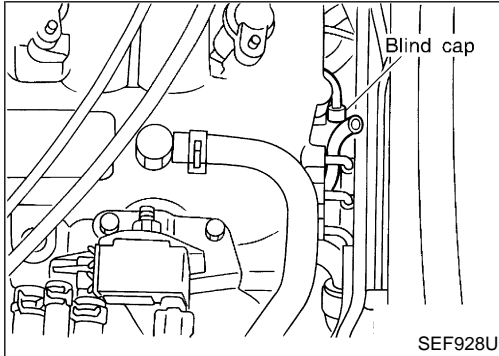
With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)

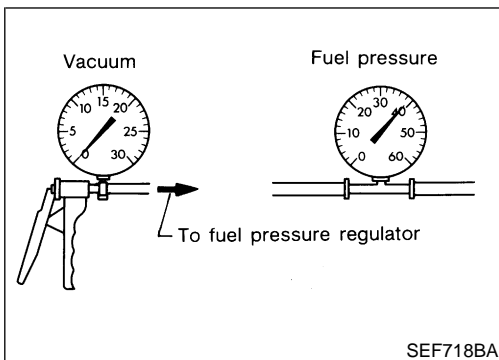
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

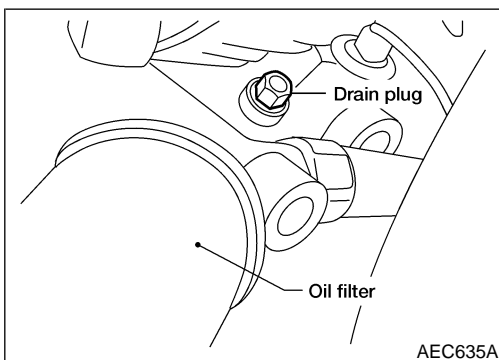
NEEC0546

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

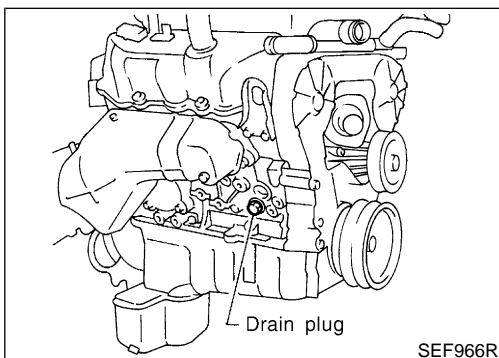
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



Injector REMOVAL AND INSTALLATION

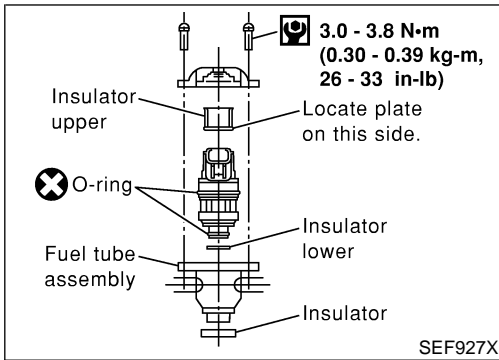
NEEC0547

1. Release fuel pressure to zero. Refer to EC-658.
2. Drain coolant.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine. The following parts should be disconnected or removed.
 - a. Harness connectors for
 - IACV-AAC valve
 - IACV-FICD solenoid valve
 - Throttle position sensor and closed throttle position switch assembly
 - Ground harness
 - b. PCV valve ventilation hoses
 - c. Vacuum hoses for
 - Brake booster
 - Fuel pressure regulator
 - d. Air hoses from
 - Air duct
 - IACV-AAC valve

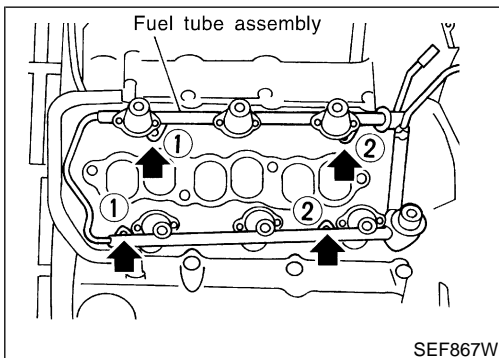


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- e. Water hoses for
 - Throttle body
 - Air relief plug
- f. EVAP canister purge hose
- 5. Remove injector fuel tube assembly. The following parts should be disconnected or removed.
 - Vacuum hose for fuel pressure regulator
 - Fuel feed and return hose
 - All injectors harness connectors
 - **Push injector tail piece.**
 - **Do not pull on connector.**
 - **Do not extract injector by pinching.**



- 6. Push out any malfunctioning injector from injector fuel tube.
- 7. Replace or clean injector as necessary.
 - **Always replace O-rings with new ones.**
 - **Lubricate O-rings with engine oil.**
- 8. Install injector to injector fuel tube assembly.



- 9. Install injectors with fuel tube assembly to intake manifold. **Tighten in numerical order shown in the figure.**
 - a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg·m, 3.6 to 4.4 ft·lb).
 - b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg·m, 8 to 11 ft·lb).
- 10. Reinstall any part removed in reverse order of removal.

CAUTION:
After properly connecting fuel hose to injector and fuel tube, check connection for fuel leakage.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

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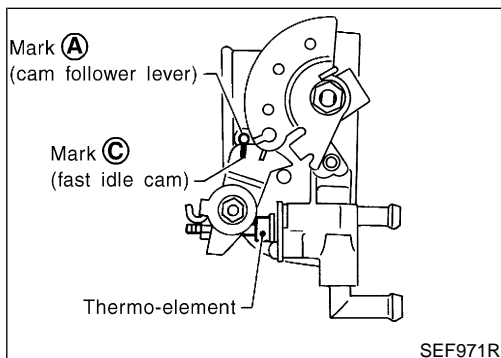
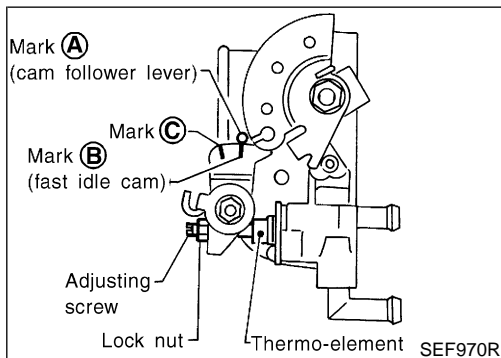
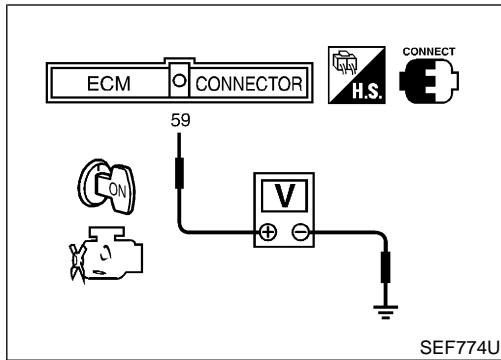
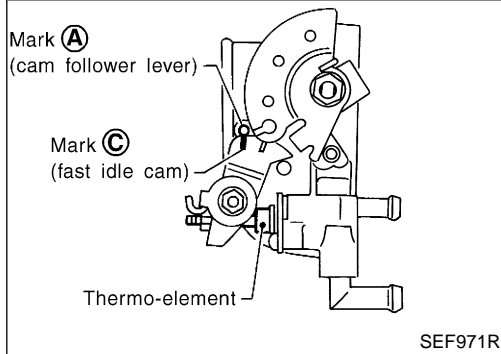
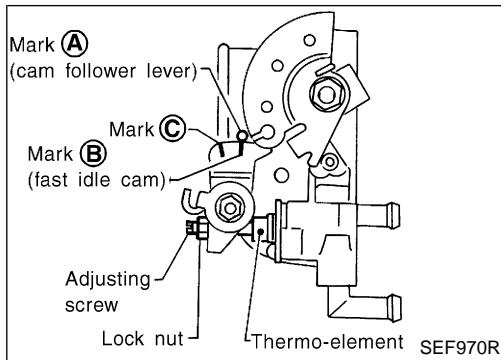
Fast Idle Cam (FIC) INSPECTION AND ADJUSTMENT

With CONSULT-II

- 1. Turn ignition switch ON.
- 2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

NEEC0548

NEEC0548S01



- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

~~⊗~~ **Without CONSULT-II**
NEEC0548S02

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NEEC0549

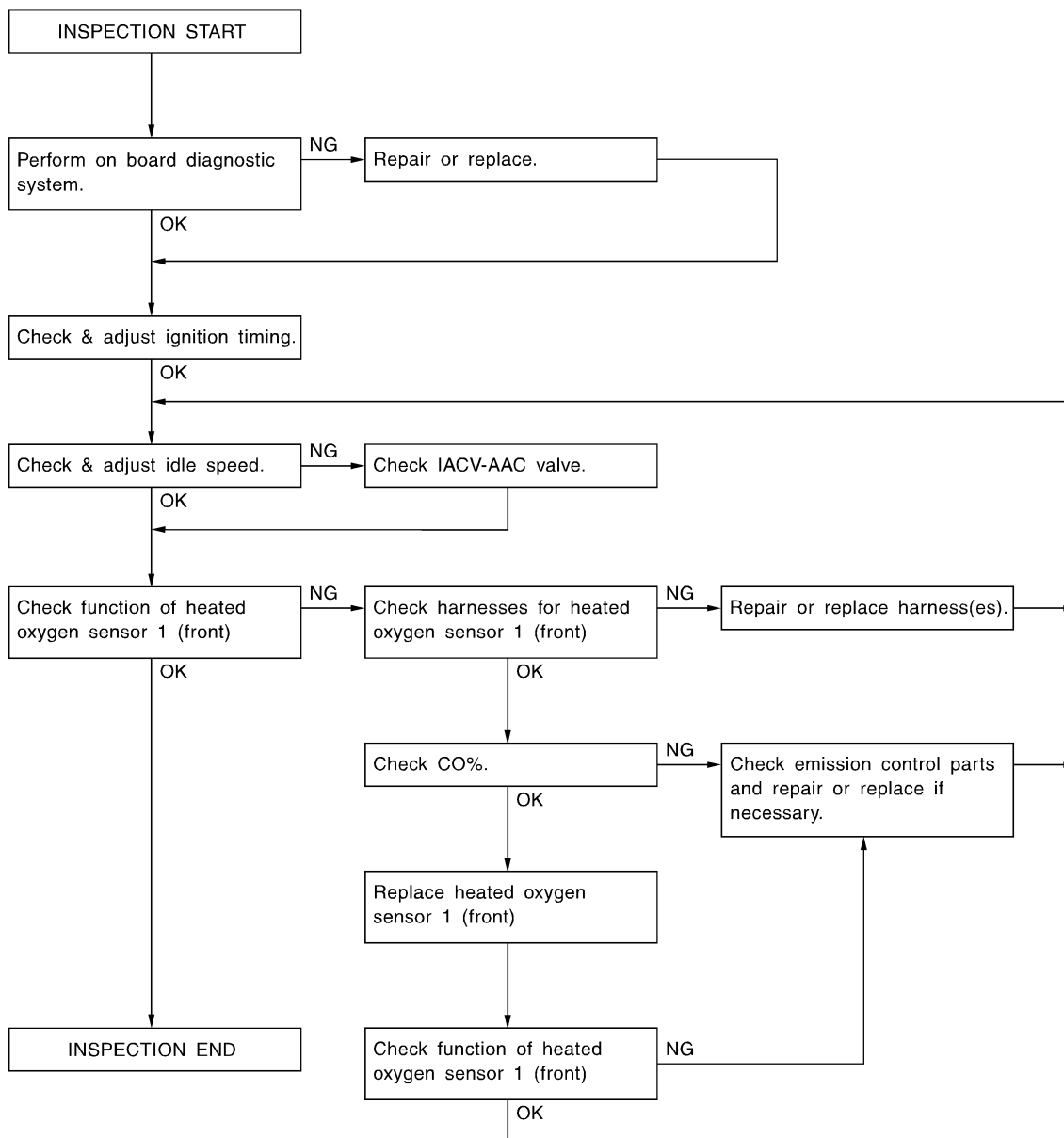
NEEC0549S01

PREPARATION

- 1) Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses
 - Air intake system
(Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - Throttle valve
 - Evaporative emission system
- 2) On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
- 3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
- 4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- 5) Turn off headlamps, heater blower, rear defogger.
- 6) Keep front wheels pointed straight ahead.
- 7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NEEC0549S0101



SEF554Y

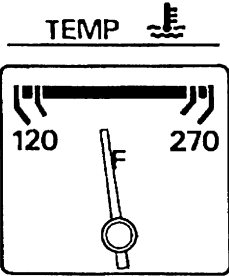
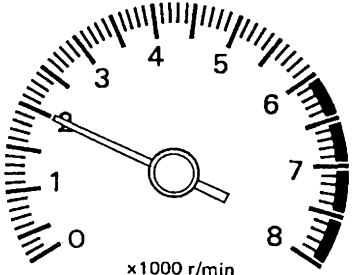
NOTE:

If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

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INSPECTION PROCEDURE

=NEEC0549S02

1	INSPECTION START	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and ducts for leaks ● Electrical connectors ● Gasket ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.</p> <div style="text-align: center; margin: 20px 0;">  <p>TEMP </p> </div> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <div style="text-align: center; margin: 20px 0;">  <p>x 1000 r/min</p> </div> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center;">OK or NG</p>	SEF976U
	OK	▶ GO TO 2.	
	NG	▶ 1. Repair or replace components as necessary. 2. GO TO 2.	

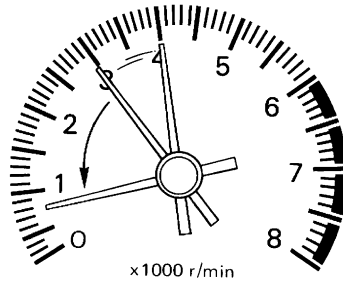
BASIC SERVICE PROCEDURE

VG33E

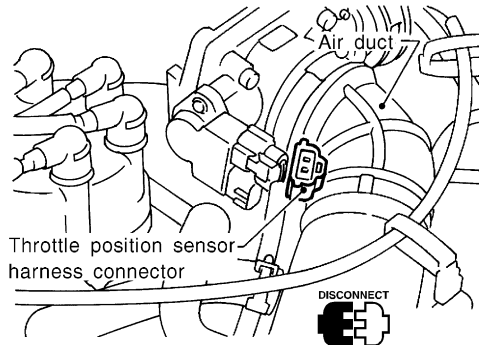
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

2 CHECK IGNITION TIMING

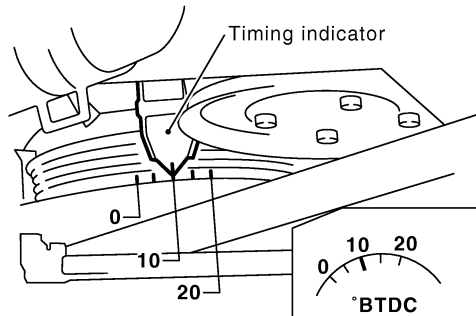
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



10°±1° BTDC (in "P" or "N" position)

OK or NG

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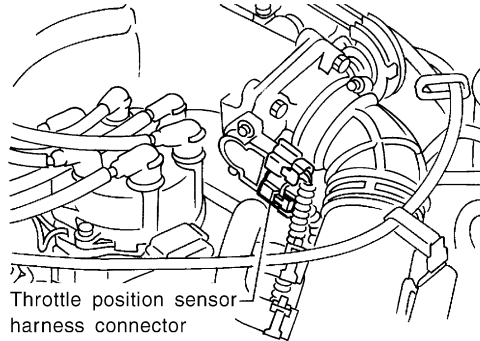
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OK	▶	GO TO 4.
NG	▶	GO TO 3.

3 ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



SEF972R

▶ GO TO 2.

4 CHECK BASE IDLE SPEED

☑ With CONSULT-II

1. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

700±50 rpm (in "P" or "N" position)

SEF058Y

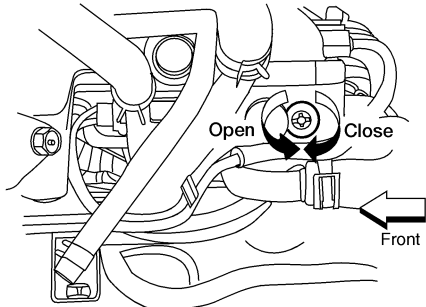
☒ Without CONSULT-II


1. Check idle speed.


700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED
<ol style="list-style-type: none"> 1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw. 	
	
700±50 rpm (in "P" or "N" position)	
LEC513	
▶	GO TO 6.

6	CHECK TARGET IDLE SPEED						
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Read idle speed in "DATA MONITOR" mode with CONSULT-II. 							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						
750±50 rpm (in "P" or "N" position)							
SEF058Y							

<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Check idle speed. <p style="text-align: center; color: blue;">750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

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BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check IACV-AAC valve and replace if necessary. Refer to EC-1048. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1048. 3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	With CONSULT-II	▶ GO TO 8.
	Without CONSULT-II	▶ GO TO 9.

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL											
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
	OK	▶ GO TO 12.										
	NG (Monitor does not fluctuate.)	▶ GO TO 17.										
	NG (Monitor fluctuates less than 5 times.)	▶ GO TO 10.										

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 62 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
	OK	▶ GO TO 12.
	NG (Voltage does not fluctuate.)	▶ GO TO 17.
	NG (Voltage fluctuates less than 5 times.)	▶ GO TO 10.

BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
	▶	GO TO 12.
	▶	GO TO 13.
	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-659. 2. Check mass air flow sensor and its circuit. Refer to EC-760. 3. Check injector and its circuit. Refer to EC-1190. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-794. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

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BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL											
<p>④ With CONSULT-II</p> <p>1. See "HO2S1 (B1)" in "DATA MONITOR" mode.</p> <p>2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
OK	▶	INSPECTION END										
NG (Monitor does not fluctuate.)	▶	GO TO 16.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 14.										

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL	
<p>⊗ Without CONSULT-II</p> <p>1. Set voltmeter probe between ECM terminal 63 and ground.</p> <p>2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</p> <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK	▶	INSPECTION END
NG (Voltage does not fluctuate.)	▶	GO TO 16.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 14.

BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ INSPECTION END
NG		▶ GO TO 15.

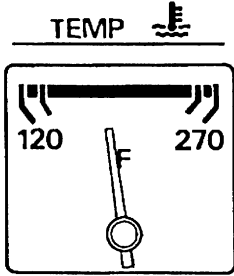
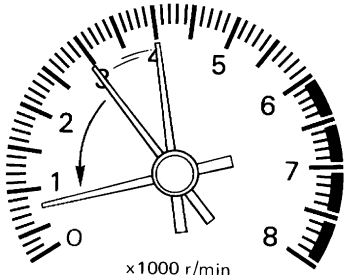
15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-659. 2. Check mass air flow sensor and its circuit. Refer to EC-760. 3. Check injector and its circuit. Refer to EC-1190. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-794. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 2.

16	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector. 4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (front) (bank 1) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK		▶ <ol style="list-style-type: none"> 1. Connect ECM harness connector. 2. GO TO 18.
NG		▶ <ol style="list-style-type: none"> 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

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17	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) HARNESS	
	<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector. 4. Check harness continuity between ECM terminal 51 and heated oxygen sensor 1 (front) (bank 2) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>	
OK	▶	<ol style="list-style-type: none"> 1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	<ol style="list-style-type: none"> 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

18	PREPARATION FOR "CO" % CHECK																					
	<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Select "COOLANT TEMP" in "ACTIVE TEST" mode. 2. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd". 																					
	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>ENG COOLANT TEMP</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>INJ PULSE-B1</td> <td>XXX msec</td> </tr> <tr> <td>IGN TIMING</td> <td>XXX BTDC</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		ACTIVE TEST		ENG COOLANT TEMP	XXX °C	MONITOR		ENG SPEED	XXX rpm	INJ PULSE-B1	XXX msec	IGN TIMING	XXX BTDC								
ACTIVE TEST																						
ENG COOLANT TEMP	XXX °C																					
MONITOR																						
ENG SPEED	XXX rpm																					
INJ PULSE-B1	XXX msec																					
IGN TIMING	XXX BTDC																					
	SEF172Y																					
	<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect engine coolant temperature sensor harness connector. 2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector. 																					
	<p style="text-align: center;">Engine coolant temperature sensor harness connector (F9)</p> <p style="text-align: center;">4.4 kΩ resistor</p>																					
	AEC036B																					
	▶	GO TO 19.																				

19	CHECK "CO" %	
<p>1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.</p> <div style="text-align: center;">  <p>TEMP </p> </div>		
<p>2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.</p> <div style="text-align: center;">  <p>x1000 r/min</p> </div>		
<p>3. Check "CO" %.</p> <p style="padding-left: 20px;">Idle CO: 1.5 - 9.5%</p> <p>4. Without CONSULT-II After checking CO%,</p> <p style="padding-left: 20px;">a. Disconnect the resistor from terminals of engine coolant temperature sensor.</p> <p style="padding-left: 20px;">b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	<p>1. Replace front heated oxygen sensor LH.</p> <p>2. GO TO 10.</p>
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Connect front heated oxygen sensor harness connectors to front heated oxygen sensors. 2. Check fuel pressure regulator. Refer to EC-659. 3. Check mass air flow sensor and its circuit. Refer to EC-760. 4. Check injector and its circuit. Refer to EC-1190. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-794. 6. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

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Introduction

NEEC0550

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

The above information can be checked using procedures listed in the table below.

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-730.)

Two Trip Detection Logic

NEEC0551

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-730.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NEEC0552

NEEC0552S01

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-684. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-713. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NEEC0552S0101

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0".

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	MAF SEN/CIRCUIT [P0100]	0		MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NEEC0552S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

Emission-related Diagnostic Information (Cont'd)

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-700.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687.

SYSTEM READINESS TEST (SRT) CODE

NEEC0552S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that the status of srt be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this service manual to set the SRT to "CMPLT".

In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern and the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items, the vehicle is returned to the customer untested.

NOTE:

If MIL is "ON" during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NEEC0552S0314

The following table shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P1441
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (rear) (high voltage)	P0140, P0160
O2 SEN HEATER	3	Front heated oxygen sensor heater	P0135, P0155
		Rear heated oxygen sensor heater	P0141, P0161

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure) one by one based on the priority for models with CONSULT-II.

SRT Set Timing

NEEC0552S0301

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is OK.

–: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “CMPLT”.

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result.

→ Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”.

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

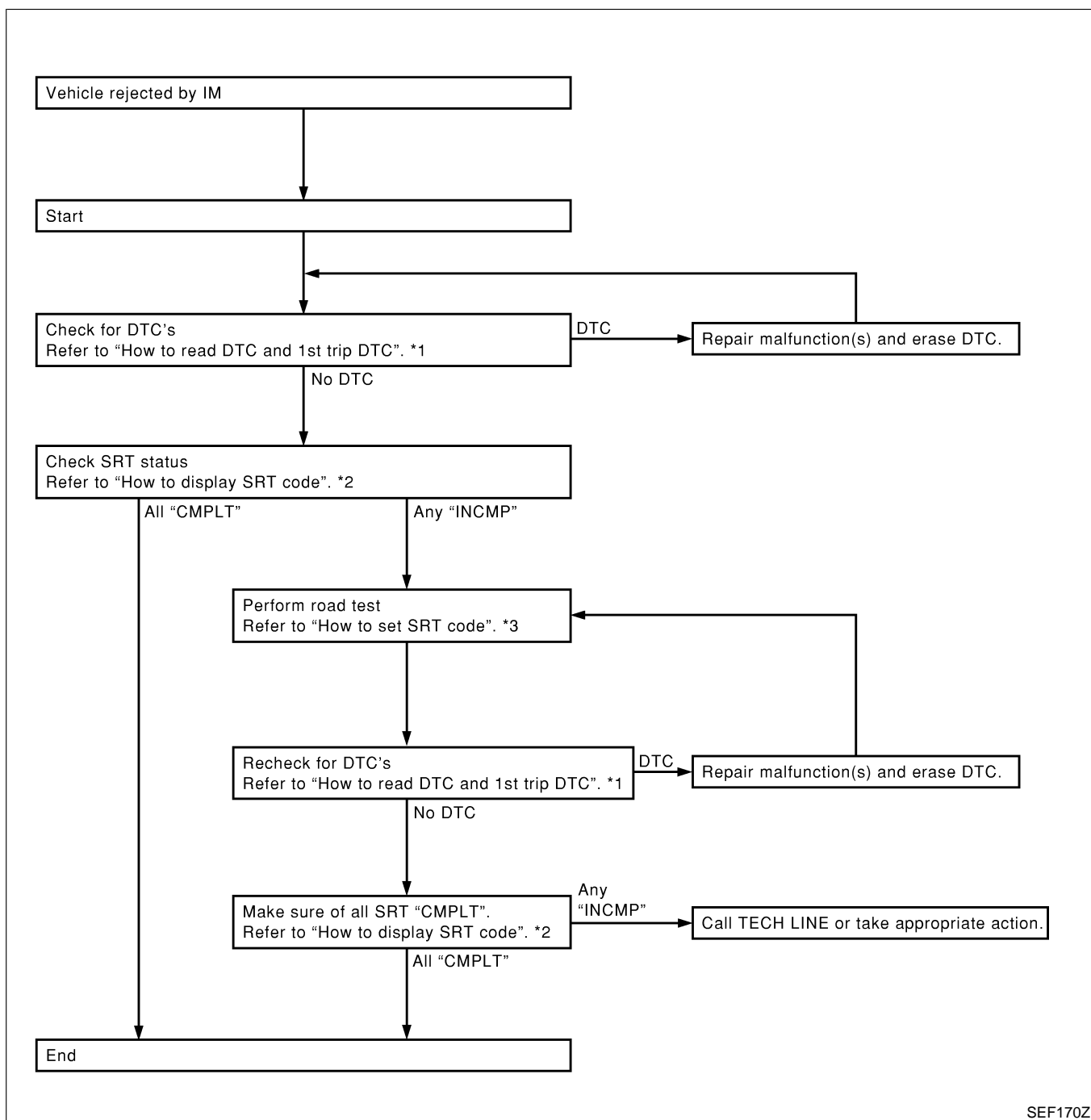
NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the State emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating “INCMP”, review the following flowchart diagnostic sequence on the next page.

NEEC0552S0302



*1 EC-675

*2 EC-679

*3 EC-680

How to Display SRT Code

1. **With CONSULT-II**
 Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
 For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

NEEC0552S0303

2. **With GST**
 Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.
 "INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT

SEF949Z

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions. NEEC0552S0304

With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-675.

Without CONSULT-II

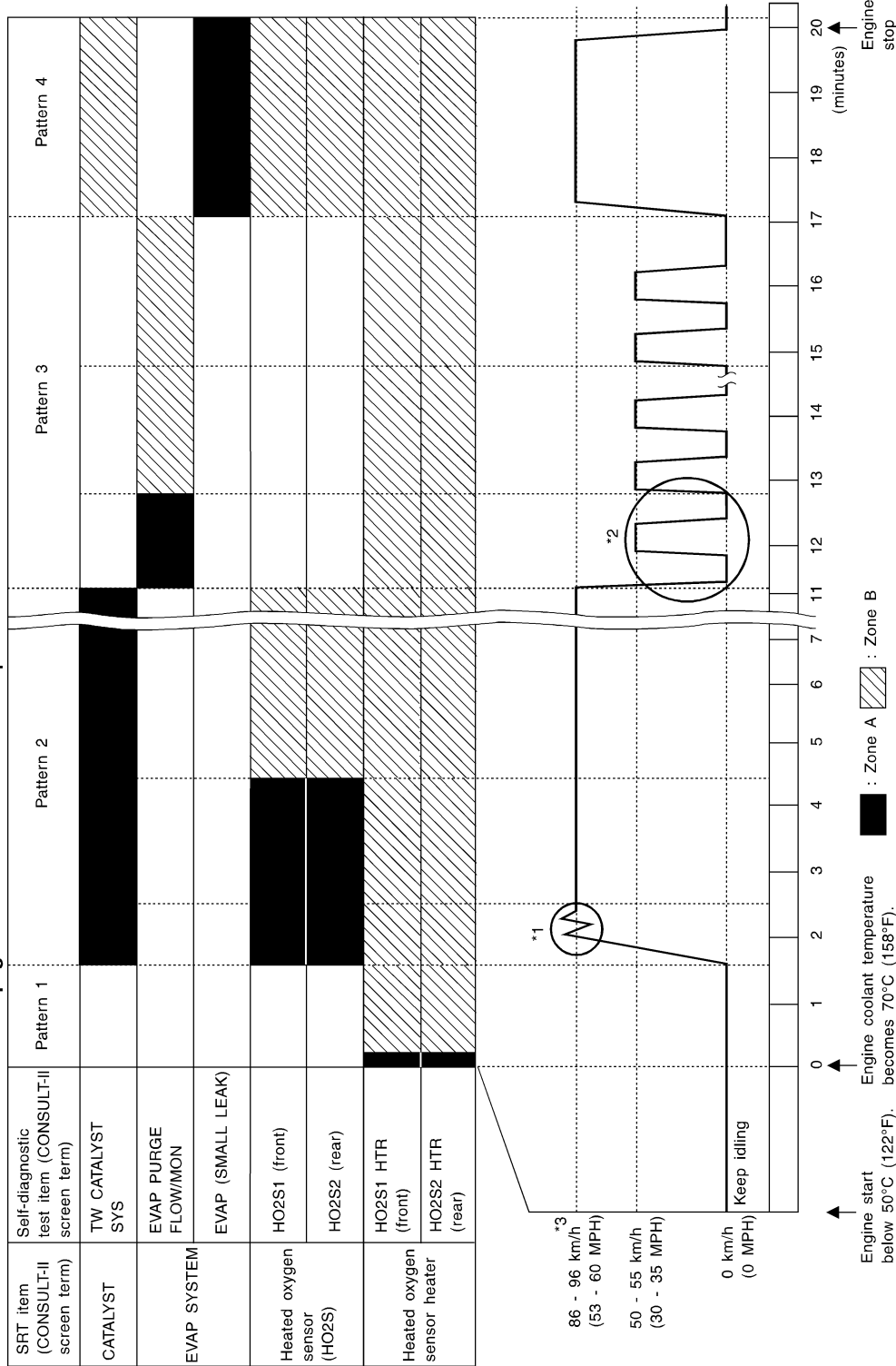
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-681. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NEEC0552S0305

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.

Driving pattern



- GI
- MA
- EM
- LC
- EC
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

Emission-related Diagnostic Information (Cont'd)

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest.
Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 59 and ground is 3.0 - 4.3V).**
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 59 and ground is lower than 1.4V).**
- The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

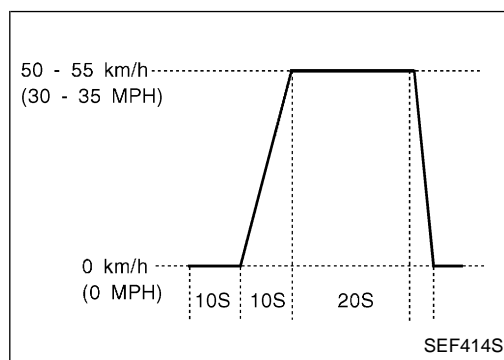
Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

- Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
 - Repeat driving pattern shown below at least 10 times.
- During acceleration, hold the accelerator pedal as steady as possible.**



*3: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the "D" position with the overdrive switch turned ON.

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

NEEC0552S04

The following is the information specified in Mode 6 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front) (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (front) (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
24H		07H	Max.	X	
O2 SENSOR HEATER	Heated oxygen sensor 1 (front) (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 (front) (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 (rear) (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
Heated oxygen sensor 2 (rear) (bank 2)	2FH	0BH	Max.	X	
	30H	8BH	Min.	X	

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NEEC0562S05

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO SELF DIAGNOSTIC FAIL- URE INDICATED	P0000	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-760
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-769
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-771
COOLANT T SEN/CIRC	P0115	—	—	X	EC-776
THRTL POS SEN/CIRC	P0120	—	—	X	EC-781

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-794
HO2S1 (B1)	P0130	X	X	X*2	EC-799
HO2S1 (B1)	P0131	X	X	X*2	EC-810
HO2S1 (B1)	P0132	X	X	X*2	EC-819
HO2S1 (B1)	P0133	X	X	X*2	EC-828
HO2S1 (B1)	P0134	X	X	X*2	EC-842
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-850
HO2S2 (B1)	P0137	X	X	X*2	EC-857
HO2S2 (B1)	P0138	X	X	X*2	EC-867
HO2S2 (B1)	P0139	X	X	X*2	EC-877
HO2S2 (B1)	P0140	X	X	X*2	EC-887
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-897
HO2S1 (B2)	P0150	X	X	X*2	EC-799
HO2S1 (B2)	P0151	X	X	X*2	EC-810
HO2S1 (B2)	P0152	X	X	X*2	EC-819
HO2S1 (B2)	P0153	X	X	X*2	EC-828
HO2S1 (B2)	P0154	X	X	X*2	EC-842
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-850
HO2S2 (B2)	P0157	X	X	X*2	EC-857
HO2S2 (B2)	P0158	X	X	X*2	EC-867
HO2S2 (B2)	P0159	X	X	X*2	EC-877
HO2S2 (B2)	P0160	X	X	X*2	EC-887
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-897
FUEL SYS LEAN/BK1	P0171	—	—	X	EC-905
FUEL SYS RICH/BK1	P0172	—	—	X	EC-914
FUEL SYS LEAN/BK2	P0174	—	—	X	EC-905
FUEL SYS RICH/BK2	P0175	—	—	X	EC-914
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-922
ENG OVER TEMP	P0217	—	—	X	EC-927
MULTI CYL MISFIRE	P0300	—	—	X	EC-948
CYL 1 MISFIRE	P0301	—	—	X	EC-948
CYL 2 MISFIRE	P0302	—	—	X	EC-948
CYL 3 MISFIRE	P0303	—	—	X	EC-948
CYL 4 MISFIRE	P0304	—	—	X	EC-948
CYL 5 MISFIRE	P0305	—	—	X	EC-948
CYL 6 MISFIRE	P0306	—	—	X	EC-948
KNOCK SEN/CIRC	P0325	—	—	—	EC-957

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CPS/CIRCUIT (OBD)	P0335	—	—	X	EC-961
CAM POS SEN/CIRC	P0340	—	—	X	EC-967
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-974
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-974
EVAP SMALL LEAK	P0440	X	X	X*2	EC-979
PURG VOLUME CONT/V	P0443	—	—	X	EC-994
VENT CONTROL VALVE	P0446	—	—	X	EC-1001
EVAP SYS PRES SEN	P0450	—	—	X	EC-1007
EVAP GROSS LEAK	P0455	X	X	X	EC-1018
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-1044
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-1048
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1054
A/T COMM LINE	P0600	—	—	—	EC-1061
ECM	P0605	—	—	X	EC-1066
PNP SW/CIRC	P0705	—	—	X	AT-250
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-256
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-262
ENGINE SPEED SIG	P0725	—	—	X	AT-267
A/T 1ST GR FNCTN	P0731	—	—	X	AT-272
A/T 2ND GR FNCTN	P0732	—	—	X	AT-278
A/T 3RD GR FNCTN	P0733	—	—	X	AT-284
A/T 4TH GR FNCTN	P0734	—	—	X	AT-290
TCC SOLENOID/CIRC	P0740	—	—	X	AT-299
A/T TCC S/V FNCTN	P0744	—	—	X	AT-304
L/PRESS SOL/CIRC	P0745	—	—	X	AT-313
SFT SOL A/CIRC	P0750	—	—	X	AT-318
SFT SOL B/CIRC	P0755	—	—	X	AT-323
CLOSED LOOP-B1	P1148	—	—	X	EC-1070
CLOSED LOOP-B2	P1168	—	—	X	EC-1070
ENG OVER TEMP	P1217	—	—	X	EC-1072
CPS/CIRC (OBD) COG	P1336	—	—	X	EC-1089
EVAP VERY SMALL LEAK	P1441	X	X	X*2	EC-1098
PURG VOLUME CONT/V	P1444	—	—	X	EC-1113
VENT CONTROL VALVE	P1446	—	—	X	EC-1125
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-1132
VENT CONTROL VALVE	P1448	—	—	X	EC-1144
VC/V BYPASS/V	P1490	—	—	X	EC-1156

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1162
A/T DIAG COMM LINE	P1605	—	—	X	EC-1171
TP SEN/CIRC A/T	P1705	—	—	X	AT-328
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1174
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-337

*1: 1st trip DTC No. is the same as DTC No.

*2: These are not displayed with GST.

NOTE:

Regarding D22 models, “-B1” and “BK1” indicate right bank and “-B2” and “BK2” indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (📱 With CONSULT-II)

NEEC0552S06

NEEC0552S0601

NOTE:

If the DTC is not for A/T related items (see EC-618), skip steps 2 through 4.

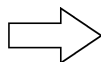
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
 2. Turn CONSULT-II “ON” and touch “A/T”.
 3. Touch “SELF-DIAG RESULTS”.
 4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
 5. Touch “ENGINE”.
 6. Touch “SELF-DIAG RESULTS”.
 7. Touch “ERASE”. (The DTC in the ECM will be erased.)
- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

Emission-related Diagnostic Information (Cont'd)

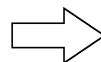
How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.

SELECT SYSTEM	
ENGINE	
A/T	

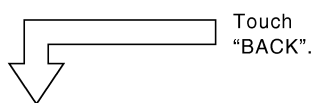


SELECT DIAG MODE	
SELF-DIAG RESULTS	
DATA MONITOR	
DTC WORK SUPPORT	
TCM PART NUMBER	



SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

2. Turn **CONSULT-II** "ON", and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the TCM will be erased.)



SELECT SYSTEM	
ENGINE	
A/T	

SELECT DIAG MODE	
WORK SUPPORT	
SELF-DIAG RESULTS	
DATA MONITOR	
DATA MONITOR (SPEC)	
ACTIVE TEST	
DTC & SRT CONFIRMATION	
ECM PART NUMBER	

SELF DIAG RESULTS	
DTC RESULTS	TIME
SFT SOL A/CIRC [P0750]	0

5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

SEF823YD

The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to Erase DTC (GST) With GST

NEEC0552S0602

NOTE:

If the DTC is not for A/T related items (see EC-618), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

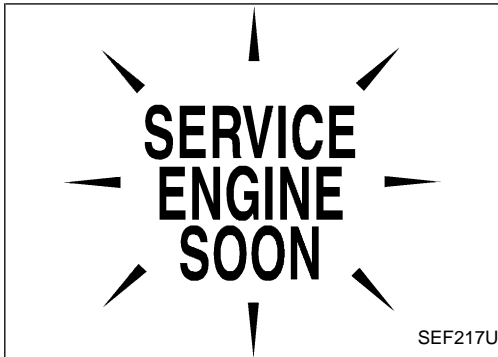
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NEEC0553



The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the MIL does not light up, refer to **EL-84**, "WARNING LAMPS" or see EC-1216.
2. When the engine is started, the MIL should go OFF.
 - If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

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On Board Diagnostic System Function

-NEEC0553S01

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit. (See EC-1216.)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

Diagnostic Test Mode I — Bulb Check

NEEC0553S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to **EL-84**, "WARNING LAMPS" or see EC-1216.

Diagnostic Test Mode I — Malfunction Warning

NEEC0553S04

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

NEEC0554

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

NEEC0554S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-674.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in "OK" for the 2nd trip.

SUMMARY CHART

NEEC0554S02

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-693.

For details about patterns "A" and "B" under "Other", see EC-695.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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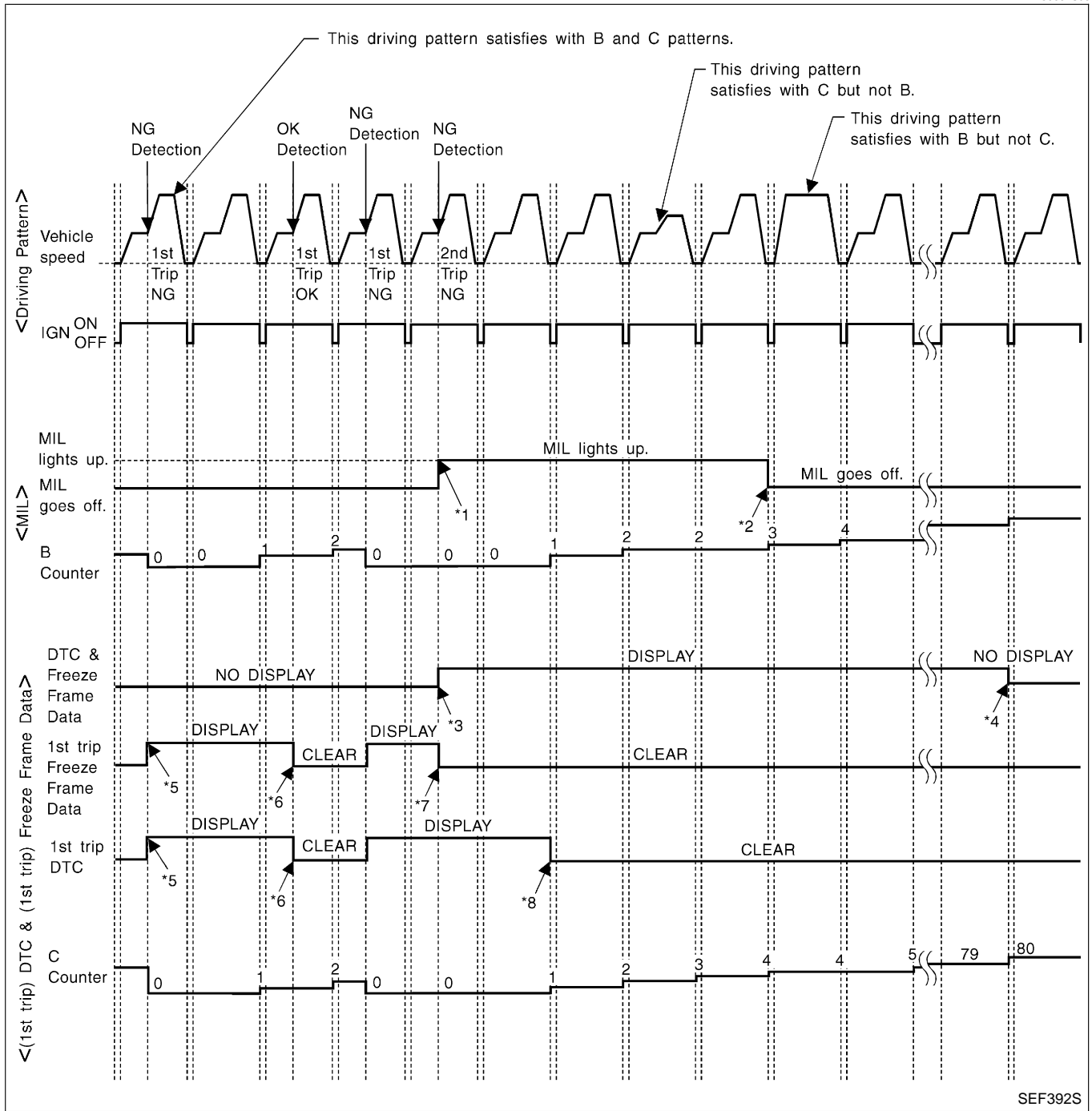
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE” <EXHAUST QUALITY DETERIORATION>, “FUEL INJECTION SYSTEM”

=NEEC0554S03



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern B>

NEEC0554S04

NEEC0554S0401

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>

NEEC0554S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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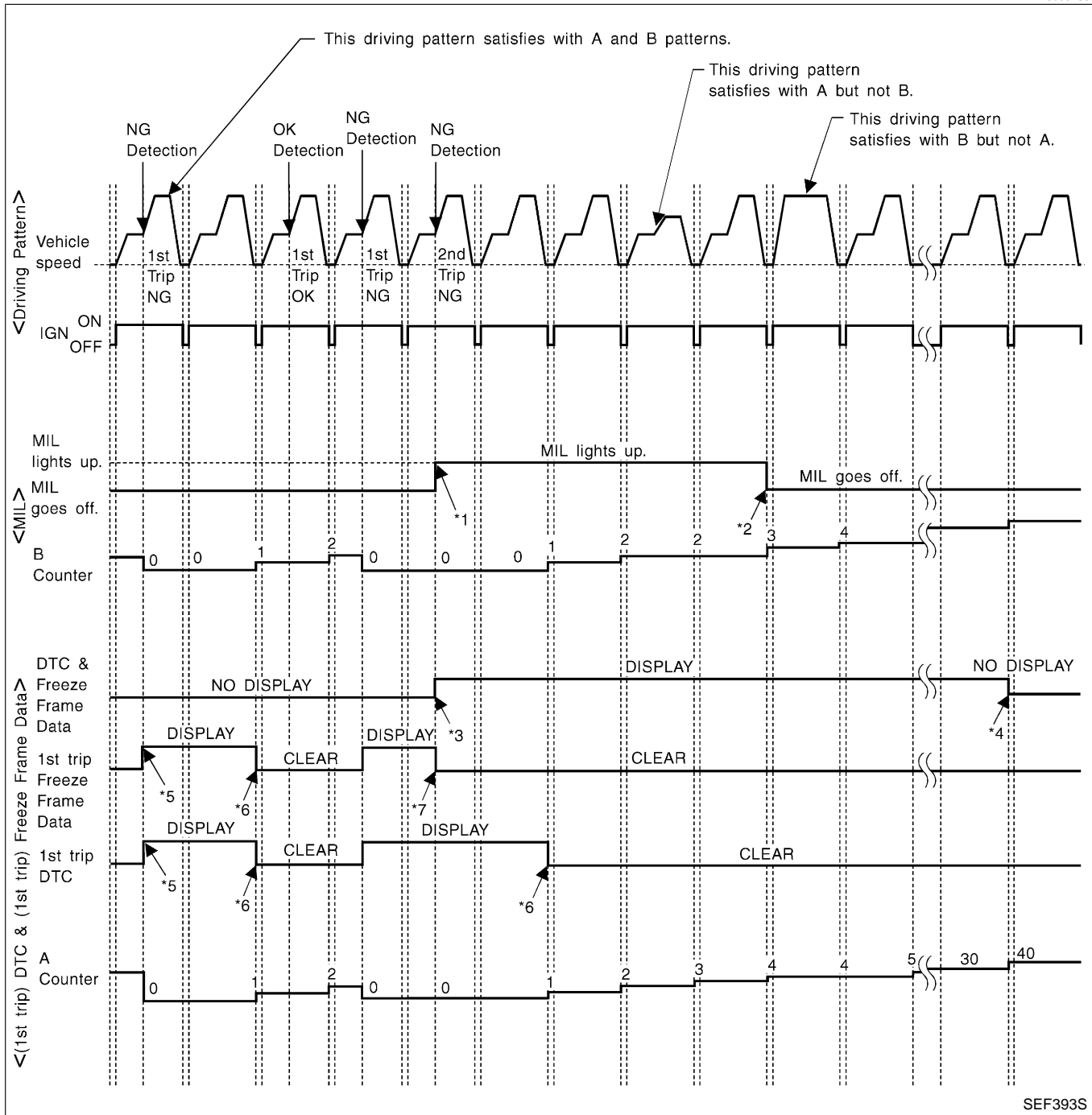
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NEEC0554S05



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC

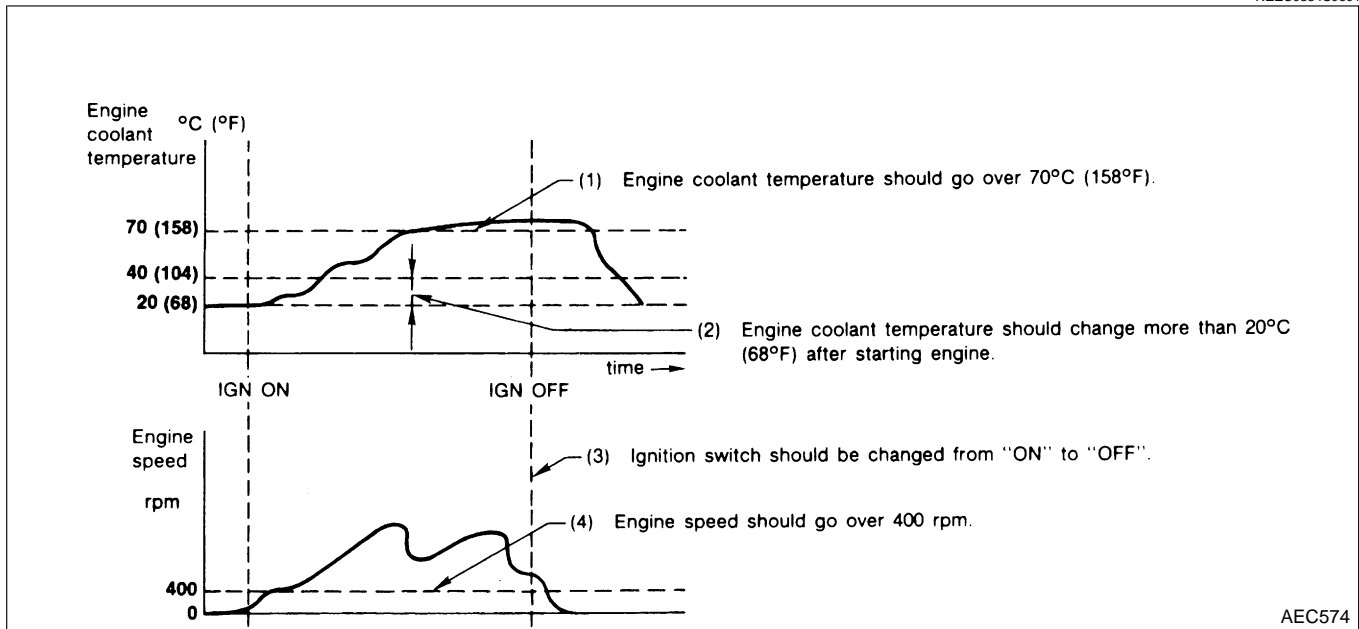
- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>

NEEC0554S06

NEEC0554S0601



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NEEC0554S0602

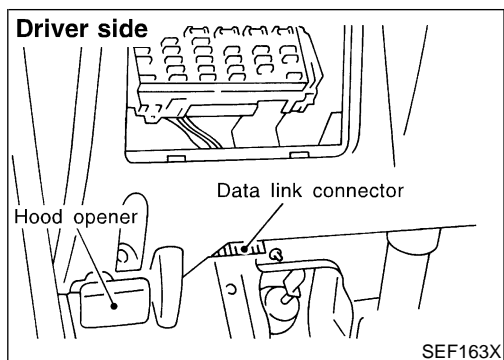
Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

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CONSULT-II



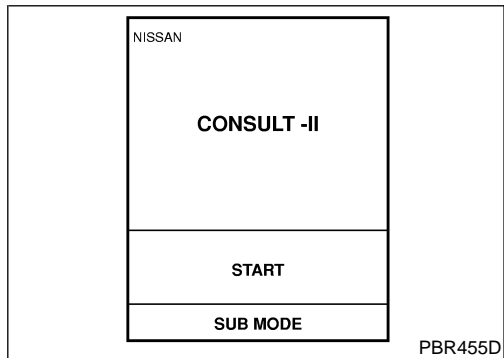
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

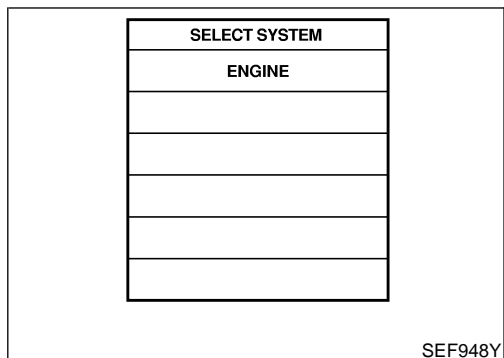
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NEEC0555S01

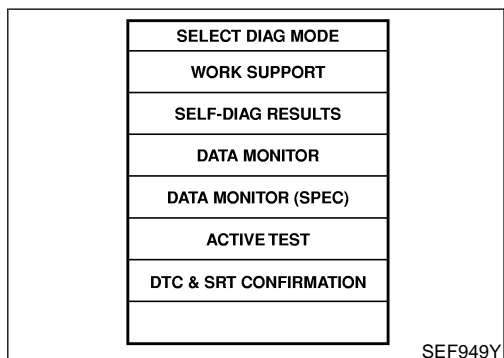
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NEEC0555S02

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS INPUT	Camshaft position sensor		X	X	X	X			
	Mass air flow sensor		X		X	X			
	Engine coolant temperature sensor		X	X	X	X	X		
	Heated oxygen sensor 1 (front)		X		X	X		X	X
	Heated oxygen sensor 2 (rear)		X		X	X		X	X
	Vehicle speed sensor		X	X	X	X			
	Throttle position sensor		X		X	X			
	Fuel tank temperature sensor		X		X	X	X		
	EVAP control system pressure sensor		X		X	X			
	Absolute pressure sensor		X		X	X			
	Intake air temperature sensor		X		X	X			
	Crankshaft position sensor (OBD)		X			X			
	Knock sensor		X			X			
	Ignition switch (start signal)				X	X			
	Closed throttle position switch		X		X	X			
	Closed throttle position switch (throttle position sensor signal)				X	X			
	Air conditioner switch				X	X			
	Park/neutral position (PNP) switch		X		X	X			
	Power steering oil pressure switch				X	X			
	Battery voltage				X	X			
Ambient air temperature switch				X	X				

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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CONSULT-II (Cont'd)

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS OUTPUT	Injectors				X	X	X		
	Power transistor (Ignition timing)				X	X	X		
	IACV-AAC valve	X	X		X	X	X		
	EVAP canister purge volume control solenoid valve		X		X	X	X		X
	Air conditioner relay				X	X			
	Fuel pump relay	X			X	X	X		
	Cooling fan*3		X		X	X	X		
	Heated oxygen sensor 1 heater (front)		X		X	X		X	
	Heated oxygen sensor 2 heater (rear)		X		X	X		X	
	EVAP canister vent control valve		X		X	X	X		
	Vacuum cut valve bypass valve		X		X	X	X		X
	Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-675.

*3: Models with electric cooling fan.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

FUNCTION

-NEEC0555S03

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

- 1) Diagnostic trouble codes
- 2) 1st trip diagnostic trouble codes
- 3) Freeze frame data
- 4) 1st trip freeze frame data
- 5) System readiness test (SRT) codes
- 6) Test values
- 7) Others

WORK SUPPORT MODE

NEEC0555S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> ● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL. 	When adjusting the idle throttle position
TARGET IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IDLE CONDITION 	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clean the coefficient of self-learning control valve

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting initial ignition timing and idle speed

SELF-DIAGNOSTIC MODE

DTC and 1st Trip DTC

NEEC0555S05

Regarding items of “DTC and 1st trip DTC”, refer to “TROUBLE DIAGNOSIS — INDEX” (See EC-618.)

NEEC0555S0501

Freeze Frame Data and 1st Trip Freeze Frame Data

NEEC0555S0502

Freeze frame data item *1	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-618.)
FUEL SYS-B1 *2	<ul style="list-style-type: none"> ● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. <ul style="list-style-type: none"> “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2 *2	
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> ● The vehicle speed at the moment a malfunction is detected is displayed.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Freeze frame data item *1	Description
ABSOL PRESS [kPa] or [kg/cm ²] or [psi]	<ul style="list-style-type: none"> The absolute pressure at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.

*2: Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

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DATA MONITOR MODE

=NEEC0555S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○		<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor. 	
MAS AIR/FL SE [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 (front) is displayed. 	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 (rear) is displayed. 	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
TANK F/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	
INT/A TEMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
ABSOL PRES/SE [V]			<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 		GI
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal. 	MA EM
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 		LC
CLSD THL/P SW [ON/OFF]			<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 		EC
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		FE
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. 		CL
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 		MT AT
AMB TEMP SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the ambient air temperature switch signal. 		TF
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		PD
INJ PULSE-B2 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	AX
INJ PULSE-B1 [msec]					SU
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 		BR
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	ST
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 		RS
PURG VOL C/V [%]		○	<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		BT
A/F ALPHA-B2 [%]			<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. 	HA
A/F ALPHA-B1 [%]					SC
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 		EL

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
COOLING FAN* [ON/OFF]			<ul style="list-style-type: none"> Indicates the control condition of the cooling fan (determined by ECM according to the input signal). ON ... Operation OFF ... Stop 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ON ... Closed OFF ... Open 	
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S1 HTR (B1) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH·P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
FREQUENCY [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> Only "#" is displayed if item is unable to be measured. Figures with "#"'s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

*: Models with electric cooling fan.

DATA MONITOR (SPEC) MODE

NEEC0555S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]			<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated. This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NEEC0555S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
COOLING FAN*	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "ON" and "OFF" using CONSULT-II. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connector Cooling fan motor Cooling fan relay
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> ● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> ● Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

*: Models with electric cooling fan.

DTC CONFIRMATION MODE

SRT STATUS Mode

NEEC0555S08

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-676.

NEEC0555S0801

SRT WORK SUPPORT Mode

SRT status and some of the data monitor item can be read.

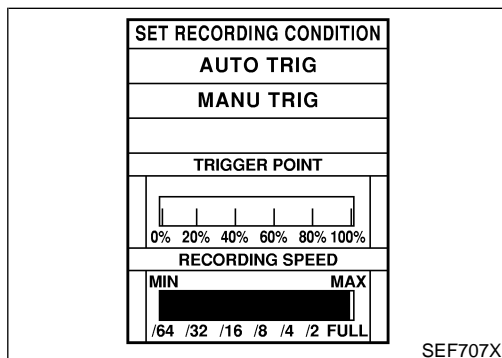
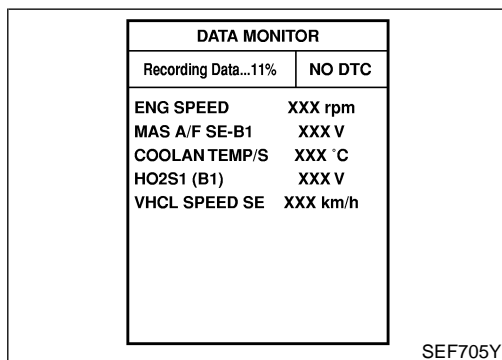
NEEC0555S0803

DTC Work Support Mode

NEEC0555S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-979
	EVAP VERY SML LEAK P1441		EC-1098
	PURG VOL CN/V P1444		EC-1113
	PURGE FLOW P1447		EC-1132
	VC CUT/V BP/V P1491		EC-1162
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-799
	HO2S1 (B1) P0131		EC-810
	HO2S1 (B1) P0132		EC-819
	HO2S1 (B1) P0133		EC-828
	HO2S1 (B2) P0150		EC-799
	HO2S1 (B2) P0151	EC-810	
	HO2S1 (B2) P0152	EC-819	
	HO2S1 (B2) P0153	EC-828	
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137	EC-857	
	HO2S2 (B1) P0138	EC-867	
	HO2S2 (B1) P0139	EC-877	
	HO2S2 (B2) P0157	EC-857	
	HO2S2 (B2) P0158	EC-867	
	HO2S2 (B2) P0159	EC-877	

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REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NEEC0555S09

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

- 1) "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.
- 2) "MANU TRIG" (Manual trigger):
 - DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT-II screen even though a malfunction is detected by ECM.

DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

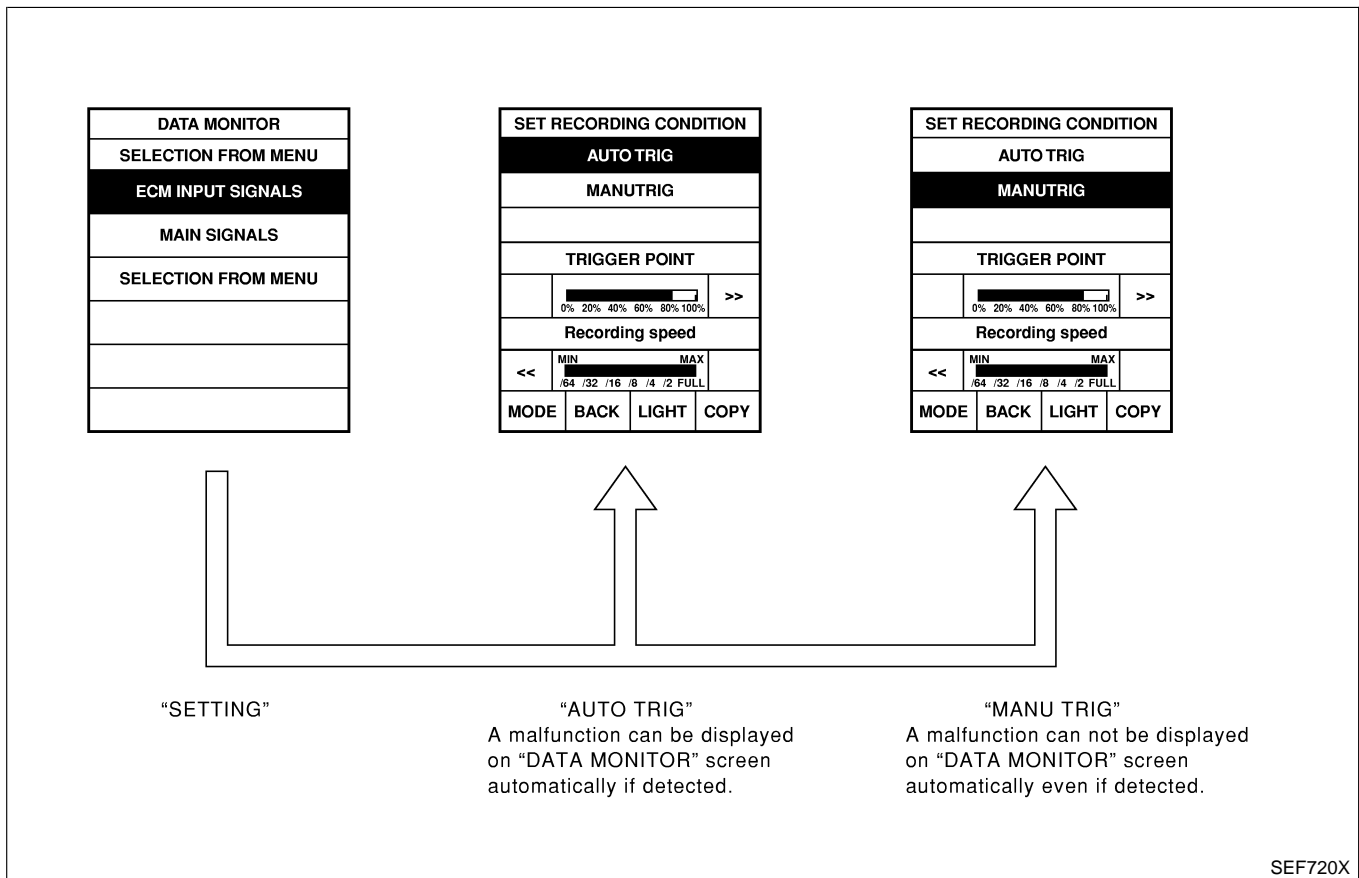
1) "AUTO TRIG"

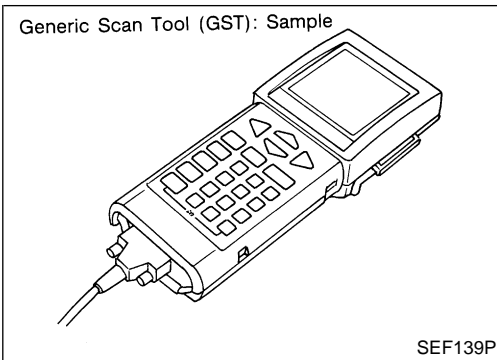
- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.

When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to **GI-24**, "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

2) "MANU TRIG"

- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.





Generic Scan Tool (GST)

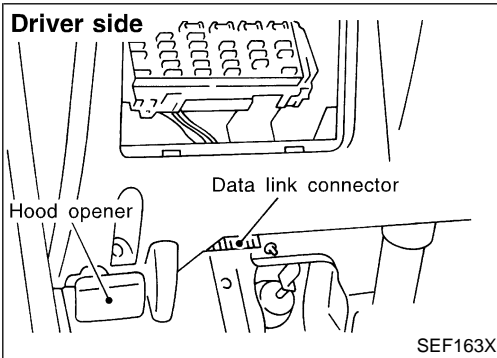
=NEEC0556

DESCRIPTION

NEEC0556S01

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.

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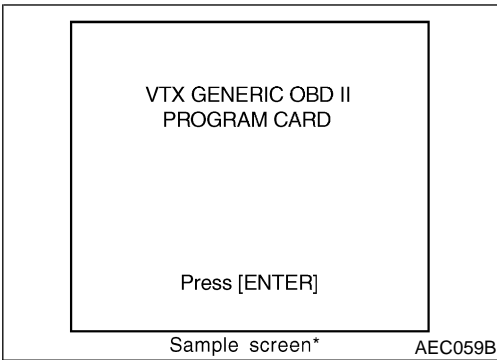


GST INSPECTION PROCEDURE

NEEC0556S02

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector for GST which is located under LH dash panel near the fuse box cover.

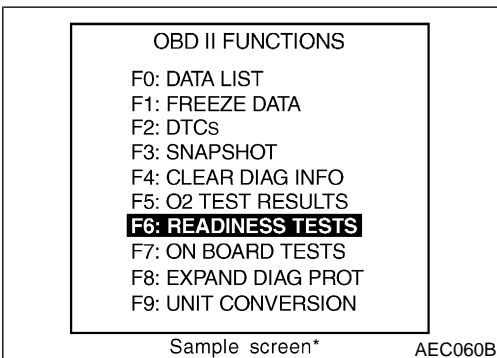
EC
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3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)

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5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

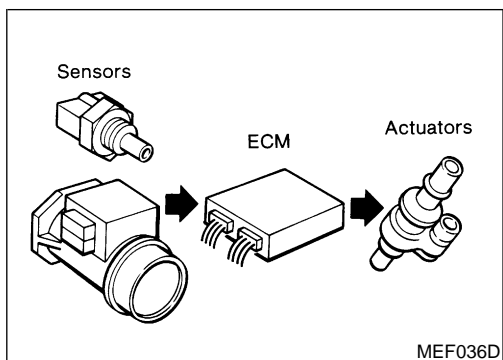
VG33E

Generic Scan Tool (GST) (Cont'd)

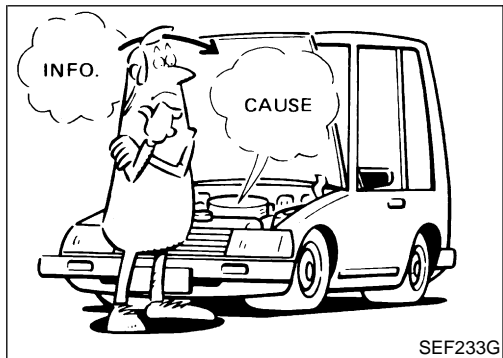
FUNCTION

NEEC0556S03

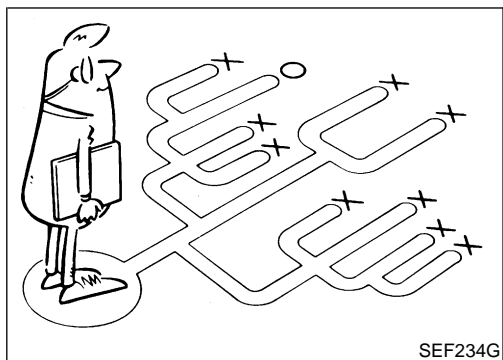
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-700).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. <ul style="list-style-type: none"> ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.



MEF036D



SEF233G



SEF234G

KEY POINTS

- WHAT** Vehicle & engine model
- WHEN** Date, Frequencies
- WHERE**..... Road conditions
- HOW** Operating conditions,
Weather conditions,
Symptoms

SEF907L

Introduction

NEEC0557

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-713.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on next page should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NEEC0557S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

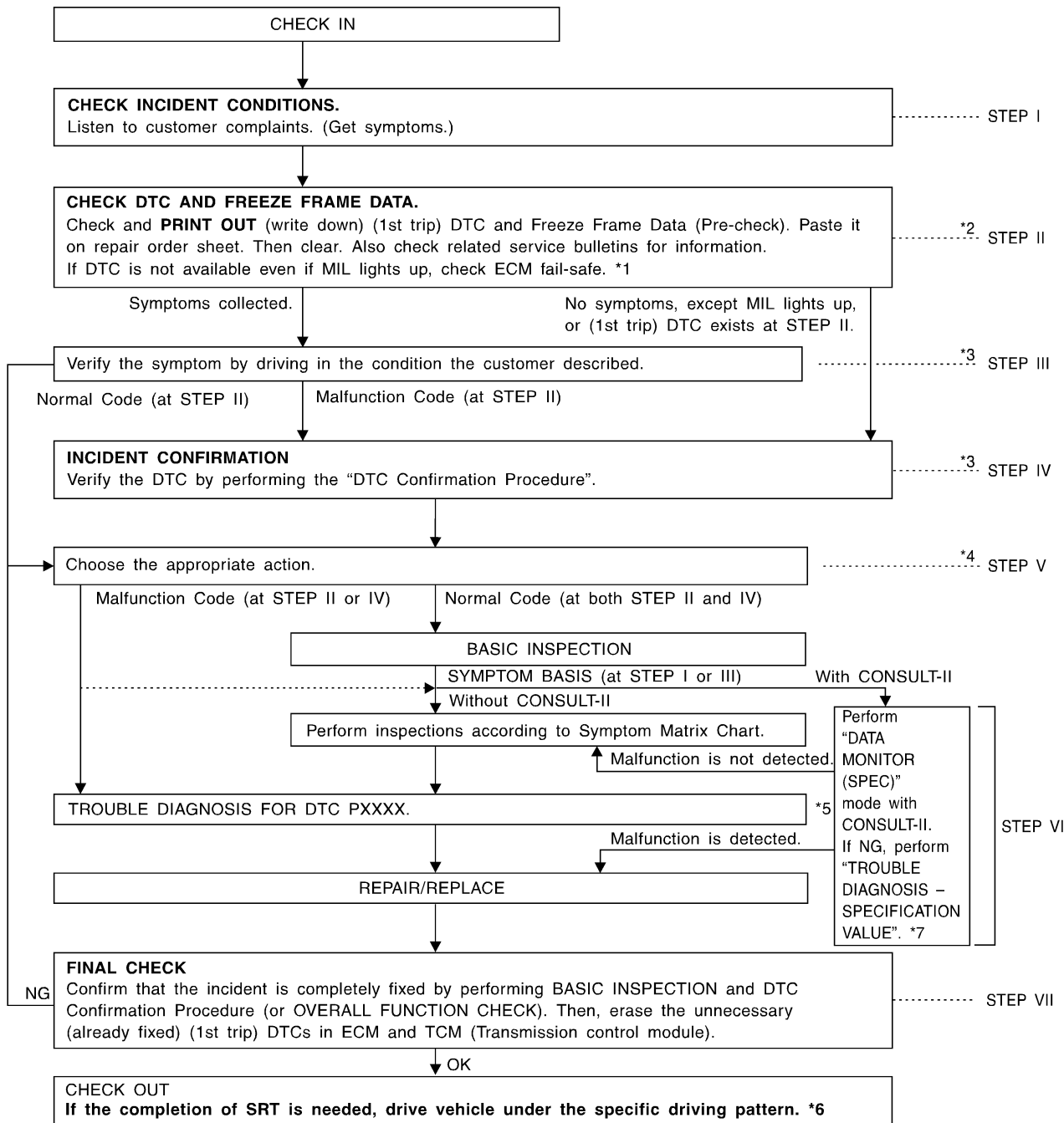
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

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Work Flow

NEEC0558



*1 EC-730

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-754.

*5 If malfunctioning part cannot be

detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

*6 EC-681

*7 EC-749

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DESCRIPTION FOR WORK FLOW

NEEC0558S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-712.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-687.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-731.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-715.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-749. (If malfunction is detected, proceed to "REPAIR REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-731.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-735, EC-740. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-23 , "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-687.)

Basic Inspection

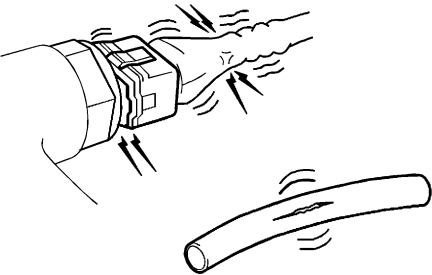
NEEC0559



Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

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1	INSPECTION START	
<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts 		
		
SEF983U		
Models with CONSULT-II	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 16.

2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
<p> With CONSULT-II Connect "CONSULT-II" to the data link connector for CONSULT-II and select "ENGINE" from the menu. Refer to EC-696.</p>		
<p> With GST Connect "GST" to the data link connector for GST. Refer to EC-709.</p>		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 15.

3 CHECK FI CAM FUNCTION

④ With CONSULT-II

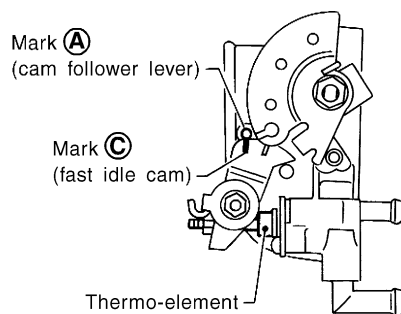
1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

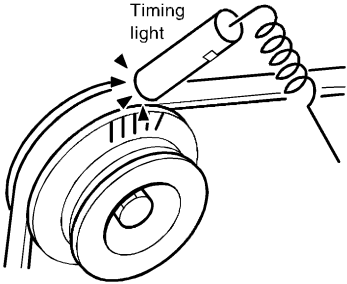
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

OK or NG

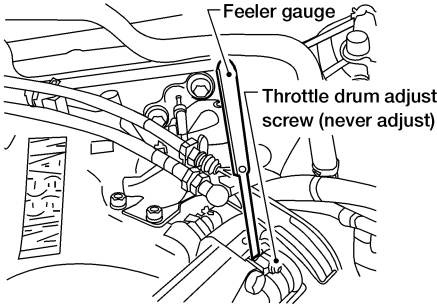
OK	▶	GO TO 4.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-660. 2. GO TO 4.

4	CHECK IGNITION TIMING		
<p>④ With CONSULT-II</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p style="text-align: center; margin: 0;">TARGET IDLE RPM ADJ</p> <hr/> <p style="text-align: center; margin: 0;">SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION.</p> <p style="text-align: center; margin: 0;">-ENG WARMED UP ENOUGH</p> <p style="text-align: center; margin: 0;">-NO LOAD</p> </div> <p>3. Check ignition timing at idle using a timing light.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; font-weight: bold;">Ignition timing: 10°±2° BTDC</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>			
OK		▶	GO TO 5.
NG		▶	<p>1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-662.</p> <p>2. GO TO 5.</p>

5	CHECK BASE IDLE SPEED		
<p>④ With CONSULT-II</p> <p>1. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p style="text-align: center; margin: 0;">TARGET IDLE RPM ADJ</p> <hr/> <p style="text-align: center; margin: 0;">SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION.</p> <p style="text-align: center; margin: 0;">-ENG WARMED UP ENOUGH</p> <p style="text-align: center; margin: 0;">-NO LOAD</p> </div> <p>2. Check idle speed.</p> <p style="color: blue; font-weight: bold;">700±50 rpm (in "P" or "N" position)</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>			
OK		▶	GO TO 6.
NG		▶	<p>1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-662.</p> <p>2. GO TO 6.</p>

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6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I
<p> With CONSULT-II NOTE: Always check ignition timing and base idle speed before performing the following.</p> <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam, refer to procedure 3. 3. Stop engine. 	
▶	GO TO 7.

7	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II						
<ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "CLSD THL/P SW" in "DATA MONITOR" mode. 3. Read "CLSD THL/P SW" signal under the following conditions. <ul style="list-style-type: none"> ● Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal. 							
							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	CLSD THL/P SW	ON
DATA MONITOR							
MONITOR	NO DTC						
CLSD THL/P SW	ON						
<p>“CLSD THL/P SW” signal should remain “ON” while inserting 0.3 mm (0.012 in) feeler gauge. “CLSD THL/P SW” signal should remain “OFF” while inserting 0.4 mm (0.016 in) feeler gauge.</p> <p>OK or NG</p>							
OK	▶ GO TO 12.						
NG	▶ GO TO 8.						

LEC517

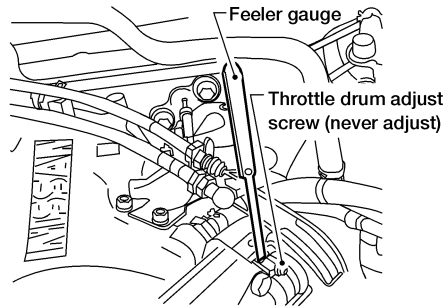
SEF173Y

8	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION
<p> With CONSULT-II NOTE:</p> <ul style="list-style-type: none"> ● Never adjust throttle adjust screw (TAS). ● Do not touch throttle drum when checking “CLSD THL/P SW” signal, doing so may cause an incorrect adjustment. <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam. Refer to procedure 3. 3. Stop engine. 4. Loosen throttle position sensor fixing bolts. 	
▶	GO TO 9.

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9 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

LEC517

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	OFF

SEF305Y

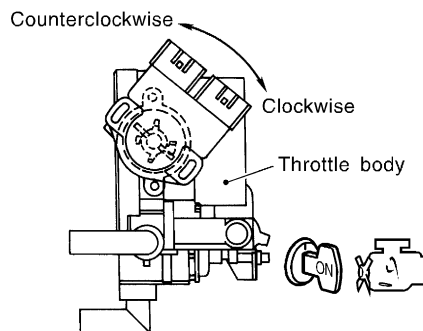
"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 10. |
| NG | ▶ | GO TO 8. |

10 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

- With CONSULT-II**
Turn throttle position sensor body clockwise until "CLSD THL/P SW" signal switches to "OFF".



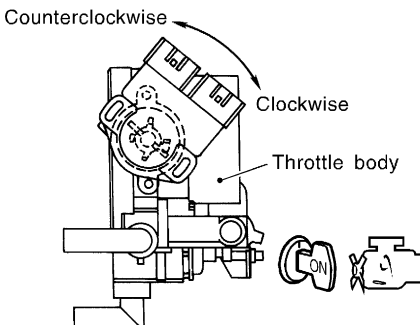
SEF689W

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| ▶ | GO TO 11. |
|---|-----------|

11 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

④ With CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.
 - Gradually move the sensor body counterclockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.



SEF689W

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.

The signal remains "OFF" while closing throttle valve.


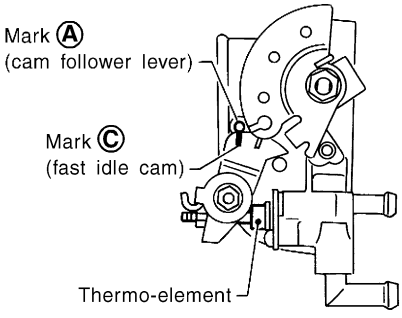
OK or NG

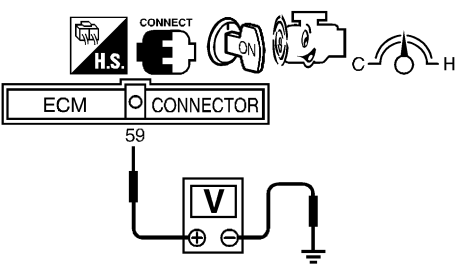
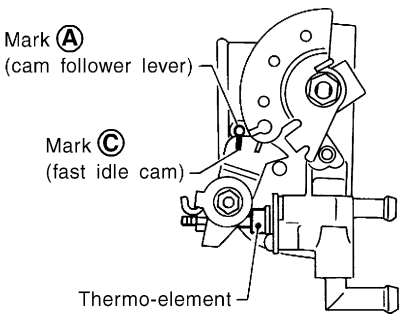
OK	▶	GO TO 12.
NG	▶	GO TO 8.

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12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY										
<p>With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Remove feeler gauge. 2. Start engine. 3. Warm up engine to normal operating temperature. 4. Select "CLSD THL POS" in "DATA MONITOR" mode. 5. Stop engine. (Turn ignition switch OFF.) 6. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 7. Turn ignition switch OFF and wait at least 5 seconds. 8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> </tbody> </table> </div>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	CLSD THL/P SW	ON
DATA MONITOR											
MONITOR	NO DTC										
ENG SPEED	XXX rpm										
COOLAN TEMP/S	XXX °C										
CLSD THL/P SW	ON										
SEF864V											
<p>▶ GO TO 13.</p>											

13	CHECK TARGET IDLE SPEED
<p>With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-662.

14	CHECK FI CAM FUNCTION
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "MODE 1" with GST. 3. Start engine and warm it up. 4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. <div style="text-align: center; margin: 20px 0;">  <p style="margin-left: 100px;">Mark A (cam follower lever)</p> <p style="margin-left: 100px;">Mark C (fast idle cam)</p> <p style="margin-left: 100px;">Thermo-element</p> </div> <p style="text-align: right; margin-right: 50px;">SEF971R</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ <ol style="list-style-type: none"> 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-660. 2. GO TO 16.

15	CHECK FI CAM FUNCTION
<p>NO TOOLS</p>	
<p>1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground. 2. Start engine and warm it up.</p>	
	
<p>3. When the voltage is between 1.10 to 1.36V, check the following.</p> <ul style="list-style-type: none"> • The center of mark A is aligned with mark C. • The cam follower lever's roller is not touching the fast idle cam. 	
	
<p>SEF119W</p> <p>SEF971R</p>	
<p>OK or NG</p>	
<p>OK</p>	<p>▶ GO TO 16.</p>
<p>NG</p>	<p>▶ 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-660. 2. GO TO 16.</p>

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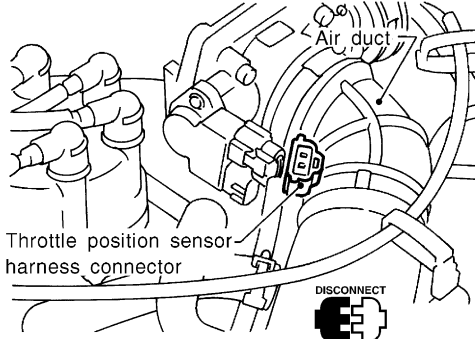
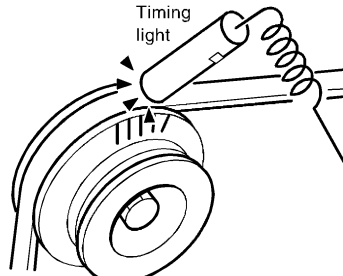
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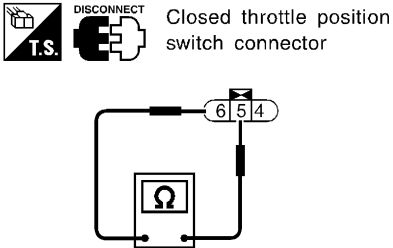
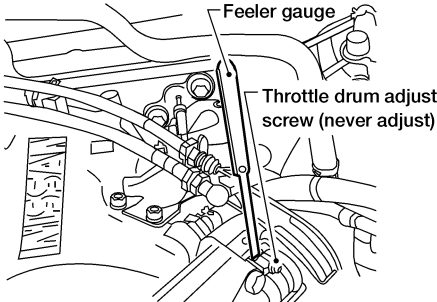
16	CHECK IGNITION TIMING
<p>⊗ Without CONSULT-II</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Stop engine and disconnect throttle position sensor harness connector.</p>	
	
<p>3. Start engine.</p> <p>4. Check ignition timing at idle using a timing light.</p>	
	
<p>Ignition timing: 10°±2° BTDC</p> <p>OK or NG</p>	
OK	▶ GO TO 17.
NG	▶ 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-662. 2. GO TO 17.

SEF975R

SEF984U

17	CHECK BASE IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>Does engine speed fall to the following speed?</p> <p>700±50 rpm (in "P" or "N" position)</p>	
<p>OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ 1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-662. 2. GO TO 18.

18	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION
<p>⊗ Without CONSULT-II</p> <p>NOTE:</p> <p>Always check ignition timing and base idle speed before performing the following.</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Check FI cam, refer to procedure 12 or 13.</p> <p>3. Stop engine.</p>	
▶	GO TO 19.

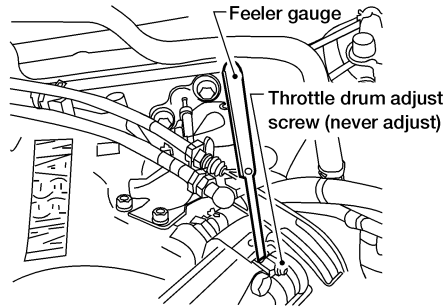
19	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I
<p>1. Disconnect closed throttle position switch harness connector.</p> <p>2. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions.</p>	
 <p style="text-align: center;">Closed throttle position switch connector</p>	
<p style="text-align: right;">SEF862V</p> <ul style="list-style-type: none"> ● Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure. 	
	
<p style="text-align: right;">LEC517</p> <p>“Continuity should exist” while inserting 0.3 mm (0.012 in) feeler gauge. “Continuity should not exist” while inserting 0.4 mm (0.016 in) feeler gauge.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 24.
NG	▶ GO TO 20.

20	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION
<p>⊗ Without CONSULT-II</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Never adjust throttle adjust screw (TAS). ● Do not touch throttle drum when checking “continuity”, doing so may cause an incorrect adjustment. <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam. Refer to procedure 12 or 13. 3. Stop engine. 4. Loosen throttle position sensor fixing bolts. 	
▶	GO TO 21.

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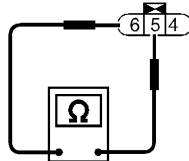
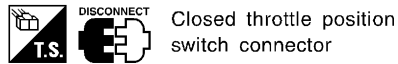
21 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



LEC517

3. Open throttle valve then close.
4. Check continuity between closed throttle position switch terminals 5 and 6.



SEF862V

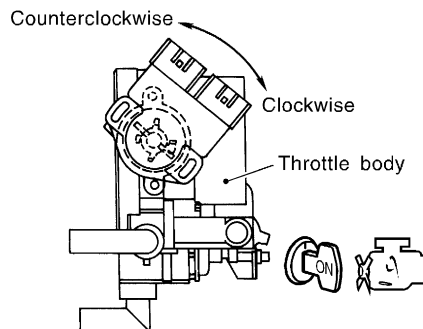
Continuity should not exist while closing the throttle position sensor.

OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

- Without CONSULT-II**
 Turn throttle position sensor body clockwise until continuity does not exist.



SEF689W

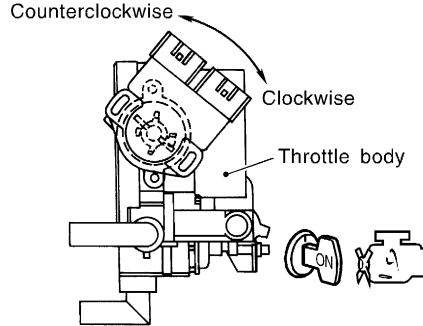
▶ GO TO 23.

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23 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

⊗ Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.
 - Gradually move the sensor body counterclockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.



SEF689W

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

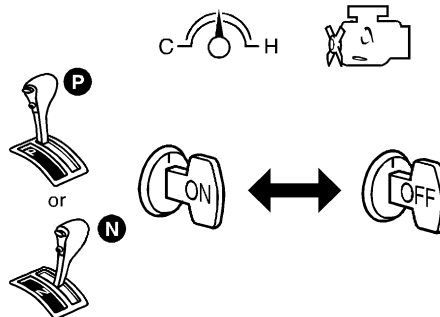
24 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

⊗ Without CONSULT-II

NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch OFF.)
5. Turn ignition switch ON and wait at least 5 seconds.



SEF864V

6. Turn ignition switch OFF and wait at least 5 seconds.
7. Repeat steps 4 and 5, 20 times.

▶	GO TO 25.
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Basic Inspection (Cont'd)

25	REINSTALLATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed. 	
▶ GO TO 26.	
26	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 27.
NG	▶ <ol style="list-style-type: none"> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-662. 2. GO TO 27.
27	ERASE UNNECESSARY DTC
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687 and AT-179, "HOW TO ERASE DTC".</p>	
▶ INSPECTION END	

DTC Inspection Priority Chart

NEEC0560

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)	
1	<ul style="list-style-type: none"> ● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115 P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0180 Fuel tank temperature sensor ● P0325 Knock sensor ● P0335 P1336 Crankshaft position sensor (OBD) ● P0340 Camshaft position sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0600 A/T communication line ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch 	<p style="text-align: right;">GI</p> <p style="text-align: right;">MA</p> <p style="text-align: right;">EM</p> <p style="text-align: right;">LC</p> <div style="background-color: black; color: white; text-align: center; padding: 5px;">EC</div> <p style="text-align: right;">FE</p>
2	<ul style="list-style-type: none"> ● P0105 Absolute pressure sensor (0803) ● P0130-P0134, P0150-P0154 Heated oxygen sensor 1 (front) ● P0135 P0155 Heated oxygen sensor 1 heater (front) ● P0137-P0140, P0157-P0160 Heated oxygen sensor 2 (rear) ● P0141 P0161 Heated oxygen sensor 2 heater (rear) ● P0217 Engine coolant overtemperature enrichment protection ● P0443 P1444 EVAP canister purge volume control solenoid valve ● P0446 P1446 P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P1441 EVAP control system (VERY SMALL LEAK) ● P1447 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve 	<p style="text-align: right;">CL</p> <p style="text-align: right;">MT</p> <p style="text-align: right;">AT</p> <p style="text-align: right;">TF</p> <p style="text-align: right;">PD</p>
3	<ul style="list-style-type: none"> ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420 P0430 Three way catalyst function ● P0440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P0731-P0734 P0744 A/T function ● P1148 P1168 Closed loop control 	<p style="text-align: right;">AX</p> <p style="text-align: right;">SU</p>

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Fail-safe Chart

=NEEC0561

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
CONSULT-II GST		Condition	Engine coolant temperature decided (CONSULT-II display)
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Just as ignition switch is turned ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.
P0120	Throttle position sensor circuit	Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.	
		Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.	
		ECM fail-safe operation	
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset value
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

Symptom Matrix Chart
SYSTEM — BASIC ENGINE CONTROL SYSTEM

NEEC0562

NEEC0562S01

		SYMPTOM													Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel pump circuit	1	1	2	3	2		3	2					3	1	EC-1198
	Injector circuit							2								EC-1190
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3				4		EC-659
	Evaporative emission system															EC-640
Air	Positive crankcase ventilation system	3	3				1	1	1	1				1		EC-656
	Incorrect idle speed adjustment															EC-662
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2				3		EC-1048
	IACV-FICD solenoid valve circuit		2				3	3								EC-1211
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1					1		EC-662
	Ignition circuit							1	1							2
Main power supply and ground circuit		1	2	3	3	3		3	2			1		3	1	EC-754
Air conditioner circuit		2										3				3

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1			2				2						EC-967
Mass air flow sensor circuit		1	2		2							2		
Heated oxygen sensor 1 (front) circuit				3			2							EC-799
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-776, 794
Throttle position sensor circuit		1	2		2	2					2			EC-781
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-715
Vehicle speed sensor circuit		2												EC-1044
Knock sensor circuit			3		3						3			EC-957
ECM	2	2		3		3	3	2	2	1				EC-1066, 730
Start signal circuit	1													EC-1195
Park/neutral position (PNP) switch circuit			3		3						3			EC-1174
Power steering oil pressure switch circuit		2					3	2						EC-1206

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NEEC0562S02

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE-4
	Fuel piping			5	5	5		5	4		5				
	Vapor lock														
	Valve deposit														
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	4		5				
Air	Air duct														—
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5	5	5		5	4		5				
	Throttle body, Throttle wire	5					5			4					
	Air leakage from intake manifold/Collector/Gasket				5										
Cranking	Battery		1	1		1		1	1			1	1	SC-4	
	Generator circuit	1													
	Starter circuit														
	Park/neutral position (PNP) switch														
	Drive plate/Flywheel	6													

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head														EM-85, EM-96 and EM-116
	Cylinder head gasket	5	5	5	5	5		5	5		2	5	2		
	Cylinder block														
	Piston												3		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														FE-8
	Camshaft														
	Intake valve	6	6	6	6	6		6	6			6	2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			MA-30, EM-80 and LC-20
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		MA-30
	Oil level (Low/Filthy) oil														
Cooling	Radiator/Hose/Radiator filler cap														LC-27
	Thermostat						5				5				
	Water pump														
	Water gallery	6	6	6	6	6		6	6		2	6			
	Cooling fan						5				5				
	Coolant level (low)/Contaminated coolant														

1 - 6: The numbers refer to the order of inspection.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0563

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

- If the real-time diagnosis results are NG and the on board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION	SPECIFICATION
CMPS-RPM (POS) ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 	Almost the same speed as the CONSULT-II value.
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 2,500 rpm
		1.0 - 1.7V 1.7 - 2.3V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 	More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)		LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 	Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: fully closed (a) 0.15 - 0.85V
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Partially open Between (a) and (b)
		Throttle valve: fully opened (b) 3.5 - 4.7V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 	OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch: OFF OFF
		Air conditioner switch: ON (Compressor operates.) ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: "P" or "N" ON
		Except above OFF
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction) OFF
		The steering wheel is turned ON

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient air temperature with the following: 	Below 19°C (66°F)
		Above 25°C (77°F)
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
A/F ALPHA-B2 A/F ALPHA-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 	Approx. 3.4V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	Except as shown above	OFF
COOLING FAN*	<ul style="list-style-type: none"> ● After warming up engine, idle the engine. ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less
		Engine coolant temperature is 95°C (203°F) or more
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	<ul style="list-style-type: none"> ● Engine speed: Below 3,200 rpm 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 3,200 rpm 	OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,200 rpm 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more] 	ON
VC/V BYPASS/V	<ul style="list-style-type: none"> Ignition switch: ON 	OFF
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,500 rpm

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. 	Throttle valve: fully closed 0.0%
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: fully opened Approx. 80%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 3.3 - 4.8 g-m/s
		2,500 rpm 12.0 - 14.9 g-m/s
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Approx. 4.4V
		For 5 seconds after starting engine Approx. 4.4V
	<ul style="list-style-type: none"> ● Engine speed: Idle 	More than 5 seconds after starting engine Approx. 1.3V

*: Models with electric cooling fan.

Major Sensor Reference Graph in Data Monitor Mode

The following are the major sensor reference graphs in "DATA MONITOR" mode. (Select "HI SPEED" in "DATA MONITOR" with CONSULT-II.)

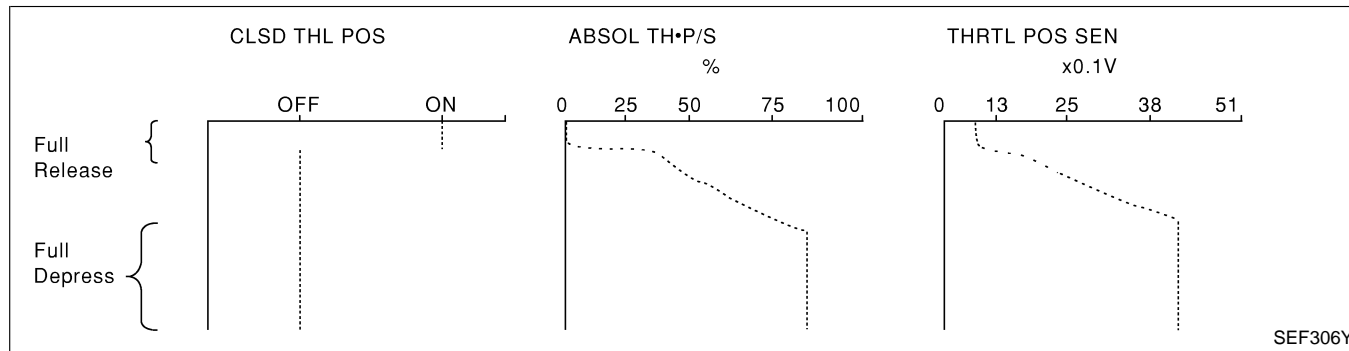
NEEC0564

THRTL POS SEN, ABSOL TH-P/S, CLSD THL POS

Below is the data for "THRTL POS SEN", "ABSOL TH-P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.

NEEC0564S01

The signal of "THRTL POS SEN" and "ABSOL TH-P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



ENG SPEED, MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

Below is the data for "ENG SPEED", "MAS AIR/FL SE", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

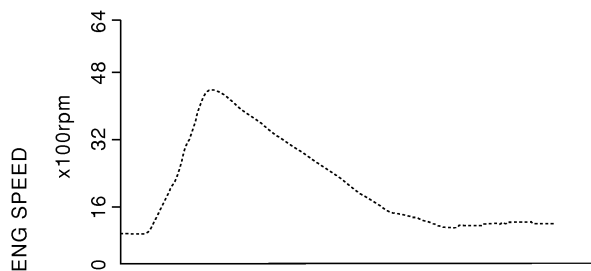
NEEC0564S02

Each value is for reference, the exact value may vary.

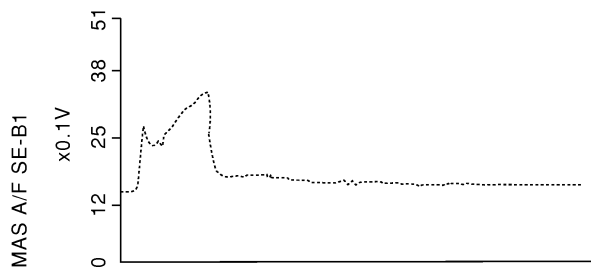
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



- "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.



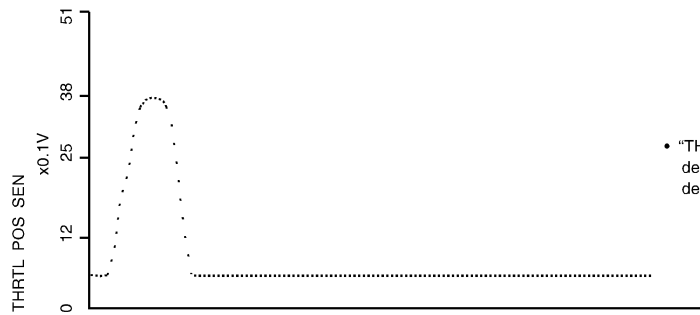
- "MAS A/F SE-B1" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

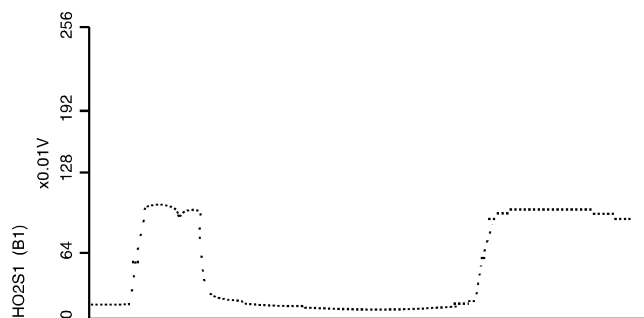
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



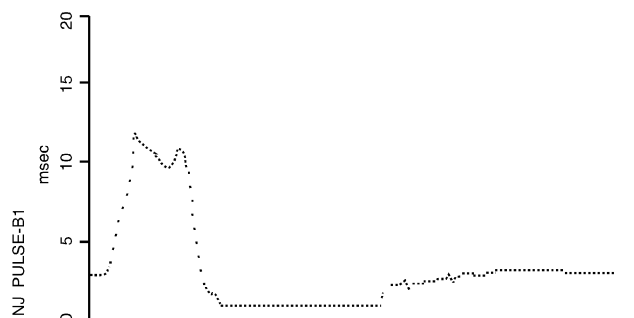
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

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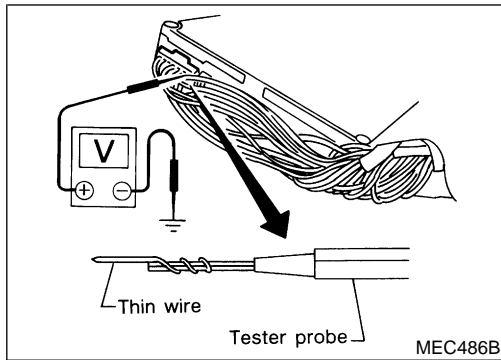
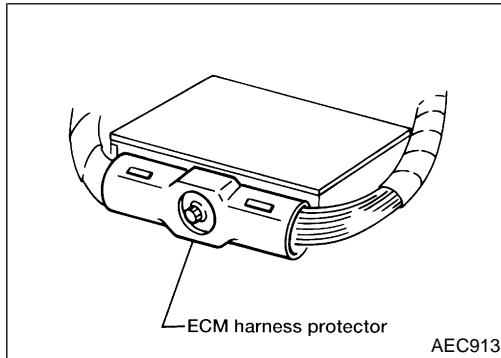
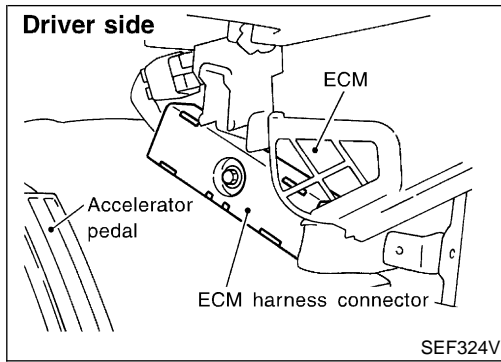
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ECM Terminals and Reference Value

NEEC0565

PREPARATION

NEEC0565S01

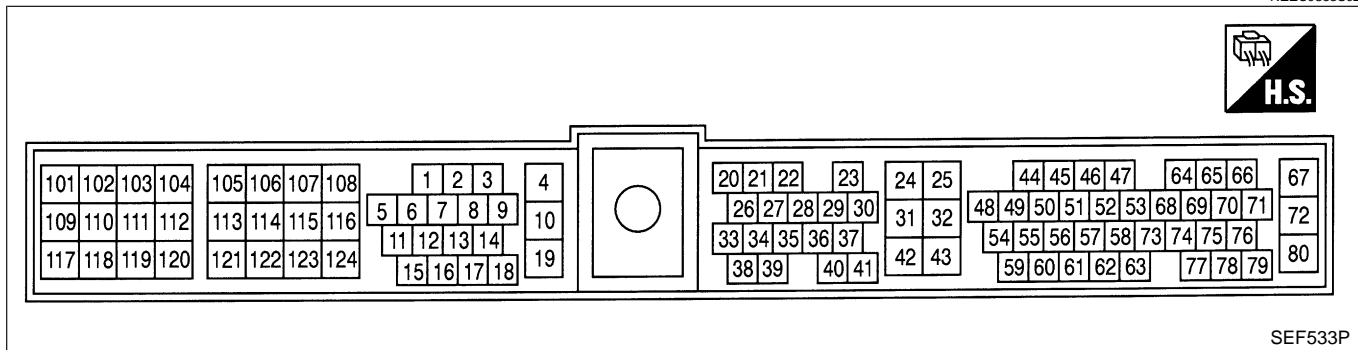
1. ECM is located behind the instrument lower cover. For this inspection:
 - Remove instrument lower cover.

2. Remove ECM harness protector.

3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
 - Open harness securing clip to make testing easier.
 - Use extreme care not to touch 2 pins at one time.
 - Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NEEC0565S02



ECM INSPECTION TABLE

NEEC0565S03

Specification data are reference values and are measured between each terminal and ground.

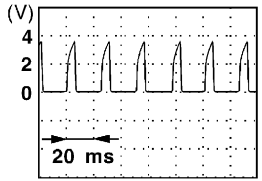
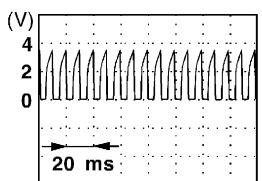
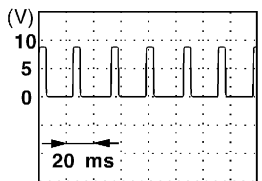
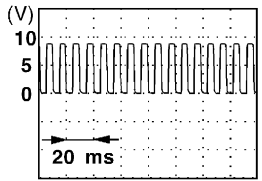
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p>  <p style="text-align: right; font-size: small;">SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p>  <p style="text-align: right; font-size: small;">SEF989U</p>
3	R/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V</p>  <p style="text-align: right; font-size: small;">SEF992U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 5V</p>  <p style="text-align: right; font-size: small;">SEF993U</p>
4	OR/B	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	<p>0 - 1.5V</p>
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	<p>BATTERY VOLTAGE (11 - 14V)</p>

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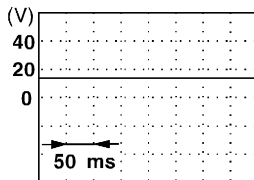
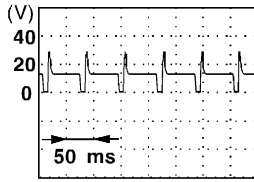
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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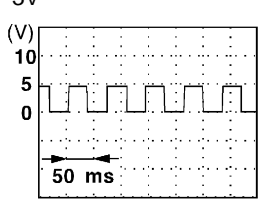
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V)  SEF995U
7	Y/G	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V
9	B/Y	Ambient air tempera- ture switch	[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
10	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	[Ignition switch ON] <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON*1 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	[Ignition switch ON]	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	9 - 12V
21	G/R	Air conditioner switch	[Engine is running] ● Both A/C switch and blower switch are ON (Compressor operates)*1	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P"	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	[Ignition switch ON] [Engine is running] ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	[Ignition switch ON] [Engine is running] ● Idle speed	6 - 8V
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V
29	G/B	Vehicle speed sensor	[Engine is running] ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V 
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground (Probe this terminal with (-) tester probe when measuring)

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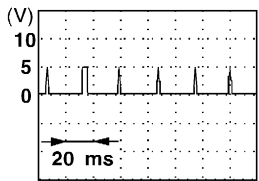
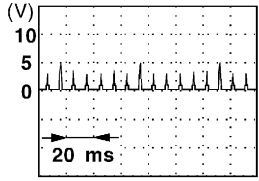
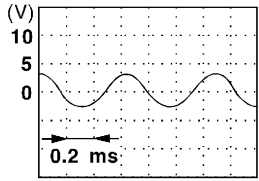
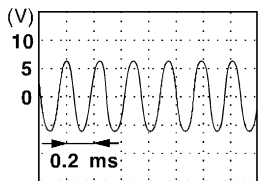
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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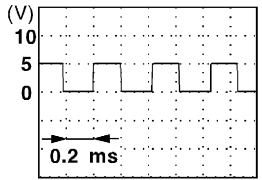
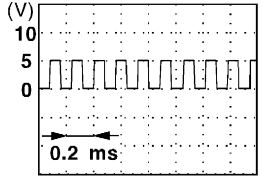
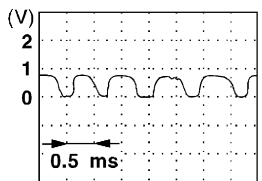
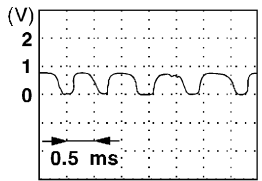
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	G/R	A/T signal No. 3	[Ignition switch ON]	0V
36	LG/R	Cooling fan relay*2	[Engine is running] ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 1V
39	GY/R	Power steering oil pres- sure switch	[Engine is running] ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V 
46	P/B	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	1 - 2V (AC range) 
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range) 

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 2.5V 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	Approximately 2.5V 
50	B	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V 
51	G	Heated oxygen sensor 1 (front) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V 
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature

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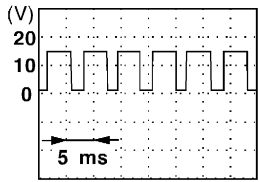
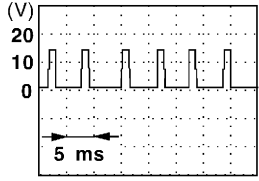
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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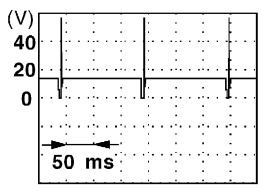
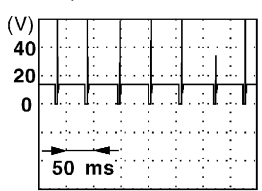
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector for GST	[Engine is running] ● Idle speed (GST is disconnected)	6 - 10V
72	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
75	Y/R	Data link connector for CONSULT-II	[Engine is running] ● Idle speed (Connect CONSULT-II and turned on.)	0 - 4V
76	GY/L			3 - 9V
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
101	OR/L	IACV-AAC valve	[Engine is running] ● Warm-up condition ● Idle speed	8 - 11V  SEF005V
			[Engine is running] ● Warm-up condition ● Engine speed is 3,000 rpm	7 - 10V  SEF692W

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V)  SEF008V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm 	Approximately 0.4V
119	BR/Y	Heated oxygen sensor 1 heater (front) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (front) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none">● Idle speed	Engine ground

*1: Any mode except OFF, ambient air temperature is above 25°C (77°F).

*2: Models with electric cooling fan.

Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

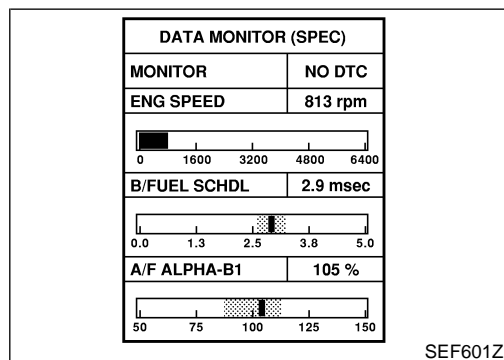
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,100 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



Inspection Procedure

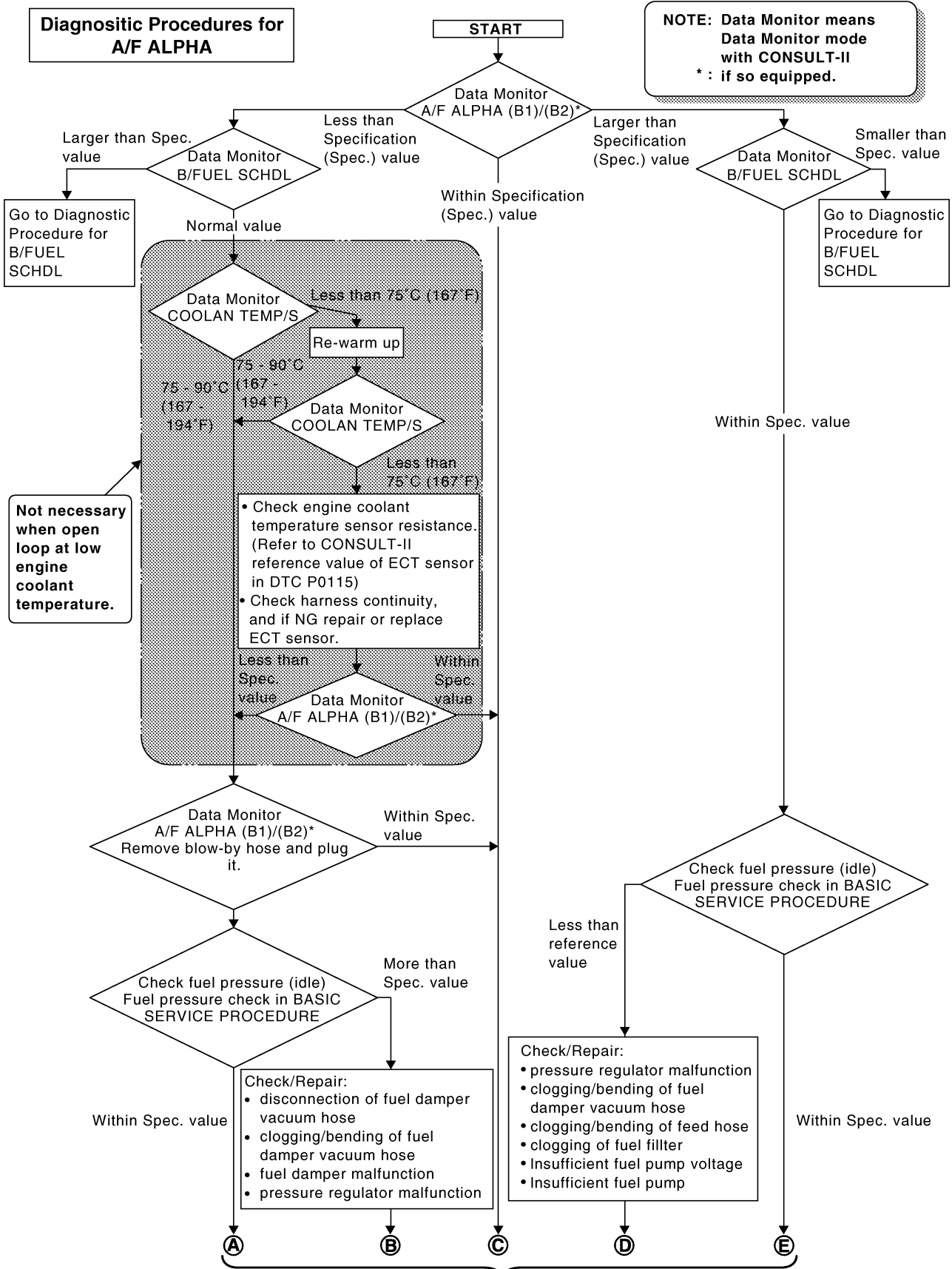
NOTE:

Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

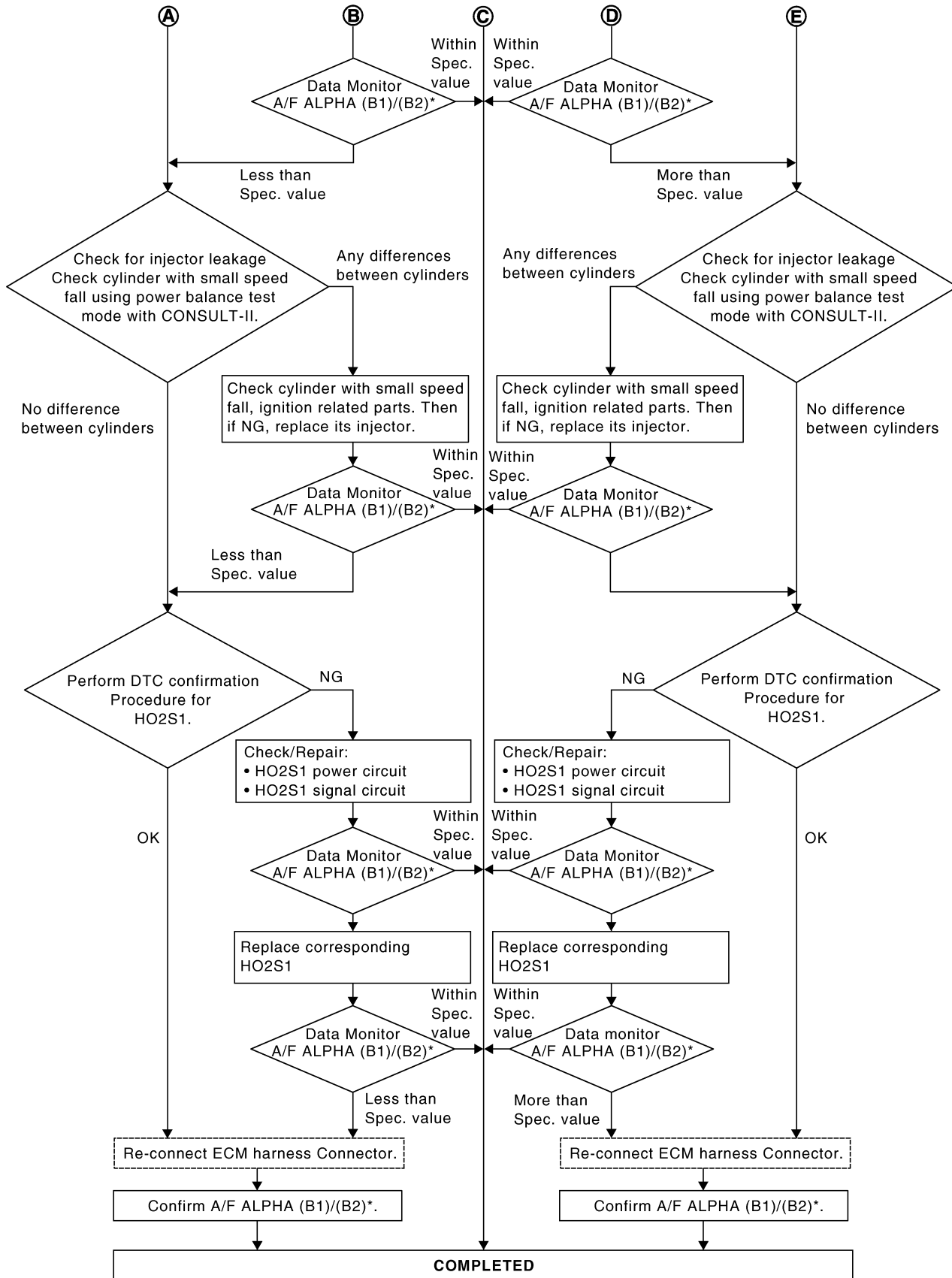
1. Perform “Basic Inspection”, EC-715.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-750.

Diagnostic Procedure

NEEC0961

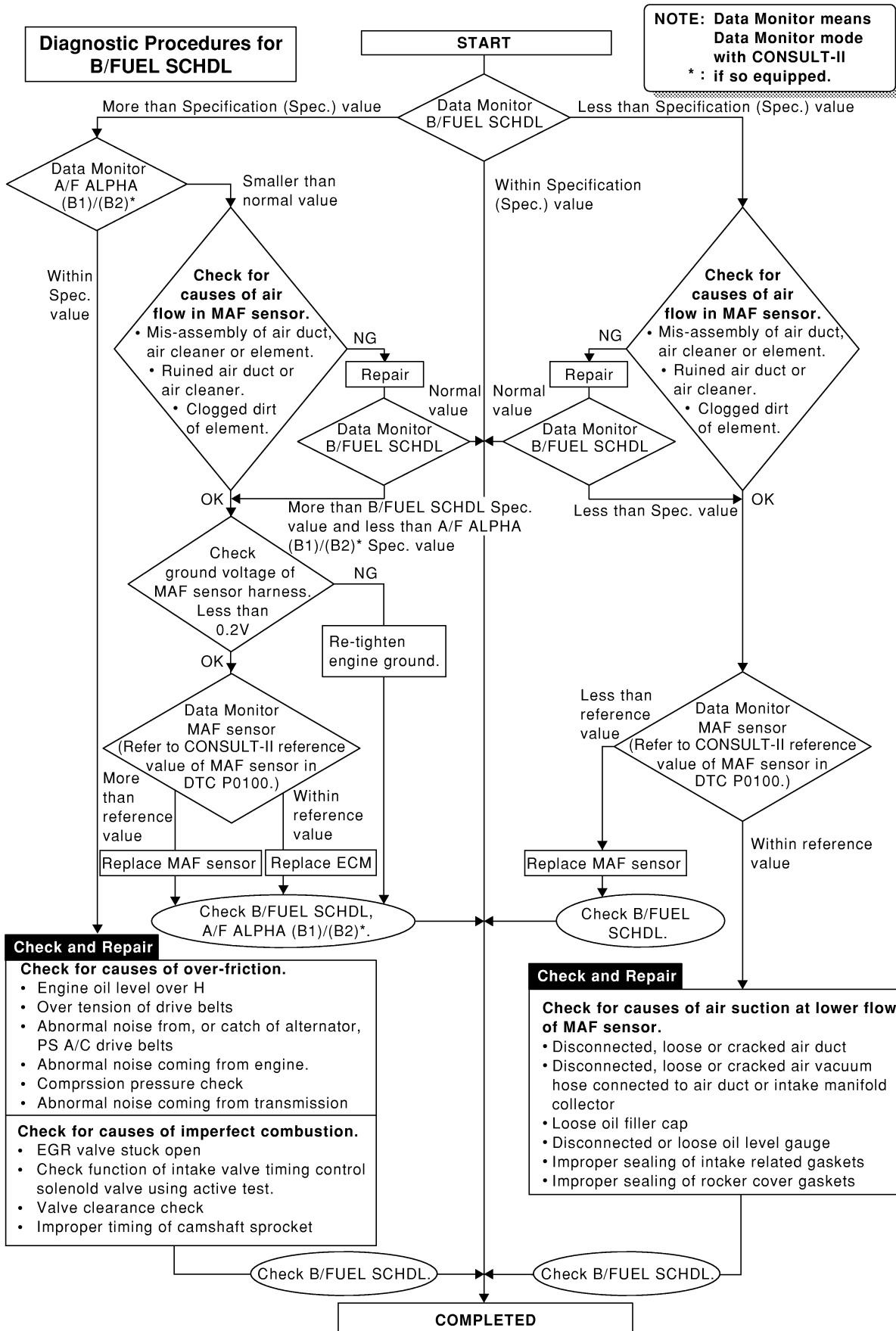


Not necessary when open loop at low engine coolant temperature.



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Description

NEEC0566

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NEEC0566S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "[1t]".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the problem area.

Diagnostic Procedure

NEEC0567

1	INSPECTION START	
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION - RELATED INFORMATION", EC-687.		
▶		GO TO 2.

2	CHECK GROUND TERMINALS	
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-29 .		
OK or NG		
OK ▶		GO TO 3.
NG ▶		Repair or replace.

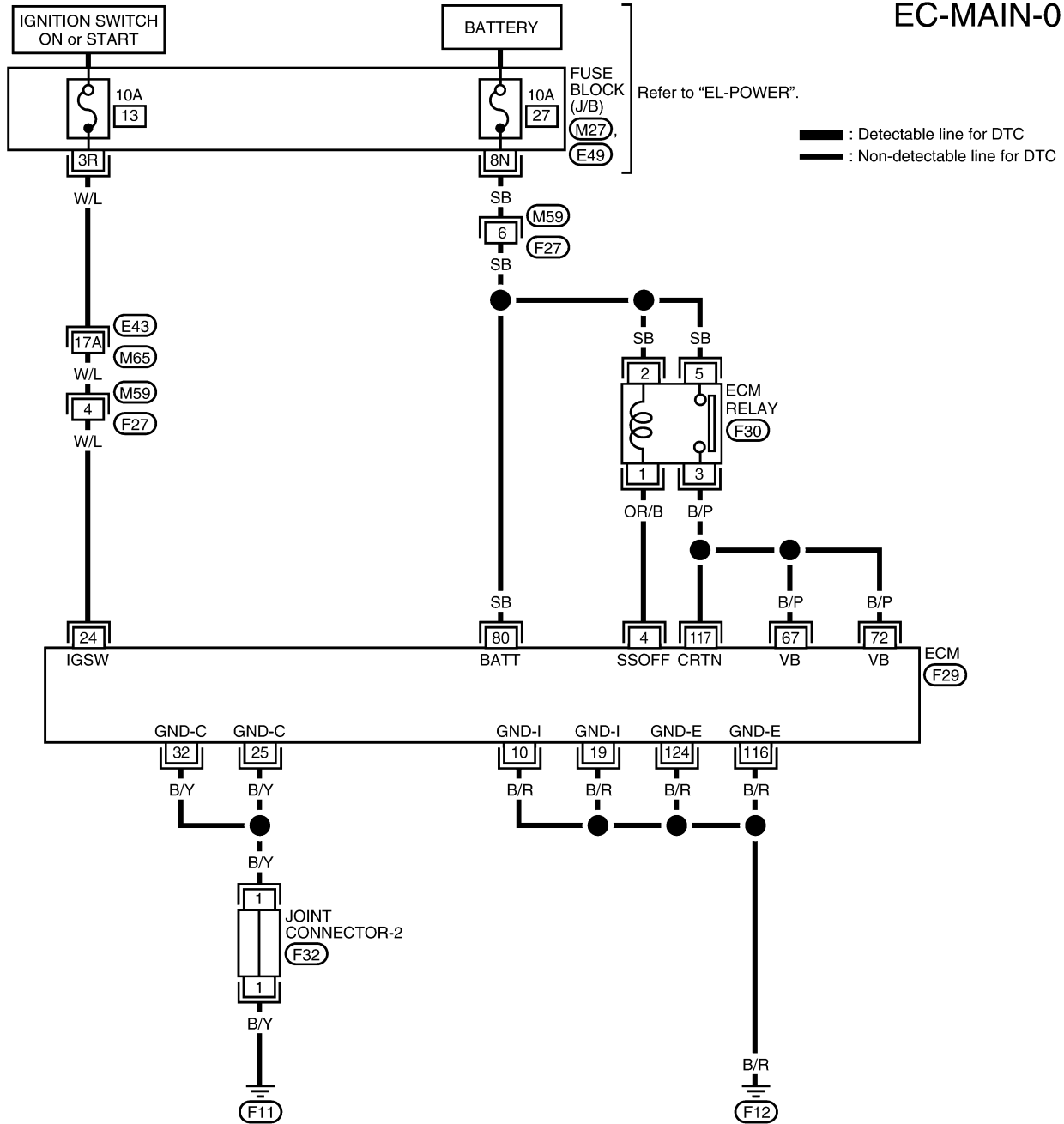
3	SEARCH FOR ELECTRICAL INCIDENT	
Perform "Incident Simulation Tests", GI-24 .		
OK or NG		
OK ▶		GO TO 4.
NG ▶		Repair or replace.

4	CHECK CONNECTOR TERMINALS	
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-21 .		
OK or NG		
OK ▶		INSPECTION END
NG ▶		Repair or replace connector.

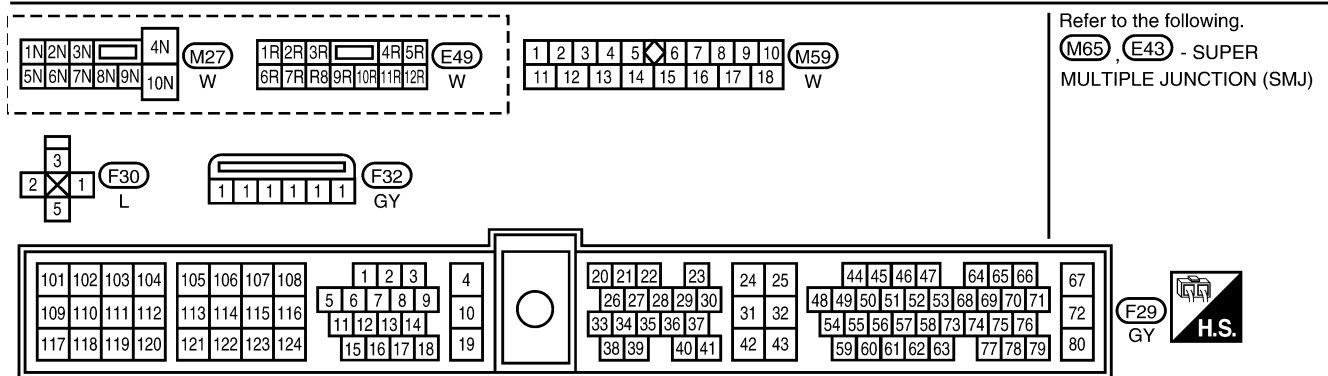
Main Power Supply and Ground Circuit WIRING DIAGRAM

NEEC0568

EC-MAIN-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NEEC0569

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shutoff)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground (Probe this terminal with (-) tester probe when measuring)
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

DIAGNOSTIC PROCEDURE

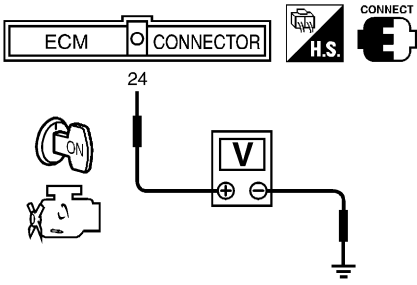
NEEC0570

1	INSPECTION START		
Start engine.			
Is engine running?			
Yes or No			
Yes	▶	GO TO 6.	
No	▶	GO TO 2.	

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

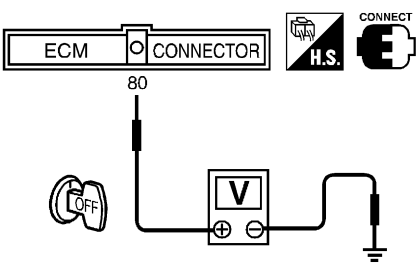
2	CHECK ECM POWER SUPPLY CIRCUIT-I
<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p>	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

SEF674U

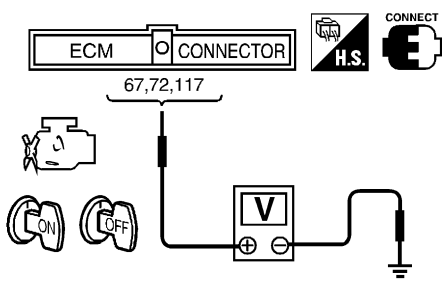
3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M59, F27 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between ECM and fuse 	
▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT-I FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p>	
<p>OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ GO TO 5.

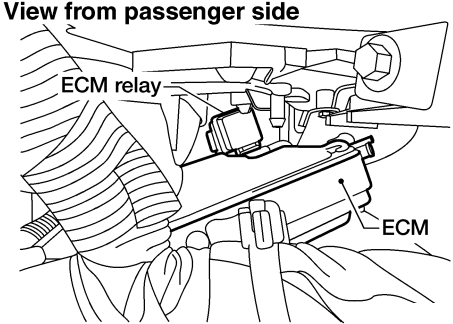
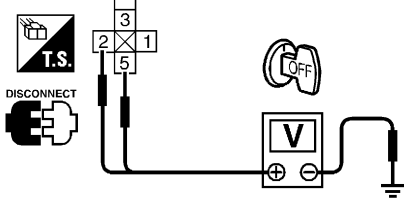
5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-2 ● Harness for open between ECM and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK ECM POWER SUPPLY CIRCUIT-II	
<p>1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF678U</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between ECM and fuse 		
▶		Repair harness or connectors.

8	CHECK ECM POWER SUPPLY CIRCUIT-III	
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p> <p style="text-align: right;">SEF679U</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 9.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

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9	CHECK ECM POWER SUPPLY CIRCUIT-IV						
<p>1. Disconnect ECM relay.</p> <div style="text-align: center;"> <p>View from passenger side</p>  </div>							
<p>2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>		OK	▶	GO TO 11.	NG	▶	GO TO 10.
OK	▶	GO TO 11.					
NG	▶	GO TO 10.					

AEC927A

SEF625W

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and harness connector F27 	
<p>▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	

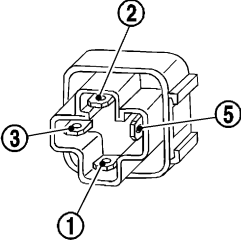
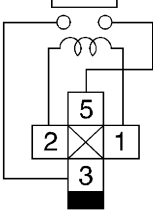
11	CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 12.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 12.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 12.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

12	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT						
<p>1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 13.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 13.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

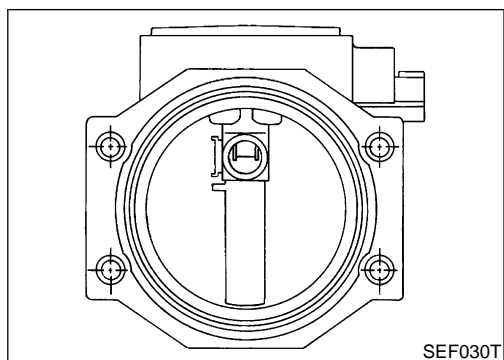
13	CHECK ECM RELAY	
<p>1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: right;">SEF039W</p> <p>12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	Replace ECM relay.

14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 15.
NG	▶	GO TO 5.

15	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END

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 EL
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Component Description



Component Description

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC0572

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC0573

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V

On Board Diagnosis Logic

NEEC0574

Malfunction is detected when
 (Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,
 (Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,
 (Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,
 (Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition.

POSSIBLE CAUSE

Malfunction A or C

NEEC0574S01

NEEC0574S0101

- Harness or connectors
(The sensor circuit is open or shorted.)
- Mass air flow sensor

GI

MA

Malfunction B or D

NEEC0574S0102

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

EM

LC

FAIL-SAFE MODE

NEEC0574S02

When the malfunction B is detected, the ECM enters fail-safe mode and the MIL lights up.

EC

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

FE

CL

MT

DTC Confirmation Procedure

NEEC0575

Perform "PROCEDURE FOR MALFUNCTION A" first.
 If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".
 If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
 If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

AT

TF

PD

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

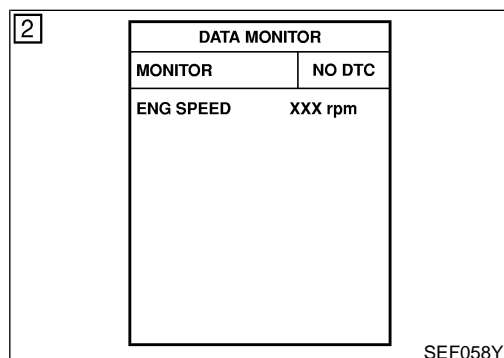
AX

SU

BR

ST

RS



PROCEDURE FOR MALFUNCTION A

NEEC0575S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-765.

BT

HA

SC

With GST

Follow the procedure "With CONSULT-II".

EL

IDX

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC0575S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-765.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NEEC0575S03

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

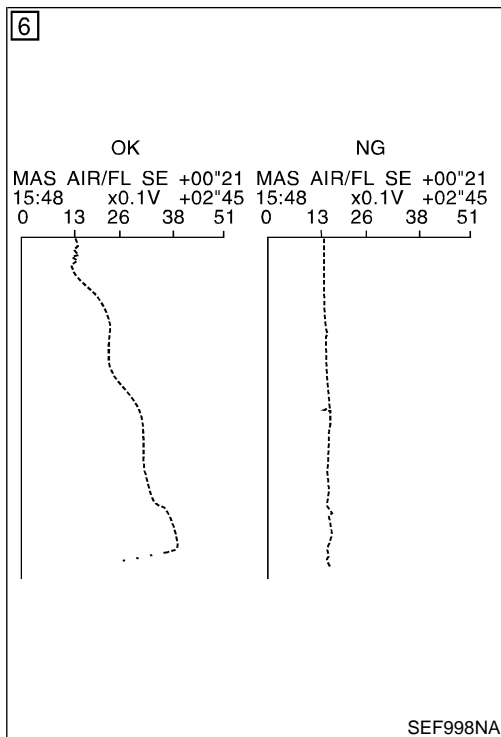
With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-765.

With GST

Follow the procedure "With CONSULT-II".

NEEC0575S04



PROCEDURE FOR MALFUNCTION D

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-765.**
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-765.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-765.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

PROCEDURE FOR MALFUNCTION D

NEEC0576

NEEC0576S01

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check the mass air flow sensor signal with "MODE 1".
- 4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-765.

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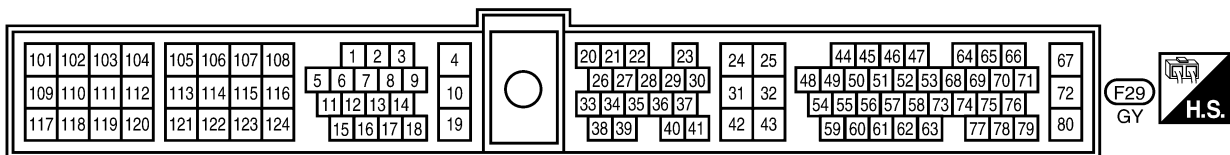
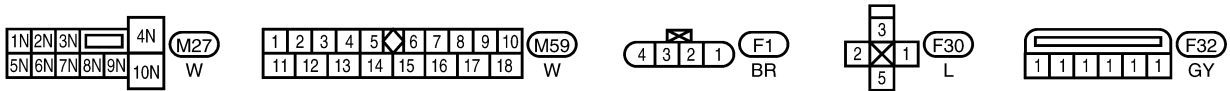
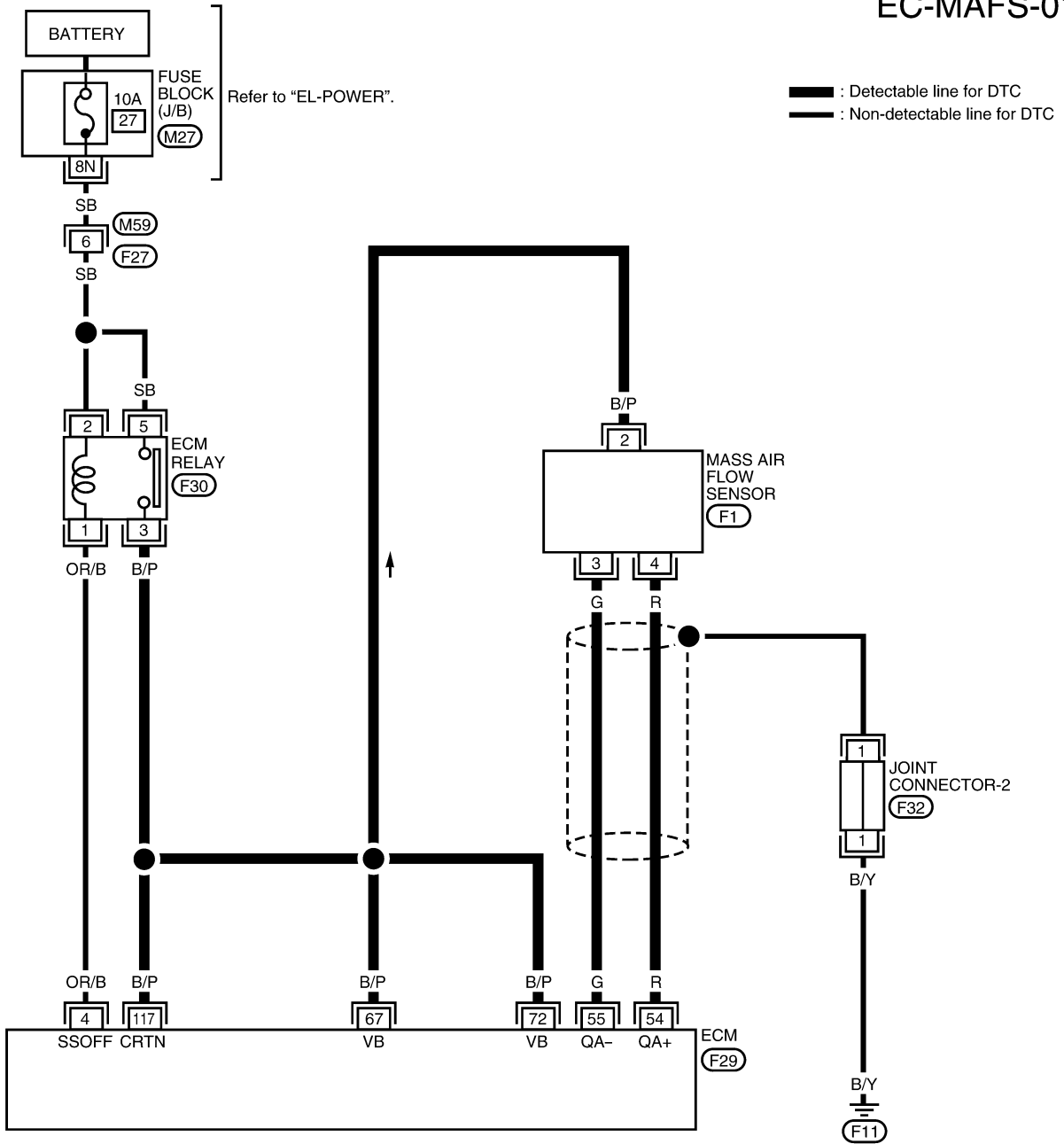
EL

IDX

Wiring Diagram

NEEC0577

EC-MAFS-01

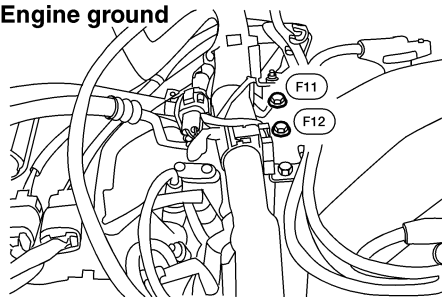


Diagnostic Procedure

NEEC0578

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td>B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
<p>Engine ground</p>  <p>The diagram shows a close-up of the engine's ground screw assembly. Two screws are labeled F11 and F12. They are part of a larger metal bracket that is bolted to the engine block. Various hoses and wires are visible around the assembly.</p>		
LEC518		
		▶ GO TO 4.

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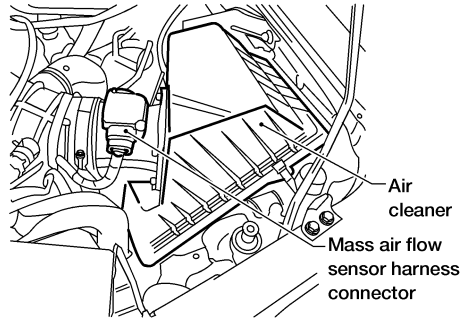
DTC P0100 MASS AIR FLOW SENSOR (MAFS)

VG33E

Diagnostic Procedure (Cont'd)

4 CHECK MAFS POWER SUPPLY CIRCUIT

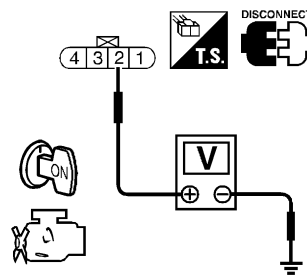
1. Disconnect mass air flow sensor harness connector.



AEC641A

2. Turn ignition switch ON.

3. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF627W

Voltage: Battery voltage

OK or NG

OK ► GO TO 6.

NG ► GO TO 5.

5 DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

► Repair harness or connectors.

6 CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness continuity between MAFS terminal 3 and ECM terminal 55.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK ► GO TO 7.

NG ► Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between MAFS terminal 4 and ECM terminal 54. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MASS AIR FLOW SENSOR											
<p>1. Reconnect harness connectors disconnected.</p> <p>2. Start engine and warm it up to normal operating temperature.</p> <p>3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.</p>												
SEF747U												
<table border="1"> <thead> <tr> <th>Condition</th> <th>Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td>Less than 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td>1.0 - 1.7</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td>1.7 - 2.3</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td>1.0 - 1.7 to Approx. 4.0</td> </tr> </tbody> </table>			Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Less than 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3	Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Less than 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3											
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0											
MTBL0227												
<p>4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.</p> <p>5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.</p>												
SEF030T												
OK or NG												
OK	▶	GO TO 9.										
NG	▶	Replace mass air flow sensor.										

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DTC P0100 MASS AIR FLOW SENSOR (MAFS)

VG33E

Diagnostic Procedure (Cont'd)

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground Refer to Wiring Diagram.● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

Component Description

The absolute pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

NEEC0579

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On Board Diagnosis Logic

Malfunction is detected when an excessively low or high voltage from the sensor is sent to the micro computer.

NEEC0580
EC

POSSIBLE CAUSE

- ECM

NEEC0580S01

FE

CL

MT

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

NEEC0581

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3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II



- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-770.

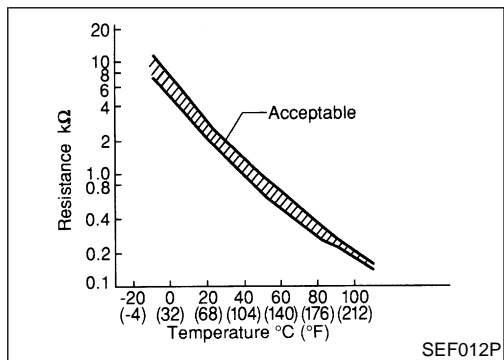
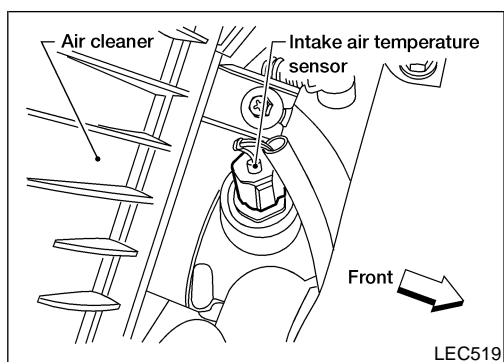
With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NEEC0962

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-769. 5. Is the 1st trip DTC P0105 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-769. 5. Is the 1st trip DTC P0105 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END



Component Description

NEEC0585

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0586

Malfunction is detected when (Malfunction A) an excessively low or high voltage from the sensor is sent to ECM, (Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

POSSIBLE CAUSE

NEEC0586S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NEEC0587

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC0587S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-774.

With GST

Follow the procedure "With CONSULT-II".

5	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

NEEC0587S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
- a) Turn ignition switch ON.
- b) Select "DATA MONITOR" mode with CONSULT-II.
- c) Check the engine coolant temperature.
- d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-774.

With GST

Follow the procedure "With CONSULT-II".

DTC P0110 INTAKE AIR TEMPERATURE SENSOR

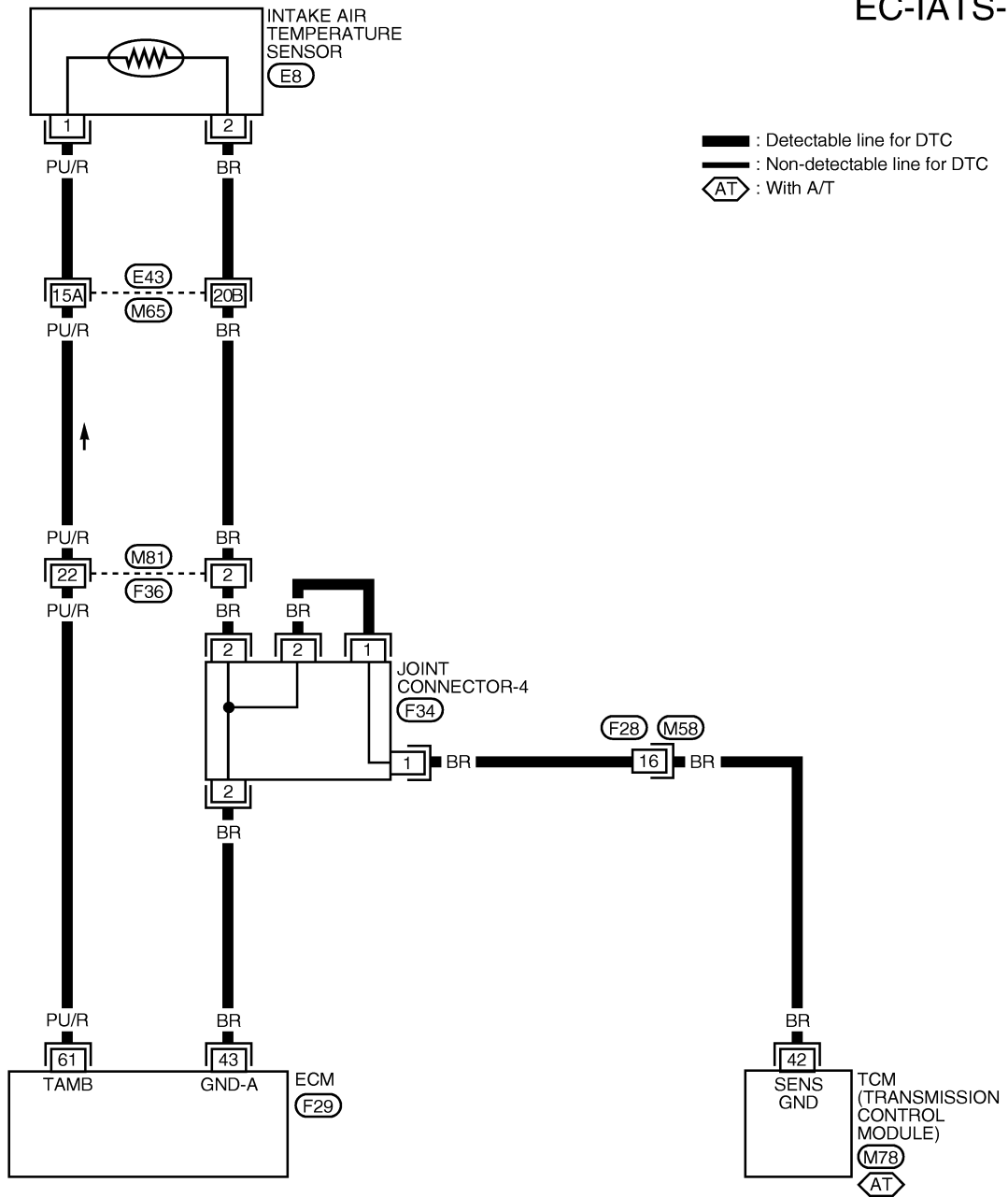
VG33E

Wiring Diagram

Wiring Diagram

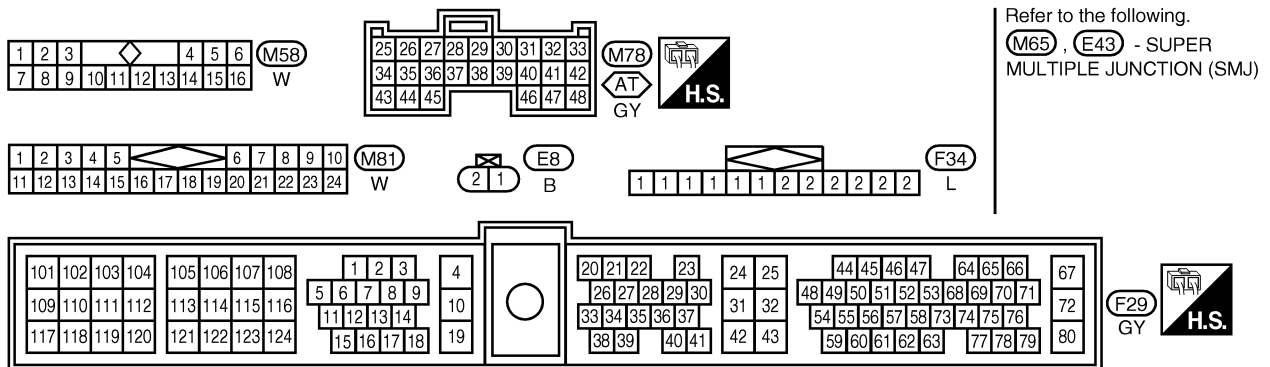
NEEC0588

EC-IATS-01



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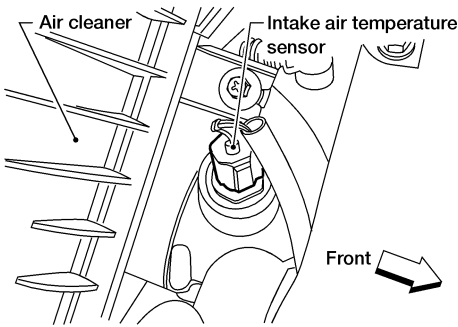
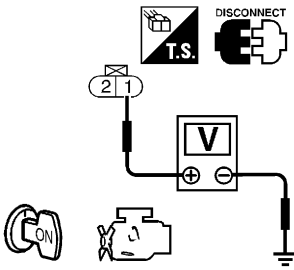
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AEC941A

Diagnostic Procedure

NEEC0589

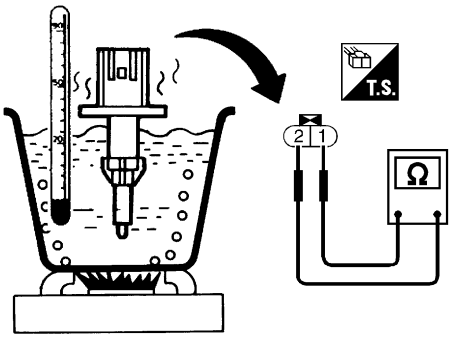
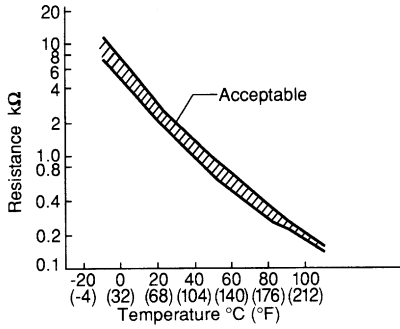
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

LEC519
SEF203W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair harness or connectors.

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between ECM and intake air temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and intake air temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
Check resistance as shown in the figure.							
							
<Reference data>							
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Intake air temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">80 (176)</td> <td style="text-align: center;">0.27 - 0.38</td> </tr> </tbody> </table>		Intake air temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Intake air temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace intake air temperature sensor.						

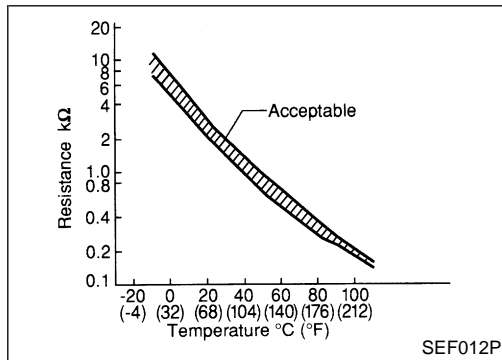
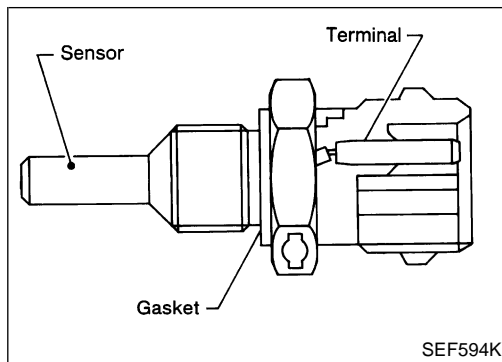
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33E

Component Description



Component Description

NEEC0590

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0591

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NEEC0591S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE MODE

NEEC0591S02

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33E

On Board Diagnosis Logic (Cont'd)

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

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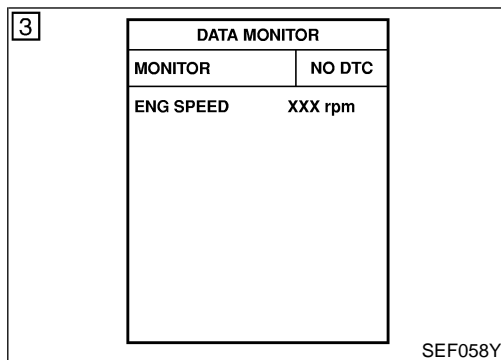
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DTC Confirmation Procedure

NEEC0592

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-779.

With GST

Follow the procedure "With CONSULT-II".

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DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

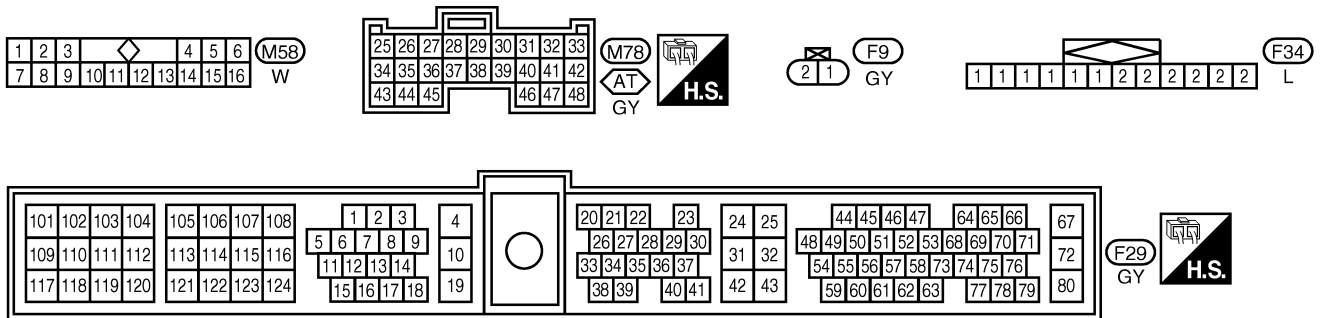
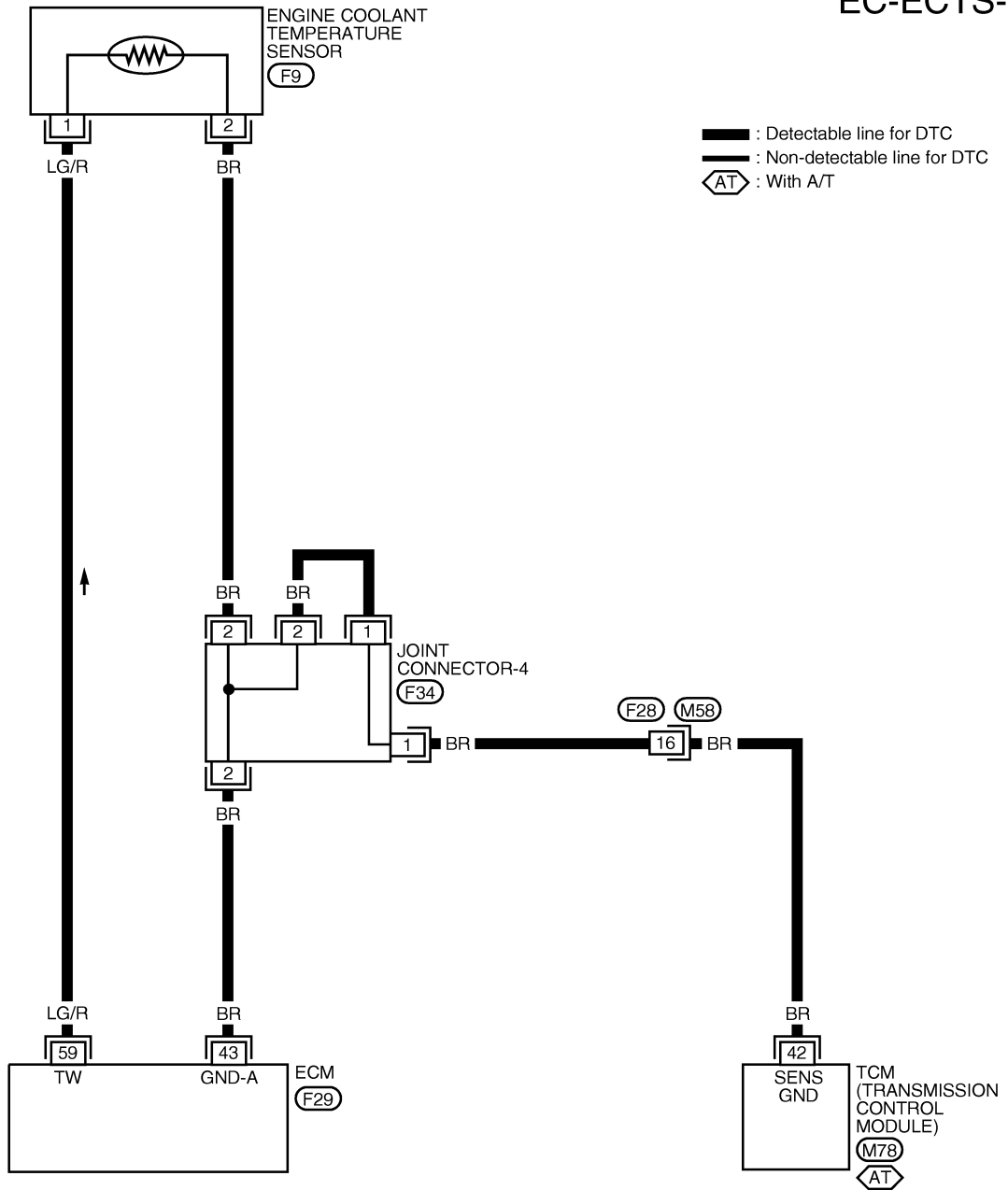
VG33E

Wiring Diagram

Wiring Diagram

NEEC0593

EC-ECTS-01



AEC942A

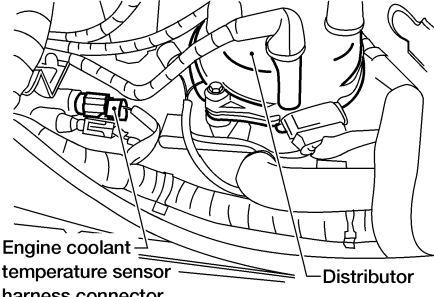
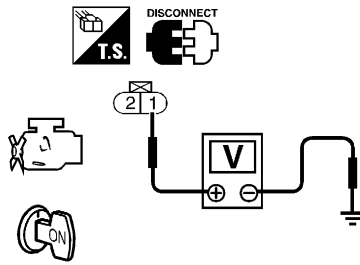
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0594

1	CHECK ECTS POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p>Engine coolant temperature sensor harness connector Distributor</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	<p>AEC643A</p> <p>SEF206W</p>
OK	▶	GO TO 2.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

2	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between ECM and engine coolant temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor 	
	▶	Repair open circuit or short to power in harness or connectors.	

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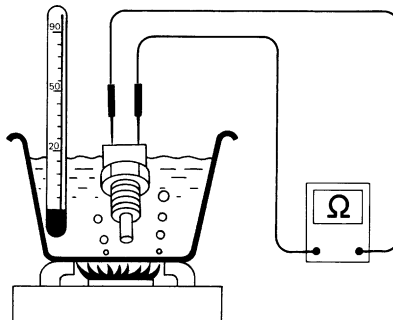
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

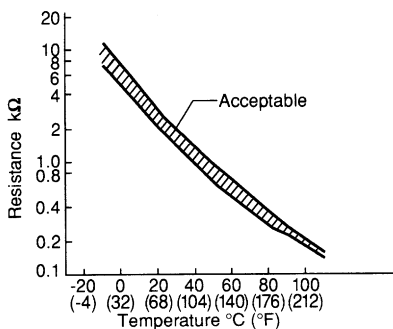
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0229

SEF012P

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

▶ **INSPECTION END**

Description

NEEC0595

NOTE:

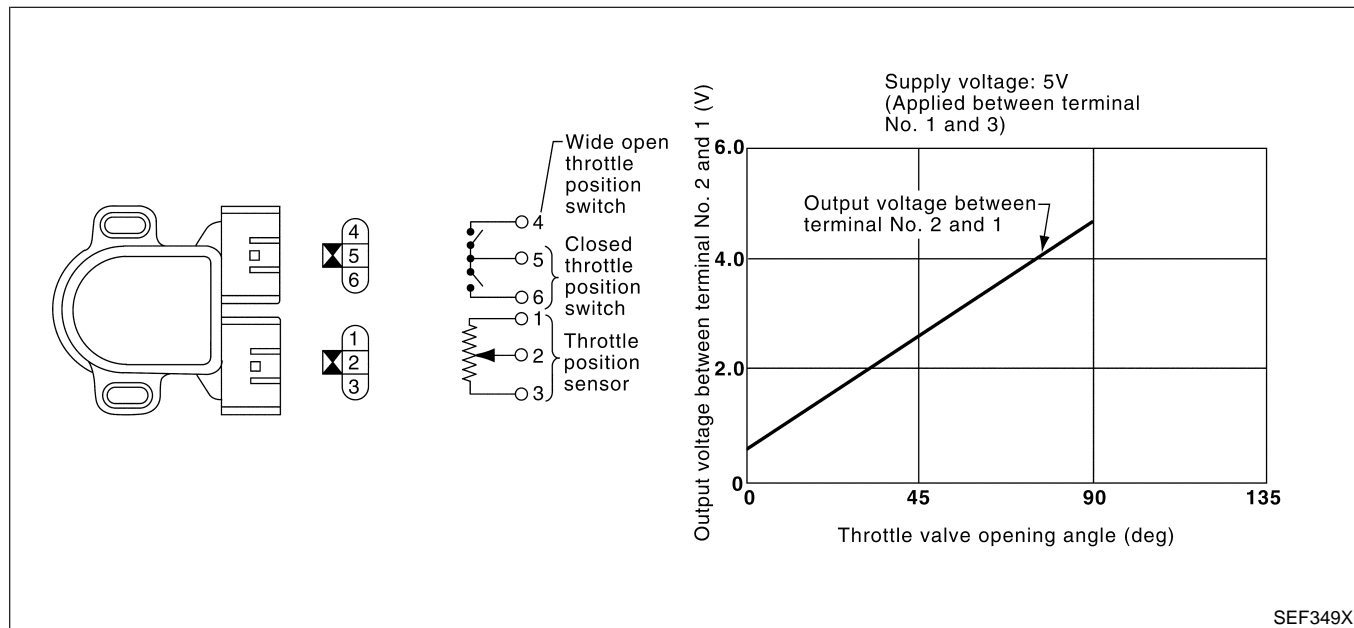
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform the trouble diagnosis for DTC P0510. Refer to EC-1054.

COMPONENT DESCRIPTION

NEEC0595S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

NEEC0596

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL POS SEN	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Throttle valve: fully closed (a) 0.15 - 0.85V
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) 	Throttle valve: Partially open Between (a) and (b)
		Throttle valve: fully opened (b) 3.5 - 4.7V
ABSOL TH-P/S	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. 	Throttle valve: fully closed 0.0%
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) 	Throttle valve: fully opened Approx. 80%

ECM Terminals and Reference Value

=NEEC0597

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NEEC0598

Malfunction is detected when
 (Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
 (Malfunction B) a high voltage from the sensor is sent to ECM under light load driving conditions,
 (Malfunction C) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

POSSIBLE CAUSE

NEEC0598S01

Malfunction A

NEEC0598S0101

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

Malfunction B

NEEC0598S0102

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector
- Camshaft position sensor
- Mass air flow sensor

Malfunction C

NEEC0598S0103

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

FAIL-SAFE MODE

NEEC0598S02

When the malfunction A is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0120 THROTTLE POSITION SENSOR

VG33E

On Board Diagnosis Logic (Cont'd)

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

GI
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EM

LC

DTC Confirmation Procedure

NEEC0599

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NEEC0599S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

EC

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2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF

SEF065Y

With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except “P” or “N” position

- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-787.

With GST

Follow the procedure “With CONSULT-II”.

SU

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RS

BT

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EL

IDX

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC0599S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-787.

With GST

Follow the procedure "With CONSULT-II".

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NEEC0599S03

CAUTION:

Always drive vehicle at a safe speed.

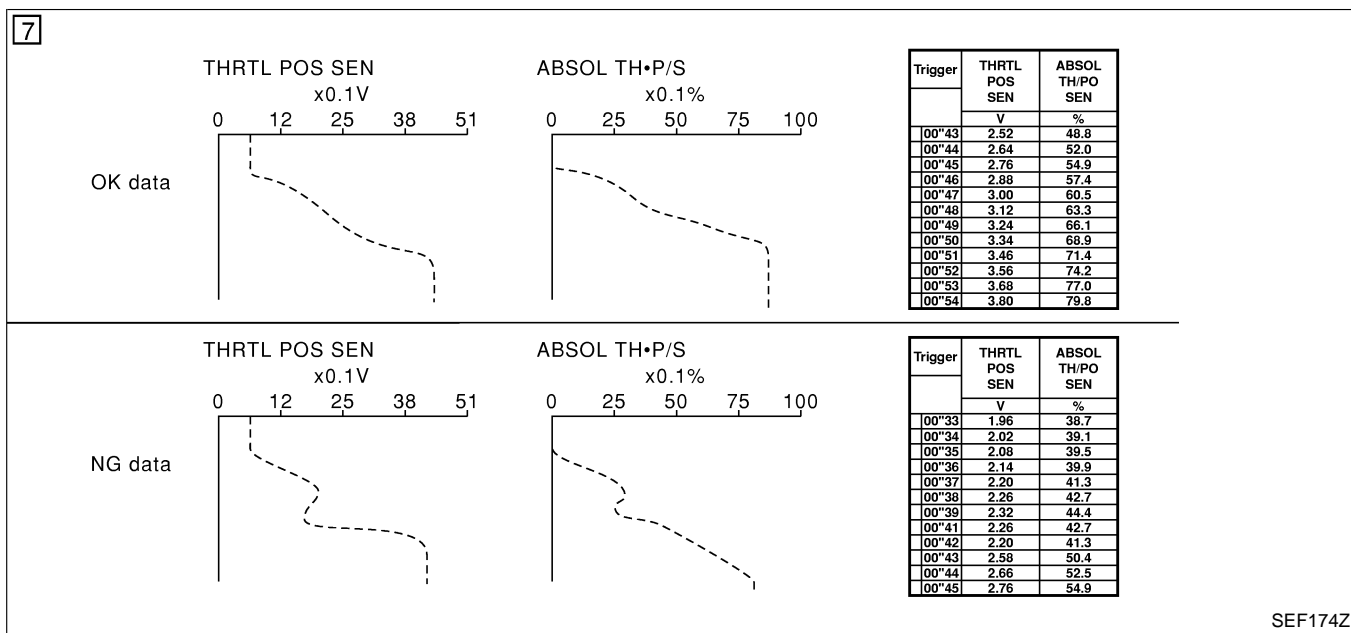
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON.
 - 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
 - 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
 - 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
 - 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
- If NG, go to "Diagnostic Procedure", EC-787.
If OK, go to following step.

DTC P0120 THROTTLE POSITION SENSOR

VG33E

DTC Confirmation Procedure (Cont'd)



DTC P0120 THROTTLE POSITION SENSOR

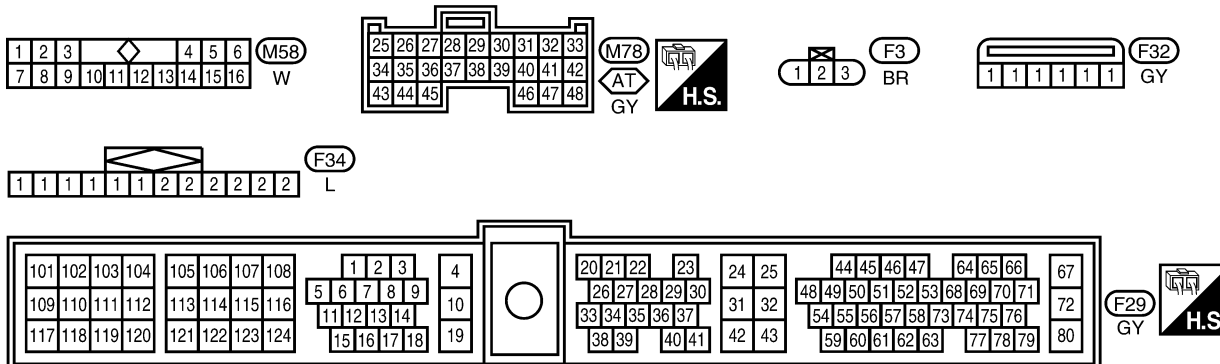
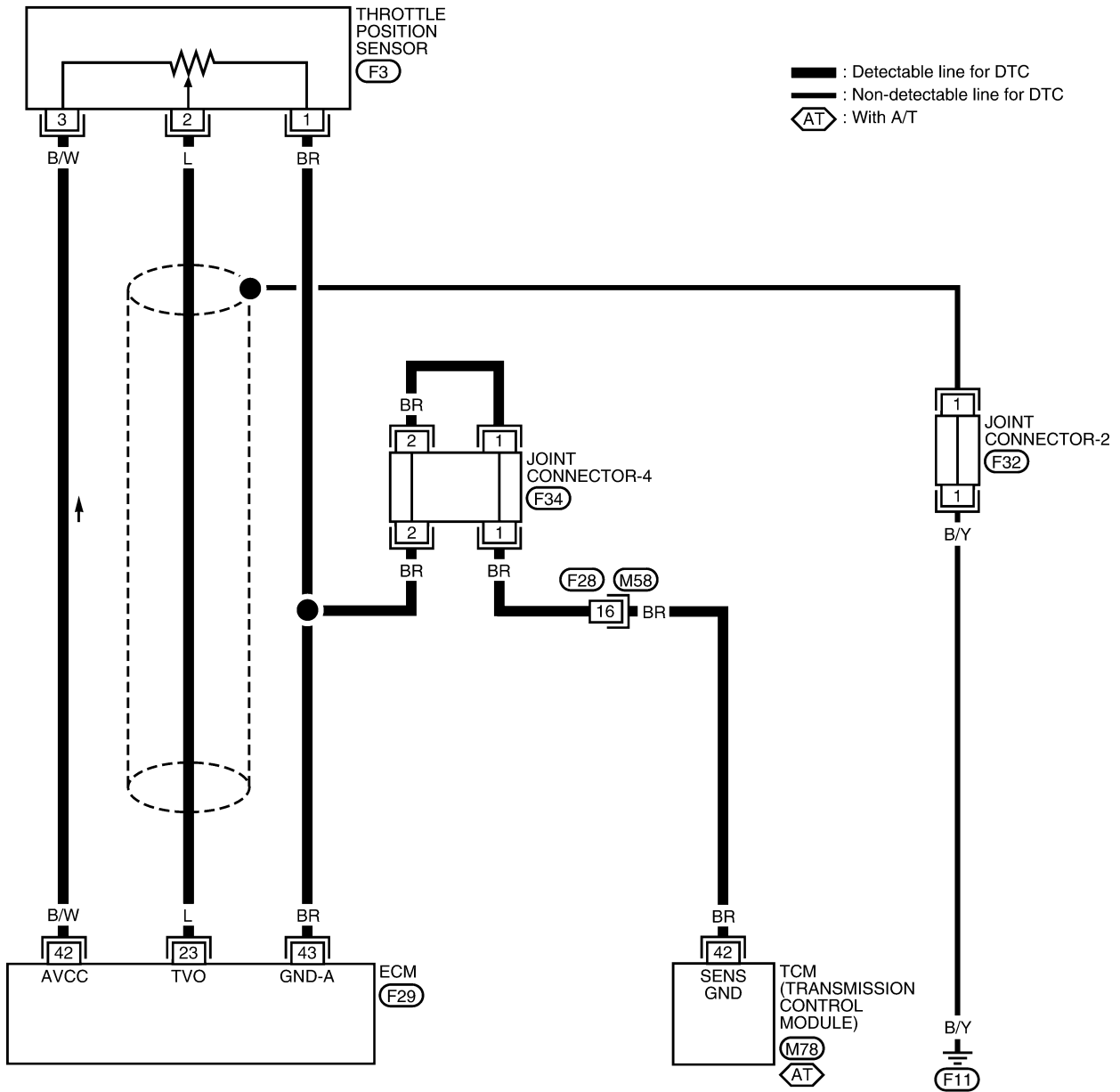
VG33E

Wiring Diagram

Wiring Diagram

NEEC0600

EC-TPS-01



WEC787

Diagnostic Procedure

NEEC0601

1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

GI
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EM
LC
EC

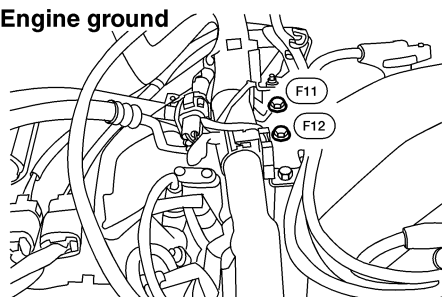
2	ADJUST THROTTLE POSITION SENSOR											
Check the following items. Refer to "Basic Inspection", EC-715.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
▶		GO TO 3.										

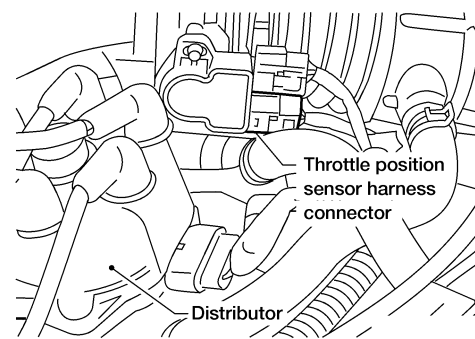
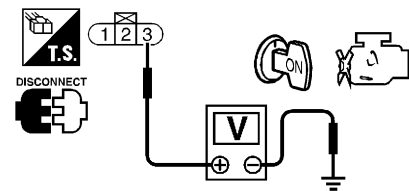
FE
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3	CHECK INTAKE SYSTEM.	
1. Turn ignition switch OFF. 2. Check the following for connection. <ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

PD
AX
SU
BR

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4	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="margin: 0;">Engine ground</p>	
LEC518	
▶ GO TO 5.	

5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Disconnect throttle position sensor harness connector. 	
	
AEC638A	
<ol style="list-style-type: none"> 2. Turn ignition switch ON. 3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester. 	
	
SEF630W	
Voltage: Approximately 5V	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0120 THROTTLE POSITION SENSOR

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between ECM and throttle position sensor ● Harness for open or short between TCM (Transmission Control Module) and throttle position sensor 		
▶		Repair open circuit or short to power in harness or connectors.

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 23 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR											
<p>Ⓟ With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Stop engine (ignition switch OFF).</p> <p>3. Turn ignition switch ON.</p> <p>4. Select "DATA MONITOR" mode with CONSULT-II.</p> <p>5. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
COOLAN TEMP/S	XXX °C											
THRTL POS SEN	XXX V											
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Throttle valve conditions</th> <th>THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td>Completely closed (a)</td> <td>0.15 - 0.85V</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open (b)</td> <td>3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V		
Throttle valve conditions	THRTL POS SEN											
Completely closed (a)	0.15 - 0.85V											
Partially open	Between (a) and (b)											
Completely open (b)	3.5 - 4.7V											
SEF062Y												
OK or NG												
OK	▶	GO TO 12.										
NG	▶	GO TO 11.										

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DTC P0120 THROTTLE POSITION SENSOR

VG33E

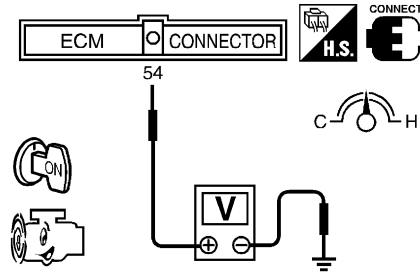
Diagnostic Procedure (Cont'd)

10	CHECK THROTTLE POSITION SENSOR									
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p style="text-align: center;">Voltage measurement must be made with throttle position sensor installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0231</p> <p style="text-align: center;">OK or NG</p>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
OK	▶	GO TO 12.								
NG	▶	GO TO 11.								

11	ADJUST CLOSED THROTTLE POSITION SWITCH											
<p>Adjust closed throttle position switch. Refer to "Basic Inspection", EC-715.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
OK	▶	GO TO 12.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-715.										

12 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

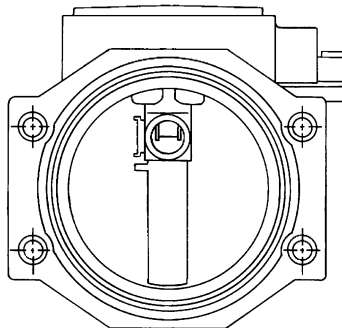


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



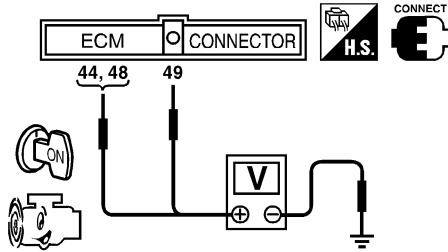
SEF030T

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

13 CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

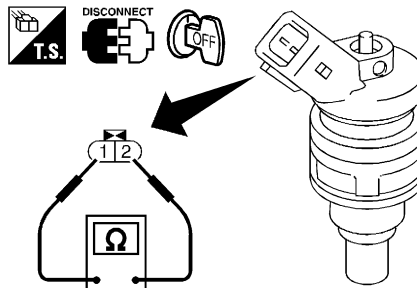
AEC072B

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 14. |
| NG | ▶ | Replace distributor assembly with camshaft position sensor. |

14 CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 10 - 14Ω [at 25°C (77°F)]

SEF625V

OK or NG

- | | | |
|----|---|------------------------|
| OK | ▶ | GO TO 15. |
| NG | ▶ | Replace fuel injector. |

DTC P0120 THROTTLE POSITION SENSOR

VG33E

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶	INSPECTION END

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DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) VG33E

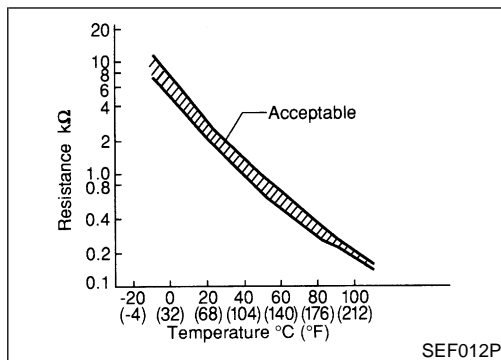
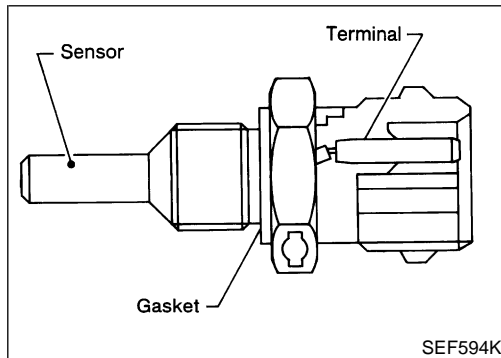
Description

Description

NEEC0602

NOTE:

If DTC P0125 (0908) is displayed with P0115 (0103), first perform the trouble diagnosis for DTC P0115. Refer to EC-776.



COMPONENT DESCRIPTION

NEEC0602S01

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC0603

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

POSSIBLE CAUSE

NEEC0603S01

- Harness or connectors (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NEEC0604

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.
- 4) Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-797.

With GST

Follow the procedure "With CONSULT-II".

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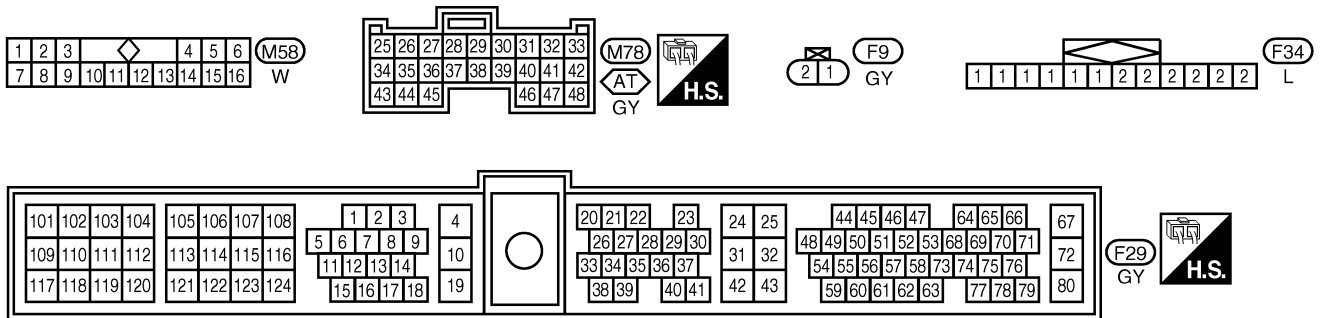
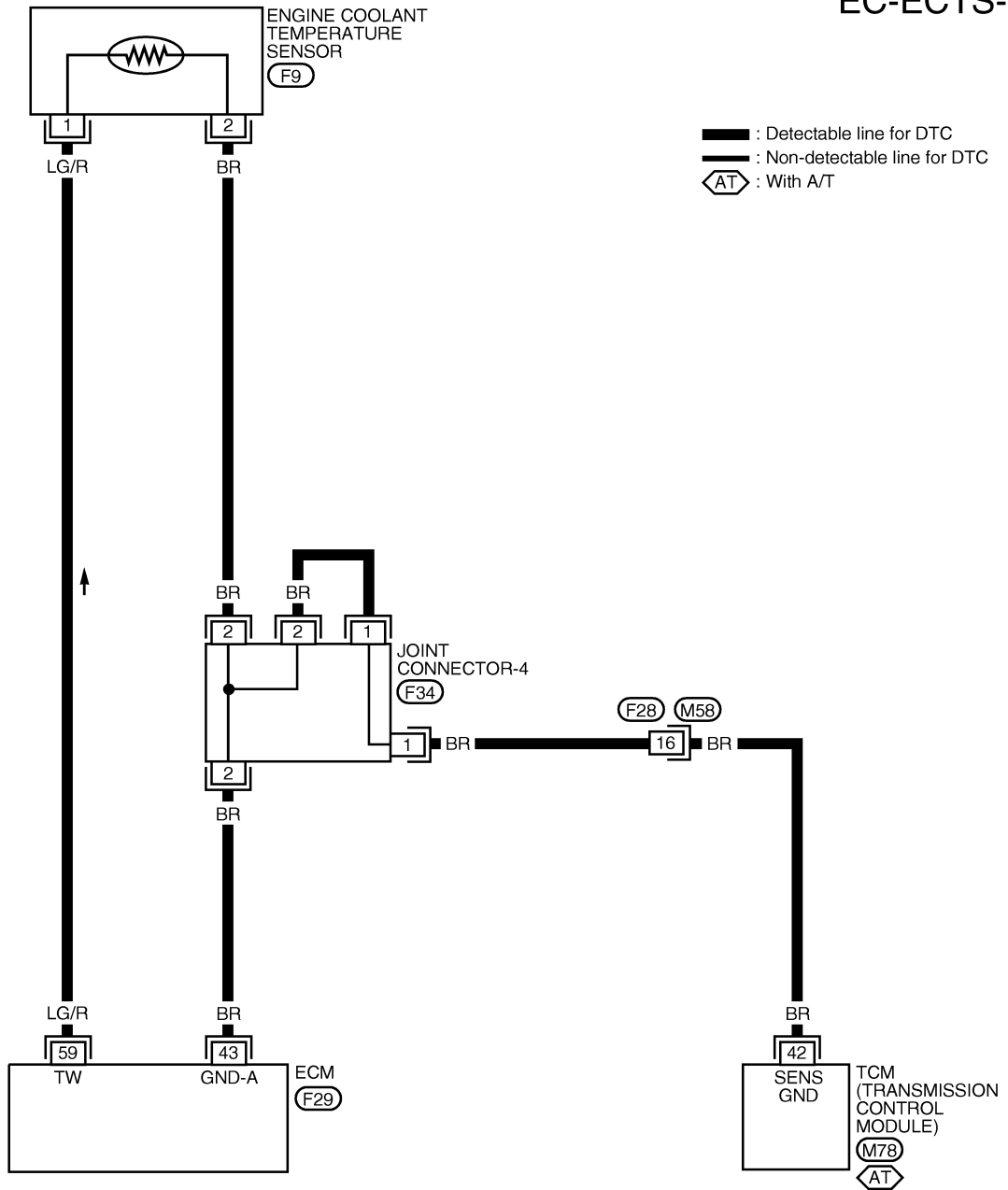
DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) VG33E

Wiring Diagram

Wiring Diagram

NEEC0605

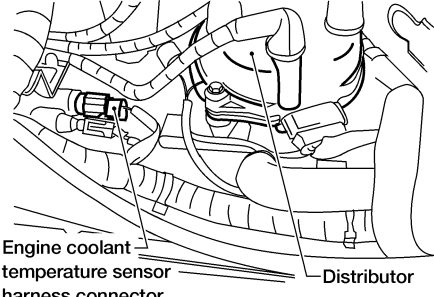
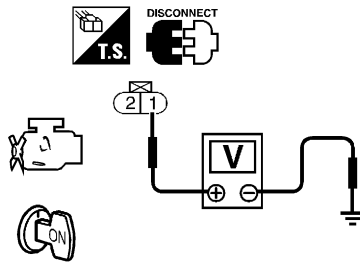
EC-ECTS-01



AEC942A

Diagnostic Procedure

NEEC0606

1	CHECK ECTS POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p>Engine coolant temperature sensor harness connector Distributor</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	<p>AEC643A</p> <p>SEF206W</p>
OK	▶	GO TO 2.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

2	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between ECM and engine coolant temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor 	
	▶	Repair open circuit or short to power in harness or connectors.	

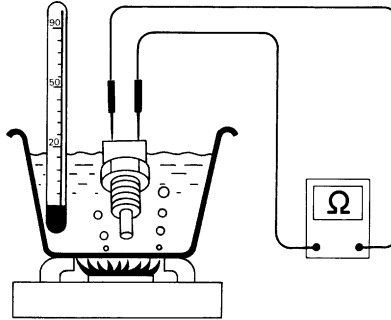
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DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) VG33E

Diagnostic Procedure (Cont'd)

4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

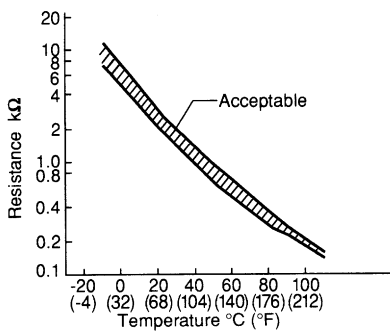
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0229

SEF012P

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace engine coolant temperature sensor.

5 CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace thermostat. Refer to LC-30 , "Thermostat".

6 CHECK INTERMITTENT INCIDENT

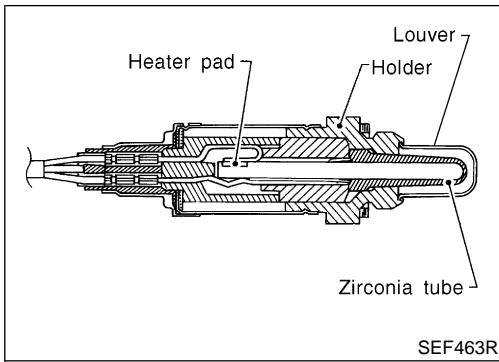
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

▶ **INSPECTION END**

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

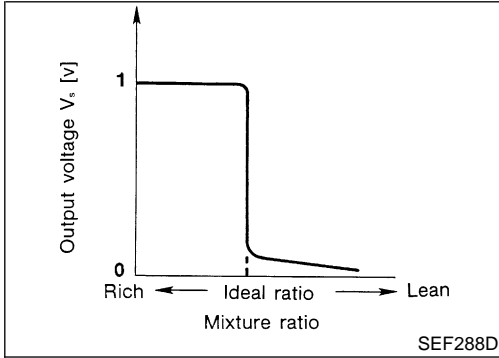
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0607



CONSULT-II Reference Value in Data Monitor Mode

NEEC0608

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0609

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

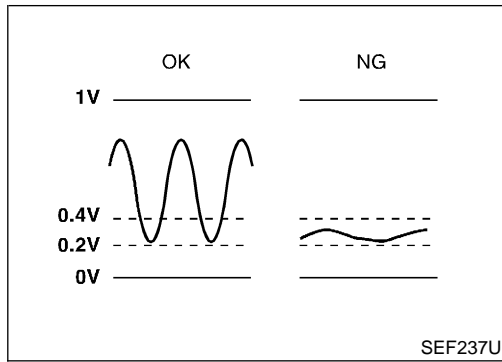
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (bank 2)		

SEF002V

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 (front) ^{NEEC0610} signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

POSSIBLE CAUSE

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

NEEC0610S01

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

On Board Diagnosis Logic (Cont'd)

5	HO2S1 (B1) P0130	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	COMPLETED	

SEF645Y

DTC Confirmation Procedure

=NEEC0611

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1)/(B2) P0130/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START".
- 4) Let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.

- 5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,800 - 3,100 rpm
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	2.3 - 13 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-805.

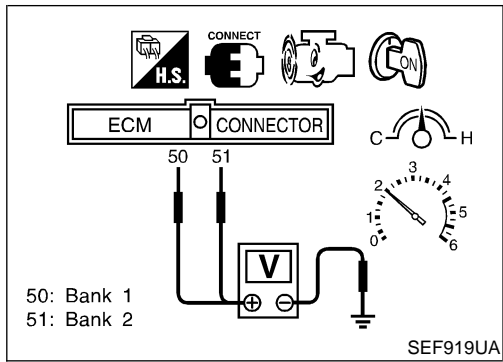
During this test, P1148 and P1168 may be stored in ECM.

GI
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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0612

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-805.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Wiring Diagram

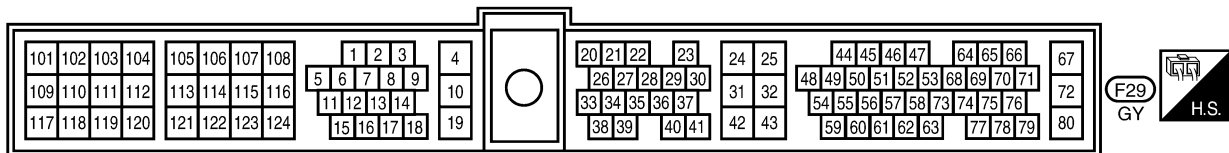
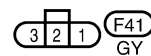
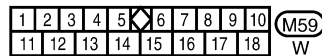
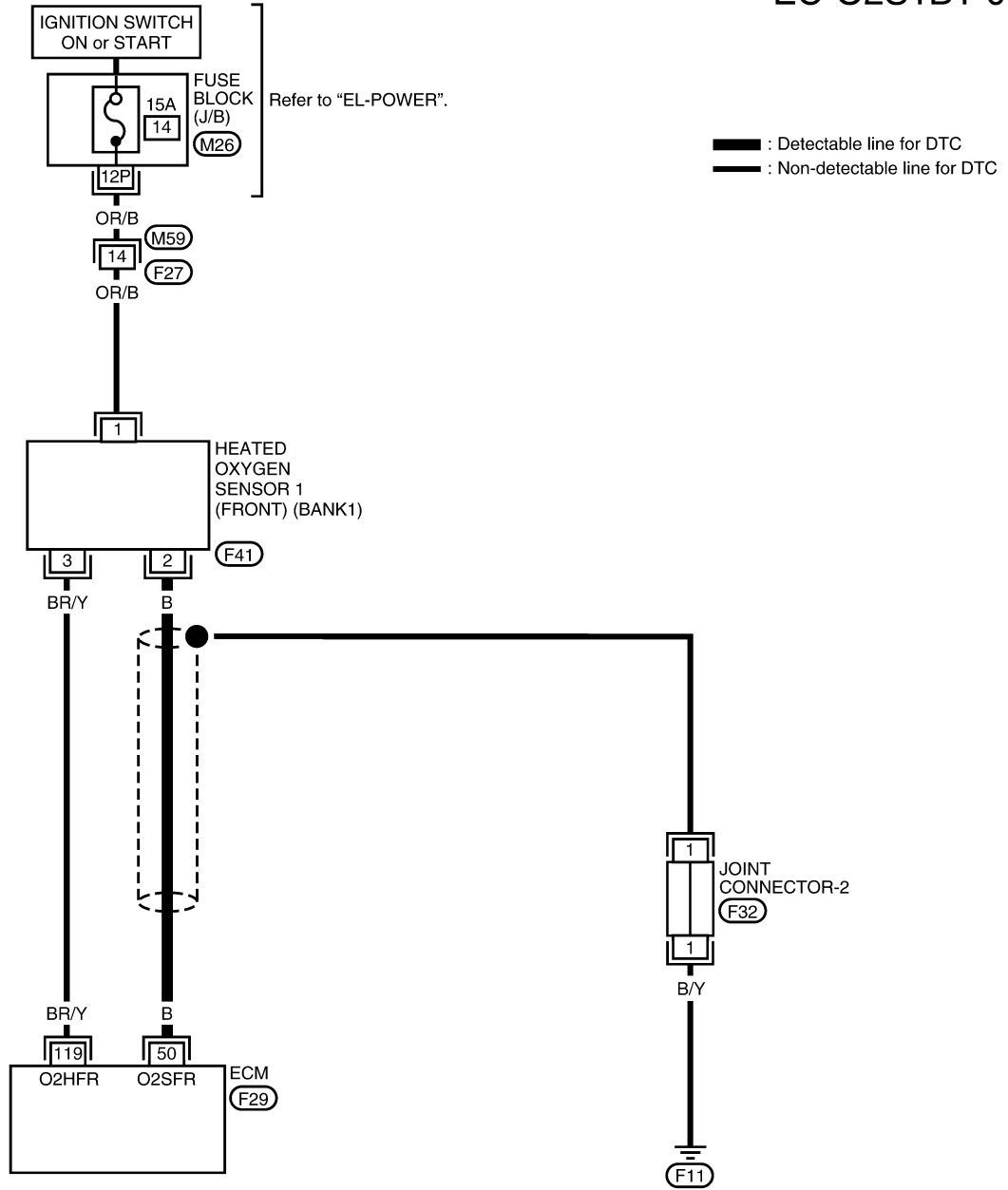
Wiring Diagram

NEEC0613

NEEC0613S01

RIGHT BANK

EC-O2S1B1-01



WEC788

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
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HA
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IDX

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

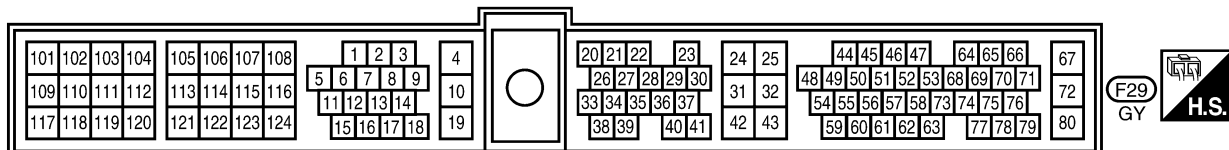
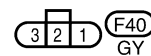
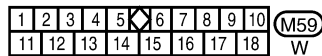
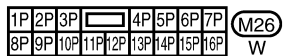
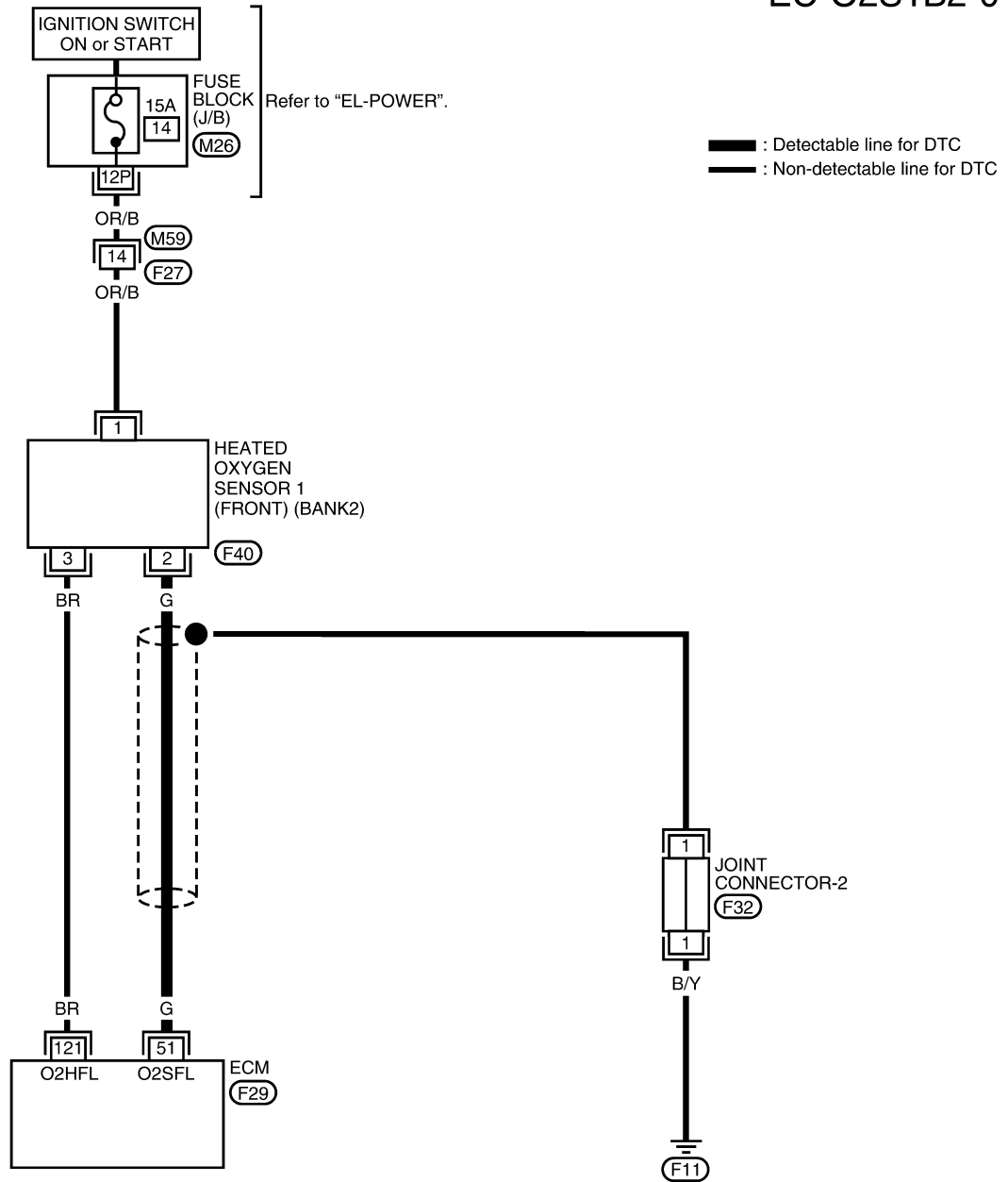
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0613S02

EC-O2S1B2-01



WEC789

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Diagnostic Procedure

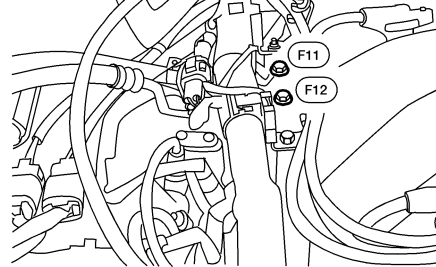
Diagnostic Procedure

NEEC0614

1 INSPECTION START

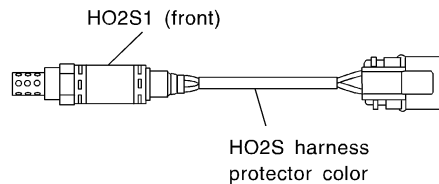
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

Engine ground



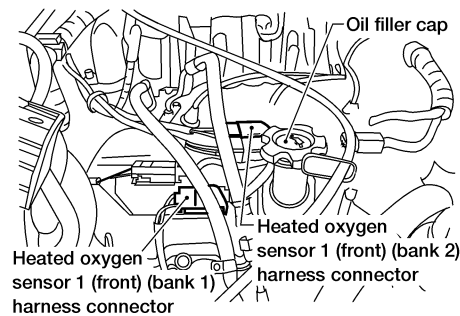
3. Make sure HO2S 1 (front) harness protector color, and disconnect corresponding heated oxygen sensor 1 (front) harness connector.

LEC518



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y



WEC545

▶ GO TO 2.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

2	CHECK HO2S 1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT														
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0130</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0150</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>		DTC	Terminals		Bank	ECM	Sensor	P0130	50	2	Bank 1 (Right)	P0150	51	2	Bank 2 (Left)
DTC	Terminals		Bank												
	ECM	Sensor													
P0130	50	2	Bank 1 (Right)												
P0150	51	2	Bank 2 (Left)												
SEF803Z															
<p style="color: blue; font-weight: bold;">Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0130</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0150</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>		DTC	Terminals		Bank	ECM or sensor	Ground	P0130	50 or 2	Ground	Bank 1 (Right)	P0150	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals		Bank												
	ECM or sensor	Ground													
P0130	50 or 2	Ground	Bank 1 (Right)												
P0150	51 or 2	Ground	Bank 2 (Left)												
SEF816Z															
<p style="color: blue; font-weight: bold;">Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>															
OK or NG															
OK (With CONSULT-II) ▶	GO TO 3.														
OK (Without CONSULT-II) ▶	GO TO 4.														
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.														

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

3 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

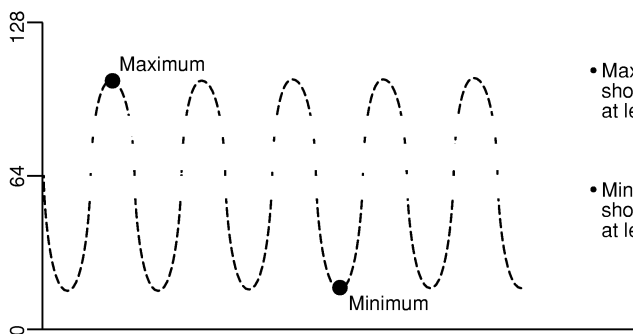
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

GI
 MA
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 LC
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 PD
 AX
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 IDX

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK HO2S 1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

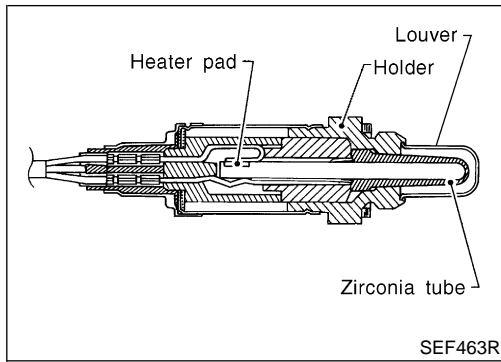
7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END

GI
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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

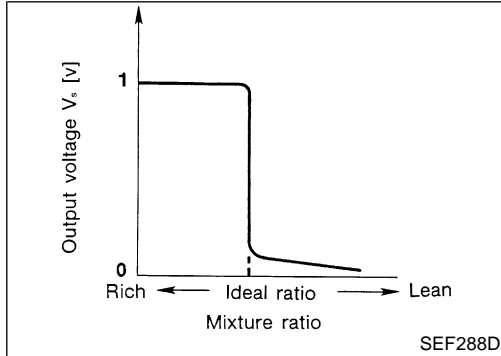
Component Description



Component Description

NEEC0615

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NEEC0616

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0617

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

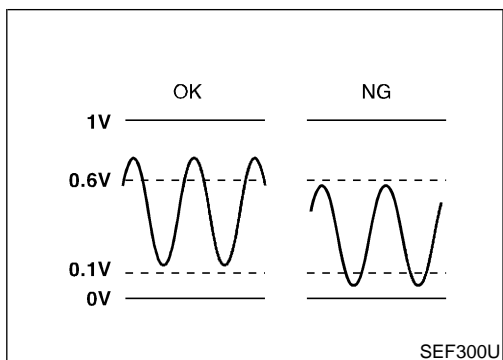
TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor (bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor (bank 2)		

SEF002V

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0618

To judge the malfunction, the output from the heated oxygen sensor (front) is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

POSSIBLE CAUSE

NEEC0618S01

- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks

GI

MA

EM

LC

EC

FE

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AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

DTC Confirmation Procedure

DTC Confirmation Procedure

=NEEC0619

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.

6	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF334Z

6	HO2S1 (B1) P0131	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF335Z

6	HO2S1 (B1) P0131	
	COMPLETED	

SEF651Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0131/P0151" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENGN SPEED	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 msec
Selector lever	Suitable position

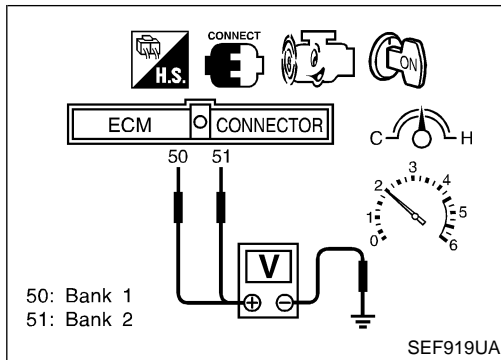
If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-813.

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

Overall Function Check



Overall Function Check

NEEC0620

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-813.

Diagnostic Procedure

NEEC0621

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
<p>Engine ground</p>	
LEC518	
▶ GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
Loosen and retighten corresponding heated oxygen sensor 1 (front).	
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)	
▶ GO TO 3.	

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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

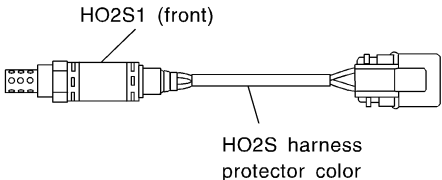
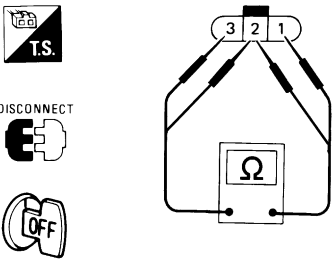
Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 20px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B2 100 %</td> </tr> </table> </div> <div style="text-align: right; margin-top: 10px;">SEF968Y</div> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? 		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p><input type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? <p style="text-align: center; margin-top: 10px;">Yes or No</p>									
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-905.								
No	▶ GO TO 4.								

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>1. Stop engine. 2. Check heated oxygen sensor 1 (front) harness protector color.</p> <div style="text-align: center;">  <p>HO2S1 (front)</p> <p>HO2S harness protector color</p> </div> <p style="text-align: center;">HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p> <p>3. Check resistance between HO2S1 (front) terminals 3 and 1.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF505Y</p> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>4. Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2. Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

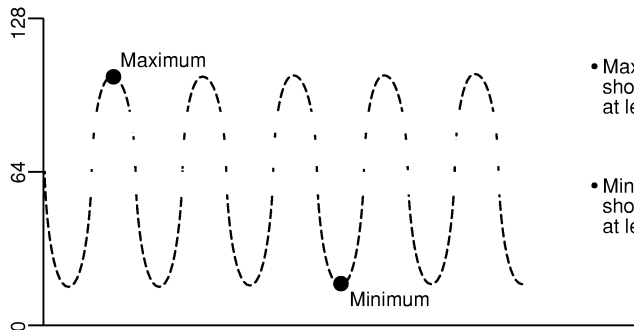
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

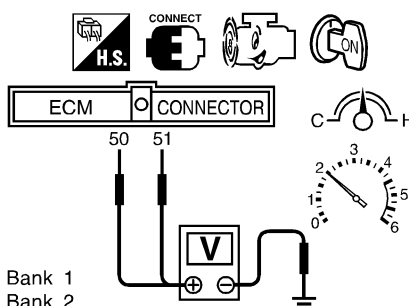
OK or NG

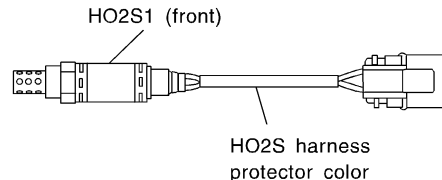
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
<p>OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

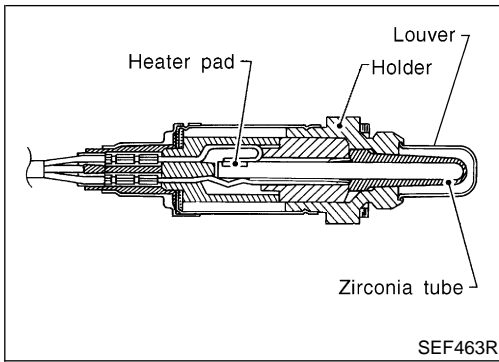
8	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-799.</p> <p>4. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>5. Also check harness for short to power.</p> <p>6. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.</p> <p>For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-799.</p>	
	▶ INSPECTION END

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

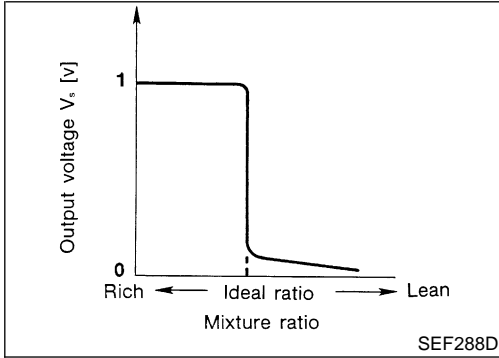
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC0622



CONSULT-II Reference Value in Data Monitor Mode

NEEC0623

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0624

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

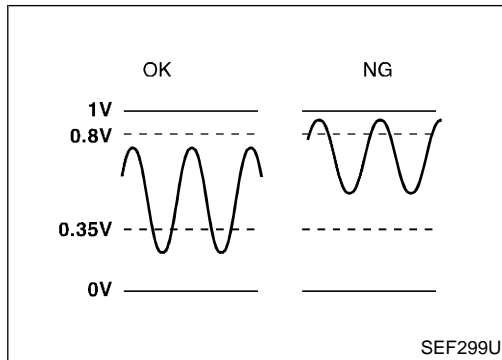
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		

SEF002V

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0625

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

NEEC0625S01

- Heated oxygen sensor 1 (front)
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

=NEEC0626

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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HO2S1 (B1) P0132	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF336Z

6

HO2S1 (B1) P0132	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF337Z

6

HO2S1 (B1) P0132	
COMPLETED	

SEF655Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “HO2S1 (B1)/(B2) P0132/P0152” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 msec
Selector lever	Suitable position

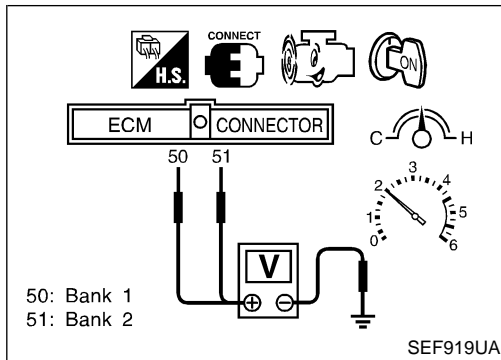
If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-822.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Overall Function Check



Overall Function Check

NEEC0627

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-822.

Diagnostic Procedure

NEEC0628

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none">1. Turn ignition switch OFF.2. Loosen and retighten engine ground screws.	
<p>Engine ground</p>	
LEC518	
▶ GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
Loosen and retighten corresponding heated oxygen sensor 1 (front).	
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)	
▶ GO TO 3.	

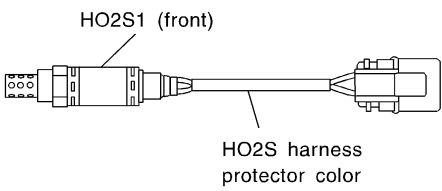
DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA								
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? 		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch OFF. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0100 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-914.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-914.	No	▶	GO TO 4.		
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-914.							
No	▶	GO TO 4.							




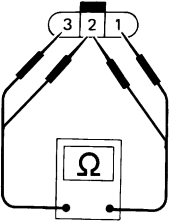
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4	CHECK HO2S 1 (FRONT) CONNECTOR FOR WATER						
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 100px;">HO2S1 (front)</p> <p style="margin-left: 100px;">HO2S harness protector color</p> </div> <p style="text-align: center; margin: 10px 0;"> HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue </p> <p style="text-align: right; margin-right: 20px;">SEF505Y</p> <ol style="list-style-type: none"> Disconnect heated oxygen sensor 1 (front) harness connector. Check connectors for water. Water should not exist. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair or replace harness or connectors.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Repair or replace harness or connectors.
OK	▶	GO TO 5.					
NG	▶	Repair or replace harness or connectors.					

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <small>DISCONNECT</small>   </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 8.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

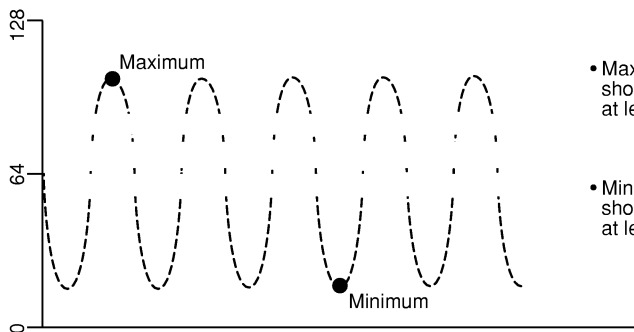
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

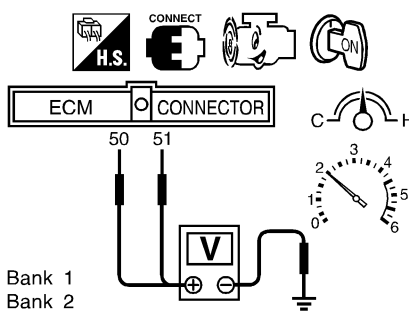
OK	▶	GO TO 9.
NG	▶	GO TO 8.

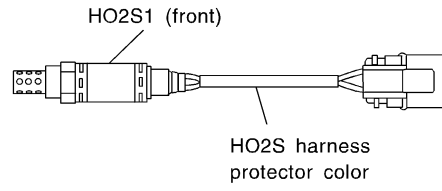
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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

9	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector. For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-799.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

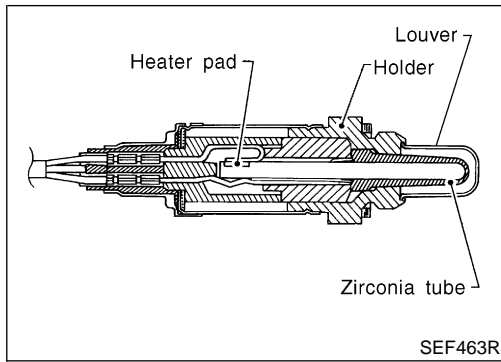
10	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753. For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-799.</p>		
	▶	INSPECTION END

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

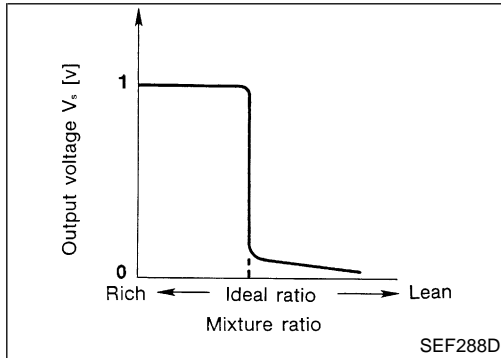
Component Description



Component Description

NEEC0629

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NEEC0630

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0631

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

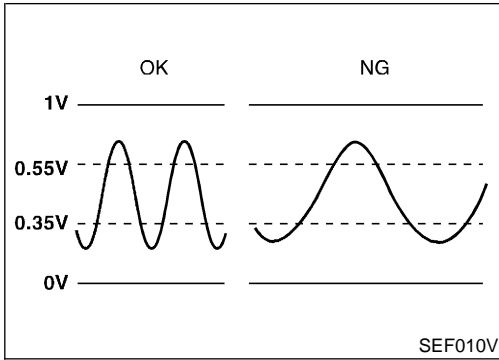
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		<p>SEF002V</p>

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0632

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 (front) cycling time index) is inordinately long or not.

Malfunction is detected when the response of the voltage from the sensor takes more than the specified time.

POSSIBLE CAUSE

NEEC0632S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

NEEC0633

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

GI
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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

DTC Confirmation Procedure (Cont'd)

6

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6

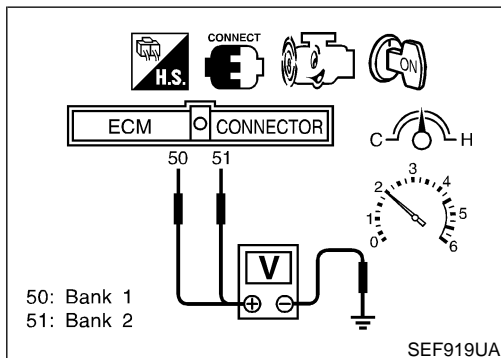
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133	
COMPLETED	

SEF658Y



With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,800 - 3,300 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 13 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-833.

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

NEEC0634

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
 - 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
 - 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
- 4) If NG, go to "Diagnostic Procedure", EC-833.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Wiring Diagram

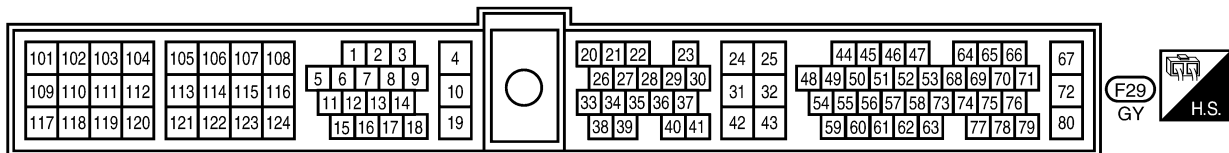
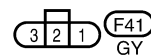
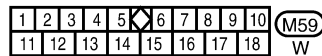
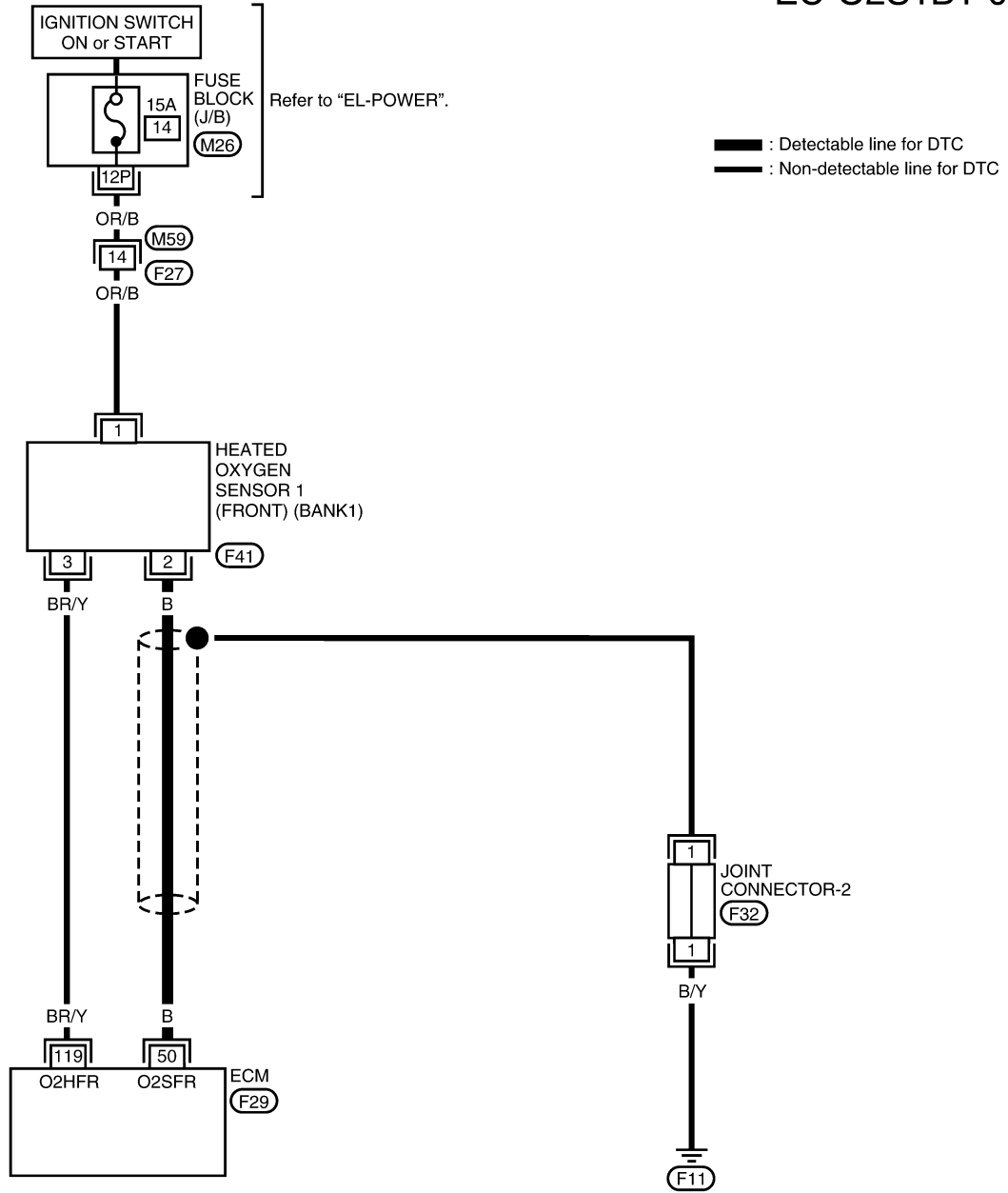
Wiring Diagram

NEEC0635

NEEC0635S01

RIGHT BANK

EC-O2S1B1-01



WEC788

GI
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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

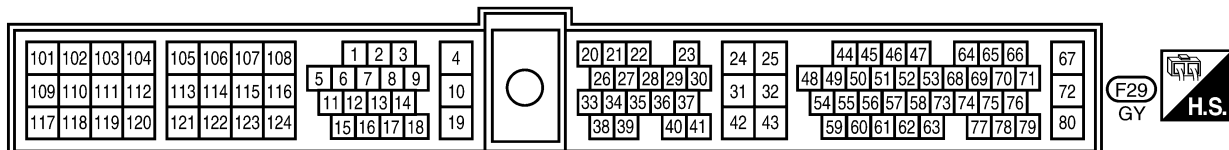
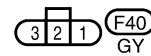
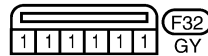
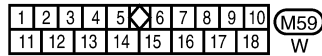
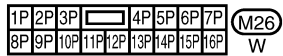
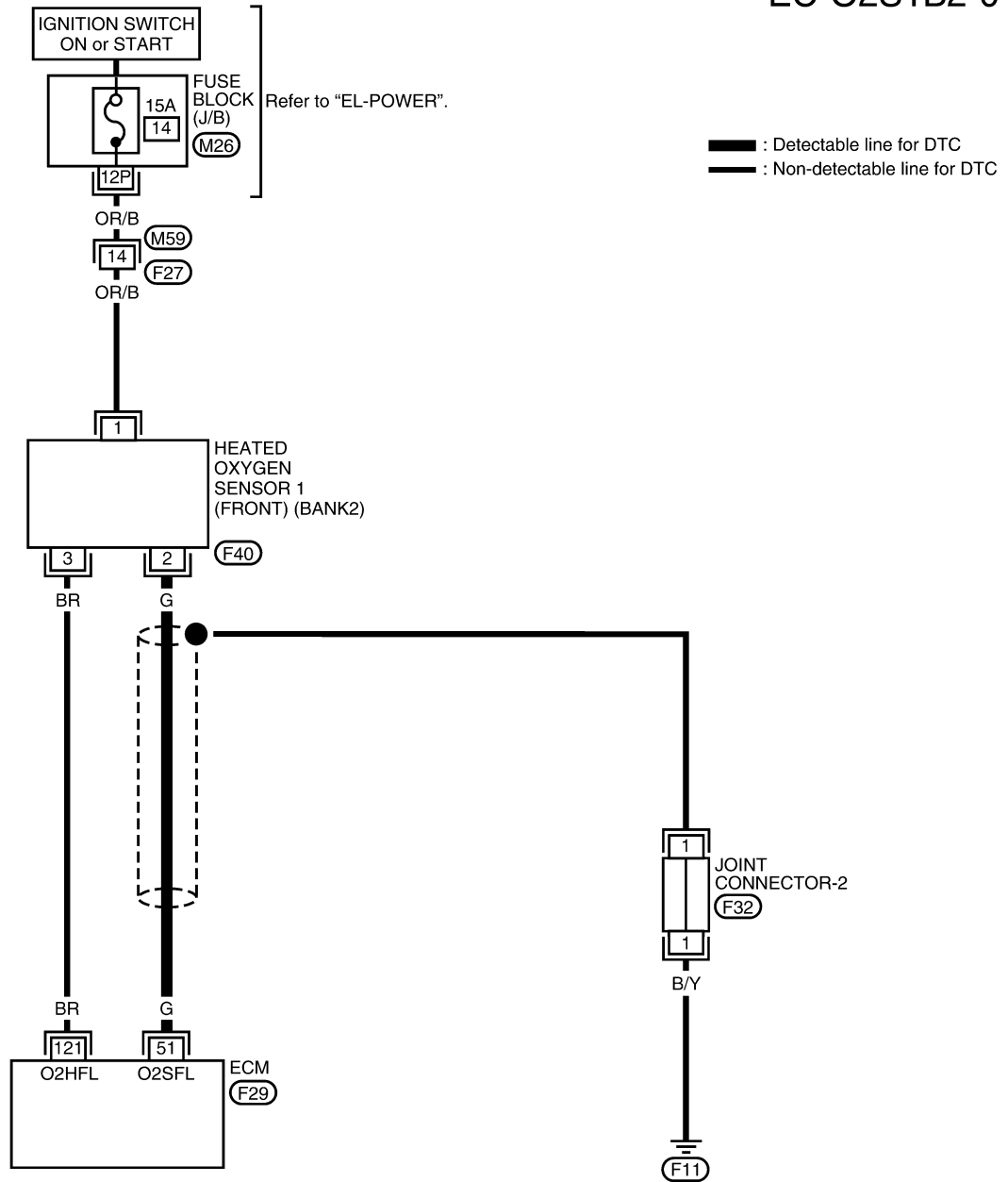
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0635S02

EC-O2S1B2-01



WEC789

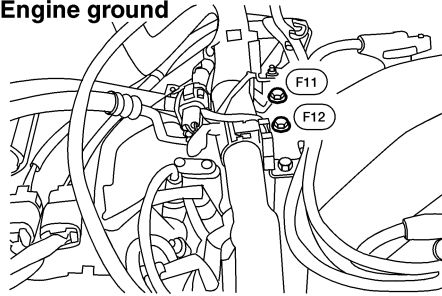
DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure

Diagnostic Procedure

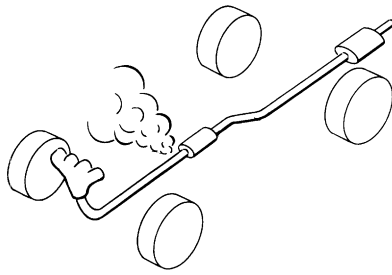
NEEC0636

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
<p>Engine ground</p> 	
LEC518	
▶ GO TO 2.	

GI
MA
EM
LC
EC

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front). Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶ GO TO 3.	

FE
CL
MT
AT

3	CHECK FOR EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>	
	
SEF099P	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

TF
PD
AX
SU
BR
ST
RS

4	CHECK FOR INTAKE AIR LEAK
<p>Listen for an intake air leak after the mass air flow sensor.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace.

BT
HA
SC
EL

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 20px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? 		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? <p style="text-align: center; margin-top: 10px;">Yes or No</p>									
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-905, 914.								
No	▶ GO TO 6.								

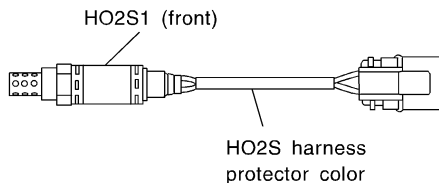
DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

6 CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

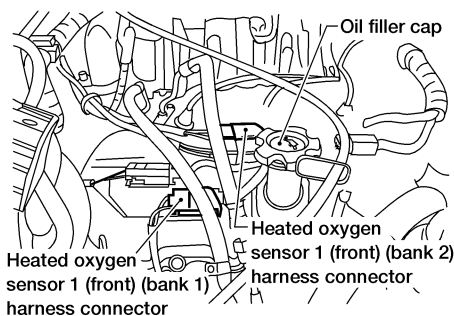
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 (front) harness protector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



WEC545

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1 (Right)
P0153	51	2	Bank 2 (Left)

MTBL0587

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Bank 1 (Right)
P0153	51 or 2	Ground	Bank 2 (Left)

MTBL0588

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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MT

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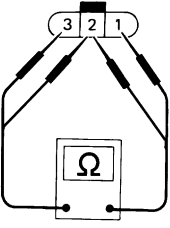
EL

IDX

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">    </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ GO TO 12.

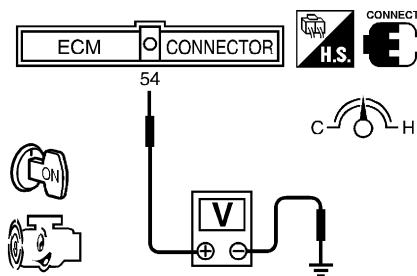
DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

8 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

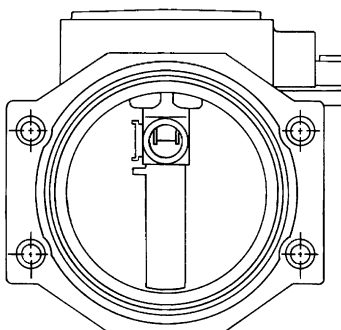


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF030T

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

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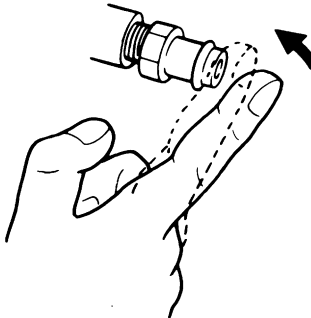
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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

9	CHECK PCV VALVE
<p>With engine running at idle, remove PCV valve ventilation hose from PCV valve; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.</p>  <p style="text-align: right;">SEC137A</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II) ▶	GO TO 10.
OK (Without CONSULT-II) ▶	GO TO 11.
NG ▶	Replace PCV valve.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

10 CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

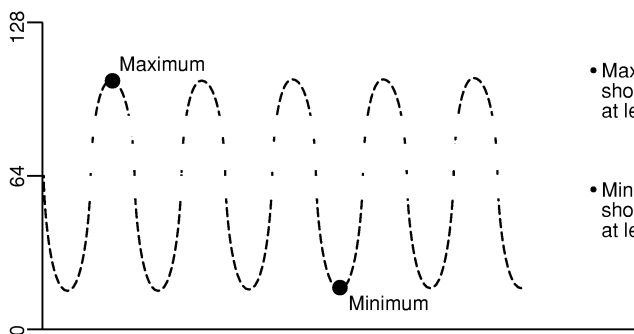
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

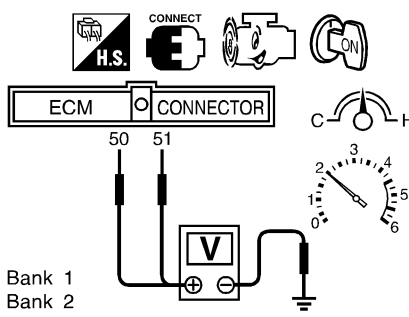
OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

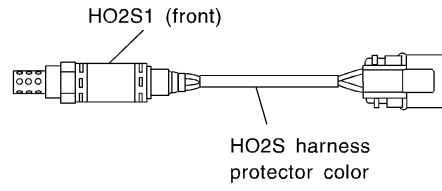
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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

12	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

13	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT	
	1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector.	
	OK or NG	
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to power in harness or connectors.

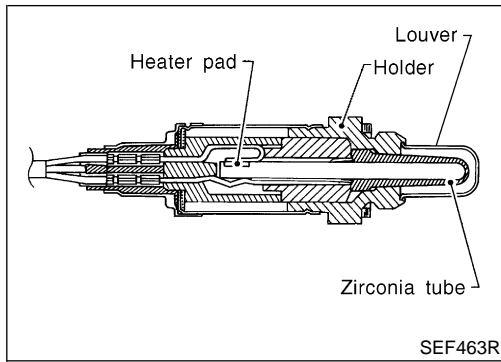
14	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶	INSPECTION END

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

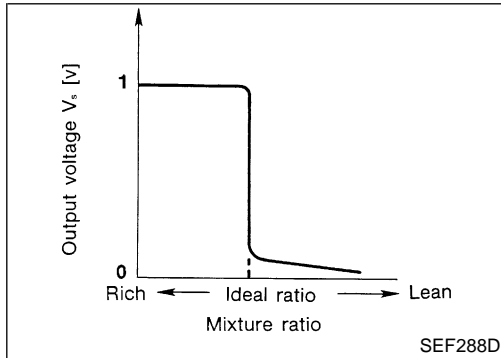
Component Description



Component Description

NEEC0637

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NEEC0638

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC0639

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

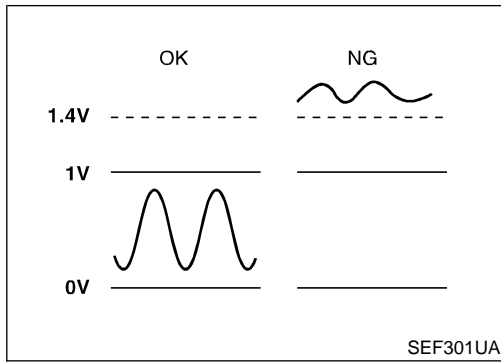
TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) RH	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) LH		

SEF002V

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0640

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NEEC0640S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NEEC0641

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 25 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-846.

With GST

Follow the procedure "With CONSULT-II".

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Wiring Diagram

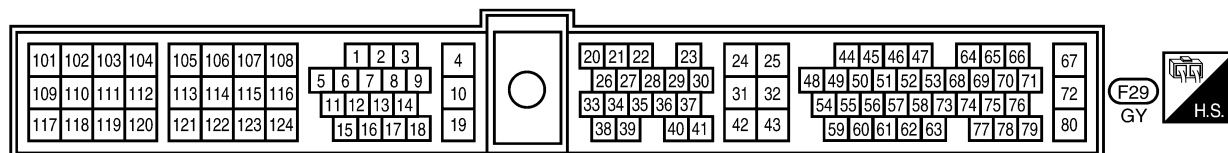
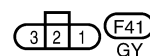
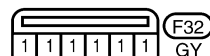
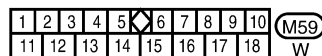
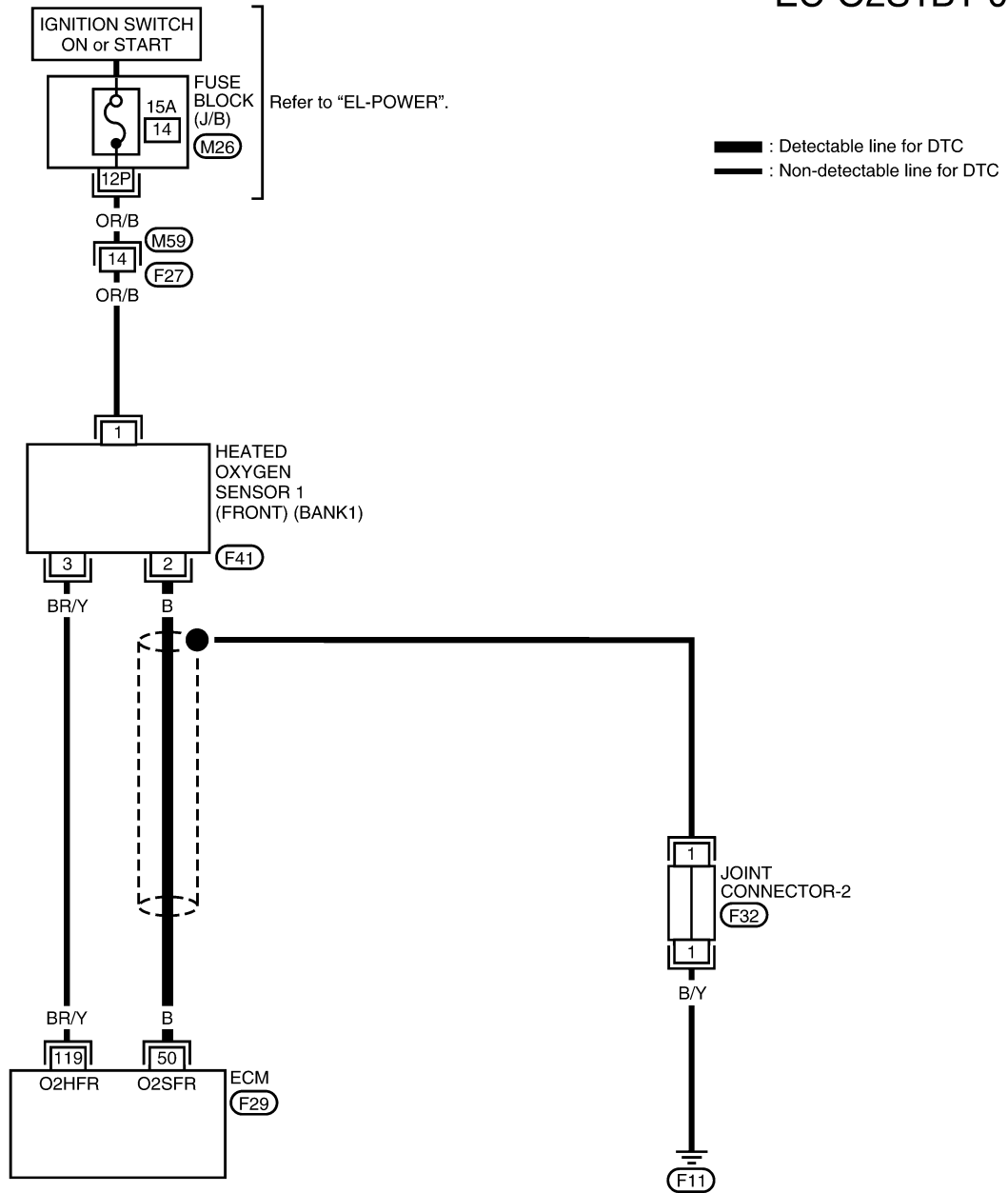
Wiring Diagram

NEEC0642

NEEC0642S01

RIGHT BANK

EC-O2S1B1-01



WEC788

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

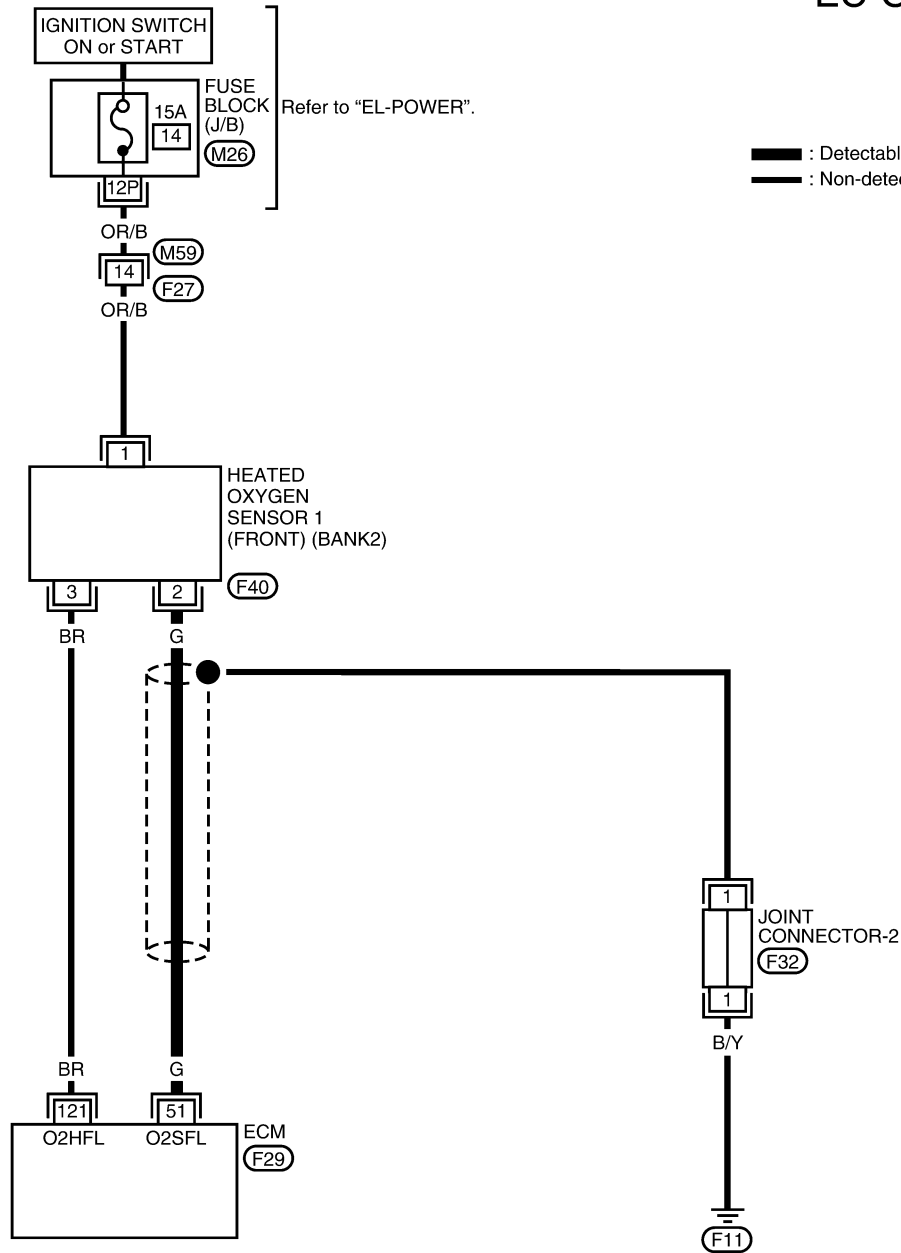
VG33E

Wiring Diagram (Cont'd)

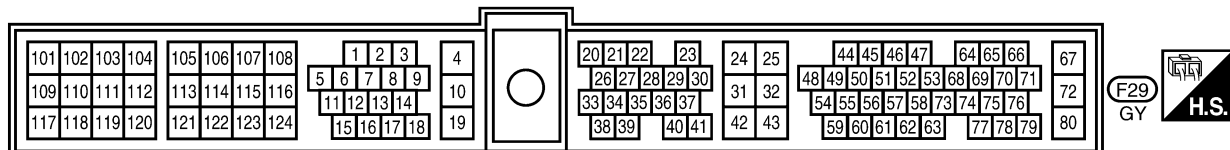
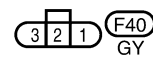
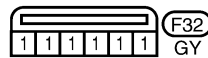
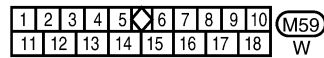
LEFT BANK

NEEC0642S02

EC-O2S1B2-01



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WEC789

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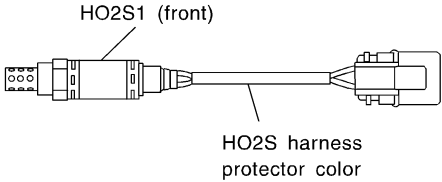
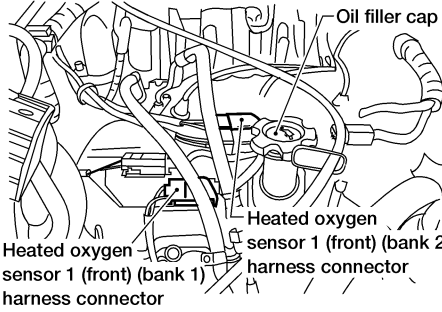
DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0643

1	INSPECTION START
<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 (front) harness protector.</p>	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
<p>3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p>	
 <p>Oil filler cap</p> <p>Heated oxygen sensor 1 (front) (bank 2) harness connector</p> <p>Heated oxygen sensor 1 (front) (bank 1) harness connector</p>	
<p>SEF505Y</p> <p>WEC545</p>	
<p>▶ GO TO 2.</p>	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>1. Loosen and retighten corresponding heated oxygen sensor 1 (front).</p> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
<p>▶ GO TO 3.</p>	

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td>50</td> <td>2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td>51</td> <td>2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0134	50	2	Bank 1 (Right)	P0154	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0134	50	2	Bank 1 (Right)													
P0154	51	2	Bank 2 (Left)													
SEF819Z																
<p style="text-align: center;">Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td>50 or 2</td> <td>Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td>51 or 2</td> <td>Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0134	50 or 2	Ground	Bank 1 (Right)	P0154	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0134	50 or 2	Ground	Bank 1 (Right)													
P0154	51 or 2	Ground	Bank 2 (Left)													
SEF820Z																
<p style="text-align: center;">Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK FRONT HO2S1 (FRONT) CONNECTOR FOR WATER	
<p>1. Disconnect heated oxygen sensor 1 (front) harness connector. 2. Check connectors for water. Water should not exist.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

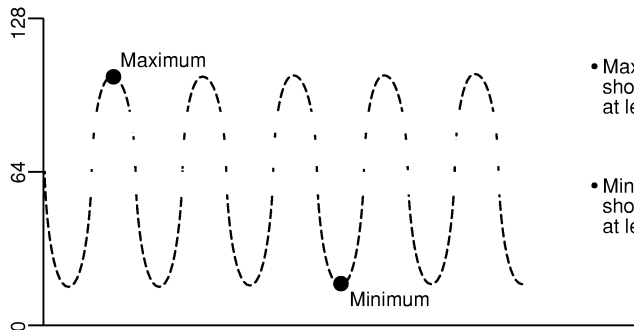
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
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	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

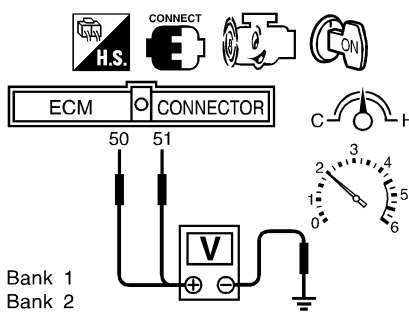
OK or NG

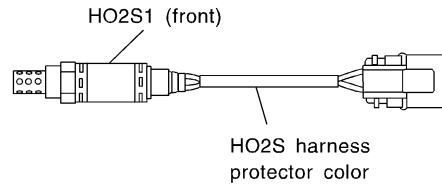
OK	▶	GO TO 8.
NG	▶	GO TO 7.

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least one time. The minimum voltage is below 0.3V at least one time. The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

Description

Description

NEEC0644

SYSTEM DESCRIPTION

NEEC0644S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heaters (front)

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters (front) corresponding to the engine speed.

OPERATION

NEEC0644S02

Engine speed rpm	Heated oxygen sensor 1 heaters (front)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC0645

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 3,200 rpm	ON
HO2S1 HTR (B2)	● Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NEEC0646

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119 (Bank 1)	BR/Y	Heated oxygen sensor 1 heater (front)	[Engine is running] ● Engine speed is below 3,200 rpm	Approximately 0.4V
121 (Bank 2)	BR		[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0647

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]

POSSIBLE CAUSE

NEEC0647S01

- Harness or connectors
[The heated oxygen sensor 1 heater (front) circuit is open or shorted.]
- Heated oxygen sensor 1 heater (front)

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

DTC Confirmation Procedure

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC0648

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-854.

With GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 3) Start engine and run it for at 6 seconds at idle speed.
- 4) Select "MODE 3" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-854.

- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

Wiring Diagram

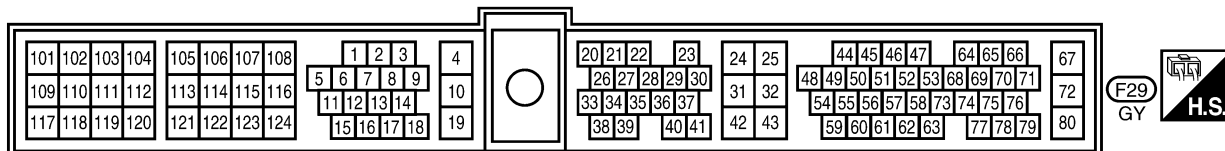
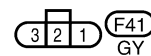
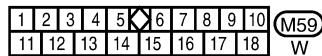
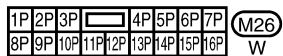
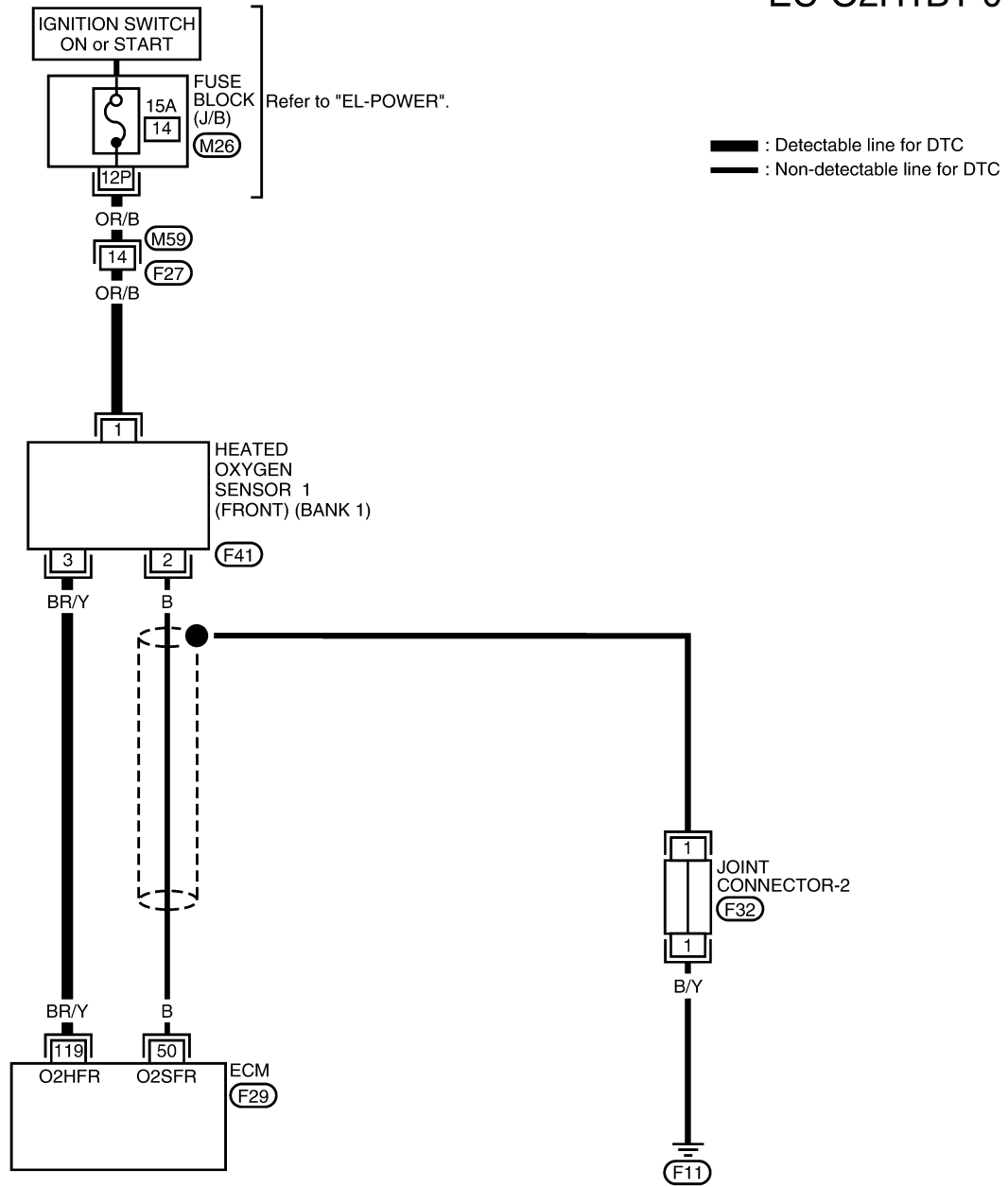
Wiring Diagram

NEEC0649

NEEC0649S01

RIGHT BANK

EC-O2H1B1-01



WEC790

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

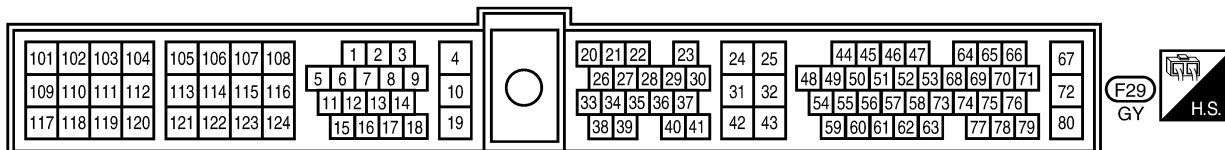
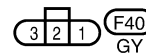
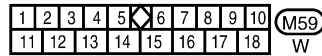
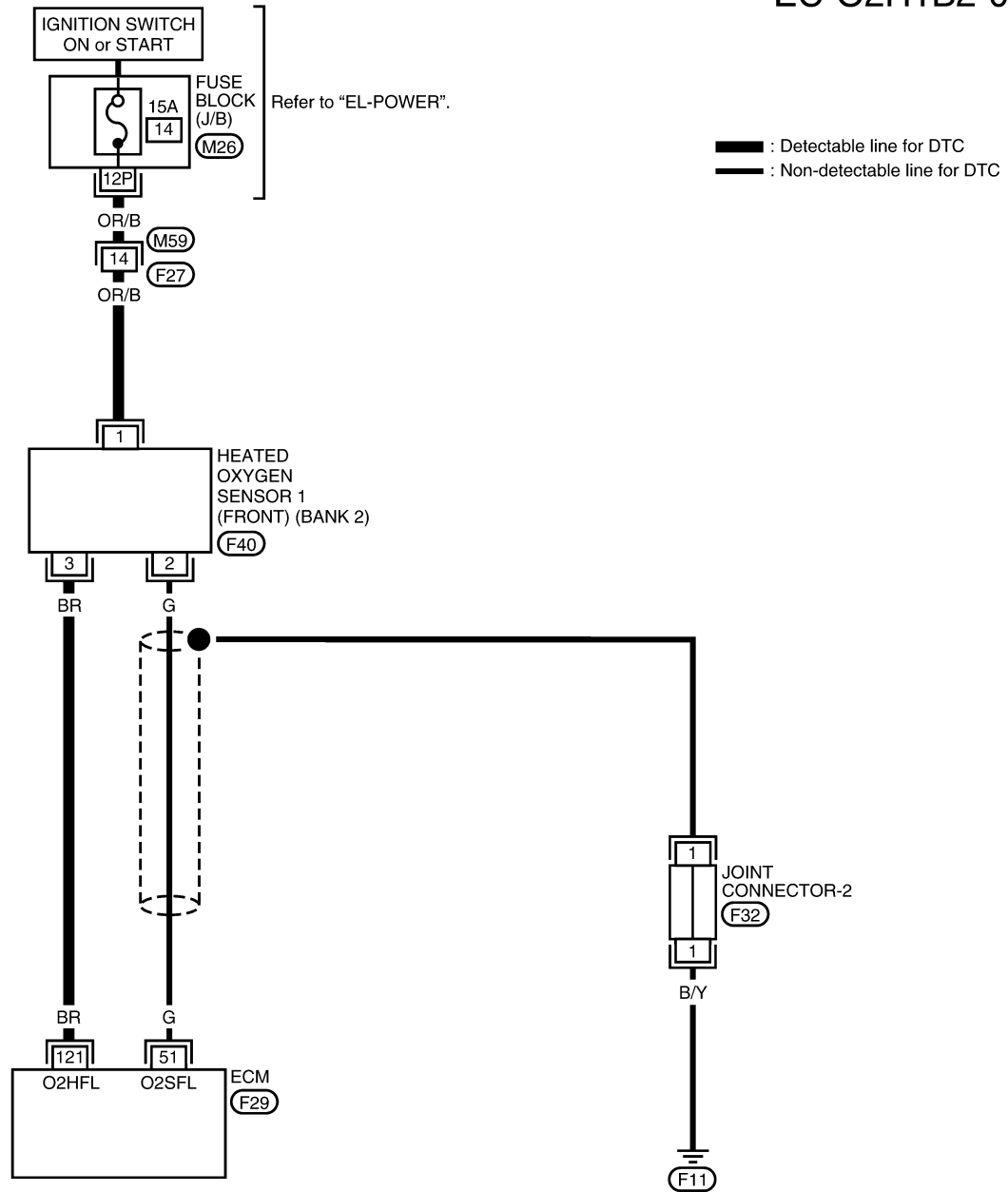
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0649S02

EC-O2H1B2-01



WEC791

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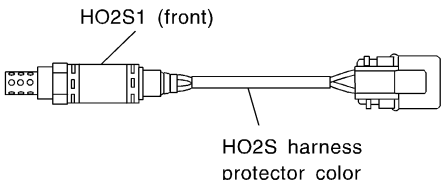
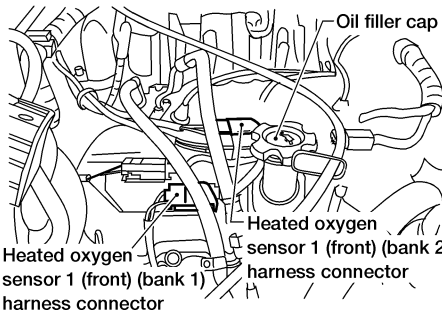
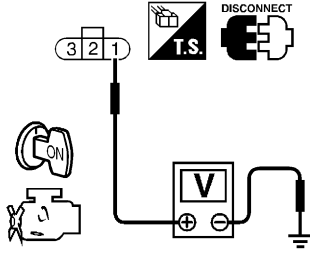
DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0650

1	CHECK HO2S1 (FRONT) POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 (front) harness protector.</p> <div style="text-align: center;">  <p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <div style="text-align: center;">  </div> <p>4. Turn ignition switch ON. 5. Check voltage between FRONT HO2S terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

SEF505Y

WEC545

SEF633W

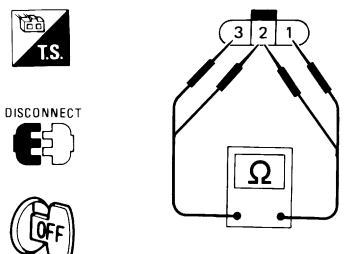
2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 1 (front) and fuse 	
▶	Repair harness or connectors.

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 HEATER (FRONT) OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0135</td> <td>119</td> <td>3</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0155</td> <td>121</td> <td>3</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0135	119	3	Bank 1 (Right)	P0155	121	3	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0135	119	3	Bank 1 (Right)													
P0155	121	3	Bank 2 (Left)													
SEF821Z																
<p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p>		
		
AEC158A		
<p style="color: blue;">Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2. Continuity should not exist.</p> <p style="color: red;">CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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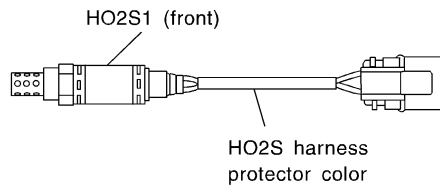
DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure (Cont'd)

5 REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



Replace malfunctioning heated oxygen sensor 1 (front).

6 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

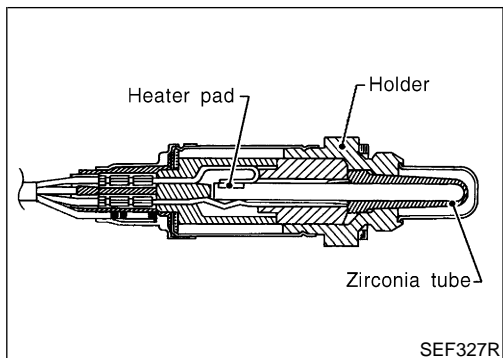


INSPECTION END

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

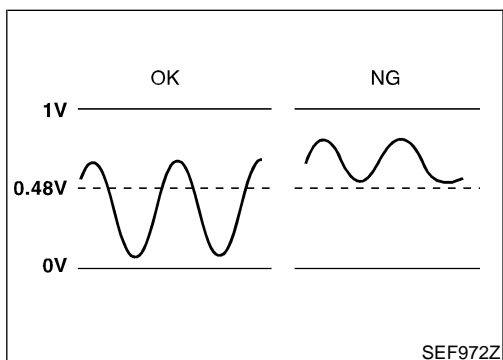
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut. Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

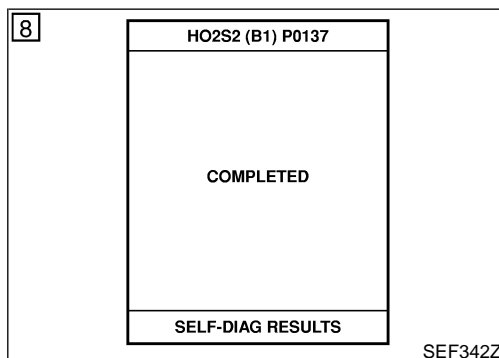
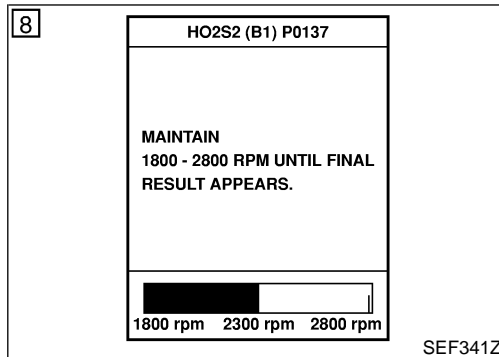
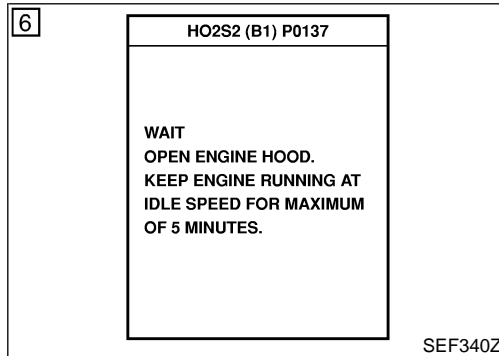
VG33E

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC0654S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors



DTC Confirmation Procedure

NEEC0655

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

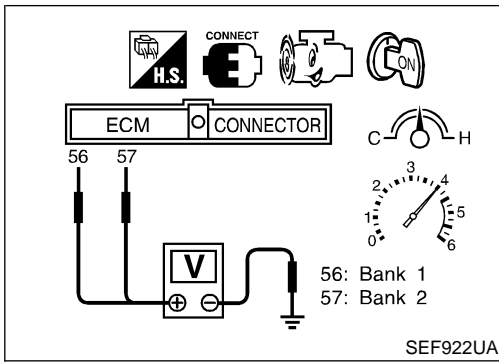
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0137/P0157" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF_DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-862.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0656

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 0.48V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be below 0.48V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-862.

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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Wiring Diagram

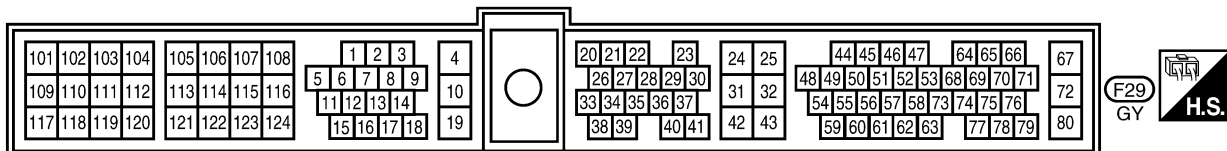
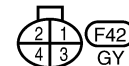
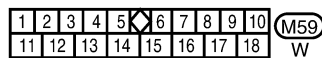
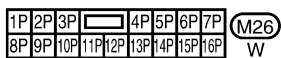
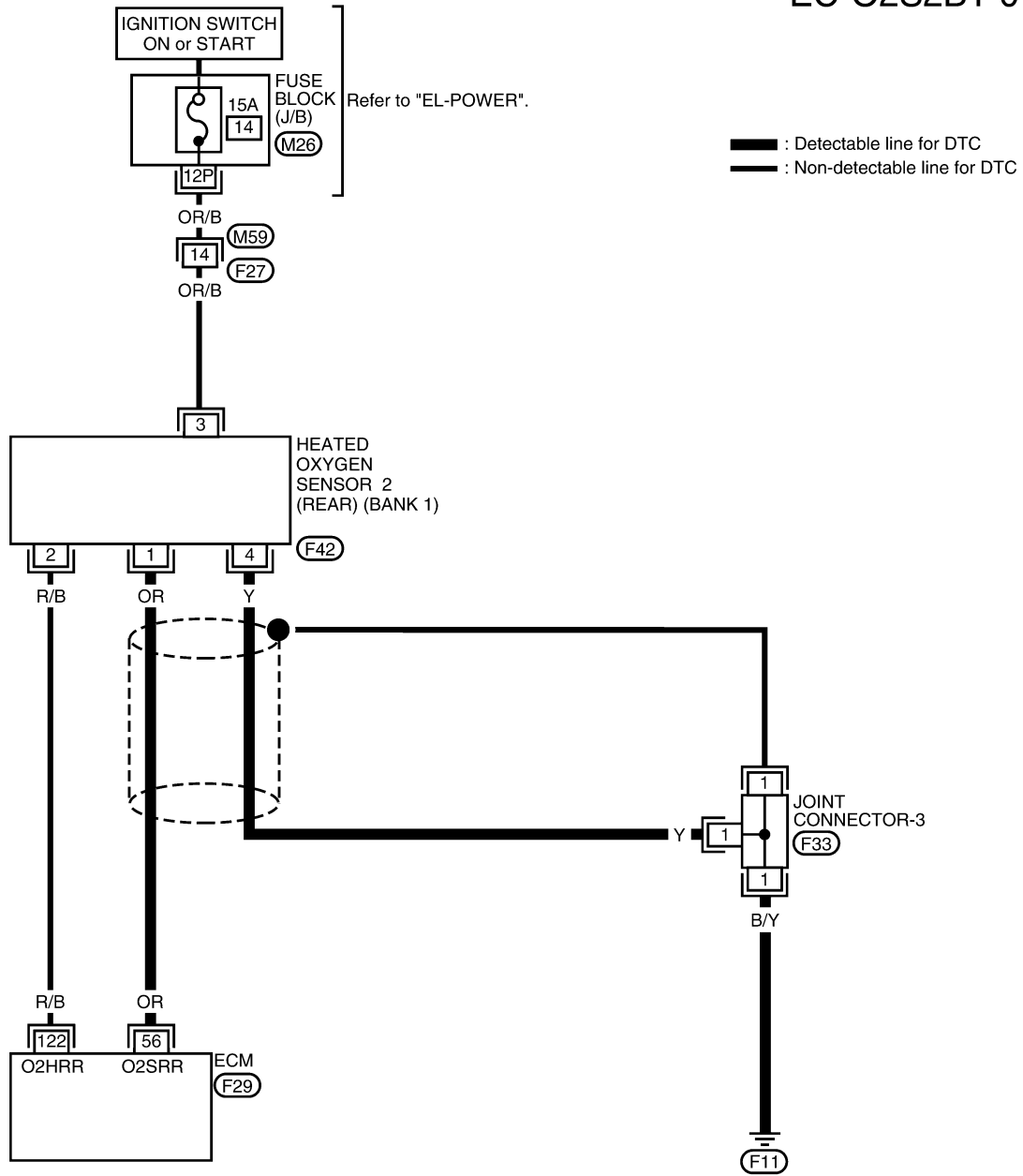
Wiring Diagram

NEEC0657

NEEC0657S01

RIGHT BANK

EC-O2S2B1-01



WEC792

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

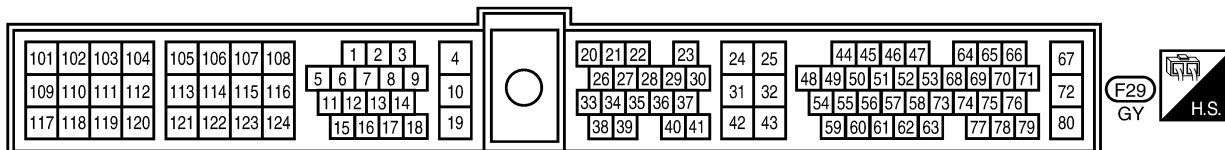
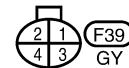
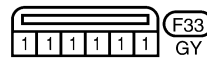
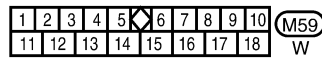
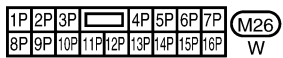
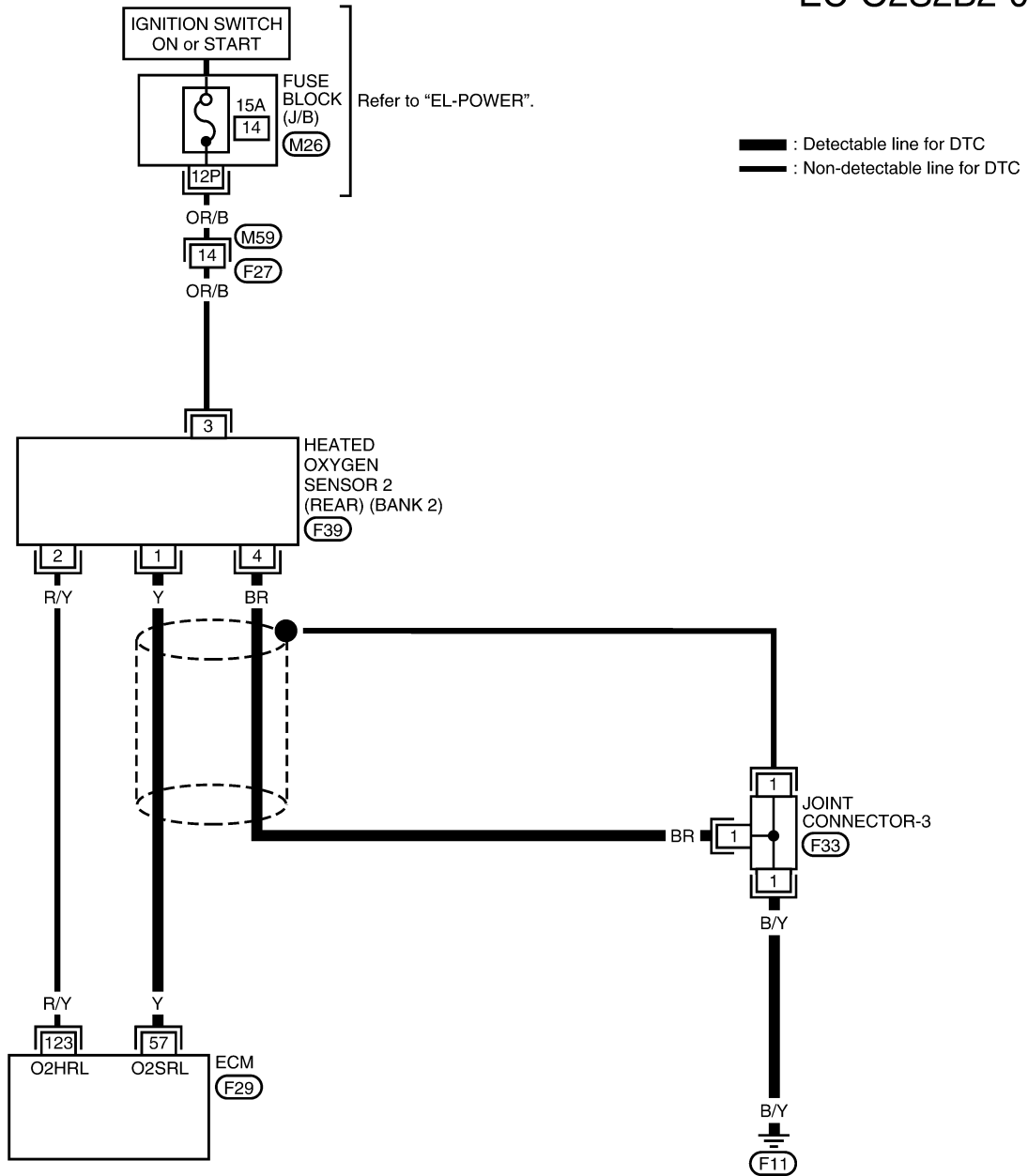
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0657S02

EC-O2S2B2-01



WEC793

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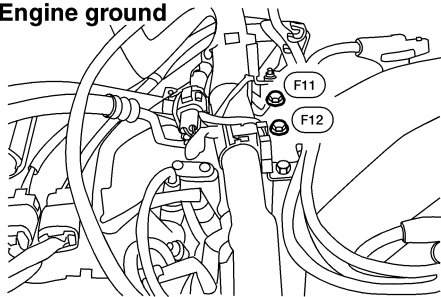
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0658

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="margin-left: 100px;">Engine ground</p>	
LEC518	
▶ GO TO 2.	

2	CLEAR THE SELF-LEARNING DATA								
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". 									
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
SEF968Y									
<ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? 									
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? 									
Yes or No									
Yes	▶ Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-915.								
No	▶ GO TO 3.								

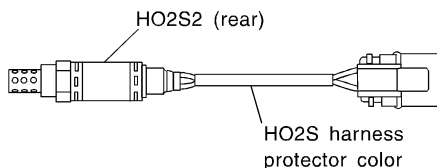
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

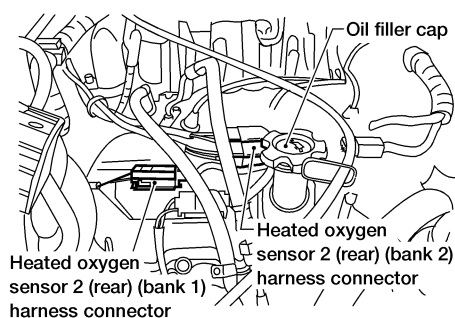
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	56	1	Bank 1 (Right)
P0157	57	1	Bank 2 (Left)

MTBL0589

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0137	56 or 1	Ground	Bank 1 (Right)
P0157	57 or 1	Ground	Bank 2 (Left)

MTBL0590

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK HO2S GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

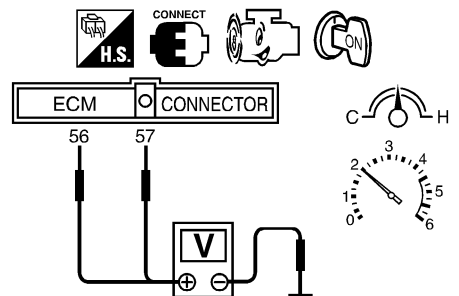
5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
(Reference data)		
SEF989RD		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

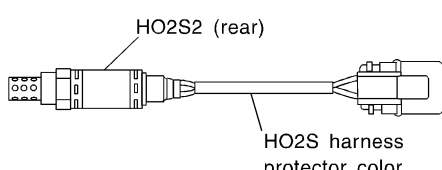
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p>56: Bank 1 57: Bank 2</p> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

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8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; font-size: small;">HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p> <p style="text-align: right; font-size: small;">SEF372Z</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2 (rear).</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2 (rear).
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).		

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

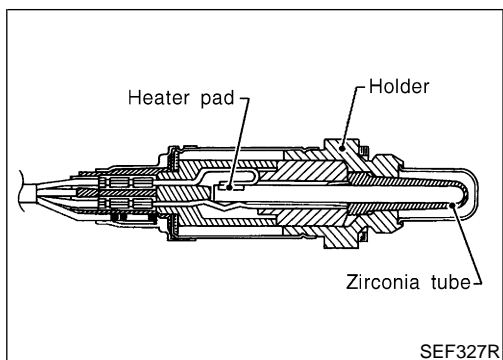
9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector-3. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector-3.</p>		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶		INSPECTION END

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

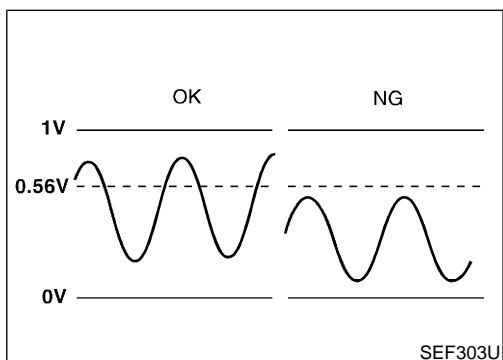
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut. Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC0662S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks

6

HO2S2 (B1) P0138

WAIT
OPEN ENGINE HOOD.
KEEP ENGINE RUNNING AT
IDLE SPEED FOR MAXIMUM
OF 5 MINUTES.

SEF663Y

8

HO2S2 (B1) P0138

MAINTAIN
1800 - 2800 RPM UNTIL FINAL
RESULT APPEARS.

1800 rpm 2300 rpm 2800 rpm

SEF664Y

8

HO2S2 (B1) P0138

COMPLETED

SELF-DIAG RESULTS

SEF665Y

DTC Confirmation Procedure

NEEC0663

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

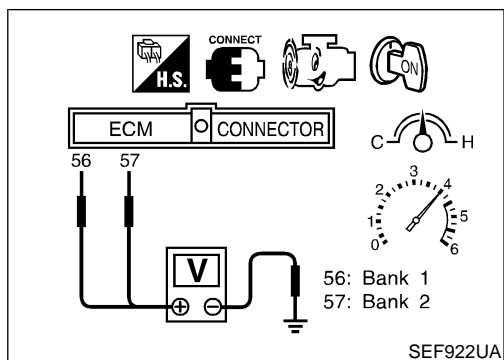
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2), P0138/P0158" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-872.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Overall Function Check



Overall Function Check

=NEEC0664

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.62V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be above 0.62V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-872.

GI

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Wiring Diagram

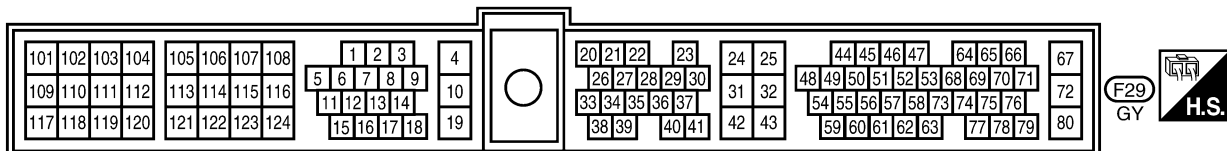
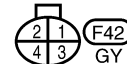
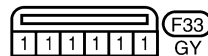
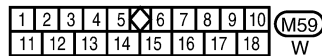
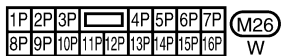
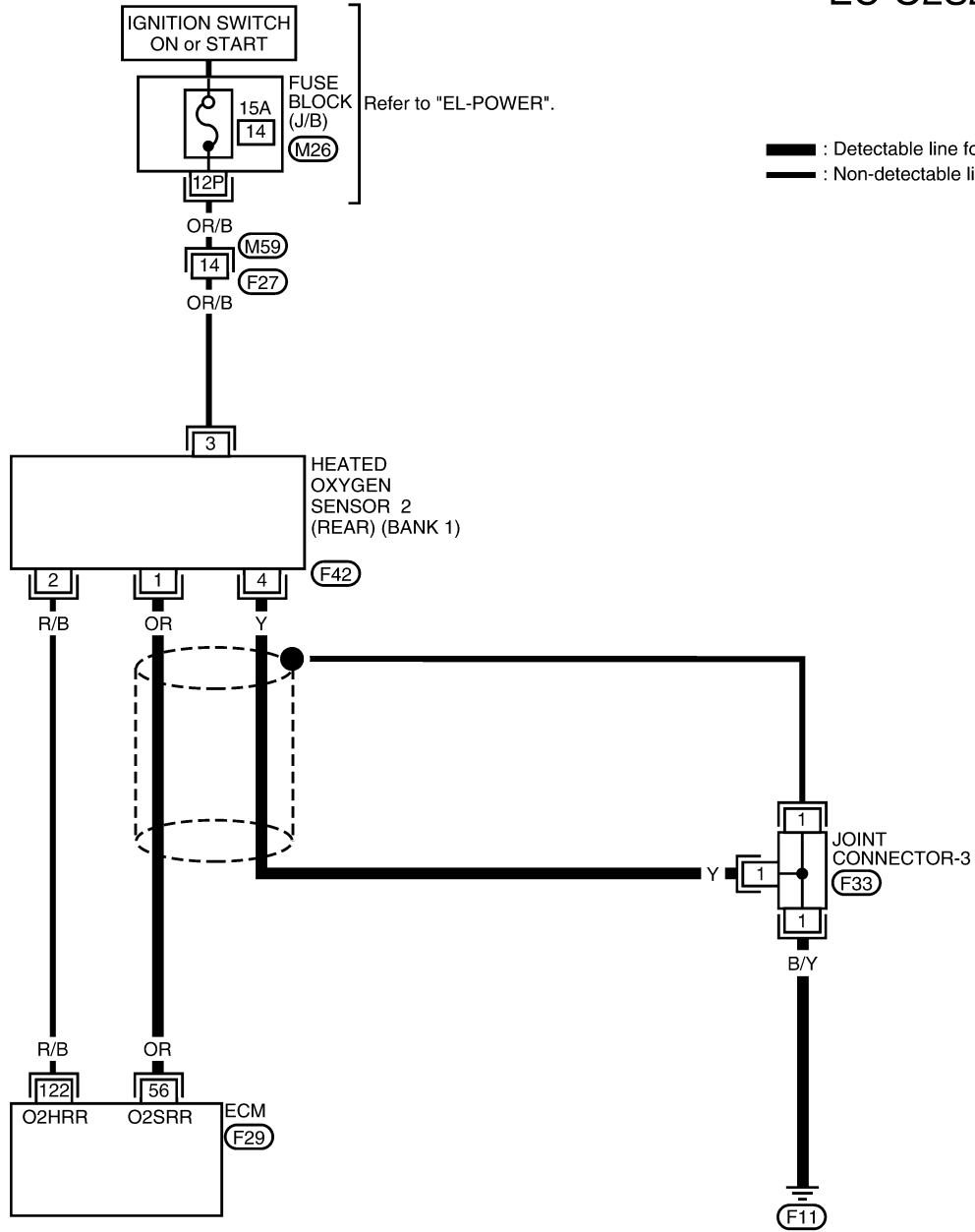
Wiring Diagram

NEEC0665

NEEC0665S01

RIGHT BANK

EC-O2S2B1-01



WEC792

EC-870

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

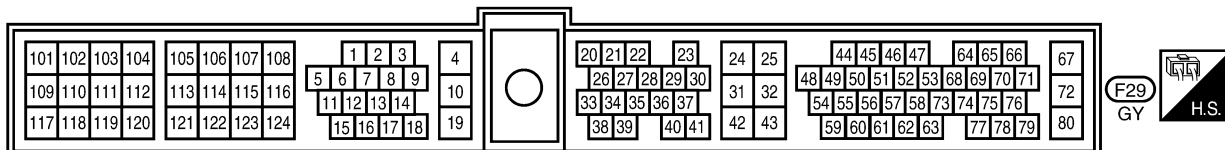
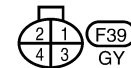
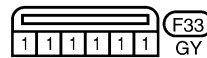
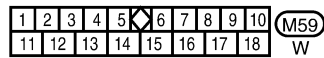
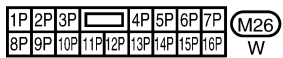
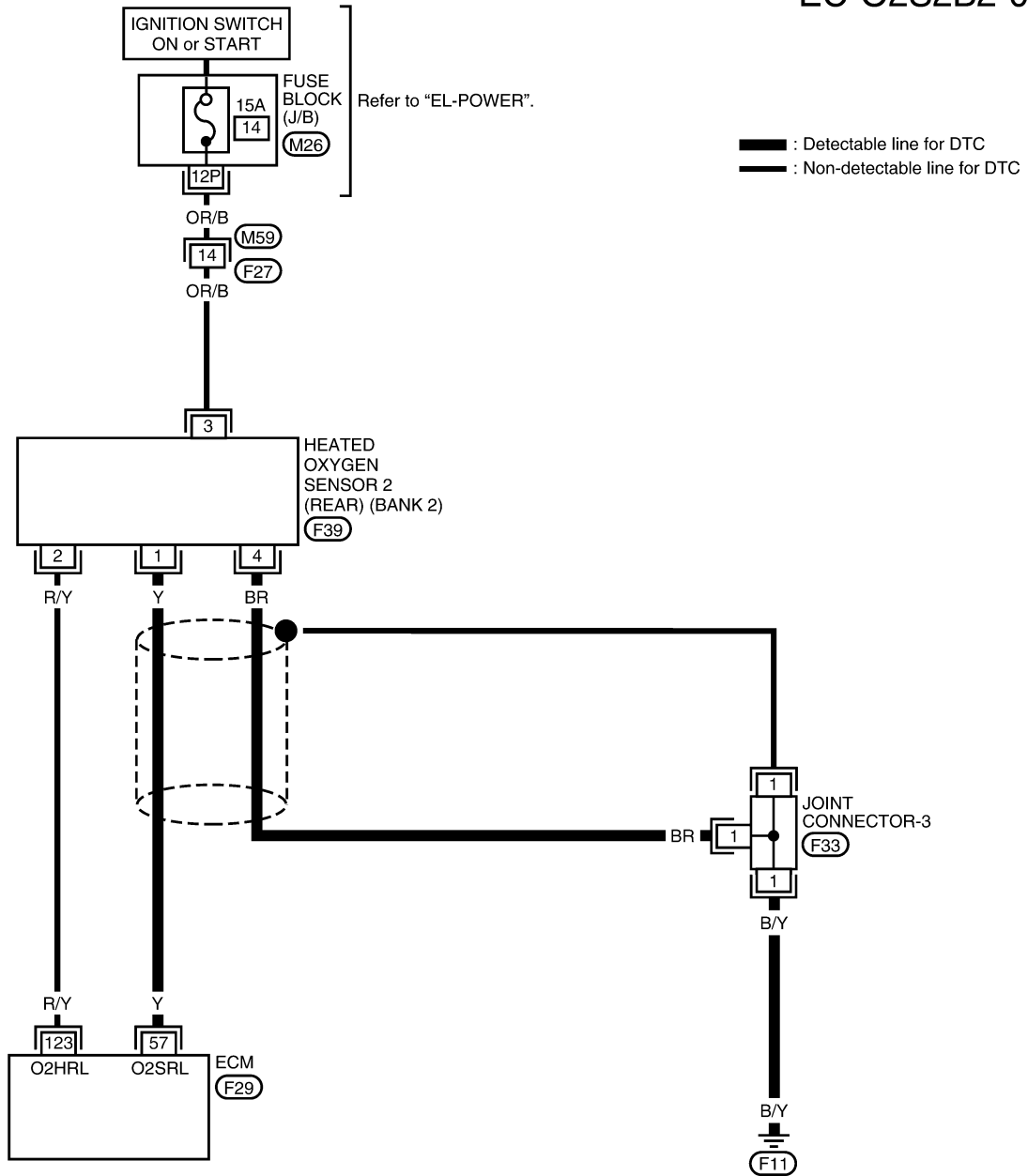
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0665S02

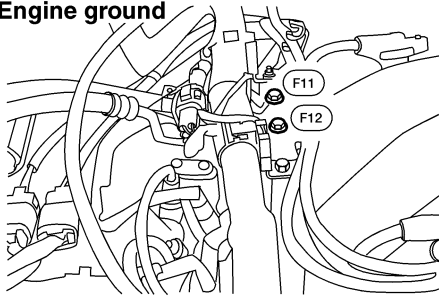
EC-O2S2B2-01



WEC793

Diagnostic Procedure

NEEC0666

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

2	CLEAR THE SELF-LEARNING DATA								
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2">WORK SUPPORT</th> </tr> <tr> <td style="text-align: center;">SELF-LEARNING CONT</td> <td style="text-align: center;">CLEAR</td> </tr> <tr> <td></td> <td style="text-align: right;">B1 100 %</td> </tr> <tr> <td></td> <td style="text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right;">SEF968Y</p> <p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p>ⓧ Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p>									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-906.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-906.	No	▶	GO TO 3.		
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-906.							
No	▶	GO TO 3.							

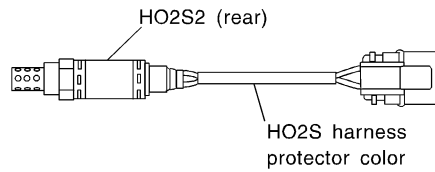
DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1 (Right)
P0158	57	1	Bank 2 (Left)

SEF824Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0138	56 or 1	Ground	Bank 1 (Right)
P0158	57 or 1	Ground	Bank 2 (Left)

SEF825Z

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
▶		Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
(Reference data)		
SEF989RD		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) 	
<p>56: Bank 1 57: Bank 2</p> <p style="text-align: right;">SEF797ZB</p>	
<ol style="list-style-type: none"> Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 (rear) harness protector color. 	
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p> <p style="text-align: right;">SEF372Z</p>	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

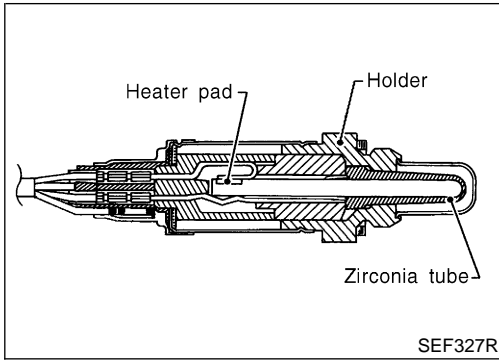
9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect joint connector.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	LEAN ↔ RICH

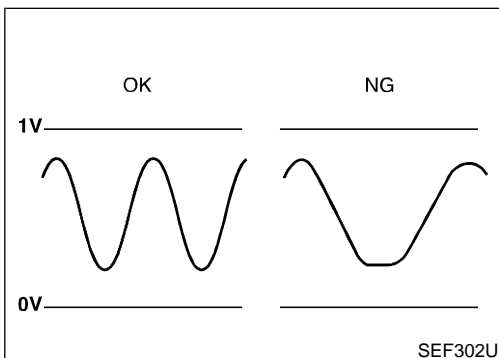
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut. Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

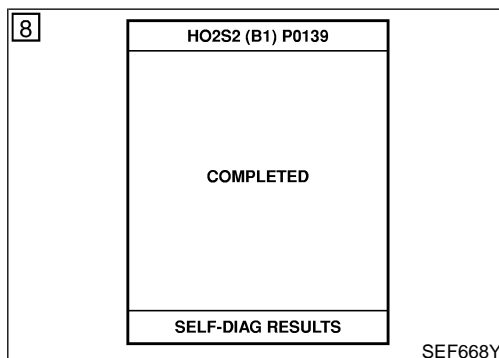
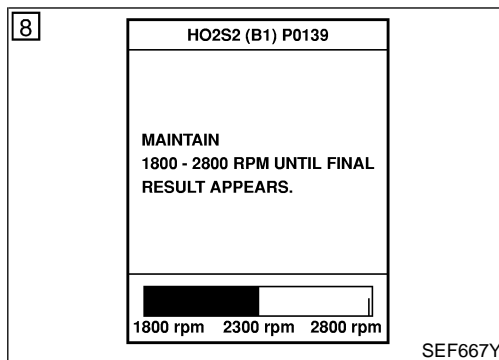
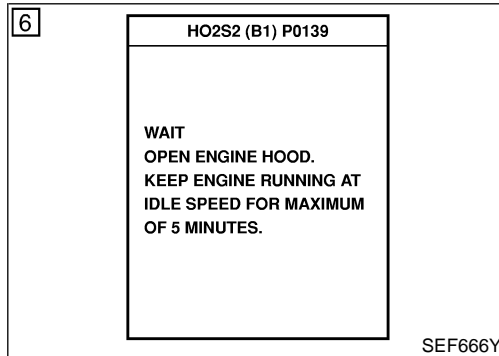
VG33E

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC0670S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks



DTC Confirmation Procedure

NEEC0671

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

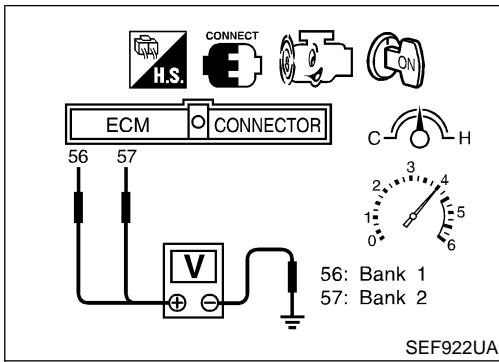
Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0139/P0159" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-882.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0672

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-882.

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Wiring Diagram

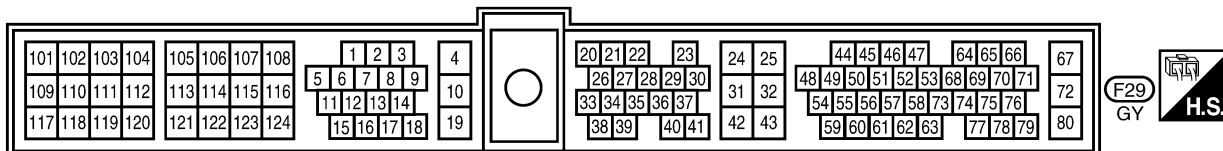
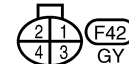
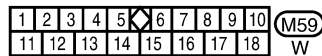
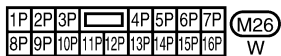
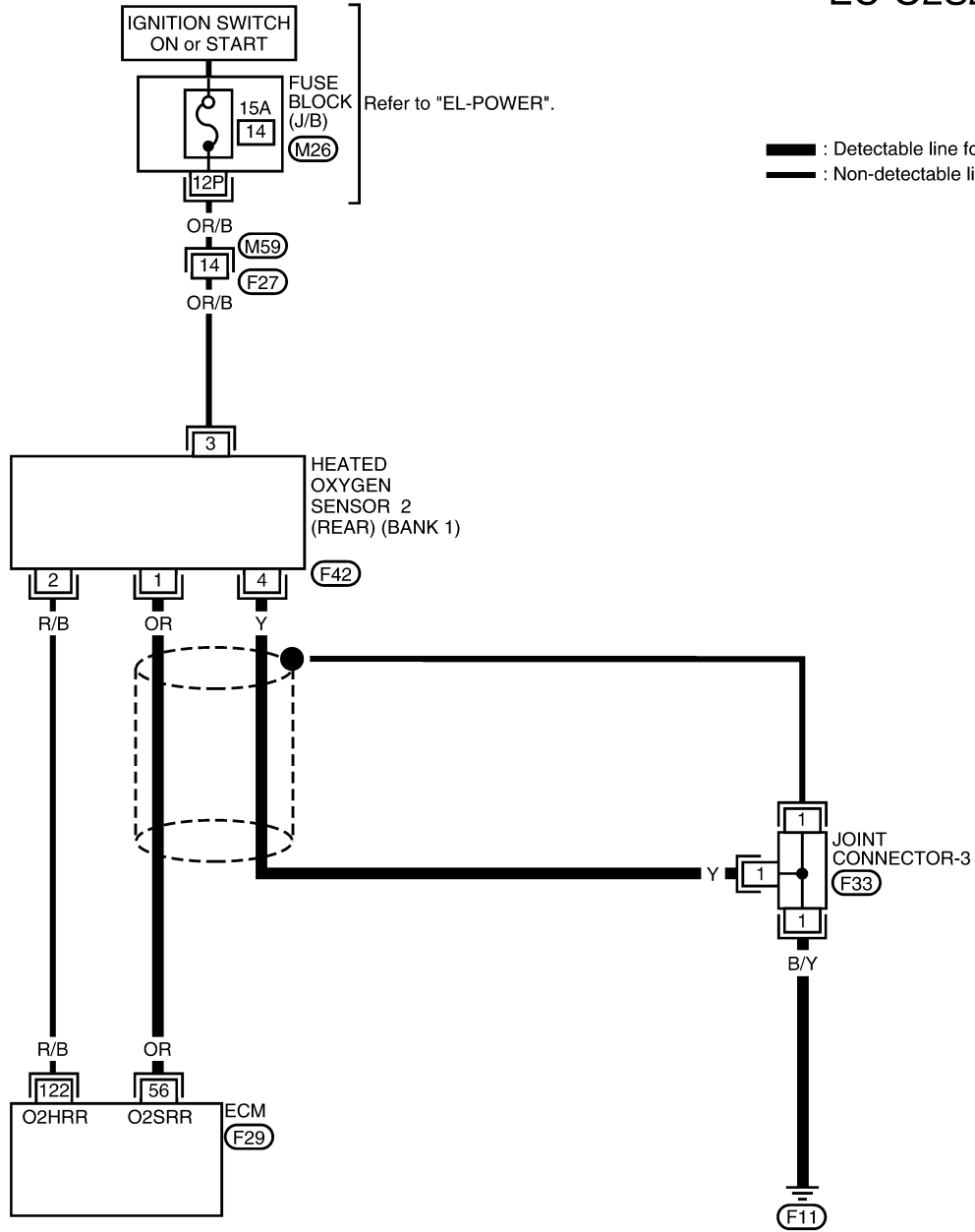
Wiring Diagram

NEEC0673

NEEC0673S01

RIGHT BANK

EC-O2S2B1-01



WEC792

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

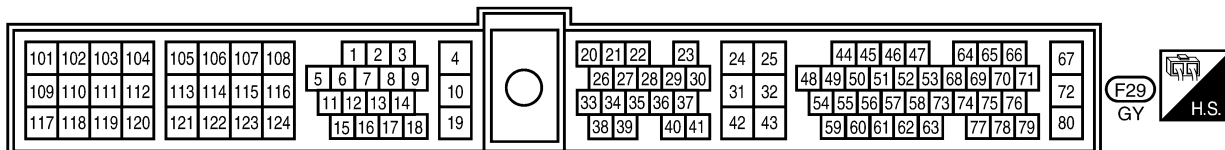
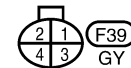
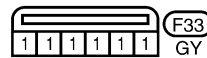
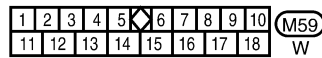
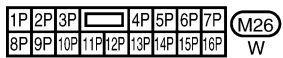
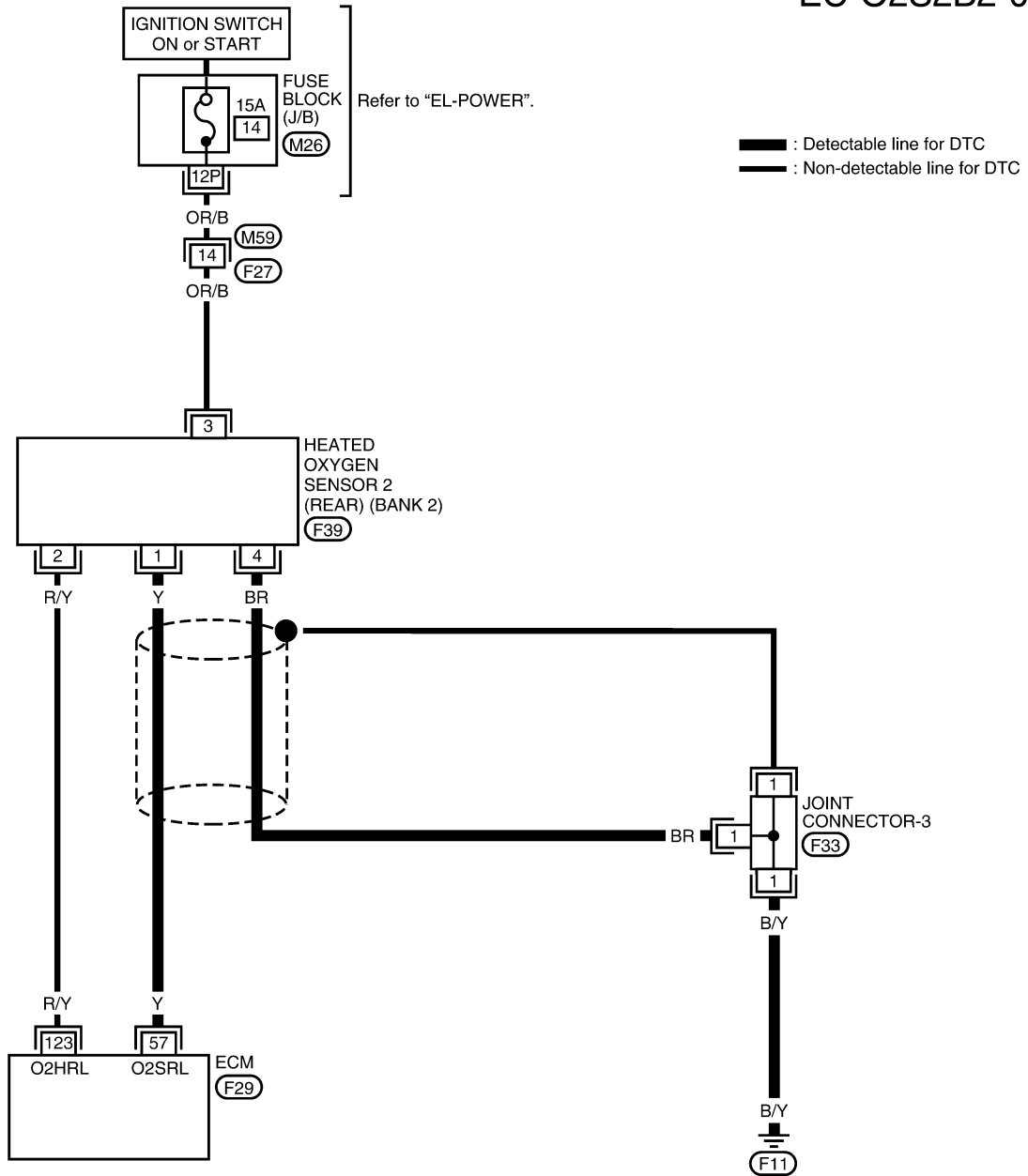
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0673S02

EC-O2S2B2-01

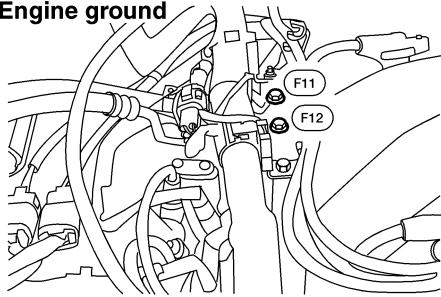


WEC793

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Diagnostic Procedure

NEEC0674

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

2	CLEAR THE SELF-LEARNING DATA								
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2">WORK SUPPORT</th> </tr> <tr> <td style="text-align: center;">SELF-LEARNING CONT</td> <td style="text-align: center;">CLEAR</td> </tr> <tr> <td></td> <td style="text-align: right;">B1 100 %</td> </tr> <tr> <td></td> <td style="text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right;">SEF968Y</p> <p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p>ⓧ Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-687. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p>									
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-905, 914.								
No	▶ GO TO 3.								

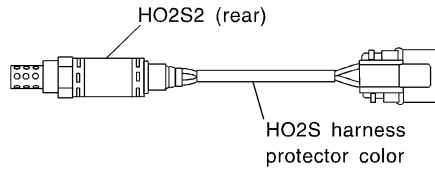
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

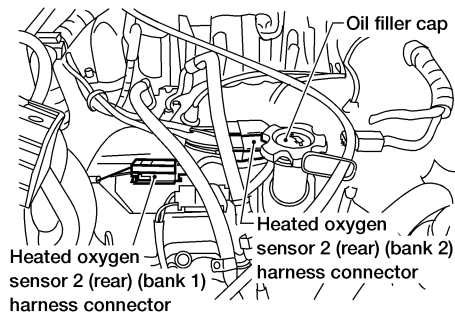
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1 (Right)
P0159	57	1	Bank 2 (Left)

MTBL0591

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Bank 1 (Right)
P0159	57 or 1	Ground	Bank 2 (Left)

MTBL0592

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%. 		
(Reference data)		
<p style="text-align: right;">SEF989RD</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center;">The voltage should be above 0.62V at least once during this procedure.</p> <p>56: Bank 1 57: Bank 2</p> <p style="text-align: right;">SEF797ZB</p> <ol style="list-style-type: none"> Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	GO TO 8.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
OK	▶	GO TO 9.							
NG	▶	GO TO 8.							

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)	<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center; margin: 10px 0;"> HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown </p> <p style="text-align: right;">SEF372Z</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2 (rear).</td> </tr> </table>		▶	Replace malfunctioning heated oxygen sensor 2 (rear).	<p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).				

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33E

Diagnostic Procedure (Cont'd)

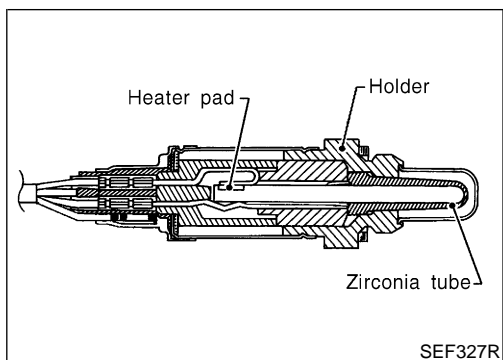
9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	LEAN ↔ RICH

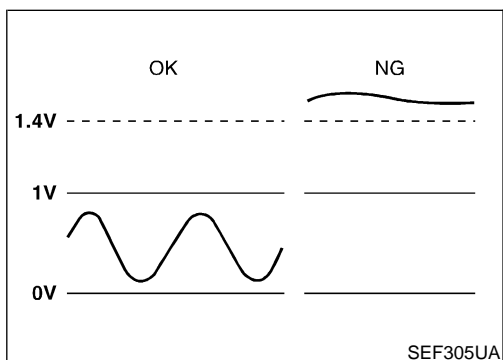
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC0678S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

DTC Confirmation Procedure

NEEC0679

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

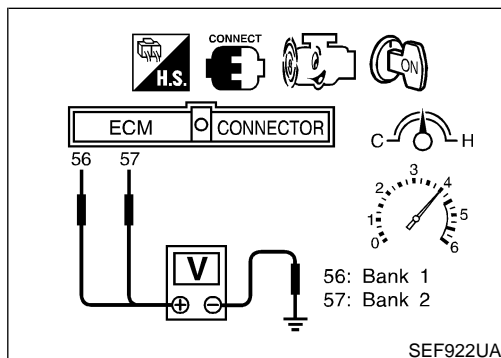
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive seconds.

END SPEED	Less than 3,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-892.



Overall Function Check

NEEC0680

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load

EC-888

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Overall Function Check (Cont'd)

- at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 1.4V during this procedure.
- 5) If NG, go to "Diagnostic Procedure", EC-892.

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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Wiring Diagram

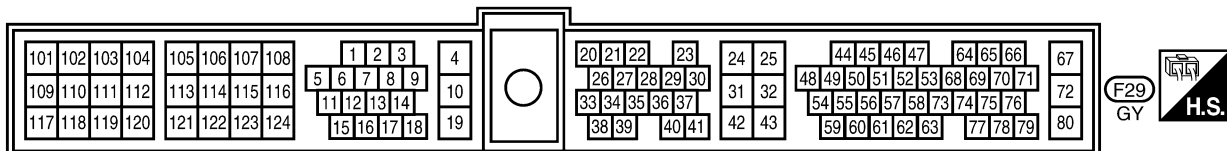
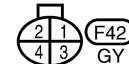
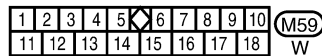
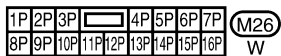
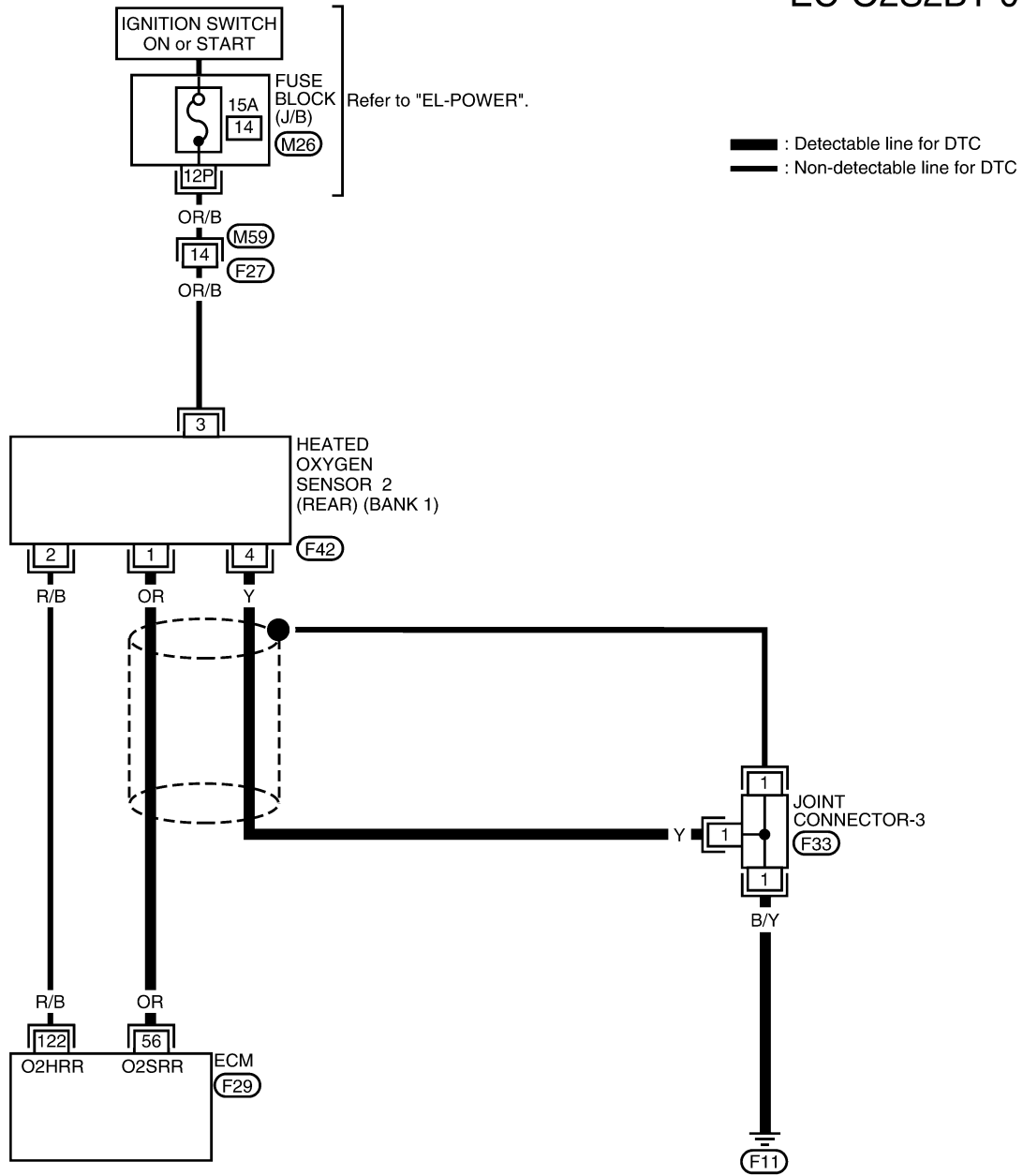
Wiring Diagram

NEEC0681

NEEC0681S01

RIGHT BANK

EC-O2S2B1-01



WEC792

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

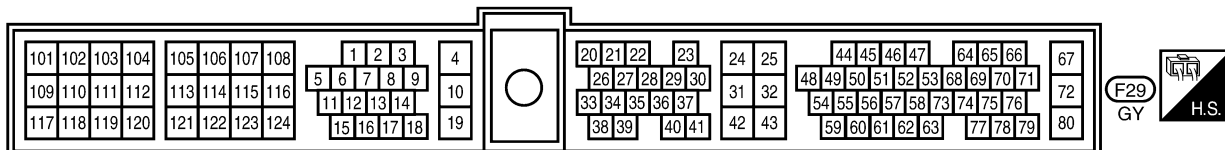
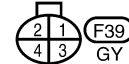
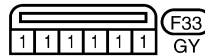
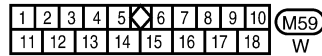
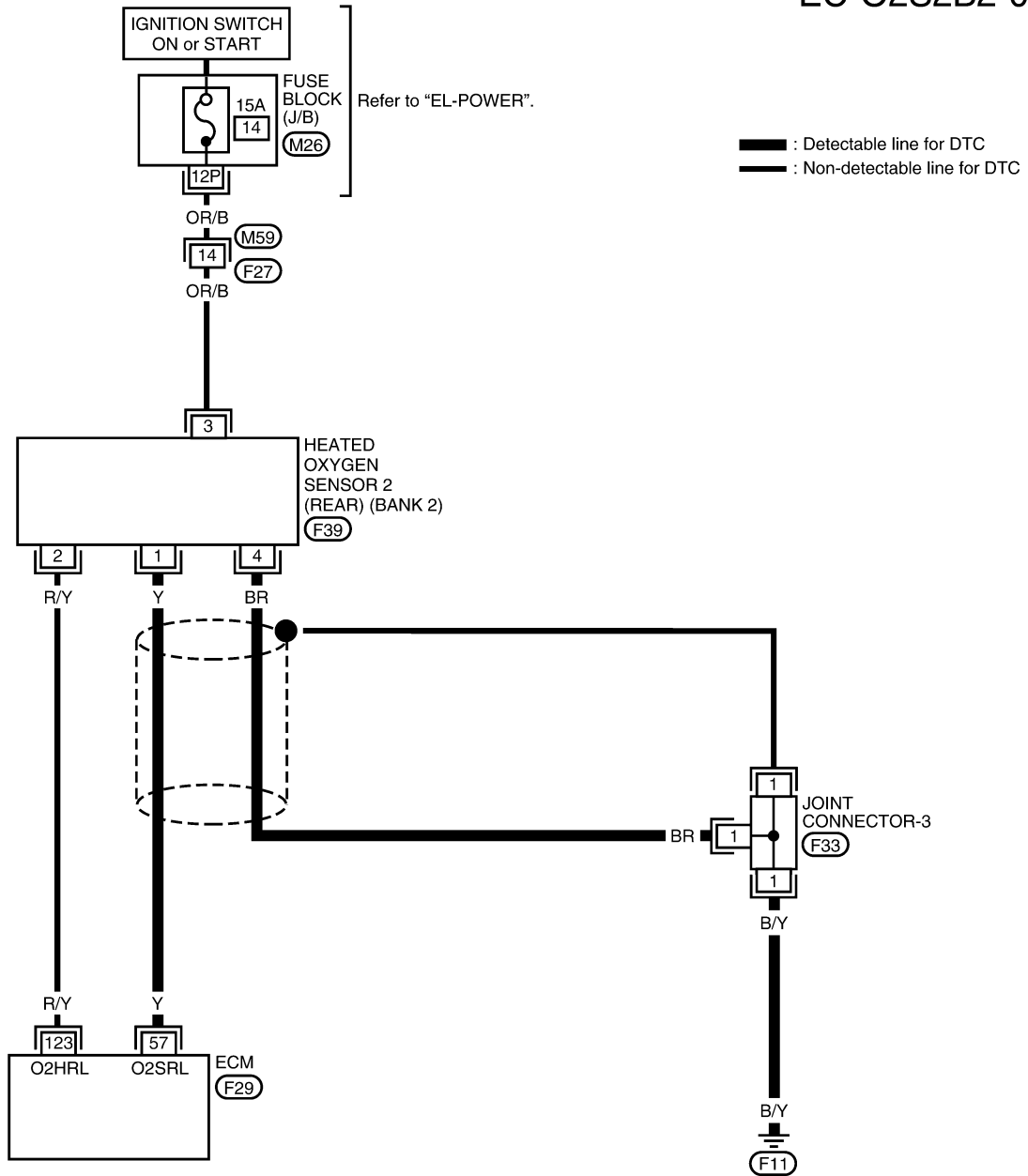
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0681S02

EC-O2S2B2-01



WEC793

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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

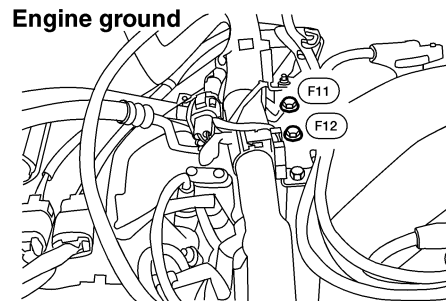
Diagnostic Procedure

Diagnostic Procedure

NEEC0682

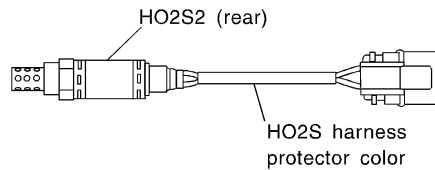
1 INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



3. Check heated oxygen sensor 2 (rear) harness protector color.

LEC518



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

4. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.
5. Disconnect ECM harness connector.

▶ GO TO 2.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

2	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">56</td> <td style="text-align: center;">1</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">57</td> <td style="text-align: center;">1</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0140	56	1	Bank 1 (Right)	P0160	57	1	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0140	56	1	Bank 1 (Right)													
P0160	57	1	Bank 2 (Left)													
SEF828Z																
<p style="text-align: center; color: blue;">Continuity should exist.</p> <p>2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">56 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">57 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0140	56 or 1	Ground	Bank 1 (Right)	P0160	57 or 1	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0140	56 or 1	Ground	Bank 1 (Right)													
P0160	57 or 1	Ground	Bank 2 (Left)													
SEF829Z																
<p style="text-align: center; color: blue;">Continuity should not exist.</p> <p>3. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 3.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

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3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p style="text-align: center; color: blue;">Continuity should exist.</p> <p>2. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
▶ Repair open circuit to ground or short to power in harness or connectors.		

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

5	CHECK HO2S2 (REAR) CONNECTORS FOR WATER	
Check heated oxygen sensor 2 (rear) connector and harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
(P) With CONSULT-II 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.		
(Reference data)		
SEF989RD		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

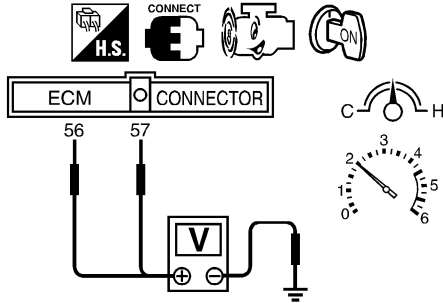
Diagnostic Procedure (Cont'd)

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7 CHECK HEATED OXYGEN SENSOR 2 (REAR)

⊗ Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)



The voltage should be above 0.62V at least once during this procedure.

56: Bank 1
57: Bank 2

SEF797ZB

5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).

The voltage should be below 0.48V at least once during this procedure.

CAUTION:

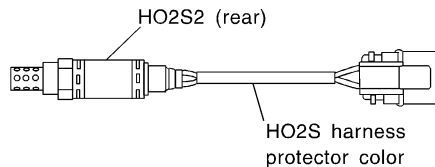
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8 REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignition switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶ Replace malfunctioning heated oxygen sensor 2 (rear).

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33E

Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect joint connector.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E
Description

Description

SYSTEM DESCRIPTION

NEEC0683

NEEC0683S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters (rear) corresponding to the engine speed.

OPERATION

NEEC0683S02

Engine speed rpm	Heated oxygen sensor 2 heaters (rear)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC0684

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine is running above 3,200 rpm. 	OFF
	<ul style="list-style-type: none"> ● Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	ON

ECM Terminals and Reference Value

NEEC0685

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]

NEEC0686

POSSIBLE CAUSE

NEEC0686S01

- Harness or connectors
(The heated oxygen sensor 2 heater (rear) circuit is open or shorted.)
- Heated oxygen sensor 2 heater (rear)

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC0687

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

④ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine.
- 3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Stop vehicle and let engine idle for at least 6 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-901.

④ With GST

Follow the procedure "With CONSULT-II".

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E

Wiring Diagram

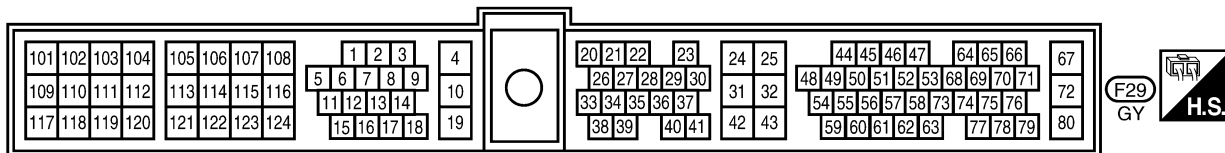
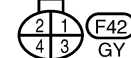
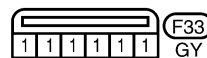
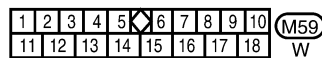
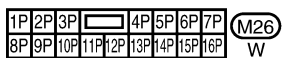
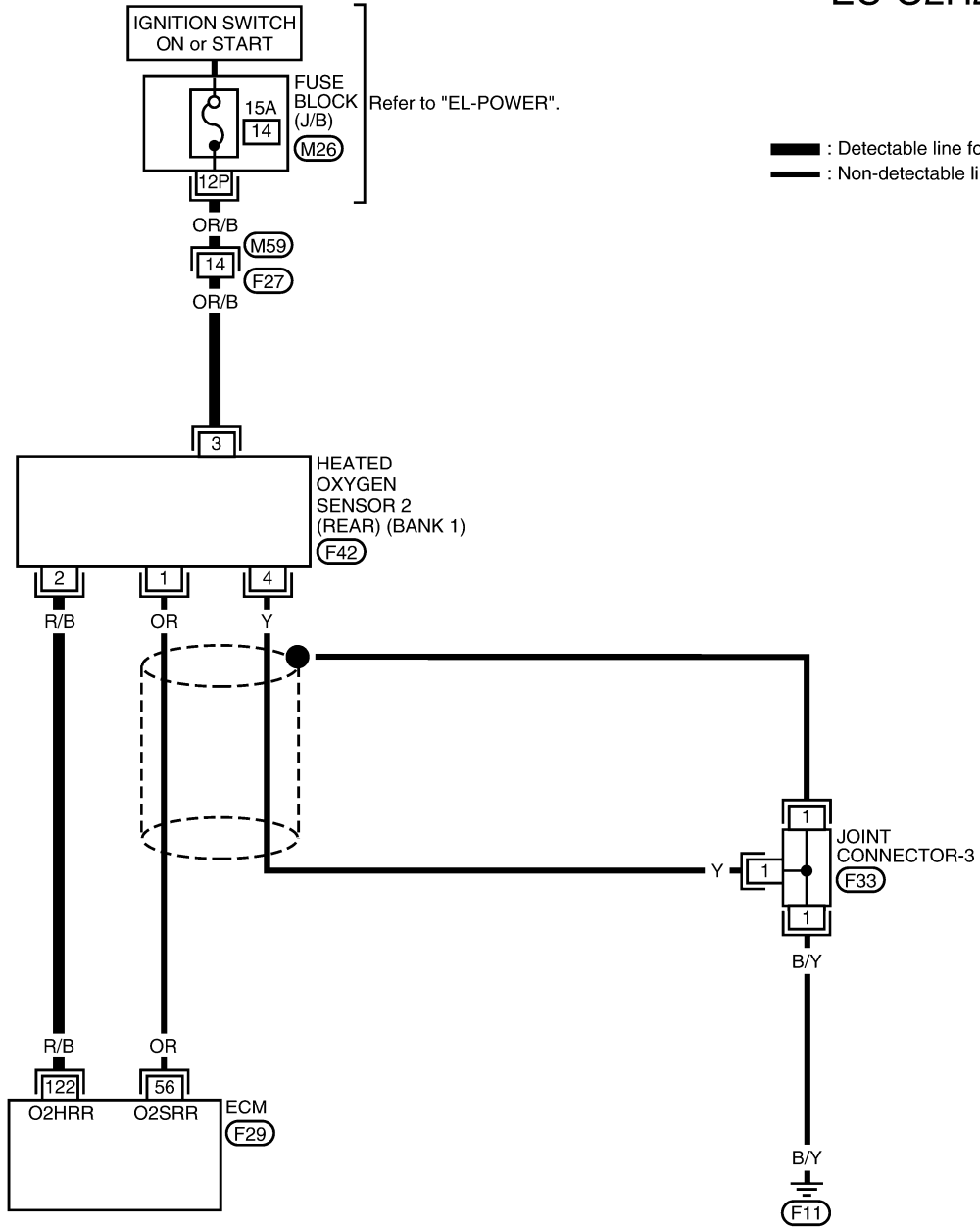
Wiring Diagram

NEEC0688

NEEC0688S01

RIGHT BANK

EC-O2H2B1-01



WEC794

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

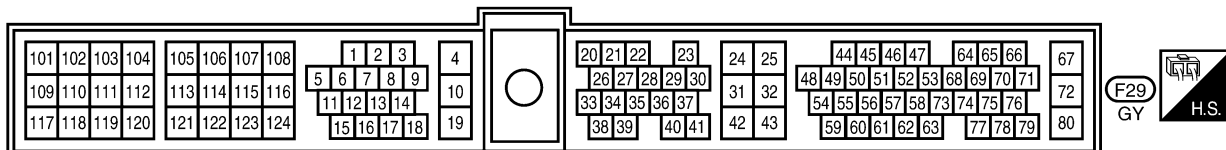
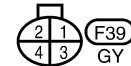
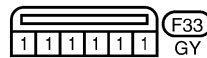
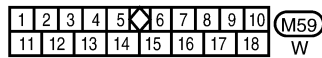
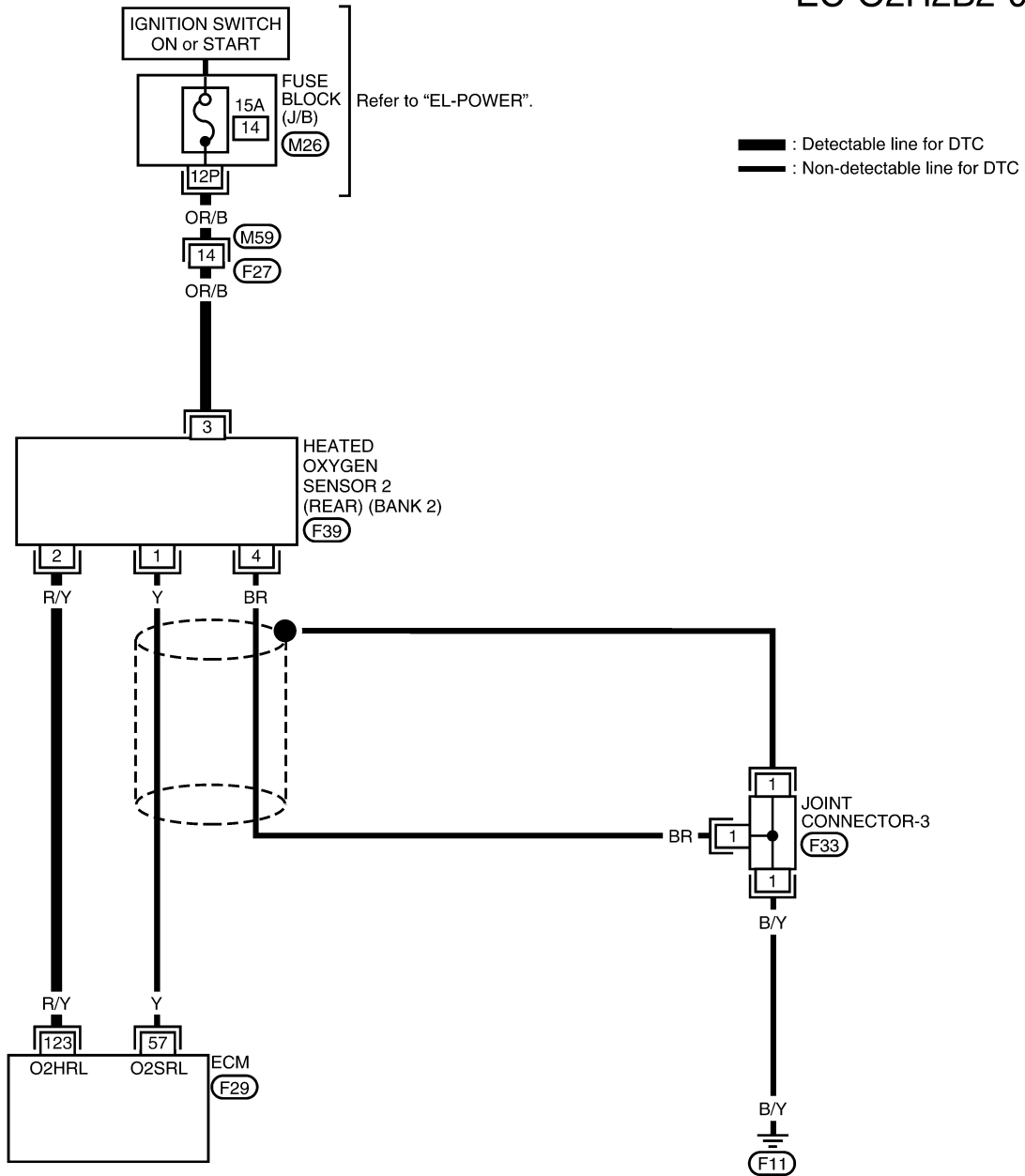
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0688S02

EC-O2H2B2-01



WEC795

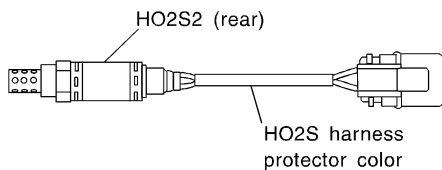
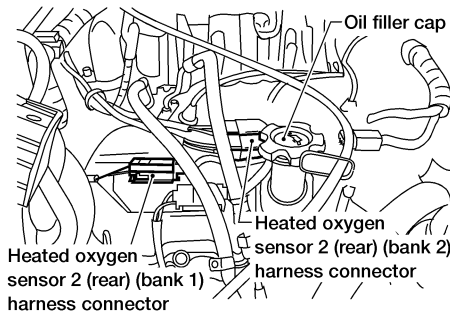
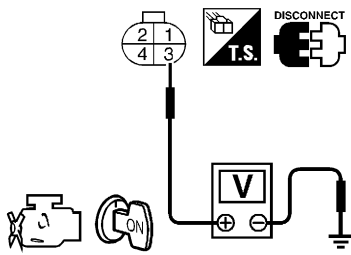
DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0689

1	CHECK HO2S2 (REAR) POWER SUPPLY CIRCUIT		
		<p>1. Turn ignition switch "OFF".</p> <p>2. Check heated oxygen sensor 2 (rear) harness protector color.</p> <div style="text-align: center;">  <p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.</p> <div style="text-align: center;">  </div> <p>4. Turn ignition switch ON.</p> <p>5. Check voltage between HO2S2 terminal 3 and ground.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>WEC546</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>
	OK	▶ GO TO 3.	
	NG	▶ GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 2 (rear) and fuse 	
		▶ Repair harness or connectors.	

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 HEATER (REAR) OUTPUT CIRCUIT FOR OPEN AND SHORT														
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.</p>															
<table border="1"><thead><tr><th rowspan="2">DTC</th><th colspan="2">Terminals</th><th rowspan="2">Bank</th></tr><tr><th>ECM</th><th>Sensor</th></tr></thead><tbody><tr><td>P0141</td><td>122</td><td>2</td><td>Bank 1 (Right)</td></tr><tr><td>P0161</td><td>123</td><td>2</td><td>Bank 2 (Left)</td></tr></tbody></table>		DTC	Terminals		Bank	ECM	Sensor	P0141	122	2	Bank 1 (Right)	P0161	123	2	Bank 2 (Left)
DTC	Terminals		Bank												
	ECM	Sensor													
P0141	122	2	Bank 1 (Right)												
P0161	123	2	Bank 2 (Left)												
SEF830Z															
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p>															
OK or NG															
OK	▶ GO TO 5.														
NG	▶ GO TO 4.														

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none">● Joint connector-3● Harness for open or short between heated oxygen sensor 2 (rear) and engine ground.	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

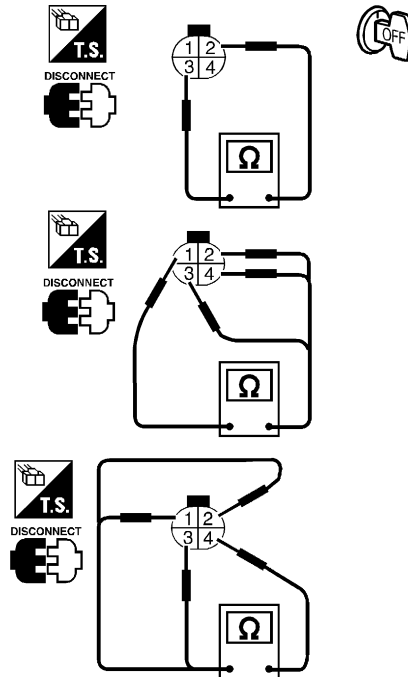
VG33E

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between HO2S2 (rear) terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

SEF716W

MTBL0233

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

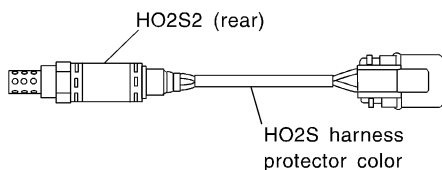
OK	▶	GO TO 7.
NG	▶	GO TO 6.

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33E

Diagnostic Procedure (Cont'd)

6	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
Check heated oxygen sensor 2 (rear) harness protector color.	
 <p>The diagram shows a heated oxygen sensor (HO2S2) on the left with a label 'HO2S2 (rear)'. A long cable (harness) extends from the sensor to a rectangular harness protector on the right, labeled 'HO2S harness protector color'.</p>	
HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown	
SEF372Z	
CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

NEEC0690

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NEEC0690S01

- Intake air leaks
- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

DTC Confirmation Procedure

4	WORK SUPPORT	
	SELF-LEARNING CONT	CLEAR
		B1 100 %
		B2 100 %

SEF968Y

DTC Confirmation Procedure

=NEEC0691

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-909.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-909. If engine does not start, check exhaust and intake air leak visually.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Wiring Diagram

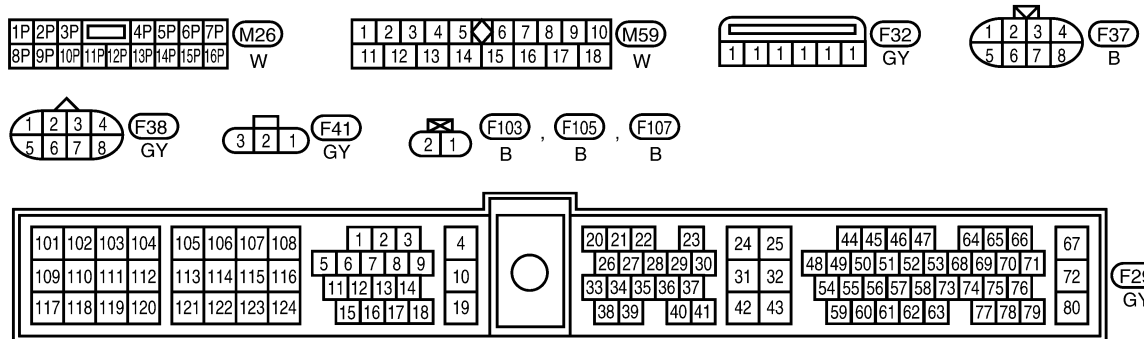
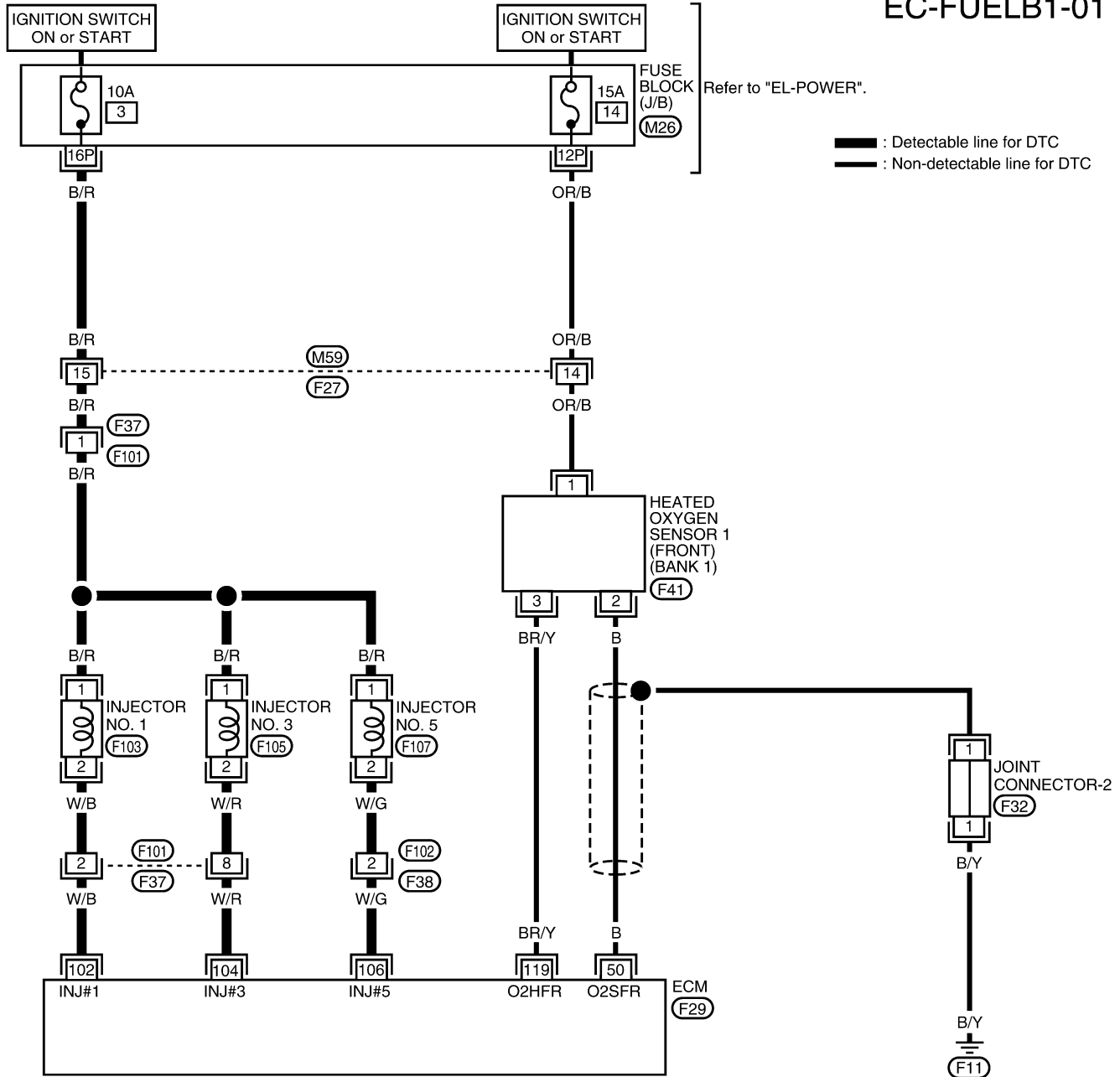
Wiring Diagram

NEEC0692

NEEC0692S01

RIGHT BANK

EC-FUELB1-01



WEC796

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

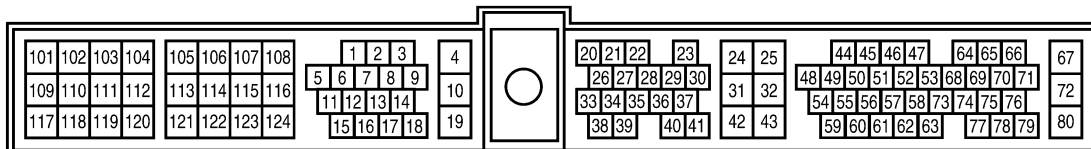
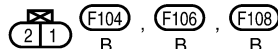
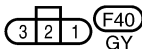
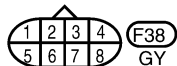
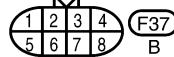
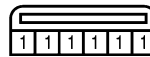
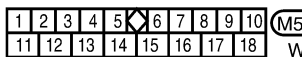
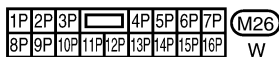
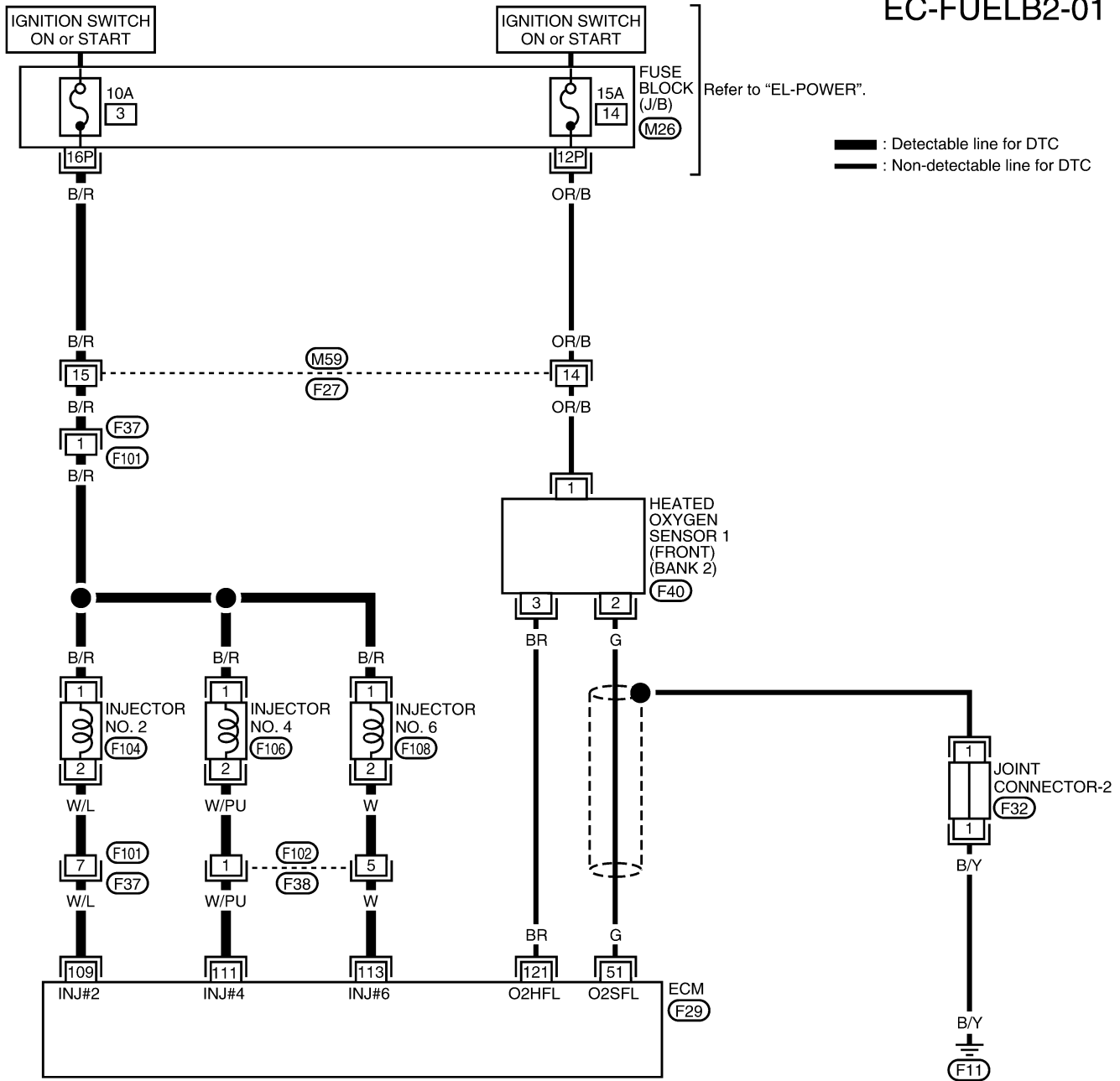
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NEEC0692S02

EC-FUEL2-01



WEC797

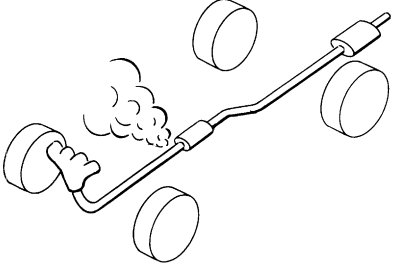
DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0693

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0171	50	2	Bank 1 (Right)	P0174	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0171	50	2	Bank 1 (Right)													
P0174	51	2	Bank 2 (Left)													
SEF831Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0171	50 or 2	Ground	Bank 1 (Right)	P0174	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0171	50 or 2	Ground	Bank 1 (Right)													
P0174	51 or 2	Ground	Bank 2 (Left)													
SEF832Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-658.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1198.) ● Fuel pressure regulator (Refer to EC-659.) ● Fuel lines (Refer to MA-29, "ENGINE MAINTENANCE".) ● Fuel filter for clogging 		
▶		Repair or replace.
6	CHECK MASS AIR FLOW SENSOR	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
<p>Ⓜ With GST</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-760.

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Diagnostic Procedure (Cont'd)

7 CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

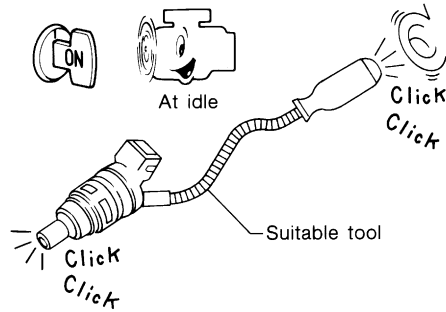
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

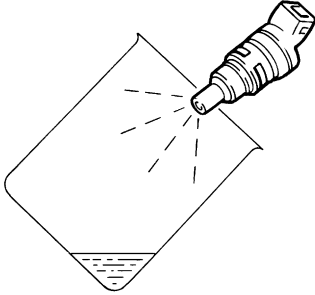
OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1190.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174). 4. Remove injector gallery assembly. Refer to EC-659. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected. 5. Disconnect all ignition coil harness connectors. 6. Prepare pans or saucers under each injector. 7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. 		
		
<p style="color: blue;">Fuel should be sprayed evenly for each injector.</p>		
SEF595Q		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶		INSPECTION END

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0694
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

NEEC0694S01

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

DTC Confirmation Procedure

4

WORK SUPPORT	
SELF-LEARNING CONT	CLEAR
	B1 100 %
	B2 100 %

SEF968Y

DTC Confirmation Procedure

=NEEC0695

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-918.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-918. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

Follow the procedure "With CONSULT-II".

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

Wiring Diagram

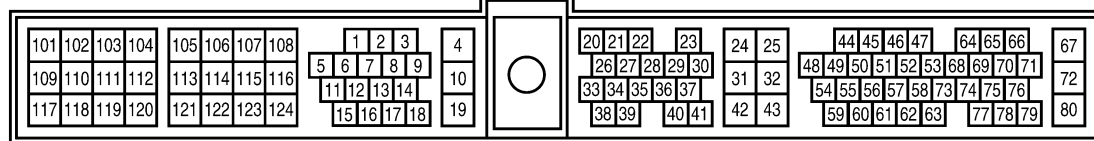
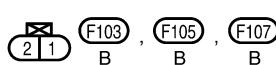
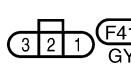
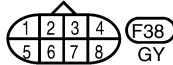
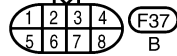
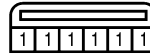
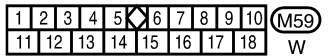
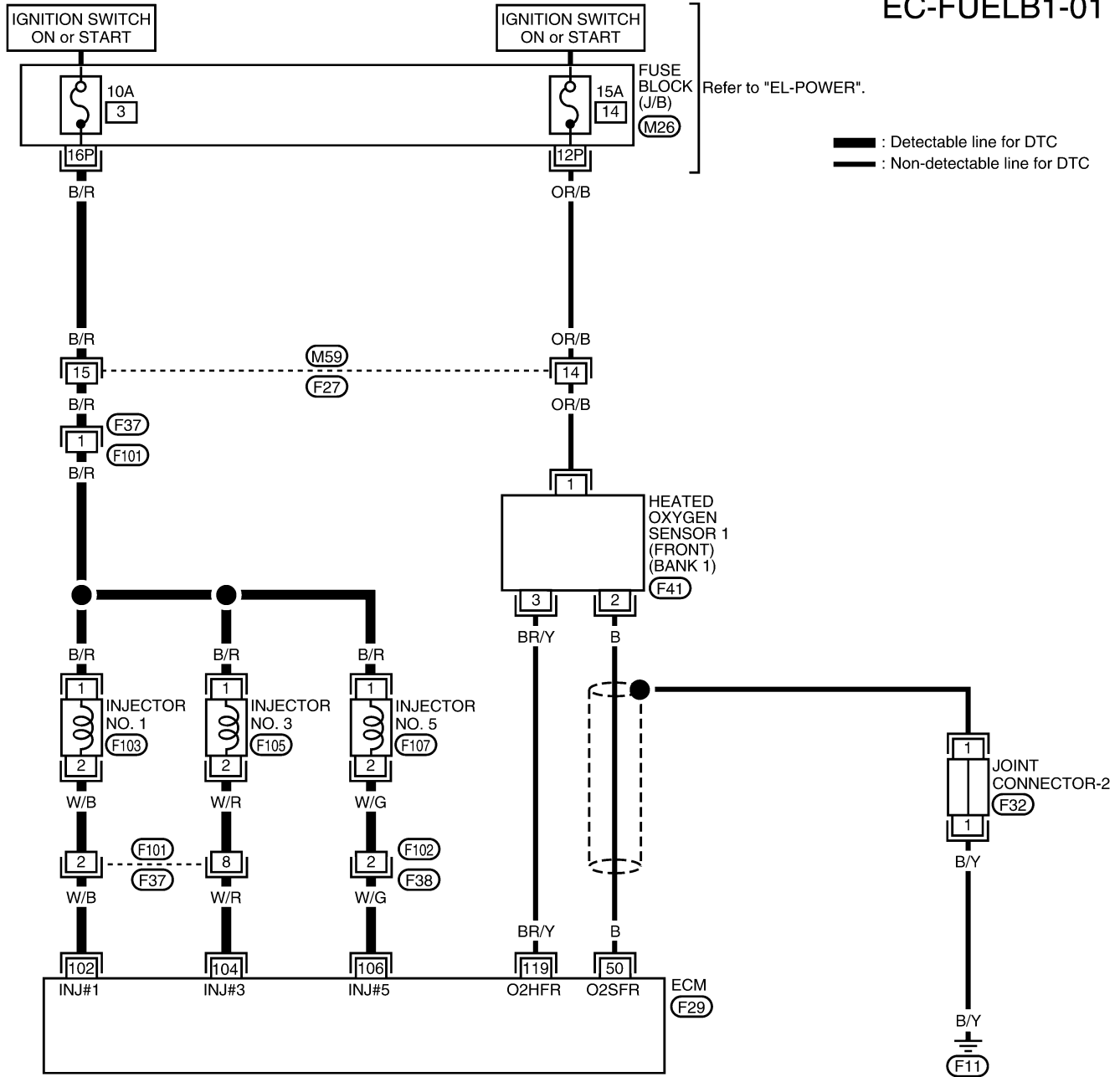
Wiring Diagram

NEEC0696

NEEC0696S01

RIGHT BANK

EC-FUELB1-01



WEC796

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

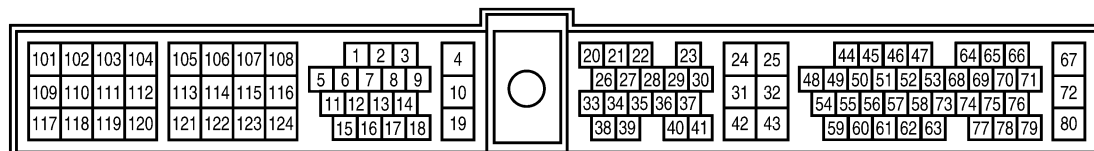
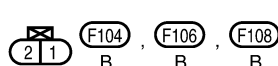
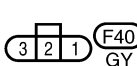
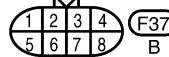
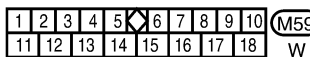
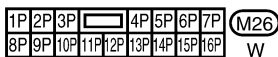
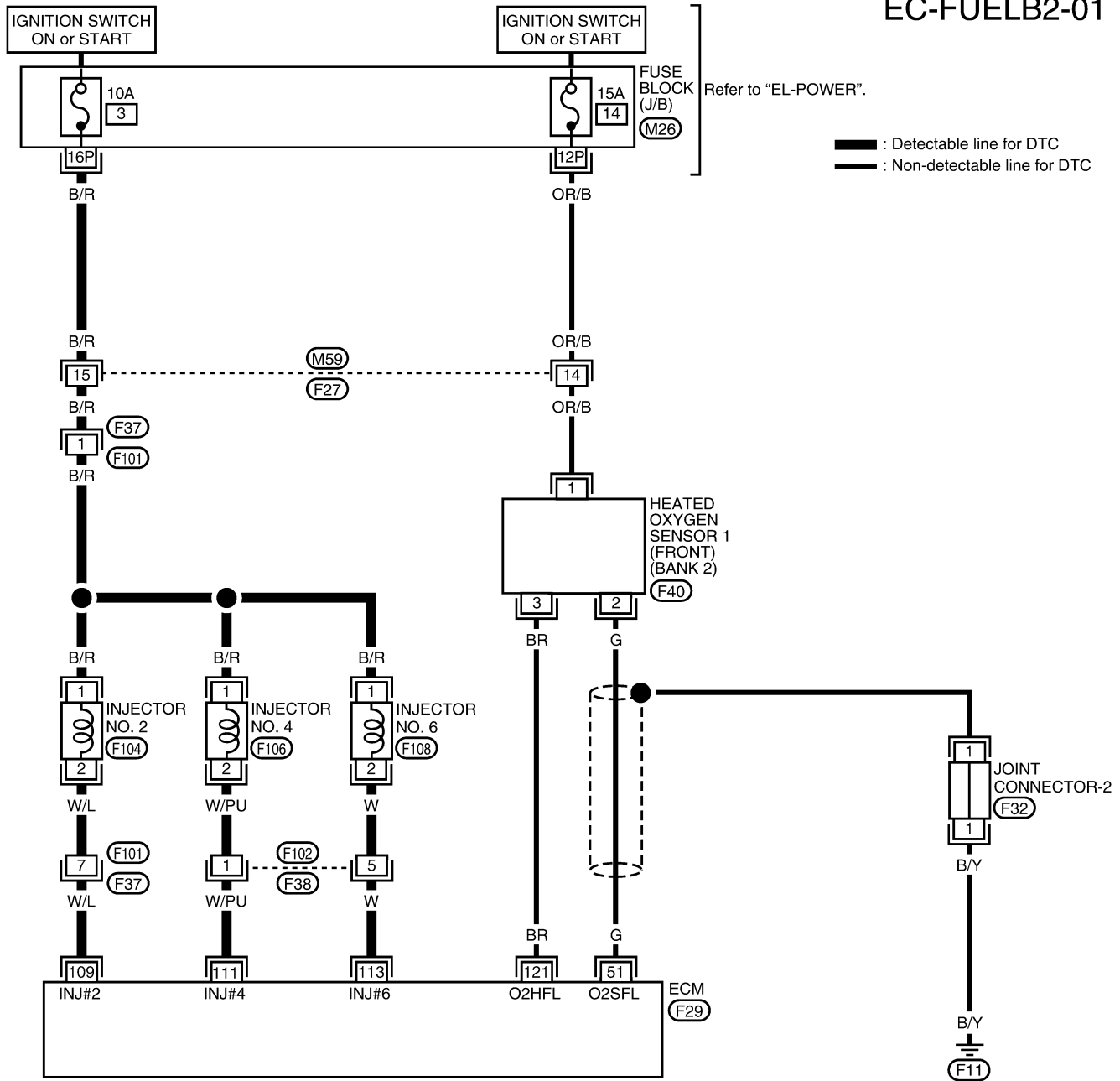
VG33E

Wiring Diagram (Cont'd)

NEEC0696S02

LEFT BANK

EC-FUEL2-01



WEC797

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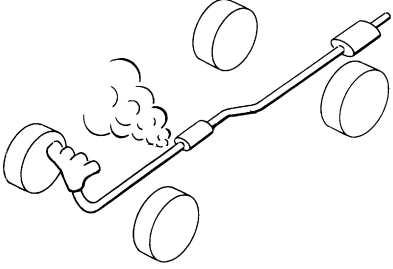
DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0697

1	CHECK EXHAUST AIR LEAK
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.	
	
SEF099P	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or replace.

2	CHECK FOR INTAKE AIR LEAK
Listen for an intake air leak after the mass air flow sensor.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0172	50	2	Bank 1 (Right)	P0175	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0172	50	2	Bank 1 (Right)													
P0175	51	2	Bank 2 (Left)													
SEF833Z																
<p>Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0172	50 or 2	Ground	Bank 1 (Right)	P0175	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0172	50 or 2	Ground	Bank 1 (Right)													
P0175	51 or 2	Ground	Bank 2 (Left)													
SEF834Z																
<p>Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-658.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="margin-left: 20px;">At idling:</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

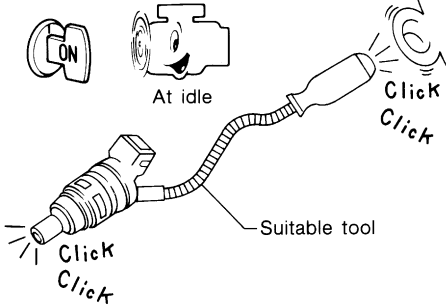
Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1198.) ● Fuel pressure regulator (Refer to EC-659.) 		
▶		Repair or replace.
6	CHECK MASS AIR FLOW SENSOR	
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
ⓘ With GST <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-760.

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33E

Diagnostic Procedure (Cont'd)

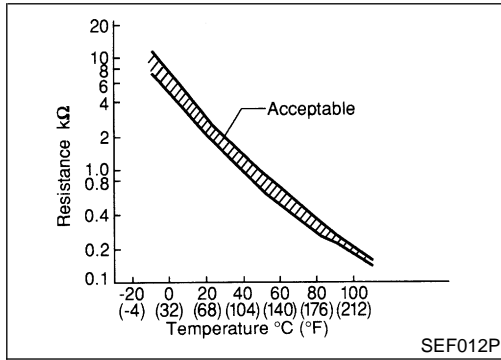
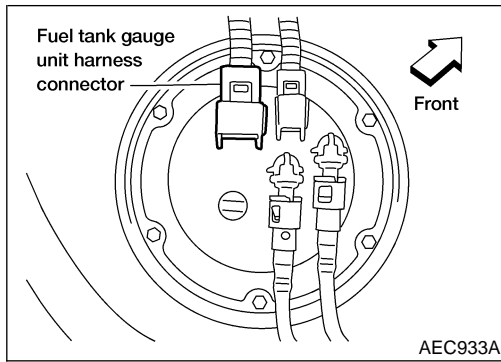
7	CHECK FUNCTION OF INJECTORS																
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX %																
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Listen to each injector operating sound. 																	
																	
<p>Clicking noise should be heard.</p>																	
<p>OK or NG</p>																	
OK	▶ GO TO 8.																
NG	▶ Perform trouble diagnosis for "INJECTORS", EC-1190.																

8	CHECK INJECTOR
<ol style="list-style-type: none"> Remove injector assembly. Refer to EC-659. Keep fuel hose and all injectors connected to injector gallery. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175). The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected. Disconnect all ignition coil harness connectors. Prepare pans or saucers under each injectors. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 	
<p>OK or NG</p>	
OK (Does not drip)	▶ GO TO 9.
NG (Drips)	▶ Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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Component Description



Component Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

Malfunction is detected when an excessively high or low voltage is sent to ECM, rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

=NEEC0700

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If the result is NG, go to "Diagnostic Procedure", EC-925.
If the result is OK, go to following step.
- 4) Check "COOLAN TEMP/S" value.
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-925.

 **With GST**

Follow the procedure "With CONSULT-II".

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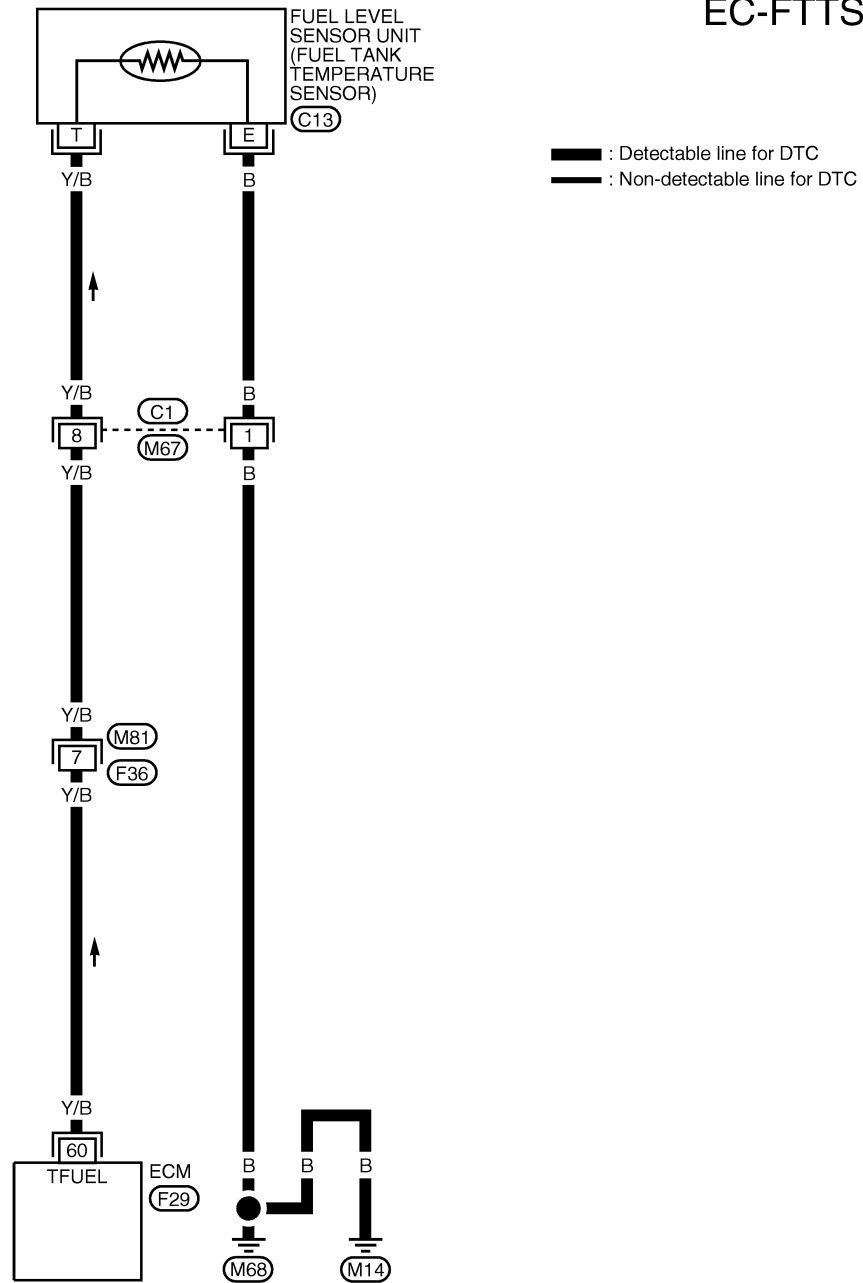
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Wiring Diagram

NEEC0701

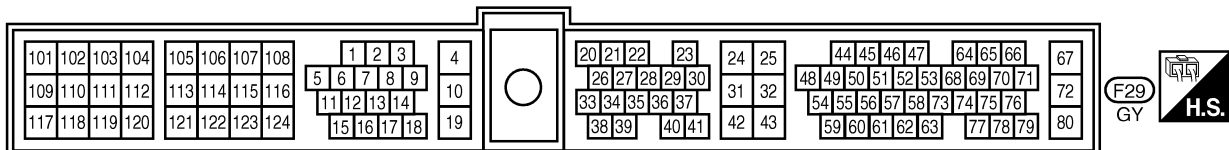
EC-FTTS-01



1	2	3	4	5	6	7	8	9	10	
11	12	13	14	15	16	17	18	19	20	
21	22	23	24	M81						W

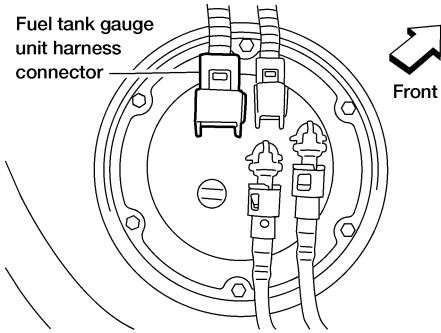
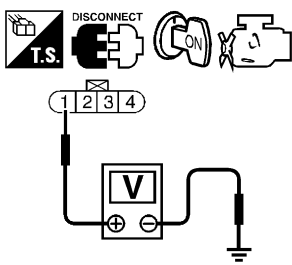
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	C1	
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Diagnostic Procedure

NEEC0702

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect fuel tank gauge unit harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC933A
SEF639W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 	
	▶ Repair harness or connector.

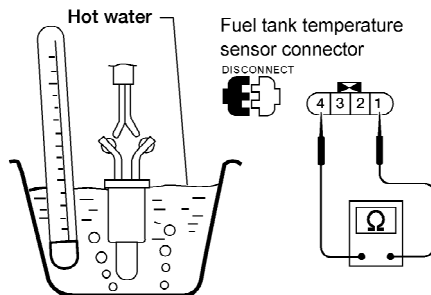
3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check harness for open between fuel tank temperature sensor and body ground.</p>	
	▶ Repair open circuit or short to power in harness or connectors.

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5 CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

▶ **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

System Description

System Description

NEEC0963

COOLING FAN CONTROL

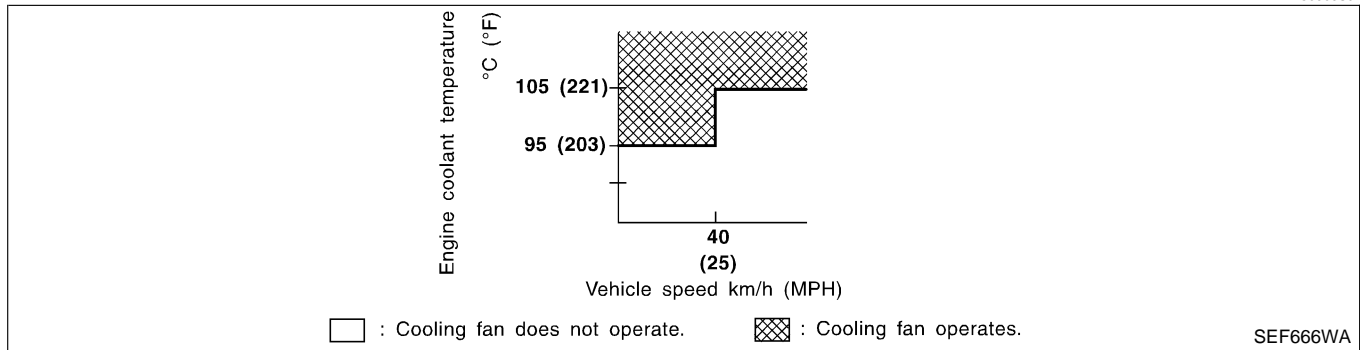
NEEC0963S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 2-step control [ON/OFF].

OPERATION

NEEC0963S02



SEF666WA

CONSULT-II Reference Value in Data Monitor Mode

NEEC0964

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> ● Engine: Idling, after warming up ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less. OFF
		Engine coolant temperature is 95°C (203°F) or more. ON

On Board Diagnosis Logic

NEEC0965

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Possible Cause

Possible Cause

NEEC0966

- Harness or connectors
(The cooling fan circuit is open or shorted)
- Cooling fan
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-940.

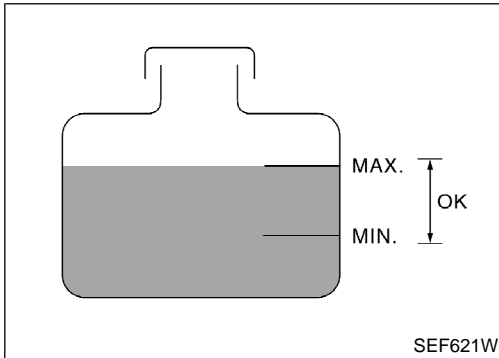
Overall Function Check

Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed. =NEEC0704

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator. NEEC0704S01

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-933.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to **MA-27**, “Changing Engine Coolant”.

- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**, “Anti-freeze Coolant Mixture Ratio”.
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-933.

3. Turn ignition switch ON.

4. Perform “COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II.

- Set “COOLANT TEMP” to 95°C (194°F) and make sure that cooling fan operates. If NG, go to “Diagnostic Procedure”, EC-933. After repair, go to next step.

5. Check for blocked coolant passage.
Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.

If NG, go to step 6 of “Diagnostic Procedure”, EC-933. After repair, go to next step.

Be extremely careful not to touch any moving or adjacent parts.

6. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.

Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.

If NG, take appropriate action and then go to next step.

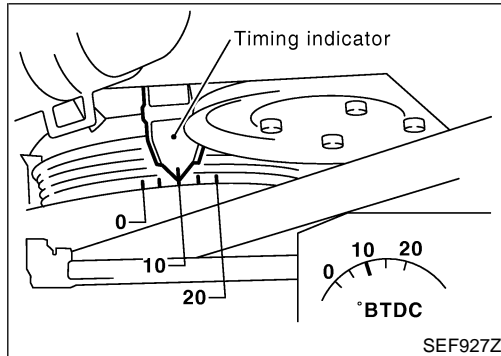
7. Check ECT sensor for proper operation. Refer to step 7 of

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

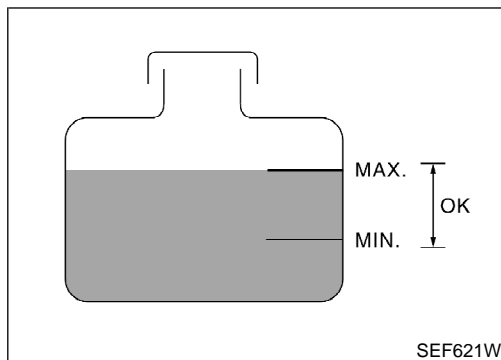
VG33E

Overall Function Check (Cont'd)

“Diagnostic Procedure”, EC-933. If NG, replace ECT sensor and go to next step.



8. Check ignition timing. Refer to “Basic Inspection”, EC-715. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.



⊗ WITHOUT CONSULT-II

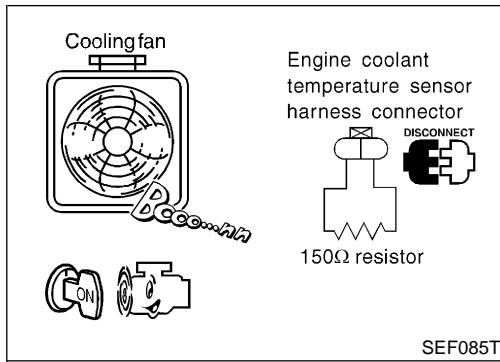
NEEC0704S02

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.
 - If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to step 3 of “Diagnostic Procedure”, EC-933.
 - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to **MA-27**, “Changing Engine Coolant”.
- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**, “Anti-freeze Coolant Mixture Ratio”.
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-933.
3. Turn ignition switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Overall Function Check (Cont'd)



5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Start engine and make sure that cooling fan operates. **Be careful not to overheat engine.**
7. Check for blocked coolant passage. Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows. If NG, go to step 6 of "Diagnostic Procedure", EC-933. After repair, go to next step. **Be extremely careful not to touch any moving or adjacent parts.**
8. Check radiator for blocked air passage. Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc. Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired. If NG, take appropriate action and then go to next step.
9. Check ECT sensor for proper operation. Refer to step 6 of "Diagnostic Procedure", EC-933. If NG, replace ECT sensor and go to next step.

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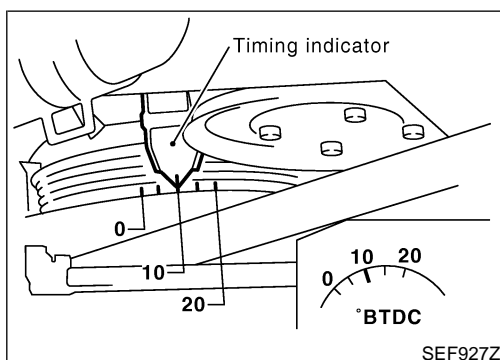
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10. Check ignition timing. Refer to "Basic Inspection", EC-715. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

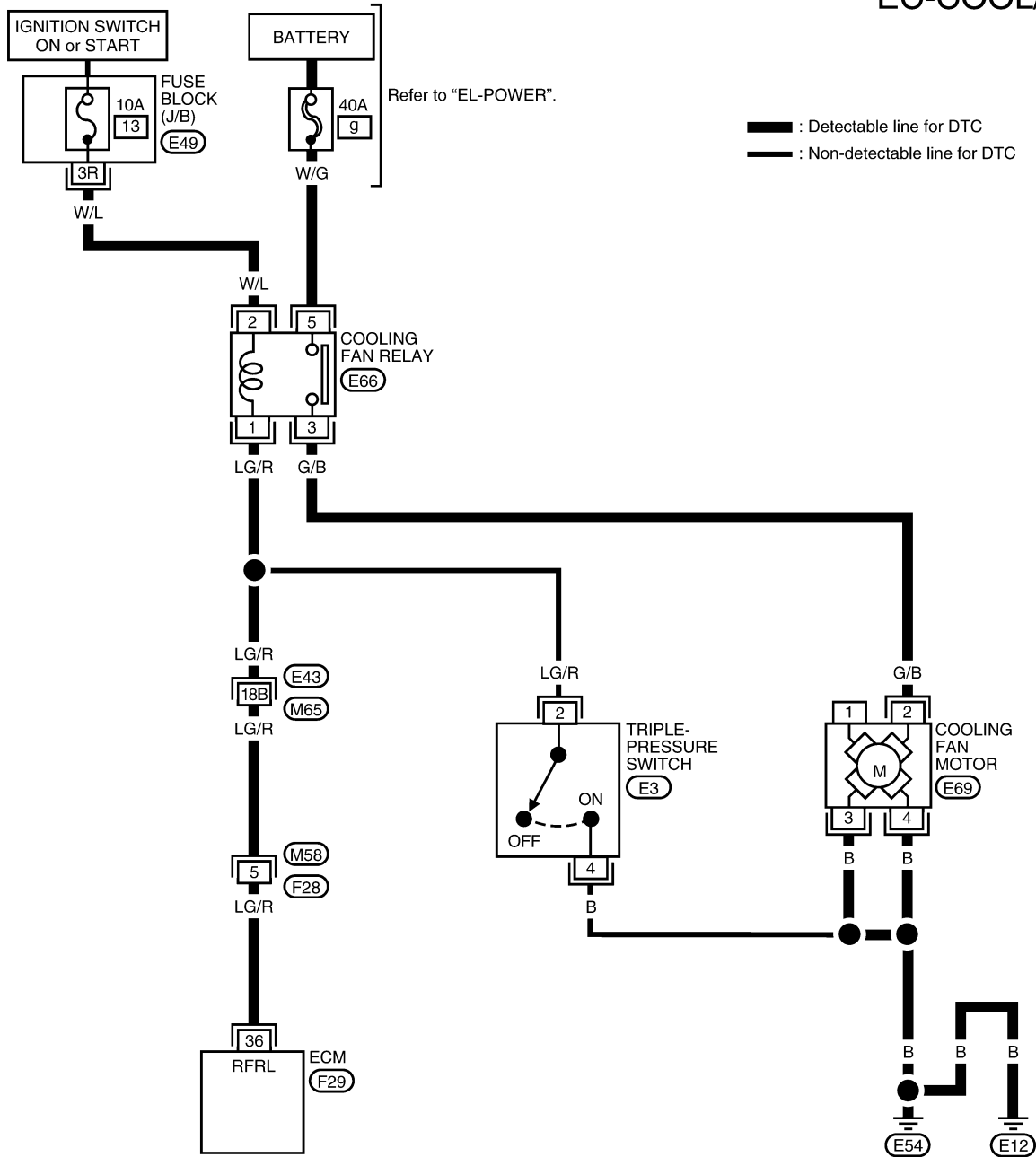
VG33E

Wiring Diagram

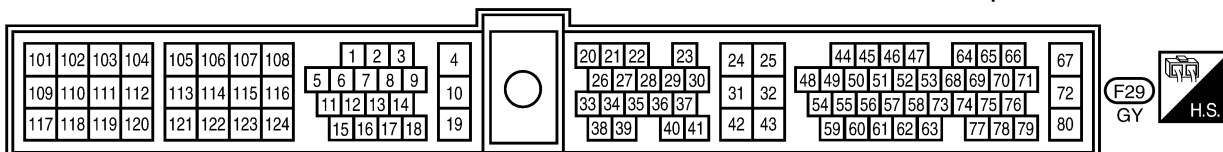
Wiring Diagram

NEEC0705

EC-COOL/F-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC504

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0706

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK COOLING FAN OPERATION																							
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II. 																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>OFF</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	OFF	MONITOR		COOLAN TEMP/S	XXX °C														
ACTIVE TEST																								
COOLING FAN	OFF																							
MONITOR																								
COOLAN TEMP/S	XXX °C																							
Does cooling fan rotate?																								
Yes or No																								
Yes	▶	GO TO 4.																						
No	▶	GO TO 9.																						

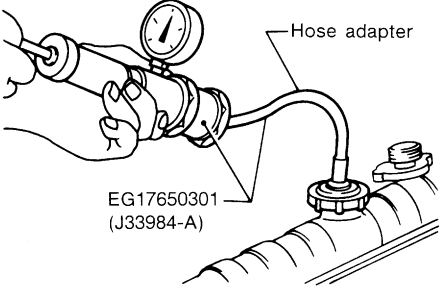
3	CHECK COOLING FAN OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector. 3. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 4. Start engine and make sure that cooling fan operates. 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 9.

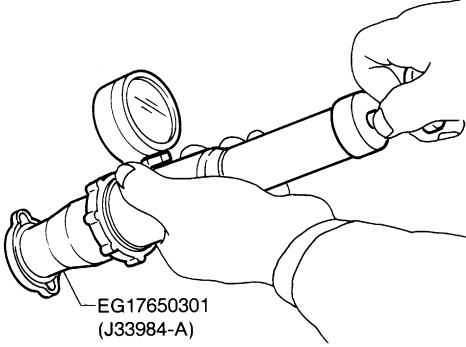
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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

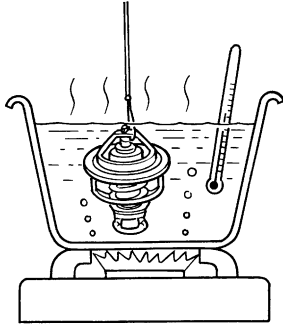
4	CHECK COOLING SYSTEM FOR LEAK	
<p>Apply pressure to the cooling system with a tester, and check if the pressure drops.</p> <p>CAUTION: Higher than the specified pressure may cause radiator damage.</p> <p style="color: blue;">Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)</p>		
		
SLC754A		
<p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	<p>Check the following for leak:</p> <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump <p>Refer to LC-29, "Water Pump".</p>

5	CHECK RADIATOR CAP	
<p>Apply pressure to cap with a tester and check radiator cap relief pressure.</p>		
		
SLC755A		
<p style="color: blue;">Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace radiator cap.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK THERMOSTAT	<p>1. Check valve seating condition at normal room temperatures. It should seat tightly.</p> <p>2. Check valve opening temperature and valve lift.</p> <div style="text-align: center;">  </div> <p style="text-align: right; margin-right: 20px;">SLC343</p> <p>Valve opening temperature: 82°C (180°F) [standard]</p> <p>Valve lift: More than 10 mm/95°C (0.31 in/203°F)</p> <p>3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-30, "Thermostat".</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
	OK	▶ GO TO 7.	
	NG	▶ Replace thermostat.	

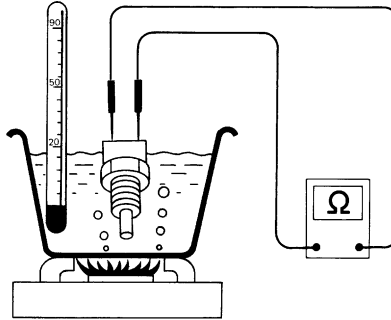
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

7 CHECK ENGINE COOLANT TEMPERATURE SENSOR

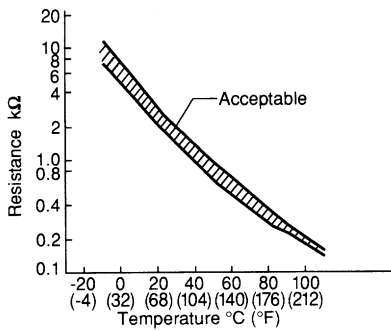
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0229

SEF012P

OK or NG

OK ▶ GO TO 8.

NG ▶ Replace engine coolant temperature sensor.

8 CHECK MAIN 12 CAUSES

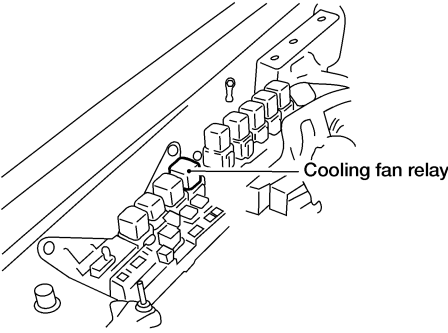
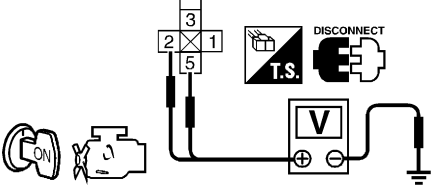
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-940.

▶ **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan relay.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">AEC932A</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF667W</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 11.
NG		▶	GO TO 10.

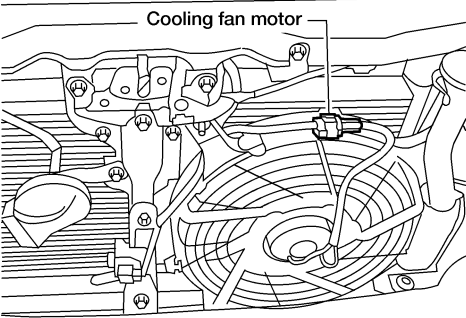
10	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay and fuse ● Harness for open or short between cooling fan relay and battery 			
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  <p style="text-align: center; margin-top: -10px;">Cooling fan motor</p> </div> <p style="text-align: right; margin-right: 20px;">AEC931A</p> <p>3. Check harness continuity between relay terminal 3 and motor terminal 2, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

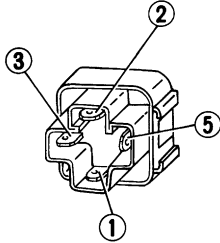
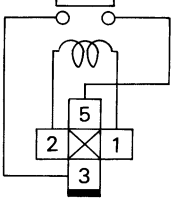
12	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 36 and relay terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

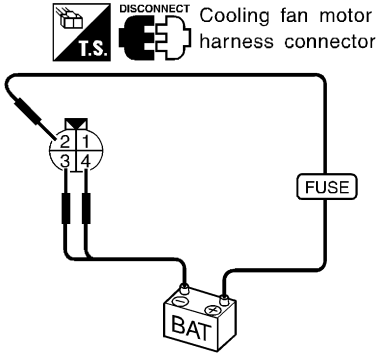
VG33E

Diagnostic Procedure (Cont'd)

14	CHECK COOLING FAN RELAY						
<p>Check continuity between terminals 3 and 5.</p> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;">   </div>							
SEF511P							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No current supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Conditions	Continuity	12V direct current supply between terminals 1 and 2	Yes	No current supply	No
Conditions	Continuity						
12V direct current supply between terminals 1 and 2	Yes						
No current supply	No						
MTBL0252							
OK or NG							
OK	▶ GO TO 15.						
NG	▶ Replace cooling fan relay.						

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15	CHECK COOLING FAN MOTOR								
<p>1. Disconnect cooling fan motor harness connector. 2. Supply cooling fan motor terminals with battery voltage and check operation.</p>									
MTBL0253									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Terminals</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td>Cooling fan motor</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3, 4</td> </tr> </tbody> </table>			Terminals		(+)	(-)	Cooling fan motor	2	3, 4
	Terminals								
	(+)	(-)							
Cooling fan motor	2	3, 4							
									
SEF670W									
<p>Cooling fan motor should operate.</p>									
OK or NG									
OK	▶ GO TO 16.								
NG	▶ Replace cooling fan motor.								

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16	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.</p>	
▶	INSPECTION END

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITH ELECTRIC COOLING FAN)

VG33E

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC0707

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-27 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-25 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-25 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-30 , "Thermostat" and LC-32 , "Radiator".
ON*1	7	<ul style="list-style-type: none"> ● Cooling fan 	<ul style="list-style-type: none"> ● CONSULT-II 	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" (EC-1072).
OFF	8	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-27 , "Changing Engine Coolant".
OFF*4	10	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-27 , "ENGINE MAINTENANCE".
OFF	11	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-96 , "Inspection".
	12	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-116 , "Inspection".

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-35**, "OVERHEATING CAUSE ANALYSIS".

On Board Diagnosis Logic

NEEC1512

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy. When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip. Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

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Possible Cause

NEEC1513

- Cooling fan (Crankshaft driven)
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

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For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-947.

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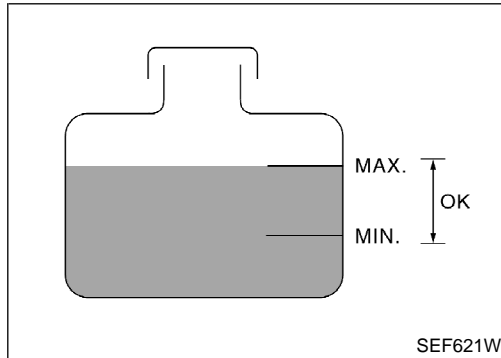
Overall Function Check

Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed. =NEEC1514

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator. NEEC1514S01

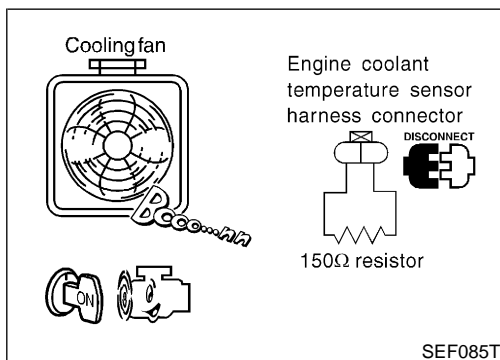
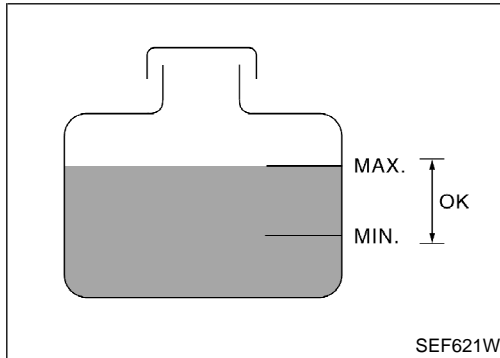
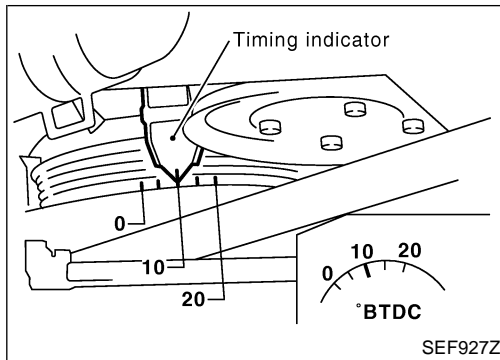
Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-944.
 - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to **MA-27**, “Changing Engine Coolant”.
- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**, “Anti-freeze Coolant Mixture Ratio”.
 - b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-944.
 3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to “Diagnostic Procedure”, EC-944. After repair, go to next step.
 4. Check for blocked coolant passage.
Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
If NG, go to step 4 of “Diagnostic Procedure”, EC-944. After repair, go to next step.
Be extremely careful not to touch any moving or adjacent parts.
 5. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
If NG, take appropriate action and then go to next step.
 6. Check ECT sensor for proper operation. Refer to step 5 of “Diagnostic Procedure”, EC-944. If NG, replace ECT sensor and go to next step.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)

VG33E

Overall Function Check (Cont'd)



7. Check ignition timing. Refer to "Basic Inspection", EC-715. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

⊗ WITHOUT CONSULT-II

NEEC1514S02

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to step 3 of "Diagnostic Procedure", EC-944.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to **MA-27**, "Changing Engine Coolant".

- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**, "Anti-freeze Coolant Mixture Ratio".
 - b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to "Diagnostic Procedure", EC-944.

3. Start engine and make sure that cooling fan (crankshaft driven) operates.

Be careful not to overheat engine.

If NG, go to step 9 of "Diagnostic Procedure", EC-944. After repair, go to next step.

4. Check for blocked coolant passage. Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.

If NG, go to step 4 of "Diagnostic Procedure", EC-944. After repair, go to next step.

Be extremely careful not to touch any moving or adjacent parts.

5. Check radiator for blocked air passage. Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.

Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.

If NG, take appropriate action and then go to next step.

6. Check ECT sensor for proper operation. Refer to step 5 of

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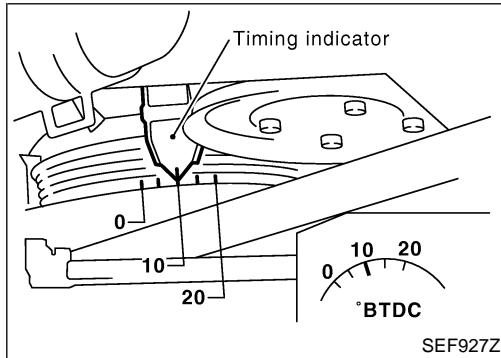
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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)

VG33E

Overall Function Check (Cont'd)

“Diagnostic Procedure”, EC-944. If NG, replace ECT sensor and go to next step.



7. Check ignition timing. Refer to “Basic Inspection”, EC-715. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NEEC1516

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-33 , “Cooling Fan”.

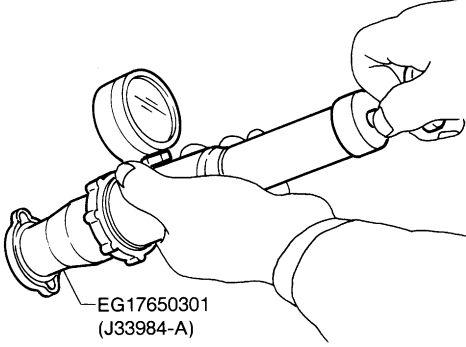
2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION:		
Higher than the specified pressure may cause radiator damage.		
Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak: <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to LC-29 , “Water Pump”.

SLC754A

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)

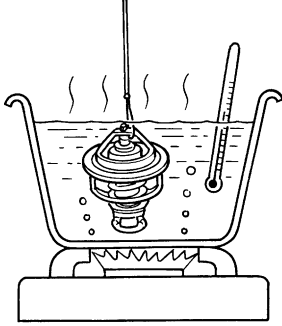
VG33E

Diagnostic Procedure (Cont'd)

3	CHECK RADIATOR CAP		
Apply pressure to cap with a tester and check radiator cap relief pressure.			
			
<p style="color: blue;">Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p>			
SLC755A			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Replace radiator cap.	

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4	CHECK THERMOSTAT		
<ol style="list-style-type: none"> 1. Check valve seating condition at normal room temperatures. It should seat tightly. 2. Check valve opening temperature and valve lift. 			
			
<p style="color: blue;">Valve opening temperature: 82°C (180°F) [standard]</p> <p style="color: blue;">Valve lift: More than 10 mm/95°C (0.31 in/203°F)</p>			
<ol style="list-style-type: none"> 3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-30, "Thermostat". 			
SLC343			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	Replace thermostat.	

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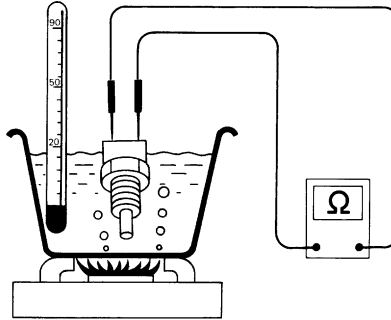
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

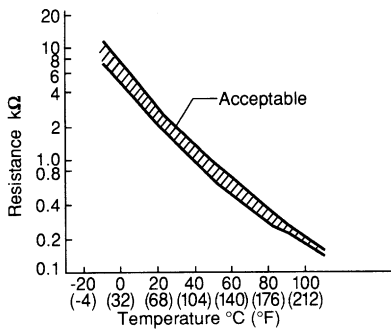
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0229

SEF012P

OK or NG

OK ▶ GO TO 6.

NG ▶ Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-947.

▶ **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION (WITHOUT ELECTRIC COOLING FAN)

VG33E

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC1517

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-27 , "Changing Engine Coolant".
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-25 , "System Check".
ON*2	5	● Coolant leaks	● Visual	No leaks	See LC-25 , "System Check".
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-30 , "Thermostat" and LC-32 , "Radiator".
ON*1	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	See LC-33 , "Cooling Fan".
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-27 , "Changing Engine Coolant".
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-27 , "ENGINE MAINTENANCE".
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-96 , "Inspection".
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-116 , "Inspection".

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-35**, "OVERHEATING CAUSE ANALYSIS".

On Board Diagnosis Logic

NEEC0708

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
 On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
 When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
 When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
 For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
 A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

POSSIBLE CAUSE

NEEC0708S01

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1 (front)
- Incorrect distributor rotor

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
	B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NEEC0709

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-949.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NEEC0710

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

3 | PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

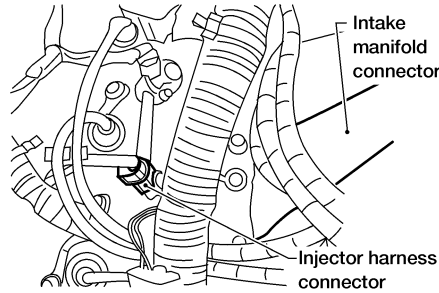
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



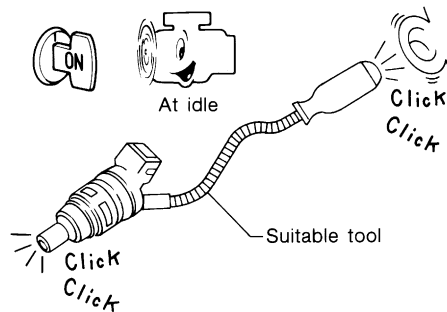
AEC646A

Yes or No

- | | | |
|-----|---|----------|
| Yes | ▶ | GO TO 4. |
| No | ▶ | GO TO 7. |

4 | CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

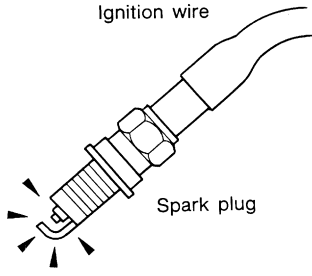
Yes or No

- | | | |
|-----|---|---|
| Yes | ▶ | GO TO 5. |
| No | ▶ | Check injector(s) and circuit(s). Refer to EC-1190. |

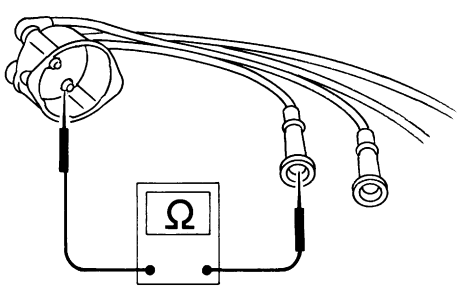
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

5	CHECK IGNITION SPARK	
<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. 		
		
SEF282G		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

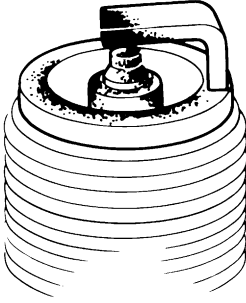
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6	CHECK IGNITION WIRES															
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 																
																
SEF174P																
Resistance:																
<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Cylinder No.</th> <th style="text-align: center;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Approximately 6.5</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Approximately 10.0</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Approximately 12.5</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">Approximately 11.0</td> </tr> </tbody> </table>			Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]															
1	Approximately 6.5															
2	Approximately 10.0															
3	Approximately 8.5															
4	Approximately 12.5															
5	Approximately 8.5															
6	Approximately 11.0															
MTBL0235																
If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.																
OK or NG																
OK	▶	Check the following: <ul style="list-style-type: none"> ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1183.														
NG	▶	Replace.														

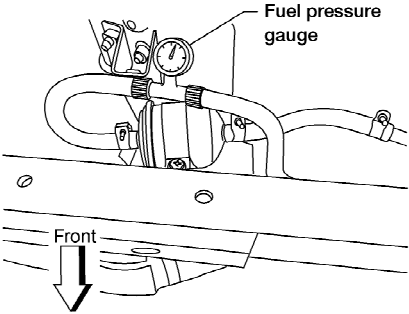
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.		
		
SEF156I		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-32 , "ENGINE MAINTENANCE".

8	CHECK COMPRESSION PRESSURE	
Refer to EM-78 .		
<ul style="list-style-type: none"> ● Check compression pressure. <ul style="list-style-type: none"> Standard: 1,196 kPa (12.2 kg/cm², 173 psi)/300 rpm Minimum: 883 kPa (9.0 kg/cm², 128 psi)/300 rpm Difference between each cylinder: 98 kPa (1.0 kg/cm², 14 psi)/300 rpm 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE	
<ol style="list-style-type: none"> 1. Install any parts removed. 2. Release fuel pressure to zero. Refer to EC-658. 3. Install fuel pressure gauge and check fuel pressure. 		
		
AEC064B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1198.) ● Fuel pressure regulator (Refer to EC-659.) ● Fuel lines (Refer to MA-29, "ENGINE MAINTENANCE".) ● Fuel filter for clogging 	
	Repair or replace.

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11	CHECK IGNITION TIMING										
<p>Check the following items. Refer to "Basic Inspection", EC-715.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II)	GO TO 12.										
OK (Without CONSULT-II)	GO TO 13.										
NG	Adjust ignition timing.										

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

12 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

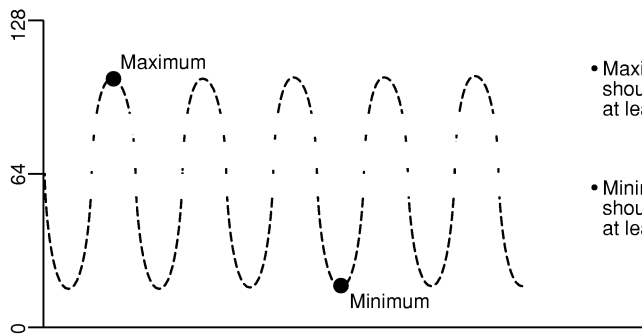
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>50: Bank 1 51: Bank 2</p> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 14.



14	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 (rear) harness protector color. 	
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>	
SEF372Z	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

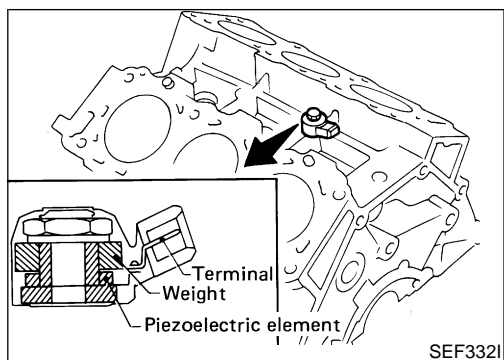
Diagnostic Procedure (Cont'd)

15	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p>		
<p> With GST Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p>		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-760.

16	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-731. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-687.		
	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
(The knock sensor circuit is open or shorted.)
- Knock sensor

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

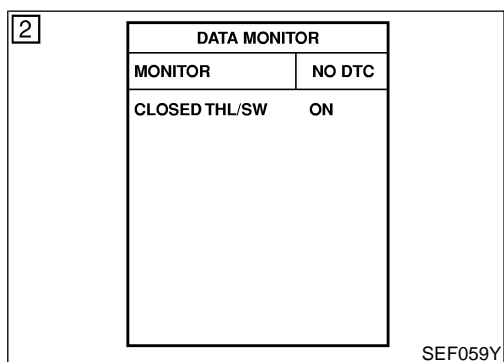
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

① With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-959.

② With GST

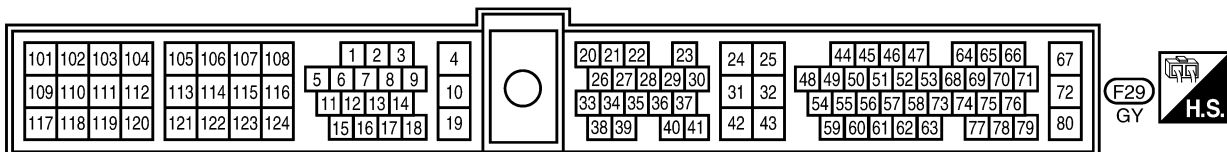
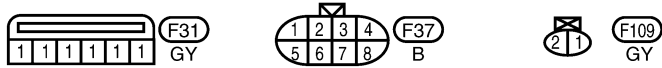
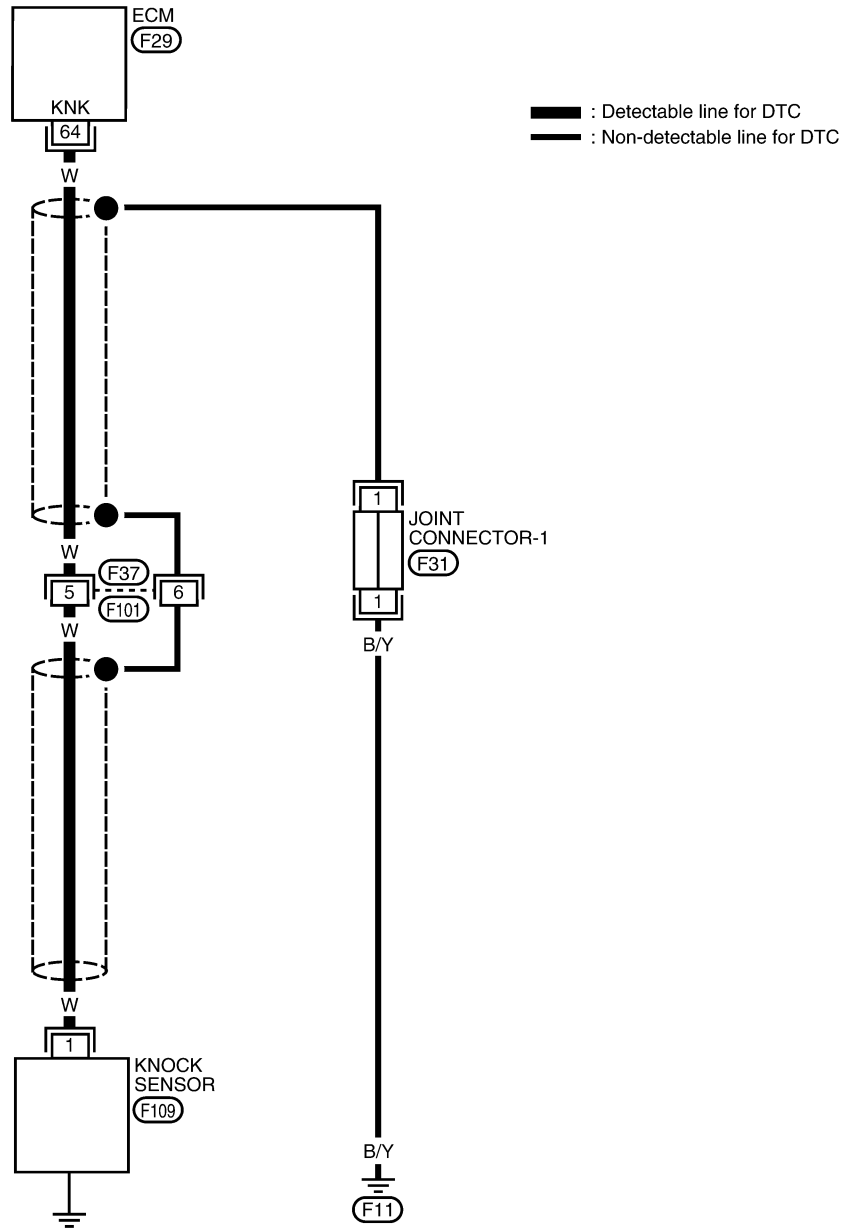
Follow the procedure "With CONSULT-II".



Wiring Diagram

NEEC0715

EC-KS-01



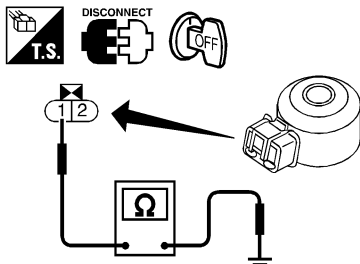
Diagnostic Procedure

NEEC0716

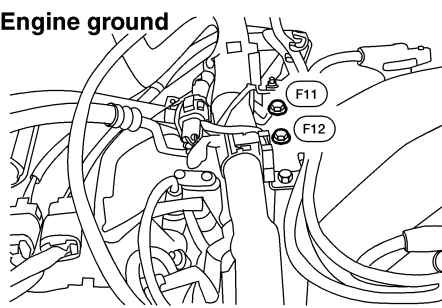
1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I	
	1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check resistance between ECM terminal 64 and engine ground. NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ. Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)] 4. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-II	
	1. Disconnect knock sensor harness connector. 2. Check harness continuity between ECM terminal 64 and knock sensor terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
	Check the following. <ul style="list-style-type: none"> ● Harness connector F37, F101 ● Harness for open or short between ECM and knock sensor 	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR	
	<ul style="list-style-type: none"> ● Use an ohmmeter which can measure more than 10 MΩ. 1. Disconnect knock sensor harness connector. 2. Check resistance between terminal 1 and ground. <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> </div> </div> <p>CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

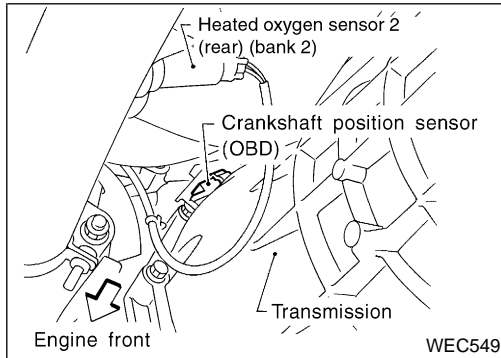
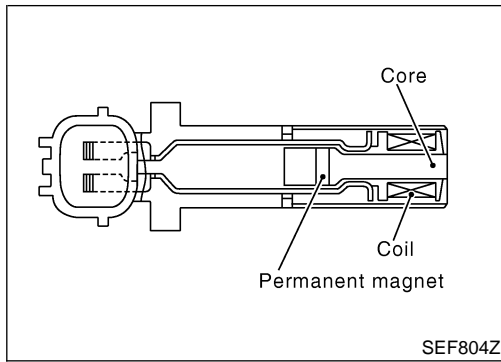
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5	RETIGHTEN GROUND SCREWS
Loose and retighten engine ground screws.	
 <p style="text-align: center;">Engine ground</p>	
LEC518	
▶ GO TO 6.	

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect harness connectors F37, F101. 2. Check harness continuity between harness connector F37 terminal 6 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Joint connectors-1 ● Harness for open between harness connector F37 and engine ground 	
▶ Repair open circuit or short to power in harness or connectors.	

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶ INSPECTION END	



Component Description

NEEC0717

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system. It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NEEC0718

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

AT

TF

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V (AC range)</p> <p>SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p> <p>SEF691W</p>

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On Board Diagnosis Logic

Malfunction is detected when the proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. NEEC0719

POSSIBLE CAUSE

- Harness or connectors
[The crankshaft position sensor (OBD) circuit is open.]
- Crankshaft position sensor (OBD)

NEEC0719S01

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0720

With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and run it for at least 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-964.

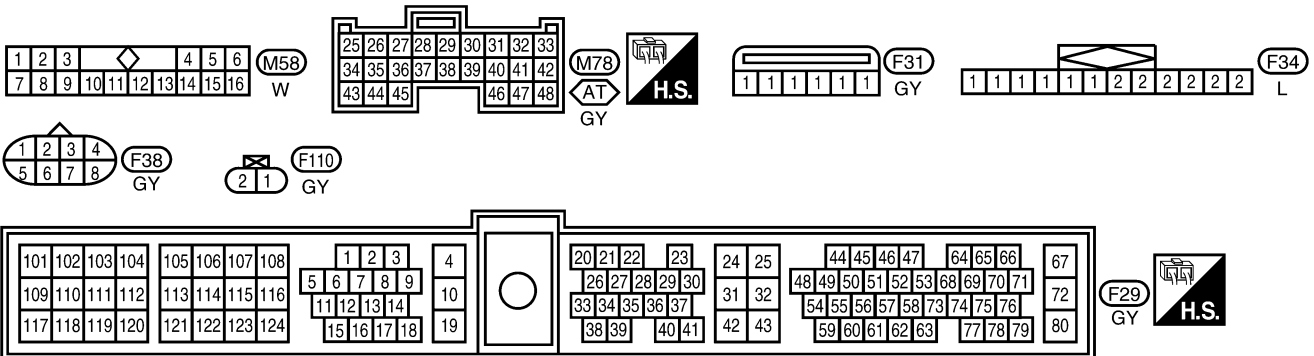
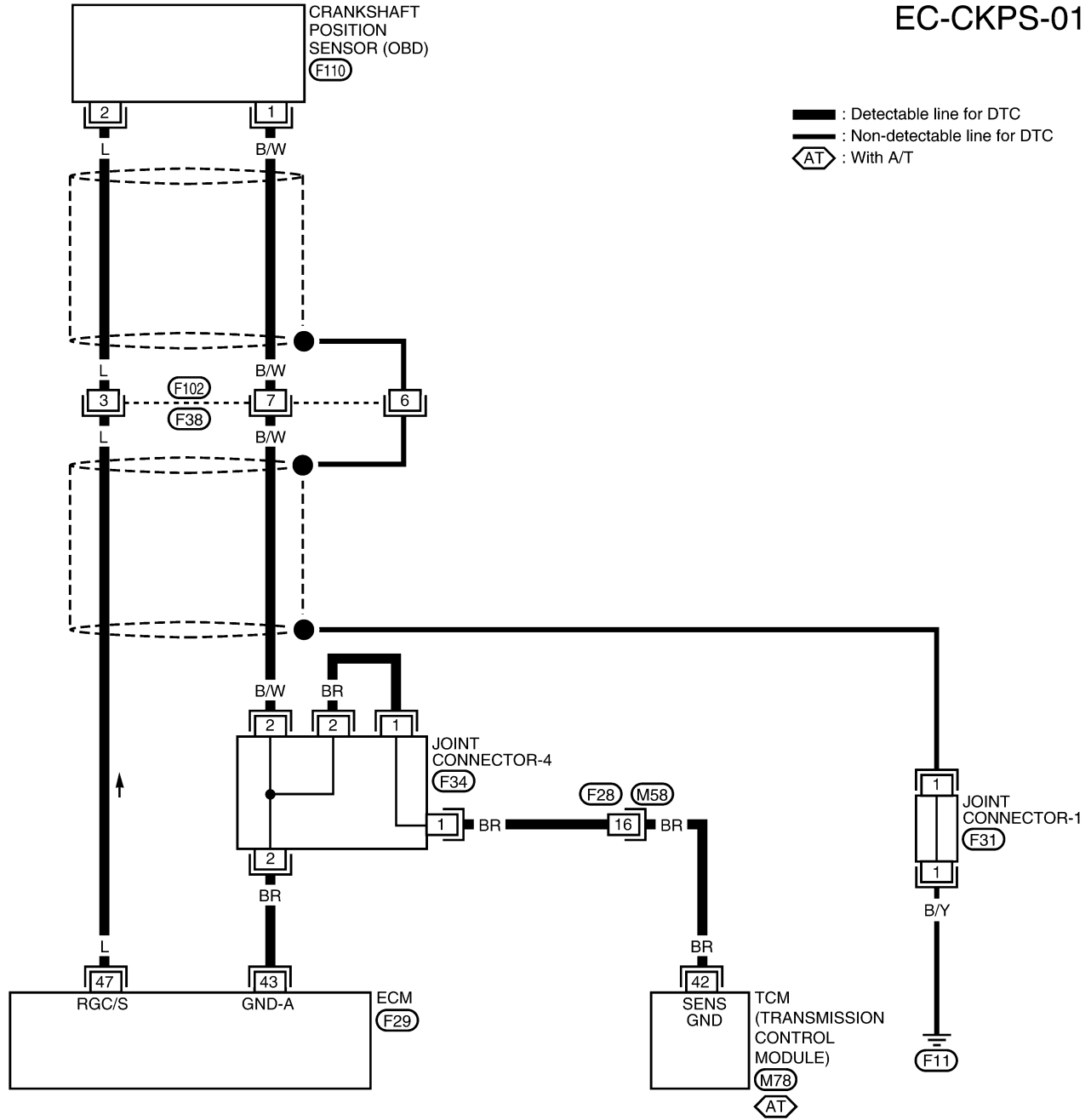
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NEEC0721

EC-CKPS-01

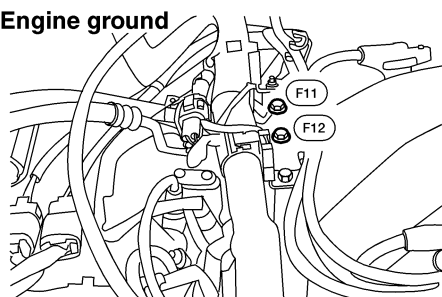


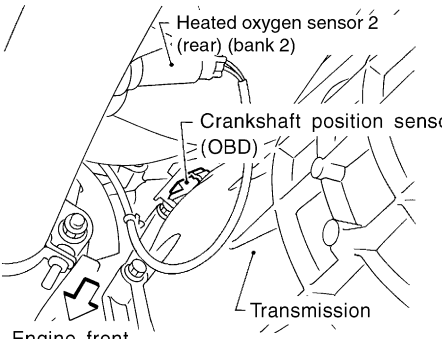
WEC799

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Diagnostic Procedure

NEEC0722

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="text-align: center;">Engine ground</p>	
<small>LEC518</small>	
▶ GO TO 2.	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors. 	
	
<small>WEC549</small>	
<ol style="list-style-type: none"> 2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

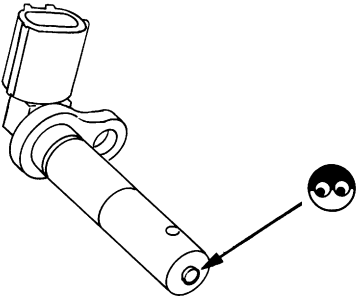
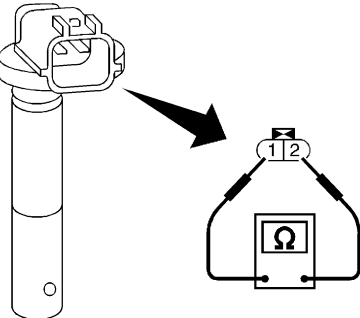
3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) VG33E

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Reconnect ECM harness connector. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between crankshaft position sensor (OBD) and ECM ● Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission Control Module) 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 		
		
<p>5. Check resistance as shown in the figure.</p>		
		
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

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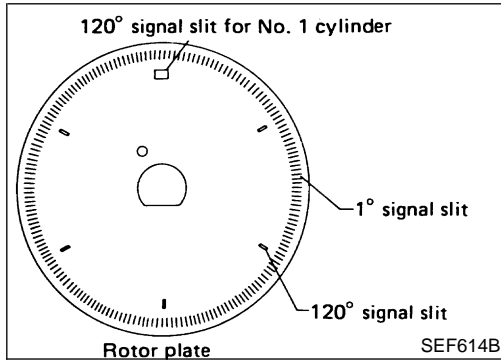
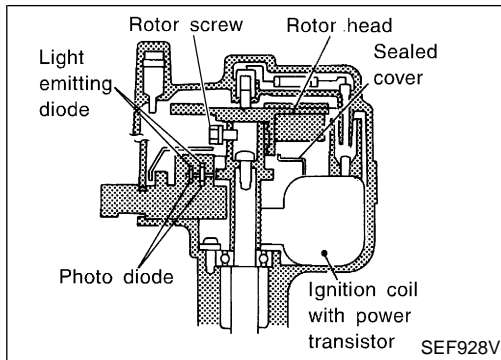
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) VG33E

Diagnostic Procedure (Cont'd)

7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT		
1. Disconnect harness connectors F38, F102.			
2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Refer to Wiring Diagram. Continuity should exist.			
3. Also check harness for short to power.			
OK or NG			
OK	▶	GO TO 9.	
NG	▶	GO TO 8.	

8	DETECT MALFUNCTIONING PART		
Check the following.			
<ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-1● Harness for open between harness connector F38 and engine ground			
	▶	Repair open circuit or short to power in harness or connectors.	

9	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.			
	▶	INSPECTION END	



Component Description

NEEC0723

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: **3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)**

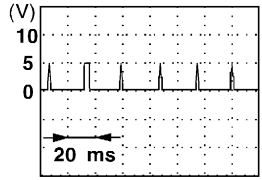
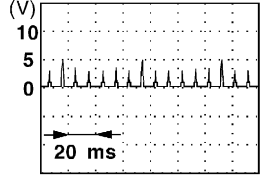
ECM Terminals and Reference Value

NEEC0724

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

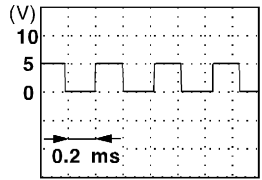
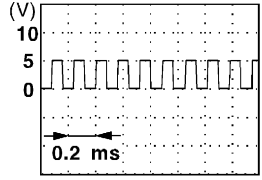
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V 
48	PU		[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V 

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

VG33E

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 2.5V  SEF999U
			[Engine is running] <ul style="list-style-type: none"> • Engine speed is 2,000 rpm 	Approximately 2.5V  SEF001V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> • Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0725

Malfunction is detected when

(Malfunction A) either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking,

(Malfunction B) either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed,

(Malfunction C) the relation between 1° and 120° signal is not in the normal range during the specified engine speed.

POSSIBLE CAUSE

NEEC0725S01

- Harness or connectors
(The camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Starter motor (Refer to **SC-10**.)
- Starting system circuit (Refer to **SC-10**.)
- Dead (Weak) battery

DTC Confirmation Procedure

NEEC0726

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

NEEC0726S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-971.

With GST

Follow the procedure “With CONSULT-II”.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NEEC0726S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-971.

With GST

Follow the procedure “With CONSULT-II”.

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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

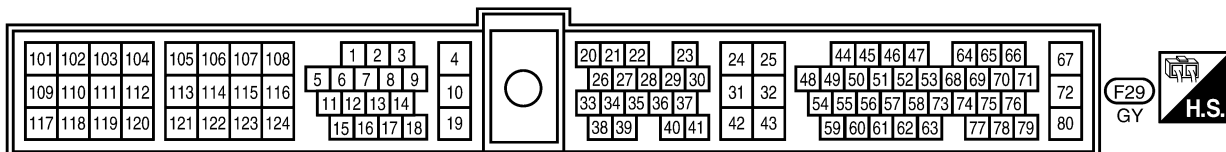
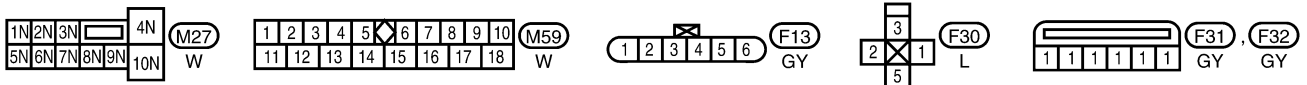
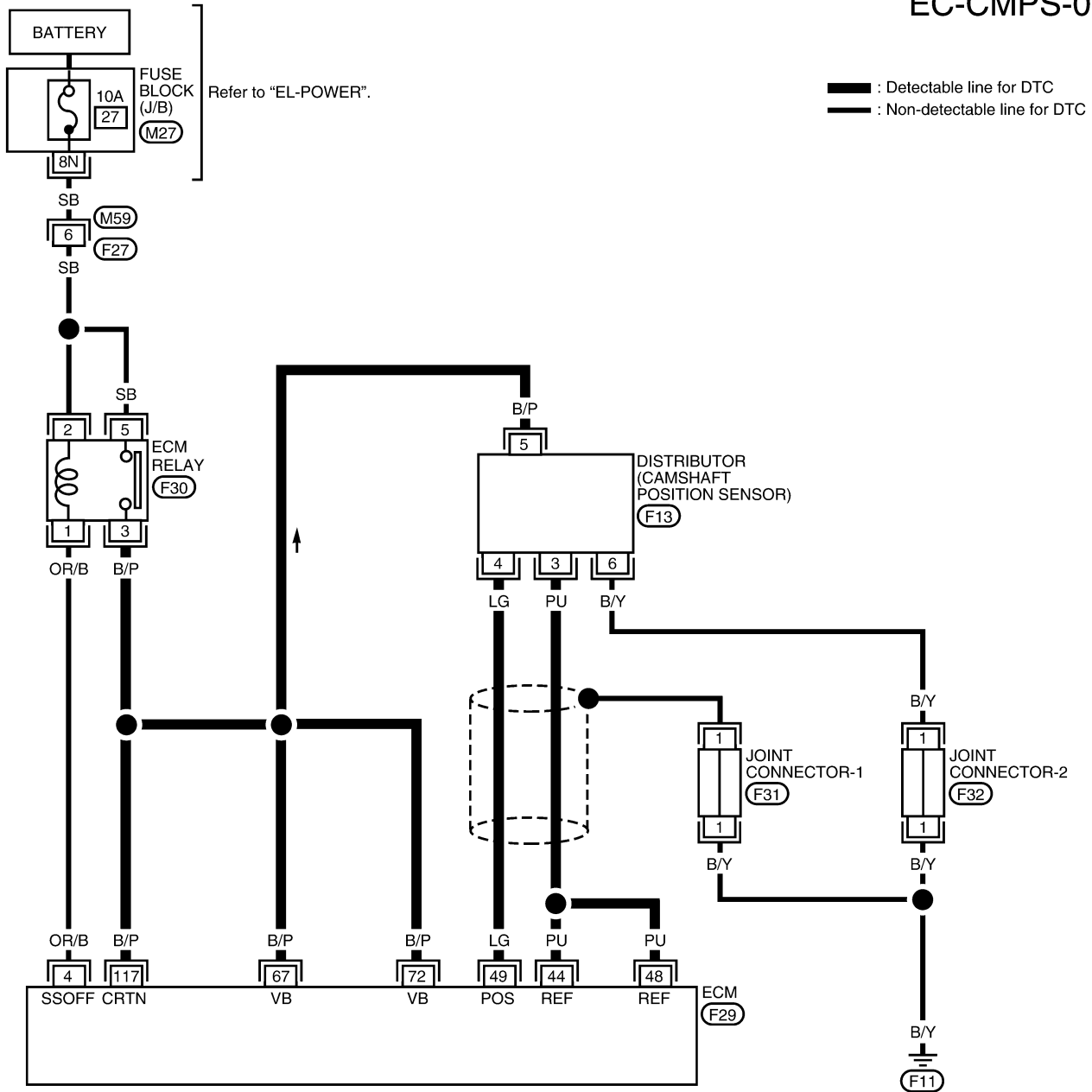
VG33E

Wiring Diagram

Wiring Diagram

NEEC0727

EC-CMPS-01

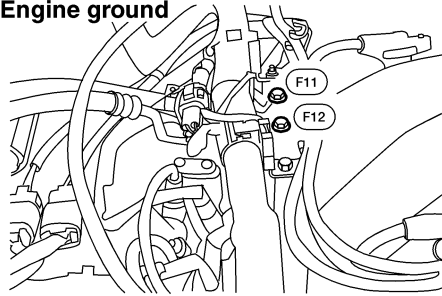


WEC800

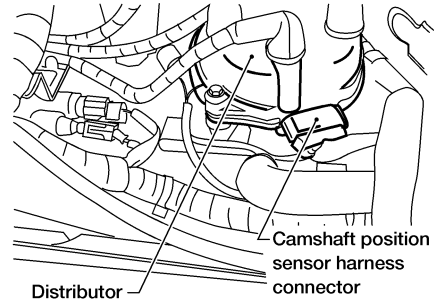
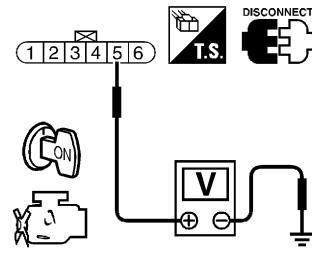
EC-970

Diagnostic Procedure

NEEC0728

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;"><small>LEC518</small></p>	
▶ GO TO 2.	

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2	CHECK CMPS POWER SUPPLY CIRCUIT						
<p>1. Disconnect camshaft position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;"><small>AEC647A</small></p> <p>2. Turn ignition switch ON. 3. Check voltage between terminal 5 and ground with CONSULT or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div> <p style="text-align: right;"><small>SEF708U</small></p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

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3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between camshaft position sensor and ECM relay ● Harness for open or short between camshaft position sensor and ECM 	
▶ Repair harness or connectors.	

SC
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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

VG33E

Diagnostic Procedure (Cont'd)

4		CHECK CMPS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5		CHECK CMPS GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 6 and engine ground. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6		DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Joint connector-2● Harness for open between camshaft position sensor and engine ground		
	▶	Repair open circuit or short to power in harness or connector.

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7	CHECK CAMSHAFT POSITION SENSOR							
1. Install any parts removed. 2. Start engine. 3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.								
Terminal 44 or 48 and engine ground								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Condition</td> <td style="width: 25%;">Idle</td> <td style="width: 25%;">2,000 rpm</td> </tr> <tr> <td>Voltage</td> <td>0.3 - 0.5V</td> <td>0.3 - 0.5V</td> </tr> </table>	Condition	Idle	2,000 rpm	Voltage	0.3 - 0.5V	0.3 - 0.5V	
Condition	Idle	2,000 rpm						
Voltage	0.3 - 0.5V	0.3 - 0.5V						
Pulse signal								
Terminal 49 and engine ground								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Condition</td> <td style="width: 25%;">Idle</td> <td style="width: 25%;">2,000 rpm</td> </tr> <tr> <td>Voltage</td> <td>Approximately 2.5V</td> <td>Approximately 2.5V</td> </tr> </table>	Condition	Idle	2,000 rpm	Voltage	Approximately 2.5V	Approximately 2.5V	
Condition	Idle	2,000 rpm						
Voltage	Approximately 2.5V	Approximately 2.5V						
Pulse signal								
AEC072B								
OK or NG								
OK	▶	GO TO 8.						
NG	▶	Replace distributor assembly with camshaft position sensor.						

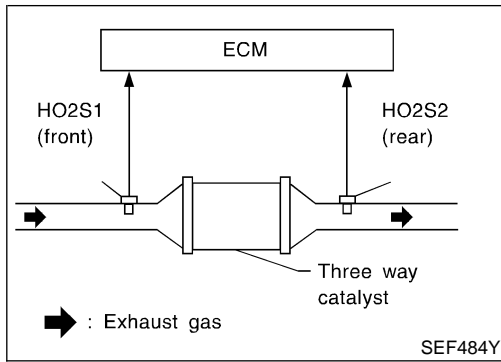
8	CHECK CMPS SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector-1. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNES LAYOUT".) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector-1.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33E

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC0740

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 (front) and 2 (rear) approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

POSSIBLE CAUSE

NEEC0740S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NEEC0741

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

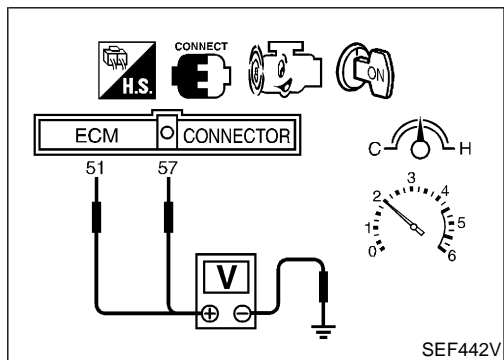
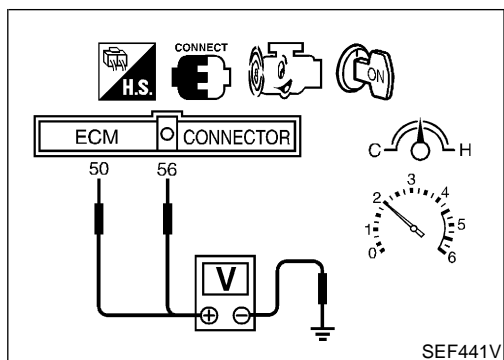
TESTING CONDITION

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**
 - 1) Turn ignition switch ON.
 - 2) Select "DTC & SRT CONFIRMATION" the SRT WORK SUPPORT" mode with CONSULT-II.
 - 3) Start engine.
 - 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
 - 5) Wait 5 seconds at idle.
 - 6) Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minute.).
 - 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-976. If not "CMPLT", stop engine and cool down "COOLANT TEMP/S" to less than 70°C (158°F) and retest from step 1).

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33E

Overall Function Check



Overall Function Check

NEEC0742

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 [heated oxygen sensor 1 (front) (bank 1) signal], 51 [heated oxygen sensor 1 (front) (bank 2) signal] and engine ground, and ECM terminals 56 [heated oxygen sensor 2 (rear) (bank 1) signal], 57 [heated oxygen sensor 2 (rear) (bank 2) signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 (rear) voltage switching frequency

B: Heated oxygen sensor 1 (front) voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-976.

NOTE:

If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-828.)

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DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

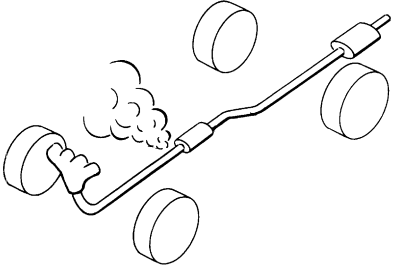
VG33E

Diagnostic Procedure

Diagnostic Procedure

=NEEC0743

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

2	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.</p>		
		
SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

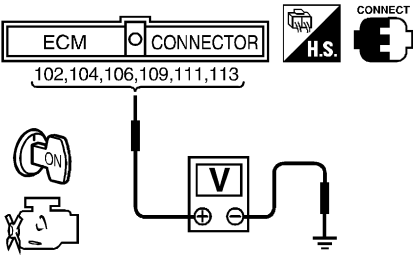
3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

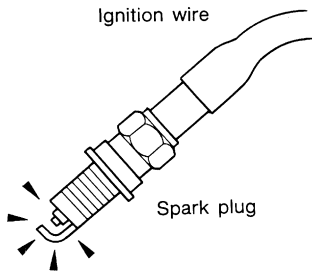
4	CHECK IGNITION TIMING											
Check the following items. Refer to "Basic Inspection", EC-715.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33E

Diagnostic Procedure (Cont'd)

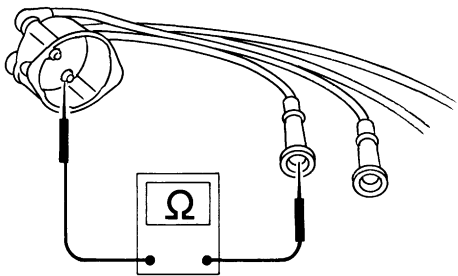
5	CHECK INJECTORS	<ol style="list-style-type: none"> 1. Refer to WIRING DIAGRAM for Injectors, EC-1190. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester. <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; margin-left: 20px;">Battery voltage should exist.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC EC
OK	▶	GO TO 6.	FE
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1191.	CL

6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 8.	ST
NG	▶	GO TO 7.	RS

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK IGNITION WIRES															
<p>1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.</p>																
																
<p>Resistance:</p>																
SEF174P																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Cylinder No.</th> <th style="padding: 5px;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">Approximately 6.5</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">Approximately 10.0</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">Approximately 12.5</td> </tr> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center; padding: 5px;">6</td> <td style="text-align: center; padding: 5px;">Approximately 11.0</td> </tr> </tbody> </table>			Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]															
1	Approximately 6.5															
2	Approximately 10.0															
3	Approximately 8.5															
4	Approximately 12.5															
5	Approximately 8.5															
6	Approximately 11.0															
MTBL0235																
<p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p>																
OK or NG																
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1183.														
NG	▶	Replace.														

8	CHECK INJECTOR	
<p>1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-659. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch ON. Make sure fuel does not drip from injector.</p>		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
Trouble is fixed	▶	INSPECTION END
Trouble is not fixed	▶	Replace warm-up three way catalyst.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0744

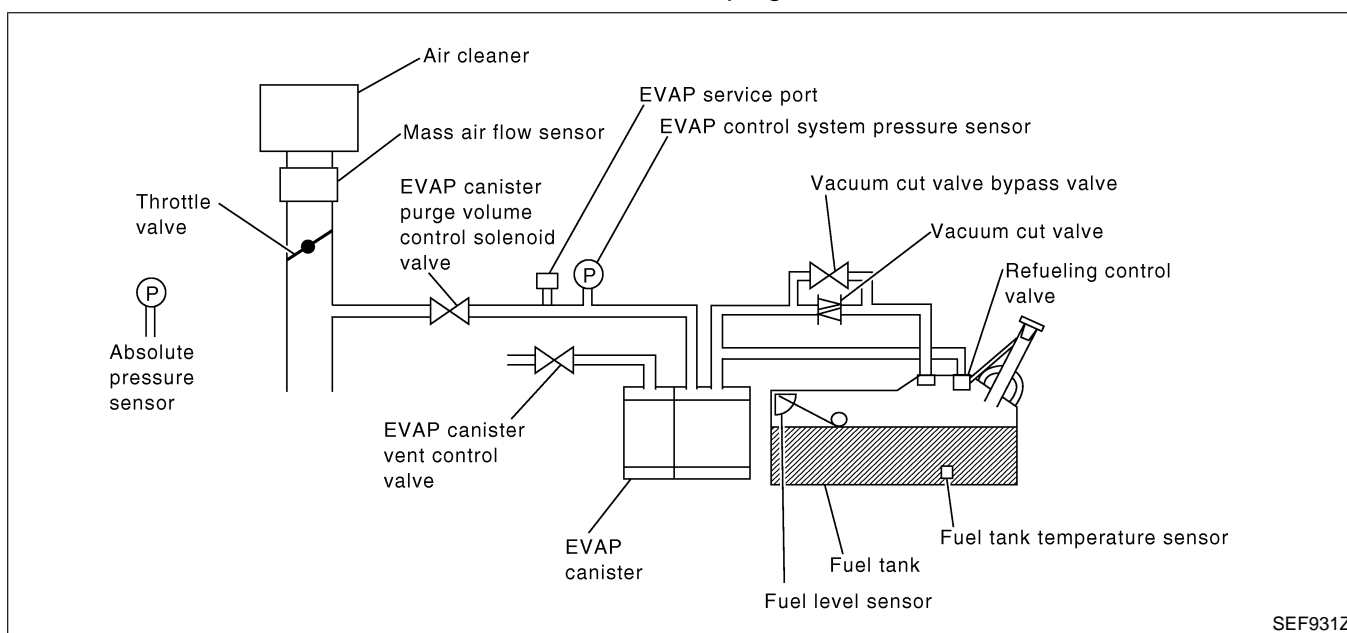
NOTE:

If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1144.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC0744S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.

EC-979

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit.
- Refueling EVAP vapor cut
- ORVR system leaks

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

On Board Diagnosis Logic (Cont'd)

NEEC0745

5

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
-FUEL LEVEL: 1/4-3/4
-AMBIENT TEMP: 0-30 C(32-86F)
-OPEN ENGINE HOOD.
2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
3)TOUCH START.

SEF565X

5

EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)

1600 rpm 1850 rpm 2100 rpm

SEF874X

5

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NOTE:

- If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1144.)
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 4) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-715.

- 6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-982.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Ⓜ With GST

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-681 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to "Driving Pattern", EC-681.
- 3) Stop vehicle.
- 4) Select "MODE 1" with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the "Driving Pattern", EC-681.
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-982.
 - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1135.
 - If P0440 and P1447 are not displayed on the screen, go to the following step.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

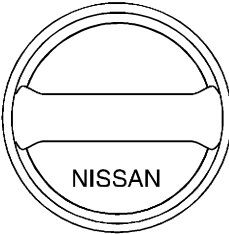
VG33E

DTC Confirmation Procedure (Cont'd)

- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NEEC0967

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

SEF915U

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE	
Refer to "Evaporative Emission System", EC-640.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

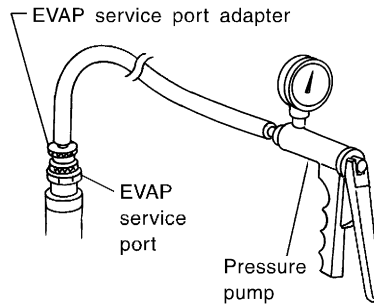
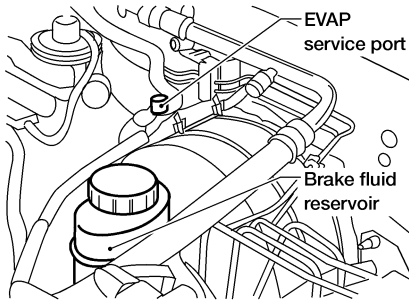
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A

SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶	GO TO 6.
Models without CONSULT-II	▶	GO TO 7.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

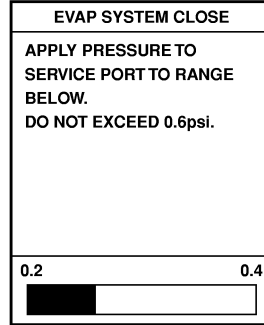
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

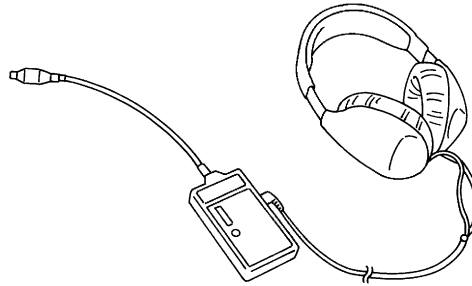
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

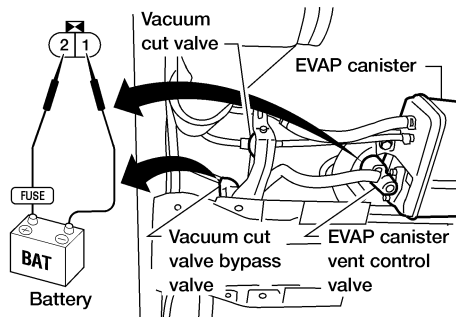
VG33E

Diagnostic Procedure (Cont'd)

7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

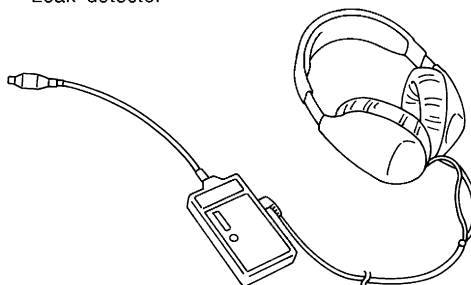
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

Leak detector



SEF200U

OK or NG

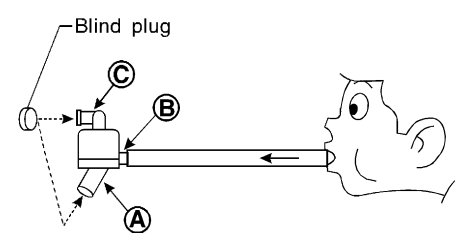
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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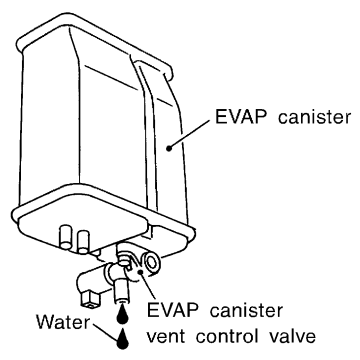
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
 <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-1002.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 		
 <p style="text-align: center;">Water EVAP canister vent control valve</p>		
Yes or No		
Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

SEF596U

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
		▶ Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-634.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

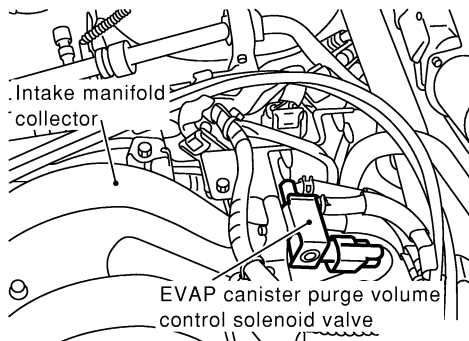
VG33E

Diagnostic Procedure (Cont'd)

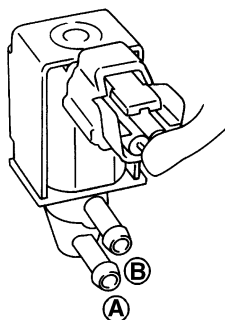
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

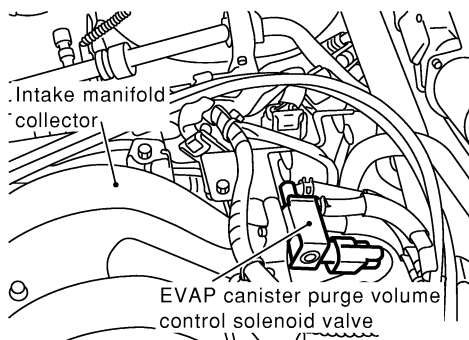


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

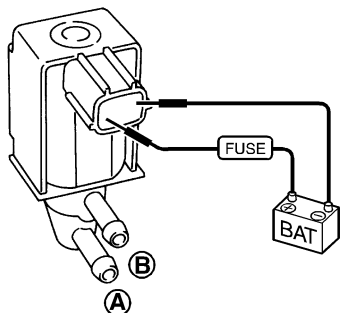
SEF334X

ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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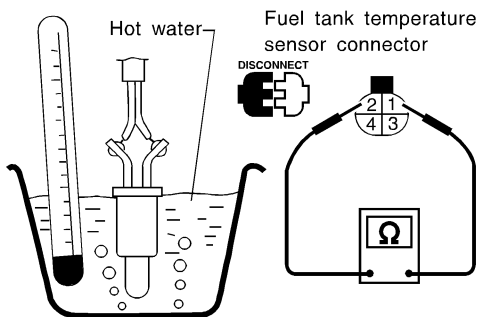
EL

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

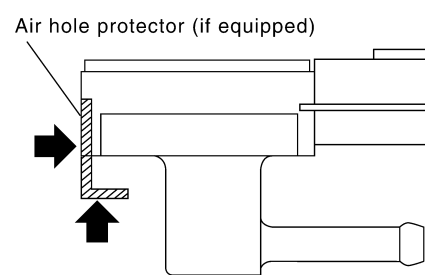
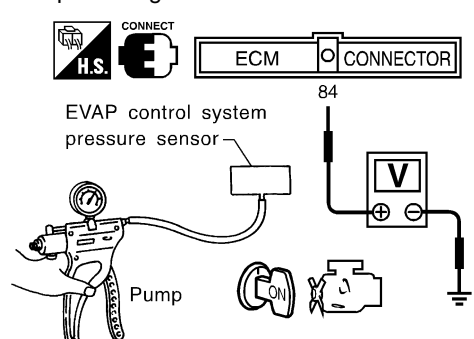
Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR						
<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.</p>							
							
<table border="1" style="border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ						
20 (68)	2.3 - 2.7						
50 (122)	0.79 - 0.90						
SEF974Y							
OK or NG							
OK	▶ GO TO 19.						
NG	▶ Replace fuel tank temperature sensor.						

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. <div style="text-align: center;">  <p style="text-align: center;">Never apply force.</p> </div> <p style="text-align: right;">SEF799W</p> <p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure. <p>5. Check input voltage between ECM terminal 84 and ground.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  <p style="text-align: center;">SEF342X</p> </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pressure (Relative to atmospheric pressure)</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 kPa (0 mmHg, 0 inHg)</td> <td style="text-align: center;">3.0 - 3.6</td> </tr> <tr> <td style="text-align: center;">-9.3 kPa (-70 mmHg, -2.76 inHg)</td> <td style="text-align: center;">0.4 - 0.6</td> </tr> </tbody> </table> </div> </div> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. <p style="text-align: center;">OK or NG</p>	Pressure (Relative to atmospheric pressure)	Voltage V	0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6	-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6
Pressure (Relative to atmospheric pressure)	Voltage V							
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6							
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6							
OK	▶	GO TO 20.						
NG	▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-640.</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE	<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p>
	▶	GO TO 22.

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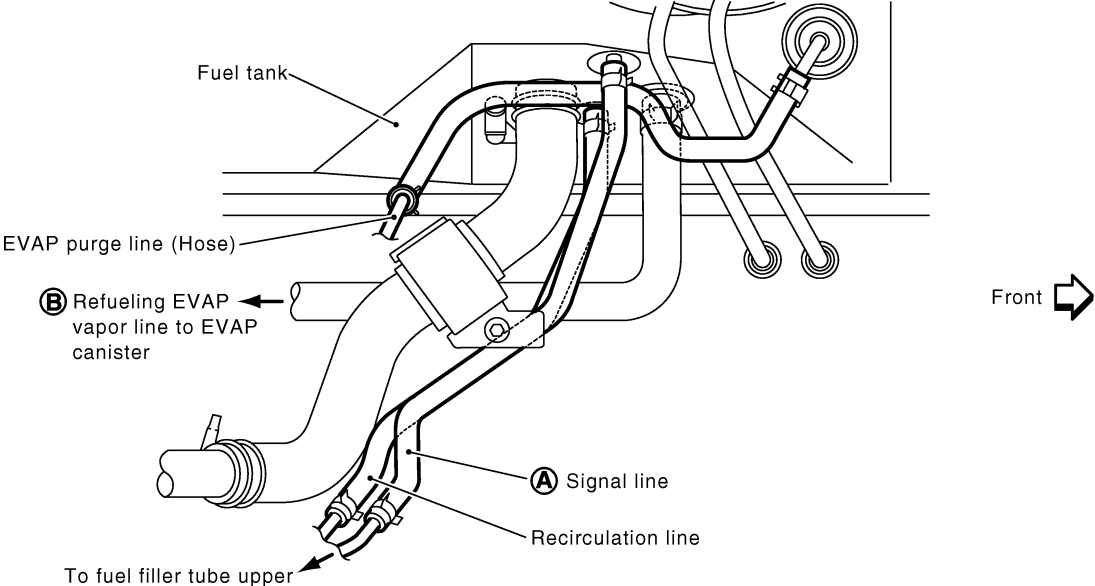
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

22	CHECK REFUELING EVAP VAPOR LINE
<p>Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-646.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 23.
NG	▶ Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE
<p>Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 24.
NG	▶ Repair or replace hoses, tubes or filler neck tube.

24	CHECK REFUELING CONTROL VALVE
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	
	
OK or NG	
OK	▶ GO TO 25.
NG	▶ Replace refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR
<p>Refer to EL-82, "Fuel Level Sensor Unit Check".</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 26.
NG	▶ Replace fuel level sensor unit.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33E

Diagnostic Procedure (Cont'd)

26	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33E

Description

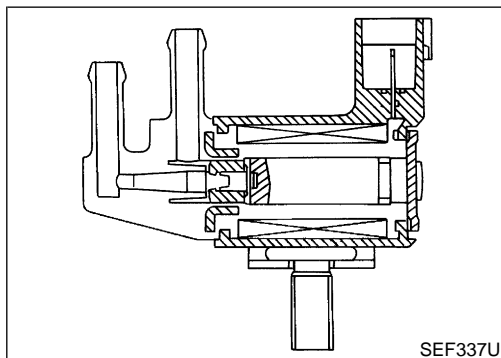
Description SYSTEM DESCRIPTION

NEEC0747

NEEC0747S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC0747S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0748

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
		2,000 rpm
		0%
		—

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33E

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NEEC0749

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V) SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V) SEF995U
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through the valve. =NEEC0750

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
 - EVAP canister purge volume control solenoid valve
- NEEC0750S01

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0751

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 13 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-998.

With GST

Follow the procedure "With CONSULT-II".

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

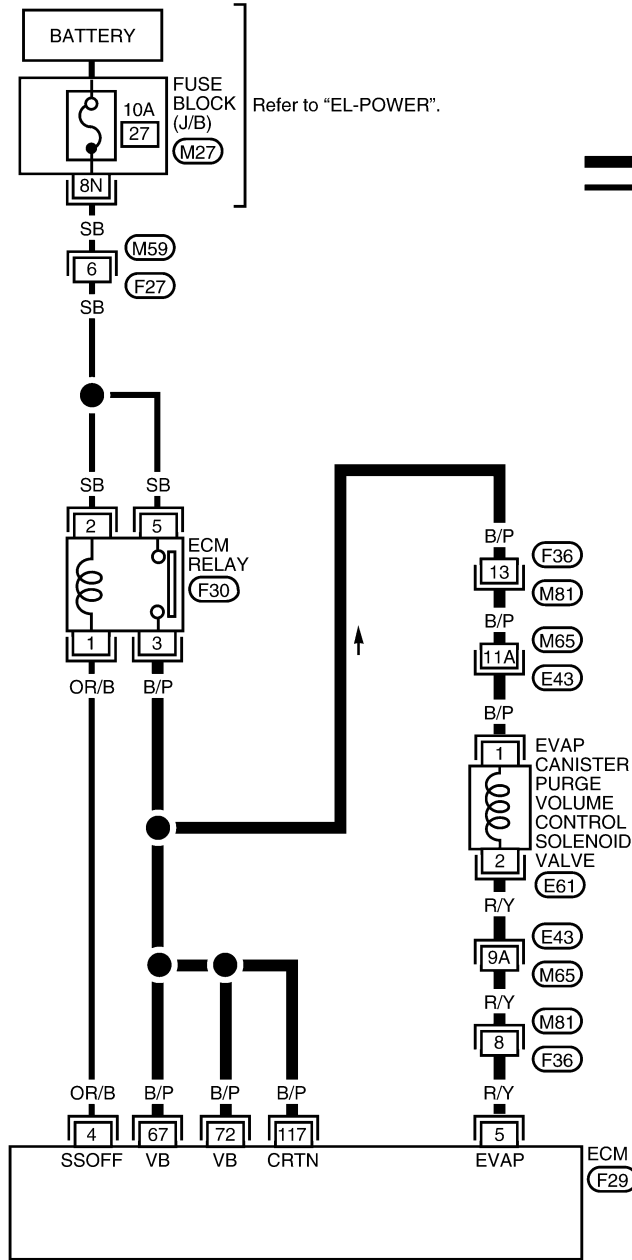
VG33E

Wiring Diagram

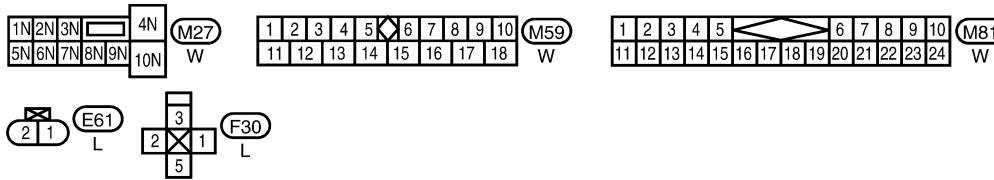
Wiring Diagram

NEEC0752

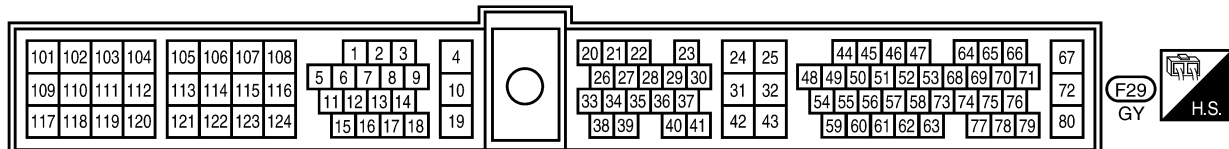
EC-PGC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65, E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC813

GI
 MA
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 FE
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 MT
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 TF
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 AX
 SU
 BR
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 RS
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 HA
 SC
 EL
 IDX

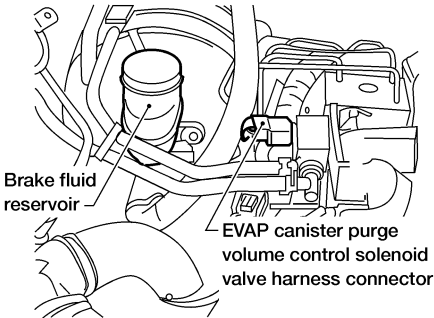
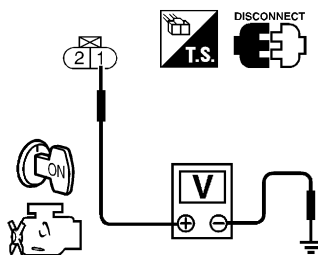
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0753

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M82, E74 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay 		
▶		Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 4.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">RICH</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK	GO TO 7.																				
NG	GO TO 6.																				

GI
 MA
 EM
 LC
EC
 FE
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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

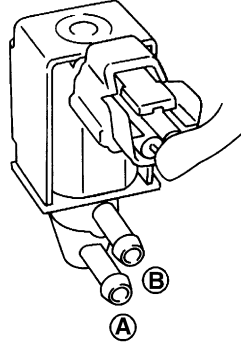
VG33E

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



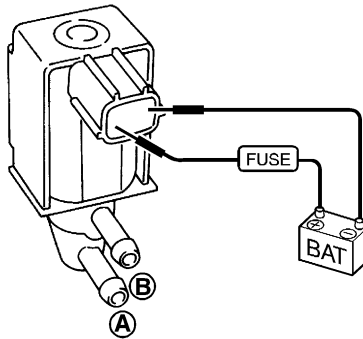
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7 CHECK INTERMITTENT INCIDENT

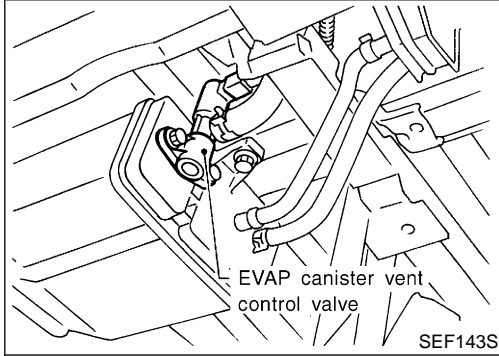
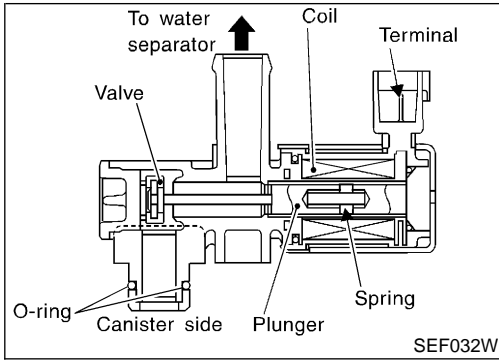
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

▶ **INSPECTION END**

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33E

Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC0754

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI
MA
EM
LC
EC

CONSULT-II Reference Value in Data Monitor Mode

NEEC0755

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

FE
CL
MT
AT

ECM Terminals and Reference Value

NEEC0756

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

AX
SU
BR
ST

RS
BT
HA
SC
EL

IDX

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve. =NEEC0757

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
- EVAP canister vent control valve

NEEC0757S01

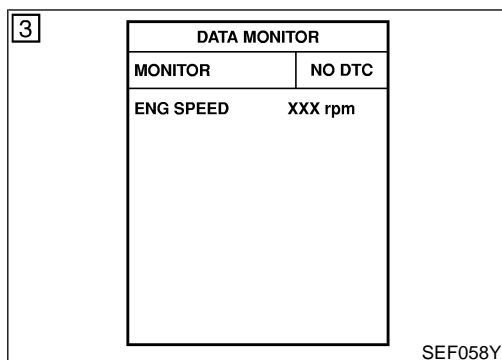
DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0758

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.



With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 8 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1004.

With GST

Follow the procedure "With CONSULT-II".

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

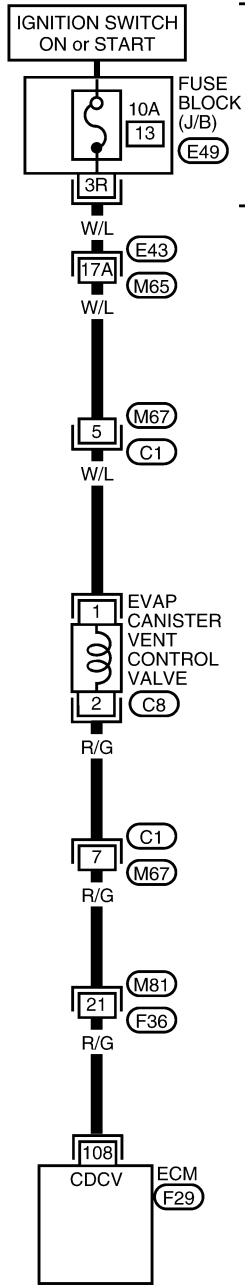
VG33E

Wiring Diagram

Wiring Diagram

NEEC0759

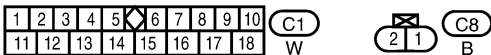
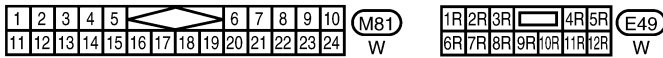
EC-VENT/V-01



Refer to "EL-POWER".

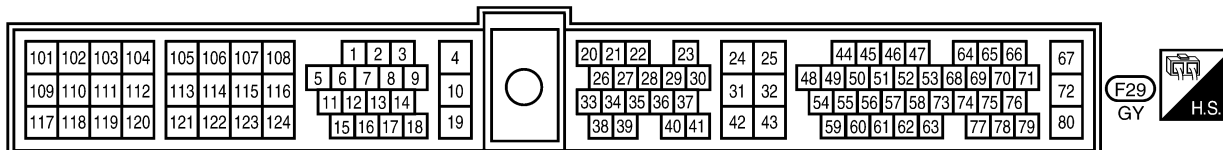
: Detectable line for DTC
 : Non-detectable line for DTC

GI
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PD
AX
SU
BR
ST



Refer to the following.

(M65), **(E43)** - SUPER MULTIPLE JUNCTION (SMJ)



LEC814

RS
BT
HA
SC
EL
IDX

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC1042

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

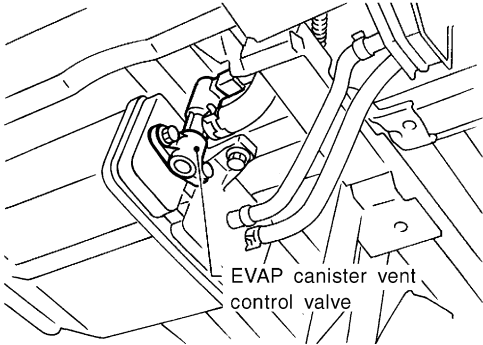
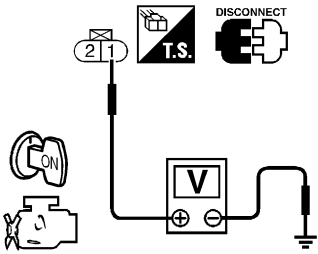
2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p>1. Turn ignition switch "OFF" and then turn "ON".</p> <p>2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>3. Touch "ON/OFF" on CONSULT-II screen.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 (B1)	XXX V																					
HO2S1 (B2)	XXX V																					
THRTL POS SEN	XXX V																					
<p>4. Check for operating sound of the valve. Clicking noise should be heard.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF989Y

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect EVAP canister vent control valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch "ON".</p> <p>4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>						
		<p>SEF143S</p> <p>SEF648W</p>							
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	GO TO 4.	<p>PD</p>
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M67, C1 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between EVAP canister vent control valve and fuse <p style="text-align: right;">▶ Repair harness or connectors.</p>	<p>AX</p> <p>SU</p> <p>BR</p>
----------	-----------------------------------	--	-------------------------------

5	CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 108 and valve terminal 2. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>RS</p> <p>BT</p> <p>HA</p>						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	GO TO 6.	<p>SC</p>
OK	▶	GO TO 7.							
NG	▶	GO TO 6.							

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33E

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE																								
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. Check air passage continuity and operation delay time. 																									
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 (B1)	XXX V																								
HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									

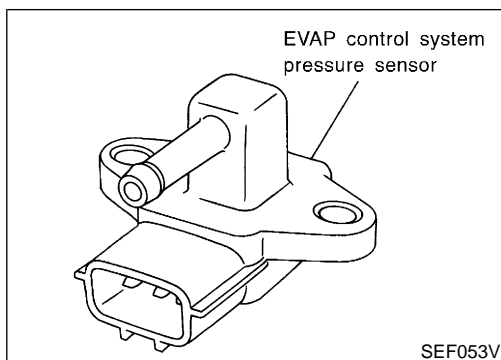
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> Check air passage continuity and operation delay time under the following conditions. 							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If portion B is rusted, replace control valve.</p> <p style="text-align: right;">5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p>
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
MTBL0240							
<p>Make sure new O-ring is installed properly.</p> <p style="text-align: center;">OK or NG</p>							
OK	GO TO 8.						
NG	Replace EVAP canister vent control valve.						

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	INSPECTION END

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

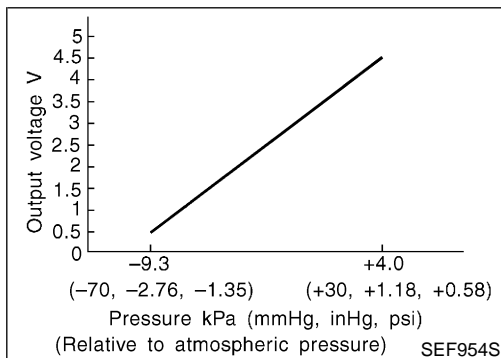
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NEEC0761



CONSULT-II Reference Value in Data Monitor Mode

NEEC0762

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NEEC0763

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM. =NEEC0764

POSSIBLE CAUSE

NEEC0764S01

- Harness or connectors
(The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NEEC0765

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

6	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	FUEL T/TMP SE	XXX °C

SEF194Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1010.

With GST

Follow the procedure "With CONSULT-II".

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

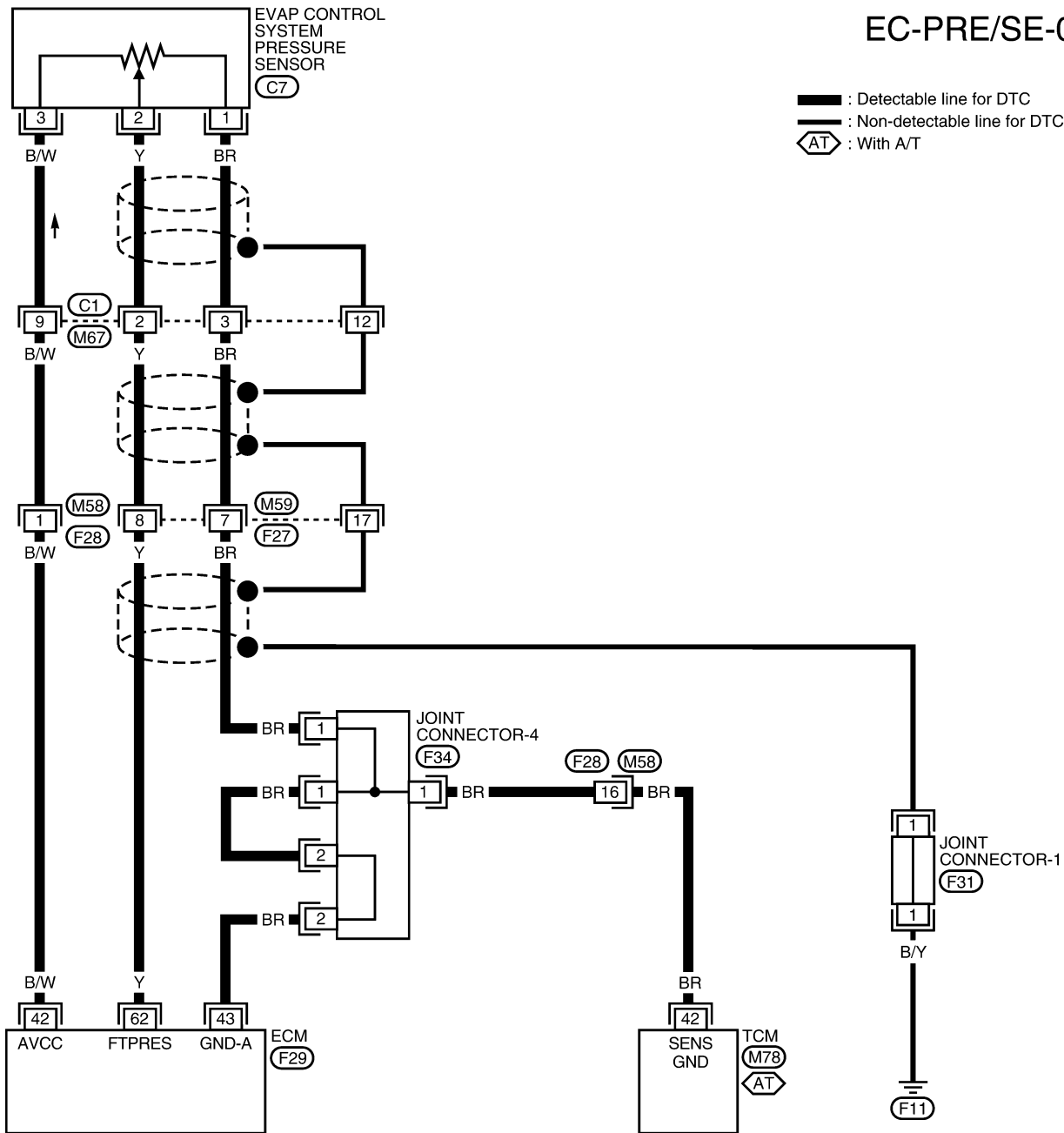
VG33E

Wiring Diagram

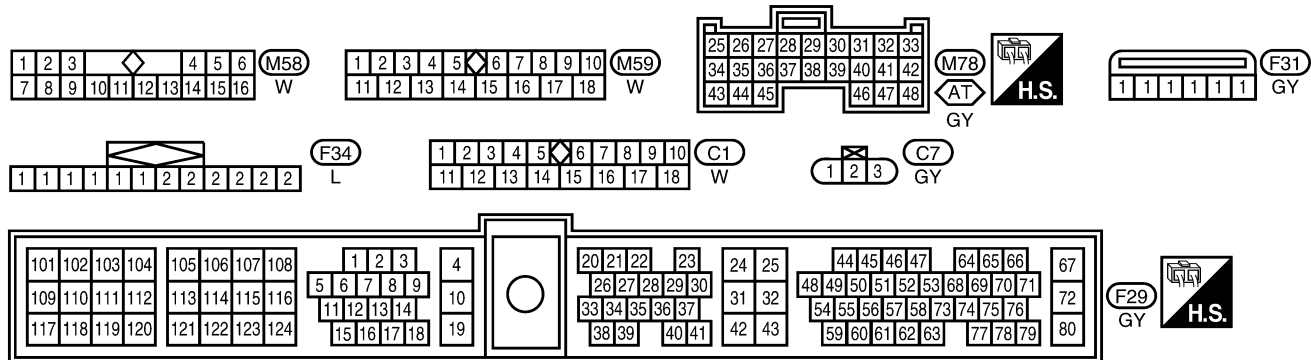
Wiring Diagram

NEEC0766

EC-PRE/SE-01



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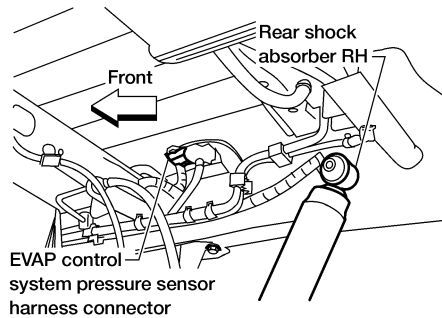
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

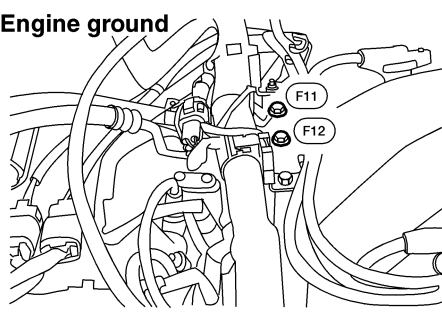
VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC1043

1	CHECK RUBBER TUBE		
<p>1. Turn ignition switch "OFF". 2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.</p>			
			
AEC651A			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Reconnect, repair or replace.	

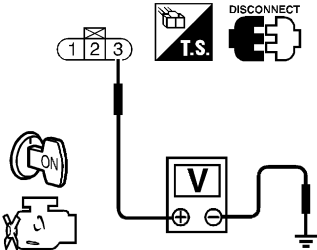
2	RETIGHTEN GROUND SCREWS		
<p>1. Loosen and retighten engine ground screws.</p>			
			
LEC518			
▶		GO TO 3.	

3	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector. 2. Check sensor harness connector for water. Water should not exist.</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Repair or replace harness connector.	

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "ON". 2. Check voltage between terminal 3 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Approximately 5V</p> <p>OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M58, F28 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶ Repair harness or connectors.		

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Joint connector-4 ● Harness for open or short between EVAP control system pressure sensor and ECM ● Harness for open or short between EVAP control system pressure sensor and TCM (Transmission Control Module) 		
▶ Repair open circuit or short to power in harness or connectors.		

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 62 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 10.
OK (Without CONSULT-II) ▶		GO TO 11.
NG ▶		GO TO 9.

9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>FR O2 MNTR-B1</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>FR O2 MNTR-B2</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	FR O2 MNTR-B1	RICH	FR O2 MNTR-B2	RICH	THRTL POS SEN	XXX V	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
FR O2 MNTR-B1	RICH																					
FR O2 MNTR-B2	RICH																					
THRTL POS SEN	XXX V																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
OK or NG																						
OK ▶		GO TO 12.																				
NG ▶		GO TO 11.																				

SEF068Y

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

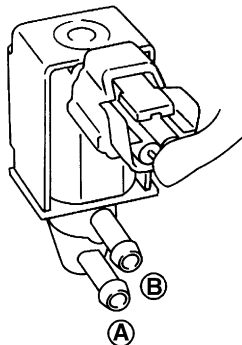
Diagnostic Procedure (Cont'd)

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11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



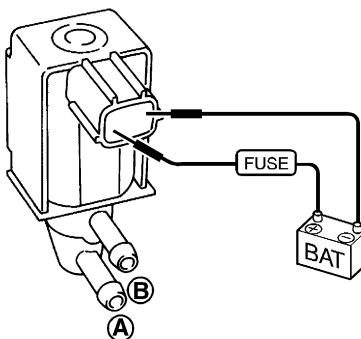
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

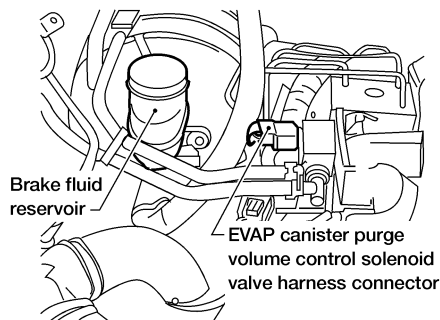
1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

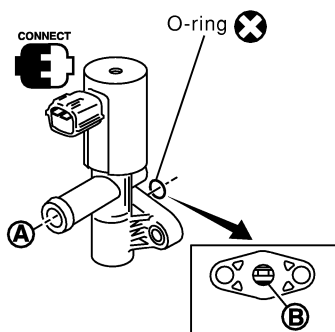
VG33E

Diagnostic Procedure (Cont'd)

12 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

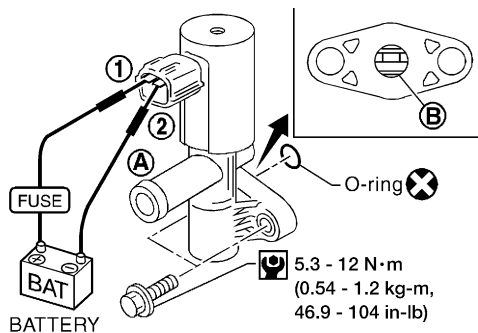
Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion B is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK



GO TO 13.

NG



Replace EVAP canister vent control valve.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

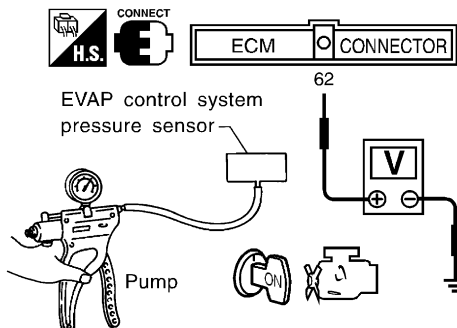
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Diagnostic Procedure (Cont'd)

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13 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



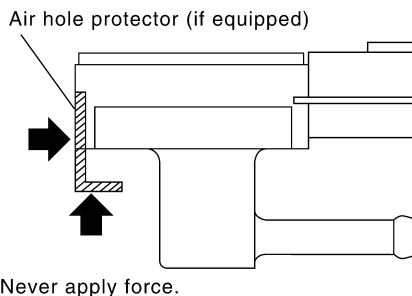
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

14 CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

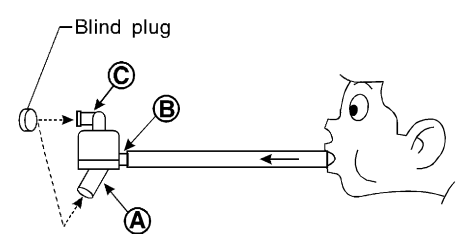
OK or NG

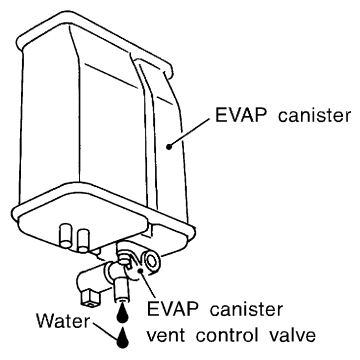
OK	▶	GO TO 15.
NG	▶	Clean, repair or replace rubber tube.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

15	CHECK WATER SEPARATOR
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: ● Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ Replace water separator.

16	CHECK IF EVAP CANISTER SATURATED WITH WATER
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 17.
No	▶ GO TO 19.

17	CHECK EVAP CANISTER
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 19.
NG	▶ GO TO 18.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

18	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 	GI
		▶ Repair hose or replace EVAP canister.	MA

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT		
		1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors C1, M67. 3. Check harness continuity between harness connector M67 terminal 12 and engine ground. Continuity should exist.	EM
		4. Also check harness for short to power.	LC
		OK or NG	EC
		OK ▶ GO TO 21.	FE
		NG ▶ GO TO 20.	FE

20	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connector M67 ● Harness connectors M59, F27 ● Joint connector-1 ● Harness for open between harness connector M67 and engine ground 	CL
		▶ Repair open circuit or short to power in harness or connectors.	MT

21	CHECK INTERMITTENT INCIDENT		
		Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	TF
		▶ INSPECTION END	PD

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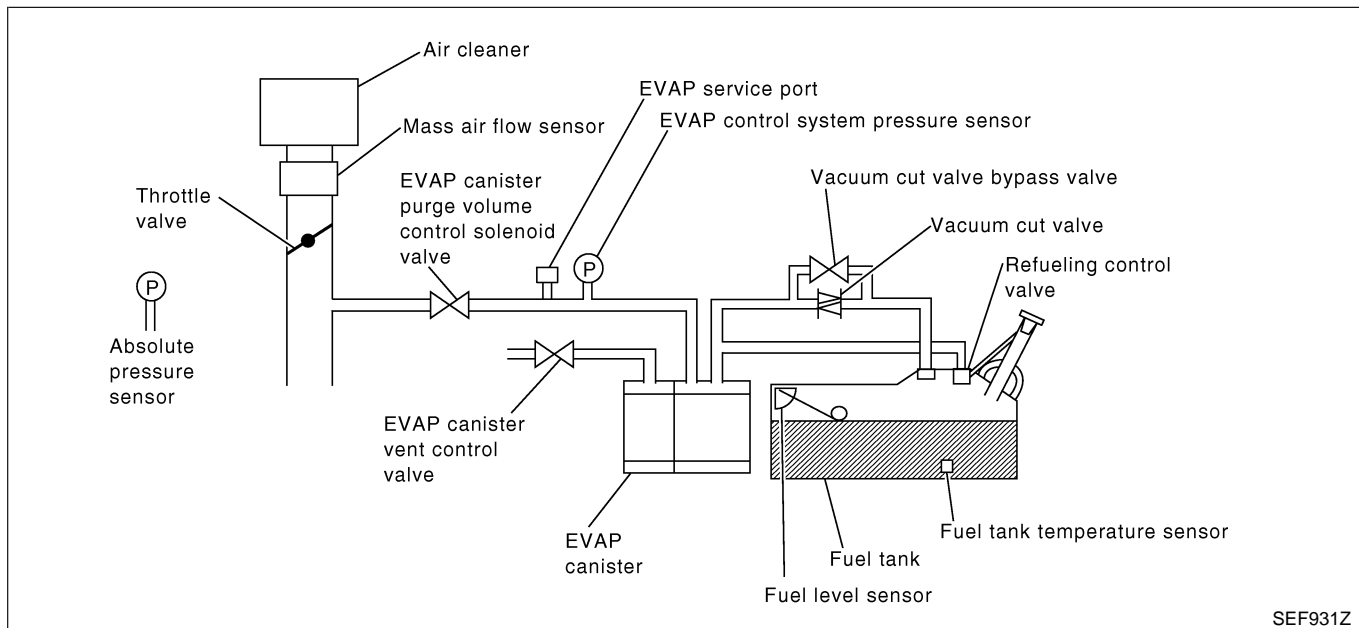
On Board Diagnosis Logic

NEEC0954

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1148.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



SEF931Z

Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Fuel filler cap remains open or fails to close.
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC0954S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor

- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

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NEEC0955

EC

6 EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.

- FUEL LEVEL: 1/4-3/4
- AMBIENT TEMP: 0-30 C(32-86F)
- OPEN ENGINE HOOD.

2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.

3)TOUCH START.

SEF565X

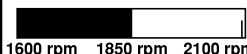
6 EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEF566X

6 EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL
RESULT APPEARS.
(APPROX. 3 MINUTES)



SEF874X

6 EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1148.)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

With CONSULT-II

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 6) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-715.

- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455] is displayed, refer to “Diagnostic Procedure”, EC-1021.
 If P0440 is displayed, perform “Diagnostic Procedure” for DTC P0440.

With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-681 before driving vehicle.

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

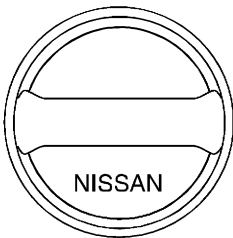
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DTC Confirmation Procedure (Cont'd)

- 1) Start engine.
- 2) Drive vehicle according to "Driving Pattern", EC-681.
- 3) Stop vehicle.
- 4) Select "MODE 1" with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch "OFF" and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the "Driving Pattern", EC-681.
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1021.
 - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-982.
 - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1135.
 - If P0440, P0455 and P1447 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

=NEEC0956

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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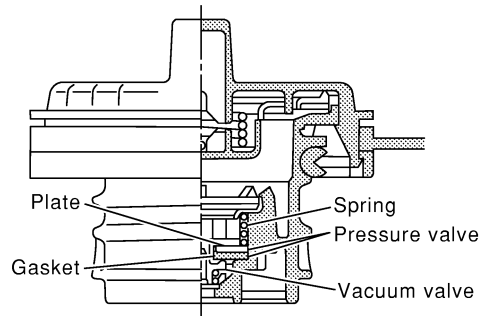
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

VG33E

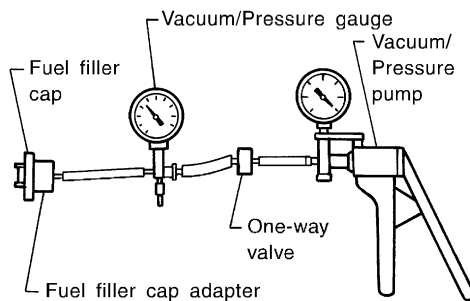
Diagnostic Procedure (Cont'd)

4 CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK ► GO TO 5.

NG ► Replace fuel filler cap with a genuine one.

5 CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-641.

OK or NG

OK ► GO TO 6.

NG ► Repair or reconnect the hose.

6 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

► GO TO 7.

7 CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to "DTC Confirmation Procedure", EC-1002.

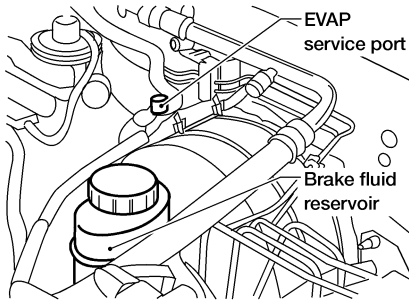
OK or NG

OK ► GO TO 8.

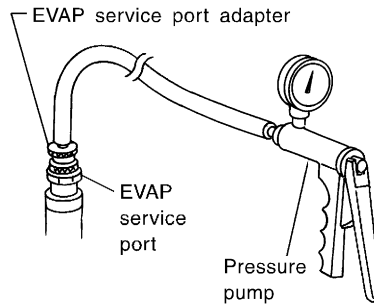
NG ► Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶▶	GO TO 9.
Models without CONSULT-II ▶▶	GO TO 10.

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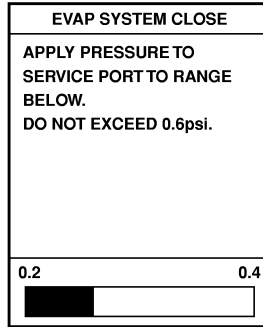
9 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

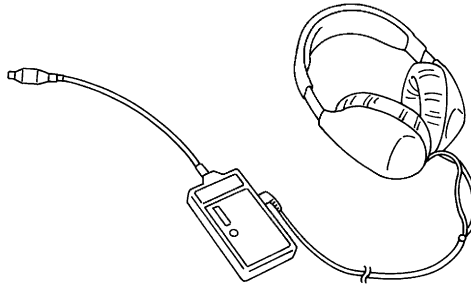
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

Leak detector



SEF200U

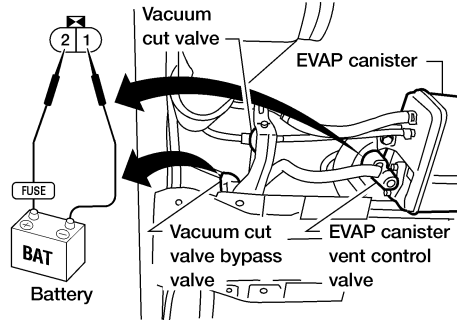
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.)



AEC632A

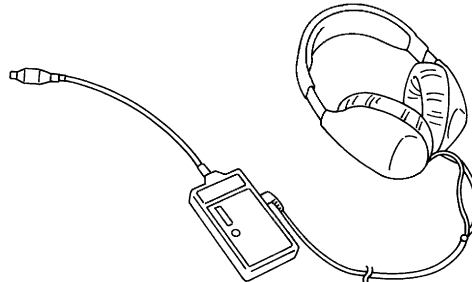
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.		Vacuum should exist.																				
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

SEF984Y

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="margin-left: 20px;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-634.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

14 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

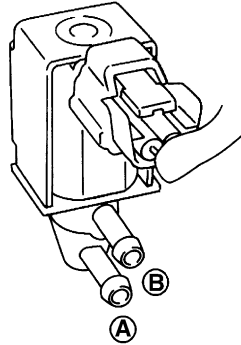
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

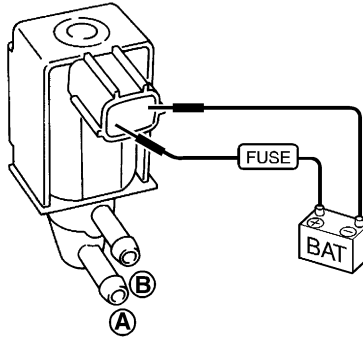
OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 16. |
| NG | ▶ | Replace EVAP canister purge volume control solenoid valve. |

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15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

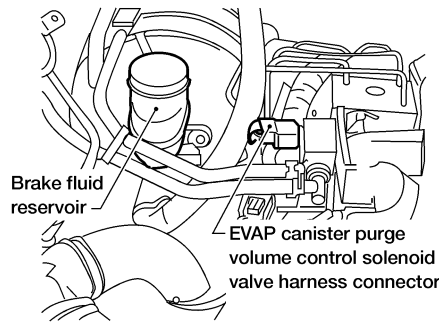
⊗ Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16 CHECK ABSOLUTE PRESSURE SENSOR

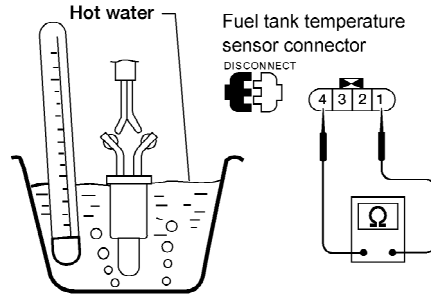
- Ⓜ With CONSULT-II**
1. Turn ignition switch ON.
 2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
 3. Touch "ERASE".
 4. **Perform "DTC Confirmation Procedure".**
See EC-769.
 5. Is the 1st trip DTC P0105 displayed again?

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM.

17 CHECK FUEL TANK TEMPERATURE SENSOR

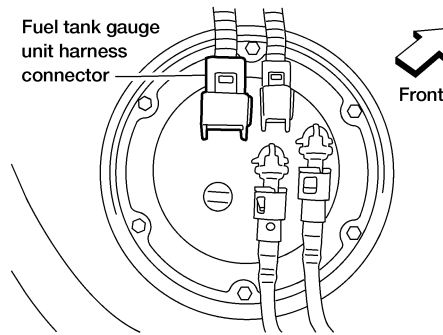
Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance k Ω
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234



AEC933A

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel tank temperature sensor.

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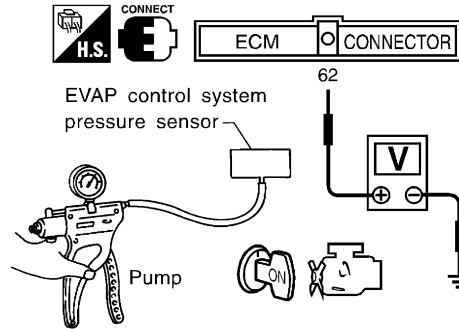
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18 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



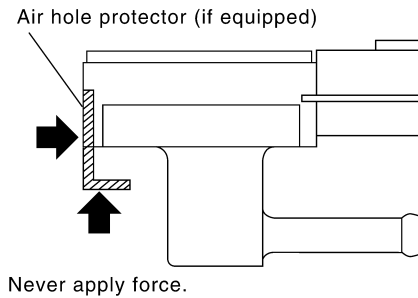
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

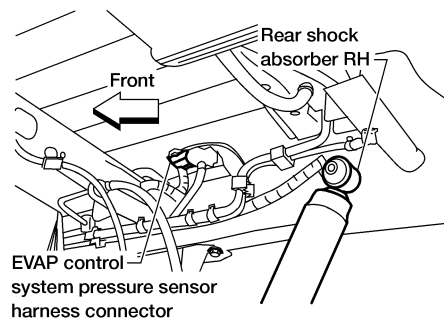
CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



AEC651A

OK or NG

OK ► GO TO 19.

NG ► Replace EVAP control system pressure sensor.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

VG33E

Diagnostic Procedure (Cont'd)

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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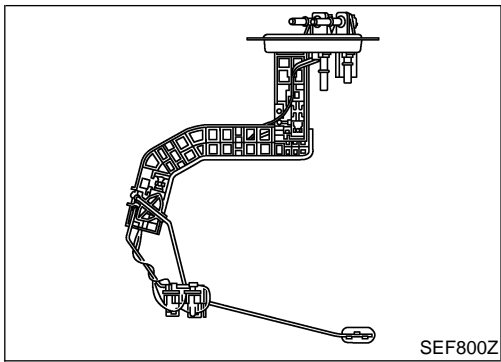
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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC0968} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NEEC0974}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	P/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NEEC0969}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NEEC0969S01}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NEEC0971
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

 **WITH CONSULT-II**
NEEC0971S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1035.

 **WITH GST**
NEEC0971S02

Follow the procedure "WITH CONSULT-II" above.

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DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

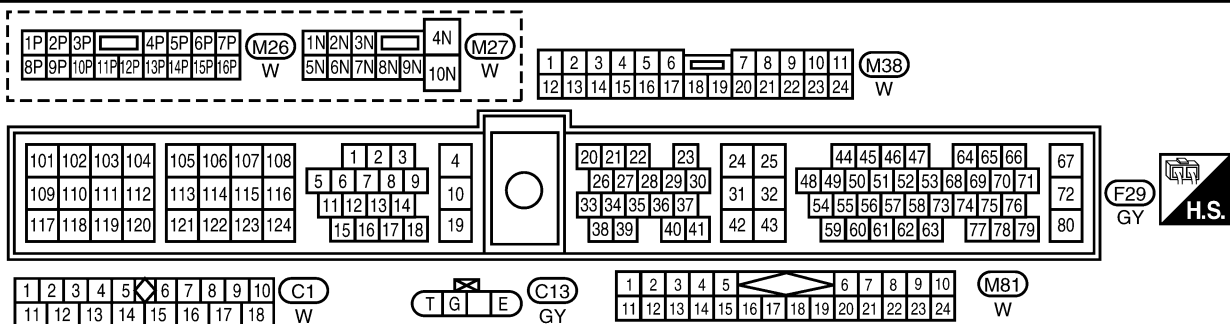
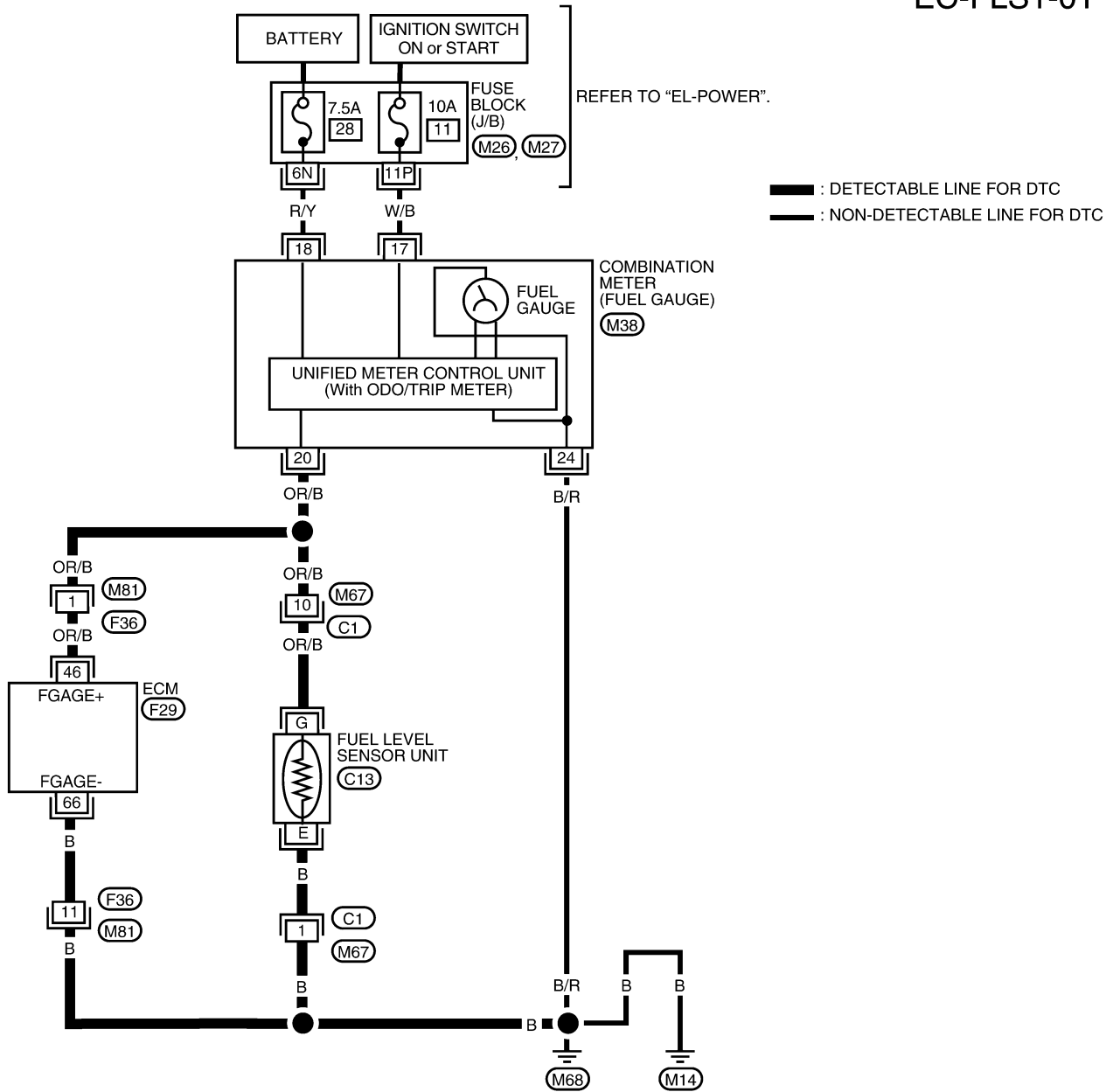
VG33E

Wiring Diagram

Wiring Diagram

NEEC0972

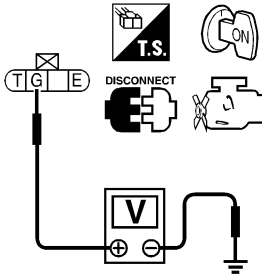
EC-FLS1-01



WEC818

Diagnostic Procedure

=NEEC0973

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until and fuel pump harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit and fuel pump terminal G and ground with CONSULT-II or a tester.</p> <div style="text-align: center;">  <p>Voltage: Approximately 12V</p> </div> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT		
	OK	▶	GO TO 3.		
	NG	▶	GO TO 2.		
2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between combination meter and fuel level sensor until and fuel pump <p style="text-align: center;">▶ Repair or replace harness or connectors.</p>			AT TF PD AX SU BR ST
3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit and fuel pump terminal E and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>			RS BT HA SC
	OK	▶	GO TO 5.		
	NG	▶	GO TO 4.		
4	DETECT MALFUNCTIONING PART	<p>Check the harness connectors C1, M67.</p> <p style="text-align: center;">▶ Repair or replace harness or connectors.</p>			EL IDX
5	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit and fuel pump terminal G, ECM terminal 66 and fuel level sensor unit and fuel pump terminal E. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>			
	OK	▶	GO TO 7.		
	NG	▶	GO TO 6.		

DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

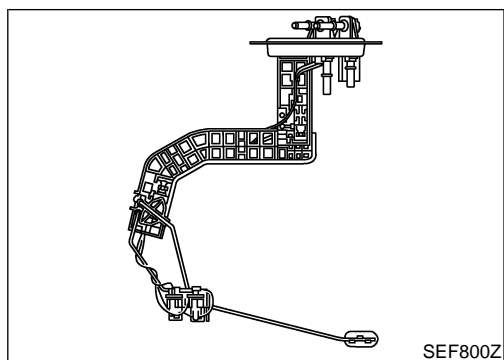
VG33E

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M67, C1● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC0975} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

Driving long distances naturally affect fuel gauge level. ^{NEEC0976} This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

POSSIBLE CAUSE

- Harness or connectors
(The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. ^{NEEC0978}

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to *FE-5*, "Fuel Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

SEF195Y

Ⓜ WITH CONSULT-II

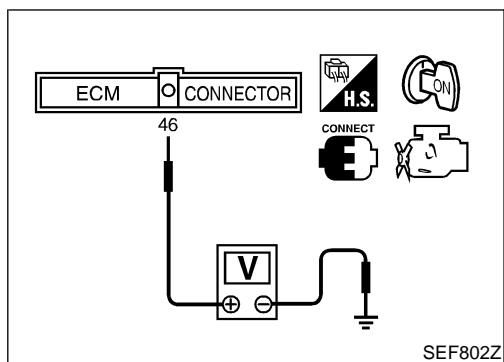
NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-658.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

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- 5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



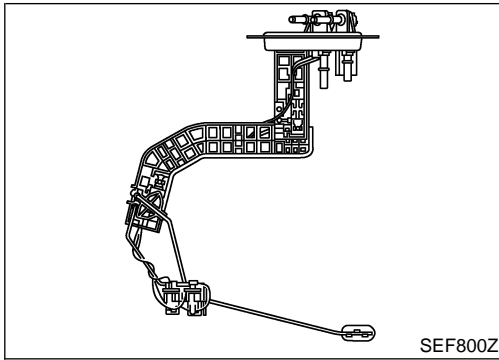
WITH GST

NEEC0978S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-658.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC0979} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM. GI

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float. MA

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC0985

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. EC

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	P/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level. CL
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V MT

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor circuit. ^{NEEC0980} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit. SU

This diagnosis indicates the former, to detect open or short circuit malfunction. BR

Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM. ST

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) RS
- Fuel level sensor BT

DTC Confirmation Procedure

NEEC0982

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

2	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
	FUEL LEVEL SE	XXX V
		SEF195Y

 **WITH CONSULT-II**

NEEC0982S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1042.

 **WITH GST**

NEEC0982S02

Follow the procedure "WITH CONSULT-II" above.

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

VG33E

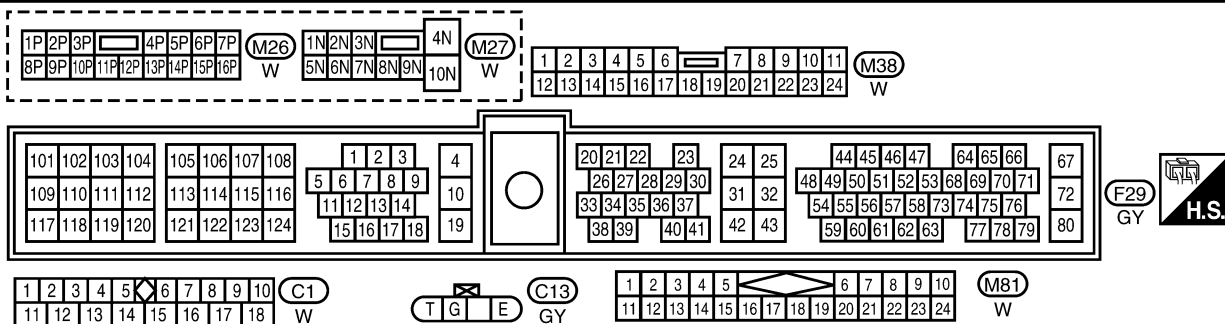
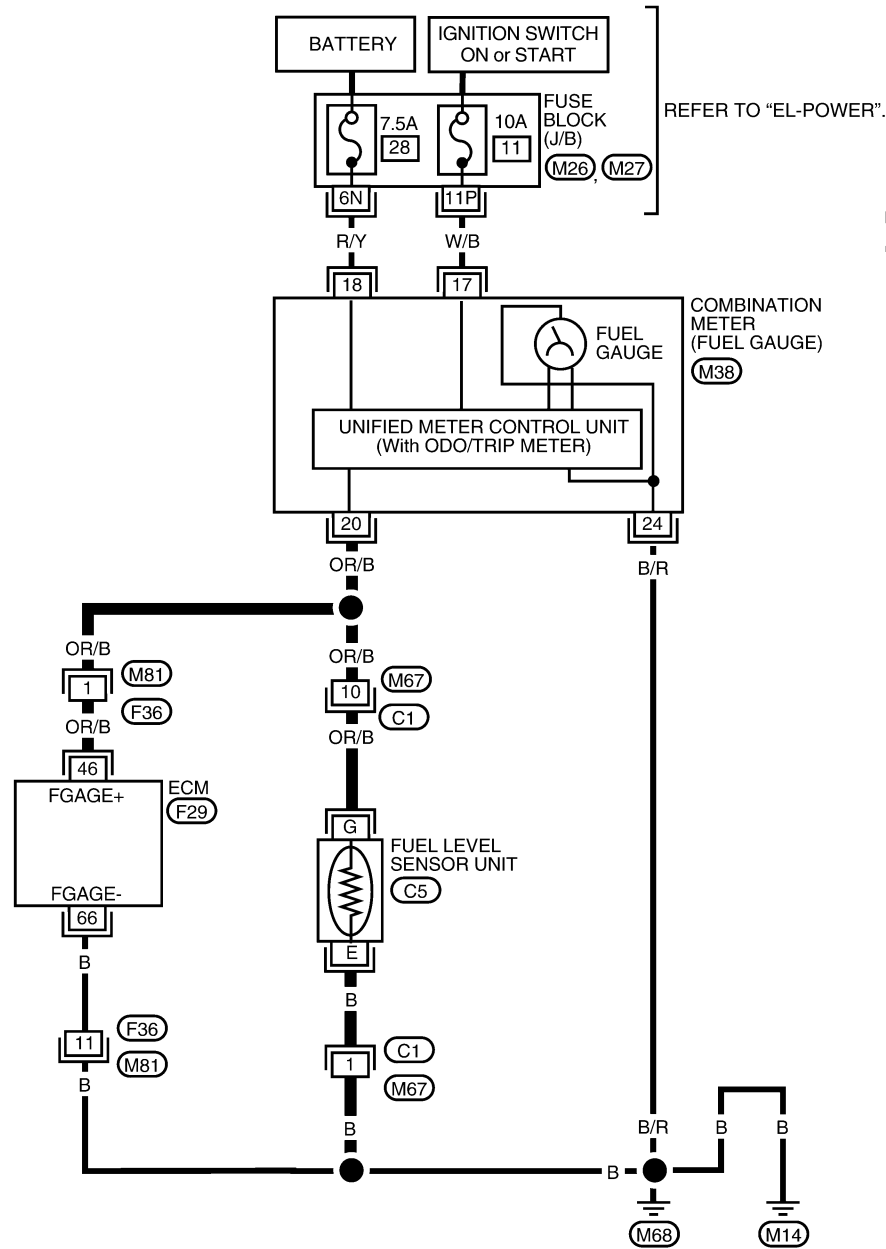
Wiring Diagram

Wiring Diagram

NEEC0983

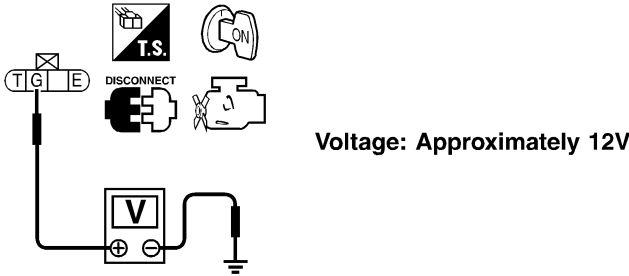
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Diagnostic Procedure

=NEEC0984

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until and fuel pump harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit and fuel pump terminal G and ground with CONSULT-II or tester. 		
		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF904Z

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between combination meter and fuel level sensor until and fuel pump 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit and fuel pump terminal E and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the harness connectors C1, M67.</p>		
▶ Repair or replace harness or connectors.		

5	CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit and fuel pump terminal G. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

VG33E

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel level sensor 		
▶		Repair open circuit or short to ground or short to power in harness on connectors.

GI

MA

EM

7	CHECK FUEL LEVEL SENSOR	
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".		
OK or NG		
OK ▶		GO TO 7.
NG ▶		Replace fuel level sensor unit.

LC

EC

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶		INSPECTION END

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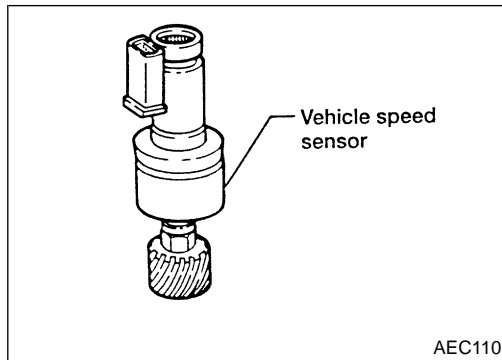
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Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. NEEC0768

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC0769

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Lift up the vehicle • In 1st gear position • Vehicle speed is 40 km/h (25 MPH) 	<p>2 - 3V</p> <p>SEF996U</p>

On Board Diagnosis Logic

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. NEEC0770

POSSIBLE CAUSE

- Harness or connector (The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor NEEC0770S01

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed. NEEC0771

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

DTC P0500 VEHICLE SPEED SENSOR (VSS)

VG33E

DTC Confirmation Procedure (Cont'd)

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

With CONSULT-II

- 1) Start engine
- 2) Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to "Diagnostic Procedure", EC-1047.
If OK, go to following step.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Warm engine up to normal operating temperature.
- 5) Maintain the following conditions for at least 10 consecutive seconds.

END SPEED	More than 1,400 rpm (A/T models) More than 2,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.5 - 9.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1047.

Overall Function Check

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

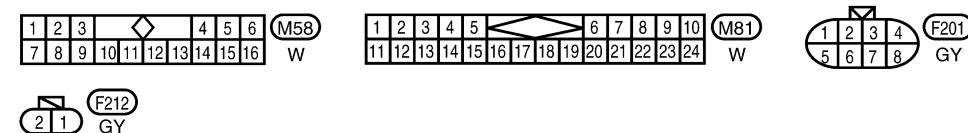
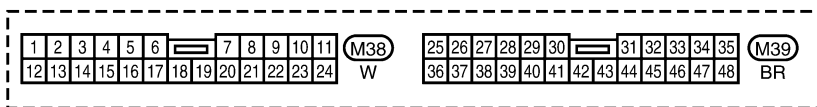
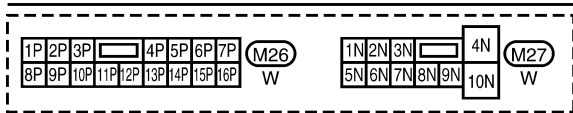
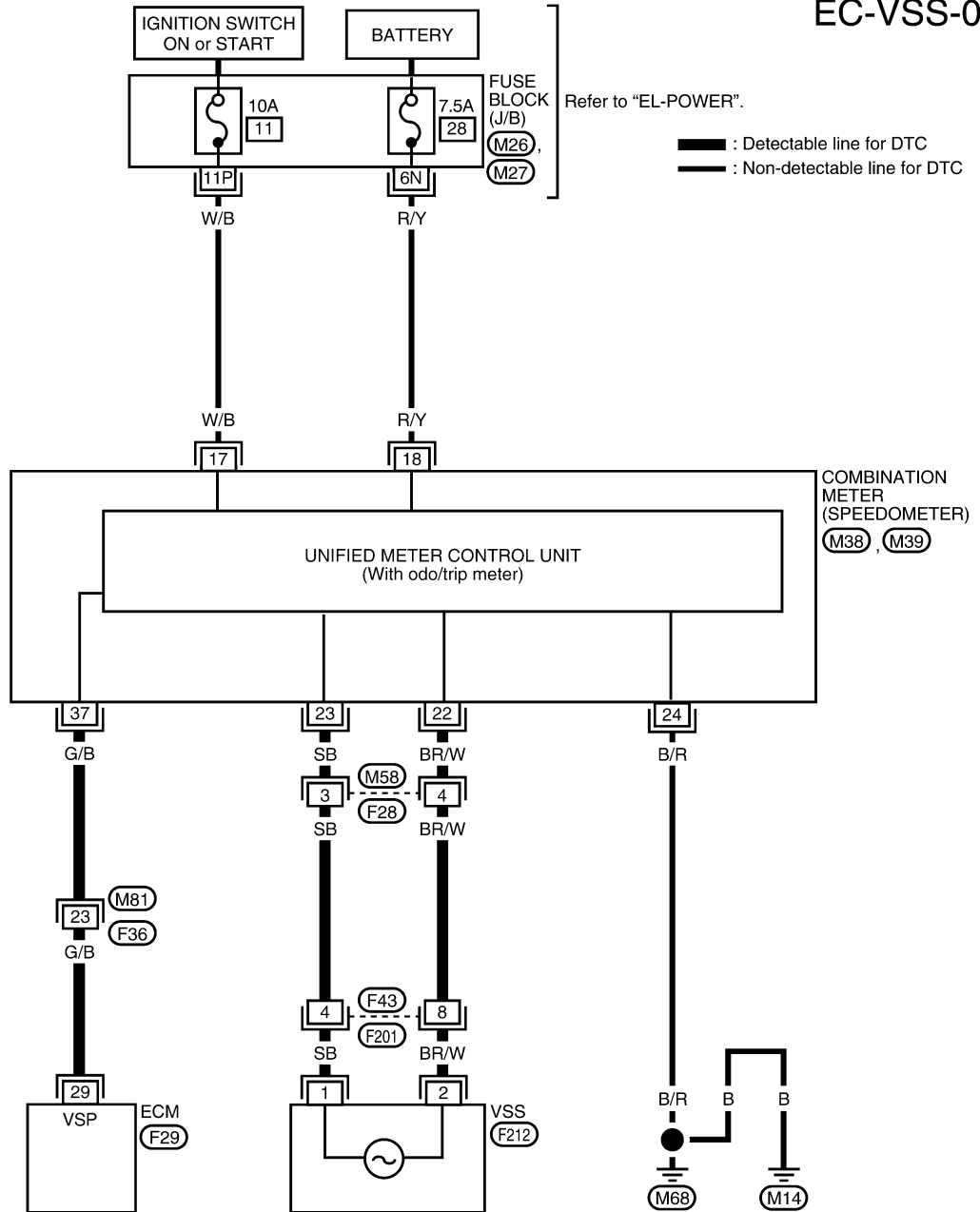
- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-1047.

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Wiring Diagram

NEEC0773

EC-VSS-01



Refer to the following.
 (F29) - ELECTRICAL UNITS

Diagnostic Procedure

NEEC0774

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 29 and meter terminal 37. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. <div style="text-align: center;">OK or NG</div>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and combination meter 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK SPEEDOMETER FUNCTION	
Make sure that speedometer functions properly. <div style="text-align: center;">OK or NG</div>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors F43, F201 ● Harness for open or short between combination meter and vehicle speed sensor <div style="text-align: center;">OK or NG</div>		
OK	▶	Check combination meter and vehicle speed sensor. Refer to EL-69 .
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753. <div style="text-align: center;">▶</div>		
		INSPECTION END

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DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33E

Description

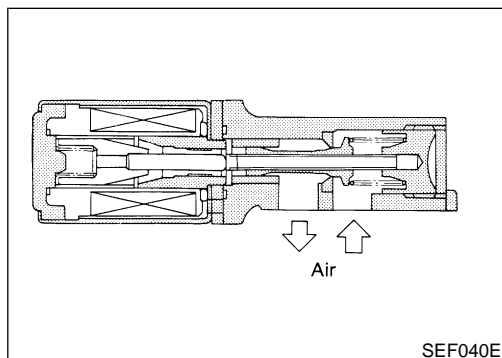
Description SYSTEM DESCRIPTION

NEEC0775

NEEC0775S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometric pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



COMPONENT DESCRIPTION IACV-AAC Valve

NEEC0775S02

NEEC0775S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33E

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC0776

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	10 - 20%
		2,000 rpm	—

ECM Terminals and Reference Value

NEEC0777

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>8 - 11V</p> <p>SEF005V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	<p>7 - 10V</p> <p>SEF692W</p>

On Board Diagnosis Logic

NEEC0778

Malfunction is detected when
 (Malfunction A) the IACV-AAC valve does not operate properly,
 (Malfunction B) the IACV-AAC valve does not operate properly.

POSSIBLE CAUSE

NEEC0778S01

- Harness or connectors
(The IACV-AAC valve circuit is open.)
- Harness or connectors
(The IACV-AAC valve circuit is shorted.)
- IACV-AAC valve

DTC Confirmation Procedure

NEEC0779

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC0779S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Wait at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1052.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NEEC0779S02

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 1 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1052.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

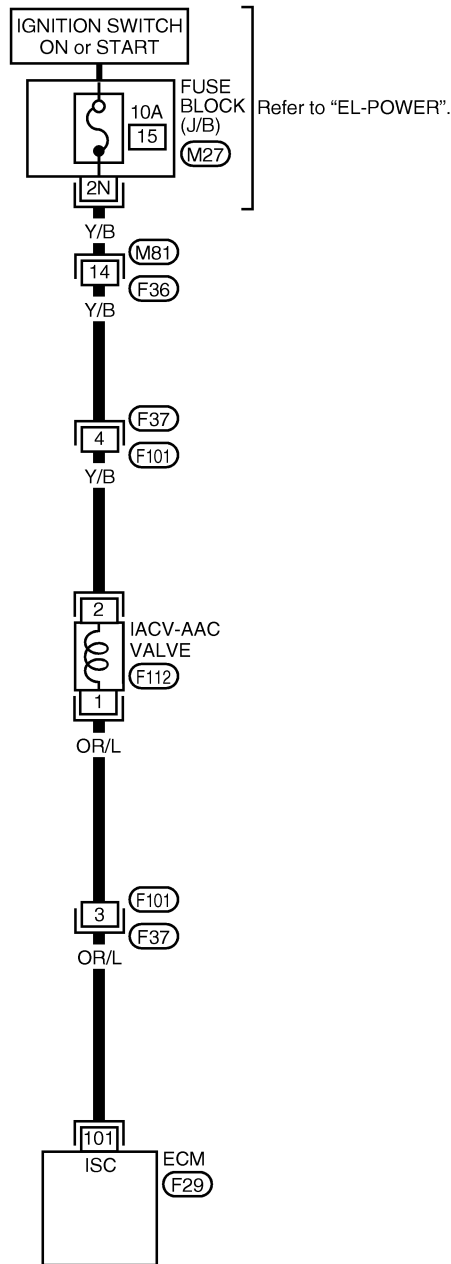
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Wiring Diagram

Wiring Diagram

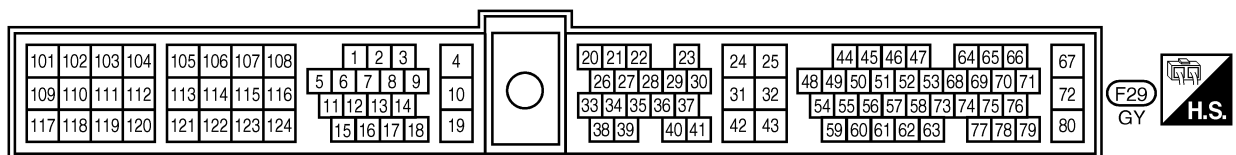
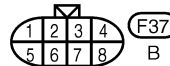
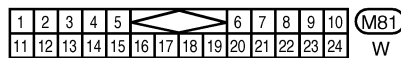
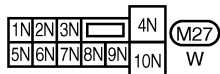
NEEC0780

EC-AAC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

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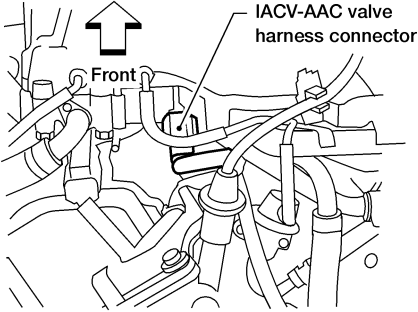
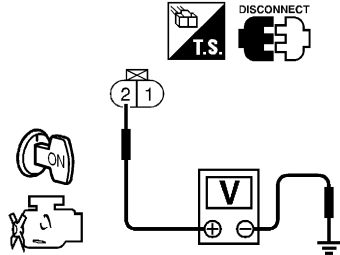
DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0781

1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

LEC514

SEF651W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between IACV-AAC valve and fuse 	
▶	Repair harness or connectors.

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33E

Diagnostic Procedure (Cont'd)

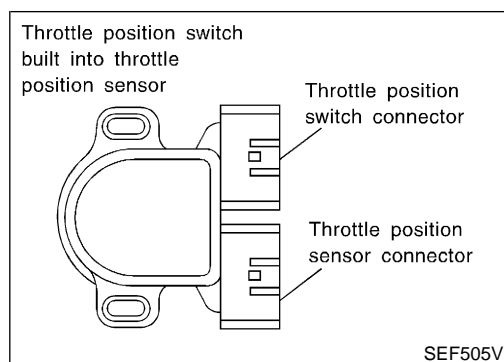
4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F101, F37 ● Harness for open or short between IACV-AAC valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK IACV-AAC VALVE
1. Disconnect IACV-AAC valve harness connector. 2. Remove IACV-AAC valve. <ul style="list-style-type: none"> ● Check IACV-AAC valve resistance. 	
<p>Resistance: Approximately 10Ω [at 20°C (68°F)]</p> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. 3. Supply battery voltage between IACV-AAC valve connector terminals. Plunger should move.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace IACV-AAC valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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Component Description



Component Description

NEEC0782

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0783

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF

ECM Terminals and Reference Value

NEEC0784

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NEEC0785

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

POSSIBLE CAUSE

NEEC0785S01

- Harness or connectors (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

NEEC0786

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then start engine.
- 3) Select “CLSD THL/P SW” in “DATA MONITOR” mode.
- 4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-1057.
If OK, go to following step.

- 5) Select “DATA MONITOR” mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1057.

Overall Function Check

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

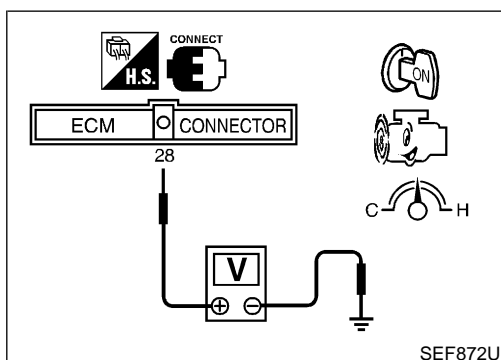
⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

- 3) If NG, go to “Diagnostic Procedure”, EC-1057.



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DTC P0510 CLOSED THROTTLE POSITION SWITCH

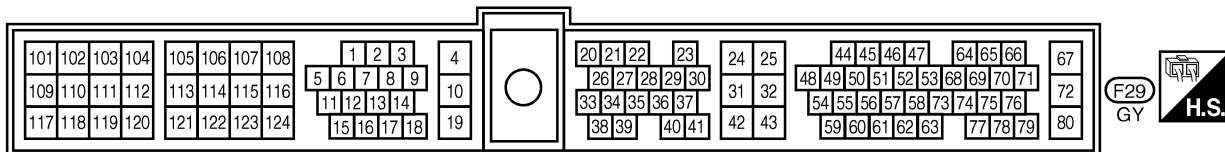
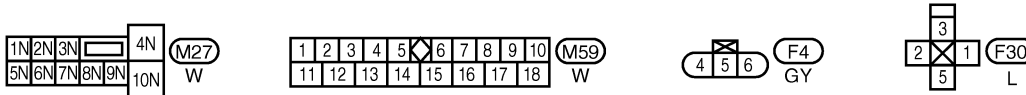
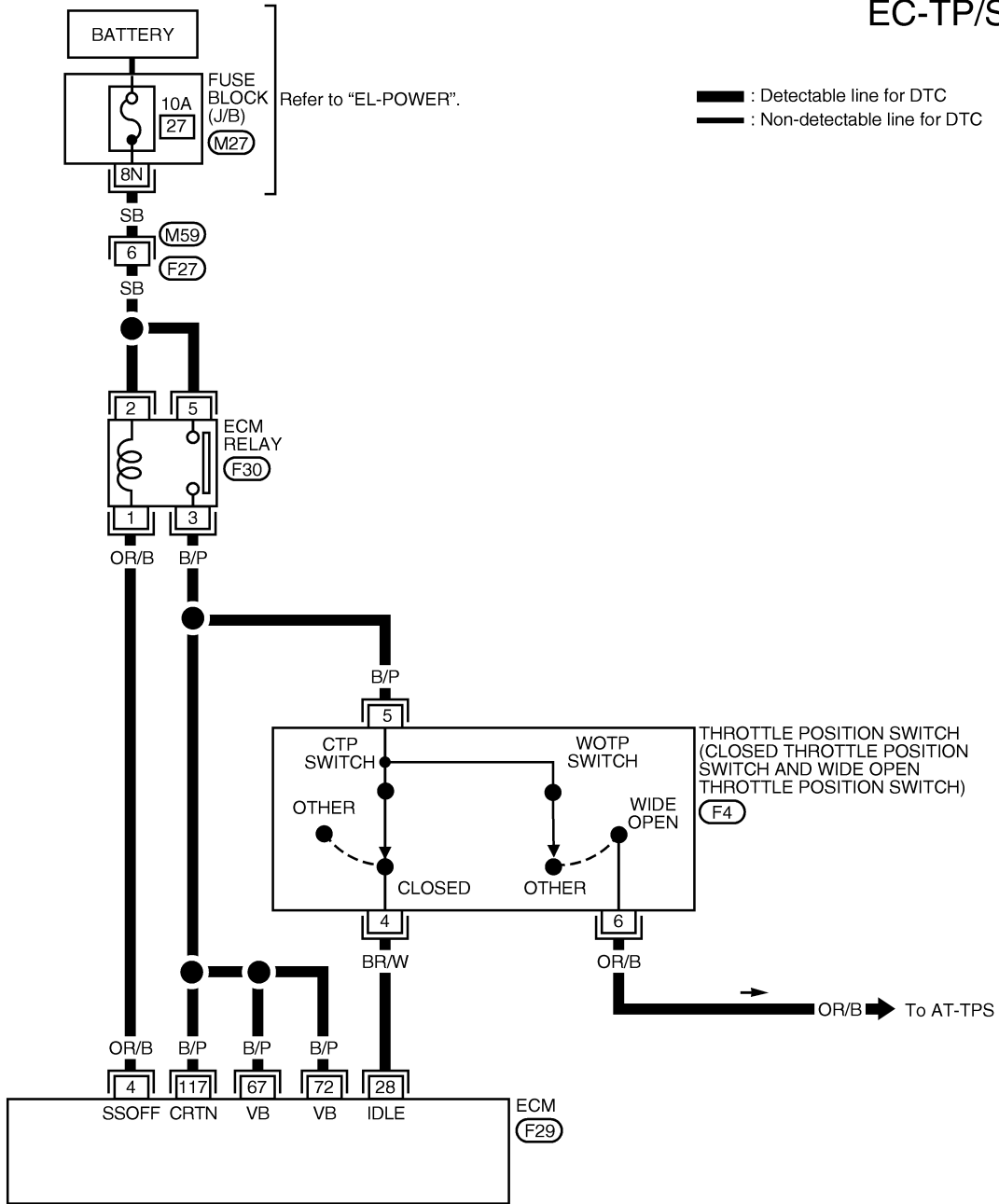
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Wiring Diagram

Wiring Diagram

NEEC0788

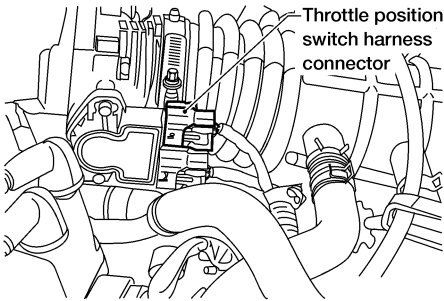
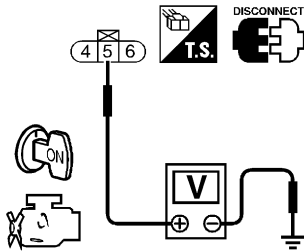
EC-TP/SW-01



AEC964A

Diagnostic Procedure

NEEC0789

1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector.</p> <div style="text-align: center;">  <p>Throttle position switch harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT T.S. ECM</p> </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
<small>AEC653A</small>	
<small>SEF715U</small>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between throttle position switch and ECM relay ● Harness for open or short between throttle position switch and ECM 	
▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and switch terminal 4. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.


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DTC P0510 CLOSED THROTTLE POSITION SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4	ADJUST THROTTLE POSITION SWITCH										
Check the following items. Refer to "Basic Inspection", EC-715.											
<table border="1"><thead><tr><th>Items</th><th>Specifications</th></tr></thead><tbody><tr><td>Ignition timing</td><td>10° ± 2° BTDC</td></tr><tr><td>Base idle speed</td><td>700 ± 50 rpm (in "P" or "N" position)</td></tr><tr><td>Closed throttle position switch idle position adjustment</td><td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td></tr><tr><td>Target idle speed</td><td>750 ± 50 rpm (in "P" or "N" position)</td></tr></tbody></table>		Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
Base idle speed	700 ± 50 rpm (in "P" or "N" position)										
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
MTBL0576											
with CONSULT-II	▶ GO TO 5.										
without CONSULT-II	▶ GO TO 6.										

5	CHECK CLOSED THROTTLE POSITION SWITCH						
 With CONSULT-II							
<ol style="list-style-type: none">1. Start engine and warm it up to normal operating temperature.2. Turn ignition switch OFF.3. Turn ignition switch ON.4. Select "DATA MONITOR" mode with CONSULT-II.5. Check indication of "CLSD THL/P SW".							
Measurement must be made with closed throttle position switch installed in vehicle.							
<table border="1"><thead><tr><th>Throttle valve conditions</th><th>CLSD THL/P SW</th></tr></thead><tbody><tr><td>Completely closed</td><td>ON</td></tr><tr><td>Partially open or completely open</td><td>OFF</td></tr></tbody></table>		Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF
Throttle valve conditions	CLSD THL/P SW						
Completely closed	ON						
Partially open or completely open	OFF						
MTBL0355							
OK or NG							
OK	▶ GO TO 8.						
NG	▶ GO TO 7.						

6	CHECK CLOSED THROTTLE POSITION SWITCH							
<p>Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect closed throttle position switch harness connector. 4. Check continuity between closed throttle position switch terminals 4 and 5. Resistance measurement must be made with closed throttle position switch installed in vehicle. 								
AEC654A								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Throttle valve conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity							
Completely closed	Yes							
Partially open or completely open	No							
MTBL0247								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	GO TO 7.						

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7	ADJUST THROTTLE POSITION SWITCH											
<p>Check the following items. Refer to "Basic Inspection", EC-715.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Items</th> <th style="width: 60%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
<p>If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p>												
OK or NG												
OK (with CONSULT-II)	▶	GO TO 8.										
OK (without CONSULT-II)	▶	GO TO 9.										
NG	▶	Replace throttle position switch.										

DTC P0510 CLOSED THROTTLE POSITION SWITCH

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR									
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN". 										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	THRTL POS SEN									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0230										
<p>Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-715.</p>										
OK or NG										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

9	CHECK THROTTLE POSITION SENSOR									
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. 										
<p>Voltage measurement must be made with throttle position sensor installed in vehicle.</p>										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0231										
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-715.</p>										
OK or NG										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

10	CHECK INTERMITTENT INCIDENT				
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.</p>					
<table style="margin: auto;"> <tr> <td style="width: 20px;"></td> <td style="text-align: center;">▶</td> <td>INSPECTION END</td> </tr> </table>				▶	INSPECTION END
	▶	INSPECTION END			

System Description

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration. NEEC0790

Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC0791

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	[Ignition switch "ON"] [Engine is running] ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	[Ignition switch "ON"] [Engine is running] ● Idle speed	6 - 8V
35	G/R	A/T signal No. 3	[Ignition switch "ON"]	0V

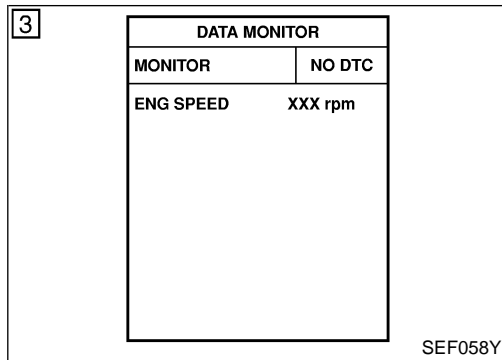
On Board Diagnosis Logic

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously. NEEC0792

POSSIBLE CAUSE

- Harness or connectors
[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.] NEEC0792S01

DTC Confirmation Procedure



DTC Confirmation Procedure

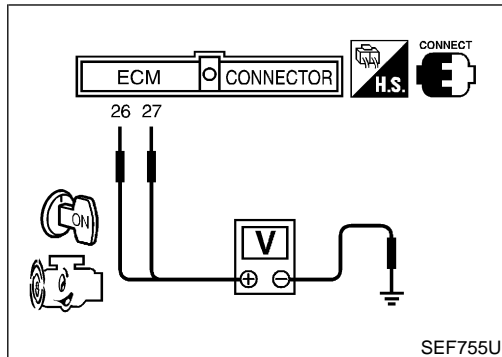
=NEEC0793

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1064.



Overall Function Check

NEEC0794

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

⊗ **Without CONSULT-II**

- 1) Start engine.
- 2) Check voltage between
ECM terminal 26 and ground.
ECM terminal 27 and ground.
Voltage: 6 - 8V
- 3) If NG, go to "Diagnostic Procedure", EC-1064.

Wiring Diagram

NEEC0795

EC-AT/C-01

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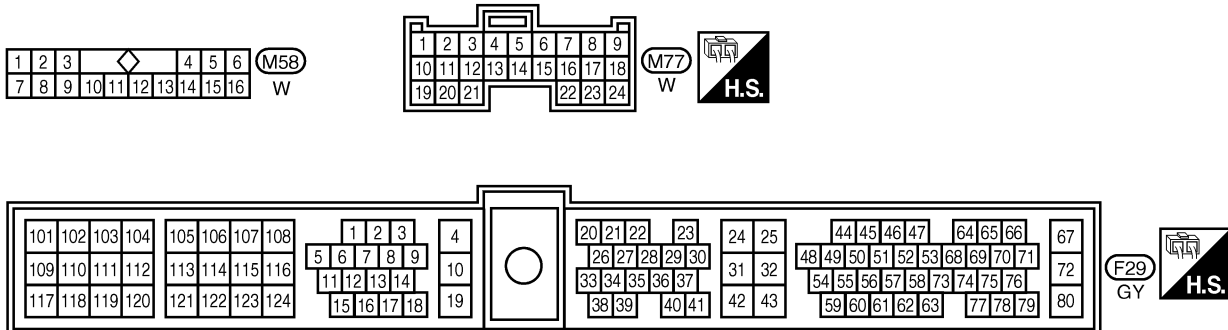
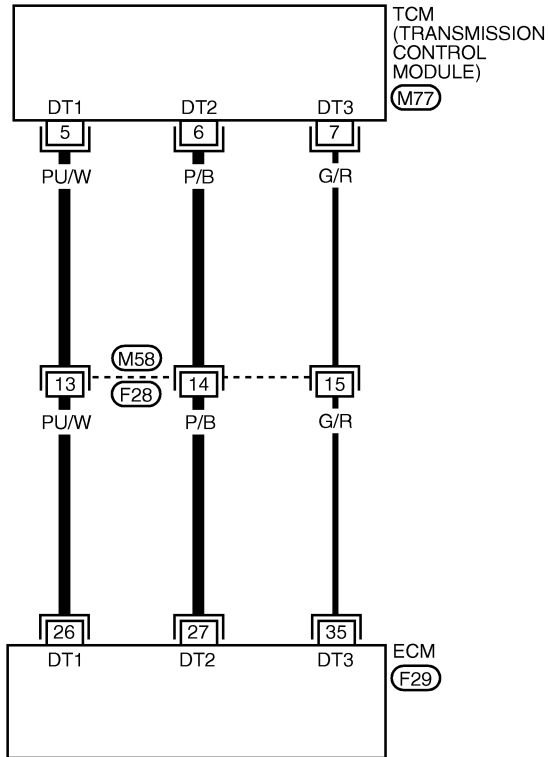
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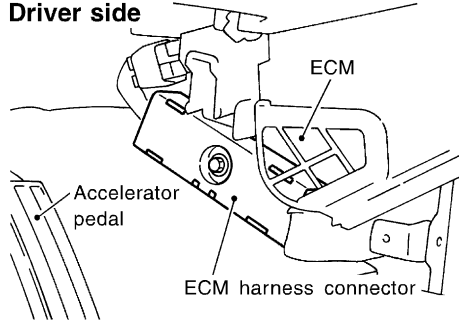
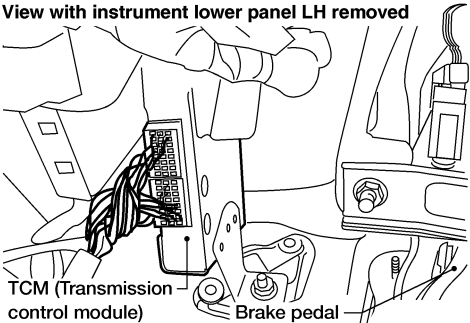
— : Detectable line for DTC
 — : Non-detectable line for DTC



AEC965A

Diagnostic Procedure

NEEC0796

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN						
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  <p>SEF324V</p> </div> <div style="text-align: center;"> <p>View with instrument lower panel LH removed</p>  <p>AEC655A</p> </div> <p>3. Check harness continuity between ECM terminal 26 and terminal 5, ECM terminal 27 and terminal 6, ECM terminal 35 and terminal 7. Refer to Wiring Diagram. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>		OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.					
NG	▶	GO TO 2.					

2	DETECT MALFUNCTIONING PART			
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Repair harness or connectors.</td> </tr> </table>			▶	Repair harness or connectors.
	▶	Repair harness or connectors.		

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT						
<p>1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground. Refer to Wiring Diagram. Continuity should not exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.					
NG	▶	GO TO 4.					

DTC P0600 A/T CONTROL

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission Control Module).	
▶	Repair open circuit or short to ground or short to power in harness.
5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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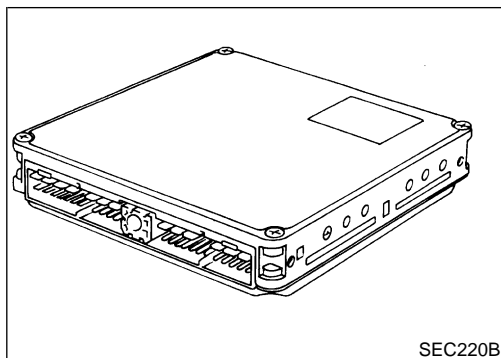
HA

SC

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IDX

Component Description



Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. NEEC0797

On Board Diagnosis Logic

Malfunction is detected when ECM calculation function is malfunctioning. NEEC0798

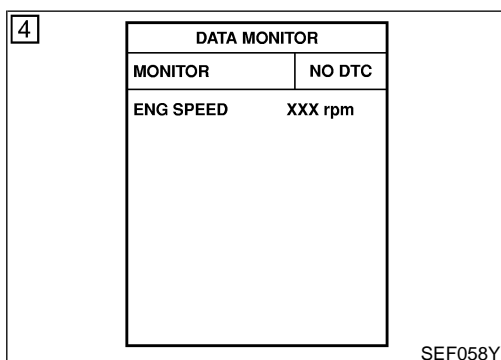
POSSIBLE CAUSE

- ECM NEEC0798S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0799


 With CONSULT-II



- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 2 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1067.

 With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NEEC0800

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1066. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1066. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

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On Board Diagnosis Logic

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. NEEC0986

This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

POSSIBLE CAUSE

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

NEEC0986S01**DTC Confirmation Procedure**NEEC0988**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 70°C (158°F).

WITH CONSULT-II

- 1) Replace thermostat with new one. Refer to **LC-31**, "Thermostat". Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on. NEEC0988S01
- 2) Turn ignition switch "ON".
- 3) Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 4) Check that the "COOLAN TEMP/S" is above 70°C (158°F).
If it is below 70°C (158°F), go to following step.
If it is above 70°C (158°F), stop engine and cool down the engine to less than 70°C (158°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)
---------------	-----------------------------

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-618.

WITH GST

- 1) Follow the procedure "WITH CONSULT-II" above.

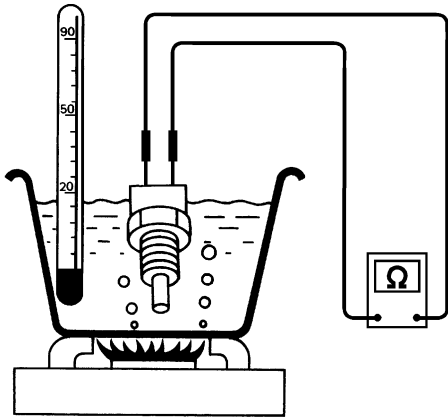
NEEC0988S02

Diagnostic Procedure

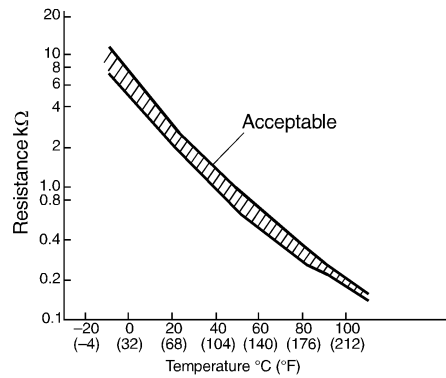
NEEC0989

1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.


<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260


SEF304X
OK or NG

OK


INSPECTION END

NG



Replace engine coolant temperature sensor.

GI

MA

EM

LC

EC

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PD

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SU

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IDX

DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

★ The closed loop control has the one trip detection logic. NEEC0808

Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

POSSIBLE CAUSE

- The heated oxygen sensor 1 (front) circuit is open or shorted. NEEC0808S01
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NEEC0809

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Never raise engine speed above 3,200 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 2.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V	

SEF967Y

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Hold engine speed at 2,000 rpm and check one of the following.
 - "HO2S1 (B1)/(B2)" voltage should go above 0.70V at least once.
 - "HO2S1 (B1)/(B2)" voltage should go below 0.21V at least once.If the check result is NG, perform "Diagnosis Procedure", EC-1071.

EC-1070

DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

VG33E

DTC Confirmation Procedure (Cont'd)

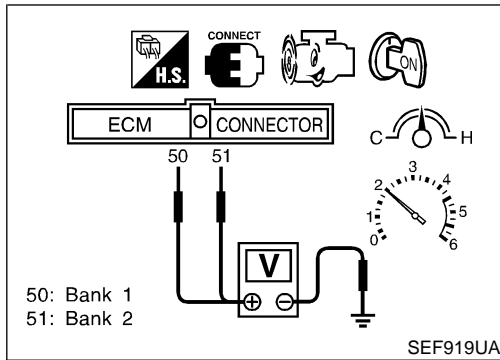
If the check result is OK, perform the following step.

- 4) Let engine idle at least 5 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.3 msec or more
ENG SPEED	1,600 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1071.



Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [heated oxygen sensor 1 (front) (bank 1) signal] or 51 [heated oxygen sensor 1 (front) (bank 2) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no-load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-1071.

Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", EC-828.

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

System Description

System Description

NEEC0901

COOLING FAN CONTROL

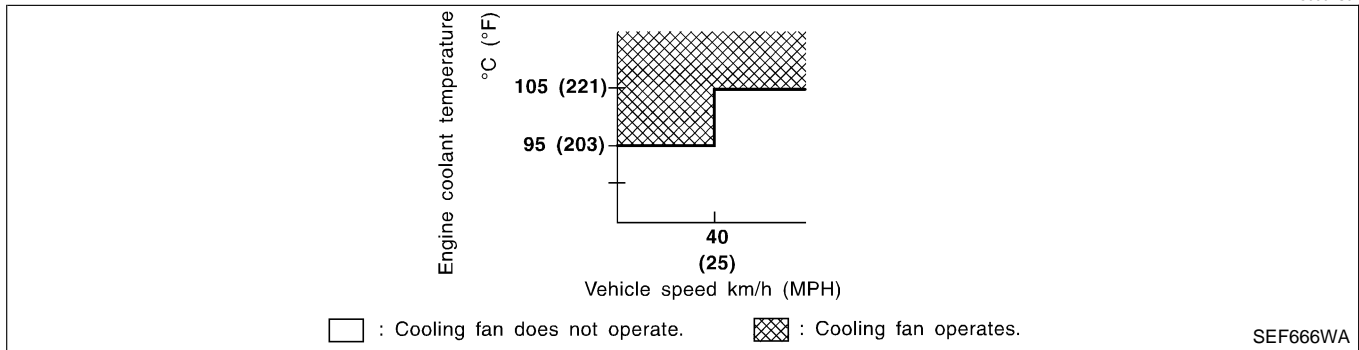
NEEC0901S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 2-step control [ON/OFF].

OPERATION

NEEC0901S02



SEF666WA

CONSULT-II Reference Value in Data Monitor Mode

NEEC0902

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> Engine: Idling, after warming up Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less. OFF
		Engine coolant temperature is 95°C (203°F) or more. ON

ECM Terminals and Reference Value

NEEC0903

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	LG/R	Cooling fan relay	[Engine is running] <ul style="list-style-type: none"> Cooling fan is not operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Cooling fan is operating 	0 - 0.6V

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC0904

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in MA-27, "Changing Engine Coolant". Also, replace the engine oil.

- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-15, "Anti-freeze Coolant Mixture Ratio".
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

NEEC0904S01

- Harness or connectors
(The cooling fan circuit is open or shorted.)
- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1083.

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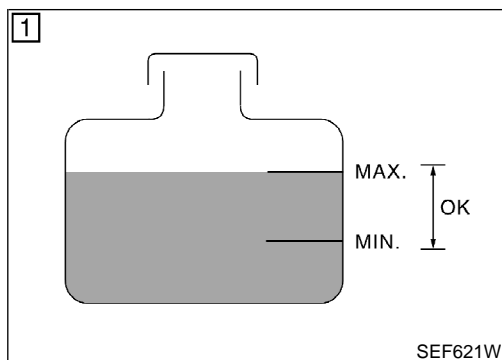
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DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

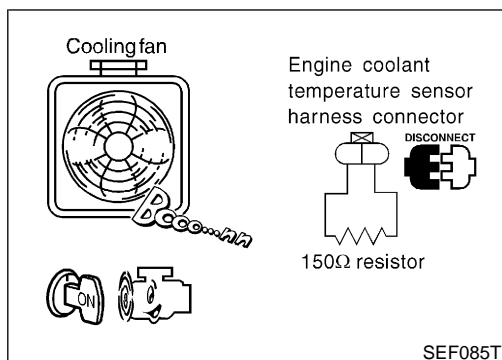
On Board Diagnosis Logic (Cont'd)



4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X



Overall Function Check

NEEC0905

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1076.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1076.
- 3) Turn ignition switch ON.
- 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
- 5) Make sure that cooling fan operates.
- 6) If NG, go to "Diagnostic Procedure", EC-1076.

Without CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1076.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1076.
- 3) Turn ignition switch OFF.
- 4) Disconnect engine coolant temperature sensor harness connector.
- 5) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 6) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
- 7) If NG, go to "Diagnostic Procedure", EC-1076.

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

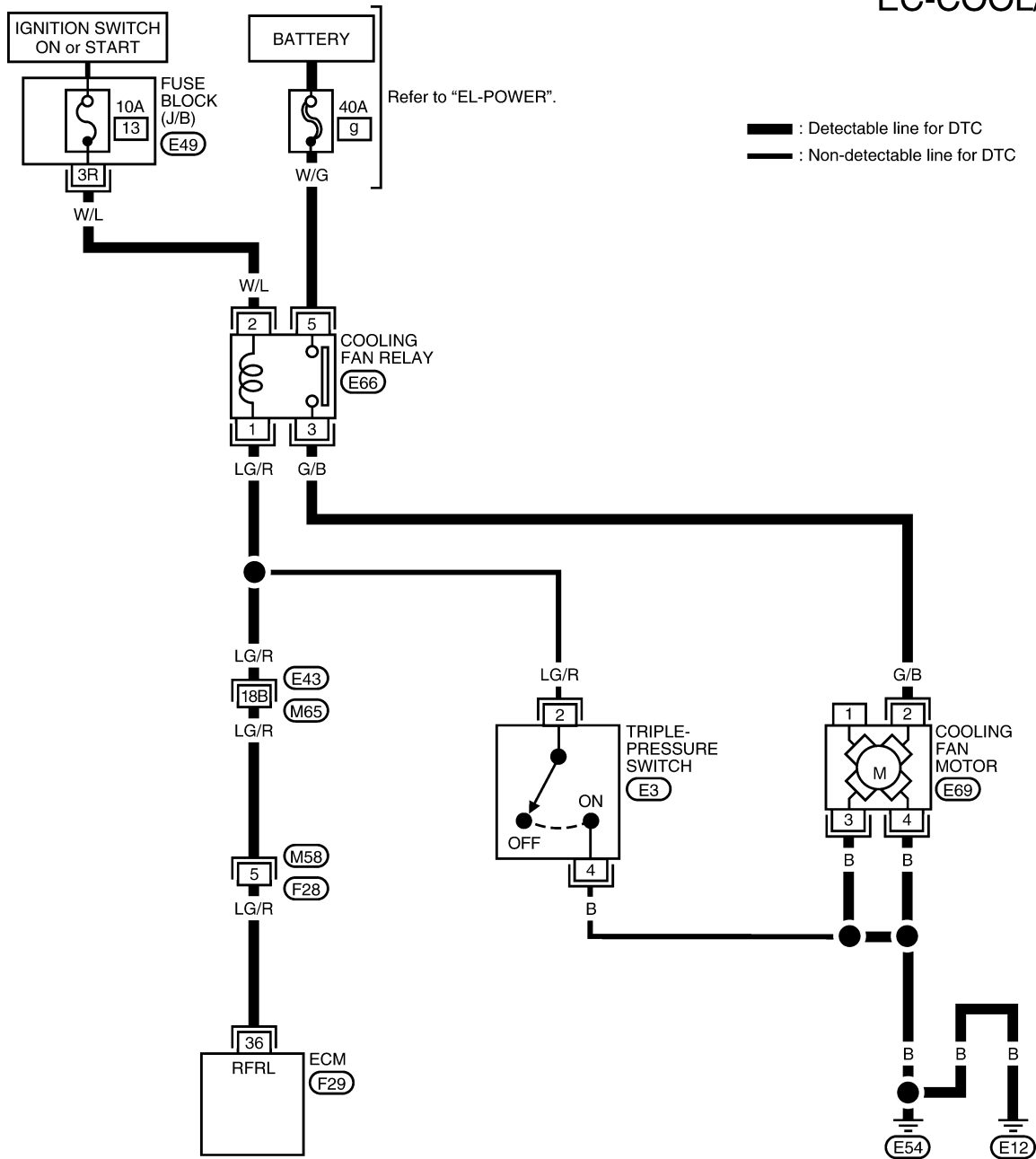
VG33E

Wiring Diagram

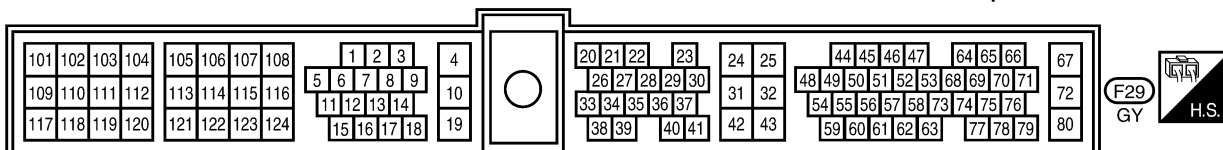
Wiring Diagram

NEEC0906

EC-COOL/F-01



Refer to the following.
(M65, E43) - SUPER
MULTIPLE JUNCTION (SMJ)



LEC504

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DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0907

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK COOLING FAN OPERATION																							
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON.</p> <p>2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>OFF</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	OFF	MONITOR		COOLAN TEMP/S	XXX °C														
ACTIVE TEST																								
COOLING FAN	OFF																							
MONITOR																								
COOLAN TEMP/S	XXX °C																							
<p>Does cooling fan rotate?</p> <p style="text-align: center;">Yes or No</p>																								
Yes	▶	GO TO 4.																						
No	▶	GO TO 9.																						

SEF376X

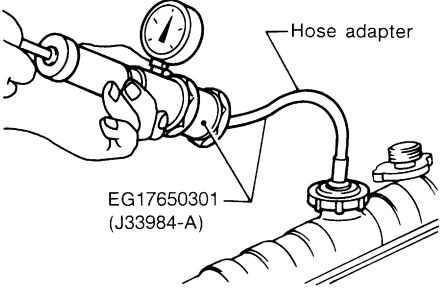
3	CHECK COOLING FAN OPERATION	
<p> Without CONSULT-II</p> <p>1. Turn ignition switch OFF.</p> <p>2. Disconnect engine coolant temperature sensor harness connector.</p> <p>3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.</p> <p>4. Start engine and make sure that cooling fan operates.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	GO TO 9.

SEF085T

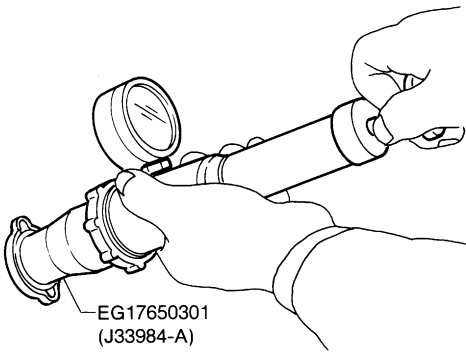
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK COOLING SYSTEM FOR LEAK		
<p>Apply pressure to the cooling system with a tester, and check if the pressure drops.</p> <p>CAUTION: Higher than the specified pressure may cause radiator damage.</p> <p style="color: blue;">Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)</p>			
			
SLC754A			
<p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	<p>Check the following for leak</p> <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump <p>Refer to LC-29, "Water Pump".</p>	

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5	CHECK RADIATOR CAP		
<p>Apply pressure to cap with a tester and check radiator cap relief pressure.</p>			
			
SLC755A			
<p style="color: blue;">Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 6.	
NG	▶	Replace radiator cap.	

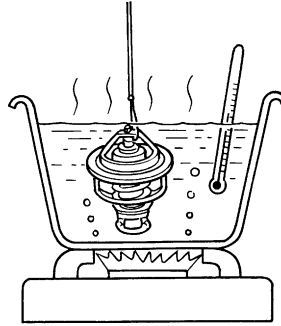
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

6 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
82°C (180°F) [standard]

Valve lift:
More than 10 mm/95°C (0.39 in/203°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to **LC-30**, "Thermostat".

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace thermostat

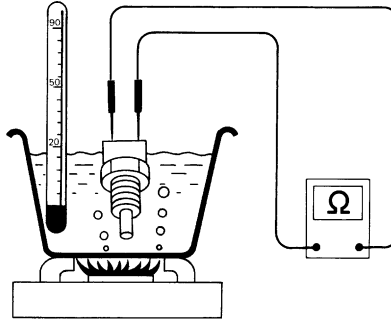
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

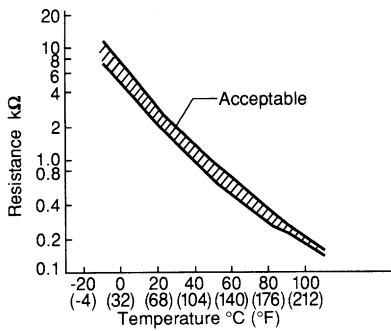
7 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

SEF152P

MTBL0229

SEF012P

OK	▶	GO TO 8.
NG	▶	Replace engine coolant temperature sensor.

8 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1083.

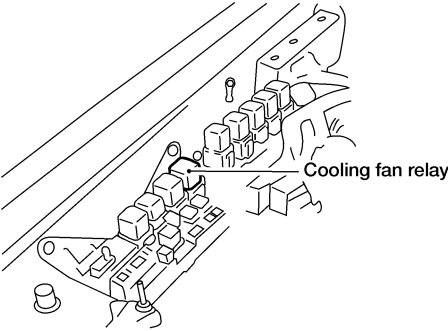
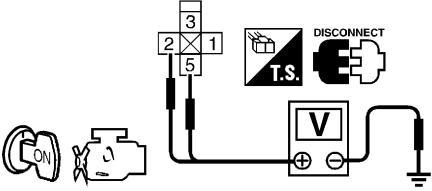
	▶	INSPECTION END
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DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

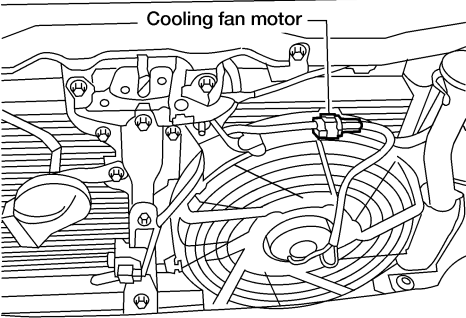
9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan relay.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 20px;">AEC932A</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 20px;">SEF667W</p> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶ GO TO 11.
NG	▶ GO TO 10.

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay and fuse ● Harness for open or short between cooling fan relay and battery 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right; font-size: small;">AEC931A</p> <p>3. Check harness continuity between relay terminal 3 and motor terminal 2, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 36 and relay terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

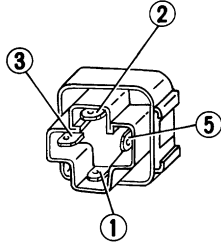
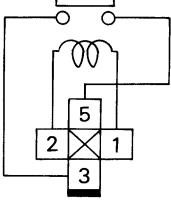
13	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

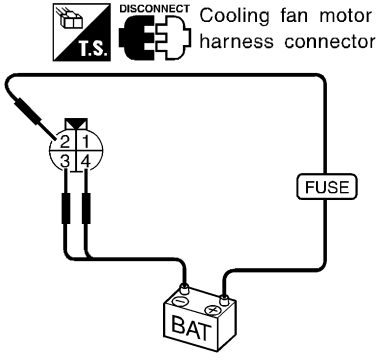
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DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

14	CHECK COOLING FAN RELAY						
<p>Check continuity between terminals 3 and 5.</p> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;">   </div>							
SEF511P							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No current supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Conditions	Continuity	12V direct current supply between terminals 1 and 2	Yes	No current supply	No
Conditions	Continuity						
12V direct current supply between terminals 1 and 2	Yes						
No current supply	No						
MTBL0252							
OK or NG							
OK	▶ GO TO 15.						
NG	▶ Replace cooling fan relay.						

15	CHECK COOLING FAN MOTOR								
<p>1. Disconnect cooling fan motor harness connector. 2. Supply cooling fan motor terminals with battery voltage and check operation.</p>									
MTBL0253									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Terminals</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td>Cooling fan motor</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3, 4</td> </tr> </tbody> </table>			Terminals		(+)	(-)	Cooling fan motor	2	3, 4
	Terminals								
	(+)	(-)							
Cooling fan motor	2	3, 4							
									
SEF670W									
<p>Cooling fan motor should operate.</p>									
OK or NG									
OK	▶ GO TO 16.								
NG	▶ Replace cooling fan motor.								

16	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.</p>	
▶	INSPECTION END

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITH ELECTRIC COOLING FAN)

VG33E

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC0908

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-27 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-25 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-25 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-30 , "Thermostat" and LC-32 , "Radiator".
ON*1	7	<ul style="list-style-type: none"> ● Cooling fan 	<ul style="list-style-type: none"> ● CONSULT-II 	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" (EC-1072).
OFF	8	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-27 , "Changing Engine Coolant".
OFF*4	10	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-27 , "ENGINE MAINTENANCE".
OFF	11	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-96 , "Inspection".
	12	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-116 , "Inspection".

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-35**, "OVERHEATING CAUSE ANALYSIS".

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1521

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in MA-27, "Changing Engine Coolant". Also, replace the engine oil.

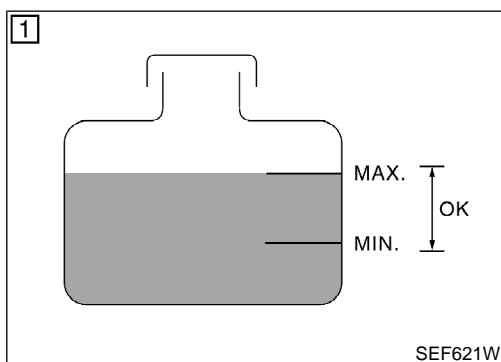
- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-15, "Anti-freeze Coolant Mixture Ratio".
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

NEEC1521S01

- Cooling fan (Crankshaft driven)
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1088.



Overall Function Check

NEEC1522

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1085.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1085.
- 3) Start engine.
- 4) Make sure that cooling fan (crankshaft driven) operates.
- 5) If NG, go to "Diagnostic Procedure", EC-1085.

EC-1084

DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)

VG33E

Overall Function Check (Cont'd)

⊗ Without CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1085.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1085.
- 3) Start engine and make sure that cooling fan (crankshaft driven) operates.
Be careful not to overheat engine.
- 4) If NG, go to "Diagnostic Procedure", EC-1085.

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Diagnostic Procedure

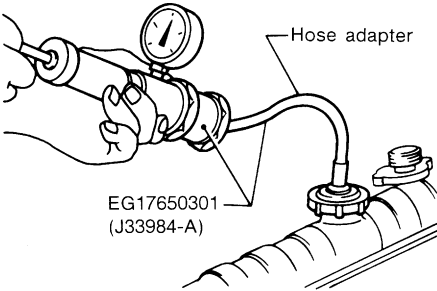
NEEC1524

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (Crankshaft driven). Refer to LC-33 , "Cooling Fan".

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2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION: Higher than the specified pressure may cause radiator damage. Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to LC-29 , "Water Pump".

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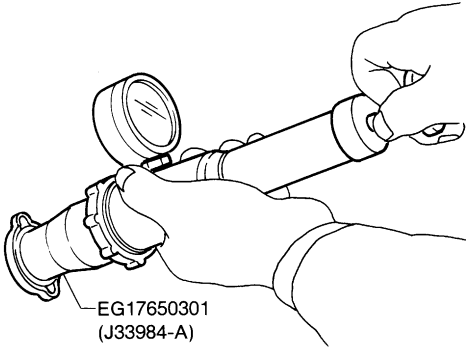
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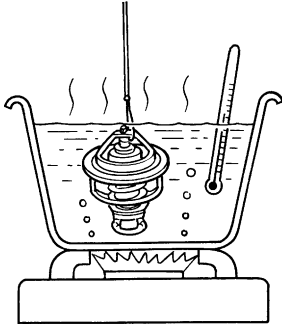
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK RADIATOR CAP		
Apply pressure to cap with a tester and check radiator cap relief pressure.			
			
<p style="color: blue; margin: 0;">Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Replace radiator cap.	

SLC755A

4	CHECK THERMOSTAT		
<ol style="list-style-type: none"> 1. Check valve seating condition at normal room temperatures. It should seat tightly. 2. Check valve opening temperature and valve lift. 			
			
<p style="color: blue; margin: 0;">Valve opening temperature: 82°C (180°F) [standard]</p> <p style="color: blue; margin: 0;">Valve lift: More than 10 mm/95°C (0.39 in/203°F)</p>			
<ol style="list-style-type: none"> 3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-30, "Thermostat". 			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	Replace thermostat	

SLC343

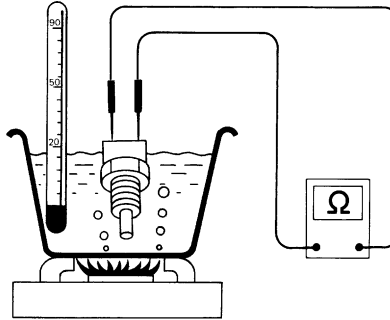
DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)

VG33E

Diagnostic Procedure (Cont'd)

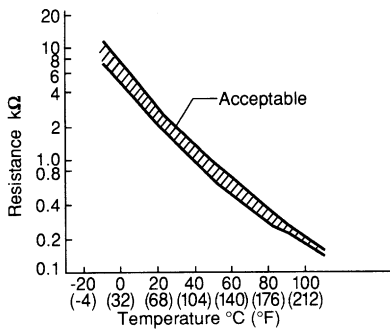
5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1088.

▶ **INSPECTION END**

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DTC P1217 ENGINE OVERTEMPERATURE (OVERHEAT) (WITHOUT ELECTRIC COOLING FAN)

VG33E

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC1525

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-27 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-25 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-25 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-30 , "Thermostat" and LC-32 , "Radiator".
ON*1	7	<ul style="list-style-type: none"> ● Cooling fan (Crankshaft driven) 	<ul style="list-style-type: none"> ● Visual 	Operating	See LC-33 , "Cooling Fan".
OFF	8	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-27 , "Changing Engine Coolant".
OFF*4	10	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-27 , "ENGINE MAINTENANCE".
OFF	11	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-96 , "Inspection".
	12	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-116 , "Inspection".

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

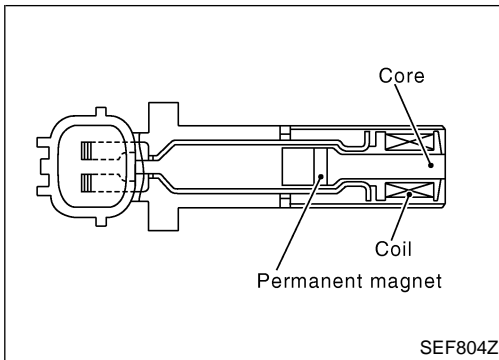
*4: After 60 minutes of cool down time.

For more information, refer to **LC-35**, "OVERHEATING CAUSE ANALYSIS".

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33E

Component Description



Component Description

NEEC0818

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

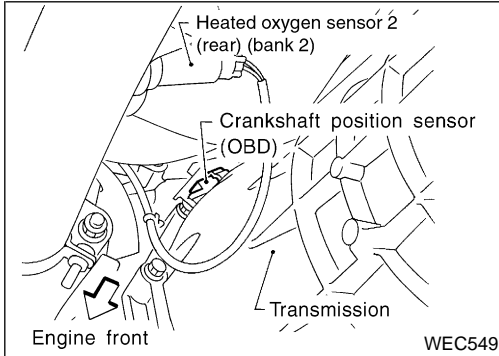
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.



ECM Terminals and Reference Value

NEEC0819

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> Warm-up condition Idle speed 	<p>1 - 2V (AC range)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p>

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. NEEC0820

POSSIBLE CAUSE

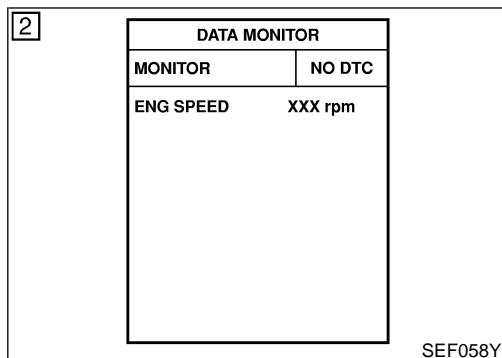
- Harness or connectors
- Crankshaft position sensor (OBD)
- Drive plate/Flywheel

NEEC0820S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0821



With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1092.

With GST

Follow the procedure "With CONSULT-II".

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

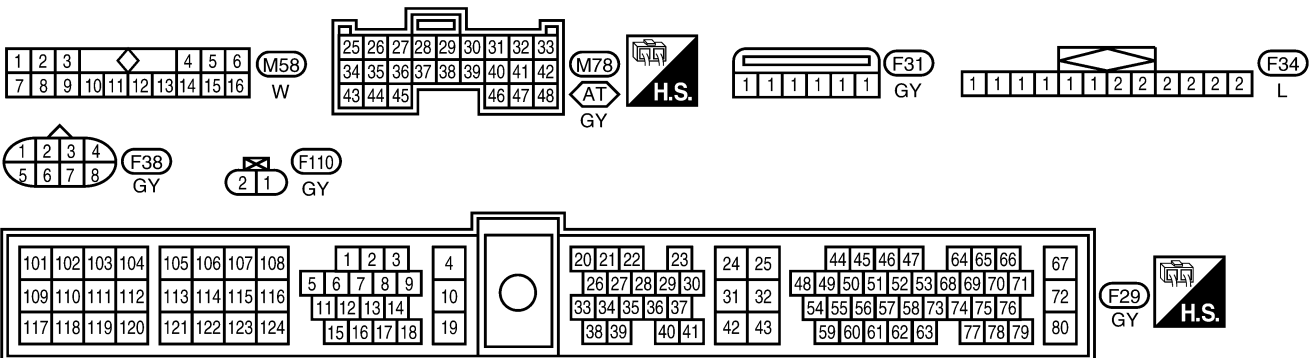
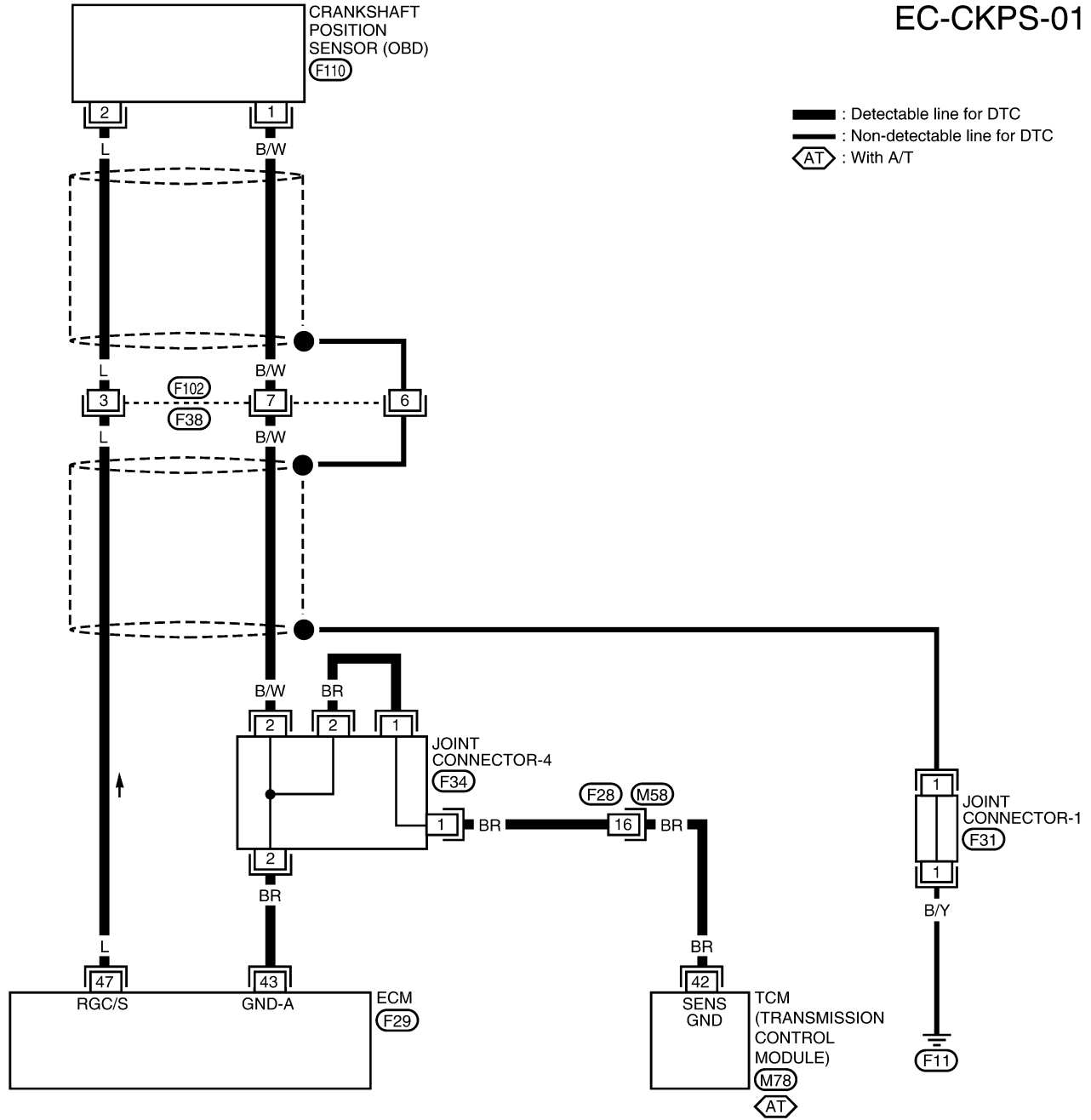
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Wiring Diagram

Wiring Diagram

NEEC0822

EC-CKPS-01



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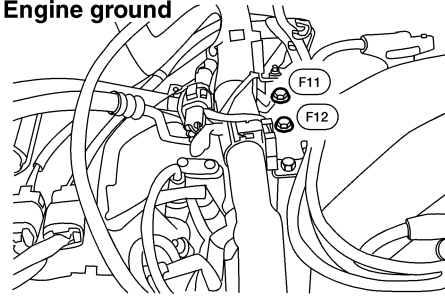
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

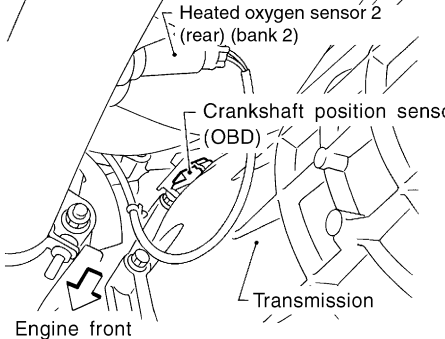
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Diagnostic Procedure

Diagnostic Procedure

NEEC0823

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> </div> <p style="text-align: right;">LEC518</p>
▶		GO TO 2.

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">WEC549</p> <p>2. Check continuity between ECM terminal 47 and sensor terminal 2. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>
OK		▶ GO TO 4.
NG		▶ GO TO 3.

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD)
▶		Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Reconnect ECM harness connectors.</p> <p>2. Check harness continuity between CKPS (OBD) terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open between crankshaft position sensor (OBD) and ECM ● Harness for open between crankshaft position sensor (OBD) and TCM (Transmission Control Module) 		
		▶ Repair open circuit or short to ground or short to power in harness or connectors.

EC
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6	CHECK IMPROPER INSTALLATION	
<p>1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).</p> <p>2. Perform "DTC Confirmation Procedure", EC-1090 again.</p> <p style="text-align: center;">Is a 1st trip DTC P1336 detected?</p>		
Yes	▶	GO TO 7.
No	▶	INSPECTION END

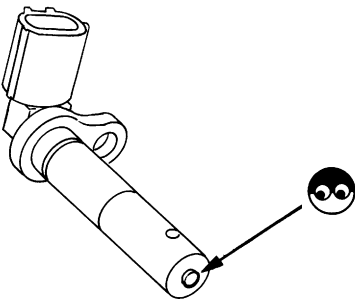
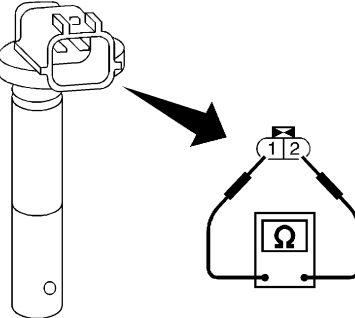
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DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK CRANKSHAFT POSITION SENSOR (OBD)
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 	
	
<ol style="list-style-type: none"> 5. Check resistance as shown in the figure. 	
	
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p>OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ Replace crankshaft position sensor (OBD).

SEF960N

SEF504V

8	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Continuity should exist. 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 10.
NG	▶ GO TO 9.

9	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-1 ● Harness for open between harness connector F38 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33E

Diagnostic Procedure (Cont'd)

10	CHECK GEAR TOOTH	
Visually check for chipping flywheel or drive plate gear tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END

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DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1046

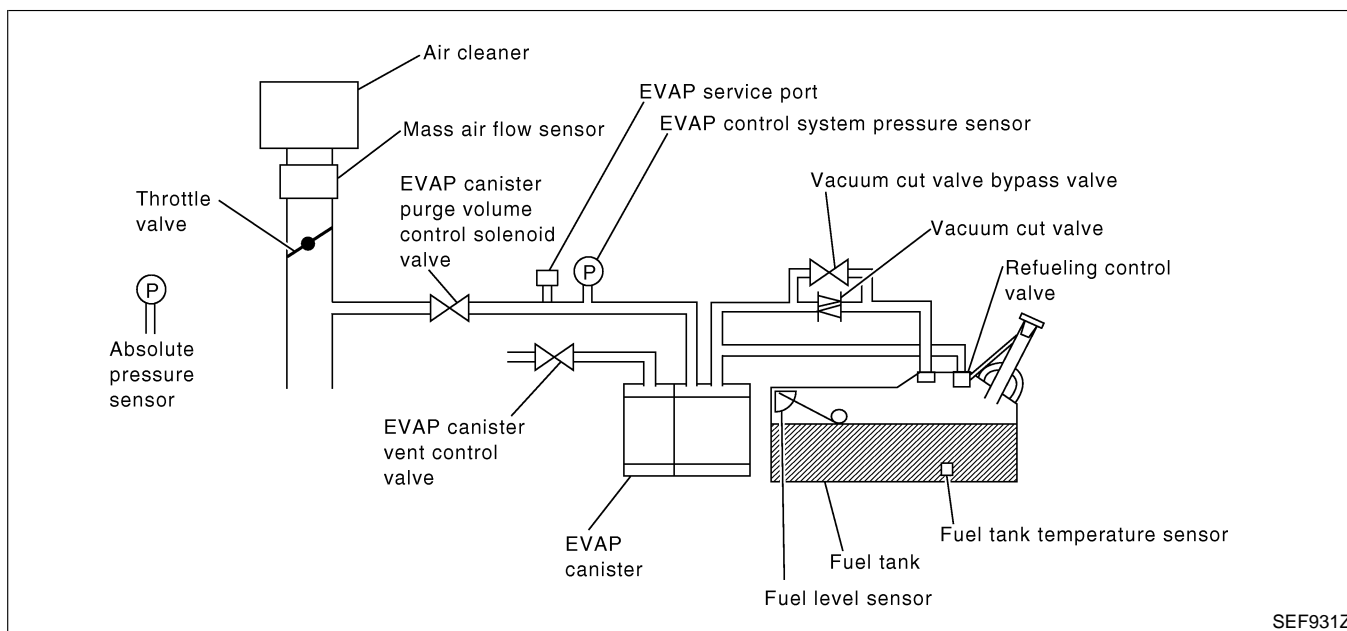
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1144.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



SEF931Z

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC1046S02

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

VG33E

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

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DTC Confirmation Procedure

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1098.

^{NEEC1048}

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Diagnostic Procedure

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1098.

^{NEEC1049}

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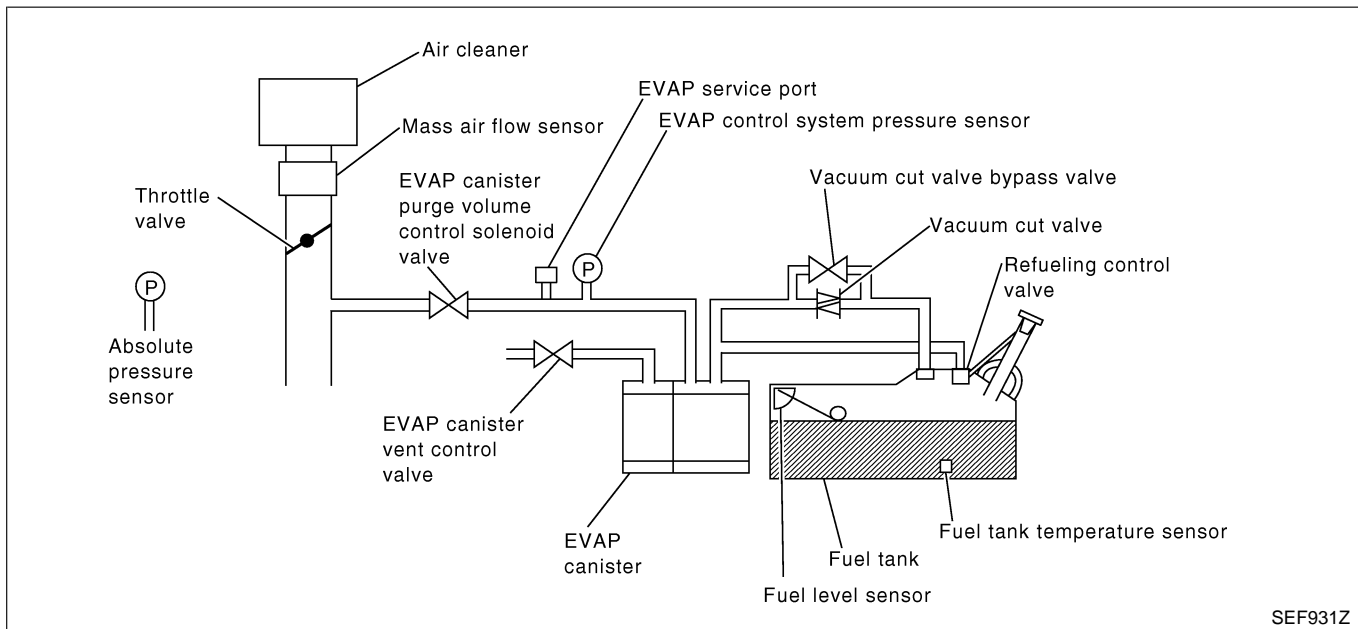
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On Board Diagnosis Logic

NEEC0990

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.


SEF931Z

Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC0990S02

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve

- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

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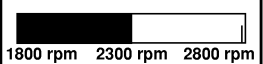
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EVAP V/S LEAK P1441	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEF881X

EVAP V/S LEAK P1441	
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.	
	

SEF882X

EVAP V/S LEAK P1441	
OK	

SEF883X

DTC Confirmation Procedure

NEEC0992

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.
 - FUEL LEVEL SE: 1.08 - 0.2V**
 - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
 - FUEL T/TMP SE: 0 - 32°C (32 - 90°F)**
 - INT A/TEMP SE: More than 0°C (32°F)**
 If NG, turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
- 3) Turn ignition switch “OFF” and wait at least 5 seconds.
- 4) Turn ignition switch “ON”.
- 5) Select “EVAP VERY/SML LEAK P1441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
- 6) Make sure that “OK” is displayed. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-846.

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NOTE:

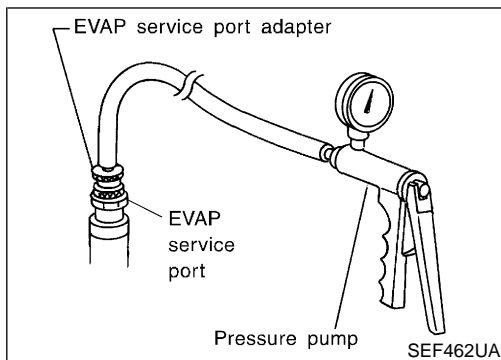
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic inspection”, EC-715.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Overall Function Check

NEEC1001

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**CAUTION:**

- **Never use compressed air, doing so may damage the EVAP system.**
 - **Do not start engine.**
 - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi).**
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch “ON”.
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

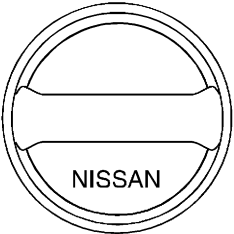
If NG, go to diagnostic procedure, EC-846.

NOTE:

For more information, refer to GST instruction manual.

Diagnostic Procedure

NEEC0993

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

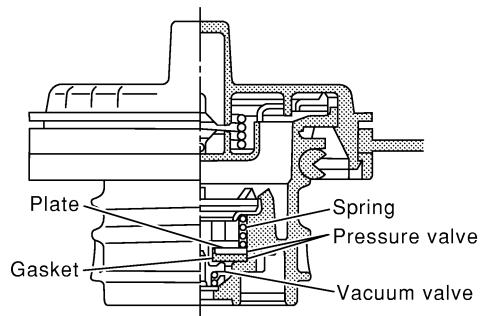
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3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

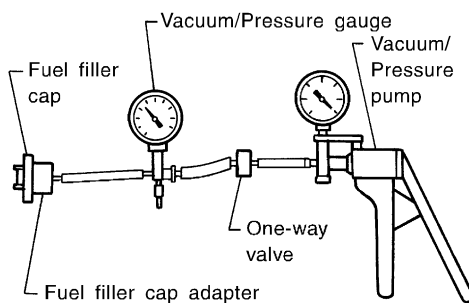
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4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

CAUTION:

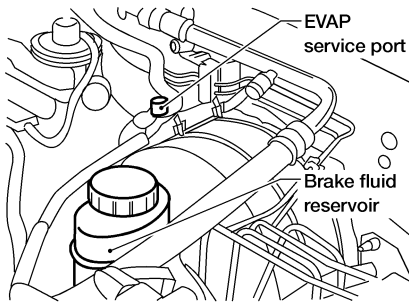
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

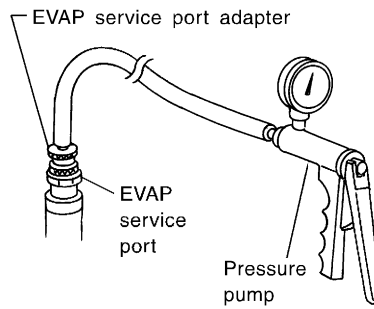
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶▶	GO TO 6.
Models without CON- SULT-II ▶▶	GO TO 7.

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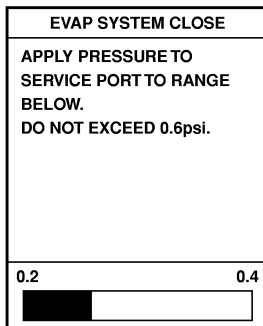
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

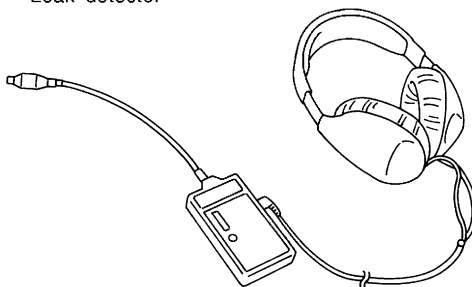
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

Leak detector



SEF200U

OK or NG

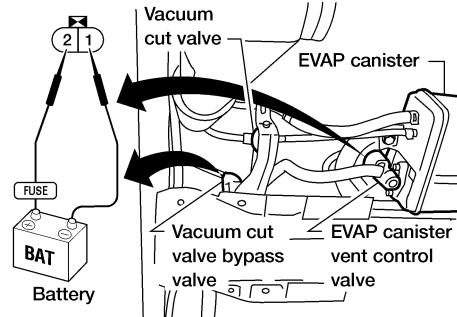
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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7 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

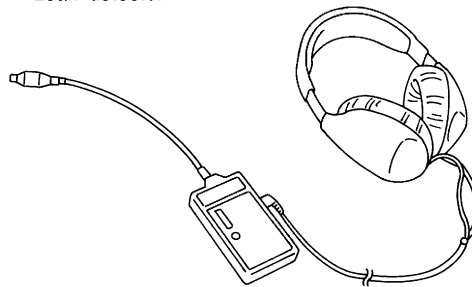
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

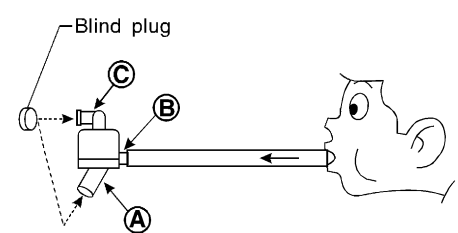
Leak detector



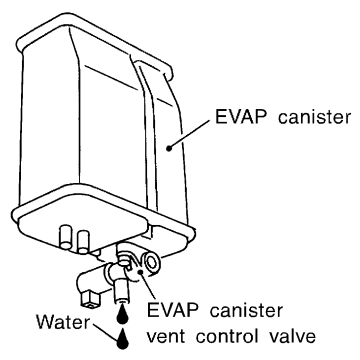
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 	
	
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>	
SEF829T	
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-1002.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister? 	
	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

SEF596U


DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)


VG33E

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33E

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-634.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

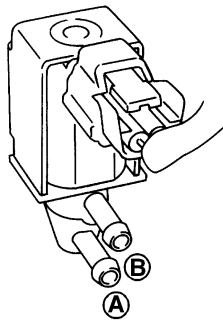
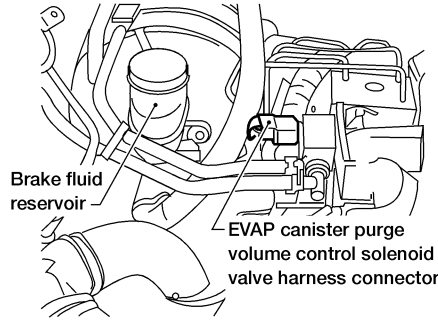
16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
④ With CONSULT-II																					
1. Start engine.																					
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.																					
<table border="1"><thead><tr><th colspan="2">ACTIVE TEST</th></tr></thead><tbody><tr><td>PURG VOL CONT/V</td><td>0.0%</td></tr><tr><th colspan="2">MONITOR</th></tr><tr><td>ENG SPEED</td><td>XXX rpm</td></tr><tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr><tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr><tr><td>HO2S1 MNTR (B1)</td><td>RICH</td></tr><tr><td>HO2S1 MNTR (B2)</td><td>RICH</td></tr><tr><td>THRTL POS SEN</td><td>XXX V</td></tr><tr><td> </td><td> </td></tr></tbody></table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK ▶	GO TO 18.																				
NG ▶	GO TO 17.																				

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17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



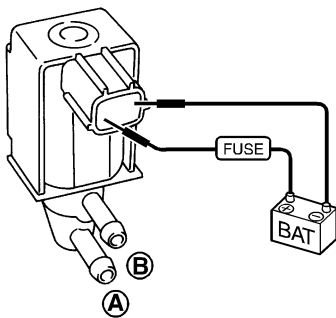
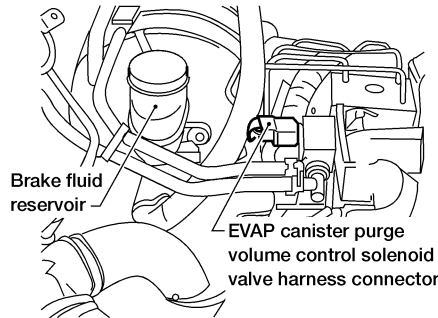
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

WEC547

SEF334X

 Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

WEC547

SEF335X

OK or NG

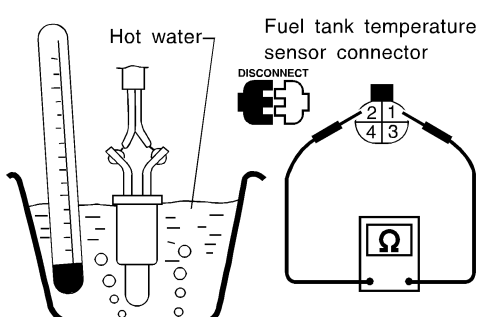
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33E

Diagnostic Procedure (Cont'd)

18	CHECK ABSOLUTE PRESSURE SENSOR	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-769. 5. Is the 1st trip DTC P0105 displayed again? <p style="text-align: right;">OK or NG</p>		
OK	▶	GO TO 19.
NG	▶	Replace ECM.

19	CHECK FUEL TANK TEMPERATURE SENSOR	
<ol style="list-style-type: none"> 1. Remove fuel level sensor unit. 2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure. 		
		
SEF974Y		
OK or NG		
OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

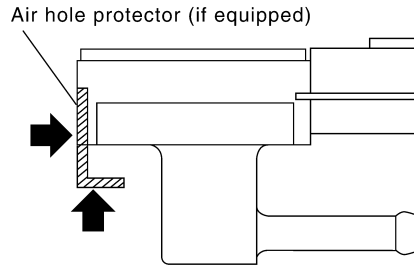
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20 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



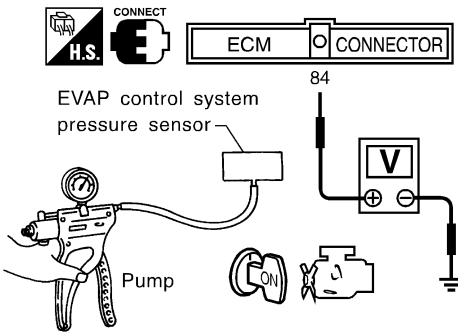
SEF799W

- Remove hose from EVAP control system pressure sensor.
- Turn ignition switch "ON".
- Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.

5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21 CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-640.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 23.
--	---	-----------

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33E

Diagnostic Procedure (Cont'd)

23	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E
Description

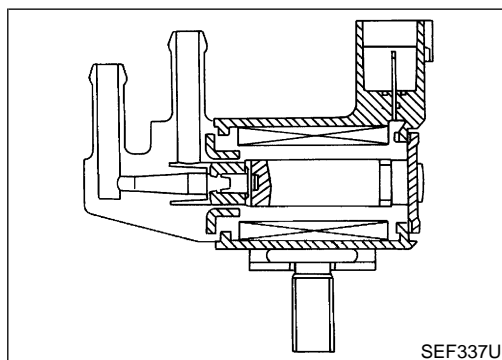
Description SYSTEM DESCRIPTION

NEEC0845

NEEC0845S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC0845S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0846

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load Idle (Vehicle stopped)	0%
	2,000 rpm	—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

ECM Terminals and Reference Value

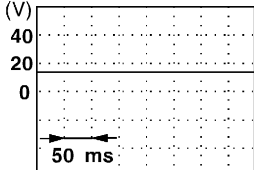
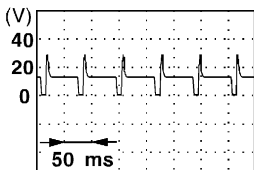
ECM Terminals and Reference Value

NEEC0847

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0848

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

POSSIBLE CAUSE

NEEC0848S01

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

DTC Confirmation Procedure

- Hoses
(Hoses are connected incorrectly or clogged.)

GI

MA

EM

LC

DTC Confirmation Procedure

NEEC0849

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

EC

FE

CL

MT

6	PURG VOL CN/V P1444	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF205Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
- 6) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for approximately 10 seconds.)

AT

TF

PD

AX

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1117.

SU

BR

6	PURG VOL CN/V P1444	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF206Y

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 20 seconds.
- 4) Select "MODE 7" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1117.

ST

RS

6	PURG VOL CN/V P1444	
	COMPLETED	

SEF237Y

BT

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EL

IDX

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

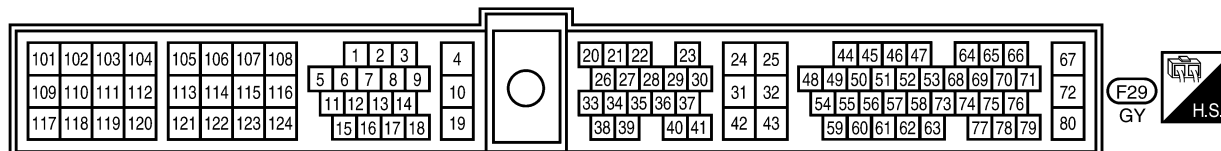
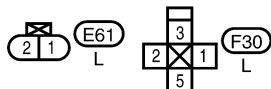
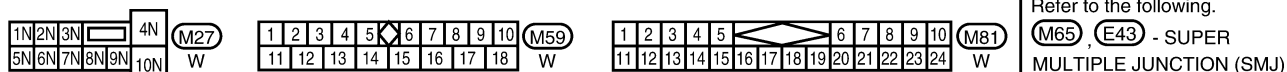
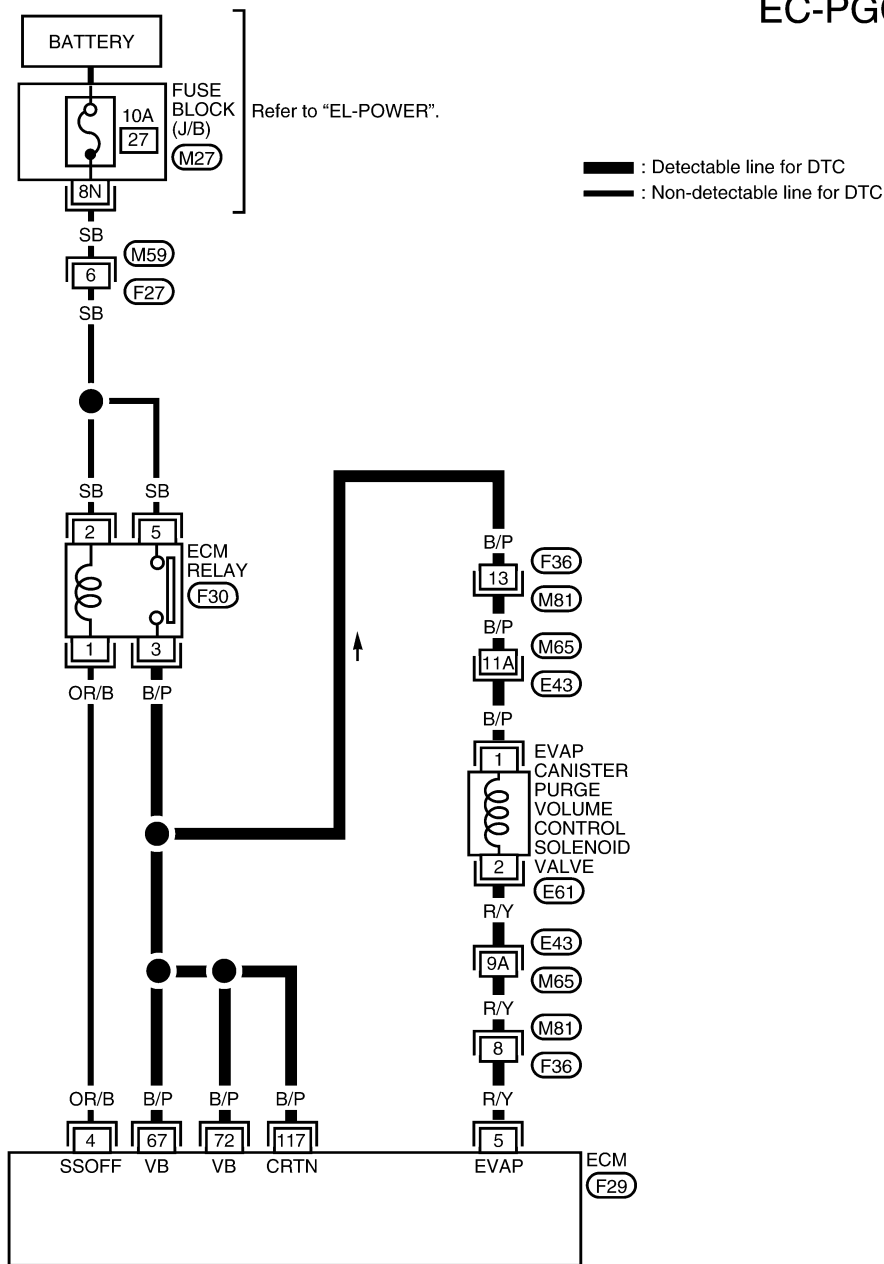
VG33E

Wiring Diagram

Wiring Diagram

NEEC0850

EC-PGC/V-01



LEC813

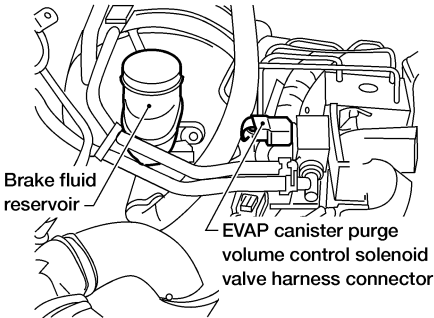
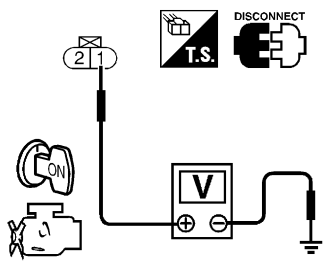
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0851

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M82, E74 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

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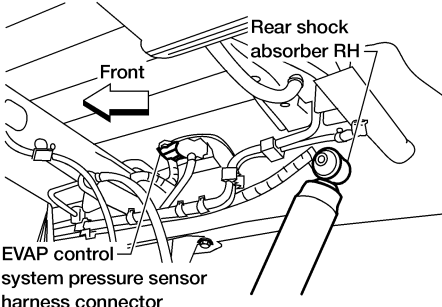
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair it.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	
	
AEC651A	
2. Check connectors for water. Water should not exist.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace EVAP control system pressure sensor.

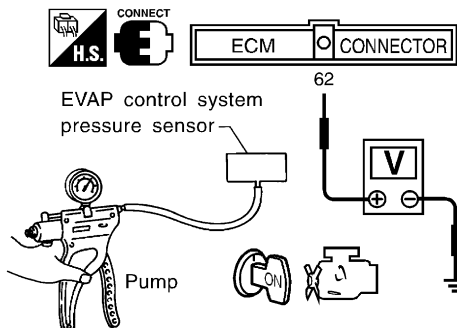
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

7 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



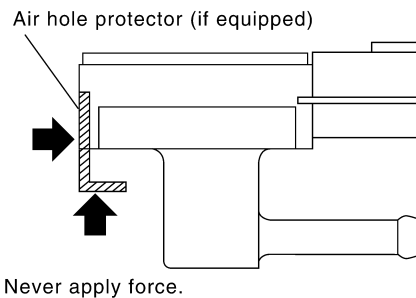
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (with CONSULT-II)	▶	GO TO 8.
OK (without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

8 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

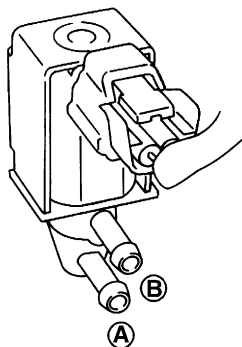
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

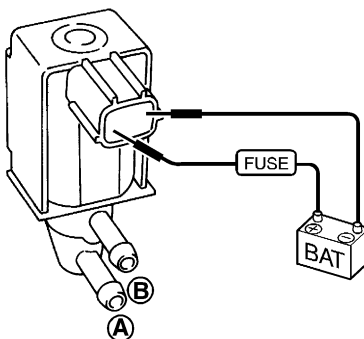
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

9 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **Without CONSULT-II**
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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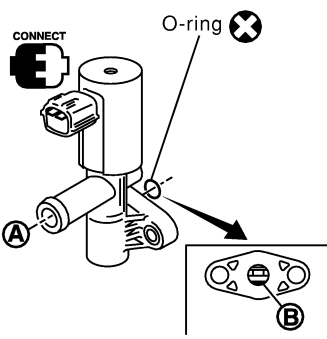
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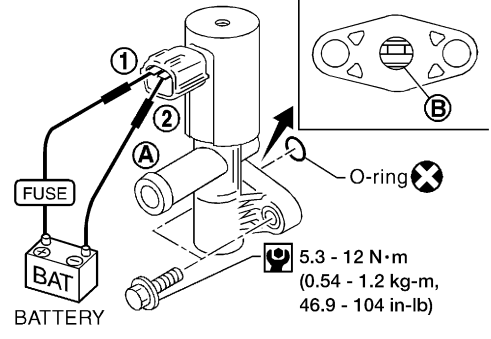
IDX

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CANISTER VENT CONTROL VALVE																								
<p>Check air passage continuity.</p> <p> With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.</p>																									
	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
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HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									

<p> Without CONSULT-II</p>							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
MTBL0240							
<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If portion B is rusted, replace control valve.</p>							
							
AEC783A							
<p>Make sure new O-ring is installed properly.</p> <p style="text-align: center;">OK or NG</p>							

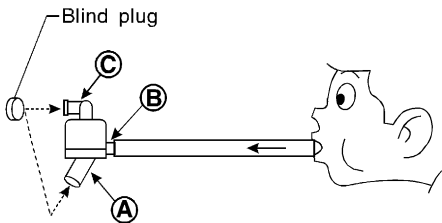
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

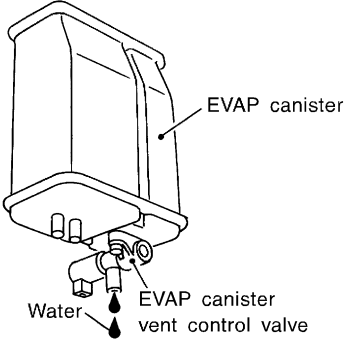
11	CHECK RUBBER TUBE	
<p>Check for obstructed rubber tube connected to EVAP canister vent control valve.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

12	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center; margin: 10px 0;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p>		
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 13.
NG	▶	Replace water separator.

13	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center;">Yes or No</p> <p style="text-align: right;">SEF596U</p>		
Yes	▶	GO TO 14.
No	▶	GO TO 16.

14	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 16.
NG	▶	GO TO 15.

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

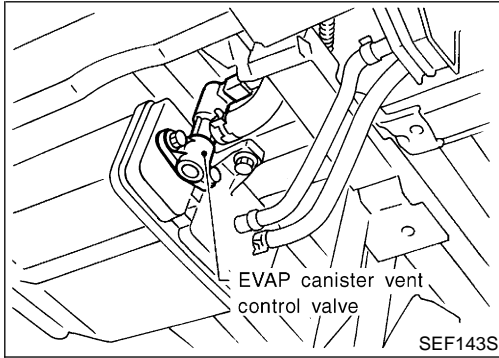
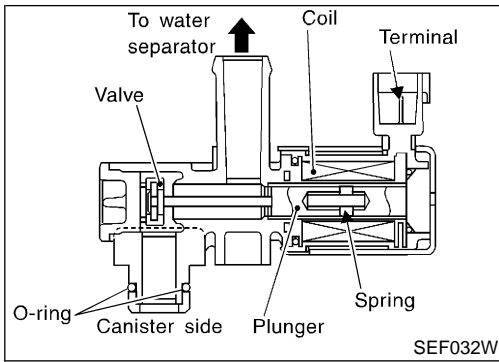
Diagnostic Procedure (Cont'd)

15	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● EVAP canister for damage● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.
16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33E

Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC0852

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI
MA
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LC
EC

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values. NEEC0853

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

FE
CL
MT
AT

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC0854

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions. =NEEC0855

POSSIBLE CAUSE

- EVAP canister vent control valve
 - EVAP control system pressure sensor and the circuit
 - Blocked rubber tube to EVAP canister vent control valve
 - Water separator
 - EVAP canister is saturated with water.
- NEEC0855S01

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF201Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1128.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

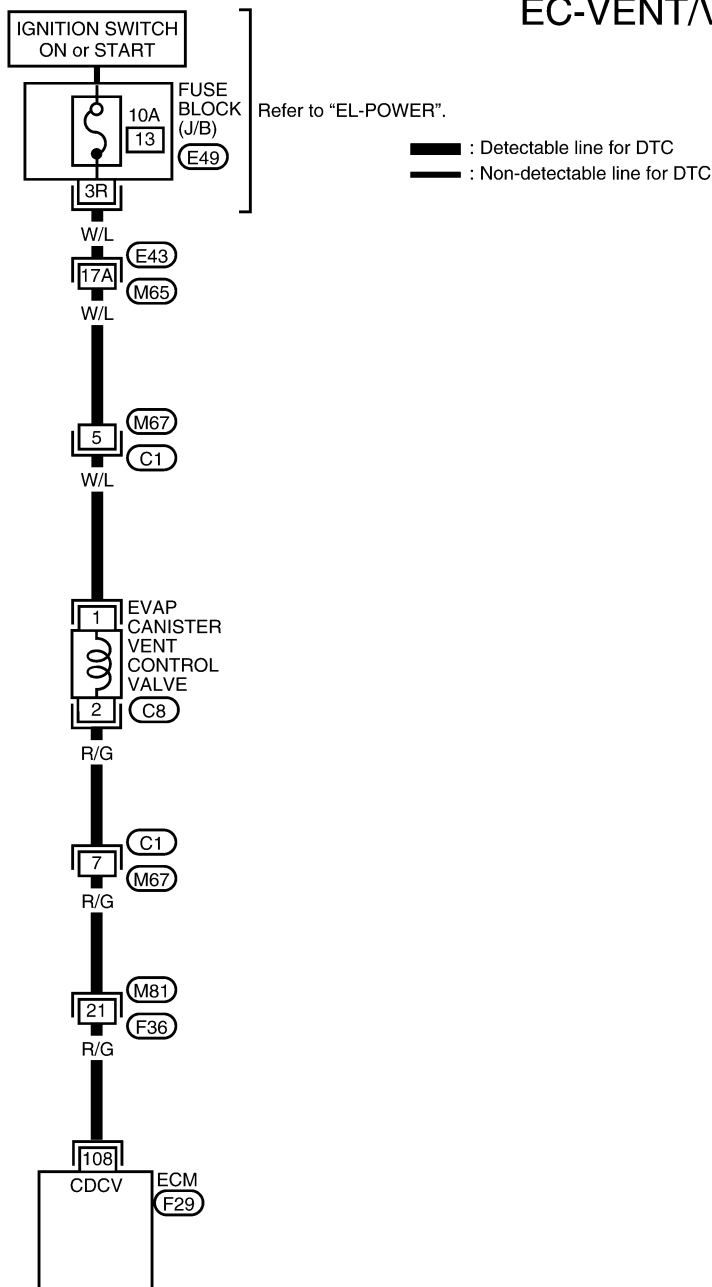
VG33E

Wiring Diagram

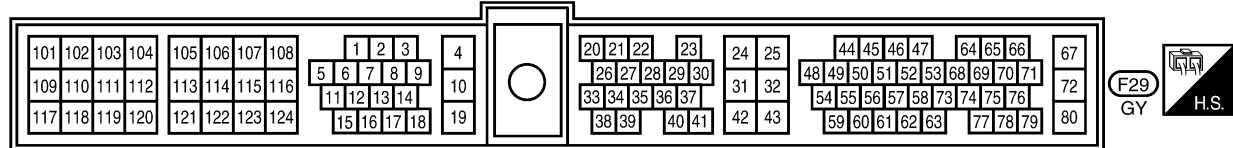
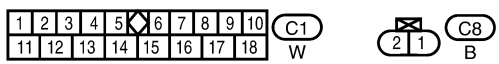
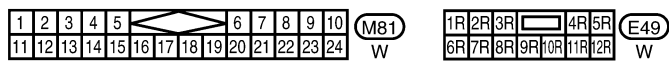
Wiring Diagram

NEEC0857

EC-VENT/V-01



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Refer to the following.
(M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)

RS
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HA
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EL
IDX

LEC814

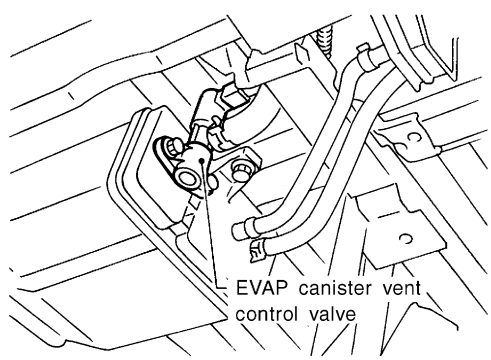
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

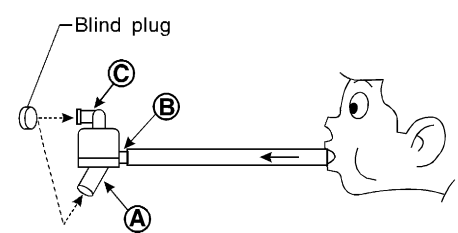
VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0858

1	CHECK RUBBER TUBE		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check obstructed rubber tube connected to EVAP canister vent control valve. 			
			
SEF143S			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

2	CHECK WATER SEPARATOR		
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 			
			
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>			
SEF829T			
5. In case of NG in items 2 - 4, replace the parts.			
NOTE:			
<ul style="list-style-type: none"> ● Do not disassemble water separator. 			
OK or NG			
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33E

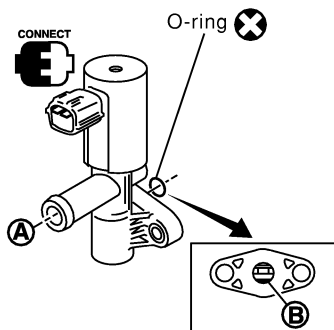
Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition	Air passage continuity between A and B
VENT CONTROL/V ON	No
VENT CONTROL/V OFF	Yes

Operation takes less than 1 second.

SEF991Y

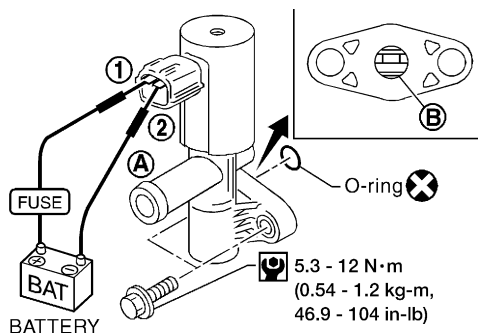
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

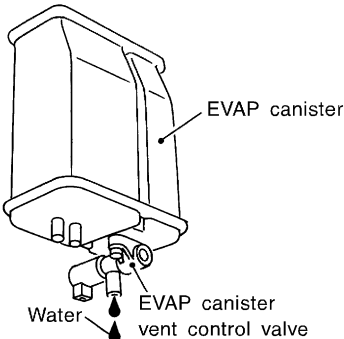
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached.</p> <p>2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 5.
No	▶	GO TO 7.

5	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

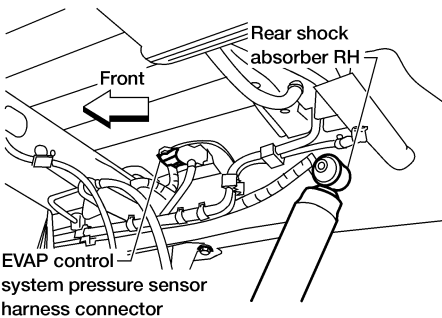
6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair it.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
		
2. Check connectors for water. Water should not exist.		
AEC651A		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

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9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1008.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

MT

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10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶ INSPECTION END		

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

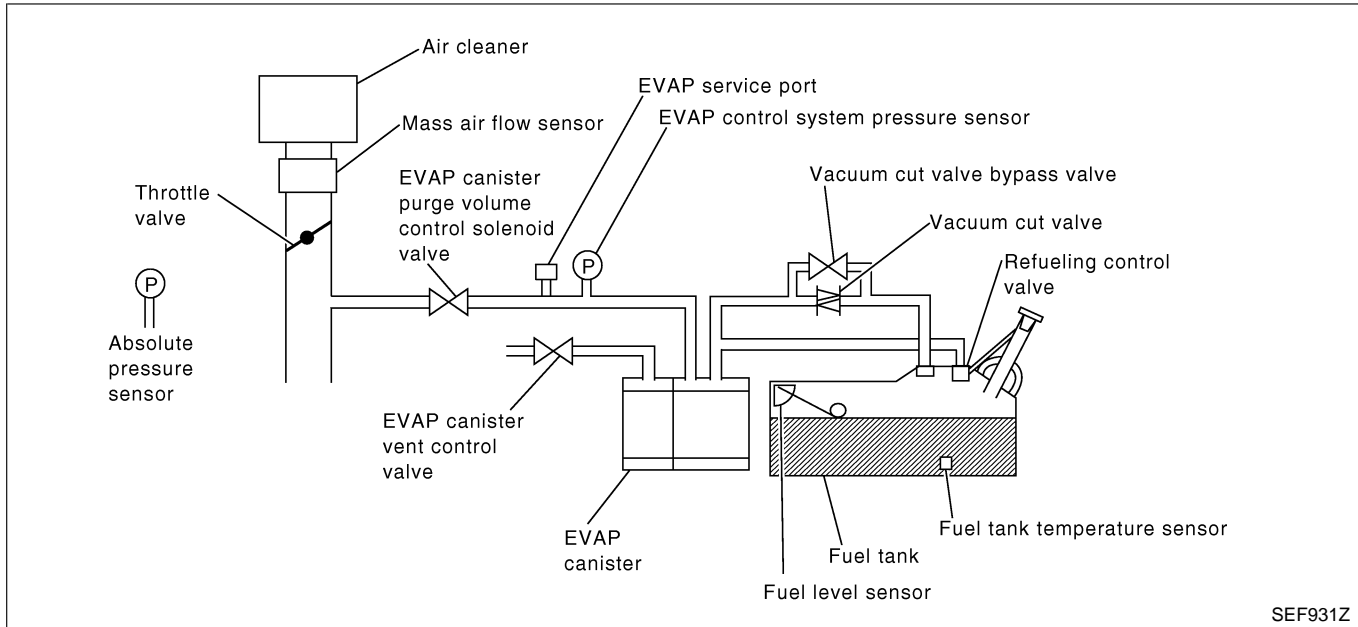
System Description

System Description

NEEC0859

NOTE:

If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1054.)



SEF931Z

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NEEC0860

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

POSSIBLE CAUSE

NEEC0860S01

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

On Board Diagnosis Logic (Cont'd)

NEEC0861

5

PURG FLOW P1447	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF207Y

6

PURG FLOW P1447	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF208Y

6

PURG FLOW P1447	
COMPLETED	

SEF238Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 70 seconds.
- 4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If "TESTING" is not changed for a long time, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1135.

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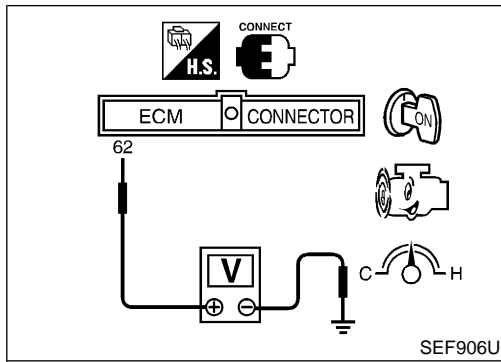
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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

Overall Function Check



Overall Function Check

=NEEC0862

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF, wait at least 5 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.
- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

- 8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- 9) If NG, go to "Diagnostic Procedure", EC-1135.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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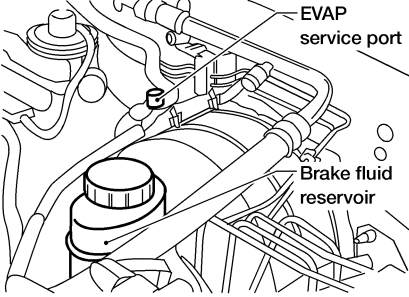
Diagnostic Procedure

Diagnostic Procedure

=NEEC0863

1	CHECK EVAP CANISTER	
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

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2	CHECK PURGE FLOW																			
④ With CONSULT-II 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.																				
																				
AEC649A																				
2. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 4. Rev engine up to 2,000 rpm. 5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.																				
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>PURG VOL CONT/V</th> <th>XXX %</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V
ACTIVE TEST																				
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ENG SPEED	XXX rpm																			
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THRTL POS SEN	XXX V																			
<table border="1" style="margin: auto;"> <thead> <tr> <th>PURG VOL CONT/V</th> <th>VACUUM</th> </tr> </thead> <tbody> <tr> <td>100.0%</td> <td>Should exist</td> </tr> <tr> <td>0.0%</td> <td>Should not exist</td> </tr> </tbody> </table>			PURG VOL CONT/V	VACUUM	100.0%	Should exist	0.0%	Should not exist												
PURG VOL CONT/V	VACUUM																			
100.0%	Should exist																			
0.0%	Should not exist																			
OK or NG																				
OK	▶	GO TO 7.																		
NG	▶	GO TO 4.																		

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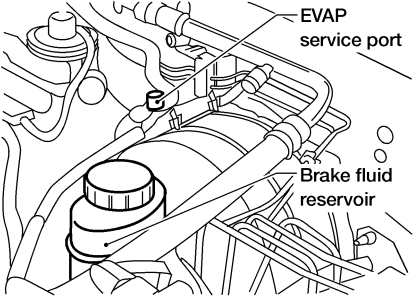
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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW		
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. 			
			
AEC649A			
<ol style="list-style-type: none"> 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. 			
OK or NG			
OK	▶	GO TO 7.	
NG	▶	GO TO 4.	

4	CHECK EVAP PURGE LINE		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644. 			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	Repair it.	

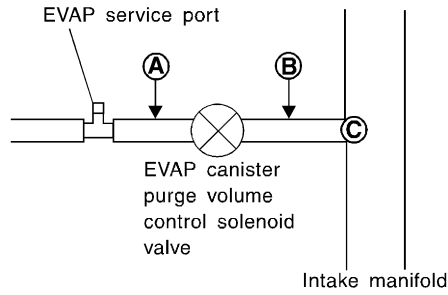
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

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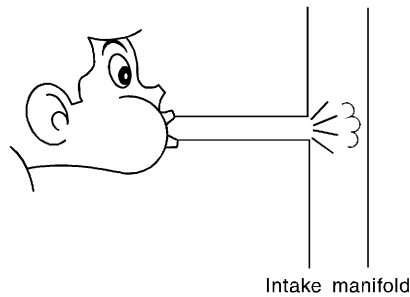
Diagnostic Procedure (Cont'd)

5 CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF367U

SEF368U

OK or NG

OK (with CONSULT-II)	▶	GO TO 6.
OK (without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

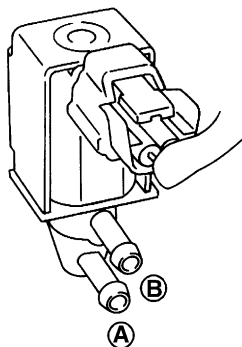
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

If NG, replace the EVAP canister purge volume control solenoid valve.

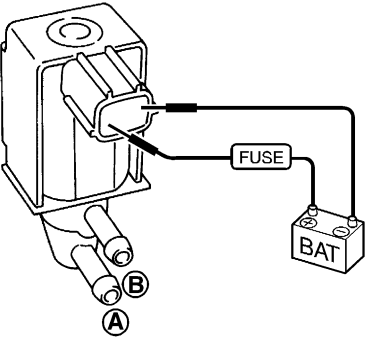
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

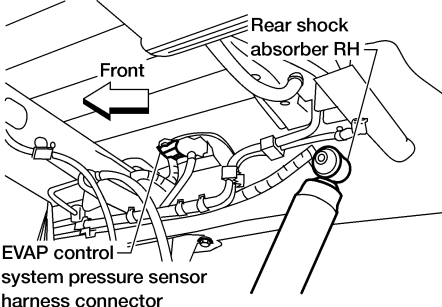
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Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE						
<p>⊗ Without CONSULT-II Check air passage continuity.</p>							
							
SEF661U							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals 1 and 2</td> <td style="padding: 5px;">Yes</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="padding: 5px;">No</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
MTBL0242							
<p>If NG, replace the EVAP canister purge volume control solenoid valve.</p> <p style="text-align: center;">OK or NG</p>							
OK	▶	GO TO 8.					
NG	▶	Replace EVAP canister purge volume control solenoid valve.					

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8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

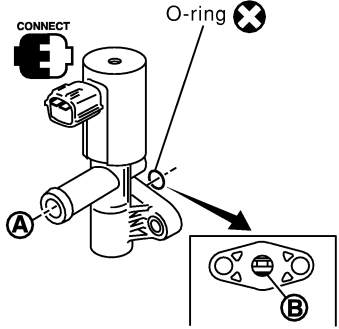
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p>		
		
AEC651A		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

Diagnostic Procedure (Cont'd)

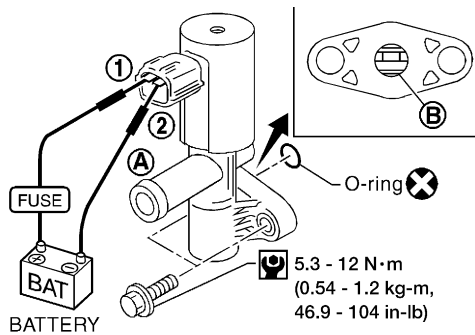
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1008.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																										
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II		
Condition	Air passage continuity between A and B	
12V direct current supply between terminals 1 and 2	No	
OFF	Yes	

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

Diagnostic Procedure (Cont'd)

12	CHECK CLOSED THROTTLE POSITION SWITCH																							
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check indication of "CLSD THL/P SW". <p>Measurement must be made with closed throttle position switch installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0355</p> <p>If NG, adjust closed throttle position switch. Check the following items. Refer to "Basic Inspection", EC-715.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p>6. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: center;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="text-align: center;">GO TO 14.</td> </tr> <tr> <td style="text-align: center;">NG</td> <td style="text-align: center;">▶</td> <td style="text-align: center;">Replace throttle position switch with throttle position sensor.</td> </tr> </table>			Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)	OK	▶	GO TO 14.	NG	▶	Replace throttle position switch with throttle position sensor.
Throttle valve conditions	CLSD THL/P SW																							
Completely closed	ON																							
Partially open or completely open	OFF																							
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)																							
OK	▶	GO TO 14.																						
NG	▶	Replace throttle position switch with throttle position sensor.																						

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

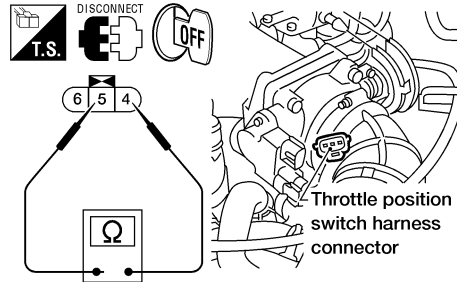
Diagnostic Procedure (Cont'd)

13 CHECK CLOSED THROTTLE POSITION SWITCH



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-715.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

14 CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-644.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

15 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.
--	---	-----------

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33E

Diagnostic Procedure (Cont'd)

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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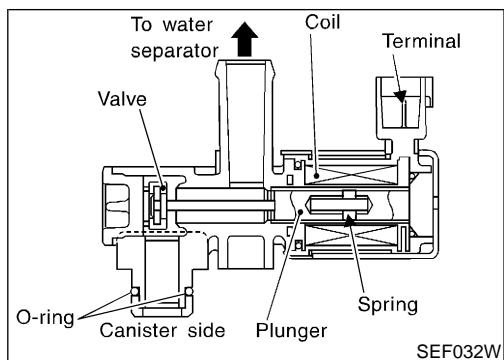
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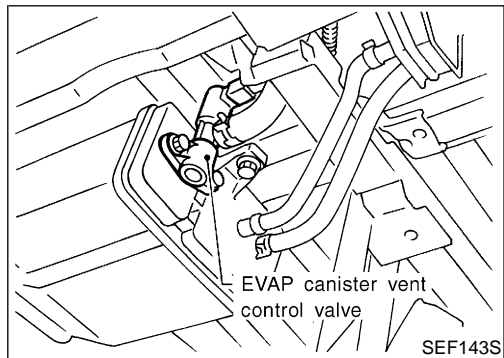
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

Component Description



SEF032W



SEF143S

Component Description

NEEC0864

NOTE:

If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0865

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NEEC0866

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC0867

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

POSSIBLE CAUSE

NEEC0867S01

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

EC-1144

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

DTC Confirmation Procedure

DTC Confirmation Procedure

NEEC0868

NOTE:

- If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEF565X

EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEF566X

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

CONNECT O-ring

A B

SEF013Z

With CONSULT-II

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
 - 4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)

- 5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-715.

- 6) Make sure that "OK" is displayed.
If "NG" is displayed, go to the following step.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn ON.
- 8) Disconnect hose from water separator.
- 9) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT-II.
- 10) Touch ON and OFF alternately.

- 11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

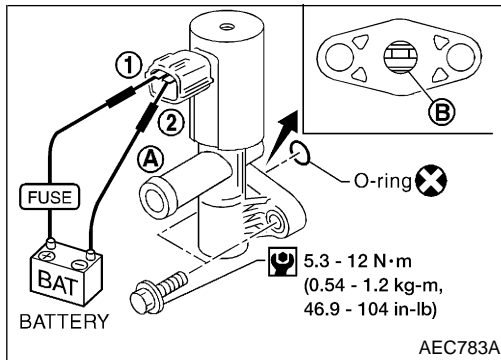
If the result is NG, go to "Diagnostic Procedure", EC-1148.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-979.

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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed. ^{NEEC0869}

⊗ Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-1148.
 If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-979.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

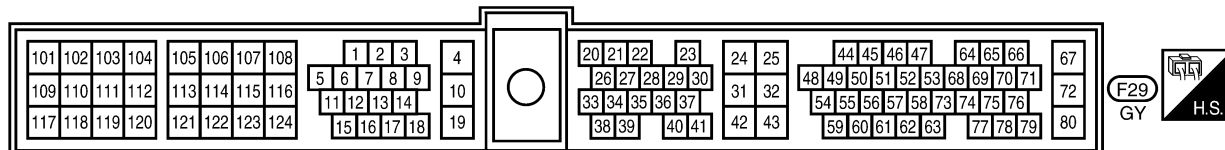
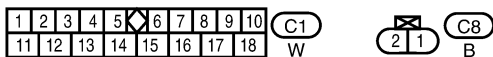
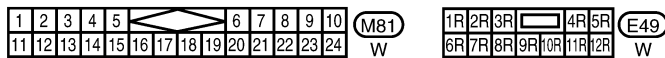
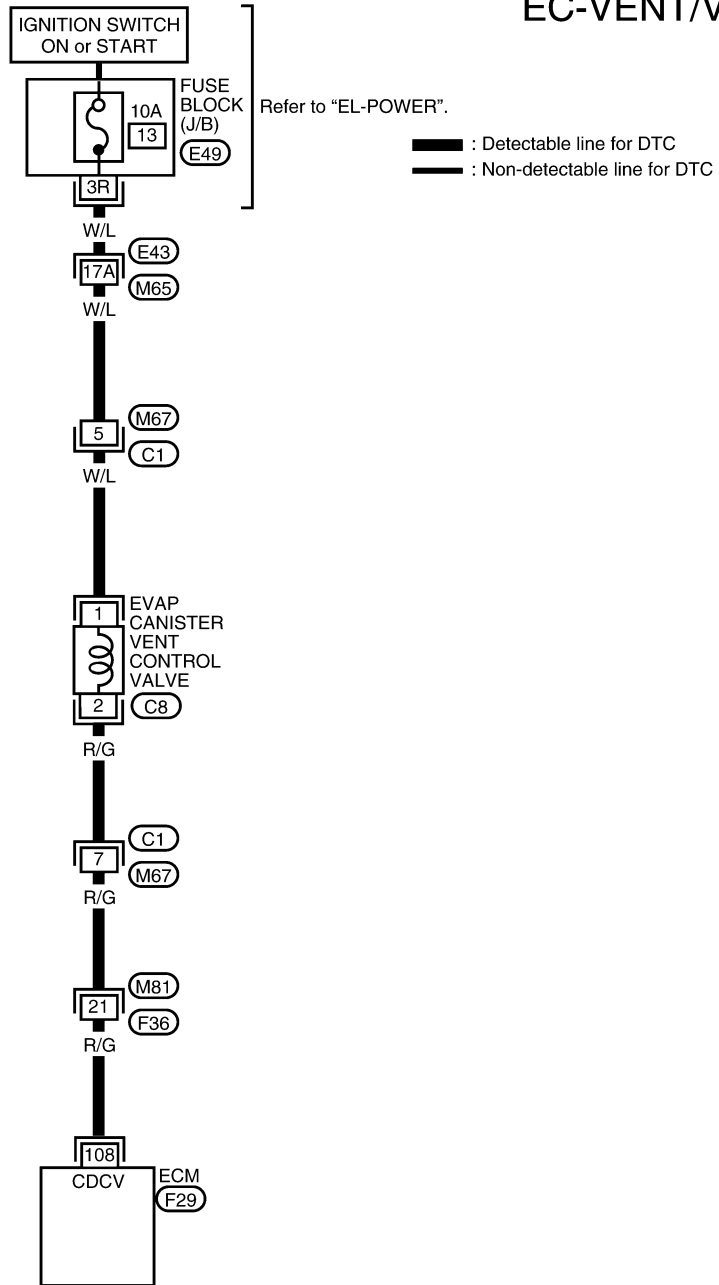
VG33E

Wiring Diagram

Wiring Diagram

NEEC0870

EC-VENT/V-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

LEC814

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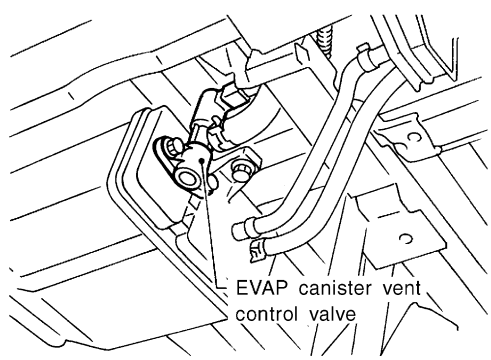
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

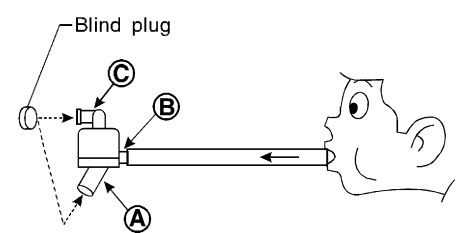
VG33E

Diagnostic Procedure

Diagnostic Procedure

NEEC0871

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF.</p> <p>2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube.

2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p style="margin-left: 40px;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 3.
NG	▶	Replace water separator.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

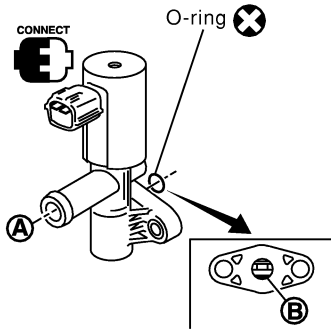
Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

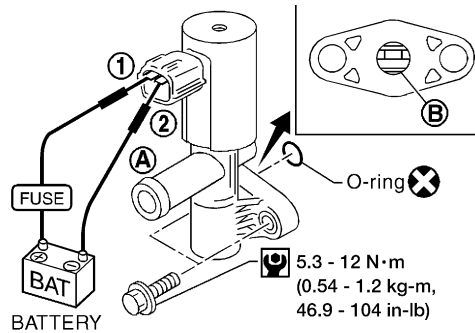
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

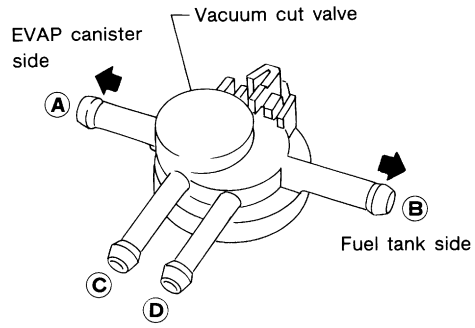
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

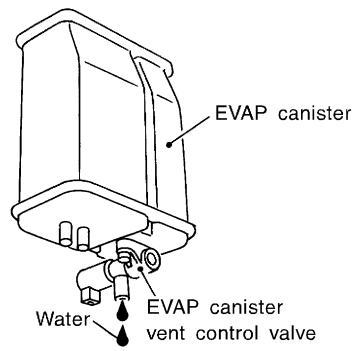
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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF379Q</p> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="width: 10%;">GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Replace vacuum cut valve.
OK	▶	GO TO 5.							
NG	▶	Replace vacuum cut valve.							

5	CHECK IF EVAP CANISTER SATURATED WITH WATER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="width: 10%;">GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 6.	NG	▶	GO TO 8.
OK	▶	GO TO 6.							
NG	▶	GO TO 8.							

6	CHECK EVAP CANISTER	<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="width: 10%;">GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace the EVAP canister.</td> </tr> </table>		OK	▶	GO TO 8.	NG	▶	Replace the EVAP canister.
OK	▶	GO TO 8.							
NG	▶	Replace the EVAP canister.							

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33E

Diagnostic Procedure (Cont'd)

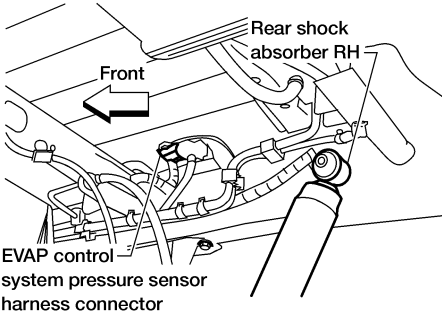
7	DETECT MALFUNCTIONING PART		
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 			
		▶	Repair hose or replace EVAP canister.

GI
MA

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE		
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.			
OK or NG			
OK		▶	GO TO 9.
NG		▶	Repair it.

EM
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EC

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR		
1. Disconnect EVAP control system pressure sensor harness connector.			
			
2. Check connectors for water. Water should not exist.			
OK or NG			
OK		▶	GO TO 10.
NG		▶	Replace EVAP control system pressure sensor.

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10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION		
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1008.			
OK or NG			
OK		▶	GO TO 11.
NG		▶	Replace EVAP control system pressure sensor.

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11	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.			
		▶	INSPECTION END

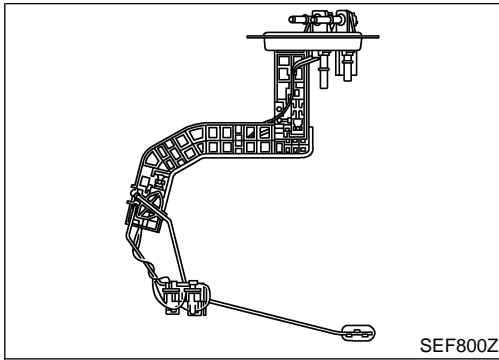
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DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL) VG33E

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. NEEC0994 The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC1000

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	P/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor. NEEC0995

One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.) NEEC0995S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test. NEEC0997

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL) VG33E

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NEEC0997S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II. GI
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", MA
EC-1155.

WITH GST

NEEC0997S02

Follow the procedure "WITH CONSULT-II" above. EM

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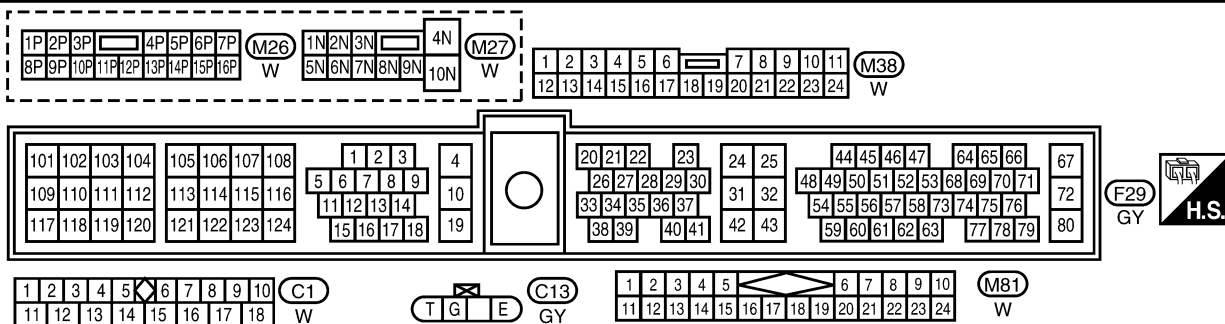
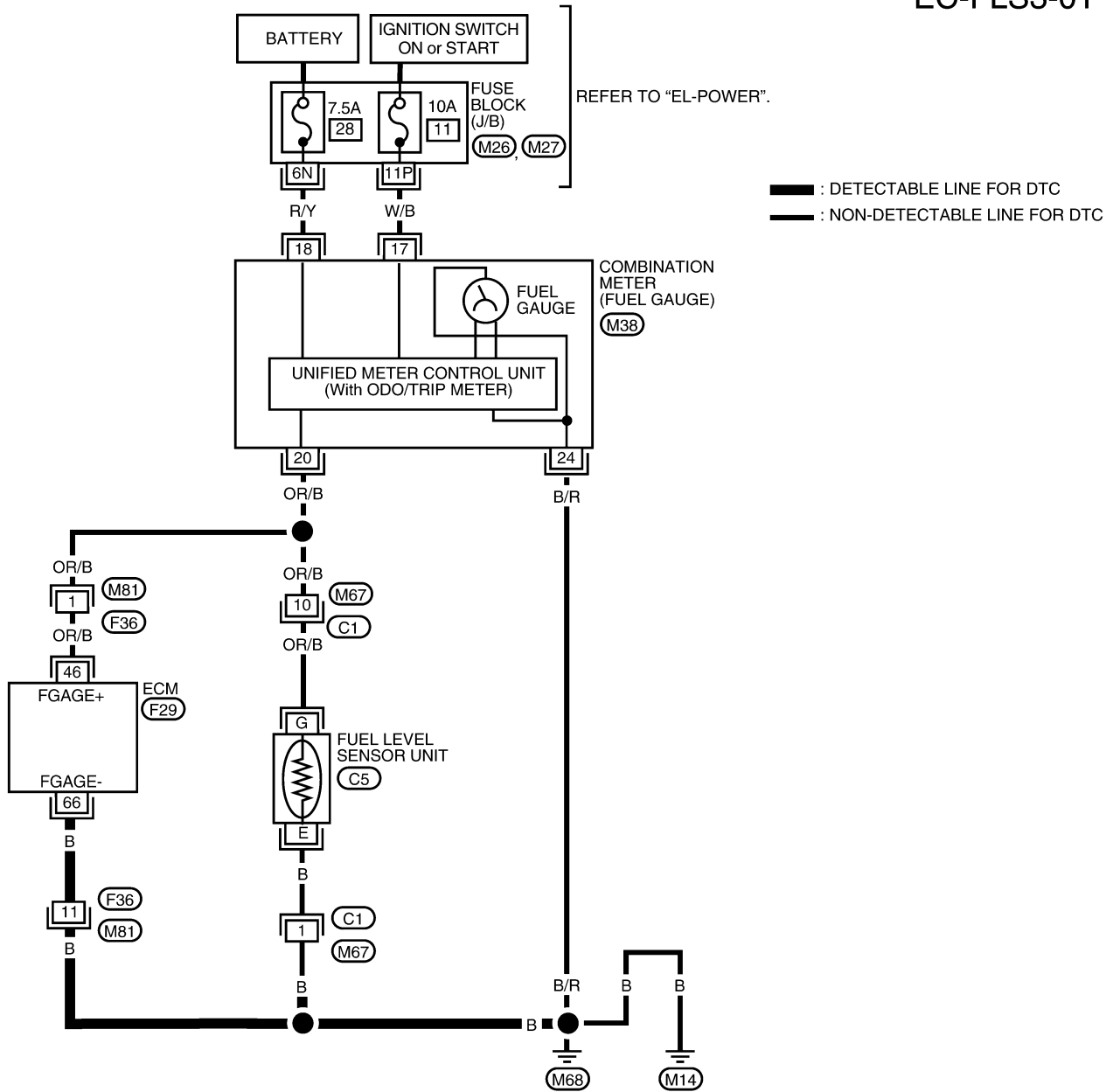
DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL) VG33E

Wiring Diagram

Wiring Diagram

NEEC0998

EC-FLS3-01



WEC820

Diagnostic Procedure

=NEEC0999

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 66 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

GI
MA
EM
LC

2	DETECT MALFUNCTIONING PART	
1. Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness for open and short between ECM and body ground 		
		▶ Replace open circuit or short to power in harness or connectors.

EC
FE
CL

3	CHECK FUEL LEVEL SENSOR	
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace fuel level sensor unit.

MT
AT
TF

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753		
OK or NG		
		▶ INSPECTION END

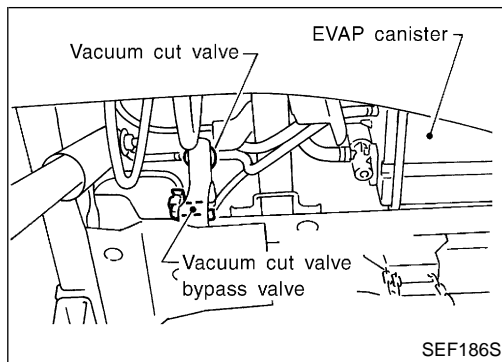
PD
AX

SU
BR
ST
RS
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IDX

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

VG33E

Description



Description

COMPONENT DESCRIPTION

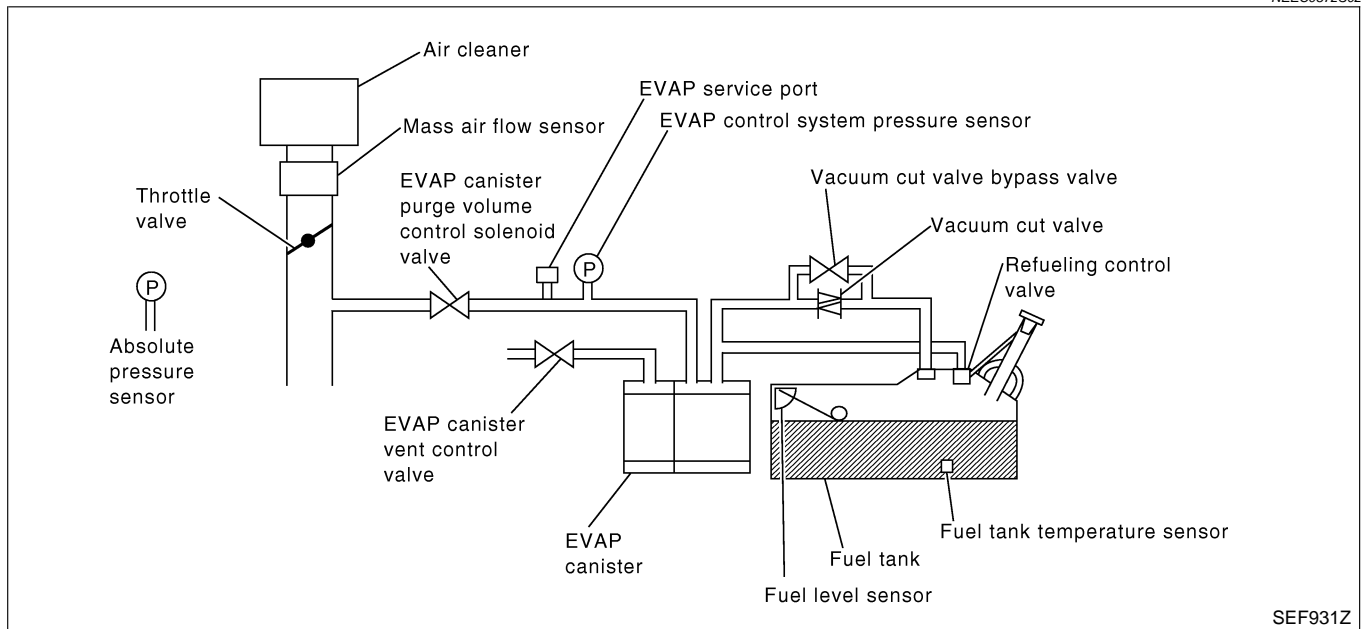
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve. NEEC0875

POSSIBLE CAUSE

- Harness or connectors
(The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

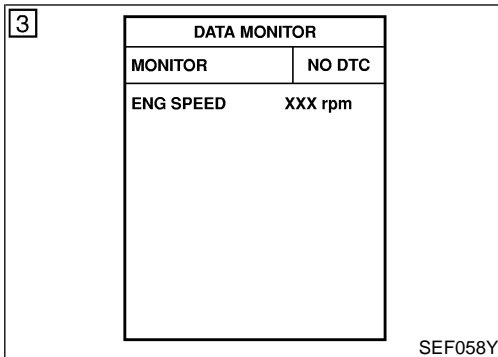
DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC0876

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.



④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1159.

⑤ With GST

Follow the procedure "With CONSULT-II".

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

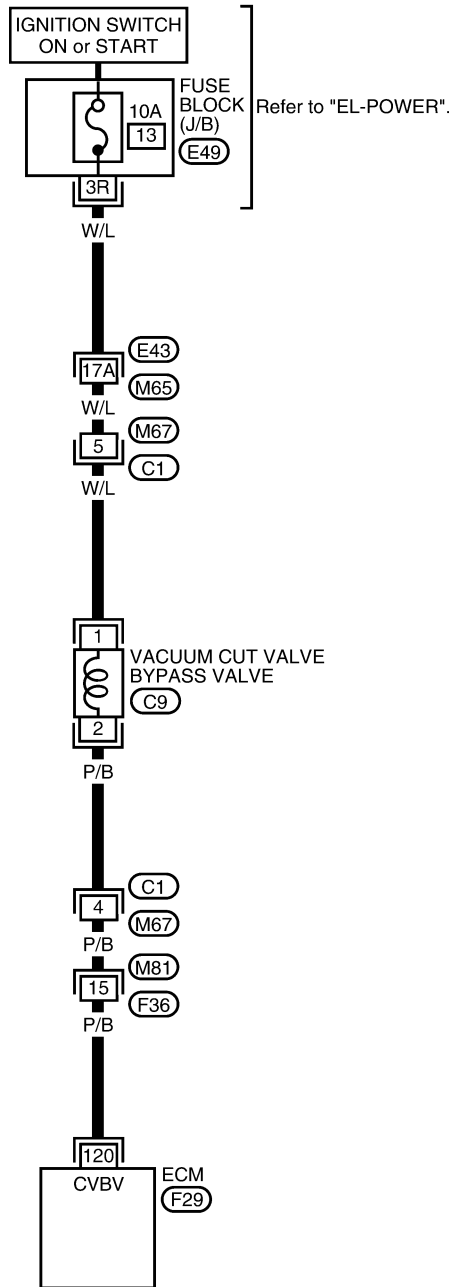
VG33E

Wiring Diagram

Wiring Diagram

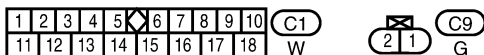
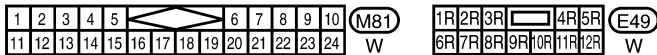
NEEC0877

EC-BYPS/V-01



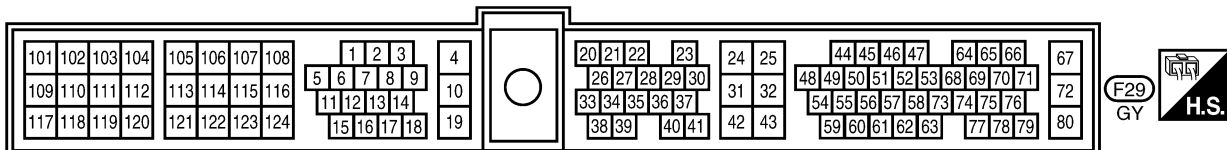
Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC



Refer to the following.

(M65), (E43) - SUPER
MULTIPLE JUNCTION (SMJ)




LEC815

Diagnostic Procedure

NEEC1044

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF" and then "ON". 2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON/OFF" on CONSULT-II screen. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VC/V BYPASS/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
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A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.</p> <p style="text-align: right;"><small>SEF014Z</small></p> <p style="text-align: center;">OK or NG</p>																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

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RS

BT

HA

SC

EL

IDX

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

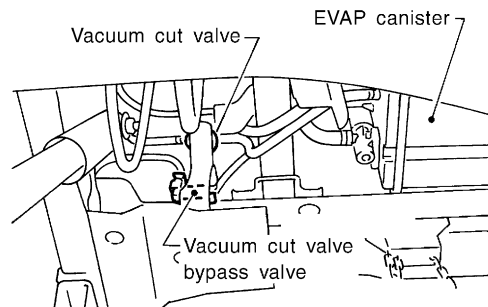
VG33E

Diagnostic Procedure (Cont'd)

3 CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT

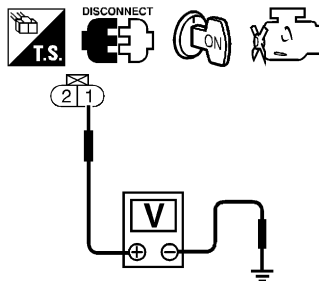
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF186S

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF659W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E74, M82
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

▶ Repair harness or connectors.

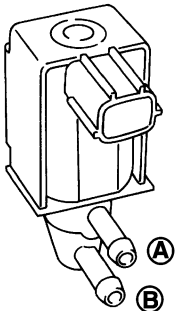
5 CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

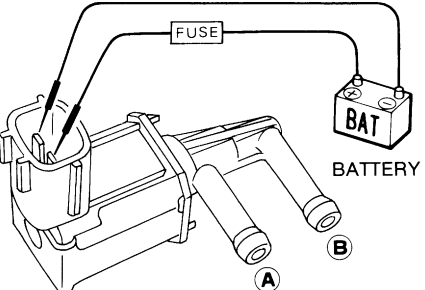
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 120 and valve terminal 2. Refer to Wiring Diagram.
Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

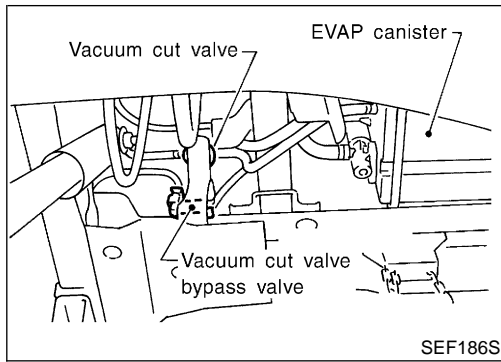
7	CHECK VACUUM CUT VALVE BYPASS VALVE																								
(E) With CONSULT-II <ol style="list-style-type: none"> 1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time under the following conditions. 																									
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VC/V BYPASS/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition VC/V BYPASS/V</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>ON</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>No</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	Condition VC/V BYPASS/V	Air passage continuity between A and B	ON	Yes	OFF	No
ACTIVE TEST																									
VC/V BYPASS/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
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HO2S1 MNTR (B2)	LEAN																								
THRTL POS SEN	XXX V																								
Condition VC/V BYPASS/V	Air passage continuity between A and B																								
ON	Yes																								
OFF	No																								
SEF016Z																									

(X) Without CONSULT-II <ol style="list-style-type: none"> 1. Check air passage continuity and operation delay time under the following conditions. 							
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>No</td> </tr> </table> <p style="text-align: right;">SEF351Q</p> <p style="text-align: center;">OK or NG</p>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
MTBL0242							
OK	▶	GO TO 8.					
NG	▶	Replace vacuum cut valve bypass valve.					

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
▶	INSPECTION END

GI
 MA
 EM
 LC
 EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

Description



Description

COMPONENT DESCRIPTION

NEEC0879

NEEC0879S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

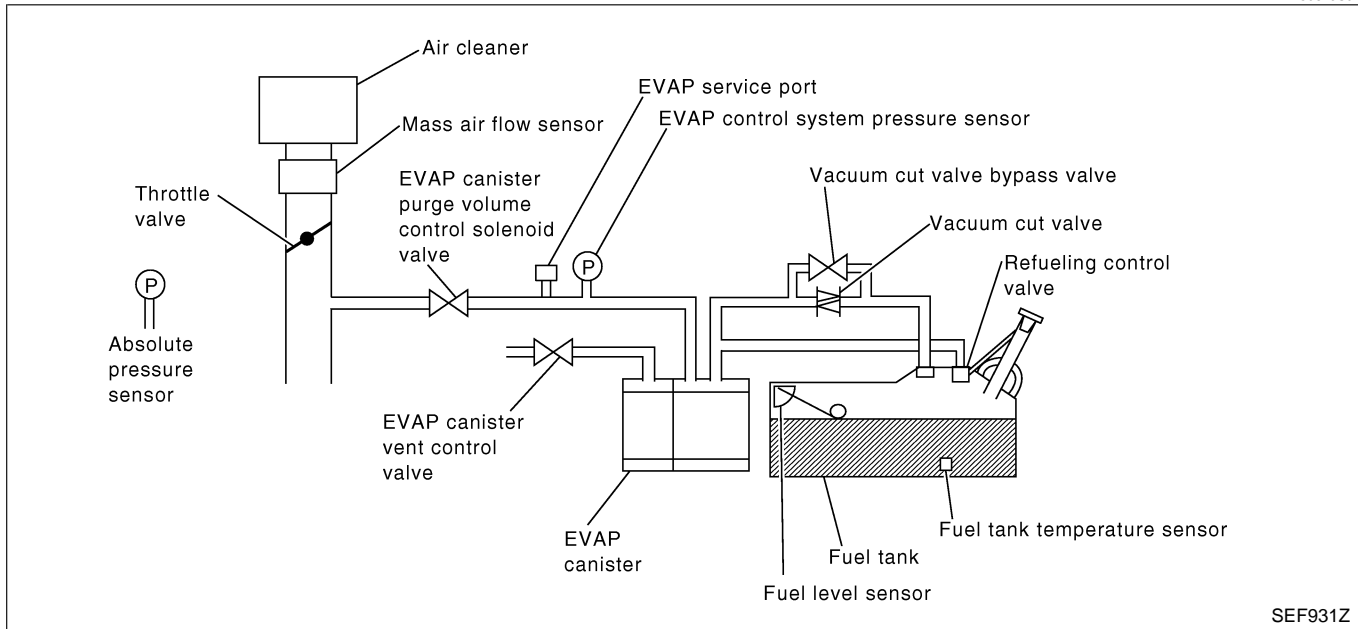
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NEEC0879S02



CONSULT-II Reference Value in Data Monitor Mode

NEEC0880

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NEEC0881

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when vacuum cut valve bypass valve does not operate properly. NEEC0882

POSSIBLE CAUSE

- Vacuum cut valve bypass valve NEEC0882S01
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

7	VC CUT/V BP/V P1491
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491
COMPLETED	

SEF239Y

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed. NEEC0883

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. AT

TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F). TF

With CONSULT-II

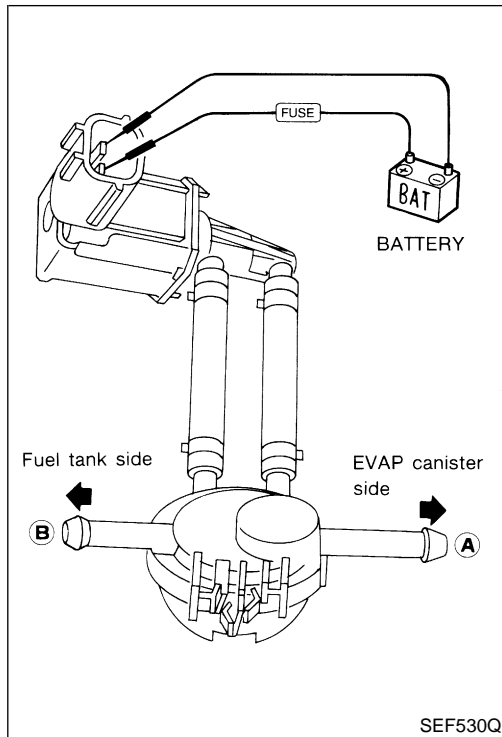
- 1) Turn ignition switch ON. PD
- 2) Start engine and warm it up to normal operating temperature. AX
- 3) Turn ignition switch OFF and wait at least 5 seconds. SU
- 4) Start engine and let it idle for at least 70 seconds. BR
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. ST
- 6) Touch "START". RS
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.) BT

CMPS-RPM (POS)	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 10.0 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3. HA

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1166. SC

Overall Function Check



Overall Function Check

NEEC0884

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

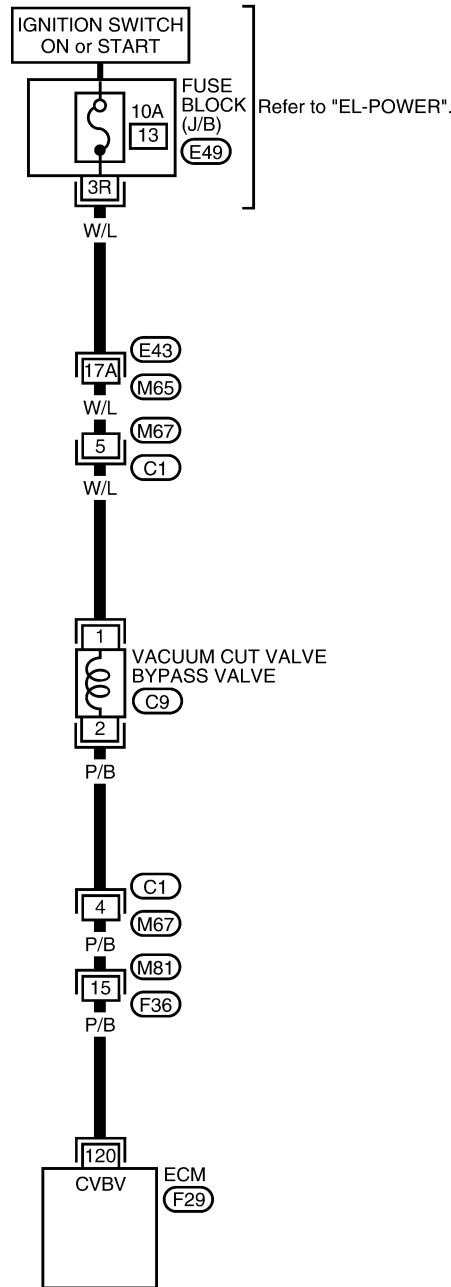
⊗ Without CONSULT-II

- 1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- 2) Apply vacuum to port **A** and check that there is no suction from port **B**.
- 3) Apply vacuum to port **B** and check that there is suction from port **A**.
- 4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
- 5) Supply battery voltage to the terminal.
- 6) Blow air in port **A** and check that air flows freely out of port **B**.
- 7) Blow air in port **B** and check that air flows freely out of port **A**.
- 8) If NG, go to "Diagnostic Procedure", EC-1166.

Wiring Diagram

NEEC0885

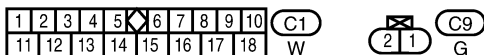
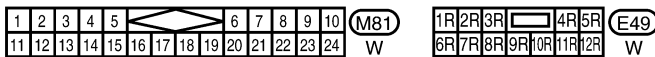
EC-BYPS/V-01



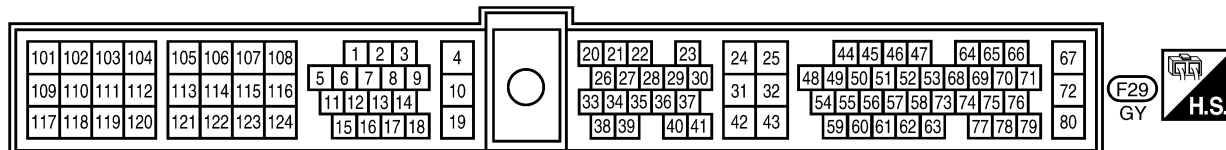
Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST



Refer to the following.
(M65), **(E43)** - SUPER
 MULTIPLE JUNCTION (SMJ)



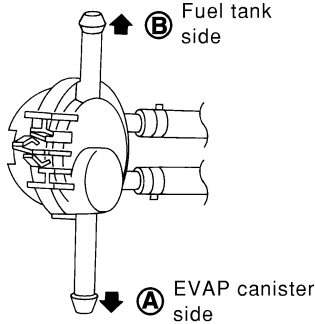
LEC815

- RS
- BT
- HA
- SC
- EL
- IDX

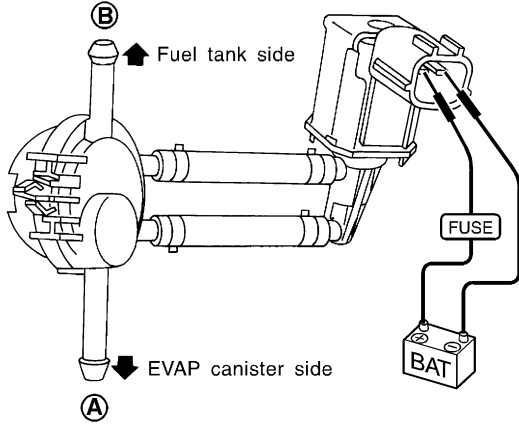
Diagnostic Procedure

NEEC0886

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION																					
<p>📱 With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Turn ignition switch ON. 7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 																						
																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VC/V BYPASS/V</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
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HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

SEF017Z

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 		
		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EVAP PURGE LINE	
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-641. 		
OK or NG		
OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

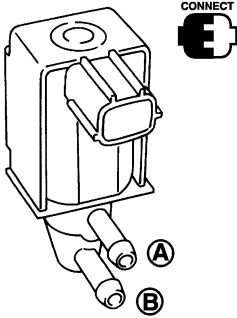
5	CHECK BYPASS HOSE	
Check bypass hoses for clogging.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

GI
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6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

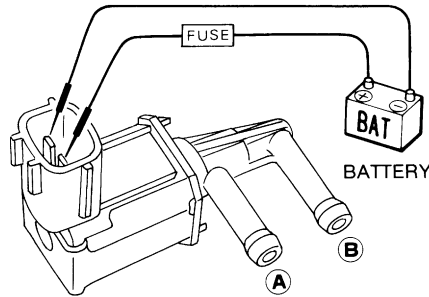
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

1. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF351Q

MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

7	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;"> </div> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace vacuum cut valve.	GI MA EM LC EC FE CL MT AT
OK	▶	GO TO 8.							
NG	▶	Replace vacuum cut valve.							

SEF379Q

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Repair it	TF PD AX
OK	▶	GO TO 9.							
NG	▶	Repair it							

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. <div style="text-align: center;"> </div> <ol style="list-style-type: none"> 2. Check connectors for water. Water should not exist. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 10.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace EVAP control system pressure sensor.</td> </tr> </table>	OK	▶	GO TO 10.	NG	▶	Replace EVAP control system pressure sensor.	SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 10.							
NG	▶	Replace EVAP control system pressure sensor.							

AEC651A

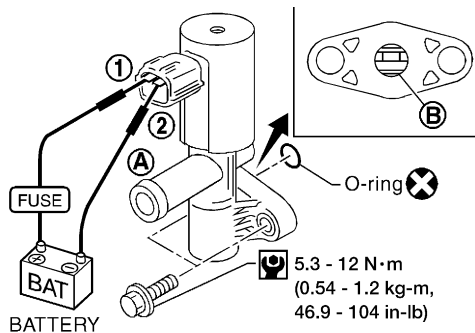
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1008.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
	ACTIVE TEST																									
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II	
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶		INSPECTION END

Component Description

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V

On Board Diagnosis Logic

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.]
- Dead (Weak) battery
- TCM (Transmission control module)

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 40 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1173.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

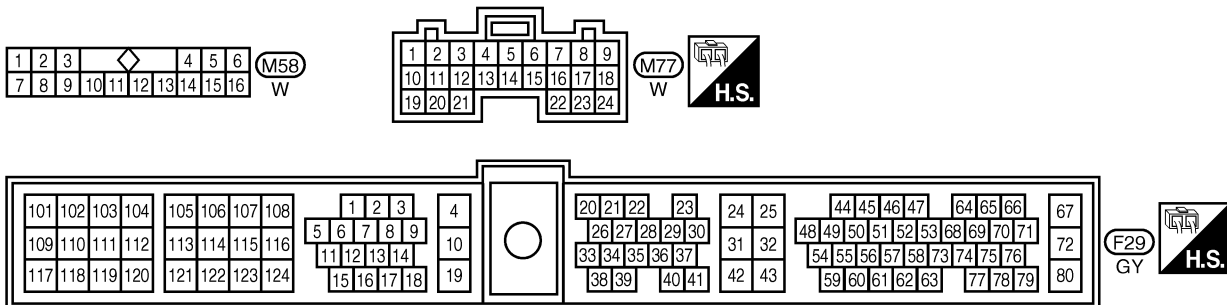
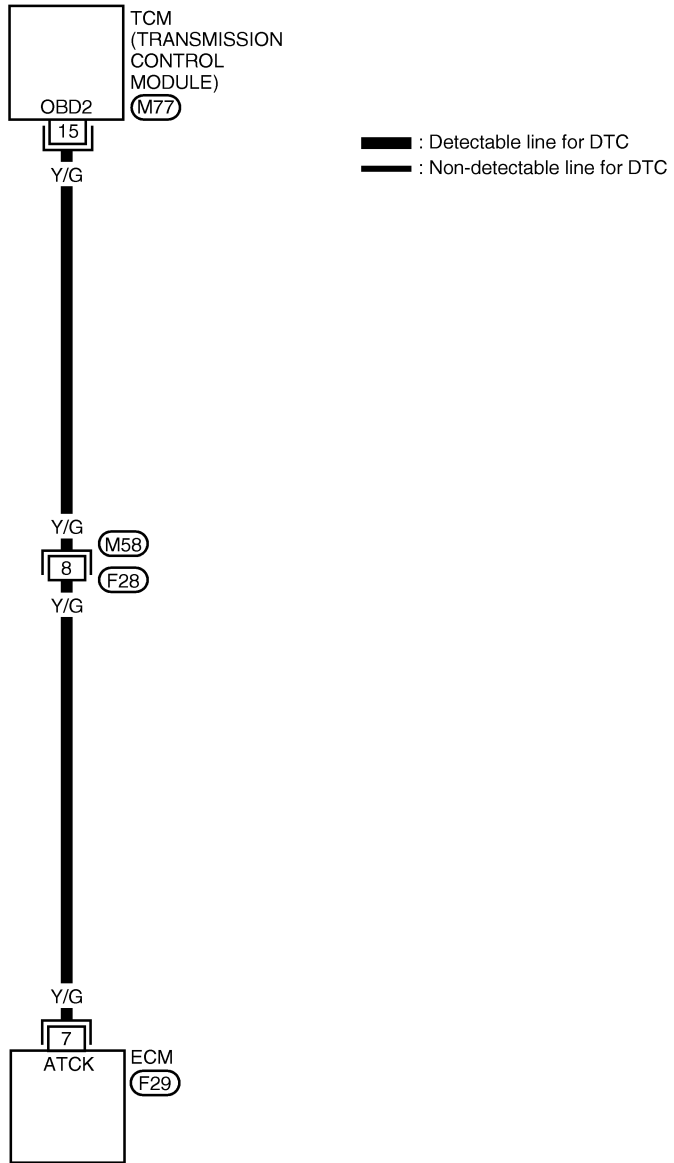
3	ACTIVE TEST	
	PURG VOL CONT/V	0.0%
	MONITOR	
	ENG SPEED	XXX rpm
	A/F ALPHA-B1	XXX %
	A/F ALPHA-B2	XXX %
	HO2S1 MNTR (B1)	RICH
	HO2S1 MNTR (B2)	RICH
	THRTL POS SEN	XXX V

SEF985Y

Wiring Diagram

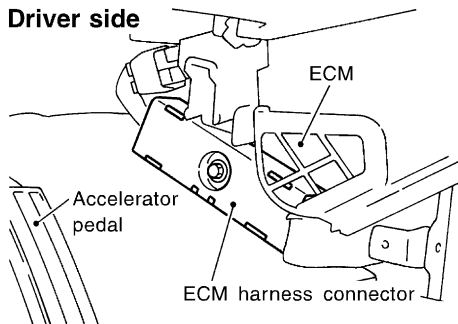
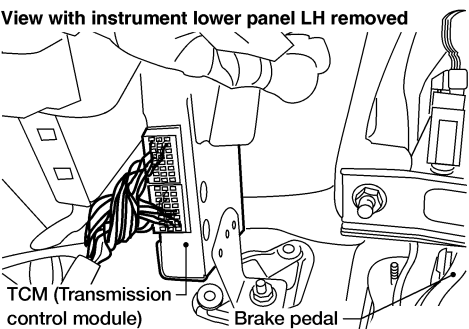
NEEC0891

EC-ATDIAG-01



Diagnostic Procedure

NEEC0892

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  </div> <div style="text-align: center;"> <p>View with instrument lower panel LH removed</p>  </div> <p style="text-align: right;"><small>SEF324V</small></p> <p>3. Check harness continuity between ECM terminal 7 and TCM (Transmission Control Module) terminal 15. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;"><small>AEC655A</small></p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

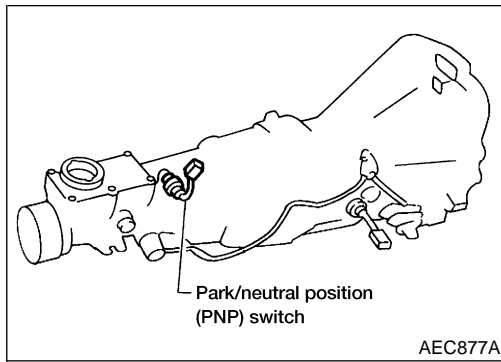
3	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
▶		INSPECTION END

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33E

Component Description



Component Description

NEEC0893

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".

ECM detects the position because the continuity of the line (the "ON" signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0894

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF

ECM Terminals and Reference Value

NEEC0895

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P" (A/T models) ● Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NEEC0896

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

NEEC0896S01

- Harness or connectors
[The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NEEC0897

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	P/N POSI SW	ON
DATA MONITOR							
MONITOR	NO DTC						
P/N POSI SW	ON						

SEF212Y

5	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>VHCL SPEED SE</td> <td>XXX km/h</td> </tr> <tr> <td>P/N POSI SW</td> <td>OFF</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	VHCL SPEED SE	XXX km/h	P/N POSI SW	OFF	B/FUEL SCHDL	XXX msec
DATA MONITOR															
MONITOR	NO DTC														
ENG SPEED	XXX rpm														
COOLAN TEMP/S	XXX °C														
VHCL SPEED SE	XXX km/h														
P/N POSI SW	OFF														
B/FUEL SCHDL	XXX msec														

SEF213Y

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-1178.

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and warm it up to normal operating temperature.
- 5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,600 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.3 - 13 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1178.

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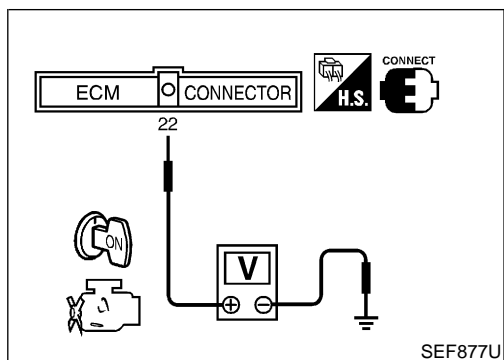
HA

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Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC0898

⊗ **Without CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-1178.

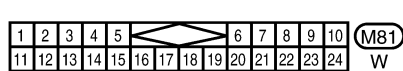
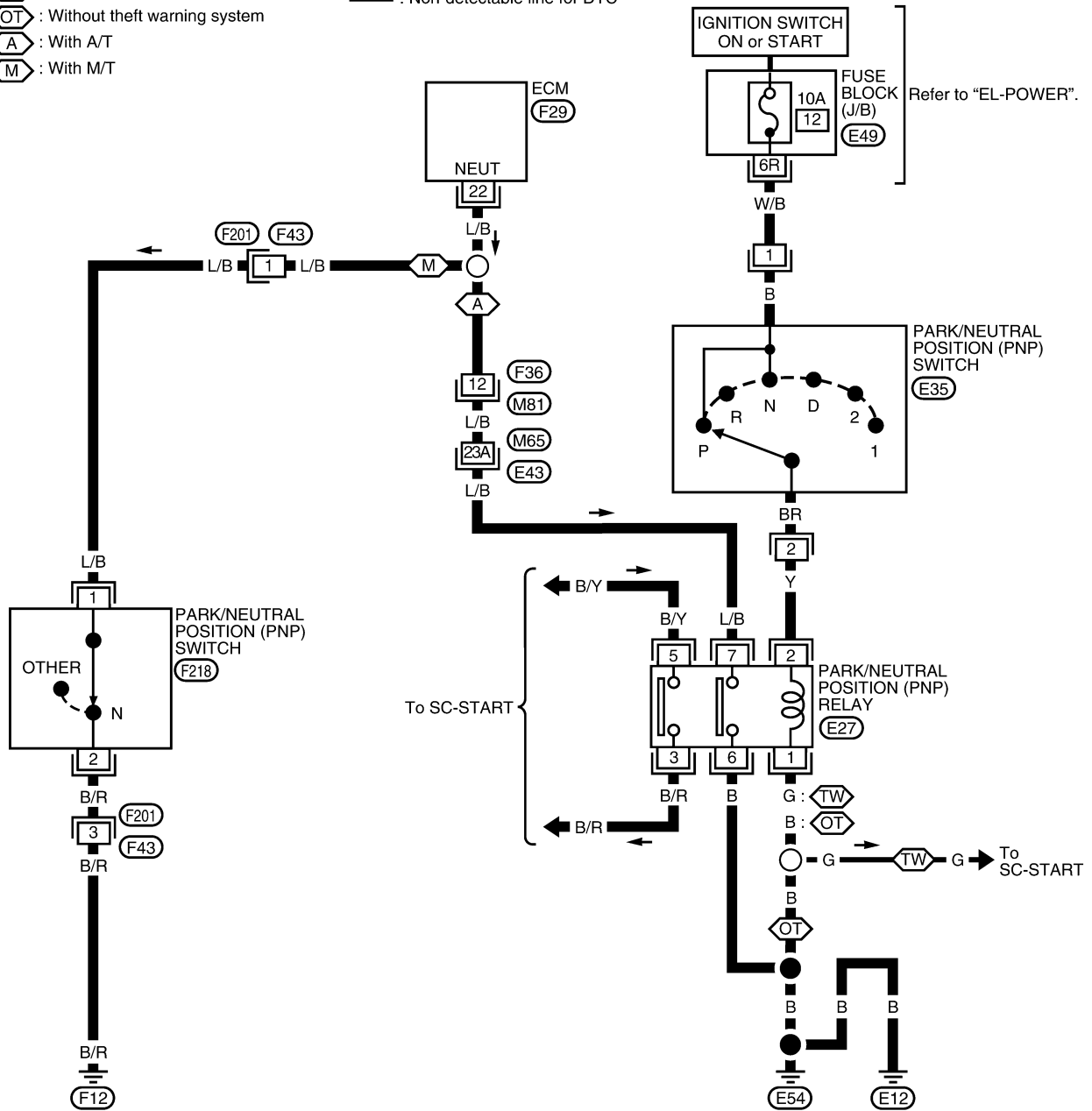
Wiring Diagram

NEEC0899

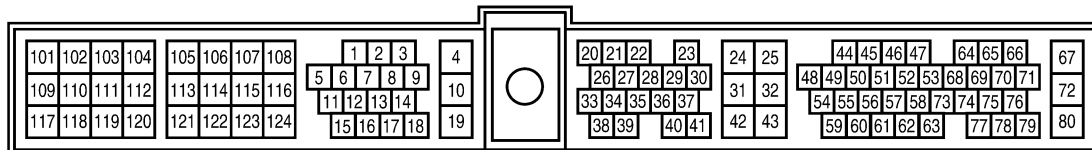
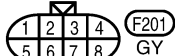
- : With theft warning system
- : Without theft warning system
- : With A/T
- : With M/T

— : Detectable line for DTC
- - - : Non-detectable line for DTC

EC-PNP/SW-01



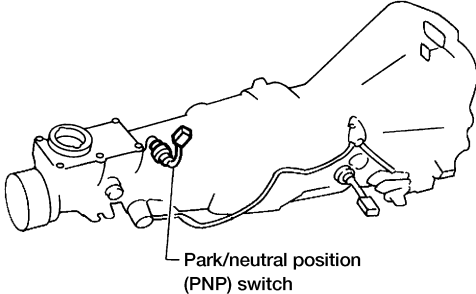
Refer to the following.
(M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



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Diagnostic Procedure FOR M/T MODELS

NEEC0900
NEEC0900S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT							
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p>3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>			OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.						
NG	▶	GO TO 2.						

AEC877A

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F201, F43 ● Harness for open between park/neutral position (PNP) switch and engine ground 		
▶ Repair open circuit or short to power in harness or connectors.		

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT							
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>			OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.						
NG	▶	GO TO 4.						

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F43, F201 ● Harness for open or short between ECM and park/neutral position (PNP) switch 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH							
<p>Refer to <i>MT-40</i>, "Position Switch Check".</p> <p style="text-align: center;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>Replace park/neutral position (PNP) switch.</td> </tr> </table>			OK	▶	GO TO 6.	NG	▶	Replace park/neutral position (PNP) switch.
OK	▶	GO TO 6.						
NG	▶	Replace park/neutral position (PNP) switch.						

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33E

Diagnostic Procedure (Cont'd)

FOR A/T MODELS

=NEEC0900S02

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) relay. 3. Turn ignition switch ON. 4. Shift selector lever to "P" or "N" position. 5. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p>	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 2.

SEF661W

2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.</p>	
<p>3. Check harness continuity between park/neutral position (PNP) switch terminal 2 and park/neutral position (PNP) relay terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p>	
<p>OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

AEC662A

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III
<p>1. Turn ignition switch ON. 2. Check voltage between park/neutral position (PNP) switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram.</p>	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between park/neutral position (PNP) switch and fuse 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

GI
MA

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to "Component Inspection", AT-254 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) switch.

EM
LC

EC

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between relay terminals 1, 6 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG (With theft warning system)	▶	GO TO 7.
NG (Without theft warning system)	▶	Repair open circuit or short to power in harness or connectors.

FE
CL
MT

AT

TF

7	DETECT MALFUNCTIONING PART	
Check the circuit between park/neutral position (PNP) relay and body ground. Refer to "STARTING SYSTEM", SC-10 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Repair or replace.

PD
AX

SU

8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and relay terminal 7. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

BR
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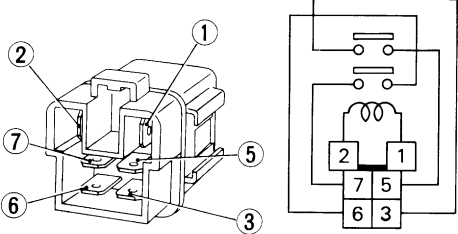
9	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between ECM and park/neutral position (PNP) relay 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

HA
SC
EL

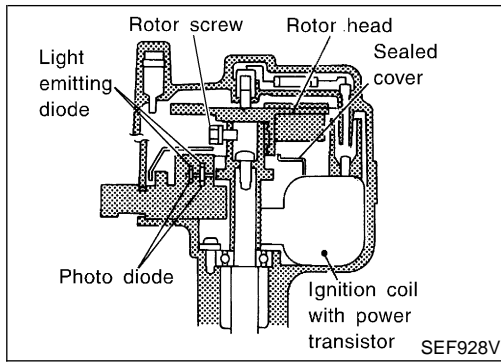
DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33E

Diagnostic Procedure (Cont'd)

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY
<p>1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2. 2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.</p>	
	
<p>12V (1 and 2) applied: Continuity should exist. No voltage applied: Continuity should not exist.</p>	
SEC202B	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END



Component Description

IGNITION COIL & POWER TRANSISTOR

NEEC0812
NEEC0812S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: **3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)**

ECM Terminals and Reference Value

NEEC0813

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

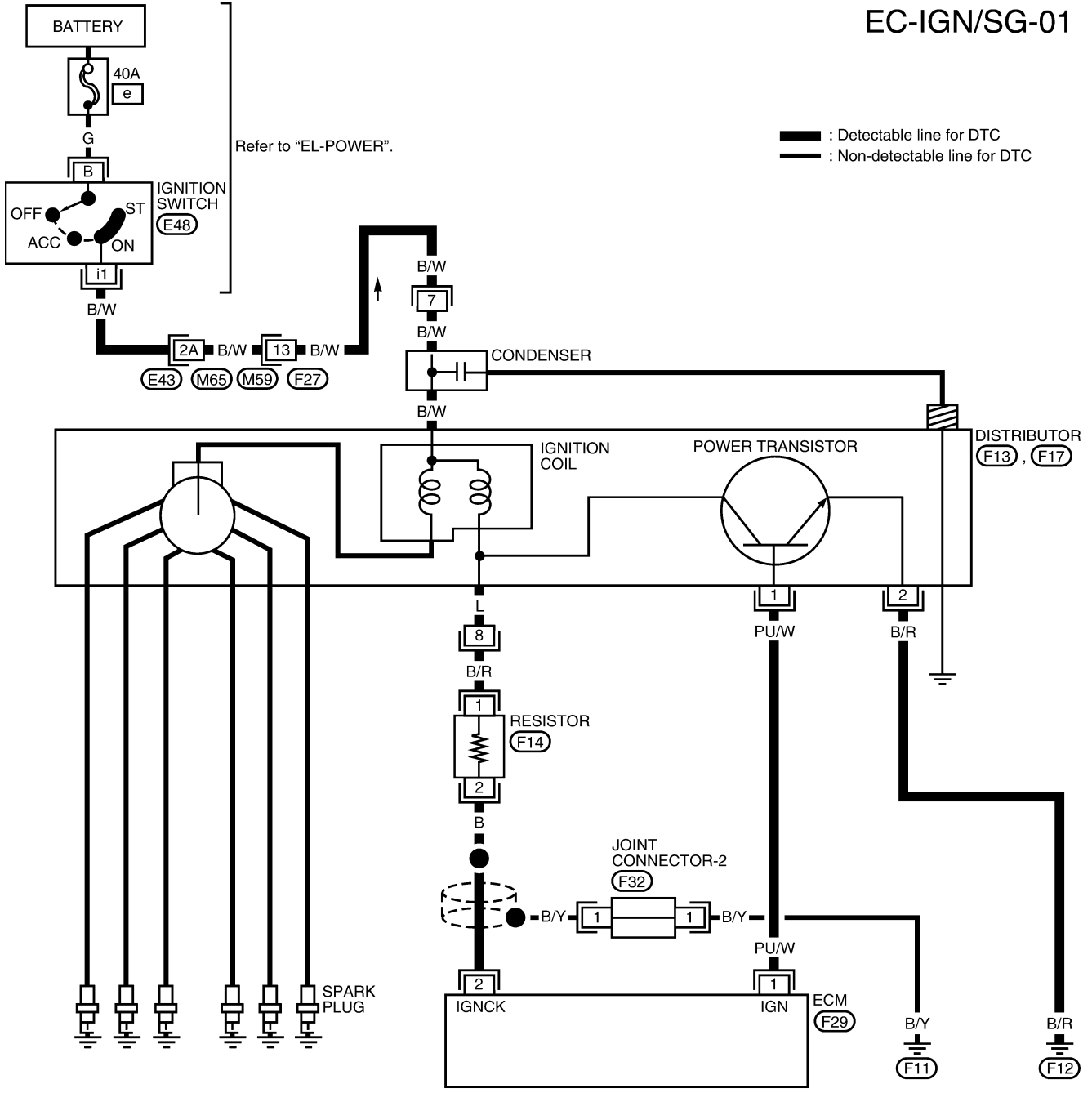
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	[Engine is running] ● Idle speed	Approximately 0.7V <small>SEF988U</small>
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V <small>SEF989U</small>

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Wiring Diagram

NEEC0816

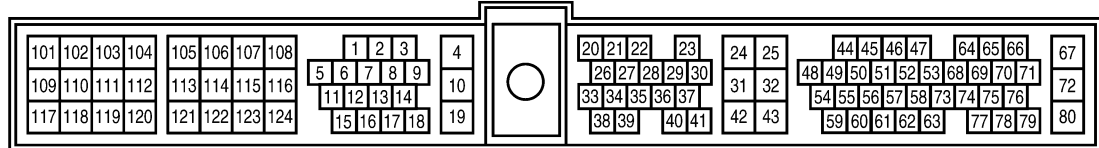
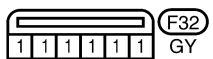
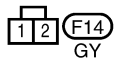
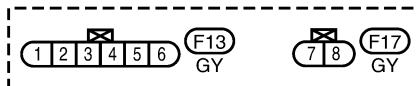
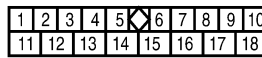
EC-IGN/SG-01



: Detectable line for DTC
 : Non-detectable line for DTC

Refer to "EL-POWER".

Refer to the following.
 (M65, E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NEEC0817

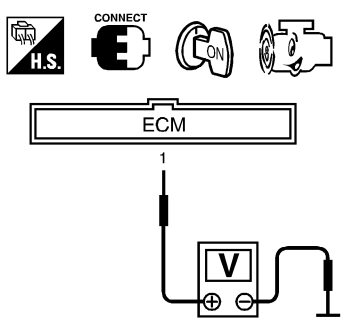
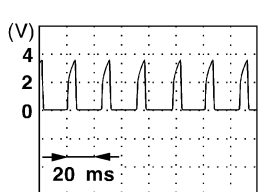
1	INSPECTION START	
Turn ignition switch "OFF", and restart engine. Is engine running?		
Yes or No		
Yes (With CONSULT-II) ▶	GO TO 2.	
Yes (Without CONSULT-II) ▶	GO TO 3.	
No ▶	GO TO 4.	

GI
MA
EM
LC

2	CHECK OVERALL FUNCTION																	
<input checked="" type="checkbox"/> With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">MAS A/F SE-B1</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">IACV-AAC/V</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
OK or NG																		
OK ▶	INSPECTION END																	
NG ▶	GO TO 4.																	

EC
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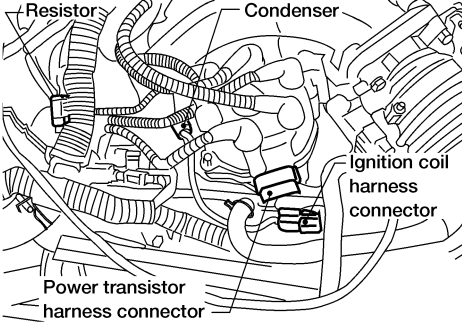
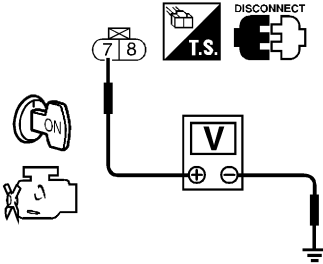
SEF981Z

3	CHECK OVERALL FUNCTION	
<input checked="" type="checkbox"/> Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
		
		
OK or NG		
OK ▶	INSPECTION END	
NG ▶	GO TO 4.	

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SEC073C

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4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition coil harness connector. 		
		
<ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between terminal 7 and ground with CONSULT-II or tester. 		
AEC656A		
		
<p style="color: blue;">Voltage: Battery voltage</p> <p>OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch 		
▶ Repair harness or connectors.		

6	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect power transistor harness connector. 3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to power in harness or connectors.

IGNITION SIGNAL

VG33E

Diagnostic Procedure (Cont'd)

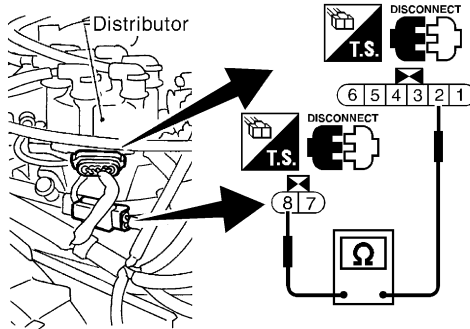
7	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IGNITION COIL							
1. Disconnect ignition coil harness connector. 2. Check resistance as shown in the figure.								
SEF013S								
AEC657A								
<table border="1"> <thead> <tr> <th>Terminal</th> <th>Resistance [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td>7 - 8 (Primary coil)</td> <td>0.5 - 1.0Ω</td> </tr> <tr> <td>7 - 9 (Secondary coil)</td> <td>Approximately 12 kΩ</td> </tr> </tbody> </table>			Terminal	Resistance [at 25°C (77°F)]	7 - 8 (Primary coil)	0.5 - 1.0Ω	7 - 9 (Secondary coil)	Approximately 12 kΩ
Terminal	Resistance [at 25°C (77°F)]							
7 - 8 (Primary coil)	0.5 - 1.0Ω							
7 - 9 (Secondary coil)	Approximately 12 kΩ							
MTBL0248								
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	Replace distributor assembly.						

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9 CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



SEF015S

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0249

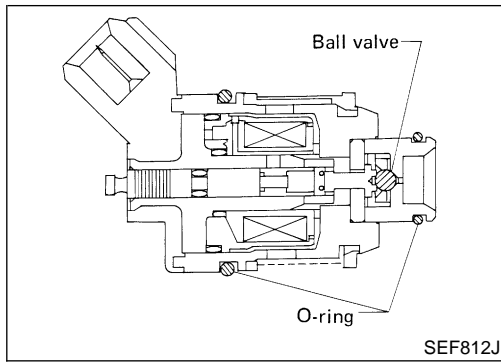
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace distributor assembly.

10 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.

▶ **INSPECTION END**



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	2.4 - 3.7 msec
	2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto Idle	1.0 - 1.6 msec
	2,000 rpm	0.7 - 1.4 msec

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

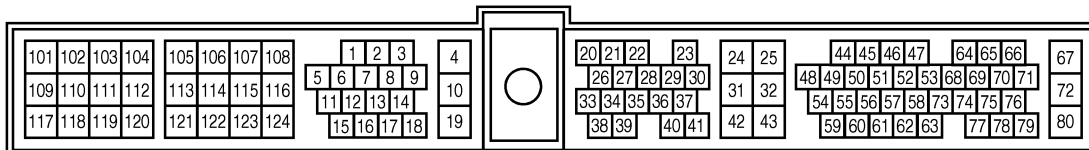
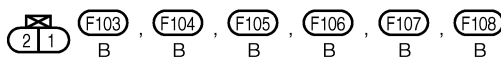
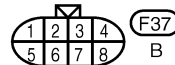
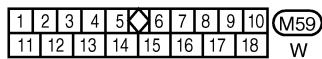
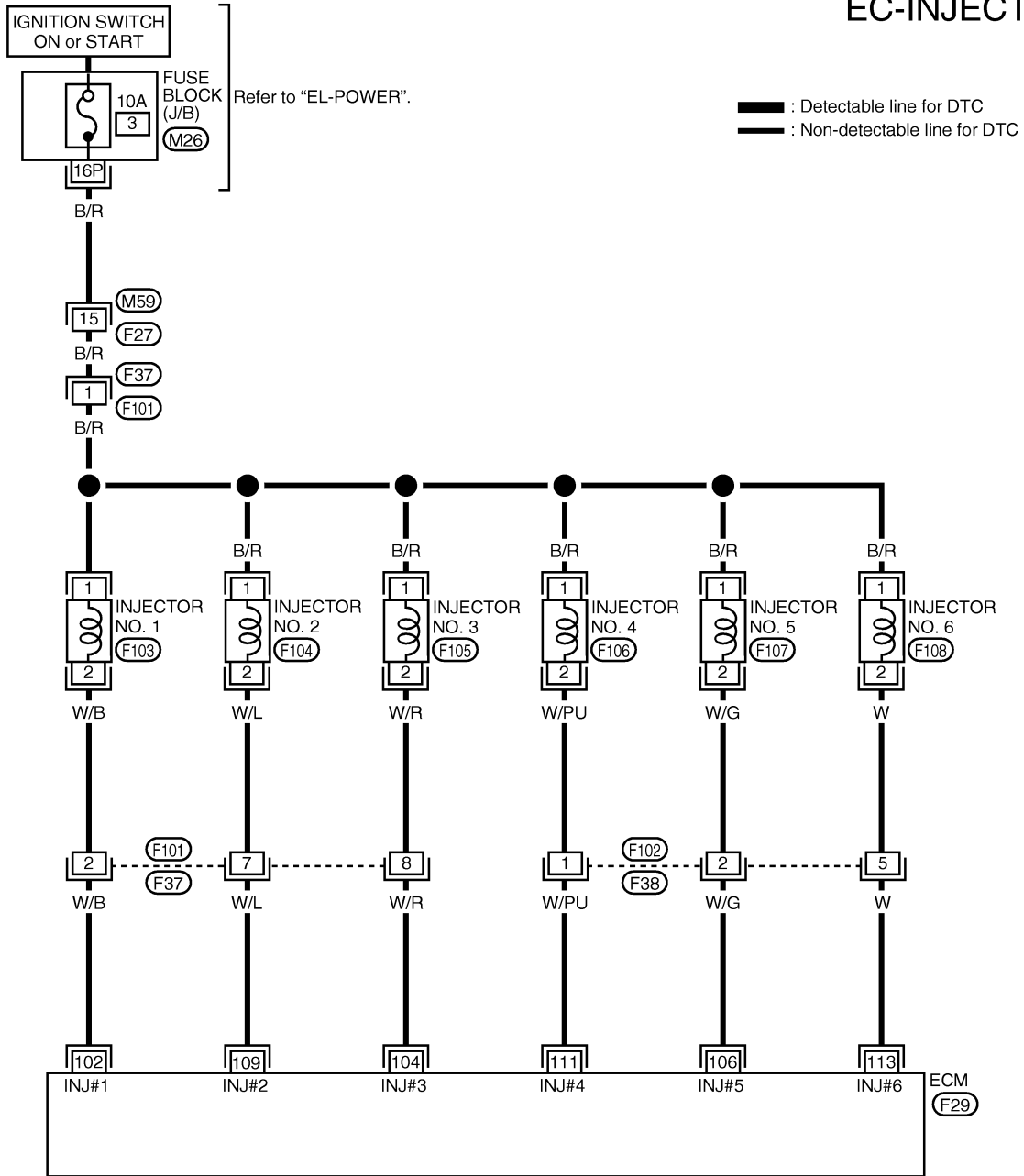
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p>

Wiring Diagram

NEEC0912

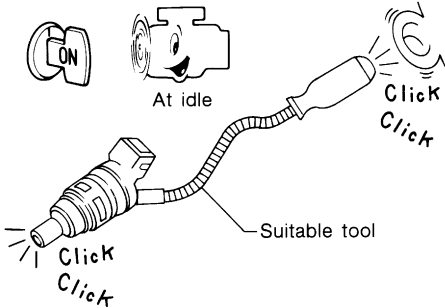
EC-INJECT-01



Diagnostic Procedure

NEEC0913

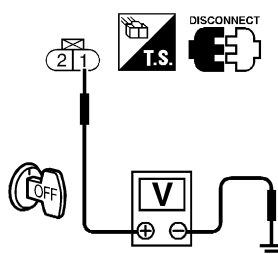
1	INSPECTION START	
Turn ignition switch to START. Is any cylinder ignited?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION																	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																		
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Listen to each injector operating sound. 																		
																		
<p>Clicking noise should be heard.</p>																		
OK or NG																		
OK	▶	INSPECTION END																
NG	▶	GO TO 3.																

SEF981Z

MEC703B

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3	CHECK INJECTOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect injector harness connector.</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p>		
		
<p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

SEF671W

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between injector and fuse 		
▶		Repair harness or connectors.

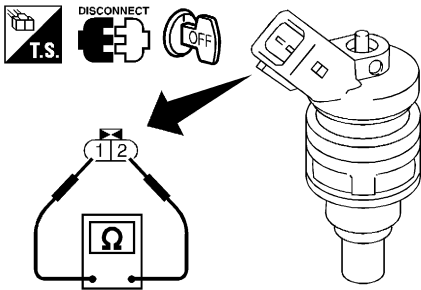
5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between injector harness connector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Harness connectors F38, F102 ● Harness for open or short between ECM and injector 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

INJECTOR

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR	<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Resistance: 10 - 14Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>		SEF625V	
OK	▶	GO TO 8.			
NG	▶	Replace injector.			

8	CHECK INTERMITTENT INCIDENT	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
	▶	INSPECTION END		

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START SIGNAL

VG33E

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC0914

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NEEC0915

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)

START SIGNAL

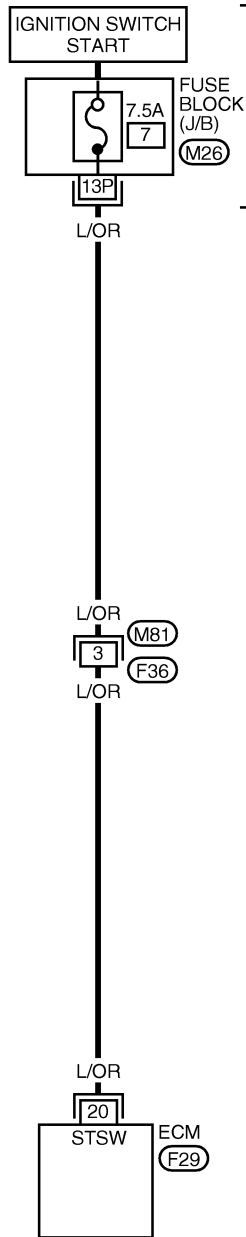
VG33E

Wiring Diagram

Wiring Diagram

NEEC0916

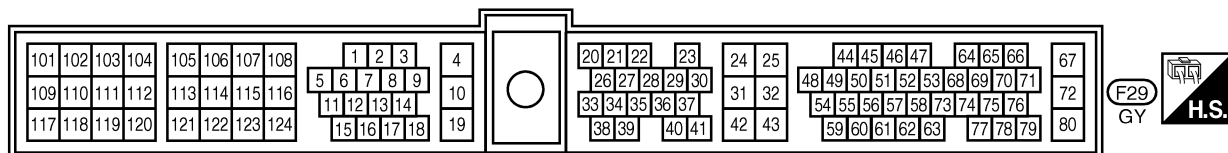
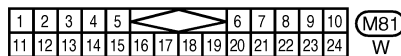
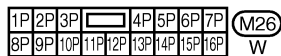
EC-S/SIG-01



Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC**
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- PD
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- ST



AEC975A

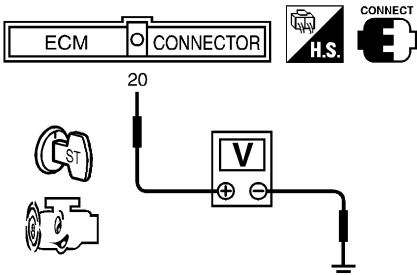
- RS
- BT
- HA
- SC
- EL
- IDX

Diagnostic Procedure

NEEC0917

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION													
Ⓜ With CONSULT-II 1. Turn ignition switch ON. 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.														
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>AIR COND SIG</td> <td>OFF</td> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF	CLSD THL POS	ON	AIR COND SIG	OFF	P/N POSI SW	ON
DATA MONITOR														
MONITOR	NO DTC													
START SIGNAL	OFF													
CLSD THL POS	ON													
AIR COND SIG	OFF													
P/N POSI SW	ON													
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON						
Condition	"START SIGNAL"													
Ignition switch "ON"	OFF													
Ignition switch "START"	ON													
SEF072Y														
OK or NG														
OK	▶	INSPECTION END												
NG	▶	GO TO 4.												

3	CHECK OVERALL FUNCTION							
⊗ Without CONSULT-II Check voltage between ECM terminal 20 and ground under the following conditions.								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Other positions</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Other positions	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Other positions	Approximately 0V							
SEF733U								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						
MTBL0148								

START SIGNAL

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK STARTING SYSTEM
Turn ignition switch OFF, then turn it to START. Does starter motor operate?	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Refer to "STARTING SYSTEM", SC-10 .

GI
MA
EM

5	CHECK FUSE
1. Turn ignition switch OFF. 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace 7.5A fuse.

LC
EC

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

FE
CL
MT
AT
TF

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness for open or short between ECM and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

PD
AX
SU

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
	▶ INSPECTION END

BR
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HASC
EL

IDX

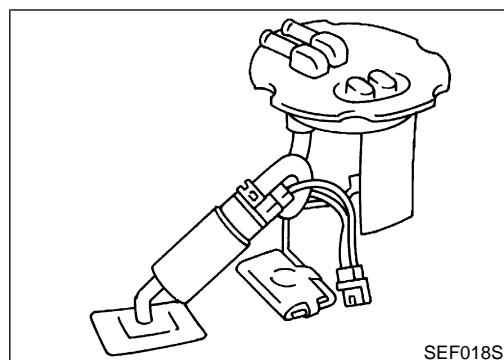
System Description

NEEC0918

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops



Component Description

NEEC0919

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NEEC0920

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON. (Operates for 5 seconds.) ● Engine running and cranking 	ON
	Except as shown above	OFF

FUEL PUMP

VG33E

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NEEC0921

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch ON] ● For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch ON] ● More than 5 seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

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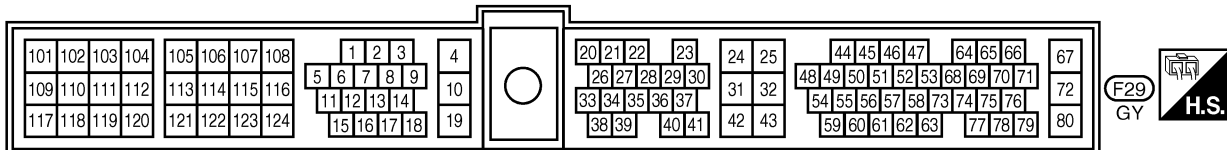
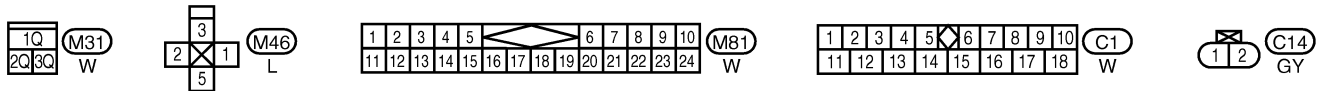
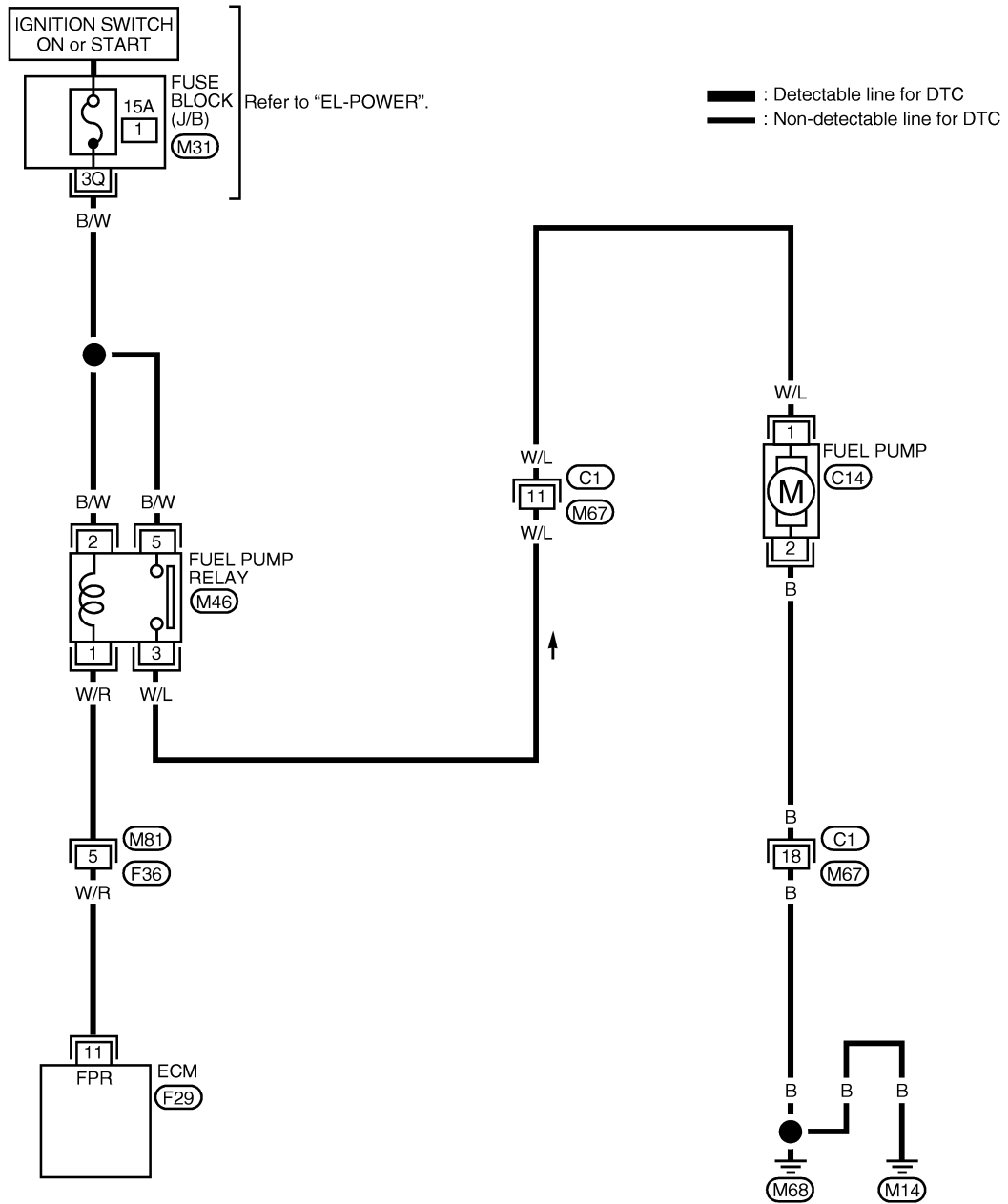
EL

IDX

Wiring Diagram

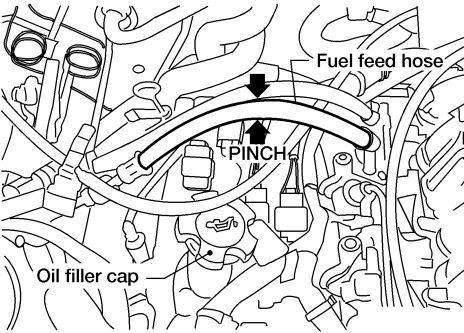
NEEC0922

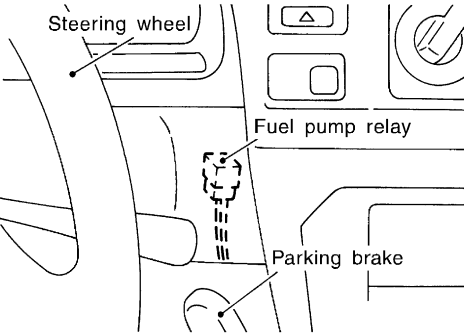
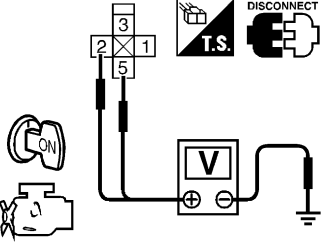
EC-F/PUMP-01



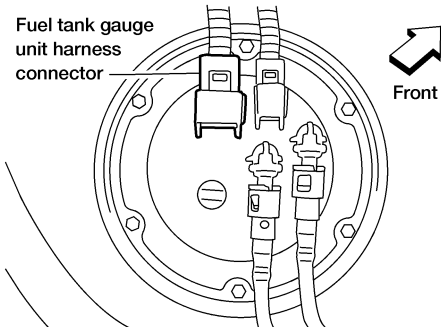
Diagnostic Procedure

NEEC1045

1	CHECK OVERALL FUNCTION	<ol style="list-style-type: none"> Turn ignition switch "ON". Pinch fuel feed hose with fingers. <div style="text-align: center;">  </div> <p style="text-align: right;">AEC663A</p> <p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	INSPECTION END	
NG	▶	GO TO 2.	

2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT	<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect fuel pump relay. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF349V</p> <ol style="list-style-type: none"> Turn ignition switch "ON". Check voltage between terminals 2, 5 and ground with CONSULT-II or tester. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF674W</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector M31 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay 	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect fuel pump harness connector.	
	
AEC933A	
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram. Continuity should exist.	
4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay terminal 1. Refer to Wiring Diagram. Continuity should exist.	
3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8 CHECK FUEL PUMP RELAY
With CONSULT-II

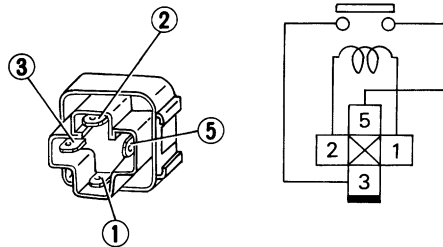
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

12V direct current supply between terminals 1 and 2
Continuity exists
No current supply
Continuity does not exist
OK or NG

OK ► GO TO 9.

NG ► Replace fuel pump relay.

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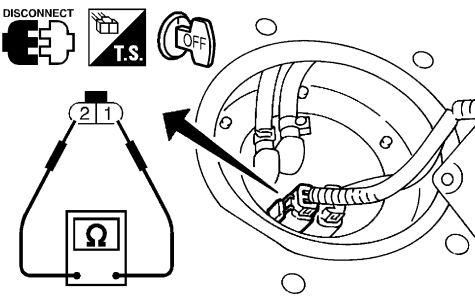
BT

HA

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IDX

9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector. 2. Check resistance between terminals 1 and 2.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 10.	
NG	▶	Replace fuel pump.	

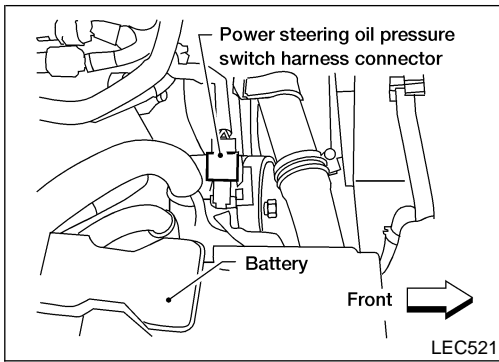
SEF022S

10	CHECK INTERMITTENT INCIDENT	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-148.	
	▶	INSPECTION END	

POWER STEERING OIL PRESSURE SWITCH

VG33E

Component Description



Component Description

NEEC0924

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NEEC0925

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Steering wheel in neutral position (forward direction)	OFF
	The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NEEC0926

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is being fully turned 	0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not being turned 	Approximately 5V

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POWER STEERING OIL PRESSURE SWITCH

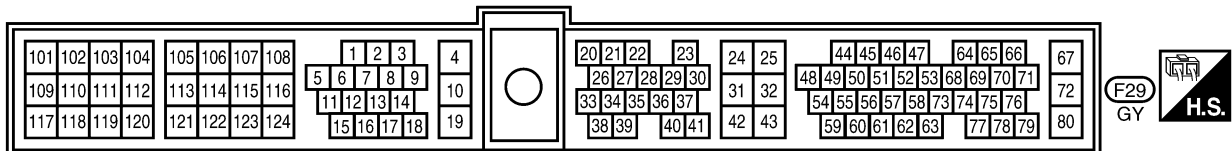
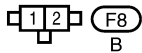
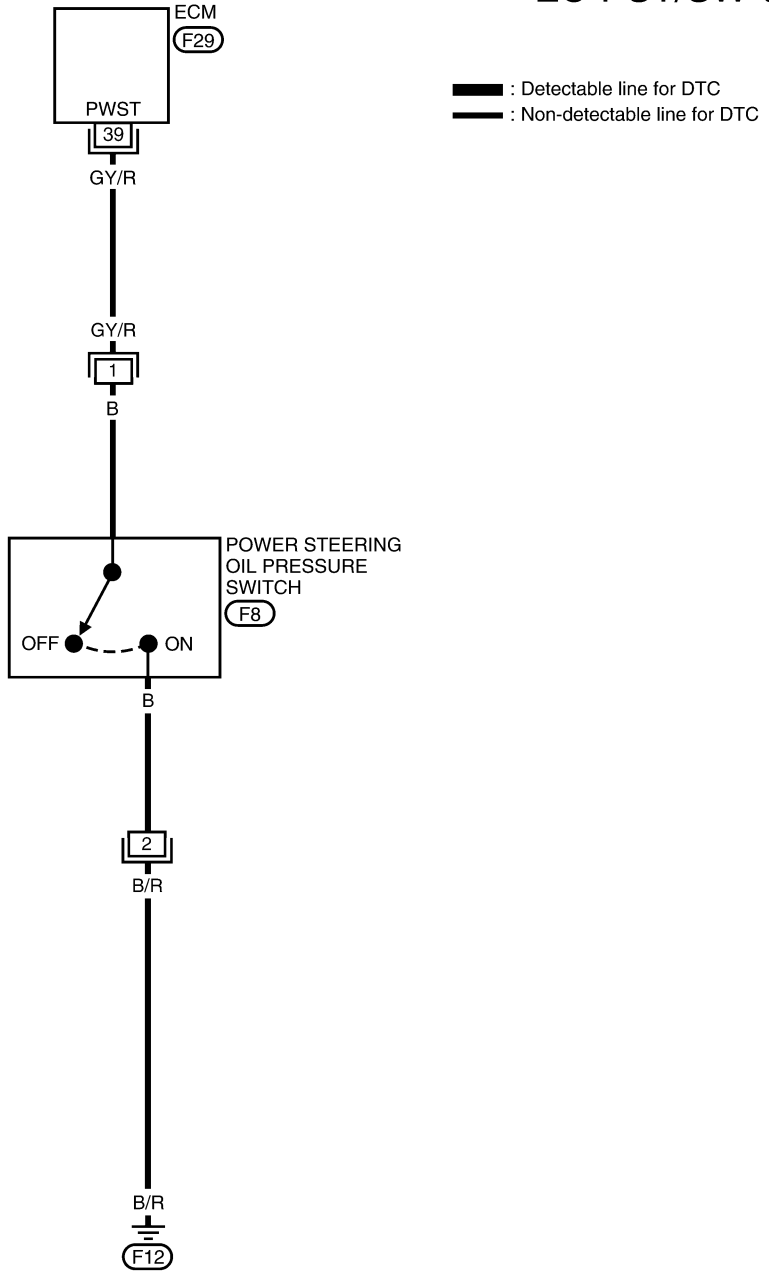
VG33E

Wiring Diagram

Wiring Diagram

NEEC0927

EC-PST/SW-01



WEC804

EC-1206

Diagnostic Procedure

NEEC0928

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

 GI
MA
EM

2	CHECK OVERALL FUNCTION									
Ⓜ With CONSULT-II 1. Start engine. 2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.										
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> <tr> <td colspan="2" style="height: 100px;"></td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF		
DATA MONITOR										
MONITOR	NO DTC									
PW/ST SIGNAL	OFF									
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Steering is in neutral position</td> <td>OFF</td> </tr> <tr> <td>Steering is turned</td> <td>ON</td> </tr> </table>			Steering is in neutral position	OFF	Steering is turned	ON				
Steering is in neutral position	OFF									
Steering is turned	ON									
<small>SEF228Y</small>										
OK or NG										
OK	▶	INSPECTION END								
NG	▶	GO TO 4.								

 LC
EC
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3	CHECK OVERALL FUNCTION							
⊗ Without CONSULT-II 1. Start engine. 2. Check voltage between ECM terminal 39 and ground.								
<small>SEF739U</small>								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Steering is neutral position</td> <td>Approximately 5V</td> </tr> <tr> <td>Steering is turned to full position</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Steering is neutral position	Approximately 5V	Steering is turned to full position	Approximately 0V
Condition	Voltage							
Steering is neutral position	Approximately 5V							
Steering is turned to full position	Approximately 0V							
<small>MTBL0145</small>								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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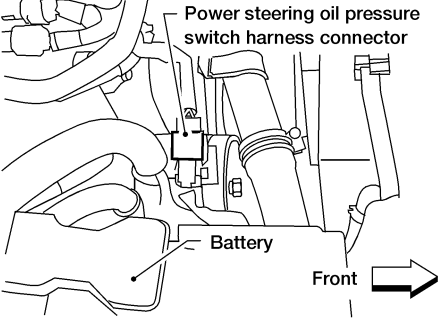
POWER STEERING OIL PRESSURE SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4 CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect power steering oil pressure switch harness connector.



3. Check harness continuity between switch terminal 2 and engine ground. Refer to Wiring Diagram.
Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connectors.

LEC521

5 CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

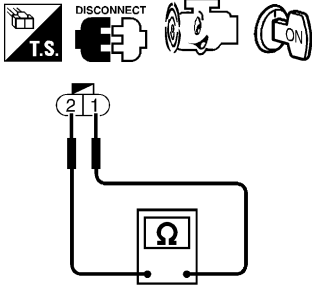
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram.
Continuity should exist.
- Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK POWER STEERING OIL PRESSURE SWITCH

- Disconnect power steering oil pressure switch harness connector then start engine.
- Check continuity between terminals 1 and 2.



Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

SEF679W

MTBL0254

POWER STEERING OIL PRESSURE SWITCH

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.	
▶	INSPECTION END

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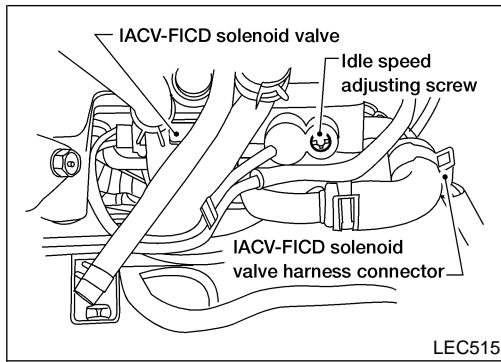
HA

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Component Description



LEC515

Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load. NEEC0929

ECM Terminals and Reference Value

NEEC0930

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
12	P	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON"* 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● A/C switch is "OFF" 	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner switch	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON" (Compressor operates)* 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> ● Air conditioner switch is "OFF" 	Approximately 5V

*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

IACV-FICD SOLENOID VALVE

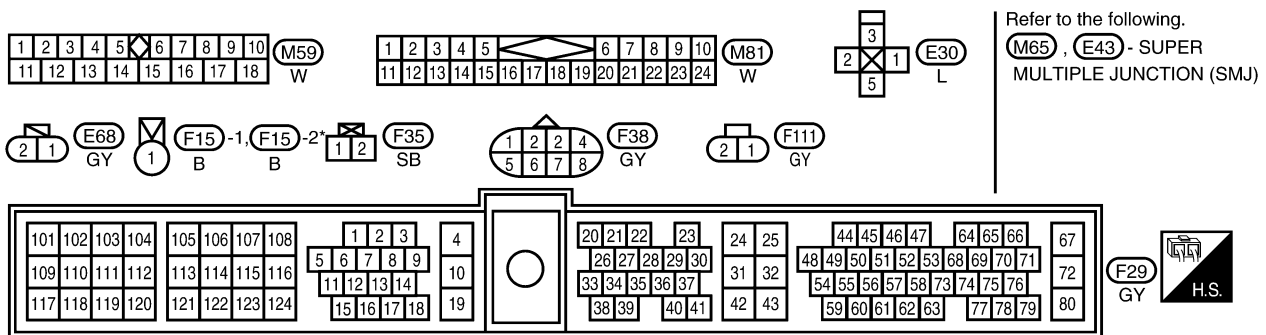
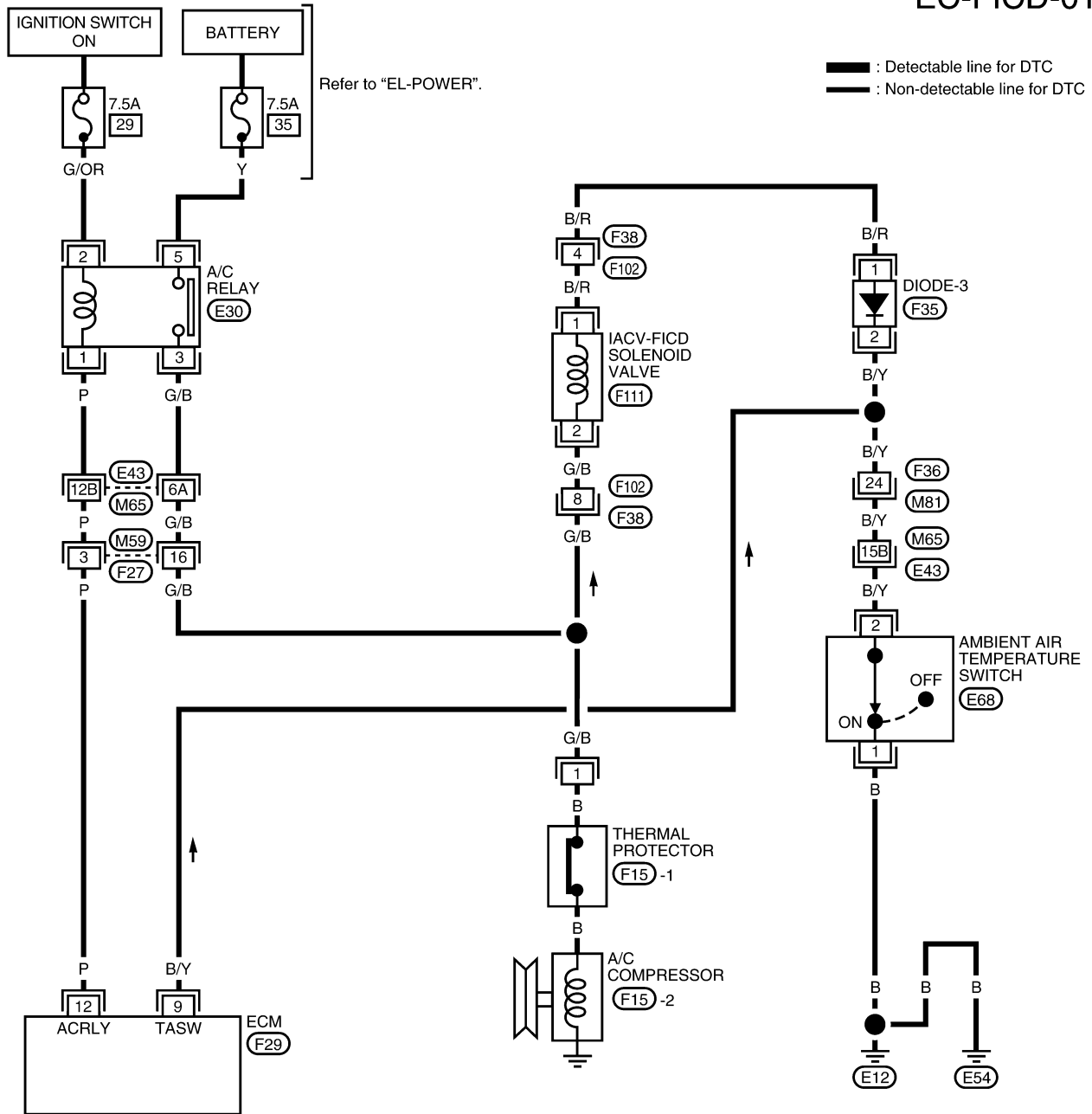
VG33E

Wiring Diagram

Wiring Diagram

NEEC0931

EC-FICD-01



*This connector is not shown in "HARNESS LAYOUT" of EL section.

LEC510

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Diagnostic Procedure

NEEC0932

1	CHECK OVERALL FUNCTION	
1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in “N” position) If NG, adjust idle speed. 3. Turn air conditioner switch and blower fan switch ON. 4. Recheck idle speed.		
850 rpm or more (in “P” or “N” position)		
OK or NG		
OK	▶	INSPECTION END
NG	▶	GO TO 2.

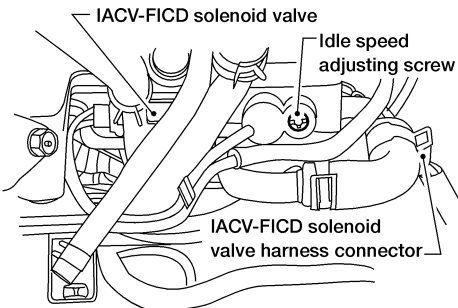
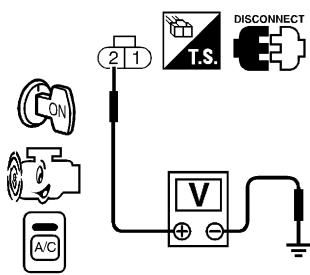
SEF742U

2	CHECK AIR CONDITIONER FUNCTION	
Check if air conditioner compressor functions normally.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Refer to “Symptom Table”, “TROUBLE DIAGNOSES”, HA-28 .

IACV-FICD SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> Turn air conditioner switch and blower fan switch OFF. Stop engine. Disconnect IACV-FICD solenoid valve harness connector. 		
		
<ol style="list-style-type: none"> Start engine, then turn air conditioner switch and blower fan switch ON. Check voltage between terminal 2 and ground with CONSULT-II or tester. 		
		
<p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

LEC515

SEF680W

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> Harness connectors F38, F102 Harness for open or short between IACV-FICD solenoid valve and harness connector F27 		
▶ Repair harness or connectors.		

5	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT	
<ol style="list-style-type: none"> Turn ignition switch OFF. Disconnect ambient air temperature switch harness connector. Check harness continuity between switch terminal 1 and body ground. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 7.

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IACV-FICD SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT WITH DIODE	
<p>1. Check harness continuity between switch terminal 2 and solenoid valve terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF160X</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Diode F35 ● Harness for open or short between ambient air temperature switch and body ground ● Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

IACV-FICD SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK IACV-FICD SOLENOID VALVE	
<p>Disconnect IACV-FICD solenoid valve harness connector.</p> <ul style="list-style-type: none"> • Check for clicking sound when applying 12V direct current to terminals. 		
<ul style="list-style-type: none"> • Check plunger for seizing or sticking. • Check for broken spring. 		
SEF682W		
SEF097K		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace IACV-FICD solenoid valve.

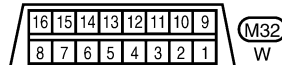
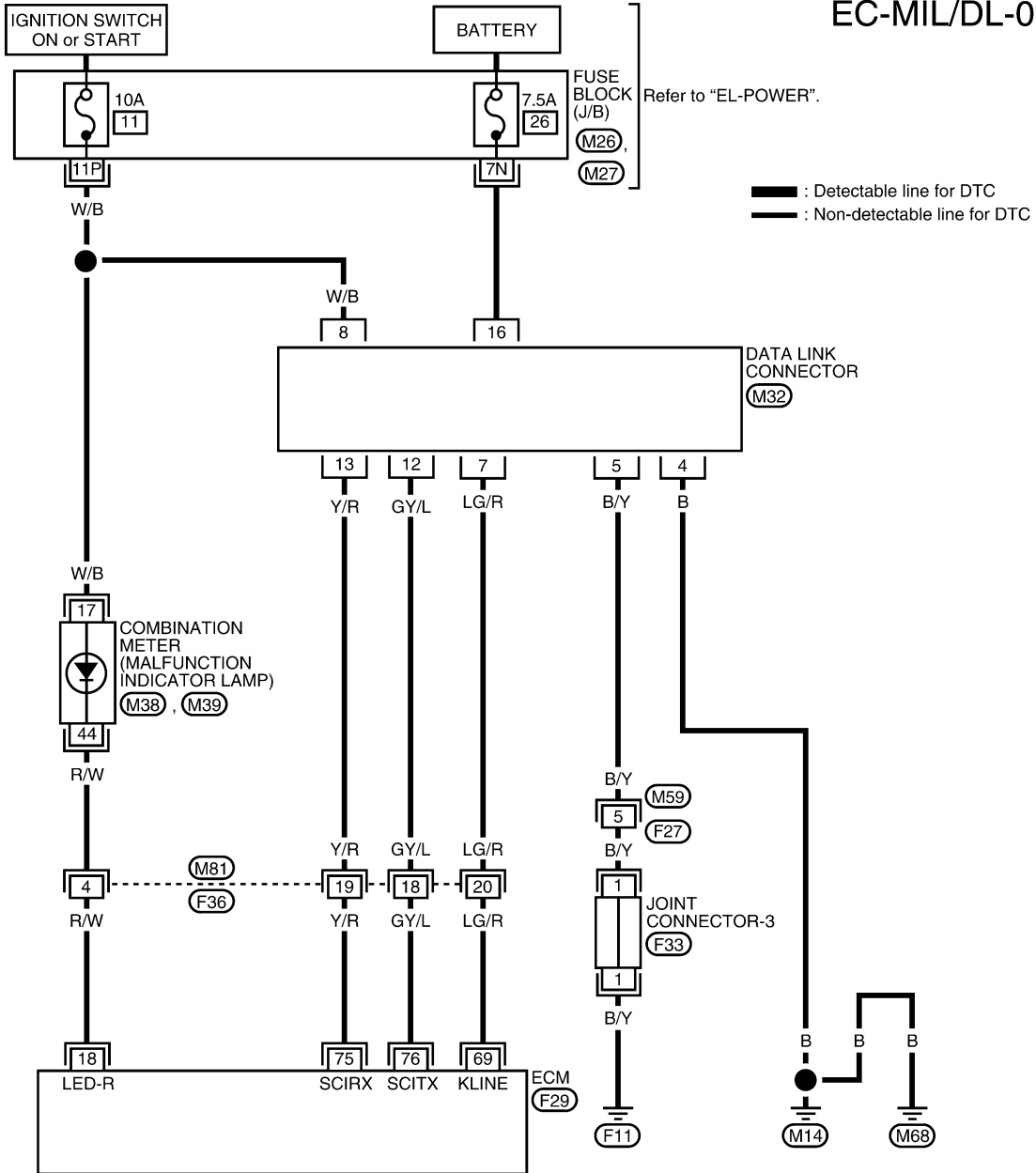
9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-753.		
		▶ INSPECTION END

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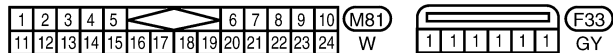
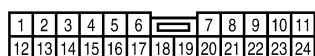
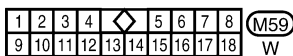
Wiring Diagram

NEEC0933

EC-MIL/DL-01



Refer to the following.
 (F29) - ELECTRICAL UNITS



Fuel Pressure Regulator

NEEC0934

Fuel pressure at idling kPa (kg/cm ² , psi)		
Vacuum hose is connected		Approximately 235 (2.4, 34)
Vacuum hose is disconnected		Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NEEC0935

Base idle speed*1	No-load*4 (in "P" or N" position)	700±50 rpm
Target idle speed*2	No-load*4 (in "P" or N" position)	750±50 rpm
Air conditioner: ON	In "P" or N" position	850 rpm or more
Ignition timing*3	In "P" or N" position	10°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Throttle position sensor harness connector disconnected

*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NEEC0936

Primary voltage		12V
Primary resistance [at 20°C (68°F)]		Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]		Approximately 10 kΩ

Mass Air Flow Sensor

NEEC0937

Supply voltage		Battery voltage (11 - 14)V
Output voltage at idle		1.0 - 1.7V
Mass air flow (Using CONSULT-II or GST)		3.3 - 4.8 g-m/sec at idle* 12.0 - 14.9 g-m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NEEC0938

Temperature °C (°F)		Resistance kΩ
20 (68)		2.1 - 2.9
50 (122)		0.68 - 1.00
90 (194)		0.236 - 0.260

Heated Oxygen Sensor 1 Heater (Front)

NEEC0940

Resistance [at 25°C (77°F)]		2.3 - 4.3Ω
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Fuel Pump

NEEC0941

Resistance [at 25°C (77°F)]		0.2 - 5.0Ω
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IACV-AAC Valve

NEEC0942

Resistance [at 20°C (68°F)]		Approximately 10.0Ω
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Injector

Injector

NEEC0943

Resistance [at 25°C (77°F)]	10 - 14Ω
-----------------------------	----------

Throttle Position Sensor

NEEC0945

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NEEC0946

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

NEEC0947

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater (Rear)

NEEC0948

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
-----------------------------	------------

Crankshaft Position Sensor (OBD)

NEEC0949

Resistance [at 20°C (68°F)]	512 - 632Ω
-----------------------------	------------

Fuel Tank Temperature Sensor

NEEC0950

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC

Alphabetical & P No. Index for DTC

NEEC1077

NEEC1077S01

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access ECM	—	EC-1330
ABSL PRES SEN/CIRC	P0105	EC-1369
AIR TEMP SEN/CIRC	P0110	EC-1371
A/T 1ST GR FNCTN	P0731	AT-272
A/T 2ND GR FNCTN	P0732	AT-278
A/T 3RD GR FNCTN	P0733	AT-284
A/T 4TH GR FNCTN	P0734	AT-290
A/T COMM LINE	P0600*4	EC-1659
A/T DIAG COMM LINE	P1605	EC-1774
A/T TCC S/V FNCTN	P0744	AT-304
ATF TEMP SEN/CIRC	P0710	AT-256
CKP SENSOR (COG)	P1336	EC-1692
CKP SEN/CIRCUIT	P0335	EC-1559
CLOSED LOOP-B1	P1148	EC-1668
CLOSED LOOP-B2	P1168	EC-1668
CLOSED TP SW/CIRC	P0510	EC-1652
CMP SEN/CIRCUIT	P0340	EC-1565
COOLANT T SEN/CIRC*2	P0115	EC-1376
*COOLAN T SEN/CIRC	P0125	EC-1394
CYL 1 MISFIRE	P0301	EC-1546
CYL 2 MISFIRE	P0302	EC-1546
CYL 3 MISFIRE	P0303	EC-1546
CYL 4 MISFIRE	P0304	EC-1546
CYL 5 MISFIRE	P0305	EC-1546
CYL 6 MISFIRE	P0306	EC-1546
ECM	P0605	EC-1664
ENGINE SPEED SIG	P0725	AT-267
ENG OVER TEMP	P0217	EC-1528
ENG OVER TEMP	P1217*4	EC-1670
EVAP GROSS LEAK	P0455	EC-1616
EVAP PURG FLOW/MON	P1447	EC-1735
EVAP SYS PRES SEN	P0450	EC-1605
EVAP SMALL LEAK	P0440	EC-1577
EVAP SMALL LEAK	P1440	EC-1699
EVAP VERY SML LEAK	P1441	EC-1701

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TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	Reference page
FUEL LEVL SEN/CIRC	P0464	EC-1637
FUEL LEVL SEN/CIRC	P1464	EC-1755
FUEL LEVEL SENSOR	P0461	EC-1635
FUEL LEV SEN SLOSH	P0460	EC-1630
FUEL SYS-LEAN/BK1	P0171	EC-1506
FUEL SYS-LEAN/BK2	P0174	EC-1506
FUEL SYS-RICH/BK1	P0172	EC-1515
FUEL SYS-RICH/BK2	P0175	EC-1515
FUEL TEMP SEN/CIRC	P0180	EC-1523
HO2S1 (B1)	P0130	EC-1400
HO2S1 (B1)	P0131	EC-1411
HO2S1 (B1)	P0132	EC-1420
HO2S1 (B1)	P0133	EC-1429
HO2S1 (B1)	P0134	EC-1443
HO2S1 (B2)	P0150	EC-1400
HO2S1 (B2)	P0151	EC-1411
HO2S1 (B2)	P0152	EC-1420
HO2S1 (B2)	P0153	EC-1429
HO2S1 (B2)	P0154	EC-1443
HO2S1 HTR (B1)	P0135	EC-1451
HO2S1 HTR (B2)	P0155	EC-1451
HO2S2 (B1)	P0137	EC-1458
HO2S2 (B1)	P0138	EC-1468
HO2S2 (B1)	P0139	EC-1478
HO2S2 (B1)	P0140	EC-1488
HO2S2 (B2)	P0157	EC-1458
HO2S2 (B2)	P0158	EC-1468
HO2S2 (B2)	P0159	EC-1478
HO2S2 (B2)	P0160	EC-1488
HO2S2 HTR (B1)	P0141	EC-1498
HO2S2 HTR (B2)	P0161	EC-1498
IACV/AAC VLV/CIRC	P0505	EC-1646
KNOCK SEN/CIRC-B1	P0325*4	EC-1555
L/PRES SOL/CIRC	P0745	AT-313
MAF SEN/CIRCUIT*2	P0100	EC-1360
MULTI CYL MISFIRE	P0300	EC-1546
NO SELF DIAGNOSTIC FAILURE INDICATED	P0000	—

TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	Reference page
O/R CLTCH SOL/CIRC	P1760	AT-337
P-N POS SW/CIRCUIT	P1706	EC-1777
PNP SW/CIRC	P0705	AT-250
PURG VOLUME CONT/V	P0443	EC-1592
PURG VOLUME CONT/V	P1444	EC-1716
SCB/V CONT SOL/V	P1243	EC-1686
SFT SOL A/CIRC*2	P0750	AT-318
SFT SOL B/CIRC*2	P0755	AT-323
TCC SOLENOID/CIRC	P0740	AT-299
THERMOSTAT FNCTN	P1126	EC-1666
THRTL POS SEN/CIRC*2	P0120	EC-1381
TP SEN/CIRC A/T*2	P1705	AT-328
TW CATALYST SYS-B1	P0420	EC-1572
TW CATALYST SYS-B2	P0430	EC-1572
VC CUT/V BYPASS/V	P1491	EC-1765
VC/V BYPASS/V	P1490	EC-1759
VEH SPD SEN/CIR AT*3	P0720	AT-262
VEH SPEED SEN/CIRC*3	P0500	EC-1642
VENT CONTROL VALVE	P0446	EC-1599
VENT CONTROL VALVE	P1446	EC-1728
VENT CONTROL VALVE	P1448	EC-1747

*1: 1st trip DTC No. is the same as DTC No.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: This DTC is displayed with CONSULT-II only.

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

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TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC (Cont'd)

P NO. INDEX FOR DTC

=NEEC1077S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-1330
P0000	NO SELF DIAGNOSTIC FAILURE INDICATED	—
P0100	MAF SEN/CIRCUIT*2	EC-1360
P0105	ABSL PRES SEN/CIRC	EC-1369
P0110	AIR TEMP SEN/CIRC	EC-1371
P0115	COOLANT T SEN/CIRC*2	EC-1376
P0120	THRTL POS SEN/CIRC*2	EC-1381
P0125	*COOLAN T SEN/CIRC	EC-1394
P0130	HO2S1 (B1)	EC-1400
P0131	HO2S1 (B1)	EC-1411
P0132	HO2S1 (B1)	EC-1420
P0133	HO2S1 (B1)	EC-1429
P0134	HO2S1 (B1)	EC-1443
P0135	HO2S1 HTR (B1)	EC-1451
P0137	HO2S2 (B1)	EC-1458
P0138	HO2S2 (B1)	EC-1468
P0139	HO2S2 (B1)	EC-1478
P0140	HO2S2 (B1)	EC-1488
P0141	HO2S2 HTR (B1)	EC-1498
P0150	HO2S1 (B2)	EC-1400
P0151	HO2S1 (B2)	EC-1411
P0152	HO2S1 (B2)	EC-1420
P0153	HO2S1 (B2)	EC-1429
P0154	HO2S1 (B2)	EC-1443
P0155	HO2S1 HTR (B2)	EC-1451
P0157	HO2S2 (B2)	EC-1458
P0158	HO2S2 (B2)	EC-1468
P0159	HO2S2 (B2)	EC-1478
P0160	HO2S2 (B2)	EC-1488
P0161	HO2S2 HTR (B2)	EC-1498
P0171	FUEL SYS-LEAN/BK1	EC-1506
P0172	FUEL SYS-RICH/BK1	EC-1515
P0174	FUEL SYS-LEAN/BK2	EC-1506
P0175	FUEL SYS-RICH/BK2	EC-1515
P0180	FUEL TEMP SEN/CIRC	EC-1523
P0217	ENG OVER TEMP	EC-1528

TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC (Cont'd)

DTC*1	Items (CONSULT-II screen terms)	Reference page	
P0300	MULTI CYL MISFIRE	EC-1546	GI
P0301	CYL 1 MISFIRE	EC-1546	MA
P0302	CYL 2 MISFIRE	EC-1546	EM
P0303	CYL 3 MISFIRE	EC-1546	EM
P0304	CYL 4 MISFIRE	EC-1546	LC
P0305	CYL 5 MISFIRE	EC-1546	LC
P0306	CYL 6 MISFIRE	EC-1546	EC
P0325*4	KNOCK SEN/CIRC-B1	EC-1555	EC
P0335	CKP SEN/CIRCUIT	EC-1559	
P0340	CMP SEN/CIRCUIT	EC-1565	FE
P0420	TW CATALYST SYS-B1	EC-1572	
P0430	TW CATALYST SYS-B2	EC-1572	CL
P0440	EVAP SMALL LEAK	EC-1577	
P0443	PURG VOLUME CONT/V	EC-1592	MT
P0446	VENT CONTROL VALVE	EC-1599	
P0450	EVAP SYS PRES SEN	EC-1605	AT
P0455	EVAP GROSS LEAK	EC-1616	
P0460	FUEL LEV SEN SLOSH	EC-1630	TF
P0461	FUEL LEVEL SENSOR	EC-1635	
P0464	FUEL LEVL SEN/CIRC	EC-1637	PD
P0500	VEH SPEED SEN/CIRC*3	EC-1642	AX
P0505	IACV/AAC VLV/CIRC	EC-1646	
P0510	CLOSED TP SW/CIRC	EC-1652	SU
P0600*4	A/T COMM LINE	EC-1659	
P0605	ECM	EC-1664	BR
P0705	PNP SW/CIRC	AT-250	
P0710	ATF TEMP SEN/CIRC	AT-256	ST
P0720	VEH SPD SEN/CIR A/T*3	AT-262	
P0725	ENGINE SPEED SIG	AT-267	RS
P0731	A/T 1ST GR FNCTN	AT-272	
P0732	A/T 2ND GR FNCTN	AT-278	BT
P0733	A/T 3RD GR FNCTN	AT-284	
P0734	A/T 4TH GR FNCTN	AT-290	HA
P0740	TCC SOLENOID/CIRC	AT-299	
P0744	A/T TCC S/V FNCTN	AT-304	SC
P0745	L/PRESS SOL/CIRC	AT-313	
P0750	SFT SOL A/CIRC*2	AT-318	EL

TROUBLE DIAGNOSIS — INDEX

VG33ER

Alphabetical & P No. Index for DTC (Cont'd)

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0755	SFT SOL B/CIRC*2	AT-323
P1126	THERMOSTAT FNCTN	EC-1666
P1148	CLOSED LOOP-B1	EC-1668
P1168	CLOSED LOOP-B2	EC-1668
P1217*4	ENG OVER TEMP	EC-1670
P1243	SCB/V CONT SOL/V	EC-1686
P1336	CKP SENSOR (COG)	EC-1692
P1440	EVAP SMALL LEAK	EC-1699
P1441	EVAP VERY SML LEAK	EC-1701
P1444	PURG VOLUME CONT/V	EC-1716
P1446	VENT CONTROL VALVE	EC-1728
P1447	EVAP PURG FLOW/MON	EC-1735
P1448	VENT CONTROL VALVE	EC-1747
P1464	FUEL LEVEL SEN/CIRC	EC-1755
P1490	VC/V BYPASS/V	EC-1759
P1491	VC CUT/V BYPASS/V	EC-1765
P1605	A/T DIAG COMM LINE	EC-1774
P1705	TP SEN/CIRC A/T*2	AT-328
P1706	P-N POS SW/CIRCUIT	EC-1777
P1760	O/R CLUTCH SOL/CIRC	AT-337

*1: 1st trip DTC No. is the same as DTC No.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

*4: This DTC is displayed with CONSULT-II only.

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

NEEC1078

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.
- The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.

Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NEEC1079

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to *EL-5* "HARNESS CONNECTOR".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

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Engine Fuel & Emission Control System

NEEC1080

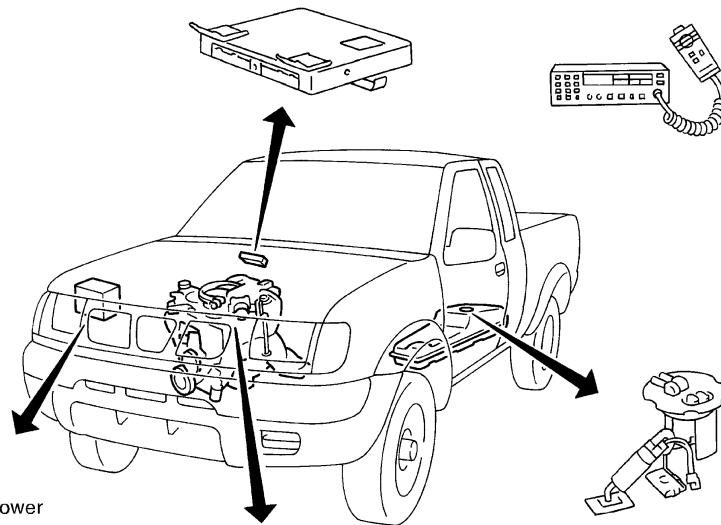
ECM

- Do not disassemble ECM.
- Do not turn on board diagnostic test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



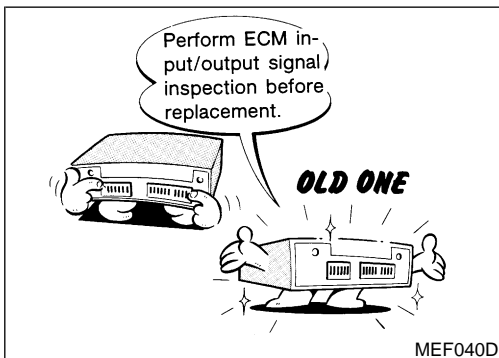
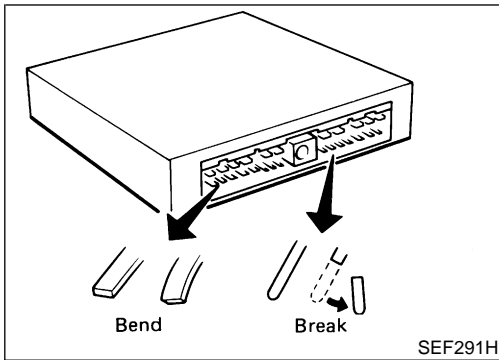
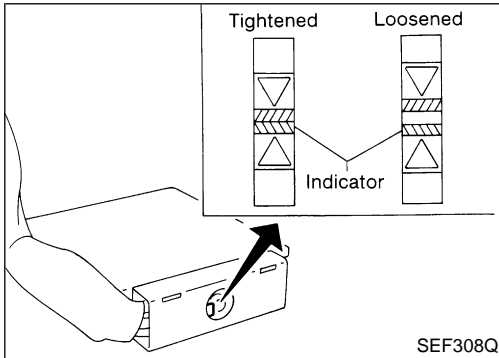
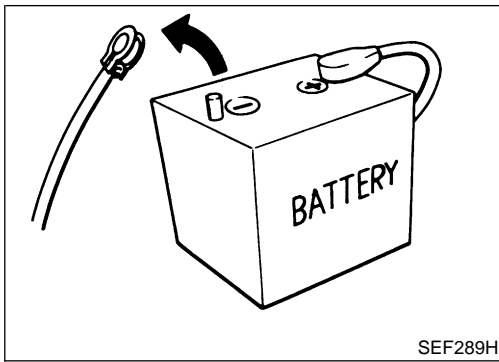
FUEL PUMP

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF236V



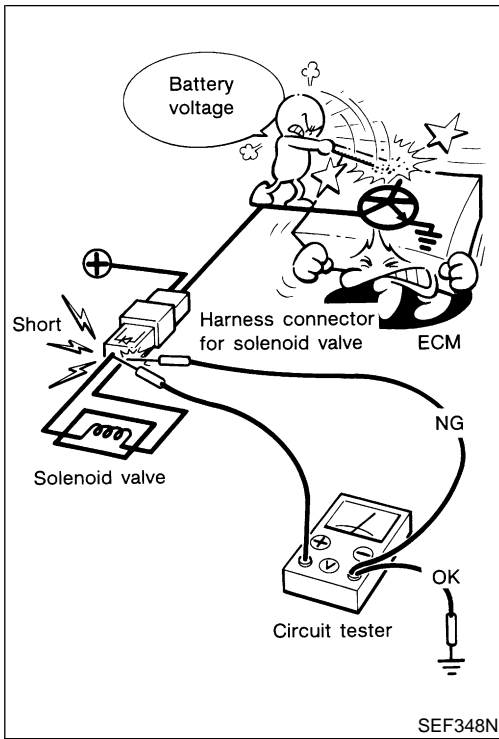
Precautions

NEEC1081

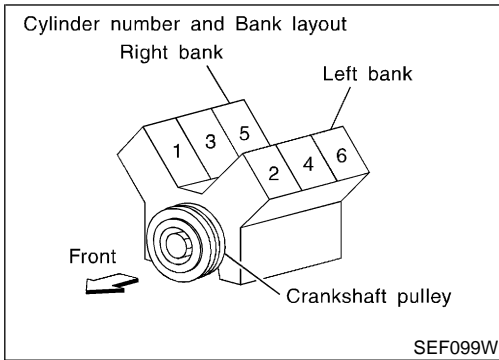
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 - : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-1340.
- After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”. The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed.

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Precautions (Cont'd)



- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.



- Regarding model D22, “-B1” indicates the right bank and “-B2” indicates the left bank as shown in the figure.

Wiring Diagrams and Trouble Diagnosis

NEEC1082

When you read Wiring diagrams, refer to the following:

- **GI-11**, “HOW TO READ WIRING DIAGRAMS”
- **EL-9**, “POWER SUPPLY ROUTING”

When you perform trouble diagnosis, refer to the following:

- **GI-34**, “How to Follow Test Groups in Trouble Diagnoses”
- **GI-23**, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

PREPARATION

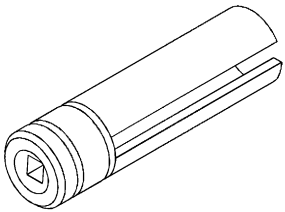
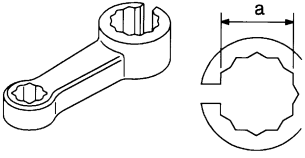
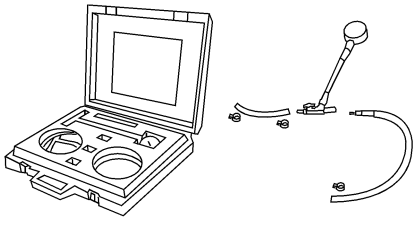
VG33ER

Special Service Tools

Special Service Tools

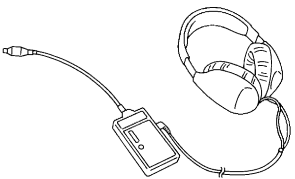
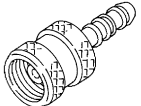
NEEC1083

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description		GI
KV10117100 (J36471-A) Heated oxygen sensor wrench		Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut	MA
KV10114400 (J-38365) Heated oxygen sensor wrench		Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)	EM
(J44321) Fuel pressure gauge kit		Checking fuel pressure	LC
LEC642	NT379		EC

Commercial Service Tools

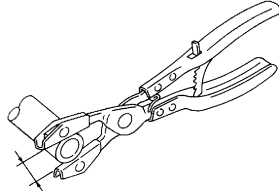
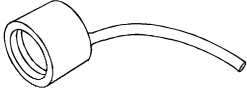
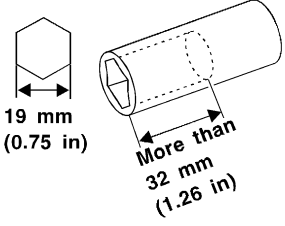
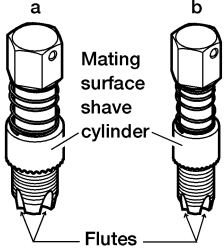
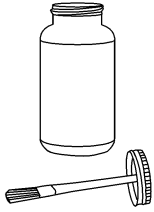
NEEC1084

Tool name (Kent-Moore No.)	Description		AX
Leak detector (J41416)		Locating the EVAP leak	SU
EVAP service port adapter (J41413-OBD)		Applying positive pressure through EVAP service port	BR
NT704	NT703		ST
			RS
			BT
			HA
			SC
			EL
			IDX

PREPARATION

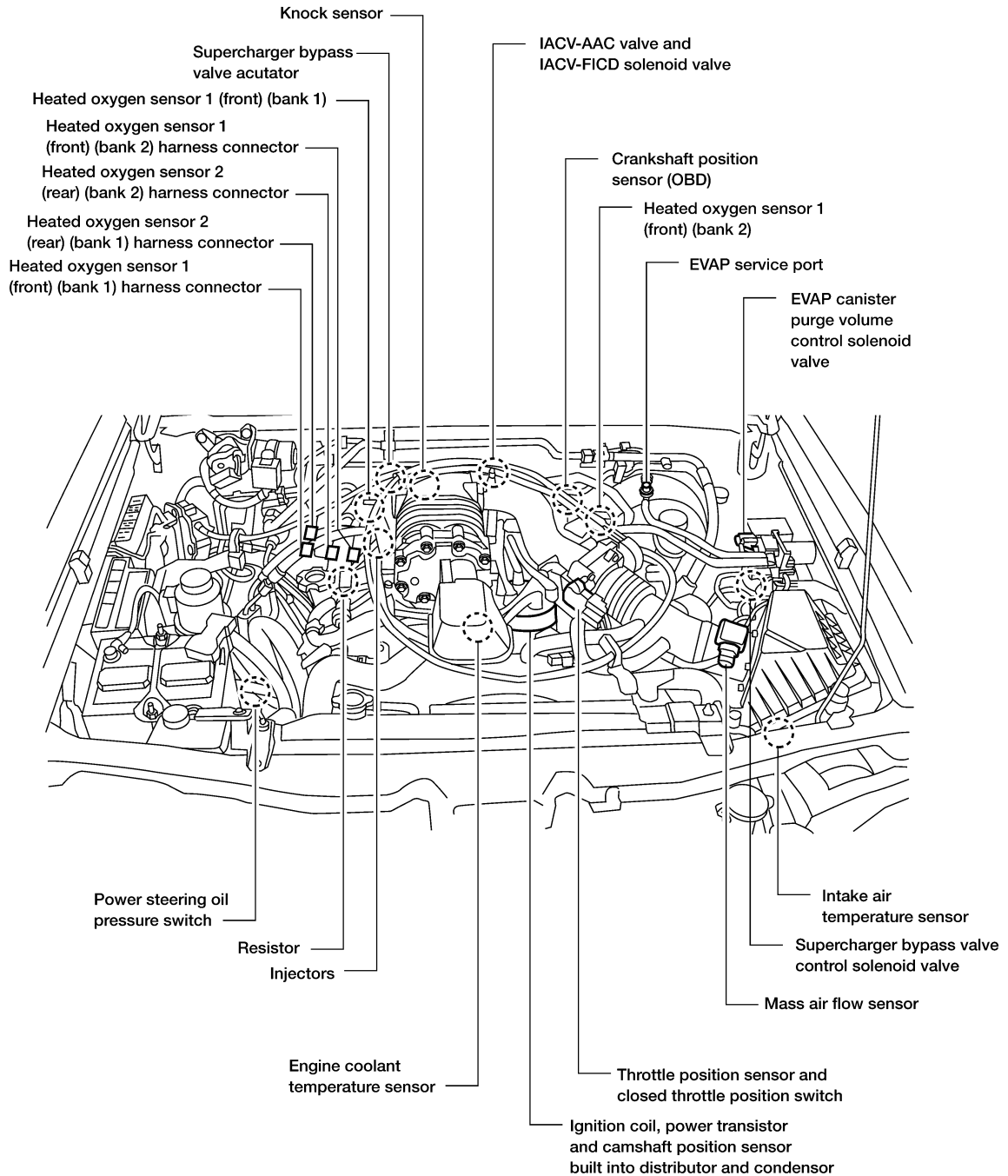
VG33ER

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description
Hose clipper	 <p>Approx. 20 mm (0.79 in)</p> <p>NT720</p> <p>Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)]</p>
Fuel filler cap adapter	 <p>NT653</p> <p>Checking fuel tank vacuum relief valve opening pressure</p>
Socket wrench	 <p>19 mm (0.75 in)</p> <p>More than 32 mm (1.26 in)</p> <p>NT705</p> <p>Removing and installing engine coolant temperature sensor</p>
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 <p>a</p> <p>b</p> <p>Mating surface shave cylinder</p> <p>Flutes</p> <p>AEM488</p> <p>Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools". a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor</p>
Anti-seize lubricant (Permatex® 133AR or equivalent meeting MIL specification MIL-A-907)	 <p>AEM489</p> <p>Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.</p>

Engine Control Component Parts Location

NEEC1085



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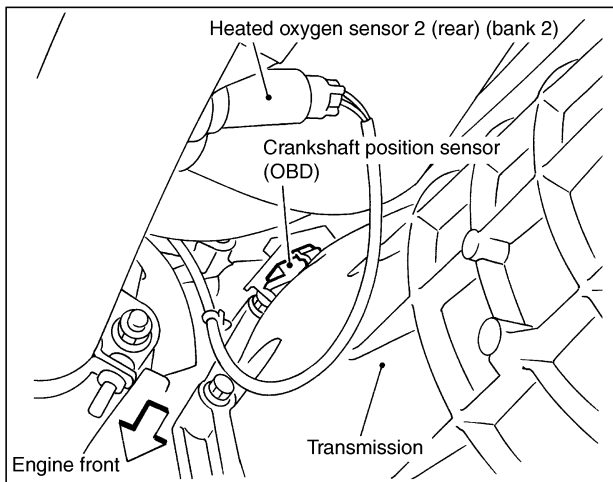
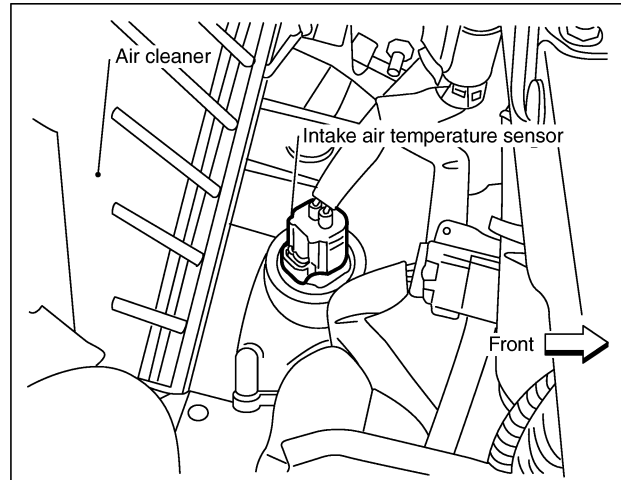
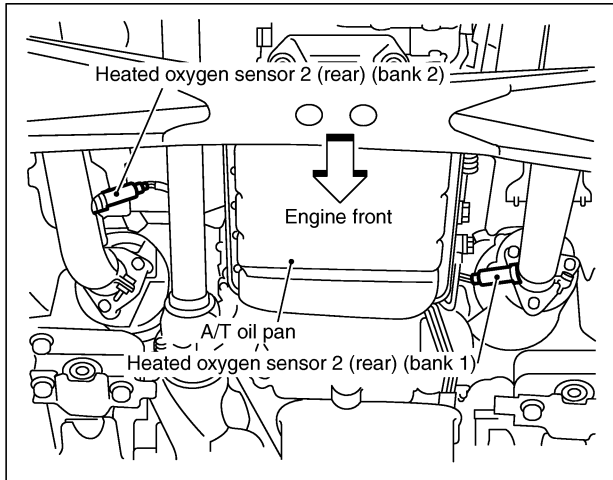
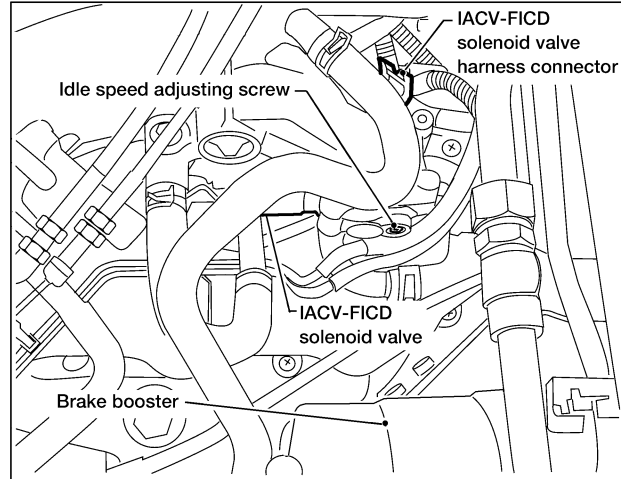
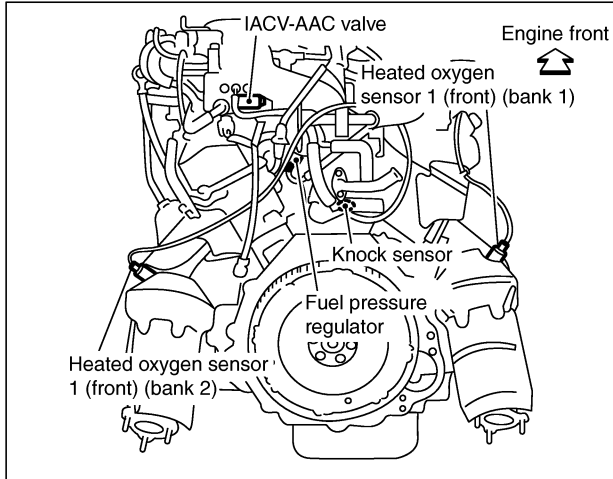
LEC808

IDX

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

VG33ER

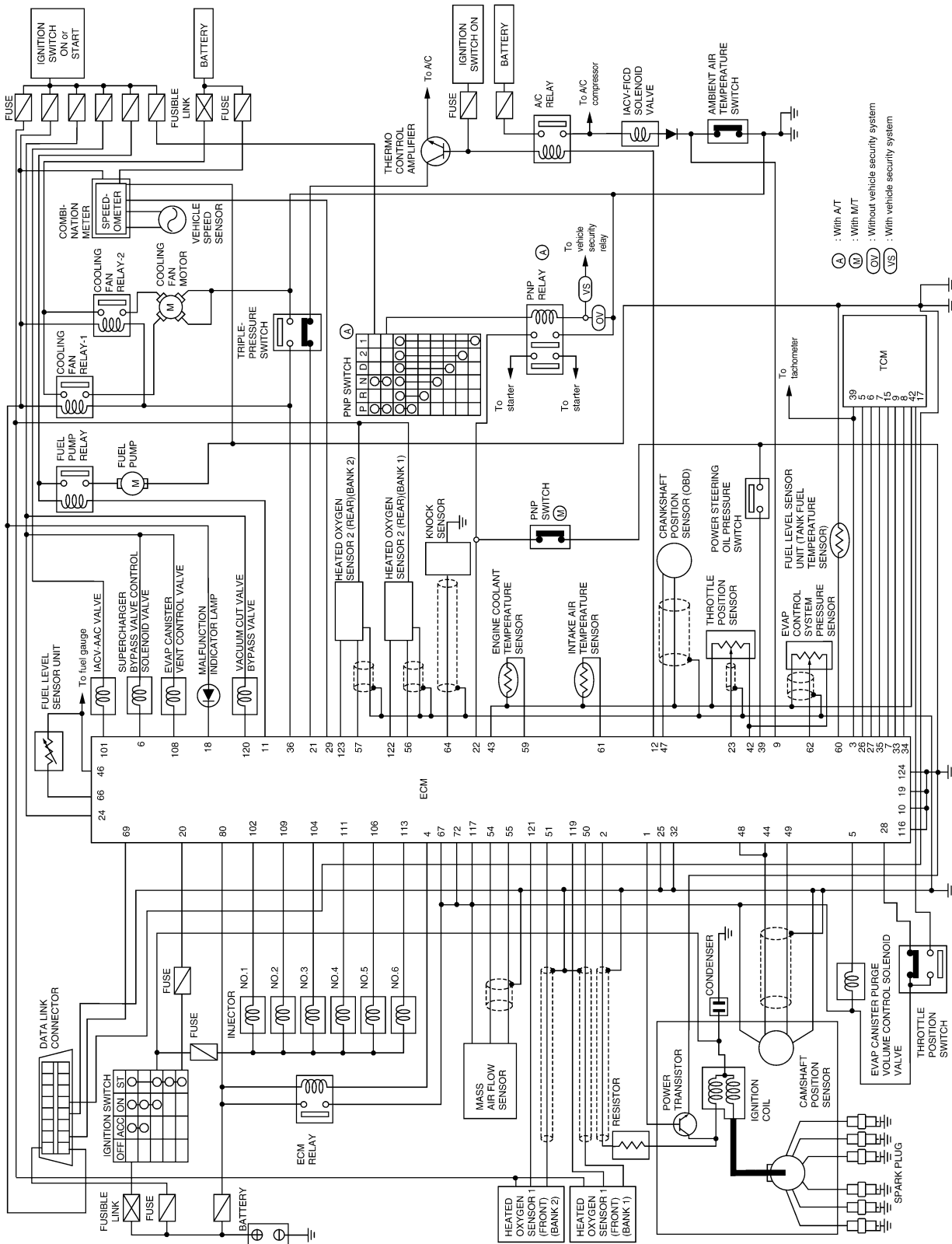
Engine Control Component Parts Location (Cont'd)



LEC762

Circuit Diagram

NEEC1086



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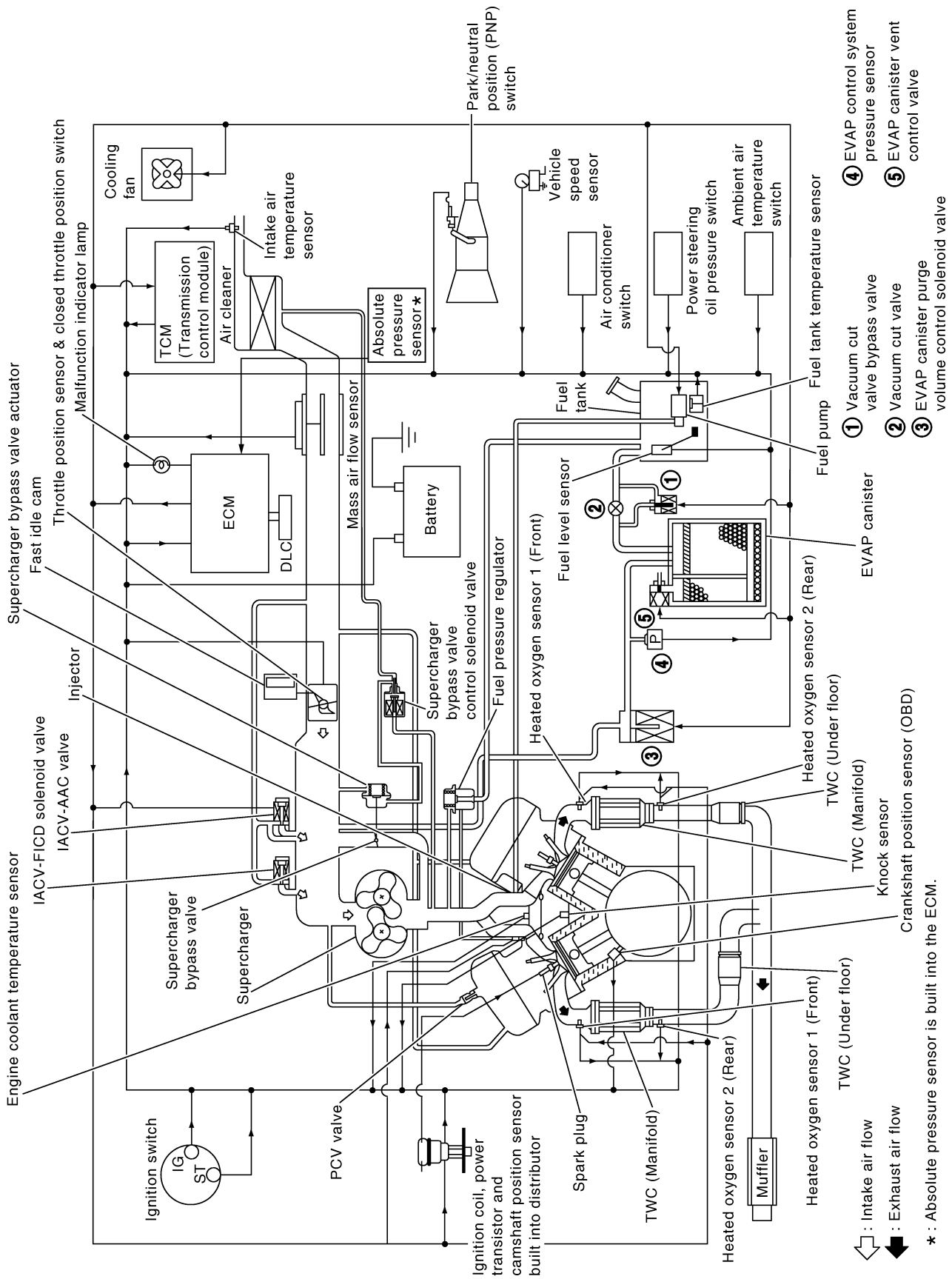
EL

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LEC156A

System Diagram

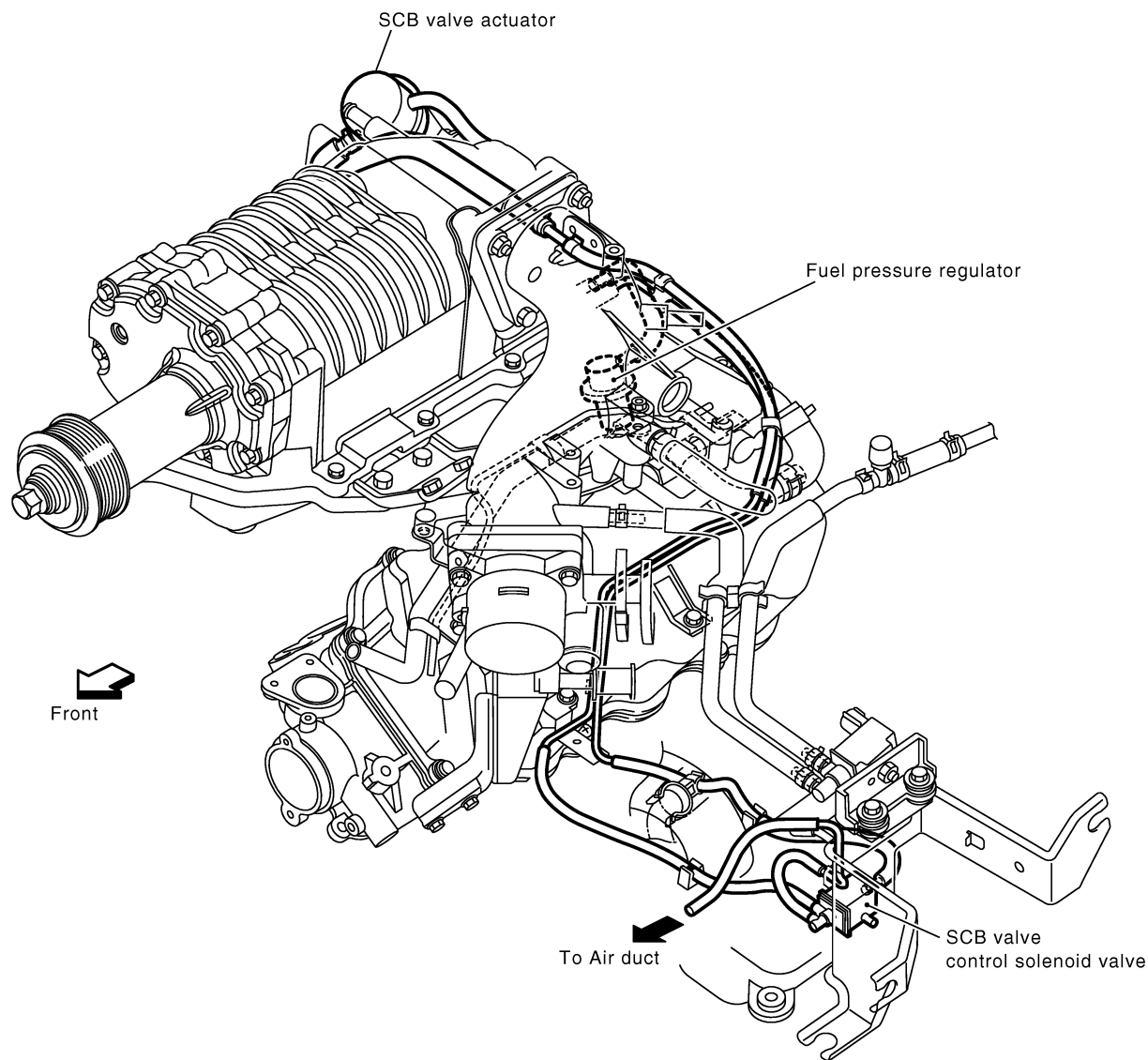
NEEC1087



Vacuum Hose Drawing

NEEC1088

Refer to "System Diagram", EC-1234 for Vacuum Control System.



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEC295C

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System Chart

NEEC1089

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 (front) ● Ignition switch ● Throttle position sensor ● Closed throttle position switch *4 ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● Intake air temperature sensor ● Absolute pressure sensor (Built into ECM) ● EVAP control system pressure sensor *1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Fuel tank temperature sensor *1 ● Crankshaft position sensor (OBD) *1 ● Rear heated oxygen sensor *3 ● TCM (Transmission control module) *2 ● Ambient air temperature switch 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Supercharged air control	SCB valve control solenoid valve
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

*2: The DTC related to A/T will be sent to ECM.

*3: This sensor is not used to control the engine system under normal conditions.

*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NEEC1090

NEEC1090S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor (Built into ECM)	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

* Under normal conditions, this sensor is not for engine control operation.

Basic Multiport Fuel Injection System

NEEC1090S02

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the camshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NEEC1090S03

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

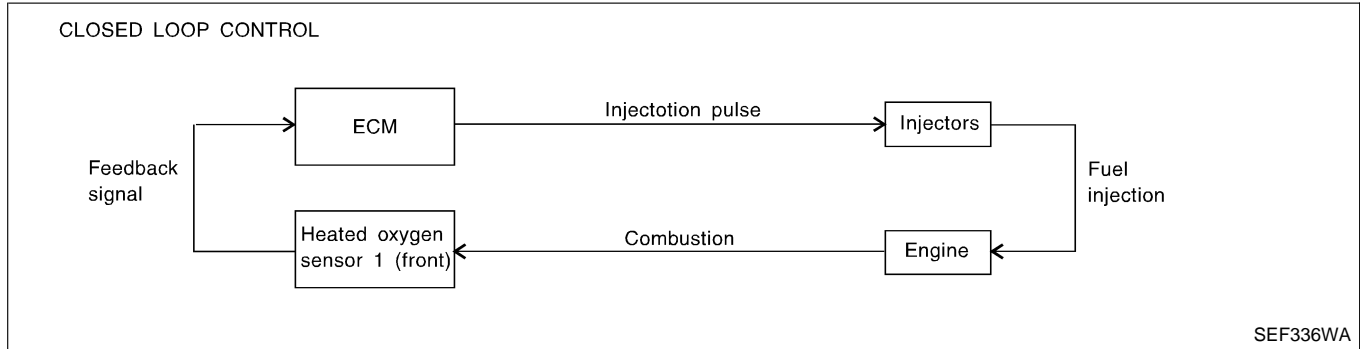
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D"
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NEEC1090S04


The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-1400. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 (rear) is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NEEC1090S05

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

Mixture Ratio Self-learning Control

NEEC1090S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

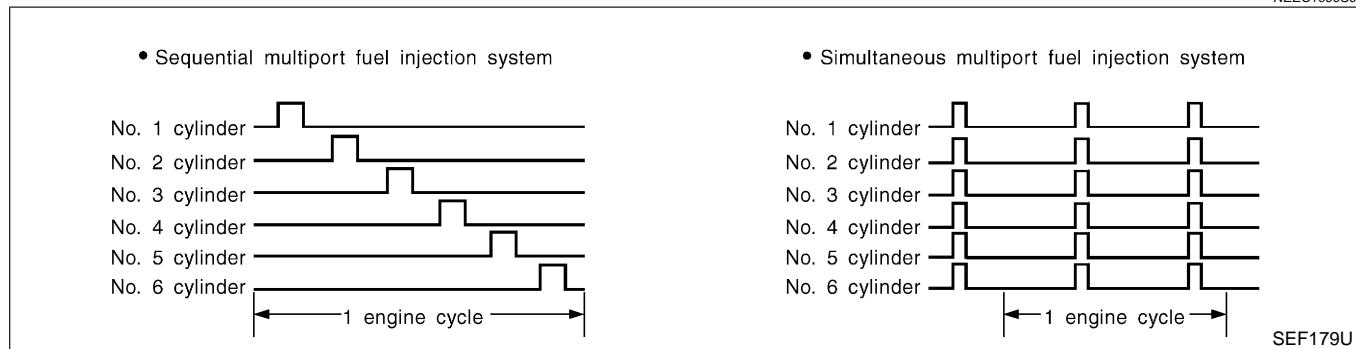
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Multiport Fuel Injection (MFI) System (Cont'd)

Fuel Injection Timing

NEEC1090S07



SEF179U

Two types of systems are used.

Sequential Multiport Fuel Injection System

NEEC1090S0701

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

NEEC1090S0702

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NEEC1090S08

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

NEEC1091

NEEC1091S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

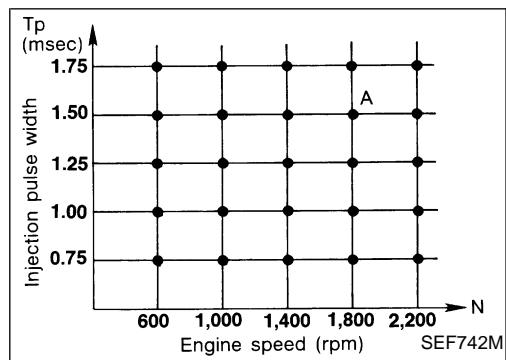
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Distributor Ignition (DI) System (Cont'd)

System Description

NEEC1091S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

e.g., N: 1,800 rpm, Tp: 1.50 msec

A °BTDC

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

DESCRIPTION

NEEC1092

Input/Output Signal Chart

NEEC1092S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NEEC1092S02

This system improves engine operation when the air conditioner is used.

Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Fuel Cut Control (at no load & high engine speed)

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

Input/Output Signal Chart

NEEC1093

NEEC1093S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

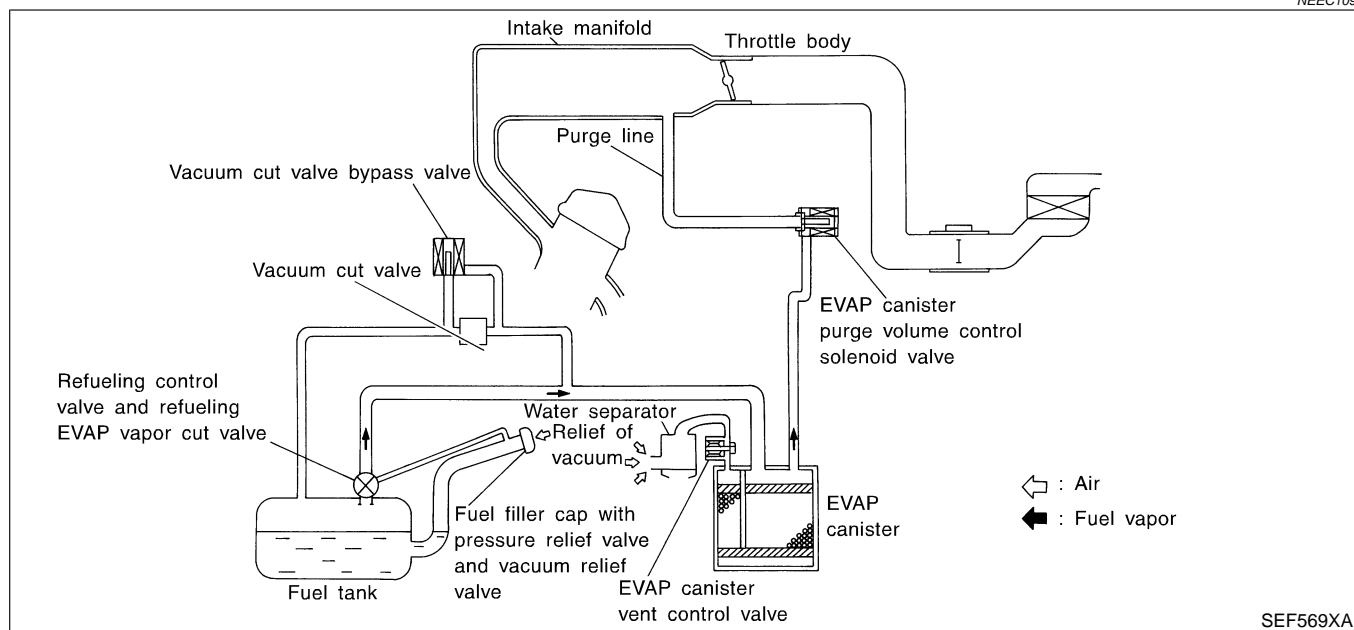
NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-1237.

Evaporative Emission System

DESCRIPTION

NEEC1094



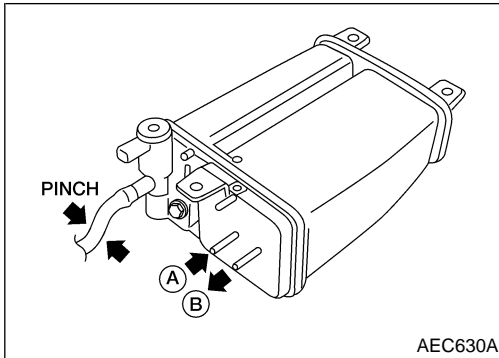
SEF569XA

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank. The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases. EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



INSPECTION

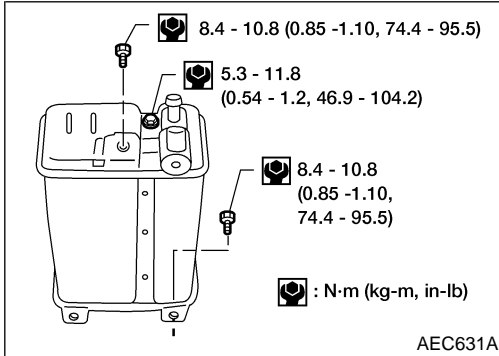
EVAP Canister

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.

NEEC1095

NEEC1095S01

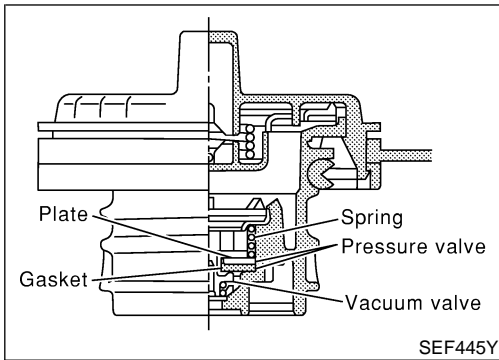


Tightening Torque

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

NEEC1095S02



Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

NEEC1095S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

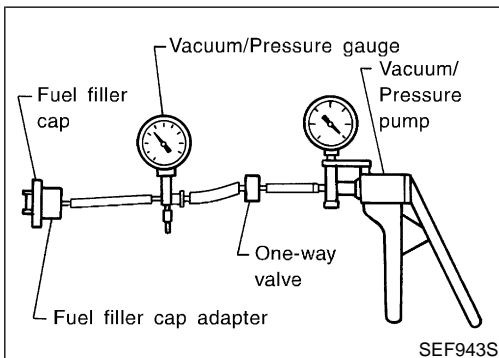
Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come ON



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NEEC1095S04

Refer to EC-1765.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

NEEC1095S05

Refer to EC-1592.

Fuel Tank Temperature Sensor

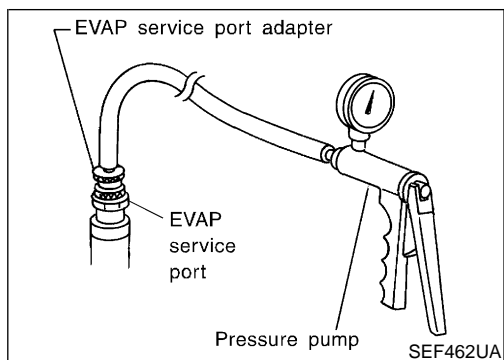
NEEC1095S06

Refer to EC-1523.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

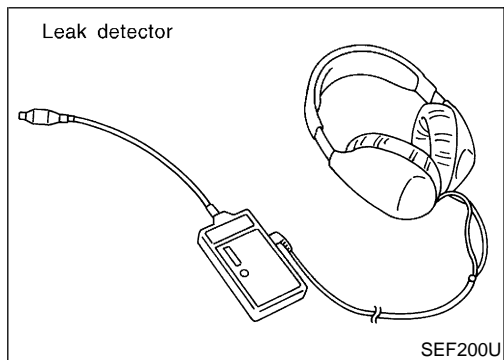
Evaporative Emission System (Cont'd)



Evap Service Port

NEEC1095S07

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



How to Detect Fuel Vapor Leakage

NEEC1095S08

CAUTION:

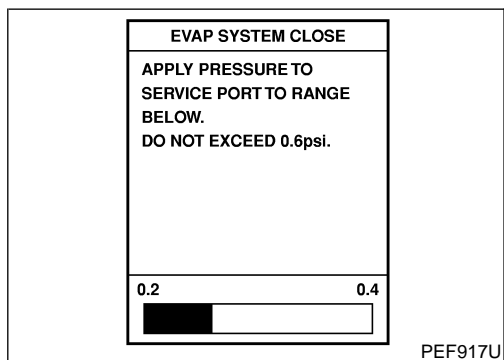
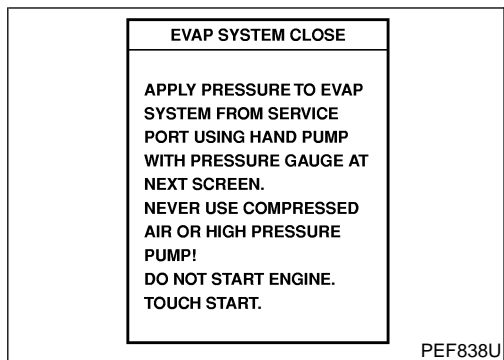
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

Ⓜ With CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose to the EVAP service port adapter.
- 3) Turn ignition switch ON.
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.



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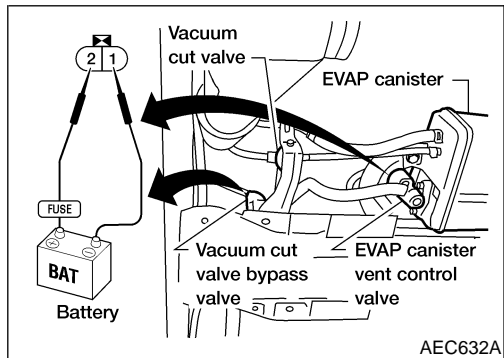
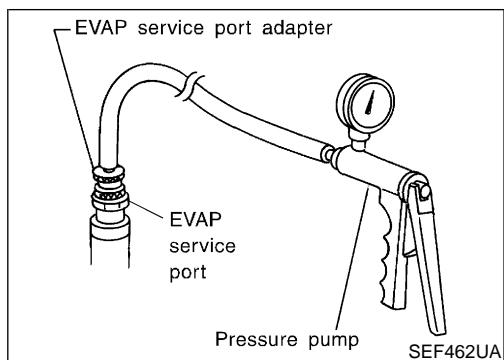
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



⊗ Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
- 3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 5) Remove EVAP service port adapter and hose with pressure pump.
- 6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

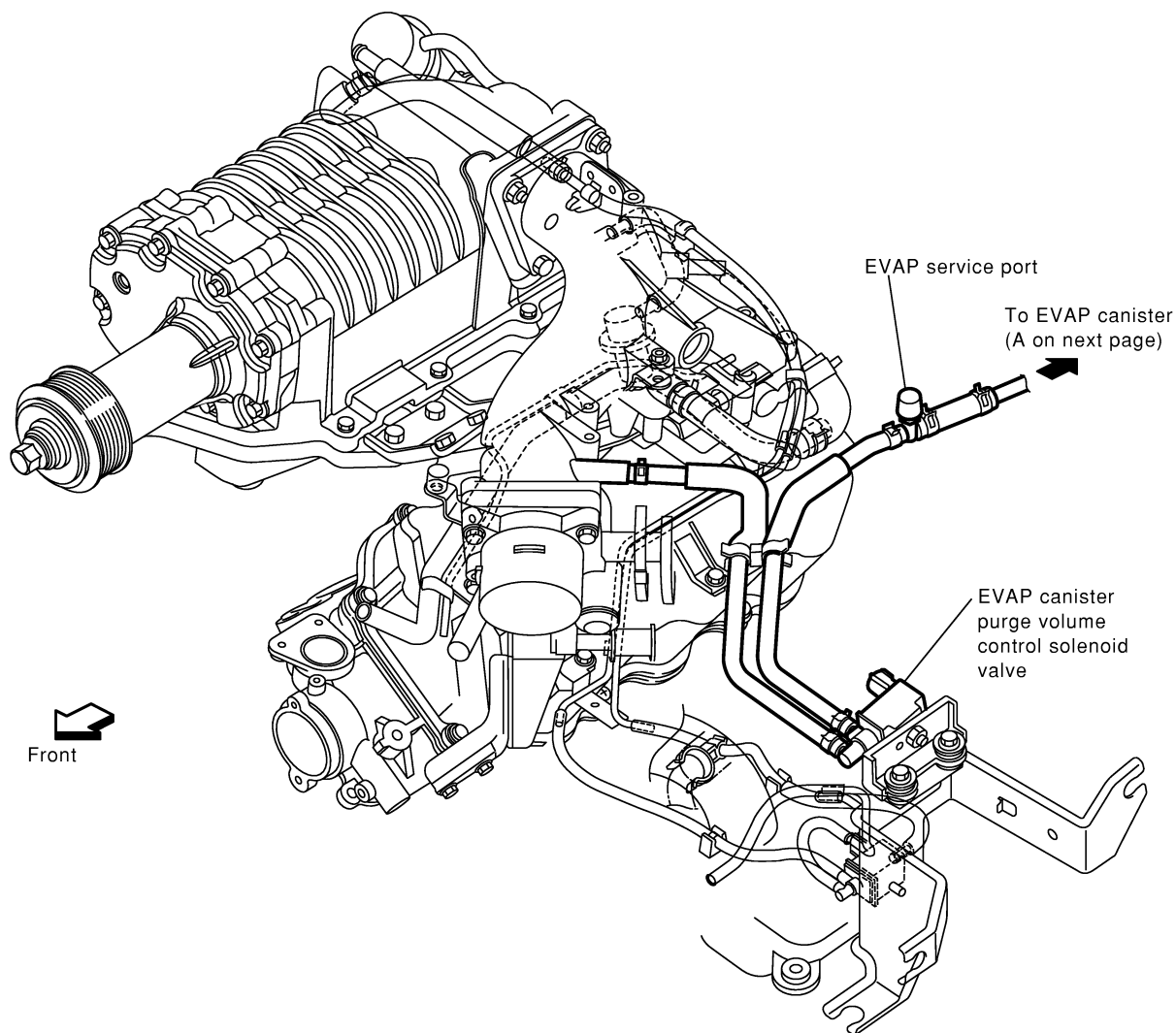
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

NEEC1096



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

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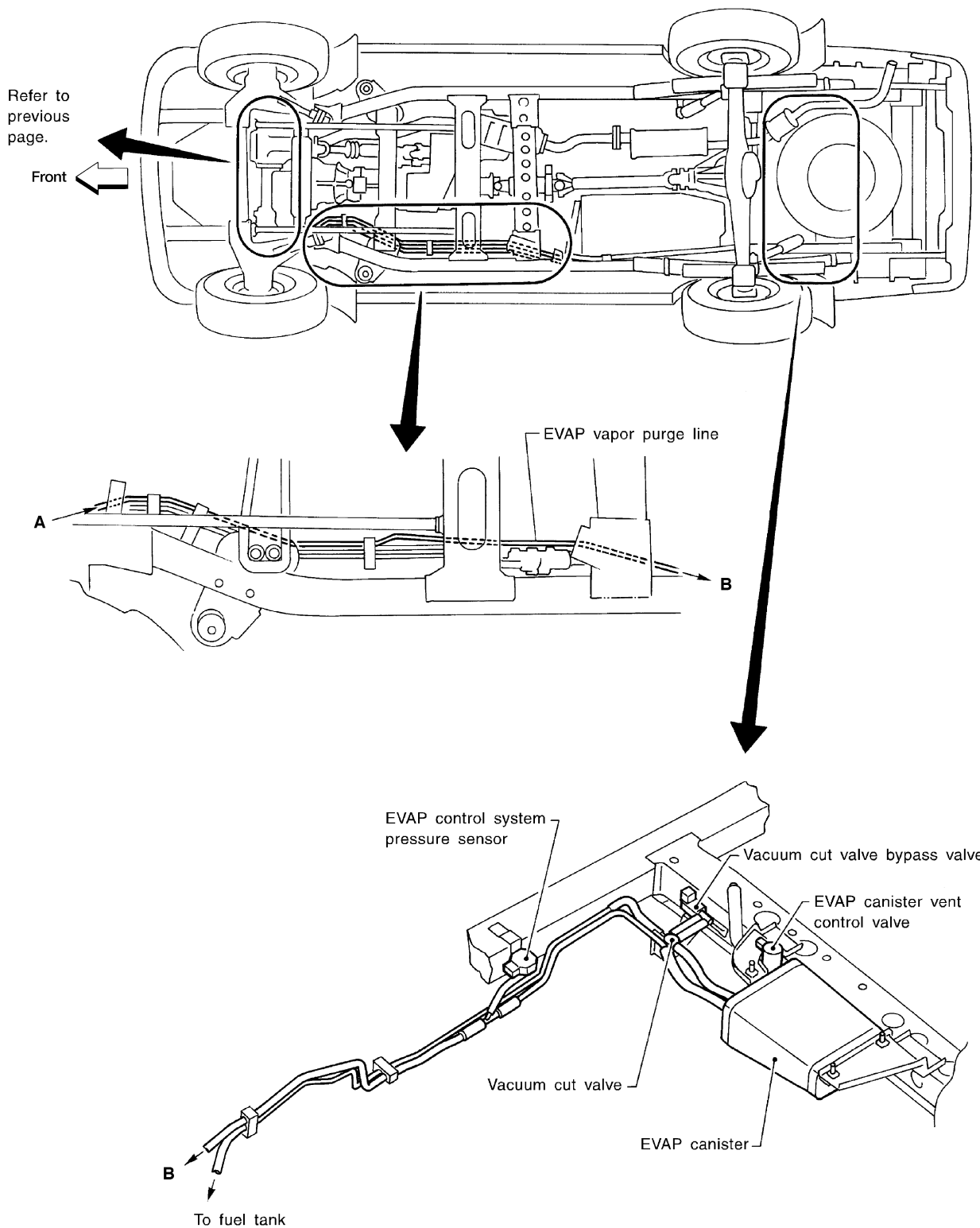
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



AEC886A

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

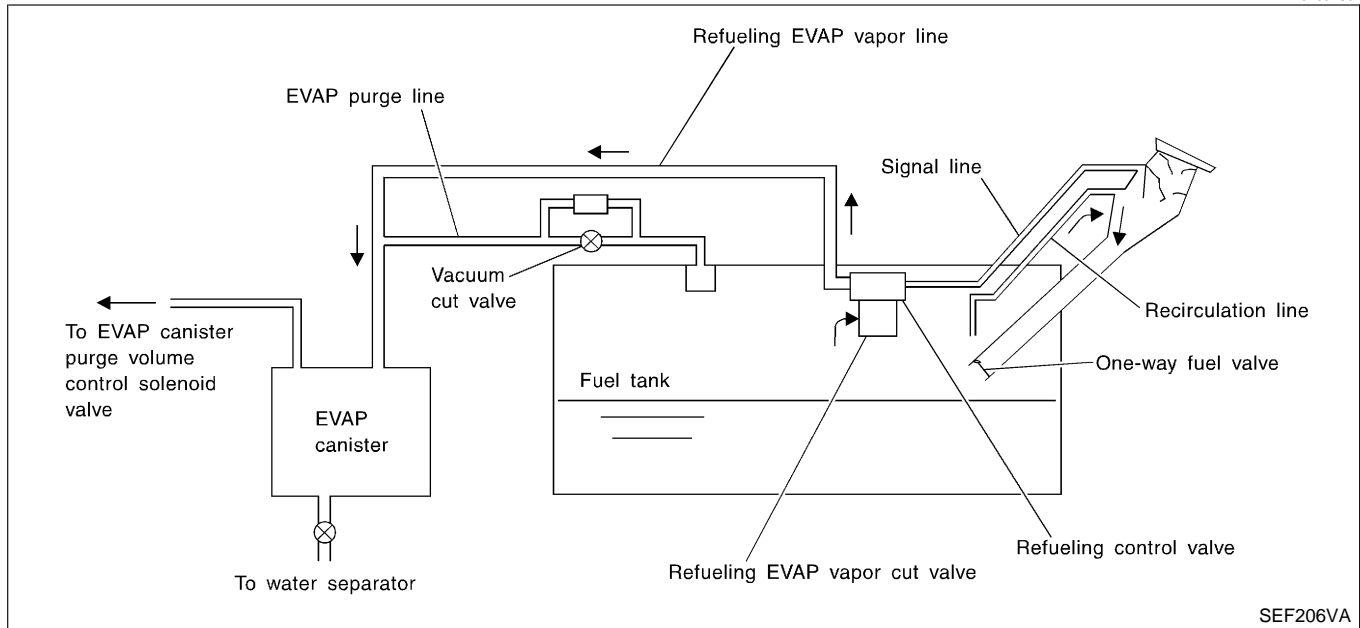
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NEEC1097

SYSTEM DESCRIPTION

NEEC1097S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: INFLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

Before removing fuel line parts, carry out the following procedures:

- a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-1259.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
 - Do not kink or twist hose and tube when they are installed.
 - Do not tighten hose and clamps excessively to avoid damaging hoses.
 - After installation, run engine and check for fuel leaks at connection.
 - Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

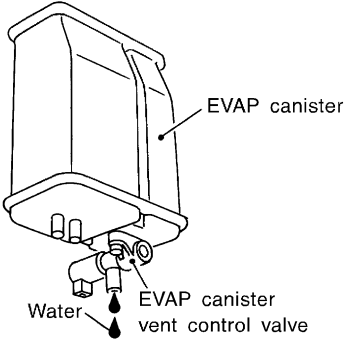
DIAGNOSTIC PROCEDURE

NEEC1097S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NEEC1097S0201

1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

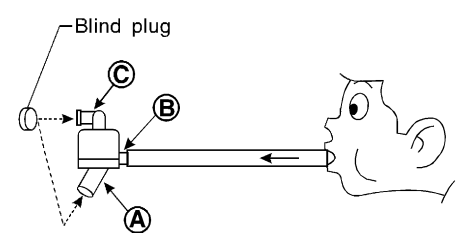
2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
	▶	GO TO 4.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 5.	
NG	▶	Replace water separator.	

5	DETECT MALFUNCTIONING PART	<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p> <p style="text-align: center;">▶</p> <p>Repair or replace EVAP hose.</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

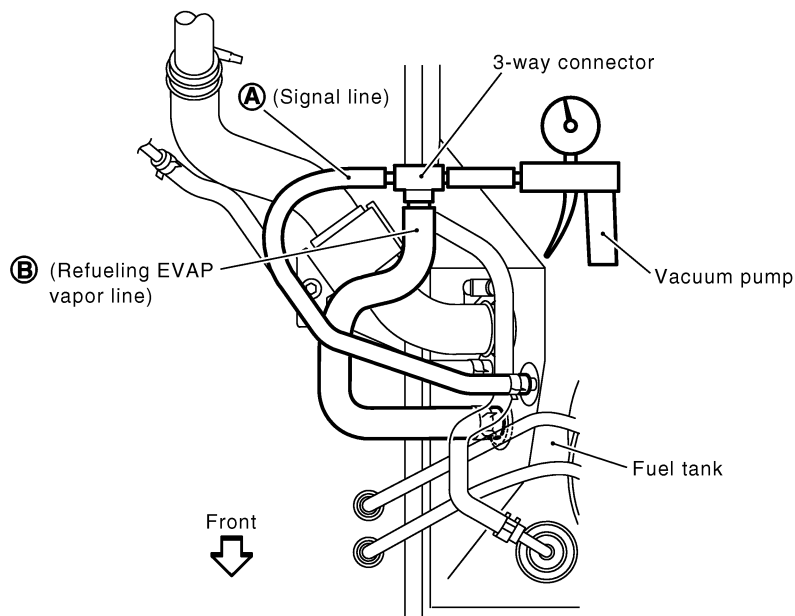
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM."
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel level sensor unit retainer.
 - b. Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK



GO TO 8.

NG



Replace refueling EVAP vapor cut valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

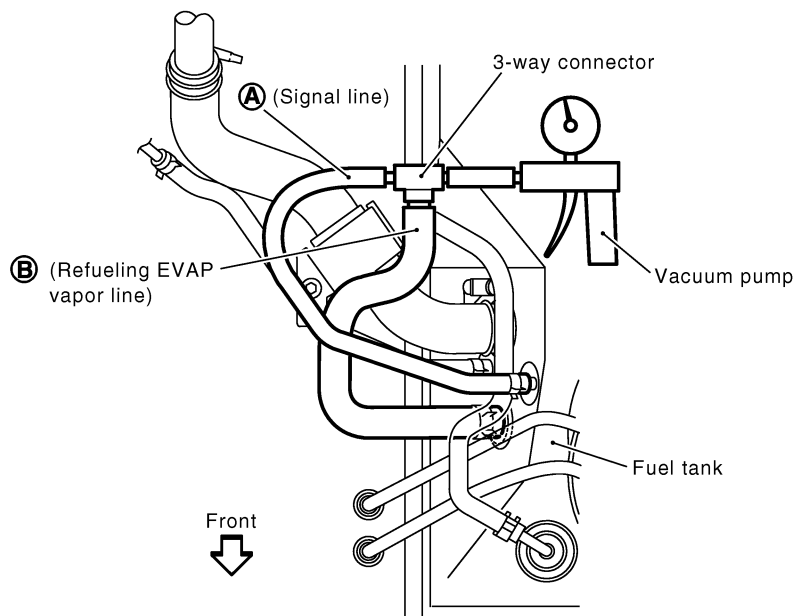
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel level sensor unit retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.
		OK or NG
OK	▶	INSPECTION END
NG	▶	Replace refueling control valve with fuel tank.

Symptom: Cannot Refuel/Fuel Odor From The Fuel Filler Opening Is Strong While Refueling.

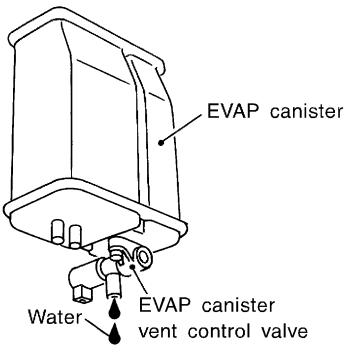
NEEC1097S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).
		OK or NG
OK	▶	GO TO 2.
NG	▶	GO TO 3.

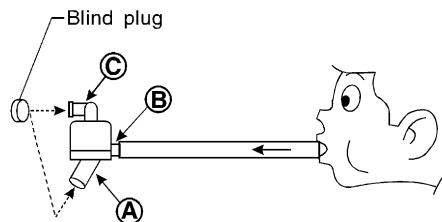
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	REPLACE EVAP CANISTER	
Replace EVAP canister with a new one.		
▶		
GO TO 4.		

4	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
<ul style="list-style-type: none"> ● Do not disassemble water separator. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.		
▶		
Repair or replace EVAP hose.		

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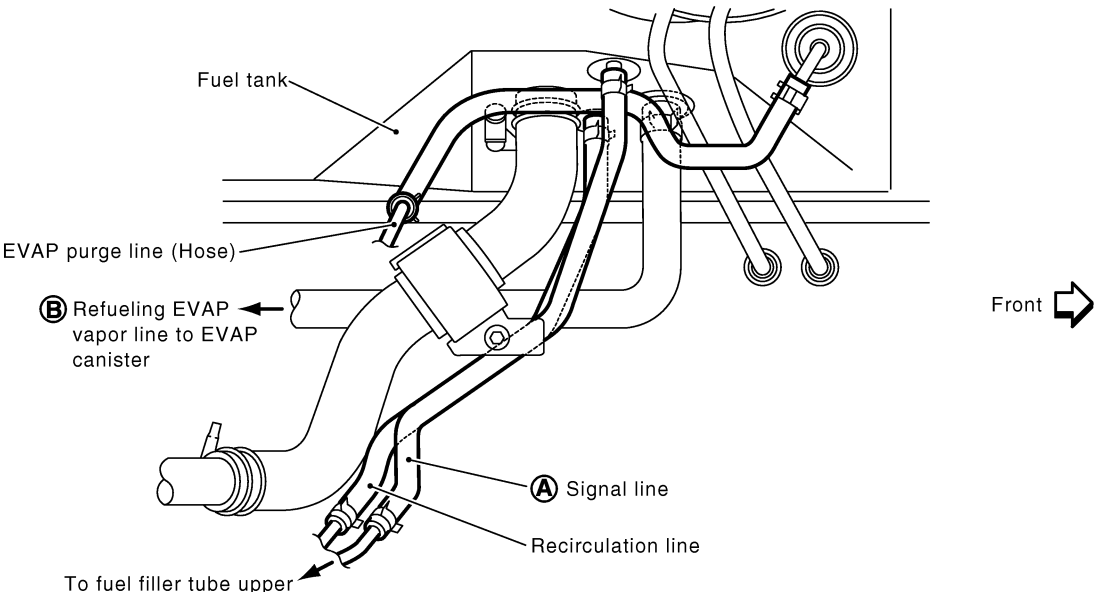
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

SEF706Z

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

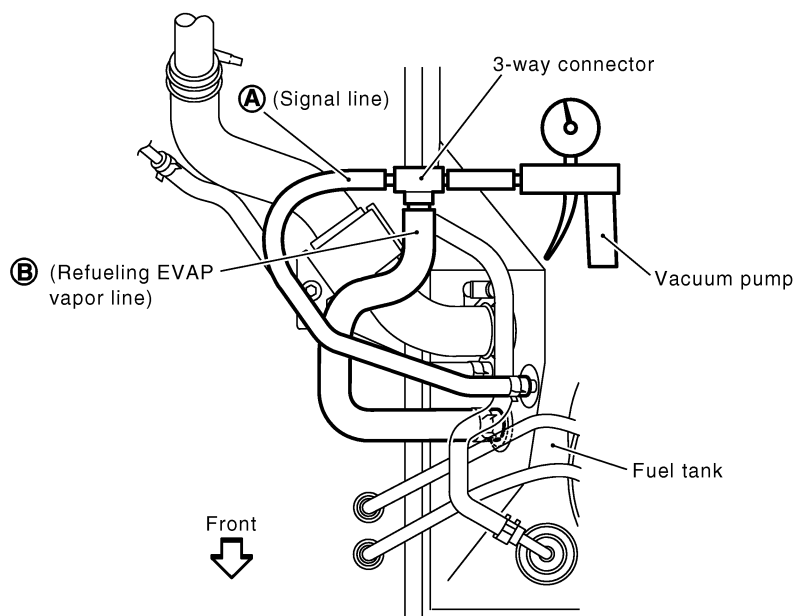
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel level sensor unit retainer.
 - b. Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

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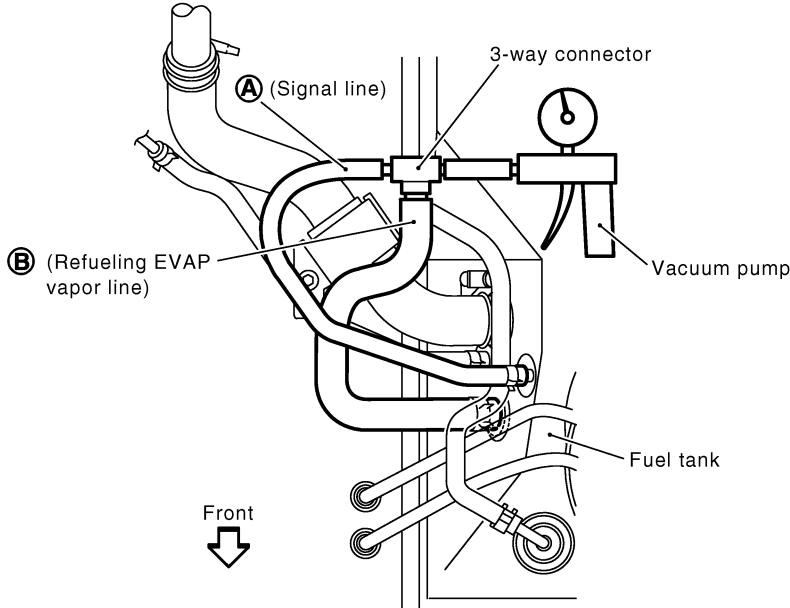
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel level sensor unit retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel level sensor unit retainer with fuel level sensor unit. Always replace O-ring with new one. c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

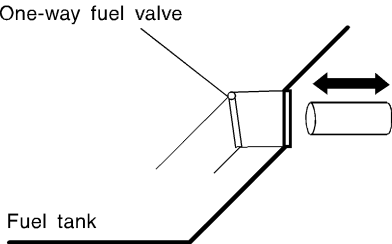
11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

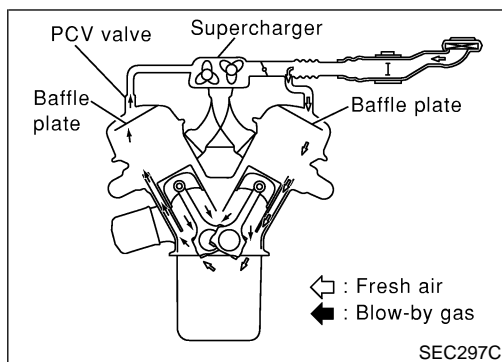
12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

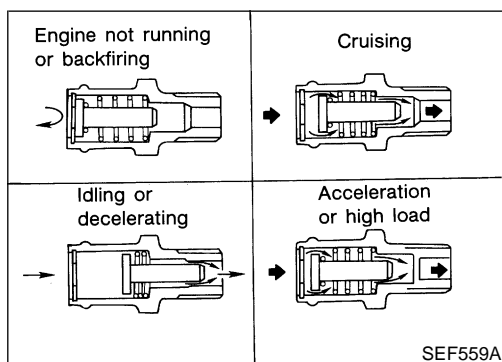
13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Positive Crankcase Ventilation DESCRIPTION

NEEC1098

This system returns blow-by gas to the intake manifold. The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction. On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



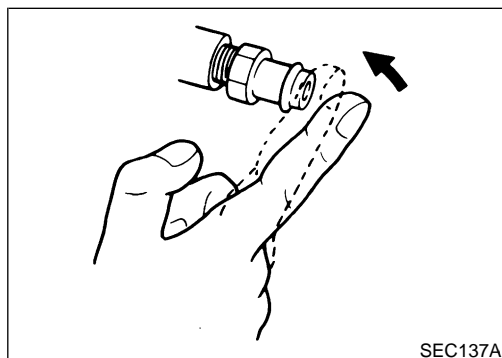
INSPECTION

NEEC1099

PCV (Positive Crankcase Ventilation) Valve

NEEC1099S01

With engine running at idle, remove PCV valve from rocker cover; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

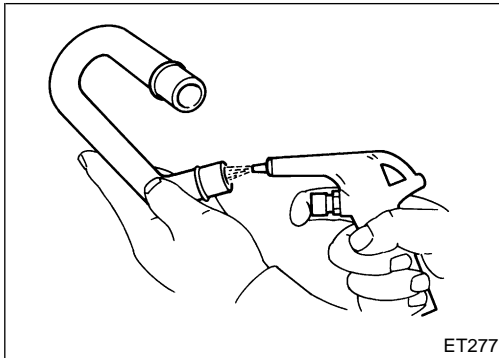


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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

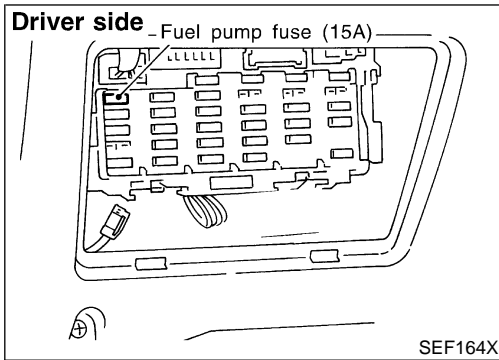
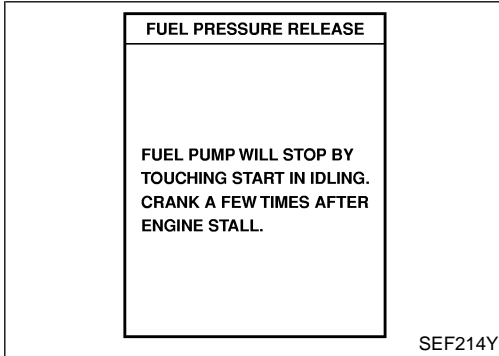
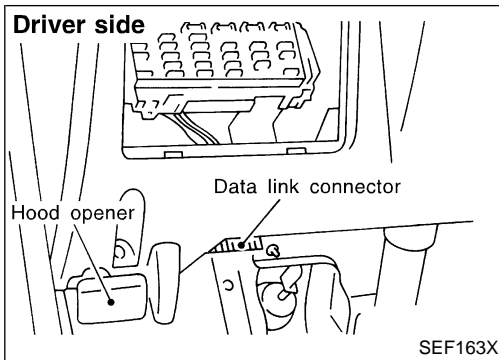
Positive Crankcase Ventilation (Cont'd)



PCV Valve Ventilation Hose

NEEC1099S02

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



Fuel Pressure Release

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NEEC1100

Ⓜ WITH CONSULT-II

1. Turn ignition switch ON. NEEC1100S01
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

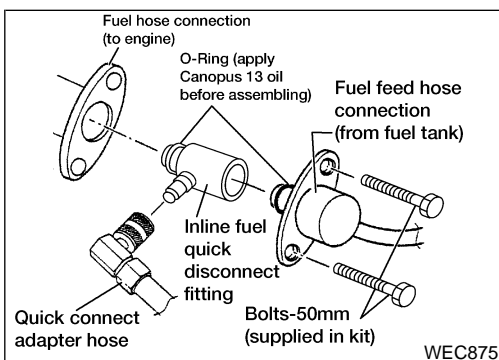
ⓧ WITHOUT CONSULT-II

1. Remove fuel pump fuse located in fuse box. NEEC1100S02
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

- Use Fuel Pressure gauge J-44321 to check fuel pressure. NEEC1101
- Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).



3. Connect the fuel pressure test gauge (quick connect adapter hose) to the quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

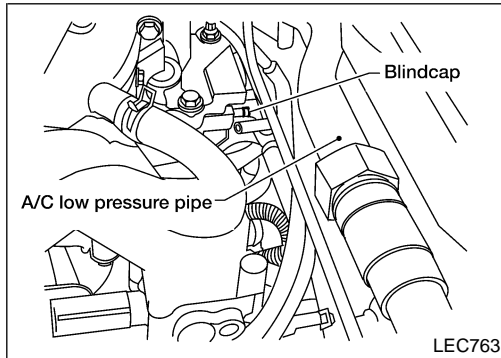
With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)

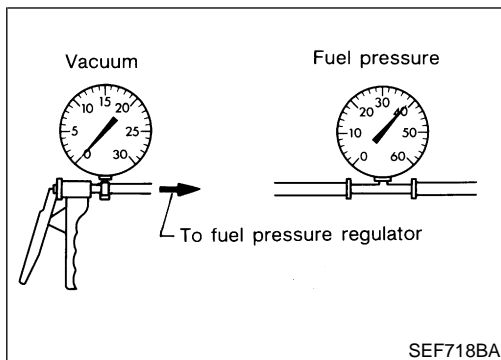
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

NEEC1102

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

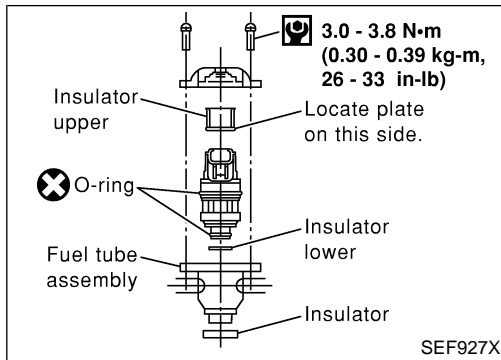
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

Injector

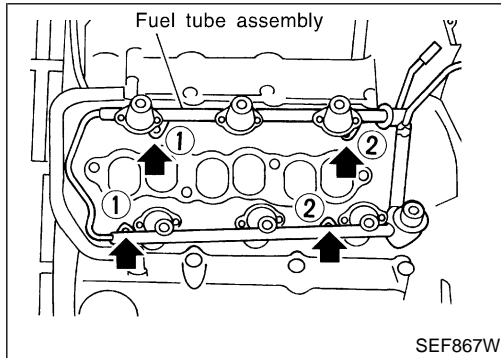
REMOVAL AND INSTALLATION

NEEC1103

1. Release fuel pressure to zero. Refer to EC-1259.
2. Remove supercharger. Refer to **EM-107**, "SUPERCHARGER".
3. Remove injector fuel tube assembly.
The following parts should be disconnected or removed.
 - Fuel feed and return hose
 - All injectors harness connectors
 - **Push injector tail piece.**
 - **Do not pull on connector.**
 - **Do not extract injector by pinching.**

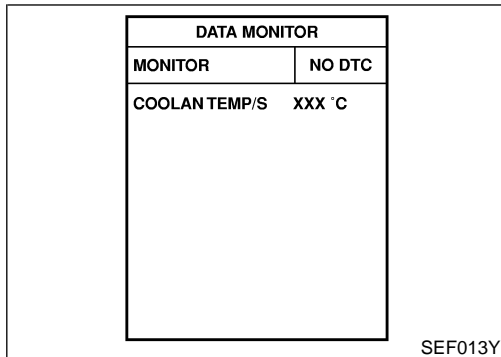


4. Push out any malfunctioning injector from injector fuel tube.
5. Replace or clean injector as necessary.
 - **Always replace O-rings with new ones.**
 - **Lubricate O-rings with engine oil.**
6. Install injector to injector fuel tube assembly.



7. Install injectors with fuel tube assembly to intake manifold. **Tighten in numerical order shown in the figure.**
 - a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg·m, 3.6 to 4.4 ft·lb).
 - b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg·m, 8 to 11 ft·lb).
8. Reinstall any part removed in reverse order of removal.

CAUTION:
After properly connecting fuel hose to injector and fuel tube, check connection for fuel leakage.



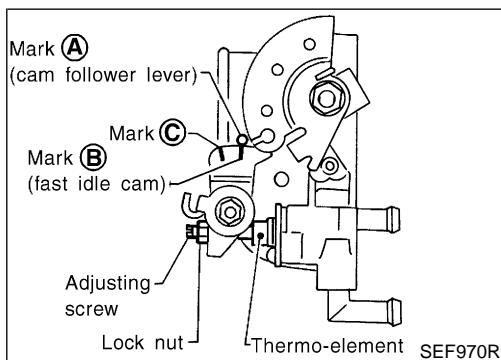
Fast Idle Cam (FIC) INSPECTION AND ADJUSTMENT

NEEC1104

With CONSULT-II

NEEC1104S01

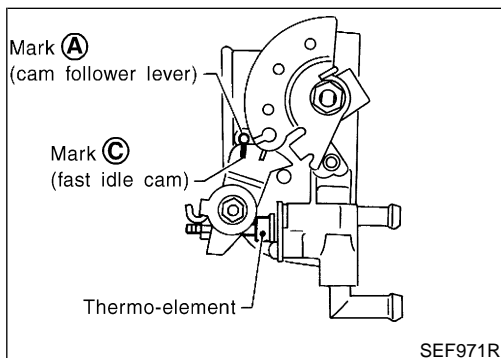
1. Turn ignition switch ON.
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

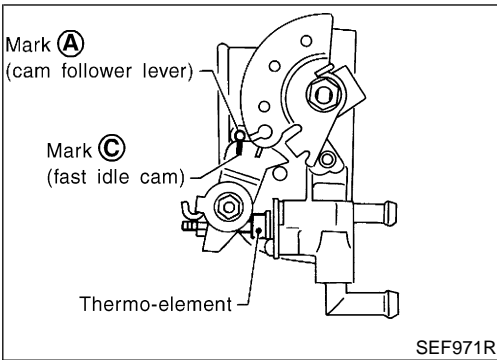
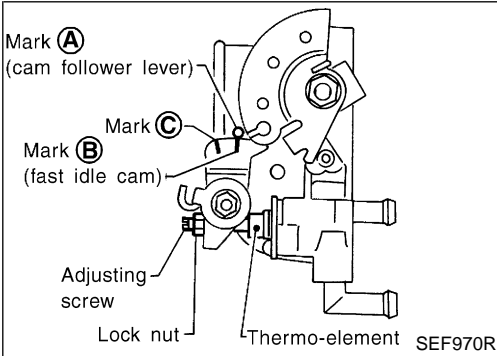
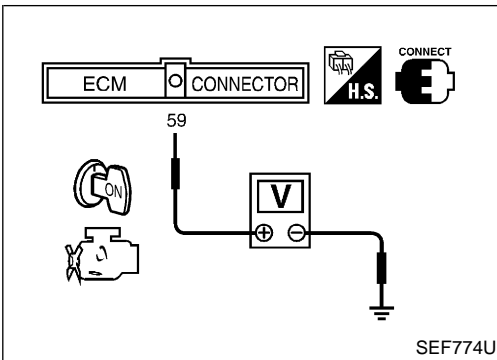
Lock nut:

0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)



4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

Fast Idle Cam (FIC) (Cont'd)



⊗ Without CONSULT-II

NEEC1104S02

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NEEC1105

NEEC1105S01

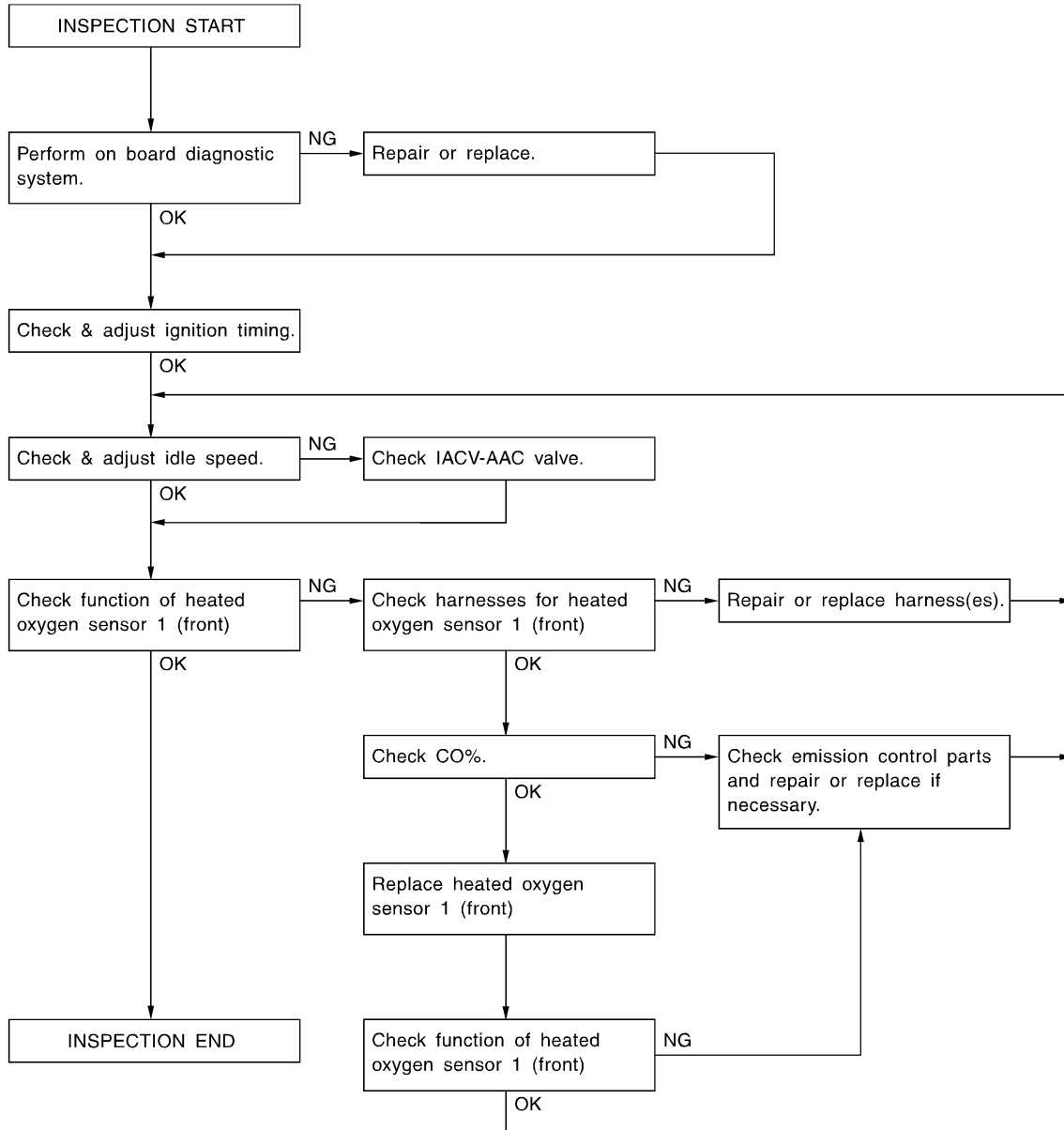
PREPARATION

- 1) Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses
 - Air intake system (Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - Throttle valve
 - Evaporative emission system
- 2) On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
- 3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
- 4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- 5) Turn off headlamps, heater blower, rear defogger.

- 6) Keep front wheels pointed straight ahead.
- 7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NEEC1105S0101



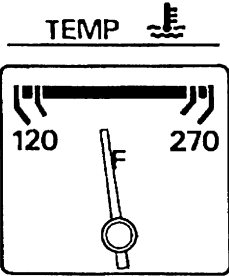
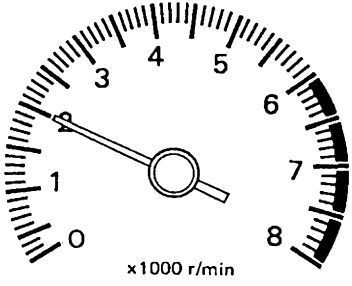
SEF554Y

NOTE:

If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

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INSPECTION PROCEDURE

1	INSPECTION START	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and ducts for leaks ● Electrical connectors ● Gasket ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">TEMP </p> </div> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">x 1000 r/min</p> </div> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center; margin: 5px 0;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	<p>1. Repair or replace components as necessary.</p> <p>2. GO TO 2.</p>

SEF976U

SEF977U

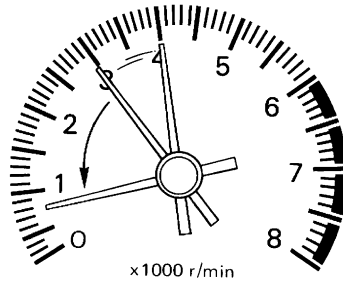
BASIC SERVICE PROCEDURE

VG33ER

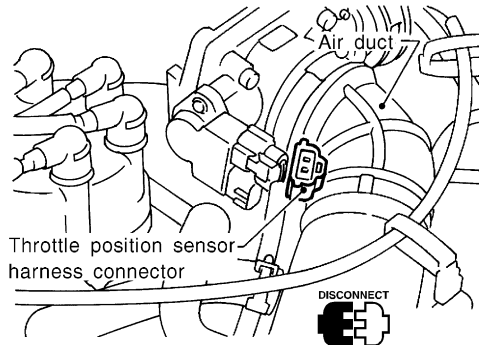
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

2 CHECK IGNITION TIMING

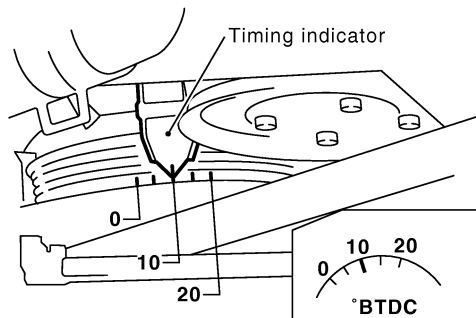
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



M/T: 10°±1° BTDC

A/T: 10°±1° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

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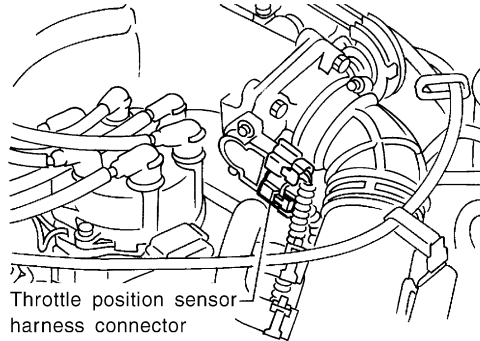
SC

EL

IDX

3 ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



SEF972R

▶ GO TO 2.

4 CHECK BASE IDLE SPEED

With CONSULT-II

1. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

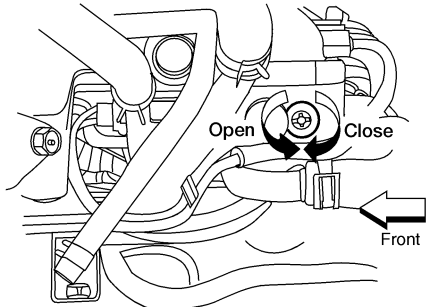
M/T: 700±50 rpm
A/T: 700±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Check idle speed.
M/T: 700±50 rpm
A/T: 700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED
<ol style="list-style-type: none"> 1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw. 	
	
<p>M/T: 700±50 rpm A/T: 700±50 rpm (in "P" or "N" position)</p>	
▶	GO TO 6.

LEC513

6	CHECK TARGET IDLE SPEED						
<p>① With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Read idle speed in "DATA MONITOR" mode with CONSULT-II. 							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						
<p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p>							
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Check idle speed. <p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>							
OK (With CONSULT-II)	▶ GO TO 8.						
OK (Without CONSULT-II)	▶ GO TO 9.						
NG	▶ GO TO 7.						

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BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check IACV-AAC valve and replace if necessary. Refer to EC-1646. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1646. 3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
With CONSULT-II		▶ GO TO 8.
Without CONSULT-II		▶ GO TO 9.

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL											
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF999Z												
OK or NG												
OK		▶ GO TO 12.										
NG (Monitor does not fluctuate.)		▶ GO TO 17.										
NG (Monitor fluctuates less than 5 times.)		▶ GO TO 10.										

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 62 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK		▶ GO TO 12.
NG (Voltage does not fluctuate.)		▶ GO TO 17.
NG (Voltage fluctuates less than 5 times.)		▶ GO TO 10.

BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
	▶	GO TO 12.
	▶	GO TO 13.
	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-1260. 2. Check mass air flow sensor and its circuit. Refer to EC-1360. 3. Check injector and its circuit. Refer to EC-1793. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-1394. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

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BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL										
<p>④ With CONSULT-II</p> <p>1. See "HO2S1 (B1)" in "DATA MONITOR" mode.</p> <p>2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</p>											
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR											
MONITOR	NO DTC										
ENG SPEED	XXX rpm										
HO2S1 MNTR (B1)	LEAN										
HO2S1 MNTR (B2)	RICH										
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>											
SEF999Z											
OK or NG											
OK	▶ INSPECTION END										
NG (Monitor does not fluctuate.)	▶ GO TO 16.										
NG (Monitor fluctuates less than 5 times.)	▶ GO TO 14.										

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL
<p>⊗ Without CONSULT-II</p> <p>1. Set voltmeter probe between ECM terminal 63 and ground.</p> <p>2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</p> <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>	
OK or NG	
OK	▶ INSPECTION END
NG (Voltage does not fluctuate.)	▶ GO TO 16.
NG (Voltage fluctuates less than 5 times.)	▶ GO TO 14.

BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ INSPECTION END
NG		▶ GO TO 15.

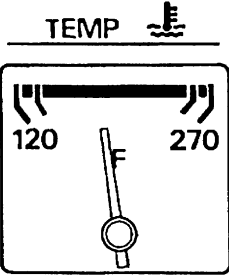
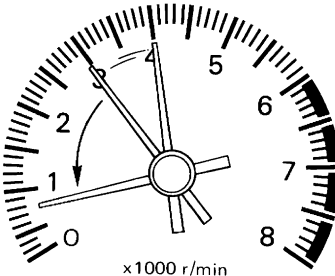
15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-1260. 2. Check mass air flow sensor and its circuit. Refer to EC-1360. 3. Check injector and its circuit. Refer to EC-1793. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-1394. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 2.

16	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector. 4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (front) (bank 1) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK		▶ <ol style="list-style-type: none"> 1. Connect ECM harness connector. 2. GO TO 18.
NG		▶ <ol style="list-style-type: none"> 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

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 IDX

17	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) HARNESS	
<p>1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector. 4. Check harness continuity between ECM terminal 51 and heated oxygen sensor 1 (front) (bank 2) harness connector. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

18	PREPARATION FOR "CO" % CHECK																					
<p> With CONSULT-II</p> <p>1. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode. 2. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG COOLANT TEMP</td> <td style="text-align: center;">XXX °C</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">INJ PULSE-B1</td> <td style="text-align: center;">XXX msec</td> </tr> <tr> <td style="text-align: center;">IGN TIMING</td> <td style="text-align: center;">XXX BTDC</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		ENG COOLANT TEMP	XXX °C	MONITOR		ENG SPEED	XXX rpm	INJ PULSE-B1	XXX msec	IGN TIMING	XXX BTDC								
ACTIVE TEST																						
ENG COOLANT TEMP	XXX °C																					
MONITOR																						
ENG SPEED	XXX rpm																					
INJ PULSE-B1	XXX msec																					
IGN TIMING	XXX BTDC																					
SEF172Y																						
<p> Without CONSULT-II</p> <p>1. Disconnect engine coolant temperature sensor harness connector. 2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.</p>																						
<p style="text-align: center;">Engine coolant temperature sensor harness connector (F9)</p> <p style="text-align: center;">4.4 kΩ resistor</p>																						
AEC036B																						
▶		GO TO 19.																				

19	CHECK "CO" %
<p>1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.</p> <div style="text-align: center;">  </div>	
SEF976U	
<p>2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.</p> <div style="text-align: center;">  </div>	
SEF978U	
<p>3. Check "CO" %. Idle CO: 1.5 - 9.5%</p> <p>4. Without CONSULT-II After checking CO%,</p> <p>a. Disconnect the resistor from terminals of engine coolant temperature sensor.</p> <p>b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ GO TO 20.

20	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Connect heated oxygen sensor 1 (front) harness connectors to heated oxygen sensors 1 (front). 2. Check fuel pressure regulator. Refer to EC-1260. 3. Check mass air flow sensor and its circuit. Refer to EC-1360. 4. Check injector and its circuit. Refer to EC-1793. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-1394. 6. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 	
▶	GO TO 2.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

Introduction

NEEC1106

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

The above information can be checked using procedures listed in the table below.

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-1330.)

Two Trip Detection Logic

NEEC1107

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-1330.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NEEC1108

NEEC1108S01

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-1284. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-1312. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NEEC1108S0101

DTC and 1st trip DTC can be read by the following methods.

☐ With CONSULT-II

⊗ With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0".

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	MAF SEN/CIRCUIT [P0100]	0		MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NEEC1108S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

Emission-related Diagnostic Information (Cont'd)

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-1299.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-1287.

SYSTEM READINESS TEST (SRT) CODE

NEEC1108S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that the status of srt be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this service manual to set the SRT to “CMPLT”.

In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer’s normal driving pattern and the SRT will indicate “INCMP” for these items.

NOTE:

The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items, the vehicle is returned to the customer untested.

NOTE:

If MIL is “ON” during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NEEC1108S0301

The following table shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-II indication)	Perfor- mance Pri- ority *	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P1441
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (rear) (high voltage)	P0140, P0160
O2 SEN HEATER	3	Heated oxygen sensor 1 heater (front)	P0135, P0155
		Heated oxygen sensor 2 heater (rear)	P0141, P0161

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure) one by one based on the priority for models with CONSULT-II.

SRT Set Timing

=NEEC1108S0302

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is OK.

–: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “CMPLT”.

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result.

→ Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”.

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

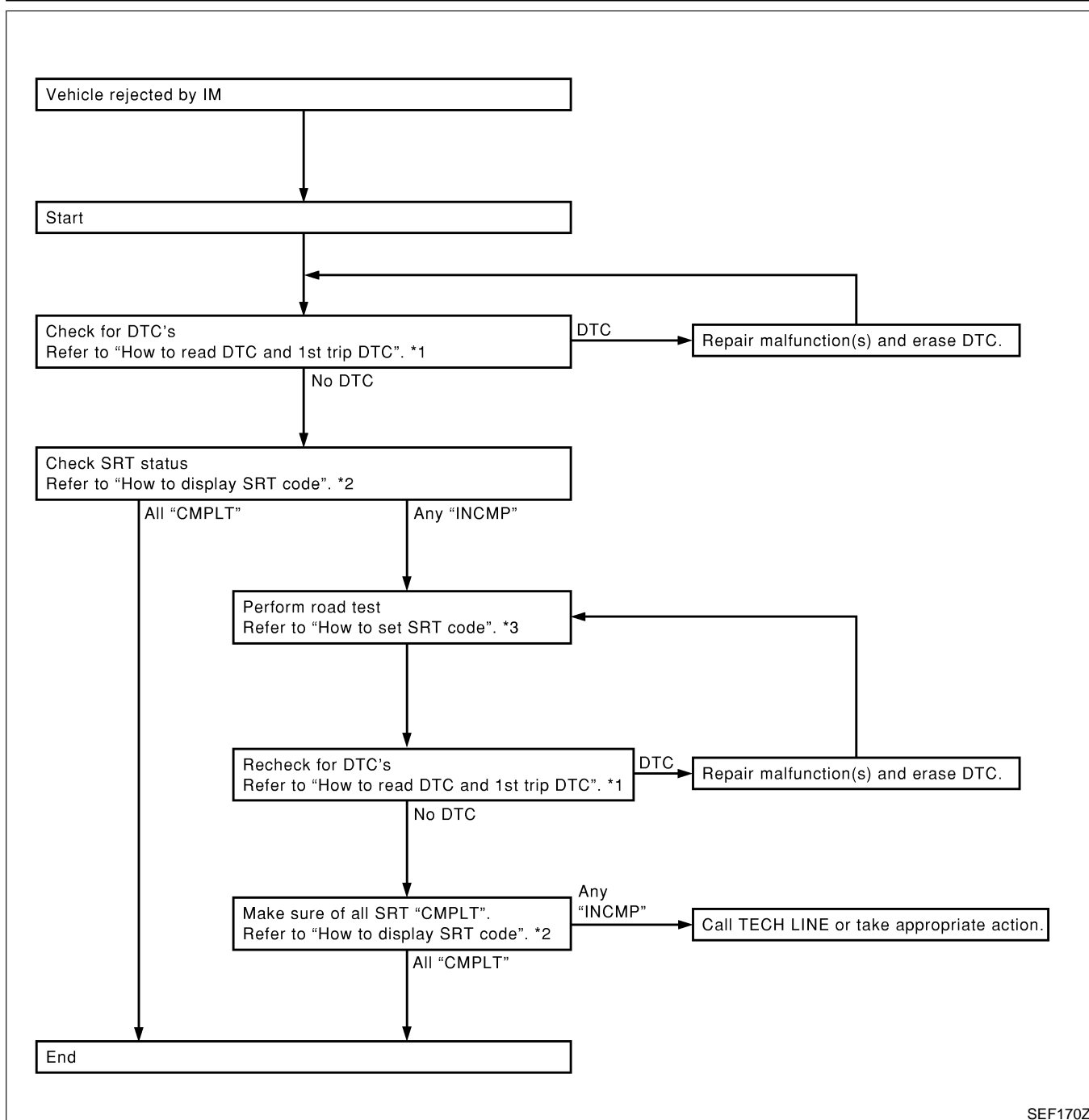
NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the State emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating “INCMP”, review the following flowchart diagnostic sequence on the next page.

NEEC1108S0303



SEF170Z

*1 EC-1275

*2 EC-1279

*3 EC-1280

How to Display SRT Code

1. **With CONSULT-II**
 Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
 For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

NEEC1108S0304

2. **With GST**
 Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.

"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

 GI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT

SEF949Z

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. ^{NEEC1108S0305} Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-1275.

Without CONSULT-II

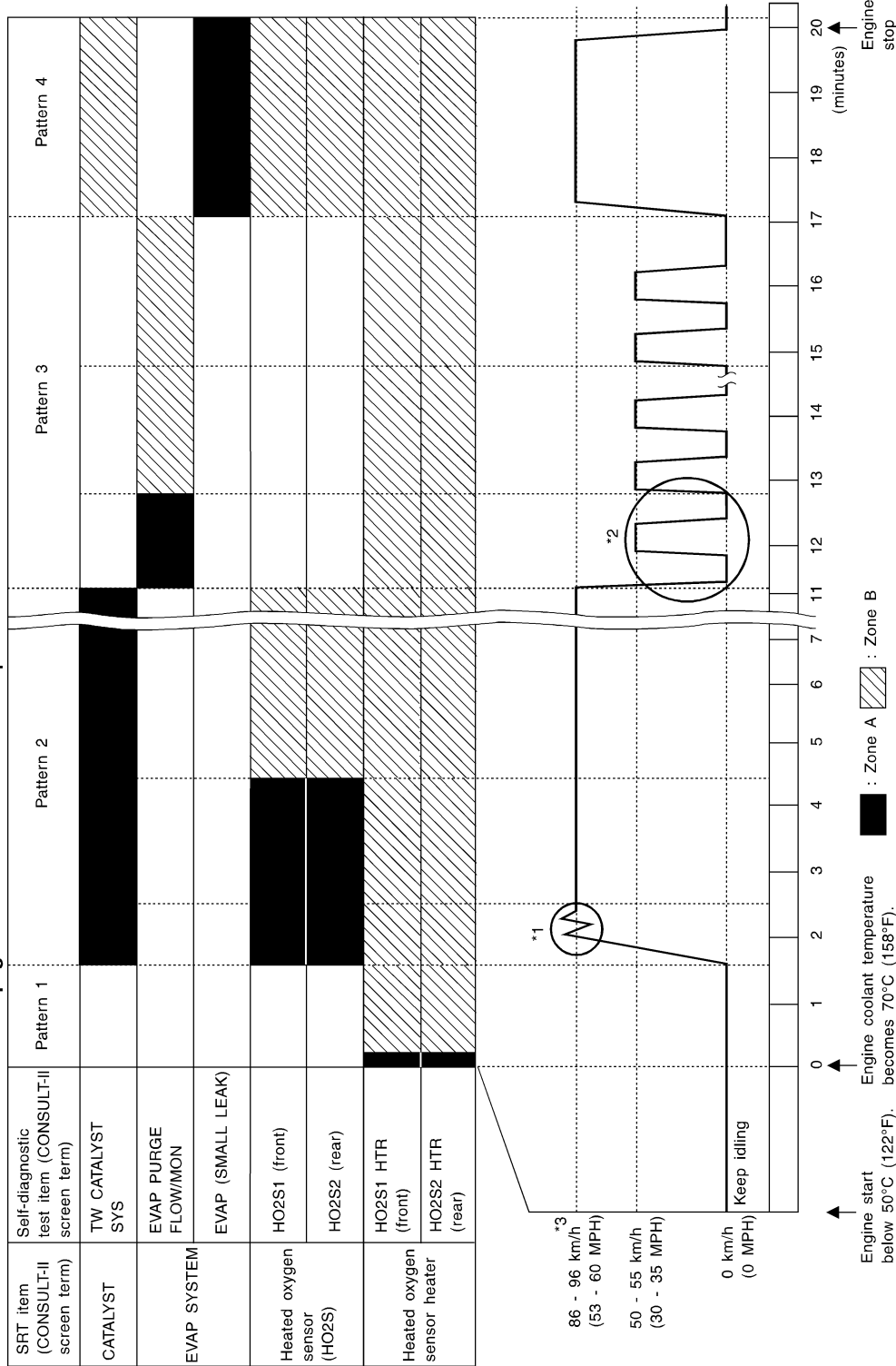
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-1281. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NEEC1108S0306

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.

Driving pattern



- GI
- MA
- EM
- LC
- EC
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

Emission-related Diagnostic Information (Cont'd)

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest.
Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 59 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

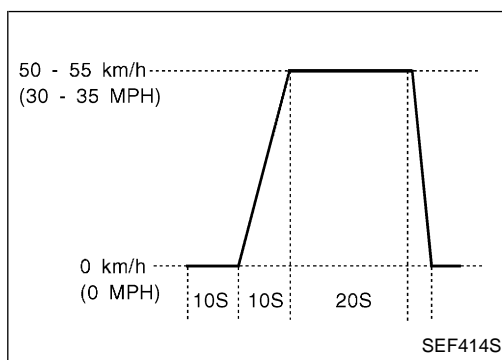
Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

- 1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
 - 2) Repeat driving pattern shown below at least 10 times.
- **During acceleration, hold the accelerator pedal as steady as possible.**



*3: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the "D" position with the overdrive switch turned ON.

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	64 (40)	64 (40)
4th to 5th	72 (45)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

NEEC1108S04

The following is the information specified in Mode 6 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front) (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (front) (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
24H		07H	Max.	X	
O2 SENSOR HEATER	Heated oxygen sensor 1 (front) (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 (front) (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 (rear) (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 (rear) (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NEEC1108S05

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO SELF DIAGNOSTIC FAIL- URE INDICATED	P0000	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-1360
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-1369
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-1371
COOLANT T SEN/CIRC	P0115	—	—	X	EC-1376
THRTL POS SEN/CIRC	P0120	—	—	X	EC-1381

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page	
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-1394	GI
HO2S1 (B1)	P0130	X	X	X*2	EC-1400	MA
HO2S1 (B1)	P0131	X	X	X*2	EC-1411	EM
HO2S1 (B1)	P0132	X	X	X*2	EC-1420	EM
HO2S1 (B1)	P0133	X	X	X*2	EC-1429	LC
HO2S1 (B1)	P0134	X	X	X*2	EC-1443	LC
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-1451	EC
HO2S2 (B1)	P0137	X	X	X*2	EC-1458	EC
HO2S2 (B1)	P0138	X	X	X*2	EC-1468	FE
HO2S2 (B1)	P0139	X	X	X*2	EC-1478	FE
HO2S2 (B1)	P0140	X	X	X*2	EC-1488	CL
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-1498	CL
HO2S1 (B2)	P0150	X	X	X*2	EC-1400	MT
HO2S1 (B2)	P0151	X	X	X*2	EC-1411	MT
HO2S1 (B2)	P0152	X	X	X*2	EC-1420	AT
HO2S1 (B2)	P0153	X	X	X*2	EC-1429	AT
HO2S1 (B2)	P0154	X	X	X*2	EC-1443	TF
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-1451	TF
HO2S2 (B2)	P0157	X	X	X*2	EC-1458	PD
HO2S2 (B2)	P0158	X	X	X*2	EC-1468	PD
HO2S2 (B2)	P0159	X	X	X*2	EC-1478	AX
HO2S2 (B2)	P0160	X	X	X*2	EC-1488	AX
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-1498	SU
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-1506	BR
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-1515	BR
FUEL SYS-LEAN/BK2	P0174	—	—	X	EC-1506	ST
FUEL SYS-RICH/BK2	P0175	—	—	X	EC-1515	ST
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-1523	RS
ENG OVER TEMP	P0217	—	—	X	EC-1528	RS
MULTI CYL MISFIRE	P0300	—	—	X	EC-1546	BT
CYL 1 MISFIRE	P0301	—	—	X	EC-1546	BT
CYL 2 MISFIRE	P0302	—	—	X	EC-1546	HA
CYL 3 MISFIRE	P0303	—	—	X	EC-1546	HA
CYL 4 MISFIRE	P0304	—	—	X	EC-1546	SC
CYL 5 MISFIRE	P0305	—	—	X	EC-1546	SC
CYL 6 MISFIRE	P0306	—	—	X	EC-1546	EL
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-1555	EL

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CKP SEN/CIRCUIT	P0335	—	—	X	EC-1559
CMP SEN/CIRCUIT	P0340	—	—	X	EC-1565
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-1572
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-1572
EVAP SMALL LEAK	P0440	X	X	X*2	EC-1577
PURG VOLUME CONT/V	P0443	—	—	X	EC-1592
VENT CONTROL VALVE	P0446	—	—	X	EC-1599
EVAP SYS PRES SEN	P0450	—	—	X	EC-1605
EVAP GROSS LEAK	P0455	X	X	X	EC-1616
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-1630
FUEL LEVEL SENSOR	P0461	—	—	X	EC-1635
FUEL LEVL SEN/CIRC	P0464	—	—	X	EC-1637
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-1642
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-1646
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1652
A/T COMM LINE	P0600	—	—	—	EC-1659
ECM	P0605	—	—	X	EC-1664
PNP SW/CIRC	P0705	—	—	X	AT-250
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-256
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-262
ENGINE SPEED SIG	P0725	—	—	X	AT-267
A/T 1ST GR FNCTN	P0731	—	—	X	AT-272
A/T 2ND GR FNCTN	P0732	—	—	X	AT-278
A/T 3RD GR FNCTN	P0733	—	—	X	AT-284
A/T 4TH GR FNCTN	P0734	—	—	X	AT-290
TCC SOLENOID/CIRC	P0740	—	—	X	AT-299
A/T TCC S/V FNCTN	P0744	—	—	X	AT-304
L/PRESS SOL/CIRC	P0745	—	—	X	AT-313
SFT SOL A/CIRC	P0750	—	—	X	AT-318
SFT SOL B/CIRC	P0755	—	—	X	AT-323
THERMOSTAT FNCTN	P1126	—	—	X	EC-1666
CLOSED LOOP-B1	P1148	—	—	X	EC-1668
CLOSED LOOP-B2	P1168	—	—	X	EC-1668
ENG OVER TEMP	P1217	—	—	X	EC-1670
SCB/V CONT SOL/V	P1243	—	—	X	EC-1686
CKP SENSRO (COG)	P1336	—	—	X	EC-1692
EVAP SMALL LEAK	P1440	X	X	X*2	EC-1699

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
EVAP VERY SML LEAK	P1441	X	X	X*2	EC-1701
PURG VOLUME CONT/V	P1444	—	—	X	EC-1716
VENT CONTROL VALVE	P1446	—	—	X	EC-1728
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-1735
VENT CONTROL VALVE	P1448	—	—	X	EC-1747
FUEL LEVL SEN/CIRC	P1464	—	—	X	EC-1755
VC/V BYPASS/V	P1490	—	—	X	EC-1759
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1765
A/T DIAG COMM LINE	P1605	—	—	X	EC-1774
TP SEN/CIRC A/T	P1705	—	—	X	AT-328
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1777
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-337

*1: 1st trip DTC No. is the same as DTC No.

*2: These are not displayed with GST.

NOTE:

Regarding D22 models, “-B1” and “BK1” indicate right bank and “-B2” and “BK2” indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (📄) With CONSULT-II

NEEC1108S06

NOTE:

NEEC1108S0601

If the DTC is not for A/T related items (see EC-1219), skip steps 2 through 4.

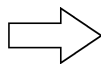
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
 2. Turn CONSULT-II “ON” and touch “A/T”.
 3. Touch “SELF-DIAG RESULTS”.
 4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
 5. Touch “ENGINE”.
 6. Touch “SELF-DIAG RESULTS”.
 7. Touch “ERASE”. (The DTC in the ECM will be erased.)
- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

Emission-related Diagnostic Information (Cont'd)

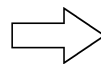
How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.

SELECT SYSTEM	
ENGINE	
A/T	



SELECT DIAG MODE	
SELF-DIAG RESULTS	
DATA MONITOR	
DTC WORK SUPPORT	
TCM PART NUMBER	

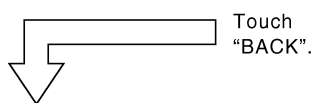


SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

2. Turn **CONSULT-II** "ON", and touch "A/T".

3. Touch "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the TCM will be erased.)



SELECT SYSTEM	
ENGINE	
A/T	

SELECT DIAG MODE	
WORK SUPPORT	
SELF-DIAG RESULTS	
DATA MONITOR	
DATA MONITOR (SPEC)	
ACTIVE TEST	
DTC & SRT CONFIRMATION	
ECM PART NUMBER	

SELF DIAG RESULTS	
DTC RESULTS	TIME
SFT SOL A/CIRC [P0750]	0

5. Touch "ENGINE".

6. Touch "SELF-DIAG RESULTS".

7. Touch "ERASE". (The DTC in the ECM will be erased.)

SEF823YD

The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to Erase DTC (GST) With GST

NEEC1108S0602

NOTE:

If the DTC is not for A/T related items (see EC-1219), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

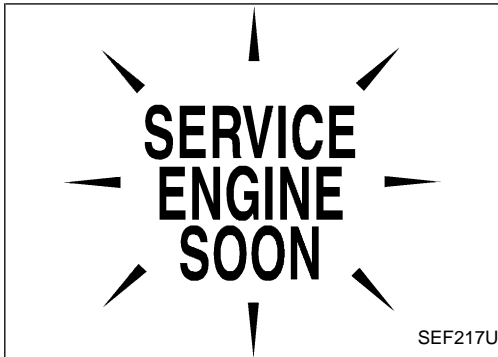
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NEEC1109






The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the MIL does not light up, refer to EL section ("WARNING LAMPS") or see EC-1819.
2. When the engine is started, the MIL should go OFF.
 - If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

NEEC1109S01

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit. (See EC-1819.)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to **EL-84**, "WARNING LAMPS" or see EC-1819.

Diagnostic Test Mode I — Malfunction Warning

NEEC1109S03

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

NEEC1110

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

NEEC1110S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-1274.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

NEEC1110S02

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns “B” and “C” under “Fuel Injection System” and “Misfire”, see EC-1292.

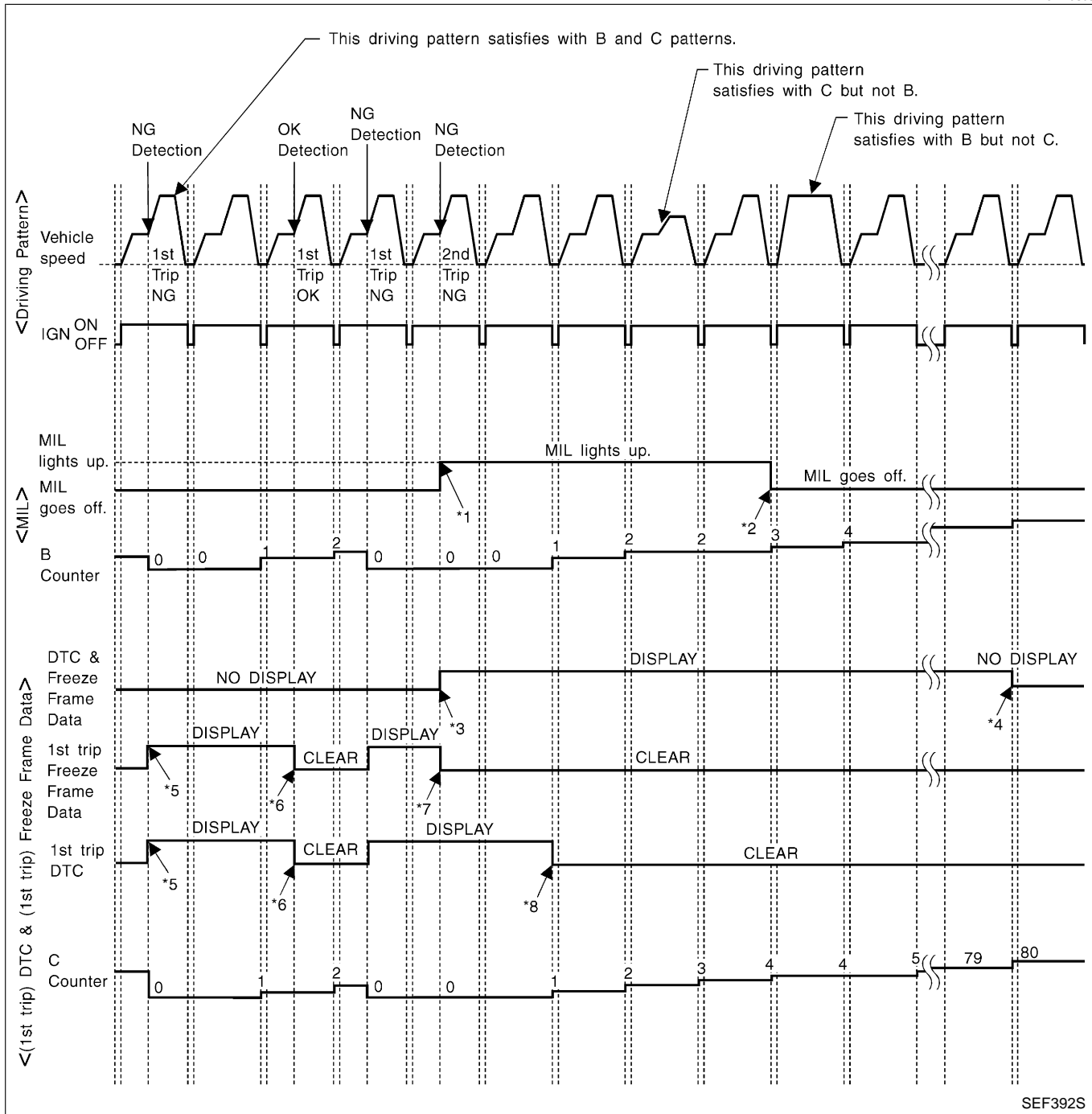
For details about patterns “A” and “B” under “Other”, see EC-1294.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE" <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

=NEEC1110S03



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame

- data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip

- freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

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EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

NEEC1110S04

NEEC1110S0401

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>

NEEC1110S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

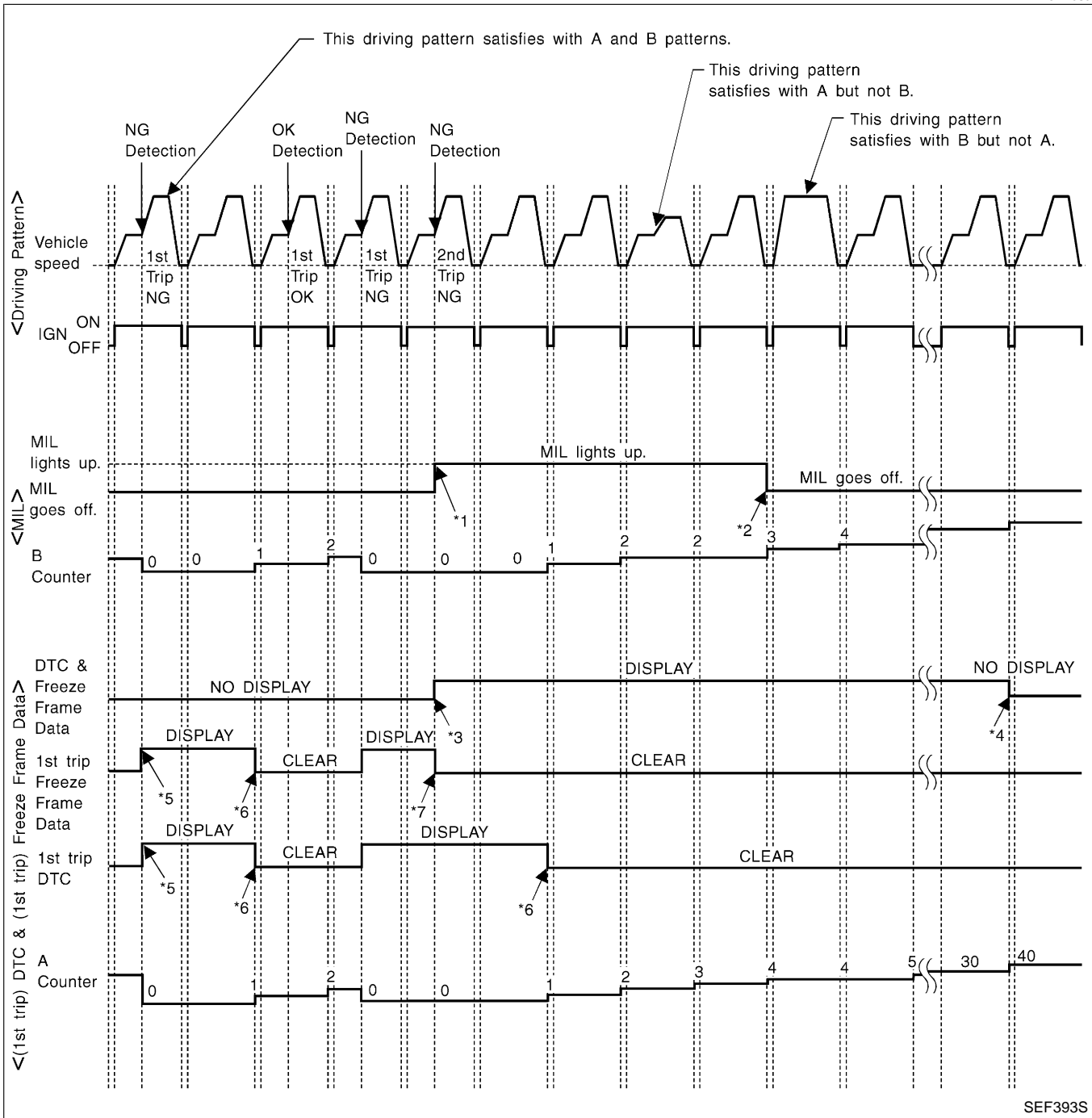
To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NEEC1110S05



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC

- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

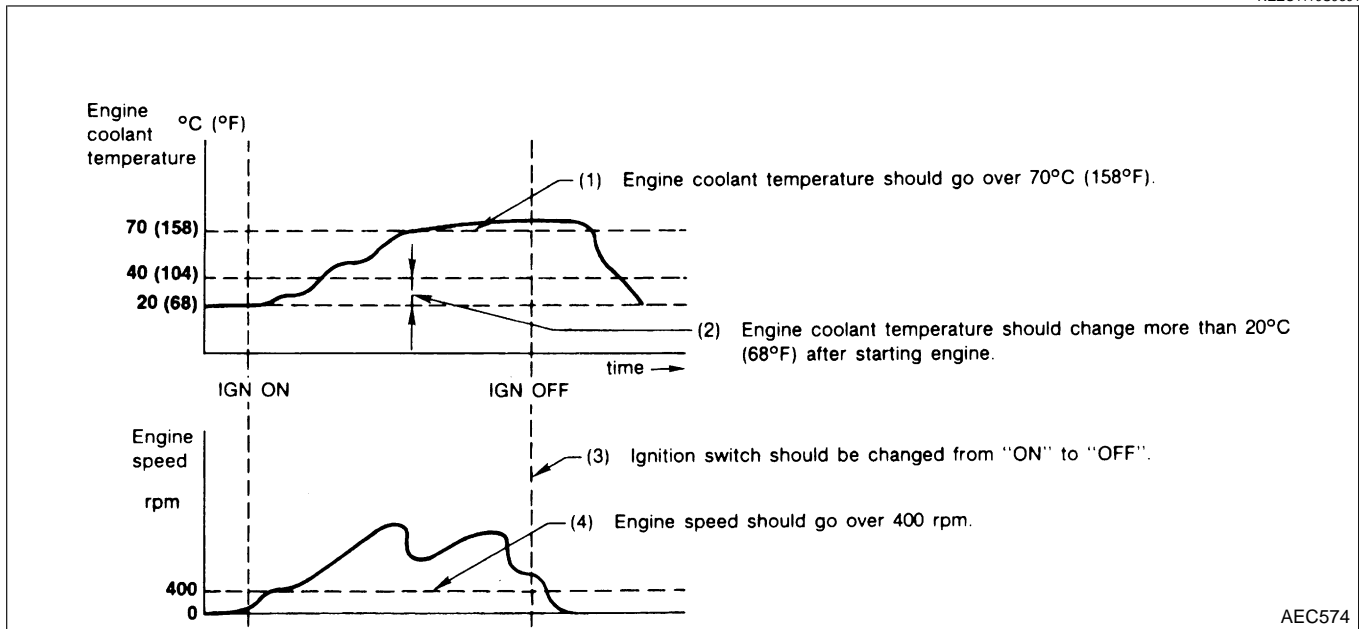
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EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>

NEEC1110S06

NEEC1110S0601



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

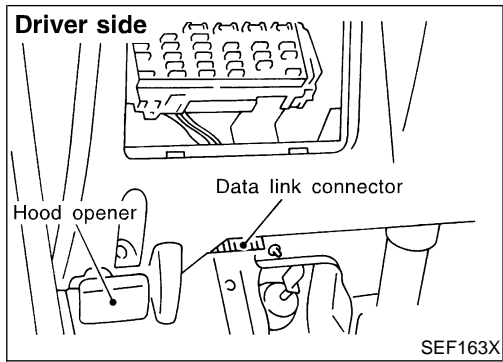
<Driving Pattern B>

NEEC1110S0602

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").



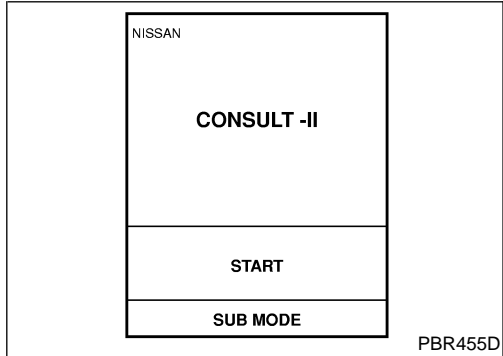
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

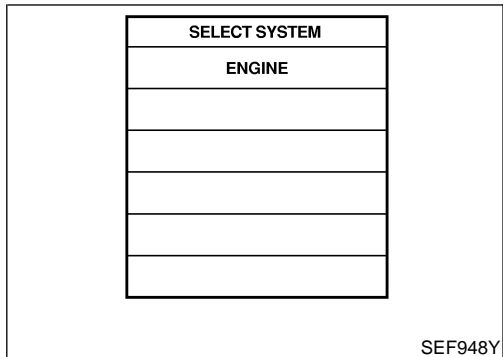
=NEEC1111

NEEC1111S01

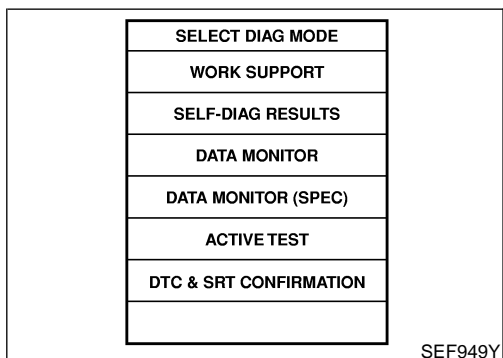
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

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ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NEEC1111S02

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS INPUT	Camshaft position sensor		X	X	X	X			
	Mass air flow sensor		X		X	X			
	Engine coolant temperature sensor		X	X	X	X	X		
	Heated oxygen sensor 1 (front)		X		X	X		X	X
	Heated oxygen sensor 2 (rear)		X		X	X		X	X
	Vehicle speed sensor		X	X	X	X			
	Throttle position sensor		X		X	X			
	Fuel tank temperature sensor		X		X	X	X		
	EVAP control system pressure sensor		X		X	X			
	Absolute pressure sensor (Built into ECM)		X		X	X			
	Intake air temperature sensor		X		X	X			
	Crankshaft position sensor (OBD)		X						
	Knock sensor		X						
	Ignition switch (start signal)				X	X			
	Closed throttle position switch		X		X	X			
	Closed throttle position switch (throttle position sensor signal)				X	X			
	Air conditioner switch				X	X			
	Park/neutral position (PNP) switch		X		X	X			
	Power steering oil pressure switch				X	X			
Battery voltage				X	X				
Ambient air temperature switch				X	X				

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT								
	Injectors				X	X	X		
	Power transistor (Ignition timing)				X	X	X		
	IACV-AAC valve	X	X		X	X	X		
	EVAP canister purge volume control solenoid valve		X		X	X	X		X
	Air conditioner relay				X	X			
	Fuel pump relay	X			X	X	X		
	Cooling fan		X		X	X	X		
	Heated oxygen sensor 1 heater (front)		X		X	X		X	
	Heated oxygen sensor 2 heater (rear)		X		X	X		X	
	EVAP canister vent control valve		X		X	X	X		
	Vacuum cut valve bypass valve		X		X	X	X		X
	SCB valve control solenoid valve		X		X	X	X		
Calculated load value			X	X	X				

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-1275.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

FUNCTION

-NEEC1111S03

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

- 1) Diagnostic trouble codes
- 2) 1st trip diagnostic trouble codes
- 3) Freeze frame data
- 4) 1st trip freeze frame data
- 5) System readiness test (SRT) codes
- 6) Test values
- 7) Others

WORK SUPPORT MODE

NEEC1111S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> ● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL. 	When adjusting the idle throttle position
IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR. 	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clean the coefficient of self-learning control valve

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	<p>OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" ● WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. <p>NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	<p>SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting initial ignition timing and idle speed

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

DTC and 1st Trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-1219.)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item *1	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-1219.)
FUEL SYS-B1 *2	<ul style="list-style-type: none"> ● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2 *2	
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "Short-term fuel trim" at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "Long-term fuel trim" at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Freeze frame data item *1	Description
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none">• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	<ul style="list-style-type: none">• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none">• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none">• The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.

*2: Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR MODE

-NEEC1111S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor. 	
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 (front) is displayed. 	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 (rear) is displayed. 	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
FUEL T/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/A TEMP SE [°C] or [°F]	○	○	<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
ABSOL PRES/SE [V]			<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 	
CLSD THL/P SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 	
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 	
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. 	
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 	
AMB TEMP SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the ambient air temperature switch signal. 	
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 	
INJ PULSE-B1 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
PURG VOL C/V [%]			<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	GI MA EM
AIR COND RLY [ON/OFF]		○	<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 	LC
FUEL PUMP RLY [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	EC
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ON ... Closed OFF ... Open 	FE CL
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	MT AT
COOLING FAN [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the control condition of the cooling fan (determined by ECM according to the input signal). ON ... Operation OFF ... Stop 	TF PD
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	AX
HO2S1 HTR (B1) [ON/OFF]				SU
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	BR
HO2S2 HTR (B2) [ON/OFF]				ST
SCB/V CON S/V			<ul style="list-style-type: none"> The control condition of the SCB valve control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... SCB valve is closed. OFF ... SCB valve is opened. 	RS BT
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
FREQUENCY [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> Only “#” is displayed if item is unable to be measured. Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, “-B1” indicates right bank and “-B2” indicates left bank.

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DATA MONITOR (SPEC) MODE

NEEC1111S07

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated. This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NEEC1111S08

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
COOLING FAN	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "ON" and "OFF" using CONSULT-II. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connector Cooling fan motor Cooling fan relay
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
FUEL PUMP RELAY	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> ● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> ● Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

DTC CONFIRMATION MODE

SRT STATUS Mode

NEEC1111S09

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-1276.

SRT WORK SUPPORT Mode

NEEC1111S0902

SRT status and some of the data monitor item can be read.

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IDX

DTC Work Support Mode

NEEC1111S0903

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440/P1440	Refer to corresponding trouble diagnosis for DTC.	EC-1577
	EVAP V/S LEAK P1441		EC-1701
	PURG VOL CN/V P1444		EC-1716
	PURGE FLOW P1447		EC-1735
	VC CUT/V BP/V P1491		EC-1765
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-1400
	HO2S1 (B1) P0131		EC-1411
	HO2S1 (B1) P0132		EC-1420
	HO2S1 (B1) P0133		EC-1429
	HO2S1 (B2) P0150		EC-1400
	HO2S1 (B2) P0151		EC-1411
	HO2S1 (B2) P0152		EC-1420
	HO2S1 (B2) P0153		EC-1429
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-1458
	HO2S2 (B1) P0138		EC-1468
	HO2S2 (B1) P0139	EC-1478	
	HO2S2 (B2) P0157	EC-1458	
	HO2S2 (B2) P0158	EC-1468	
	HO2S2 (B2) P0159	EC-1478	

DATA MONITOR	
Recording Data...11%	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
VHCL SPEED SE	XXX km/h

SEF705Y

SET RECORDING CONDITION	
AUTO TRIG	
MANU TRIG	
TRIGGER POINT	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 80%; border-bottom: 1px solid black; position: relative;"> 0% 100% </div> </div>	
RECORDING SPEED	
MIN	MAX
/64 /32 /16 /8 /4 /2 FULL	

SEF707X

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NEEC1111S10

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

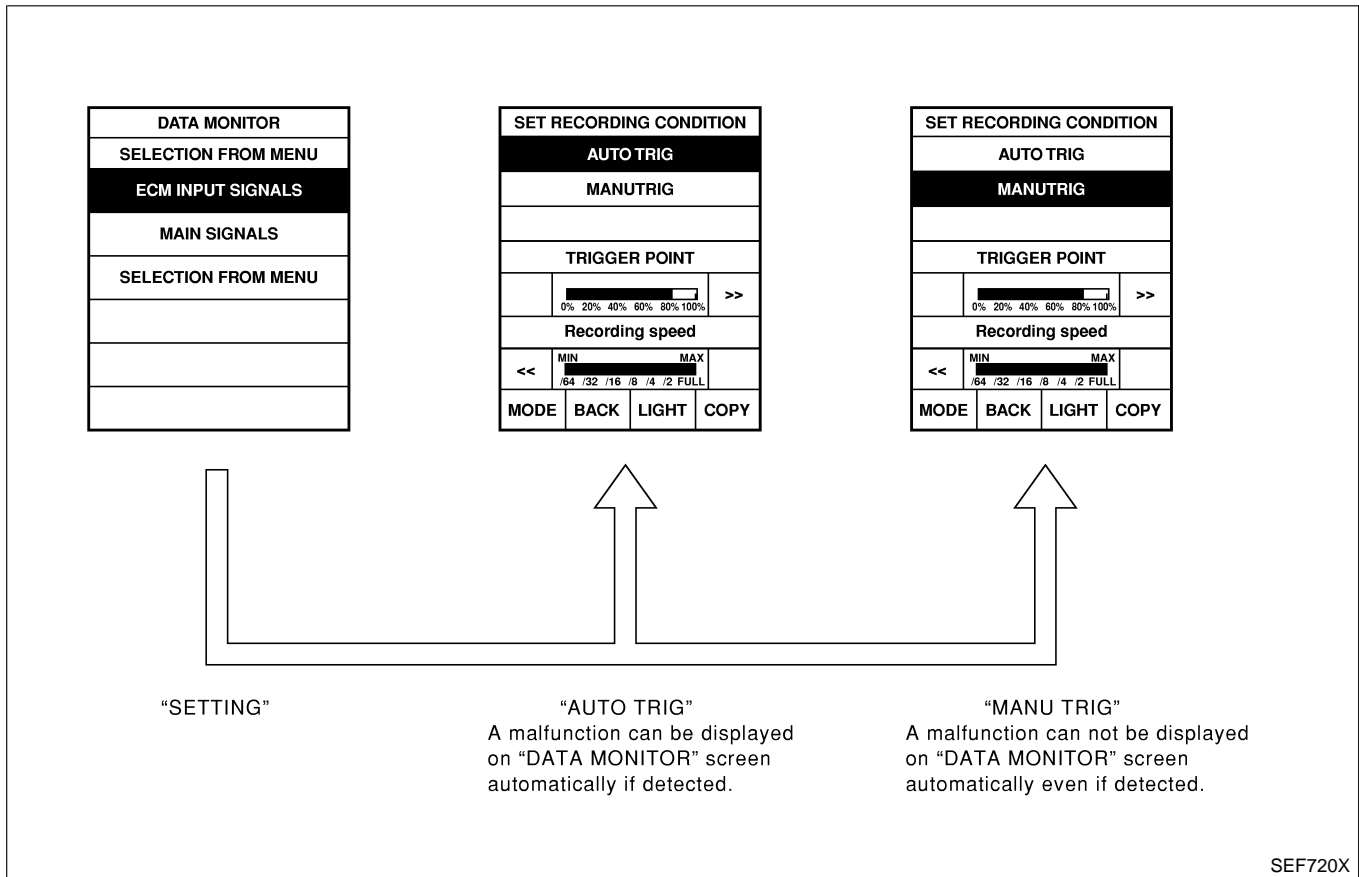
- 1) "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.
- 2) "MANU TRIG" (Manual trigger):
 - DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT-II screen even though a malfunction is detected by ECM.

DATA MONITOR can be performed continuously even though a malfunction is detected.

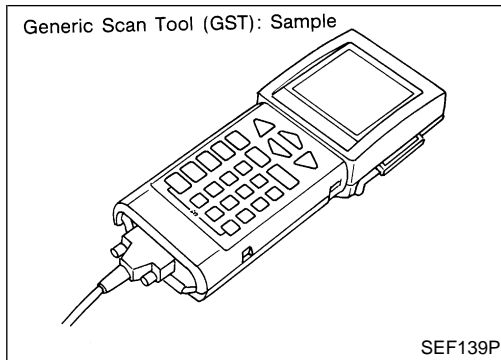
Use these triggers as follows:

- 1) "AUTO TRIG"
 - While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
 - While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
- When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to **GI-24**, "Incident Simulation Tests".
- 2) "MANU TRIG"
 - If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



SEF720X

Generic Scan Tool (GST)

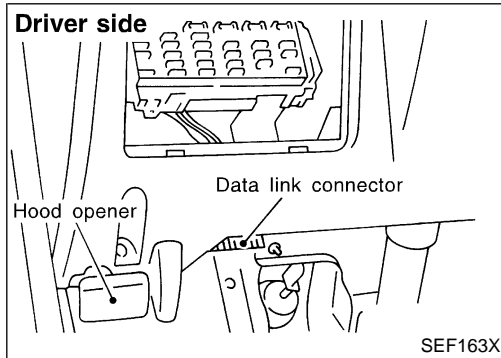


Generic Scan Tool (GST) DESCRIPTION

=NEEC1112

NEEC1112S01

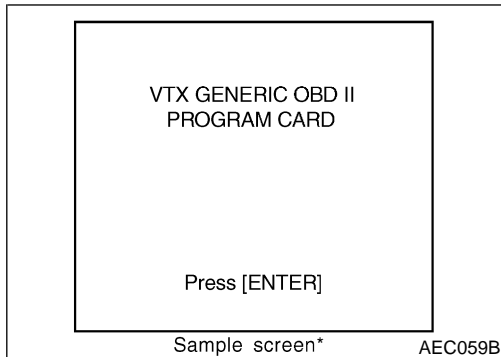
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



GST INSPECTION PROCEDURE

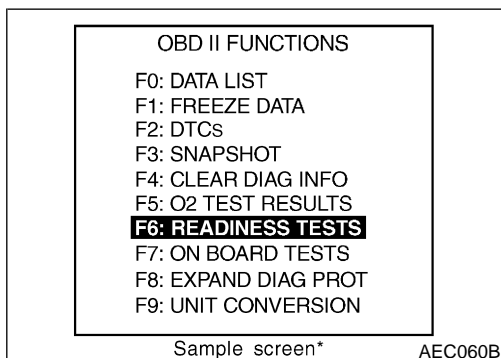
NEEC1112S02

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector for GST which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Generic Scan Tool (GST) (Cont'd)

FUNCTION

NEEC1112S03

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-1299).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. <ul style="list-style-type: none"> ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.

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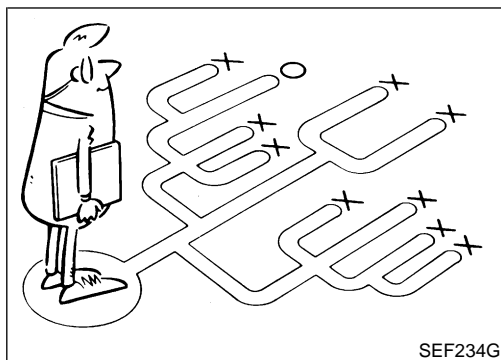
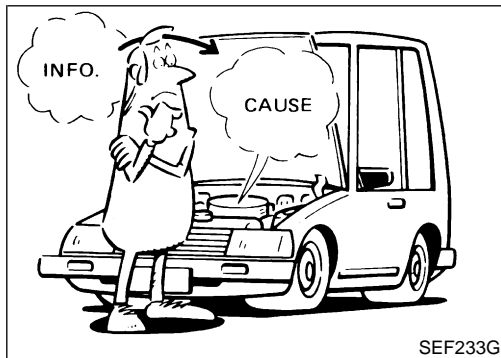
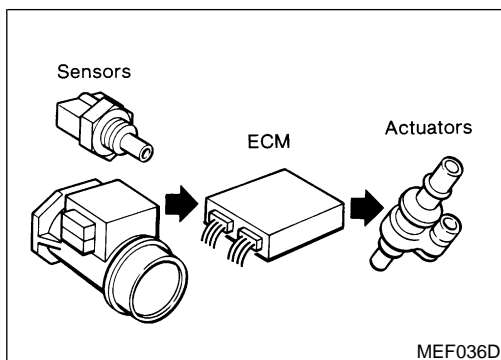
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KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
 Weather conditions,
 Symptoms

SEF907L

Introduction

NEEC1113

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-1312.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on next page should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NEEC1113S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

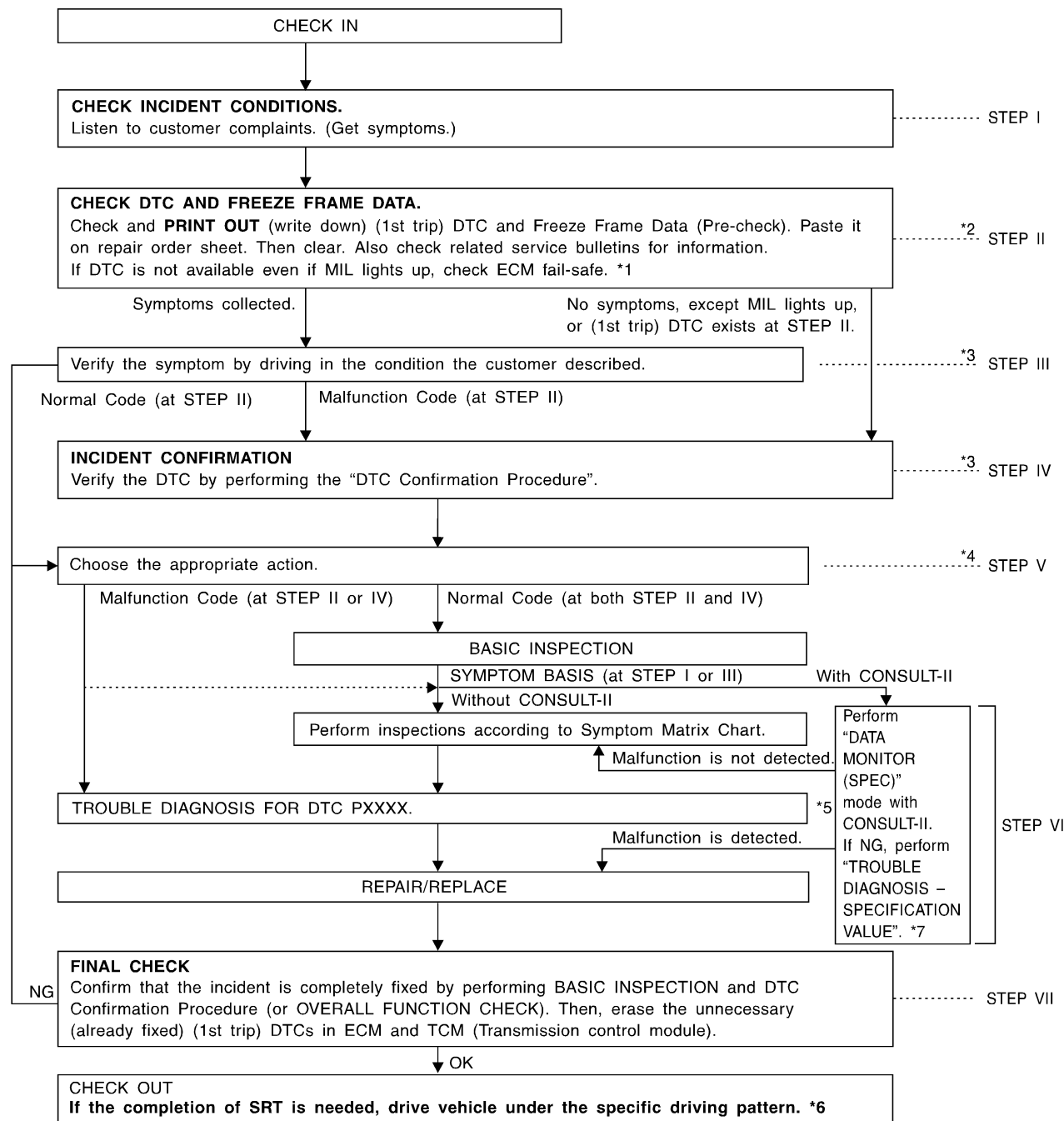
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

Work Flow

NEEC1114



SEF510ZF

*1 EC-1330

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-1354.

*5 If malfunctioning part cannot be

detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

*6 EC-1281

*7 EC-1349

TROUBLE DIAGNOSIS — INTRODUCTION

VG33ER

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NEEC1114S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-1311.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-1287.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-1331.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1314.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-1349. (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1331.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1335, EC-1340. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-26 , "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-1287.)

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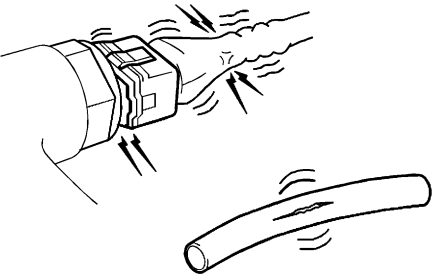
Basic Inspection



NEEC1115

Precaution:

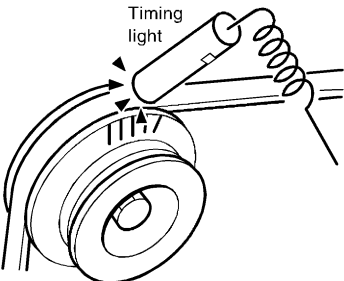
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1	INSPECTION START	
<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts 		
		
<small>SEF983U</small>		
Models with CONSULT-II	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 15.


2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
<p> With CONSULT-II Connect "CONSULT-II" to the data link connector for CONSULT-II and select "ENGINE" from the menu. Refer to EC-1295.</p>		
<p> With GST Connect "GST" to the data link connector for GST. Refer to EC-1308.</p>		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 14.


3	CHECK FI CAM FUNCTION	<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. 3. Start engine and warm it up. <div style="text-align: center; margin: 20px 0;"> <table border="1" style="border-collapse: collapse; width: 150px; margin: auto;"> <thead> <tr> <th colspan="2" style="text-align: center; padding: 2px;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center; padding: 2px;">MONITOR</th> <th style="text-align: center; padding: 2px;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">COOLAN TEMP/S</td> <td style="padding: 2px;">XXX °C</td> </tr> <tr> <td style="height: 100px;"></td> <td></td> </tr> </tbody> </table> </div> <ol style="list-style-type: none"> 4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. <div style="text-align: center; margin: 20px 0;"> <p style="font-size: small;"> Mark A (cam follower lever) Mark C (fast idle cam) Thermo-element </p> </div> <p style="text-align: right; margin-right: 20px;">SEF013Y</p> <p style="text-align: right; margin-right: 20px;">SEF971R</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>	DATA MONITOR		MONITOR	NO DTC	COOLAN TEMP/S	XXX °C			<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
DATA MONITOR											
MONITOR	NO DTC										
COOLAN TEMP/S	XXX °C										
OK	▶	GO TO 4.	AX								
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1261. 2. GO TO 4.	SU								

4	CHECK IGNITION TIMING		
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START". <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 60%; text-align: center;"> <p>IGNITION TIMING ADJ</p> <p>IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</p> </div> <p>3. Check ignition timing at idle using a timing light.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; font-weight: bold;">Ignition timing: 10°±2° BTDC</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	<ol style="list-style-type: none"> 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1262. 2. GO TO 5. 	

PEF546N

SEF984U

5	CHECK BASE IDLE SPEED	
<p> With CONSULT-II</p> <p>1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;">IGNITION TIMING ADJ</p> <p style="text-align: center;">IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</p> </div> <p style="text-align: right; margin-top: 10px;">PEF546N</p> <p>2. Check idle speed. 700±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-1262. 2. GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I	
<p> With CONSULT-II</p> <p>NOTE: Always check ignition timing and base idle speed before performing the following.</p> <p>1. Warm up engine to normal operating temperature. 2. Check FI cam, refer to procedure 3. 3. Stop engine.</p>		
	▶	GO TO 7.

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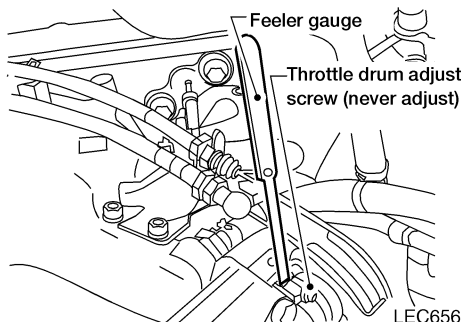
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7 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
3. Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



LEC656

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91 °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.3 mm (0.012 in) feeler gauge.
 "CLSD THL/P SW" signal should remain "OFF" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

8 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Ⓜ With CONSULT-II

NOTE:

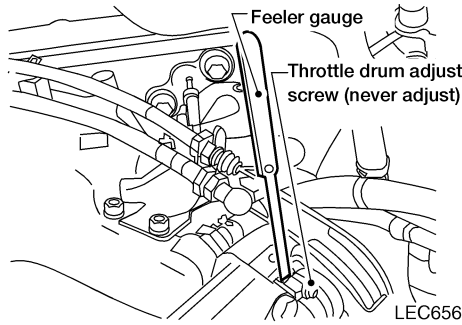
- Never adjust throttle adjust screw (TAS).
 - Do not touch throttle drum when checking "CLSD THL/P SW" signal, doing so may cause an incorrect adjustment.
1. Warm up engine to normal operating temperature.
 2. Check FI cam. Refer to procedure 3.
 3. Stop engine.
 4. Loosen throttle position sensor fixing bolts.

▶	GO TO 9.
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9 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



LEC656

4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91 °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

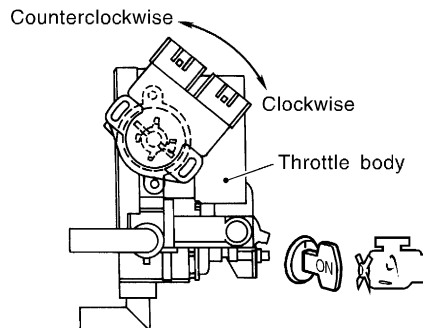
"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 11. |
| NG | ▶ | GO TO 10. |

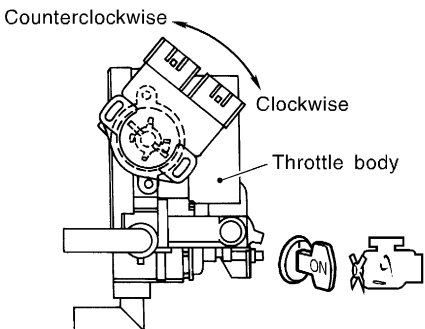
10 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III


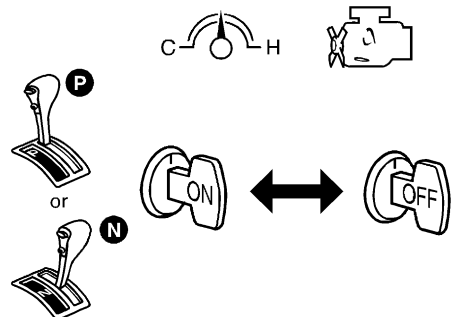
- Ⓟ With CONSULT-II
Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".




SEF689W


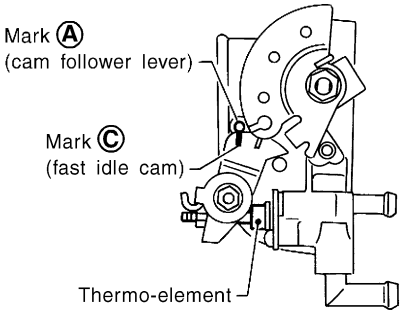
- | | |
|---|-----------|
| ▶ | GO TO 11. |
|---|-----------|

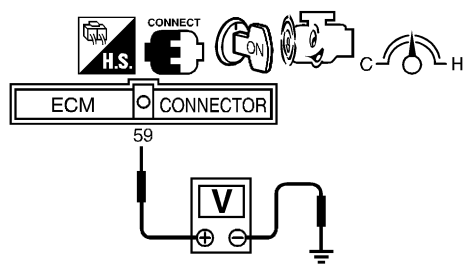
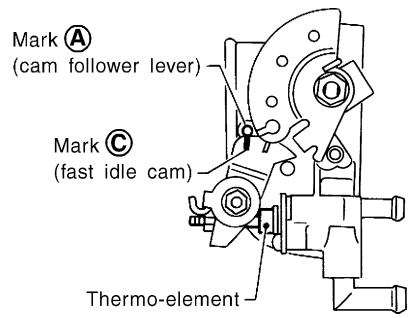
11	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge. 2. Temporarily tighten sensor body fixing bolts as follows. <ul style="list-style-type: none"> ● Gradually move the sensor body clockwise and stop it when “CLSD THL/P SW” signal switches from “OFF” to “ON”, then temporarily tighten sensor body fixing bolts. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 50px;">SEF689W</p> <ol style="list-style-type: none"> 3. Make sure two or three times that the signal is “ON” when the throttle valve is closed and “OFF” when it is opened. 4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge. 5. Make sure two or three times that the signal remains “OFF” when the throttle valve is closed. 6. Tighten throttle position sensor. 7. Check the “CLSD THL/P SW” signal again. <p style="margin-left: 20px;">The signal remains “OFF” while closing throttle valve.</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ GO TO 12.
NG	▶ GO TO 8.

12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY																						
<p> With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Remove feeler gauge. 2. Start engine. 3. Warm up engine to normal operating temperature. 4. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode. 5. Stop engine. (Turn ignition switch OFF.) 6. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 7. Turn ignition switch OFF and wait at least 5 seconds. 8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">TP SW/TP SEN IDLE POSI ADJ MONITOR</th> </tr> </thead> <tbody> <tr> <td>COOLANT TEMP/S</td> <td>91 °C</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div>		TP SW/TP SEN IDLE POSI ADJ MONITOR		COOLANT TEMP/S	91 °C	CLSD THL POS	ON	CLSD THL/P SW	ON														
TP SW/TP SEN IDLE POSI ADJ MONITOR																							
COOLANT TEMP/S	91 °C																						
CLSD THL POS	ON																						
CLSD THL/P SW	ON																						
SEF864V																							
SEF715Y																							
▶ GO TO 13.																							

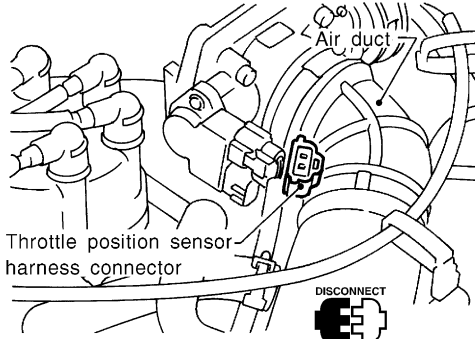
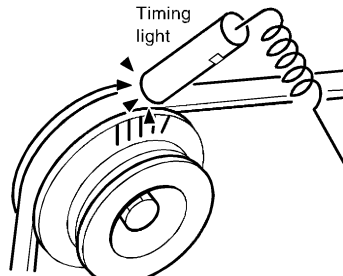
13	CHECK TARGET IDLE SPEED
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1262. 2. GO TO 27.

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14	CHECK FI CAM FUNCTION	
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "MODE 1" with GST. 3. Start engine and warm it up. 4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. <div style="text-align: center; margin: 20px 0;">  <p style="margin-left: 100px;">Mark A (cam follower lever)</p> <p style="margin-left: 100px;">Mark C (fast idle cam)</p> <p style="margin-left: 150px;">Thermo-element</p> </div> <p style="text-align: right; margin-right: 50px;">SEF971R</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 16.
NG	▶	<ol style="list-style-type: none"> 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1261. 2. GO TO 16.

15	CHECK FI CAM FUNCTION
<p>NO TOOLS</p>	
<p>1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground. 2. Start engine and warm it up.</p>	
	
<p>3. When the voltage is between 1.10 to 1.36V, check the following.</p> <ul style="list-style-type: none"> • The center of mark A is aligned with mark C. • The cam follower lever's roller is not touching the fast idle cam. 	
	
<p>OK or NG</p>	
<p>OK</p>	<p>▶ GO TO 16.</p>
<p>NG</p>	<p>▶ 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1261. 2. GO TO 16.</p>

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16	CHECK IGNITION TIMING	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Warm up engine to normal operating temperature. Stop engine and disconnect throttle position sensor harness connector. 		
		
<ol style="list-style-type: none"> Start engine. Check ignition timing at idle using a timing light. 		
		
<p>Ignition timing: 10°±2° BTDC</p> <p>OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	<ol style="list-style-type: none"> Adjust ignition timing by turning distributor. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-1262. GO TO 17.

SEF975R

SEF984U

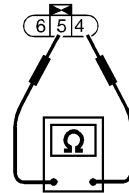
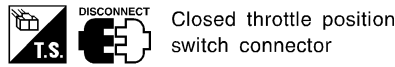
17	CHECK BASE IDLE SPEED	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Make sure that throttle position sensor harness connector remain disconnected. Does engine speed fall to the following speed? 700±50 rpm (in "P" or "N" position) 		
<p>OK or NG</p>		
OK	▶	GO TO 18.
NG	▶	<ol style="list-style-type: none"> Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-1262. GO TO 18.

18	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION	
<p>⊗ Without CONSULT-II</p> <p>NOTE: Always check ignition timing and base idle speed before performing the following.</p> <ol style="list-style-type: none"> Warm up engine to normal operating temperature. Check FI cam, refer to procedure 14 or 15. Stop engine. 		
	▶	GO TO 19.

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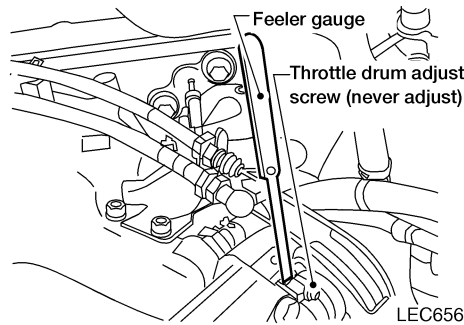
19 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions.



SEC298C

- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



LEC656

“Continuity should exist” while inserting 0.3 mm (0.012 in) feeler gauge.
“Continuity should not exist” while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

20 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

⊗ Without CONSULT-II

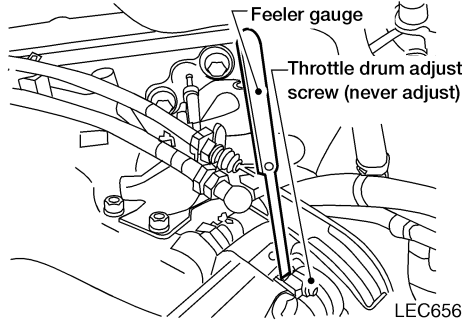
NOTE:

- Never adjust throttle adjust screw (TAS).
 - Do not touch throttle drum when checking “continuity”, doing so may cause an incorrect adjustment.
1. Warm up engine to normal operating temperature.
 2. Check FI cam. Refer to procedure 12 or 13.
 3. Stop engine.
 4. Loosen throttle position sensor fixing bolts.

	▶	GO TO 21.
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21 | ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.

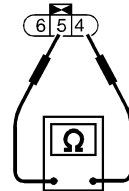


LEC656

3. Open throttle valve then close.
4. Check continuity between closed throttle position switch terminals 4 and 5.



Closed throttle position switch connector



SEC298C

Continuity should not exist while closing the throttle position sensor.

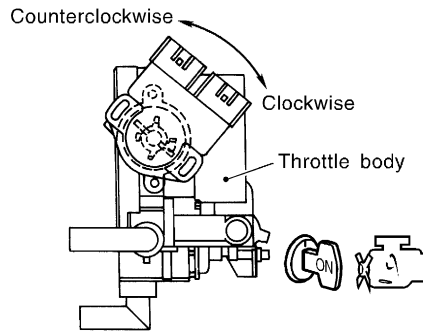
OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22 | ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II

Turn throttle position sensor body counterclockwise until continuity does not exist.



SEF689W

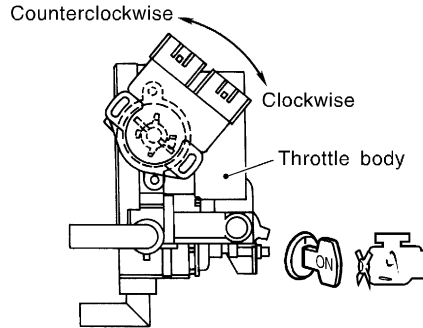
	▶	GO TO 23.
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23 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

⊗ Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.
 - Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.



SEF689W

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

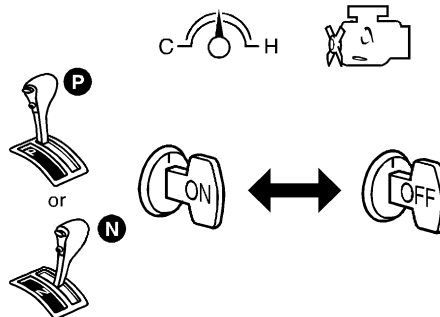
24 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

⊗ Without CONSULT-II

NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch OFF.)
5. Turn ignition switch ON and wait at least 5 seconds.



SEF864V

6. Turn ignition switch OFF and wait at least 5 seconds.
7. Repeat steps 4 and 5, 20 times.

▶	GO TO 25.
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Basic Inspection (Cont'd)

25	REINSTALLATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed. 	
▶ GO TO 26.	
26	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 27.
NG	▶ <ol style="list-style-type: none"> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1262. 2. GO TO 27.
27	ERASE UNNECESSARY DTC
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287 and AT-179, "HOW TO ERASE DTC".</p>	
▶ INSPECTION END	

DTC Inspection Priority Chart

NEEC1116

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)	
1	<ul style="list-style-type: none"> ● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115 P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0180 Fuel tank temperature sensor ● P0325 Knock sensor ● P0335 P1336 Crankshaft position sensor (OBD) ● P0340 Camshaft position sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0600 A/T communication line ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch 	GI MA EM LC EC FE
2	<ul style="list-style-type: none"> ● P0105 Absolute pressure sensor (0803) ● P0130-P0134, P0150-P0154 Heated oxygen sensor 1 (front) ● P0135 P0155 Heated oxygen sensor 1 heater (front) ● P0137-P0140, P0157-P0160 Heated oxygen sensor 2 (rear) ● P0141 P0161 Heated oxygen sensor 2 heater (rear) ● P0217 Engine coolant overtemperature enrichment protection ● P0443 P1444 EVAP canister purge volume control solenoid valve ● P0446 P1446 P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P1441 EVAP control system (VERY SMALL LEAK) ● P1447 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve 	CL MT AT TF PD
3	<ul style="list-style-type: none"> ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420 P0430 Three way catalyst function ● P0440/P1440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P0731-P0734 P0744 A/T function ● P1148 P1168 Closed loop control 	AX SU BR ST RS BT HA SC EL

Fail-safe Chart

=NEEC1117

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
CONSULT-II GST		Condition	Engine coolant temperature decided (CONSULT-II display)
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Just as ignition switch is turned ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0120	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.	
		Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.	
			ECM fail-safe operation
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset value
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
Replace ECM, if ECM fail-safe condition is confirmed.			

Symptom Matrix Chart
SYSTEM — BASIC ENGINE CONTROL SYSTEM

NEEC1118

NEEC118S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2					1	EC-1801
	Injector circuit							2							EC-1793
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3				4	EC-1260
	Evaporative emission system														EC-1241
Air	Positive crankcase ventilation system	4	4	4	4	4	4	4	3	3				1	EC-1257
	Incorrect idle speed adjustment														3
	IACV-AAC valve circuit	2	1	3	3	3		2	2	2	2			1	EC-1646
	IACV-FICD solenoid valve circuit		2					3	3						3
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1					1	EC-1262
	Ignition circuit							1	1						2
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-1354
Air conditioner circuit		2													3

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1			2				2						EC-1565
Mass air flow sensor circuit		1	2			2						2		
Heated oxygen sensor 1 (front) circuit				3			2							EC-1400
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-1376, 1394
Throttle position sensor circuit		1	2		2	2					2			EC-1381
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-1314
Vehicle speed sensor circuit		2												EC-1642
Knock sensor circuit			3		3						3			EC-1555
ECM	2	2		3		3	3	2	2	1				EC-1664, 1330
Start signal circuit	1													EC-1798
Park/neutral position (PNP) switch circuit			3		3						3			EC-1777
Power steering oil pressure switch circuit		2					3	2						EC-1809

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NEEC1118S02

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE-4
	Fuel piping			5	5	5		5	4		5				
	Vapor lock														
	Valve deposit														
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	4		5				
Air	Air duct														—
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5	5	5		5	4		5				
	Throttle body, Throttle wire	5					5			4					
	Air leakage from intake manifold/Collector/Gasket				5										
Cranking	Battery		1	1		1		1	1			1	1	SC-4	
	Generator circuit	1													
	Starter circuit														
	Park/neutral position (PNP) switch														
	Drive plate/Flywheel		6												

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head														
	Cylinder head gasket	5	5	5	5	5		5	5		2	5	2		
	Cylinder block														
	Piston												3		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														
	Camshaft														
	Intake valve	6	6	6	6	6		6	6		6	2			
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6		6				FE-8
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6		6	2			MA-30, EM-80 and LC-20
	Oil level (Low/Filthy) oil														MA-30
Cooling	Radiator/Hose/Radiator filler cap														
	Thermostat						5			5					
	Water pump														
	Water gallery	6	6	6	6	6		6	6		2	6			LC-27
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														MA-27

1 - 6: The numbers refer to the order of inspection.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1119

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

- If the real-time diagnosis results are NG and the on board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 	Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 2,500 rpm
		1.0 - 1.7V 1.7 - 2.3V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 	More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)		LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 	Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: fully closed (a) 0.15 - 0.85V
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Partially open Between (a) and (b)
		Throttle valve: fully opened (b) 3.5 - 4.7V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 	OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch: OFF OFF
		Air conditioner switch: ON (Compressor operates.) ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: "P" or "N" ON
		Except above OFF
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction) OFF
		The steering wheel is turned ON

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient air temperature with the following: 	Below 19°C (66°F)
		Above 25°C (77°F)
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
A/F ALPHA-B1 A/F ALPHA-B2	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 	Approx. 3.4V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	Except as shown above	OFF
COOLING FAN	<ul style="list-style-type: none"> ● After warming up engine, idle the engine. ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less
		Engine coolant temperature is between 95°C (203°F) and 100°C (212°F)
		Engine coolant temperature is 100°C (212°F) or more
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	<ul style="list-style-type: none"> ● Engine speed: Below 2,800 rpm 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 2,800 rpm 	OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine speed: Above 2,800 rpm 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Below 2,800 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more] 	ON
SCB/V CON S/V	<ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON (Engine stopped) 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Idle 	ON
VC/V BYPASS/V	Ignition switch: ON	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. 	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	3.3 - 4.8 g-m/s
		2,500 rpm	12.0 - 14.9 g-m/s
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine speed: Idle 		Approx. 4.4V
		For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.3V

Major Sensor Reference Graph in Data Monitor Mode

The following are the major sensor reference graphs in "DATA MONITOR" mode. (Select "HI SPEED" in "DATA MONITOR" with CONSULT-II.)

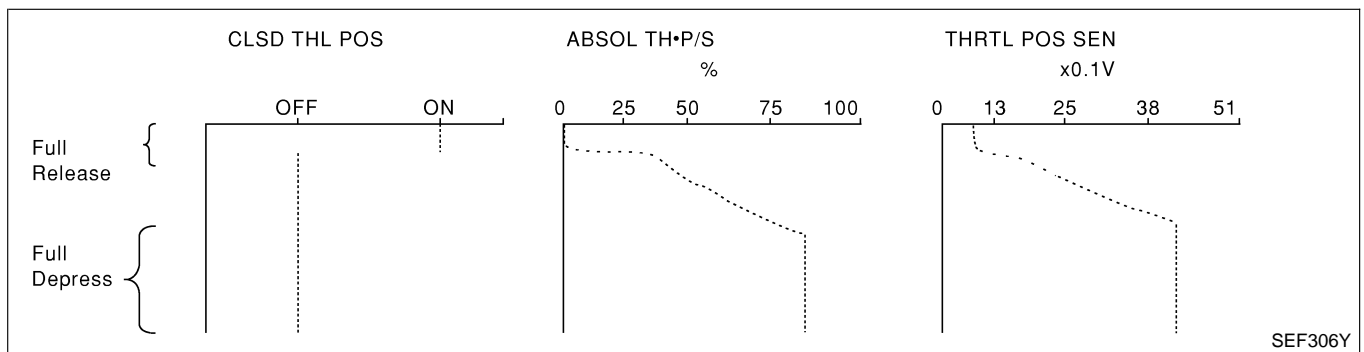
NEEC1120

THRTL POS SEN, ABSOL TH-P/S, CLSD THL POS

Below is the data for "THRTL POS SEN", "ABSOL TH-P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.

NEEC1120S01

The signal of "THRTL POS SEN" and "ABSOL TH-P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



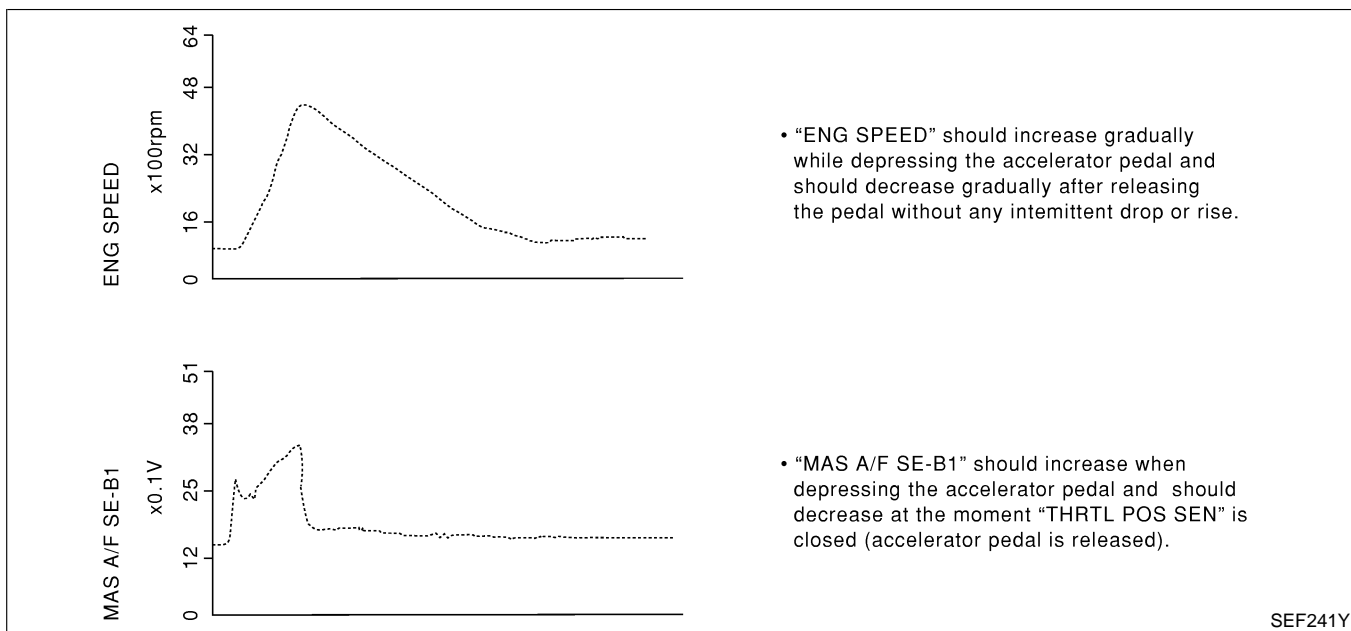
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

NEEC1120S02

Each value is for reference, the exact value may vary.

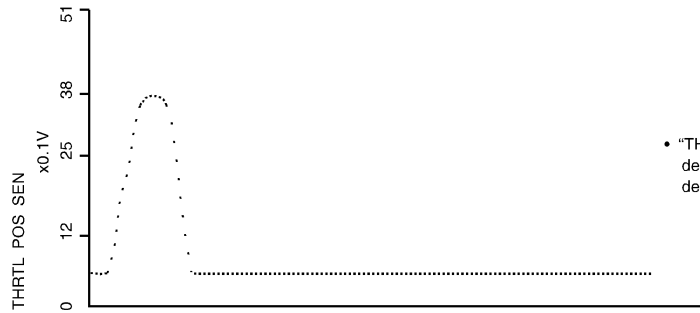
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



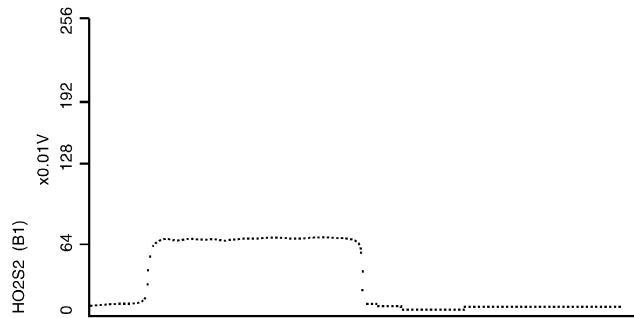
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

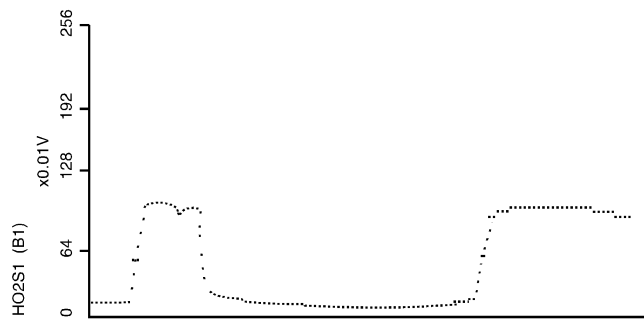
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



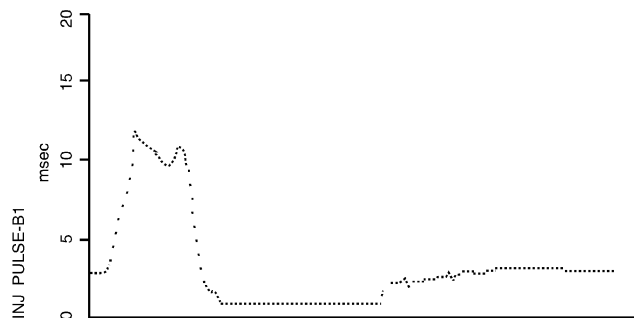
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

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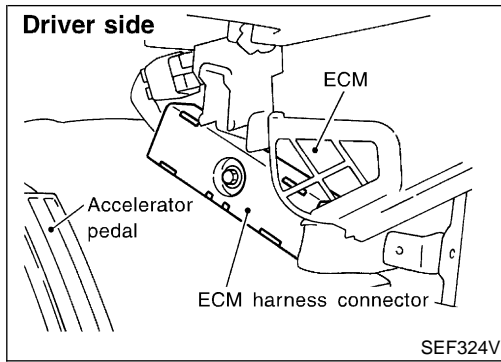
HA

SC

SEF242YD

EL

IDX



ECM Terminals and Reference Value

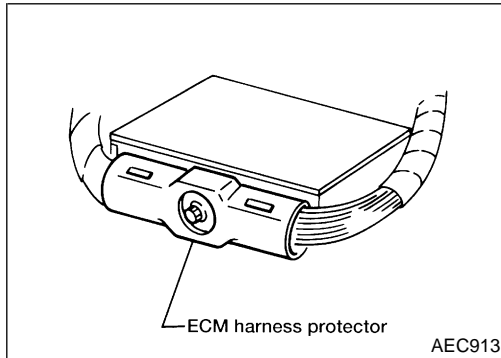
NEEC1121

PREPARATION

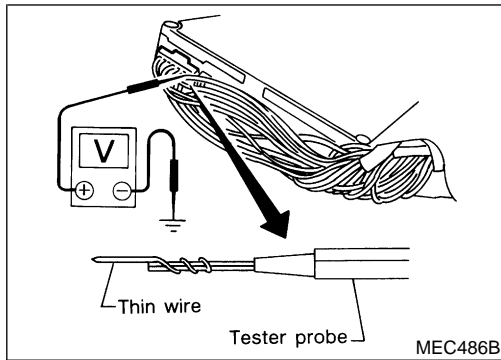
NEEC1121S01

1. ECM is located behind the instrument lower cover. For this inspection:

- Remove instrument lower cover.



2. Remove ECM harness protector.

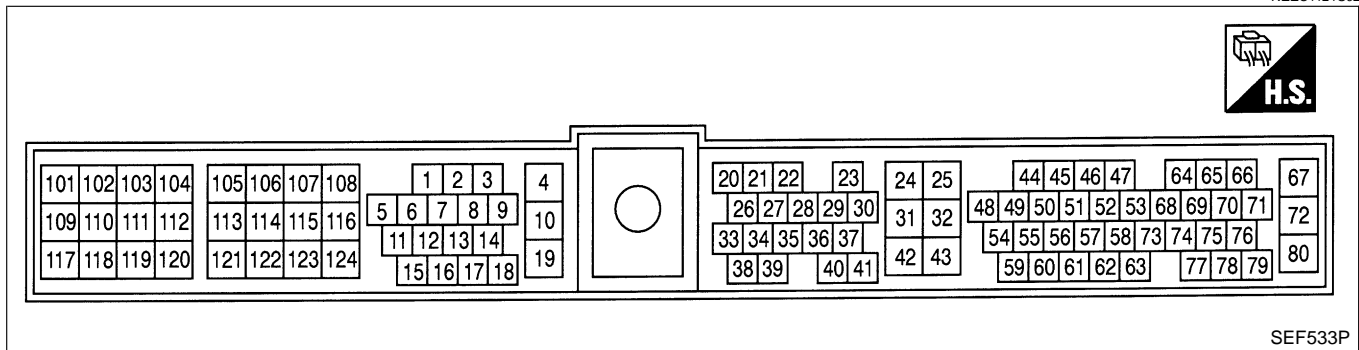


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NEEC1121S02



ECM INSPECTION TABLE

NEEC1121S03

Specification data are reference values and are measured between each terminal and ground.

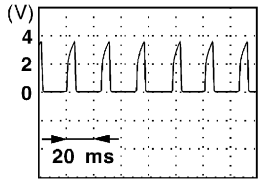
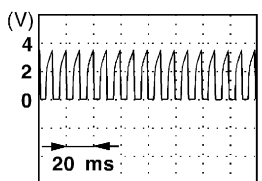
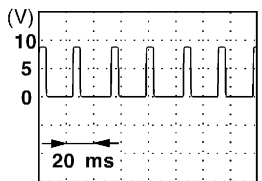
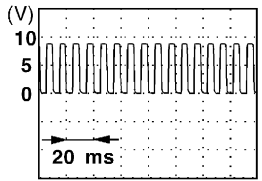
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

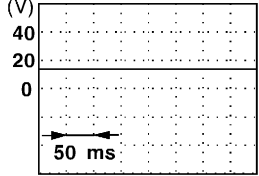

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p>  <p style="text-align: right; font-size: small;">SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p>  <p style="text-align: right; font-size: small;">SEF989U</p>
3	P/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V</p>  <p style="text-align: right; font-size: small;">SEF992U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 5V</p>  <p style="text-align: right; font-size: small;">SEF993U</p>
4	OR/B	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	0 - 1.5V
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF994U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF995U</p>
6	G/W	SCB valve control solenoid valve	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● Engine stopped 	BATTERY VOLTAGE (11 - 14V)
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Approximately 0V
7	Y/G	A/T check signal	<p>[Ignition switch ON]</p> <p>[Engine is running]</p>	0 - 3.0V
9	B/Y	Ambient air temperature switch	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
10	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON <p>[Engine is running]</p>	0 - 1V
			<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON* 	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

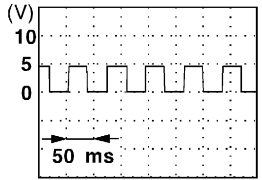
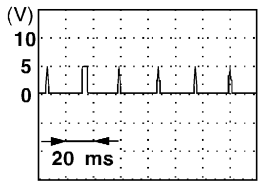
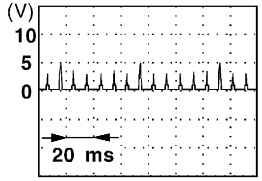
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
18	R/W	Malfunction indicator lamp	[Ignition switch ON]	0 - 1V	GI
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)	MA
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground	EM
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V	LC
			[Ignition switch START]	9 - 12V	
21	G/R	Air conditioner switch	[Engine is running] ● Both A/C switch and blower switch are ON (Compressor operates)*	Approximately 0V	EC
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)	FE
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P"	Approximately 0V	CL
			[Ignition switch ON] ● Except the above gear position	Approximately 5V	MT
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V	AT
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V	TF PD
24	W/L	Ignition switch	[Ignition switch OFF]	0V	AX
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)	
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground	SU
26	PU/W	A/T signal No. 1	[Engine is running] ● Idle speed	Approximately 0 - 1.0V	BR
27	P/B	A/T signal No. 2	[Engine is running] ● Idle speed	Approximately 0 - 1.0V	ST
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)	RS
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V	BT HA

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

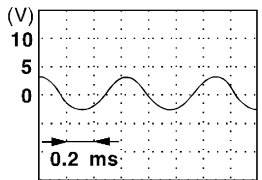
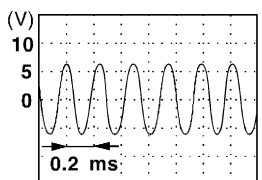
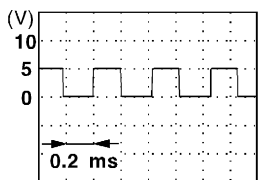
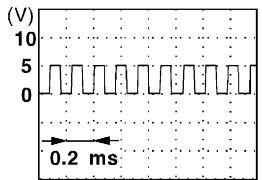
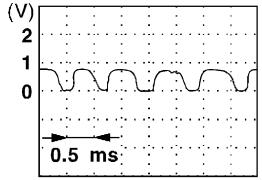
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	[Engine is running] <ul style="list-style-type: none"> ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH) 	2 - 3V  SEF996U
32	B/Y	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
33	W/G	A/T signal No. 4	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0 - 1.0V
34	R/Y	A/T signal No. 5	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 8V
35	G/R	A/T signal No. 3	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0 - 1.0V
36	G/R	Cooling fan relay (Low)	[Engine is running] <ul style="list-style-type: none"> ● Cooling fan is not operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Cooling fan is operating 	0 - 1V
38	LG/R	Cooling fan relay (High)	[Engine is running] <ul style="list-style-type: none"> ● Cooling fan is not operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Cooling fan (High) is operating 	0 - 1V
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> ● Steering wheel is being turned 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> ● Steering wheel is not being turned 	Approximately 5V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	0.3 - 0.5V  SEF997U
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	0.3 - 0.5V  SEF998U

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	G	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1 - 2V (AC range)  <p style="text-align: right; font-size: small;">SEF690W</p>
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	3 - 4V (AC range)  <p style="text-align: right; font-size: small;">SEF691W</p>
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 2.5V  <p style="text-align: right; font-size: small;">SEF999U</p>
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	Approximately 2.5V  <p style="text-align: right; font-size: small;">SEF001V</p>
50	B	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V  <p style="text-align: right; font-size: small;">SEF002V</p>

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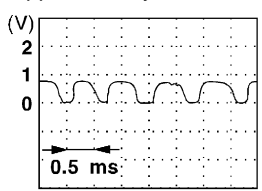
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

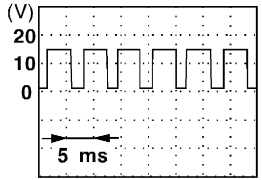
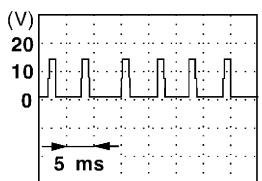
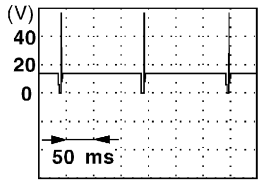
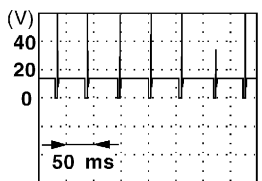
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (front) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V  SEF002V
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V
64	W	Knock sensor	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 2.5V
66	B	Fuel level sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector	[Engine is running] <ul style="list-style-type: none"> ● Idle speed (CONSULT-II or GST is disconnected) 	6 - 10V
72	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	8 - 11V  SEF005V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	7 - 10V  SEF692W
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V)  SEF008V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm 	Approximately 0.4V
119	BR/Y	Heated oxygen sensor 1 heater (front) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (front) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

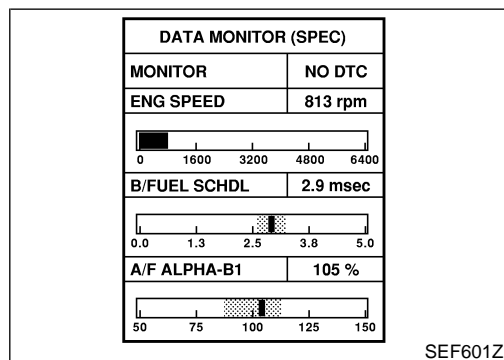
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



Inspection Procedure

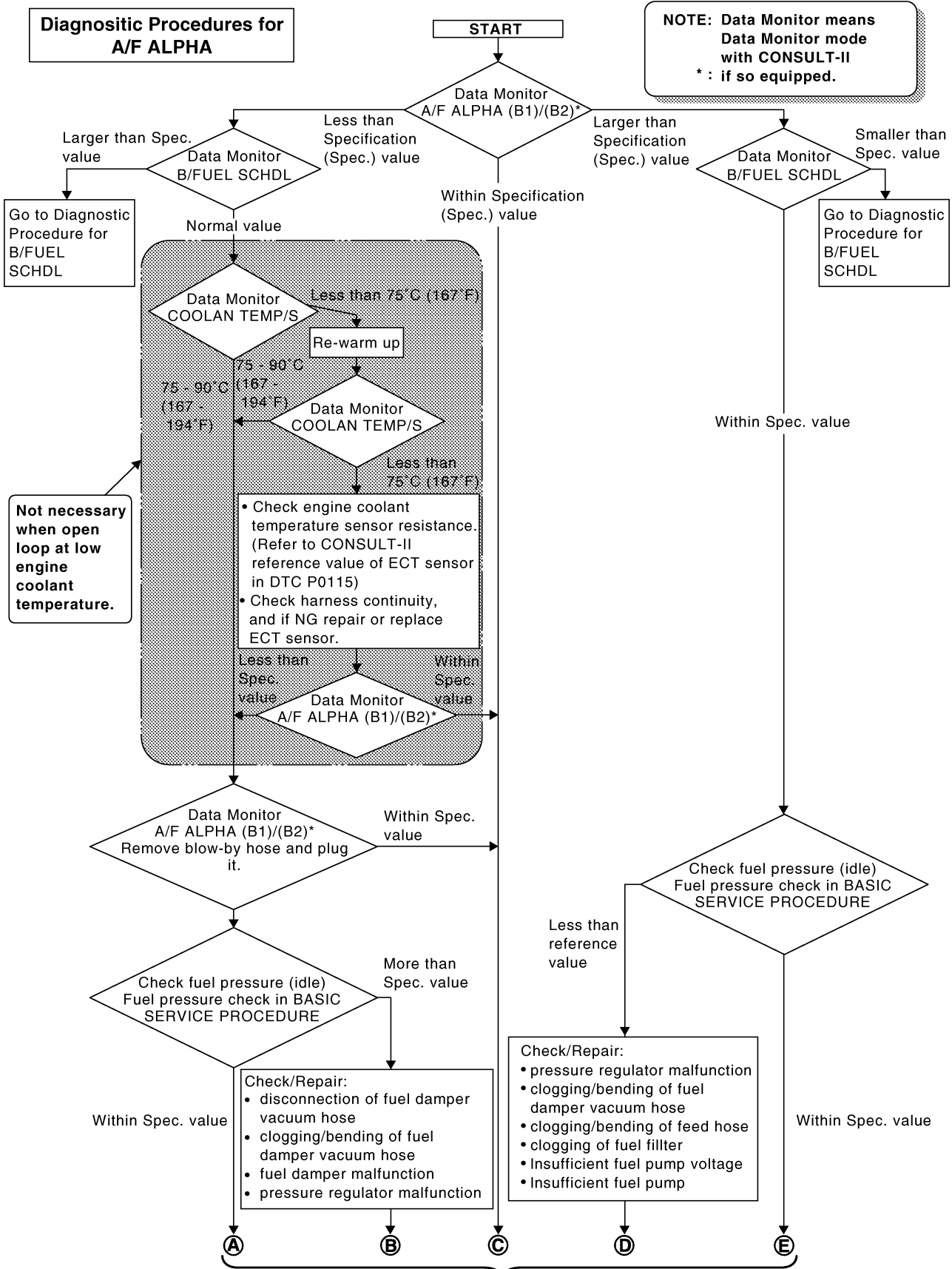
NOTE:

Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform “Basic Inspection”, EC-1314.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-1350.

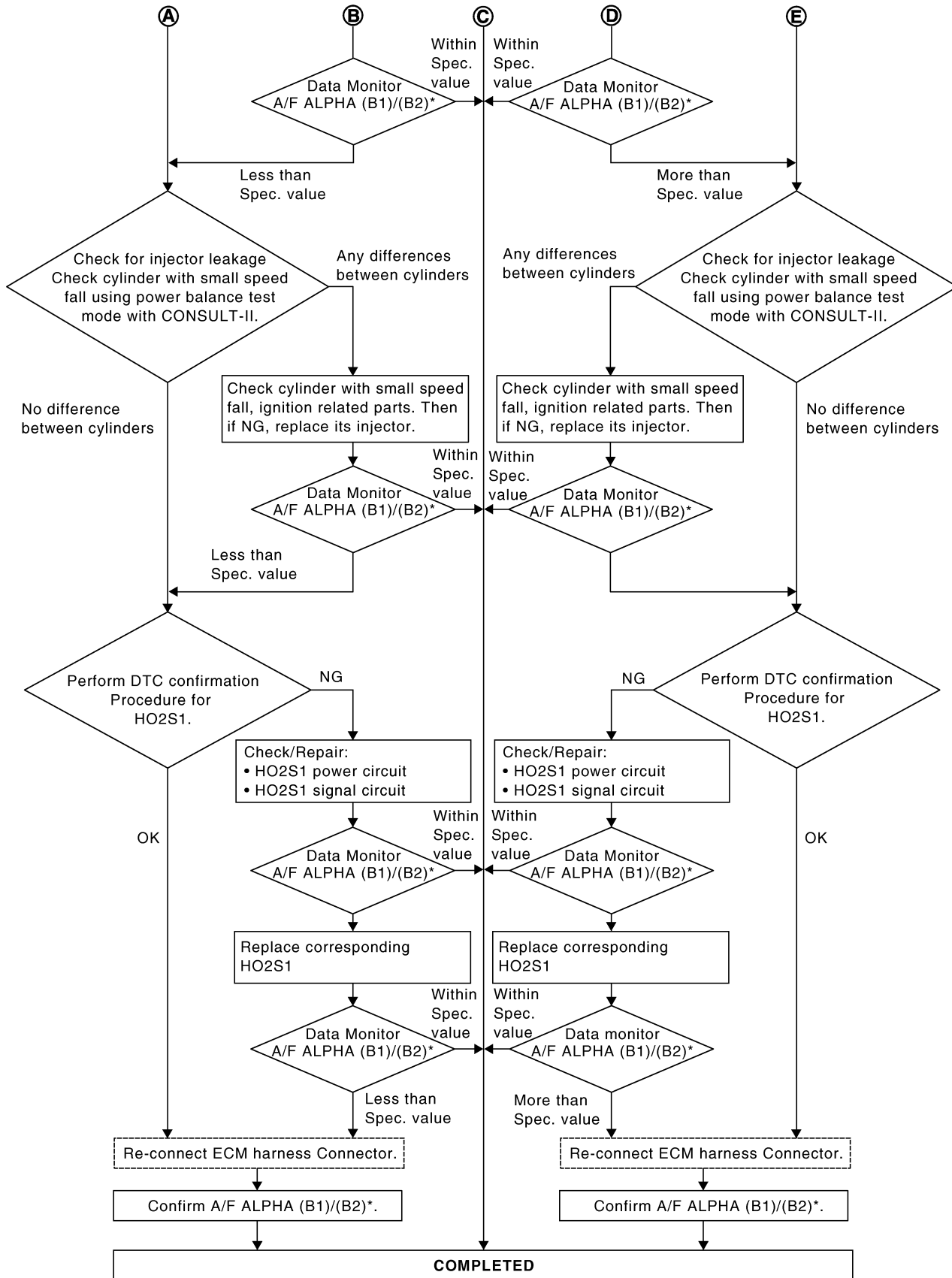
Diagnostic Procedure

NEEC1125



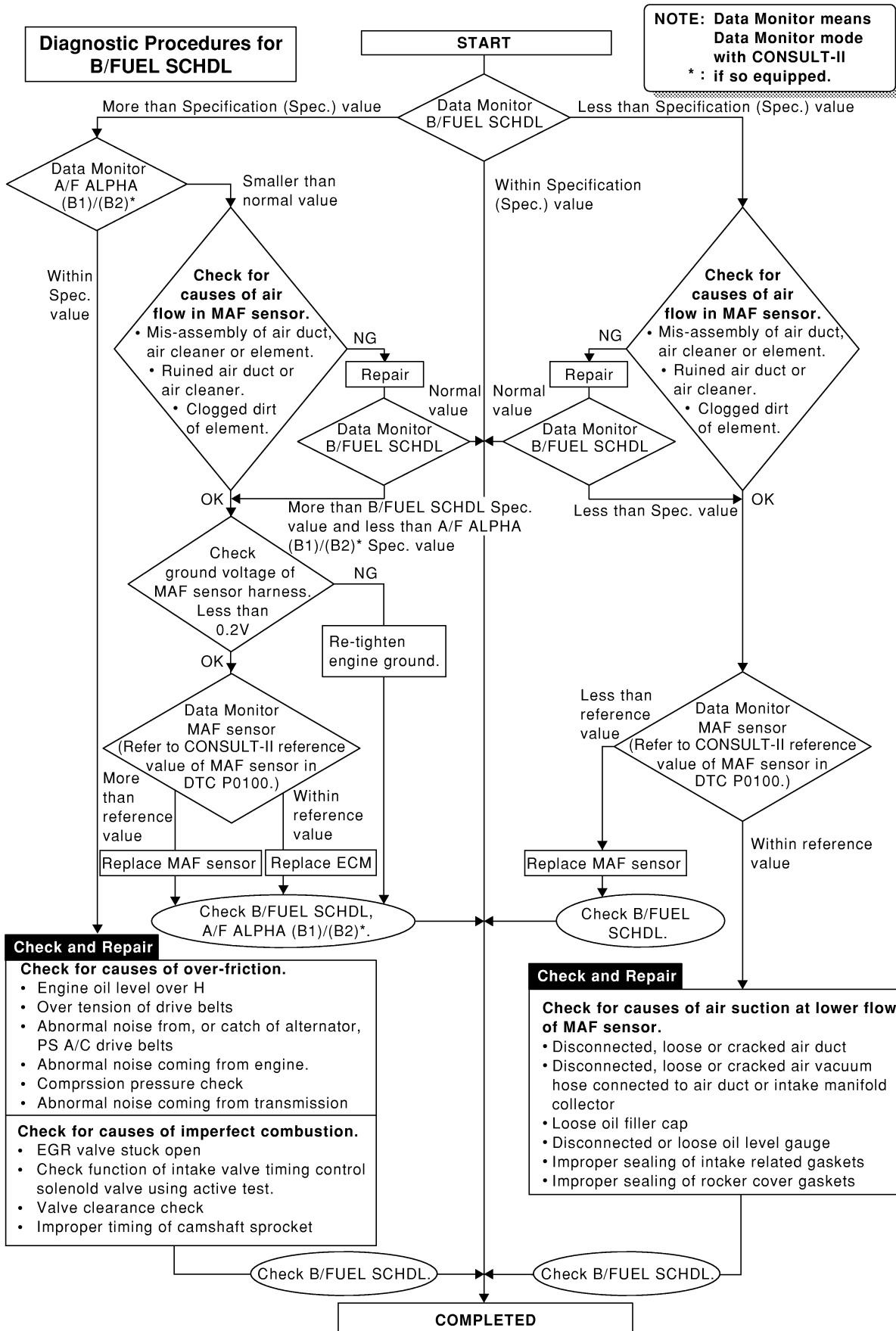
(Go to next page.)

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Description

NEEC1126

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NEEC1126S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "[1t]".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the problem area.

Diagnostic Procedure

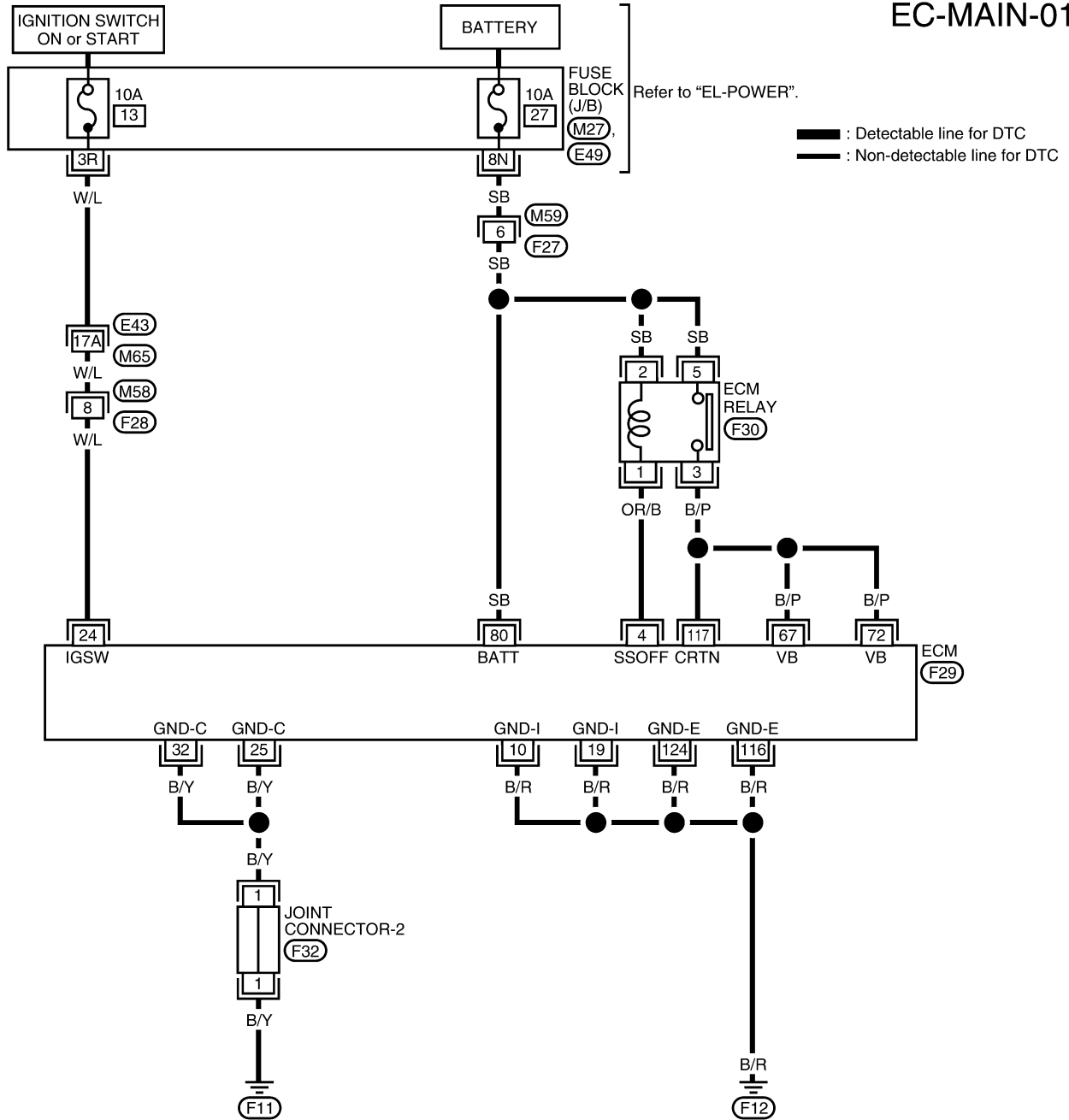
NEEC1127

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-1287.	
	▶ GO TO 2.
2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-29 .	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", GI-24 .	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.
4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-21 .	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

Main Power Supply and Ground Circuit WIRING DIAGRAM

NEEC1128

EC-MAIN-01



Refer to the following.

(M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)

1N	2N	3N	4N	(M27)	1R	2R	3R	4R	5R	(E49)	
5N	6N	7N	8N	9N	6R	7R	8R	9R	10R	11R	12R
				W					W		

1	2	3	4	5	6	7	8	(M58)				
9	10	11	12	13	14	15	16	17	18	19	20	
				W								

1	2	3	4	5	(M59)							
6	7	8	9	10	11	12	13	14	15	16	17	18
				W								

1	2	3	4	(F30)			
5	6	7	8	L			
		1	2	3	4	(F32)	
		5	6	7	8	GY	
		1	1	1	1	1	1

101	102	103	104	105	106	107	108	1	2	3	4					
109	110	111	112	113	114	115	116	5	6	7	8	9	10			
117	118	119	120	121	122	123	124	11	12	13	14	15	16	17	18	19

20	21	22	23	24	25	44	45	46	47	64	65	66	67						
26	27	28	29	30	31	32	48	49	50	51	52	53	68	69	70	71			
33	34	35	36	37	38	39	40	41	42	43	54	55	56	57	58	73	74	75	76
				59	60	61	62	63	77	78	79	80							

(F29) GY

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33ER

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NEEC1129

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

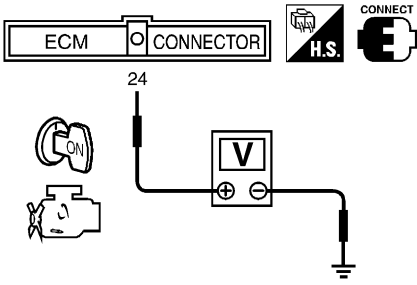
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shutoff)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

DIAGNOSTIC PROCEDURE

NEEC1130

1	INSPECTION START		
Start engine. Is engine running?			
Yes or No			
Yes	▶	GO TO 6.	
No	▶	GO TO 2.	

2	CHECK ECM POWER SUPPLY CIRCUIT-I
<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p>	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

SEF674U

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M58, F28 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between ECM and fuse 	
▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT-I FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p>	
<p>OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ GO TO 5.

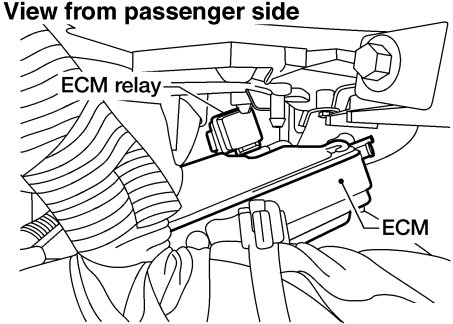
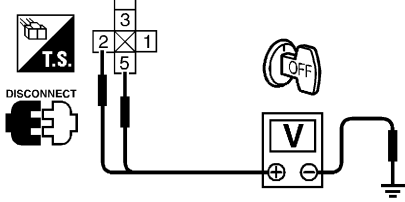
5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-2 ● Harness for open between ECM and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK ECM POWER SUPPLY CIRCUIT-II	
<p>1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF678U</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between ECM and fuse 		
▶ Repair harness or connectors.		

8	CHECK ECM POWER SUPPLY CIRCUIT-III	
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>		
<p>Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p> <p style="text-align: right;">SEF679U</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 9.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

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9	CHECK ECM POWER SUPPLY CIRCUIT-IV						
<p>1. Disconnect ECM relay.</p> <div style="text-align: center;">  </div>							
<p>2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-left: 20px;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>		OK	▶	GO TO 11.	NG	▶	GO TO 10.
OK	▶	GO TO 11.					
NG	▶	GO TO 10.					

AEC927A

SEF625W

10	DETECT MALFUNCTIONING PART			
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and harness connectors M59, F27 				
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>			▶	Repair open circuit or short to ground or short to power in harness or connectors.
	▶	Repair open circuit or short to ground or short to power in harness or connectors.		

11	CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 12.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 12.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 12.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

12	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT						
<p>1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 13.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 13.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

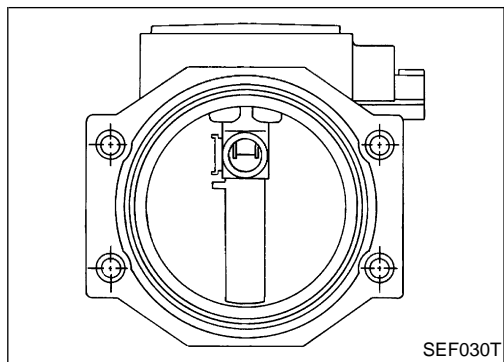
13	CHECK ECM RELAY	<p>1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5.</p> <div style="text-align: center;"> </div> <p style="color: blue;">12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity</p> <p style="text-align: right;">SEF039W</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL
OK	▶	GO TO 14.	
NG	▶	Replace ECM relay.	

14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	MT AT TF PD
OK	▶	GO TO 15.	
NG	▶	GO TO 5.	

15	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>	AX SU
	▶	INSPECTION END	

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Component Description



Component Description

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1132

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC1133

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V

On Board Diagnosis Logic

NEEC1134

Malfunction is detected when
 (Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,
 (Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,
 (Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,
 (Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition.

POSSIBLE CAUSE

Malfunction A or C

NEEC1134S01

NEEC1134S0101

- Harness or connectors
(The sensor circuit is open or shorted.)
- Mass air flow sensor

GI

MA

Malfunction B or D

NEEC1134S0102

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

EM

LC

FAIL-SAFE MODE

NEEC1134S02

When the malfunction B is detected, the ECM enters fail-safe mode and the MIL lights up.

EC

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

FE

CL

MT

DTC Confirmation Procedure

NEEC1135

Perform "PROCEDURE FOR MALFUNCTION A" first.
 If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".
 If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
 If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

AT

TF

PD

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

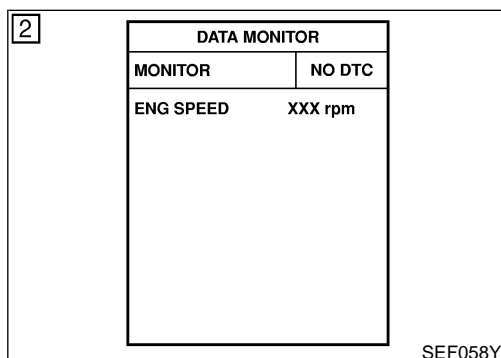
AX

SU

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ST

RS



PROCEDURE FOR MALFUNCTION A

NEEC1135S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1365.

BT

HA

SC

With GST

Follow the procedure "With CONSULT-II".

EL

IDX

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC1135S02

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1365.

 **With GST**

Follow the procedure "With CONSULT-II".

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED XXX rpm COOLAN TEMP/S XXX °C	

SEF174Y

PROCEDURE FOR MALFUNCTION C

NEEC1135S03

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

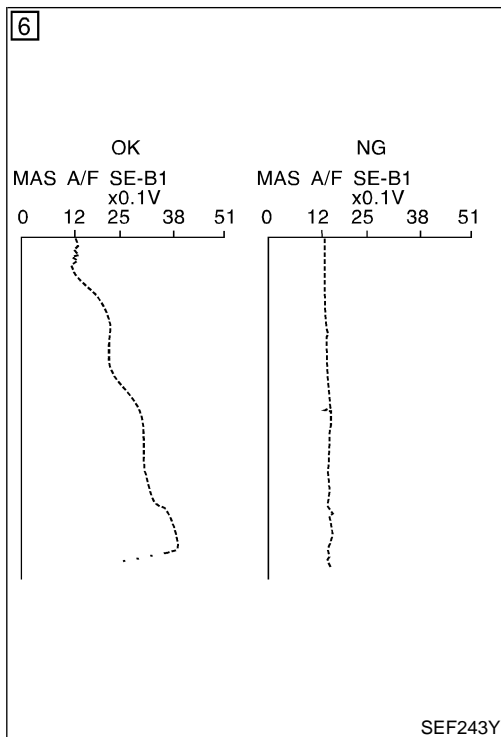
 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1365.

 **With GST**

Follow the procedure "With CONSULT-II".

NEEC1135S04



PROCEDURE FOR MALFUNCTION D

CAUTION:

Always drive vehicle at a safe speed.

Ⓜ With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-1365.**
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-1365.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1365.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

PROCEDURE FOR MALFUNCTION D

NEEC1136

NEEC1136S01

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check the mass air flow sensor signal with "MODE 1".
- 4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-1365.

GI

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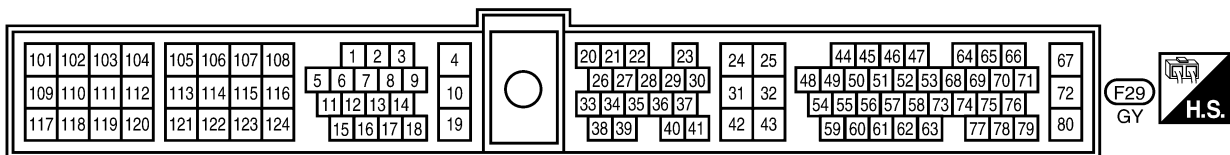
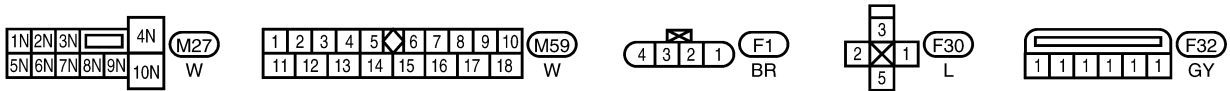
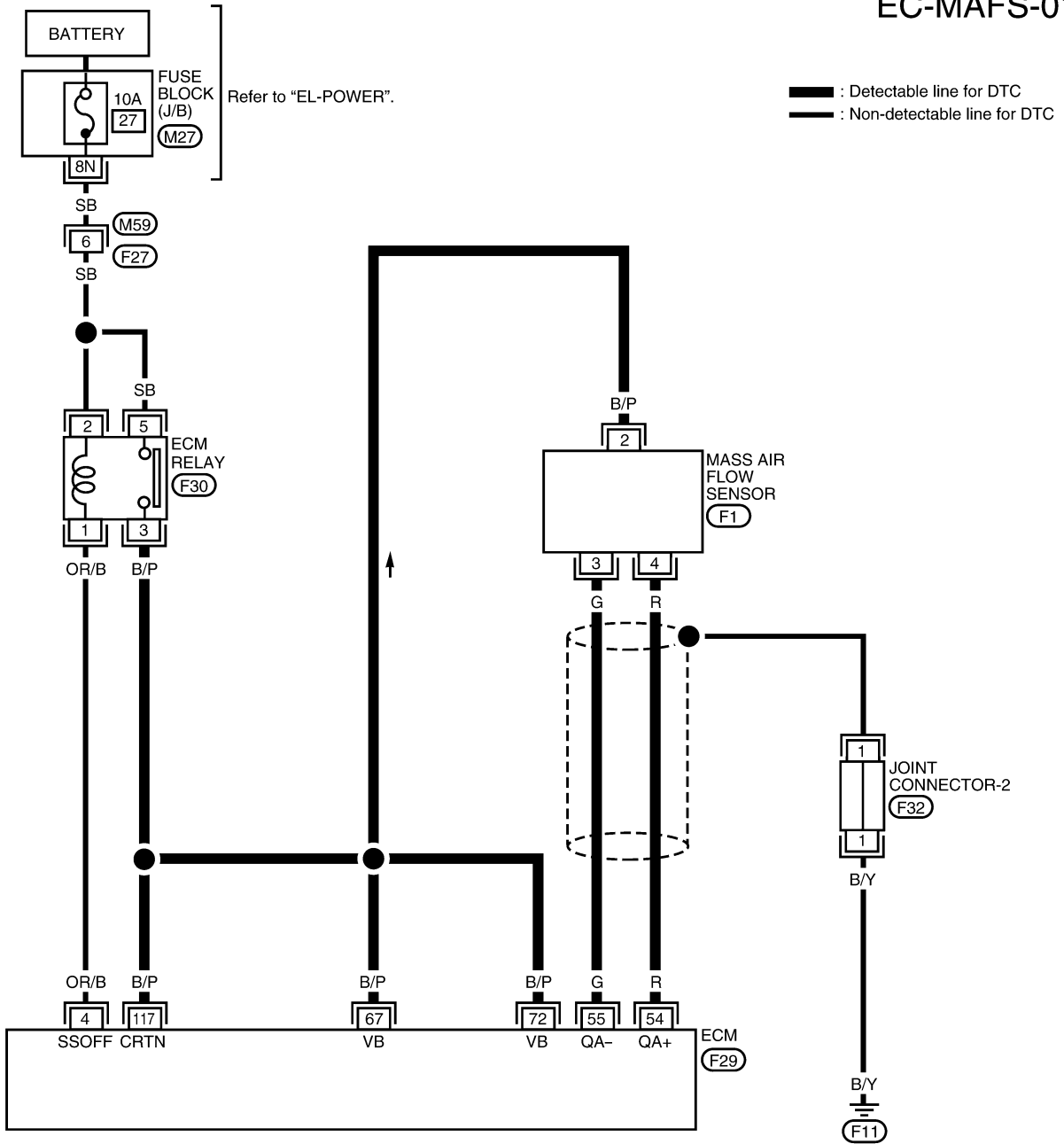
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Wiring Diagram

NEEC1137

EC-MAFS-01

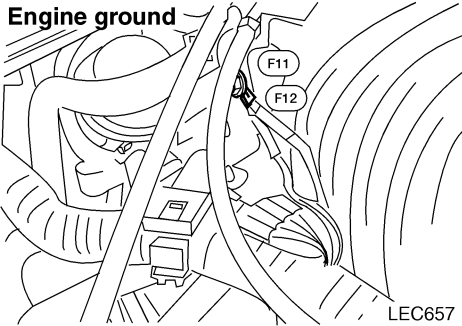


Diagnostic Procedure

NEEC1138

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td>B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
 <p style="text-align: center;">Engine ground</p> <p style="text-align: right;"><small>LEC657</small></p>		
<small>LEC657</small>		
▶		GO TO 4.

GI

MA

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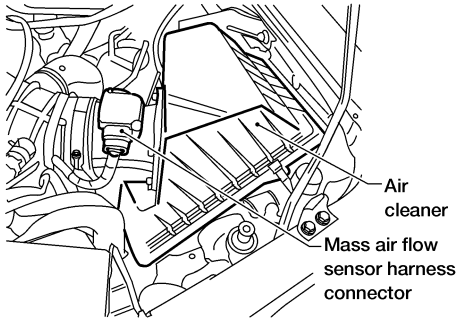
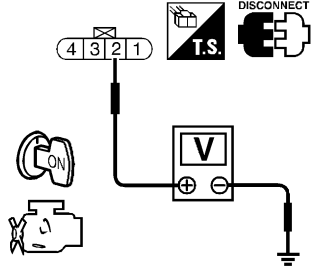
BT

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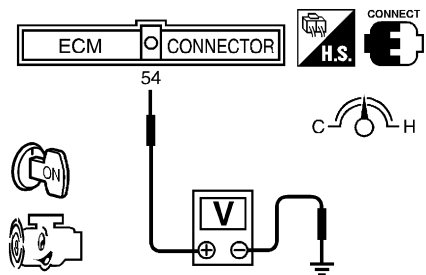
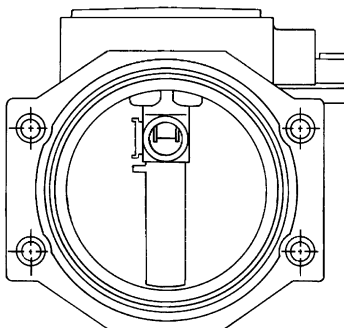
IDX

4	CHECK MAFS POWER SUPPLY CIRCUIT	
<p>1. Disconnect mass air flow sensor harness connector.</p> <div style="text-align: right; margin-right: 50px;">  <p>Air cleaner Mass air flow sensor harness connector</p> </div>		
AEC641A		
<p>2. Turn ignition switch ON. 3. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center; margin: 10px 0;">  <p>DISCONNECT I.S.</p> </div> <p style="color: blue; font-weight: bold;">Voltage: Battery voltage</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>		
SEF627W		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between mass air flow sensor and ECM 		
▶ Repair harness or connectors.		

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between MAFS terminal 3 and ECM terminal 55. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between MAFS terminal 4 and ECM terminal 54. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MASS AIR FLOW SENSOR											
<p>1. Reconnect harness connectors disconnected.</p> <p>2. Start engine and warm it up to normal operating temperature.</p> <p>3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.</p>												
												
SEF747U												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Condition</th> <th style="width: 40%;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Less than 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.0 - 1.7</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.7 - 2.3</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.0 - 1.7 to Approx. 4.0</td> </tr> </tbody> </table>			Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Less than 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3	Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Less than 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3											
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0											
MTBL0227												
<p>4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.</p> <p>5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.</p>												
												
SEF030T												
OK or NG												
OK	▶	GO TO 9.										
NG	▶	Replace mass air flow sensor.										

GI
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 IDX

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector-2 terminal 1 and ground Refer to Wiring Diagram.● Joint connector-2 (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

Component Description

The absolute pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

NEEC1139

GI

MA

EM

LC

On Board Diagnosis Logic

Malfunction is detected when an excessively low or high voltage from the sensor is sent to the micro computer.

NEEC1140
EC

POSSIBLE CAUSE

- ECM

NEEC1140S01

FE

CL

MT

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

NEEC1141

AT

TF

PD

AX

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1370.

With GST

Follow the procedure "With CONSULT-II".

SU

BR

ST

RS

BT

HA



SC

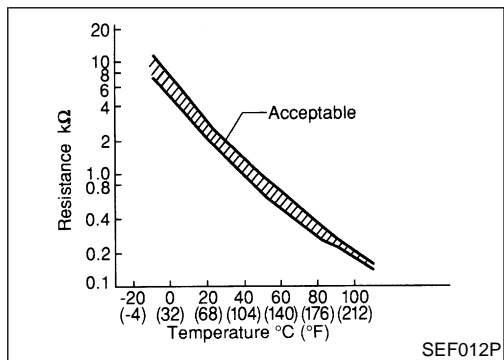
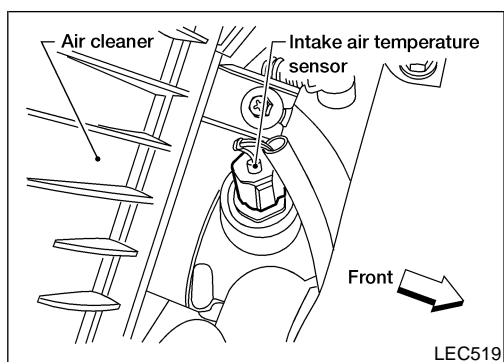
EL

IDX

Diagnostic Procedure

NEEC1142

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1369. 5. Is the 1st trip DTC P0105 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1369. 5. Is the 1st trip DTC P0105 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END



Component Description

NEEC1143

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC1144

Malfunction is detected when (Malfunction A) an excessively low or high voltage from the sensor is sent to ECM, (Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

POSSIBLE CAUSE

NEEC1144S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NEEC1145

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC1145S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1374.

With GST

Follow the procedure "With CONSULT-II".

5	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S XXX °C VHCL SPEED SE XXX km/h	

SEF176Y

PROCEDURE FOR MALFUNCTION B

NEEC1145S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
- a) Turn ignition switch ON.
- b) Select "DATA MONITOR" mode with CONSULT-II.
- c) Check the engine coolant temperature.
- d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1374.

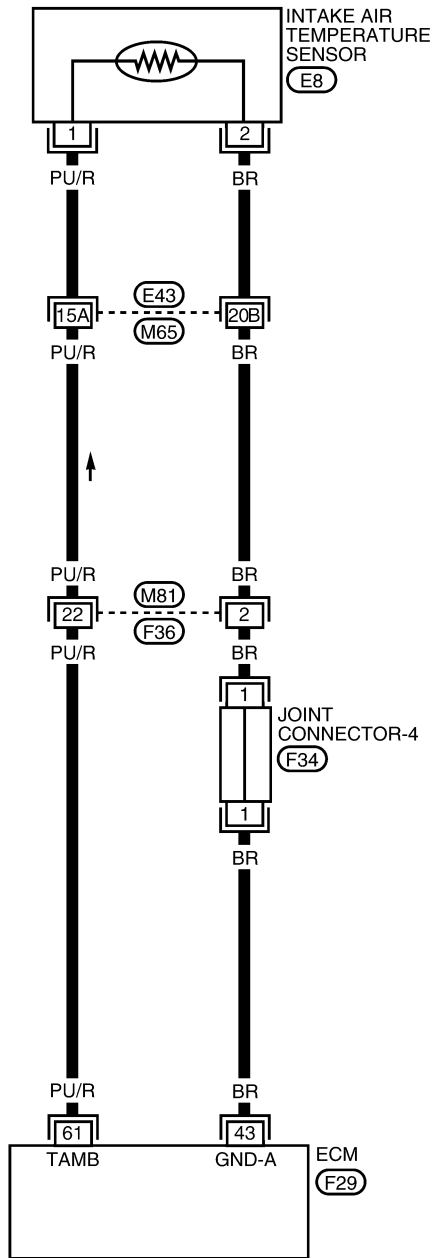
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

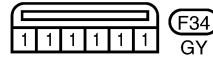
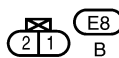
NEEC1146

EC-IATS-01

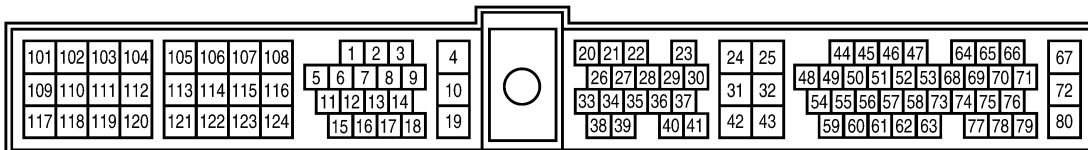


: Detectable line for DTC
 : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC
- FE
- CL
- MT
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- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

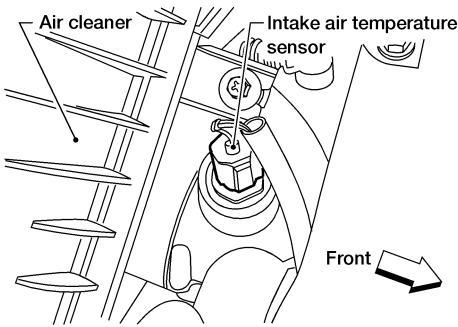
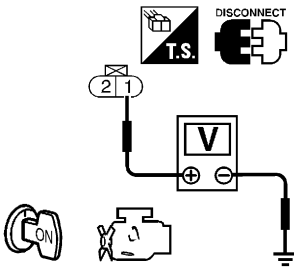


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NEEC1147

1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

LEC519
SEF203W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair harness or connectors.

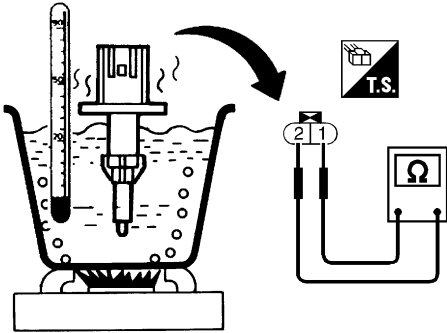
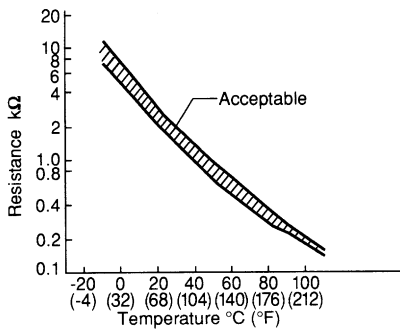
3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P0110 INTAKE AIR TEMPERATURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Joint connector-4 ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
<p>Check resistance as shown in the figure.</p> <div style="text-align: center;">  </div>							
<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Intake air temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">80 (176)</td> <td style="text-align: center;">0.27 - 0.38</td> </tr> </tbody> </table>		Intake air temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Intake air temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace intake air temperature sensor.						

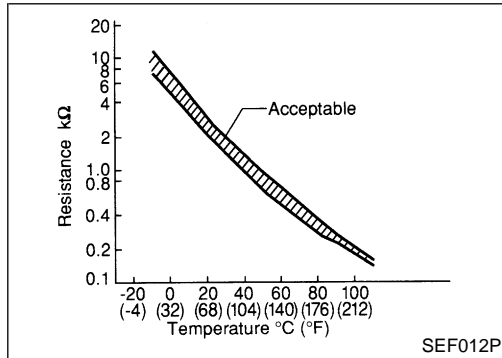
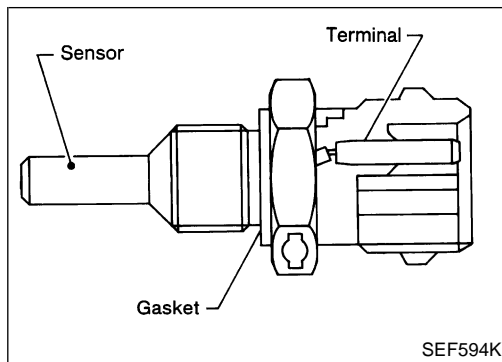
6	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>	
▶	INSPECTION END

GI
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 EL
 IDX

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33ER

Component Description



Component Description

NEEC1148

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC1149

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NEEC1149S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE MODE

NEEC1149S02

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

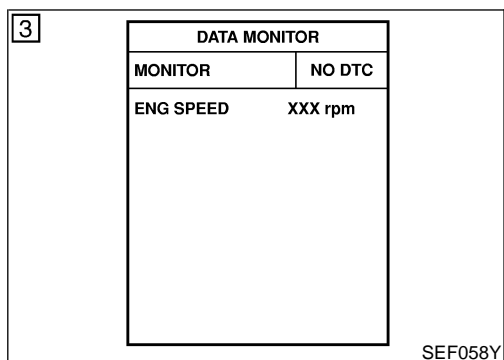
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33ER

On Board Diagnosis Logic (Cont'd)

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

GI
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DTC Confirmation Procedure

NEEC1150

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1379.

With GST

Follow the procedure "With CONSULT-II".

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

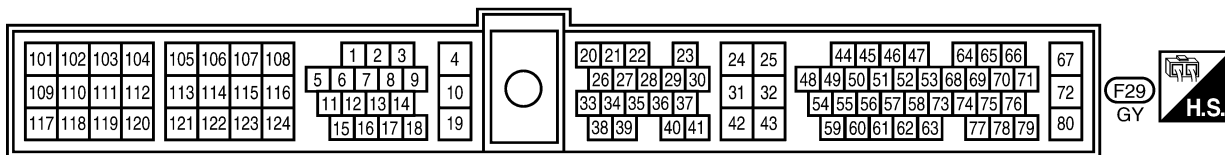
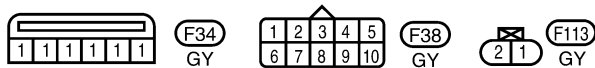
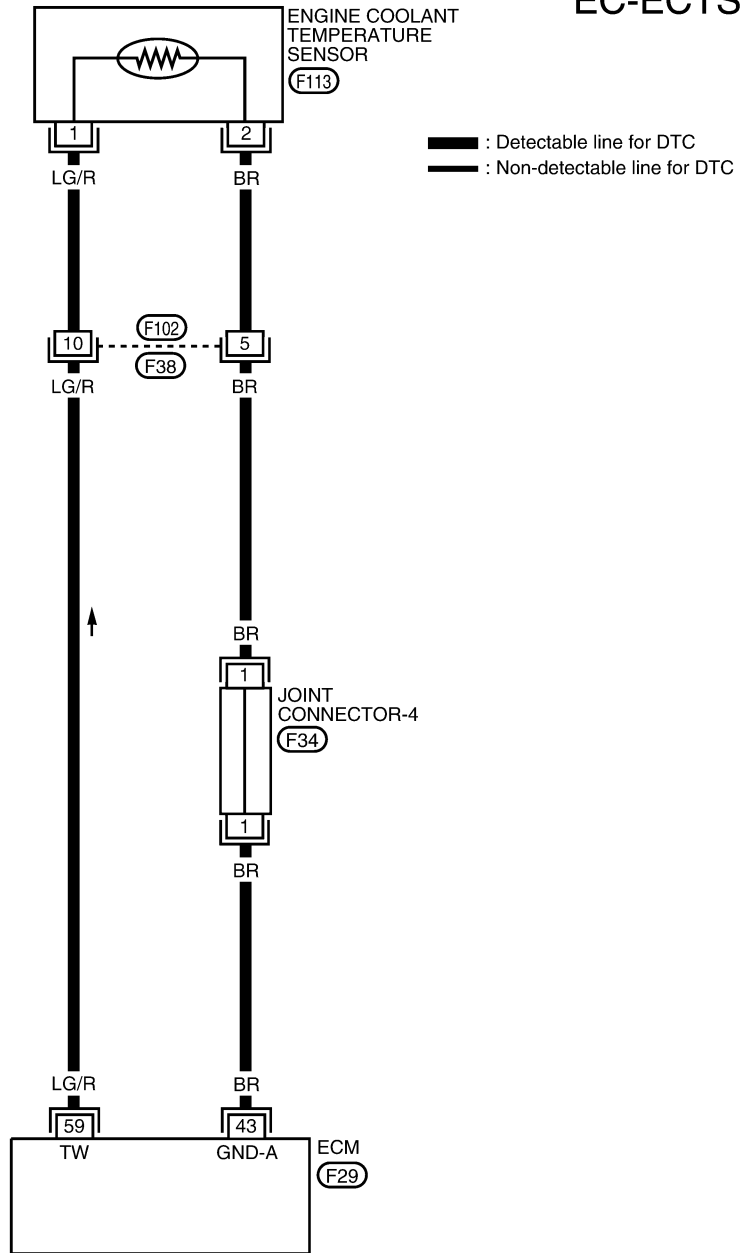
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1151

EC-ECTS-01



LEC663

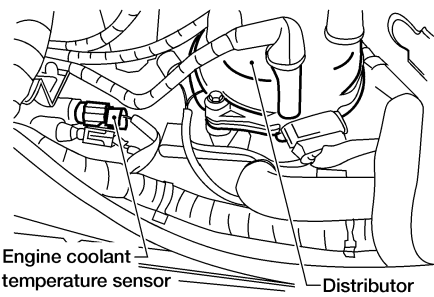
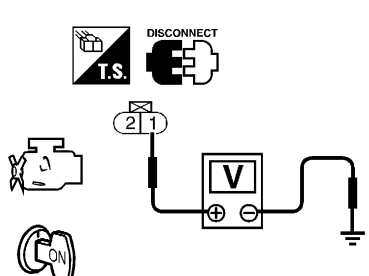
DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1152

1	CHECK ECTS POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p>Engine coolant temperature sensor harness connector Distributor</p> </div> <p style="text-align: right;">AEC643A</p> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: center; color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF206W</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
OK	▶	GO TO 3.	PD
NG	▶	GO TO 2.	AX

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and engine coolant temperature sensor <p style="text-align: right;">▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	<p>SU</p> <p>BR</p>
----------	-----------------------------------	--	---------------------

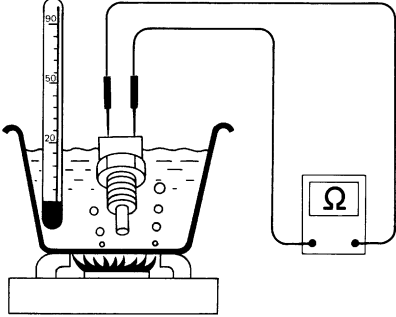
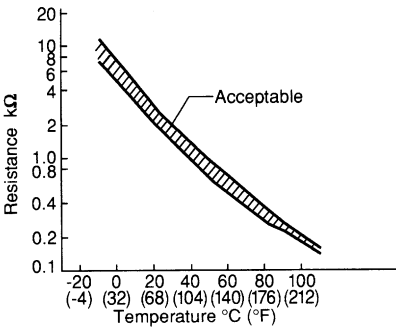
3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>ST</p> <p>RS</p> <p>BT</p>
OK	▶	GO TO 5.	HA
NG	▶	GO TO 4.	SC

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 ● Harness for open or short between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance as shown in the figure.									
									
SEF152P									
<Reference data>									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
MTBL0229									
									
SEF012P									
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

Description

NEEC1153

NOTE:

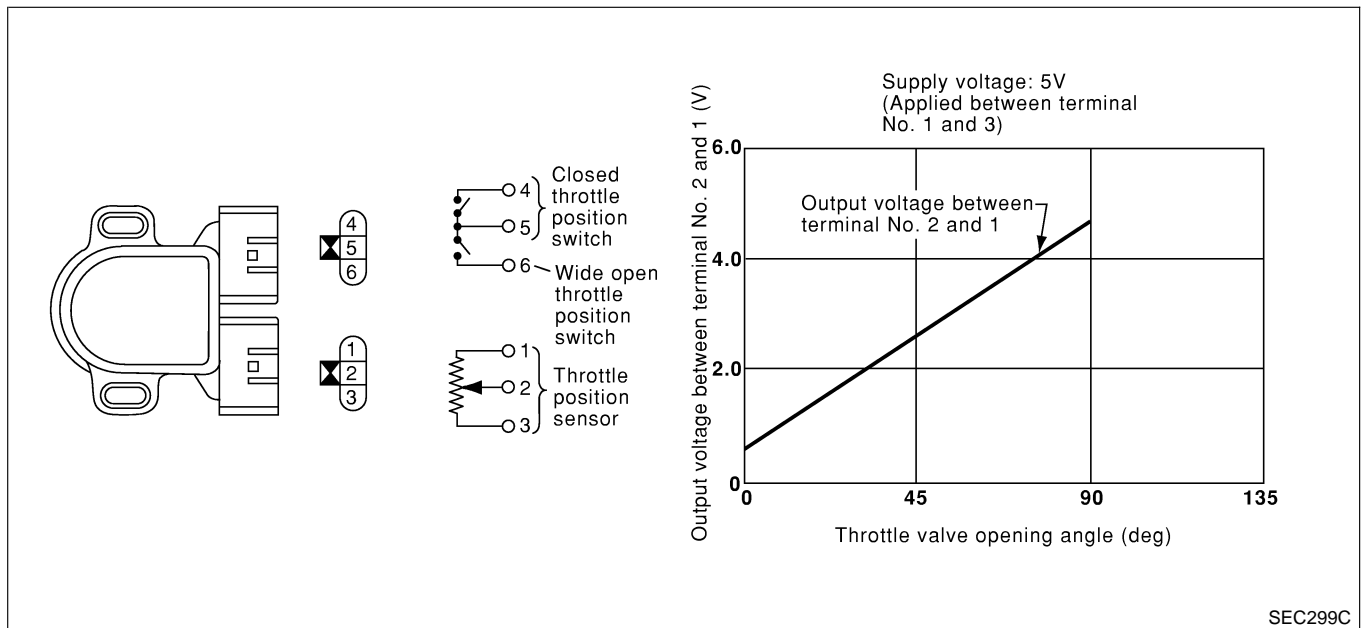
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1652.

COMPONENT DESCRIPTION

NEEC1153S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

NEEC1154

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL POS SEN	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Throttle valve: fully closed (a)	0.15 - 0.85V
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully opened (b)
ABSOL TH-P/S	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. Throttle valve: fully closed	0.0%
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NEEC1155

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NEEC1156

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) a high voltage from the sensor is sent to ECM under light load driving conditions,
(Malfunction C) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

POSSIBLE CAUSE

NEEC1156S01

Malfunction A

NEEC1156S0101

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

Malfunction B

NEEC1156S0102

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector
- Camshaft position sensor
- Mass air flow sensor

Malfunction C

NEEC1156S0103

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

FAIL-SAFE MODE

NEEC1156S02

When the malfunction A is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0120 THROTTLE POSITION SENSOR

VG33ER

On Board Diagnosis Logic (Cont'd)

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

GI
MA
EM

LC

DTC Confirmation Procedure

NEEC1157

NOTE:

- Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".
If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EC

FE

CL

MT

PROCEDURE FOR MALFUNCTION A

NEEC1157S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

AT

TF

PD

AX

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF

SEF065Y

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except "P" or "N" position

SU

BR

ST

- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1387.

RS

With GST

Follow the procedure "With CONSULT-II".

BT

HA

SC

EL

IDX

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NEEC1157S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1387.

With GST

Follow the procedure "With CONSULT-II".

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NEEC1157S03

CAUTION:

Always drive vehicle at a safe speed.

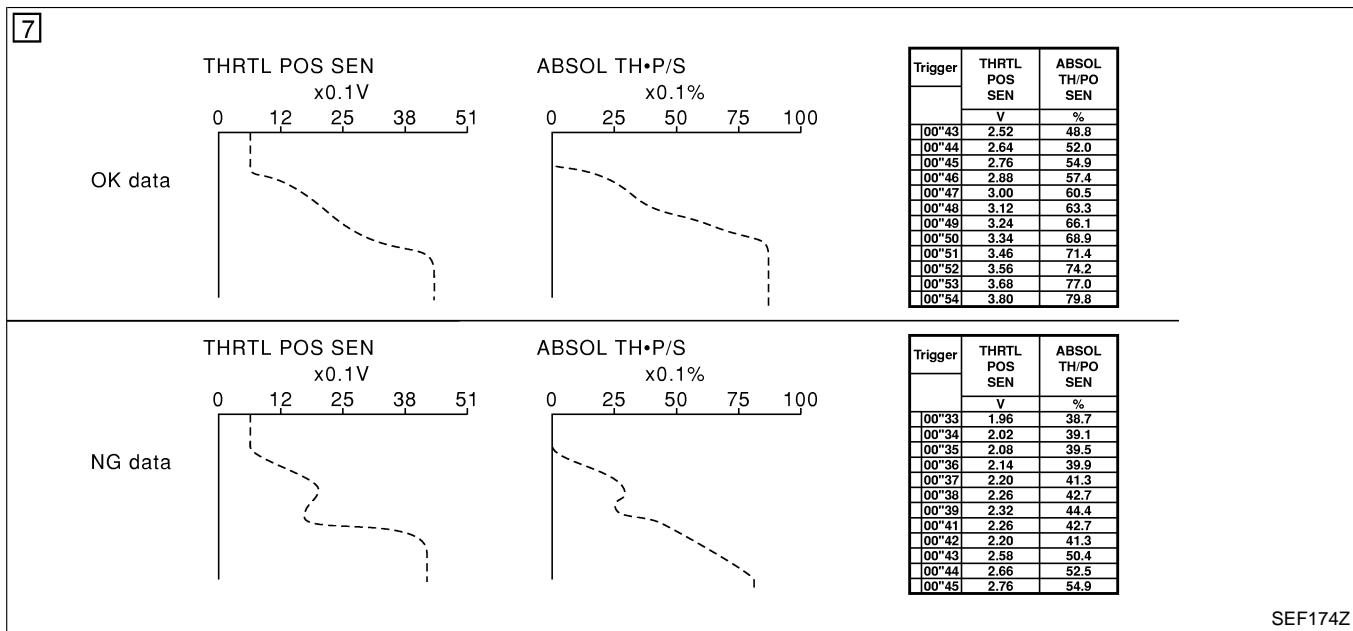
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
- 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
- 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
- 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
 If NG, go to "Diagnostic Procedure", EC-1387.
 If OK, go to following step.

DTC P0120 THROTTLE POSITION SENSOR

VG33ER

DTC Confirmation Procedure (Cont'd)



9

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
IACV-AAC/V	XXX %

SEF805Z

- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.

CMPS-RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1387.

With GST
Follow the procedure "With CONSULT-II".

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DTC P0120 THROTTLE POSITION SENSOR

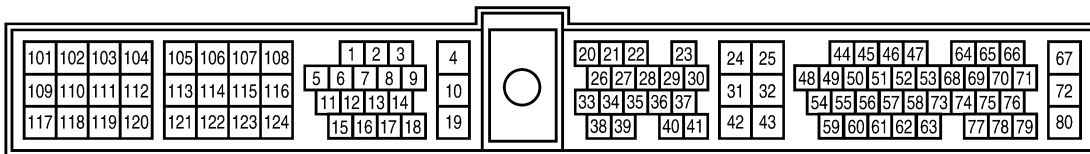
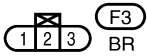
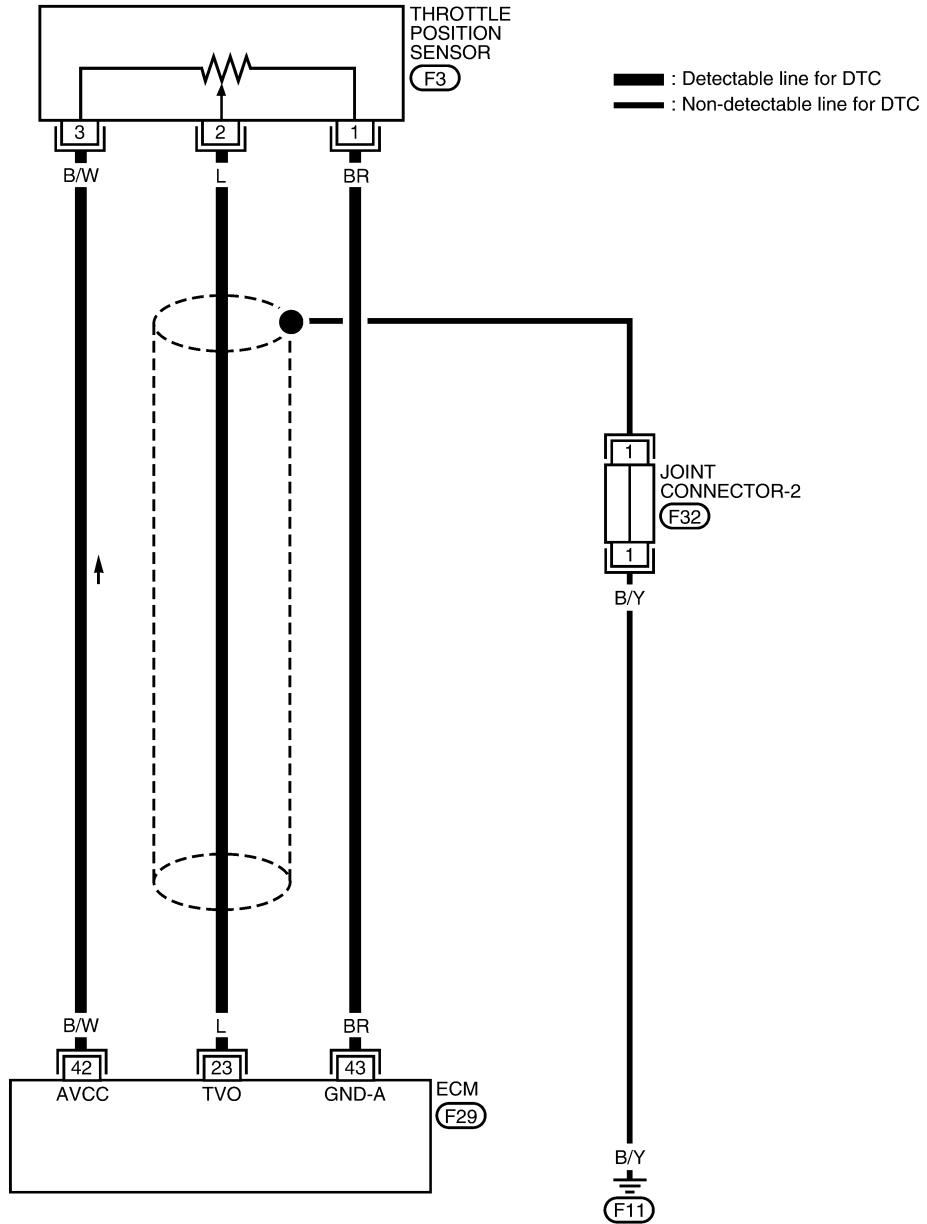
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1158

EC-TPS-01



LEC664

Diagnostic Procedure

NEEC1159

1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

GI
MA
EM
LC
EC

2	ADJUST THROTTLE POSITION SENSOR											
Check the following items. Refer to "Basic Inspection", EC-1314.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
	▶	GO TO 3.										

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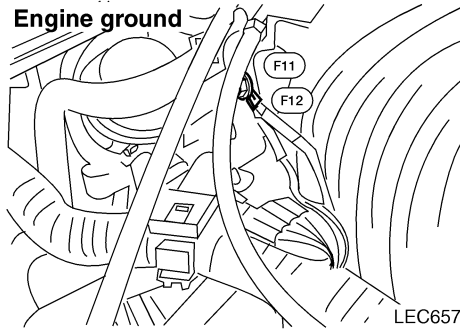
3	CHECK INTAKE SYSTEM.	
1. Turn ignition switch OFF. 2. Check the following for connection. <ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

PD
AX
SU
BR

ST
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BT
HA
SC
EL
IDX

4 RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

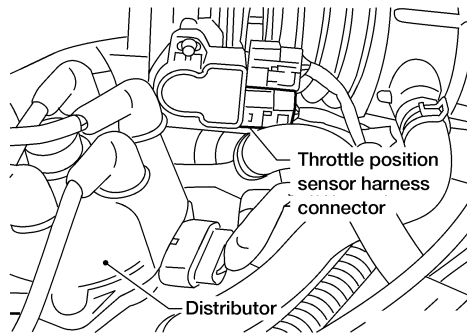


LEC657

▶ GO TO 5.

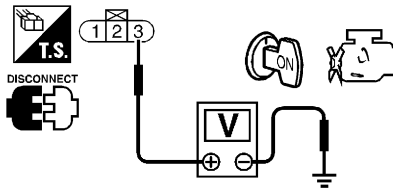
5 CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



AEC638A

2. Turn ignition switch ON.
3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester.



SEF630W

Voltage: Approximately 5V

OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

DTC P0120 THROTTLE POSITION SENSOR


VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and throttle position sensor.		
▶ Repair open circuit or short to power in harness or connectors.		

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR											
<p> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Stop engine (ignition switch OFF).</p> <p>3. Turn ignition switch ON.</p> <p>4. Select "DATA MONITOR" mode with CONSULT-II.</p> <p>5. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle.</p>												
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
DATA MONITOR												
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ENG SPEED	XXX rpm											
COOLAN TEMP/S	XXX °C											
THRTL POS SEN	XXX V											
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Partially open	Between (a) and (b)											
Completely open (b)	3.5 - 4.7V											
SEF062Y												
OK or NG												
OK	▶	GO TO 12.										
NG	▶	GO TO 11.										

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DTC P0120 THROTTLE POSITION SENSOR

VG33ER

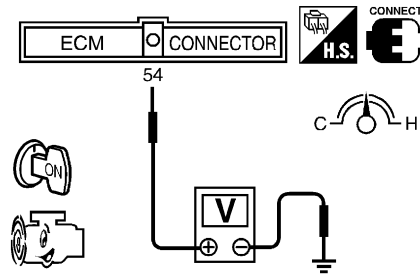
Diagnostic Procedure (Cont'd)

10	CHECK THROTTLE POSITION SENSOR									
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p style="text-align: center;">Voltage measurement must be made with throttle position sensor installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0231</p> <p style="text-align: center;">OK or NG</p>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
OK	▶	GO TO 12.								
NG	▶	GO TO 11.								

11	ADJUST CLOSED THROTTLE POSITION SWITCH											
<p>Adjust closed throttle position switch. Refer to "Basic Inspection", EC-1314.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
OK	▶	GO TO 12.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-1314.										

12 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

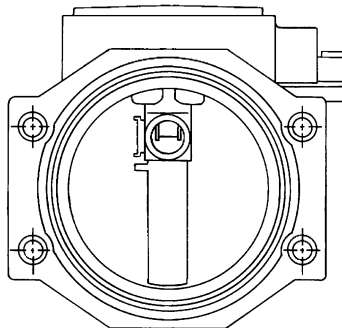


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF030T

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

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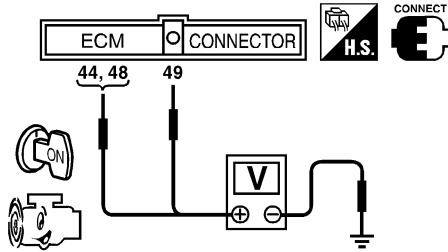
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13 CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

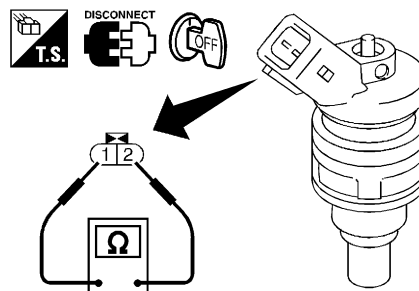
AEC072B

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 14. |
| NG | ▶ | Replace distributor assembly with camshaft position sensor. |

14 CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 10 - 14Ω [at 25°C (77°F)]

SEF625V

OK or NG

- | | | |
|----|---|------------------------|
| OK | ▶ | GO TO 15. |
| NG | ▶ | Replace fuel injector. |

DTC P0120 THROTTLE POSITION SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-2 terminal 1 and ground ● Joint connector-2 (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶	INSPECTION END

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DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

VG33ER

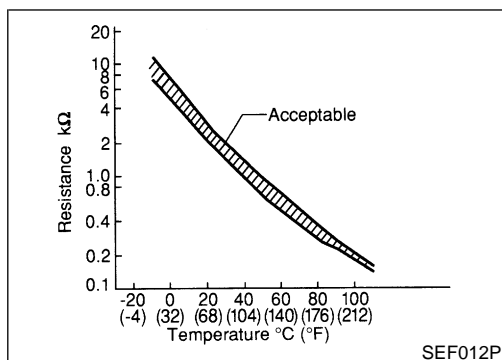
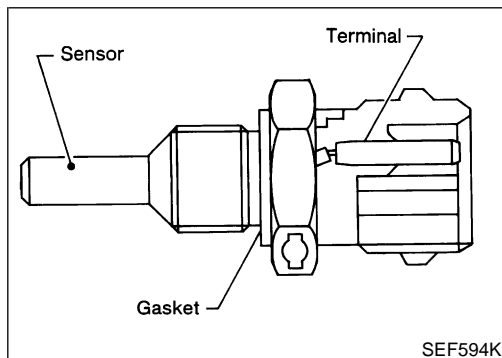
Description

Description

NEEC1160

NOTE:

If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC-1376.



COMPONENT DESCRIPTION

NEEC1160S01

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NEEC1161

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

POSSIBLE CAUSE

NEEC1161S01

- Harness or connectors (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

VG33ER

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NEEC1162

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.
- 4) Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1397.

④ With GST

Follow the procedure "With CONSULT-II".

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DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

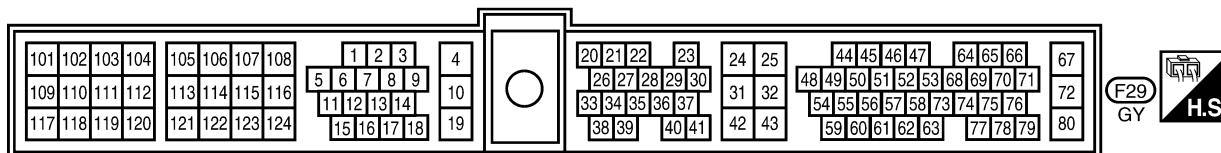
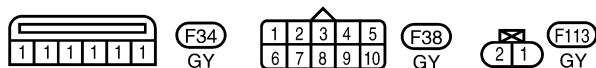
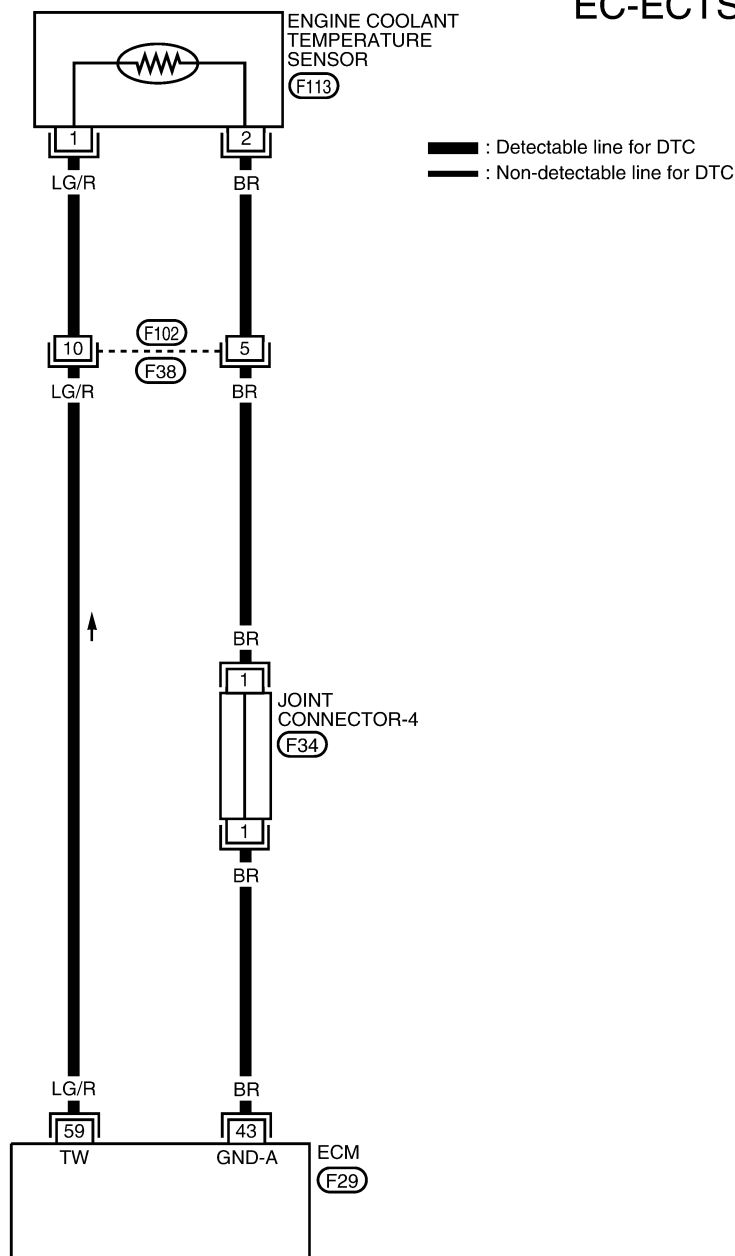
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1163

EC-ECTS-01



LEC663

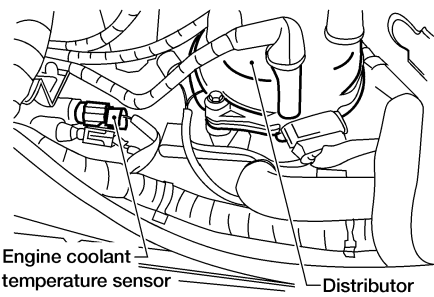
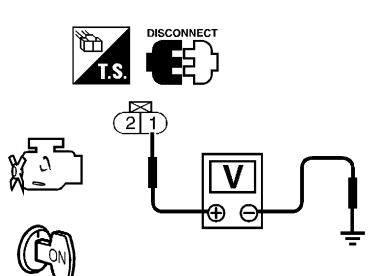
DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1164

1	CHECK ECTS POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p>Engine coolant temperature sensor harness connector Distributor</p> </div> <p style="text-align: right;">AEC643A</p> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: center;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF206W</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

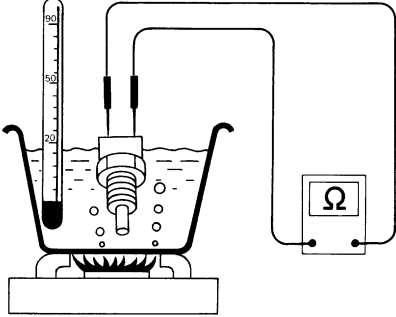
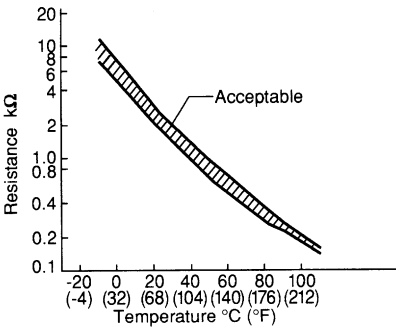
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DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 ● Harness for open or short between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance as shown in the figure.									
									
SEF152P									
<Reference data>									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
MTBL0229									
									
SEF012P									
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

6	CHECK THERMOSTAT OPERATION
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair or replace thermostat. Refer to LC-30 , "Thermostat".

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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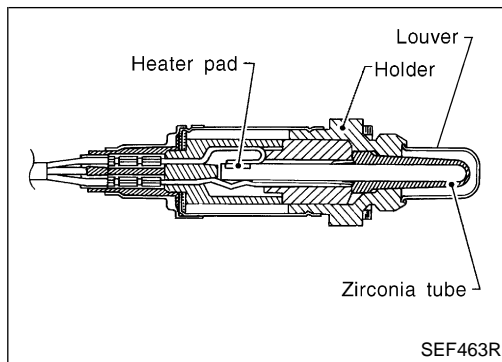
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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

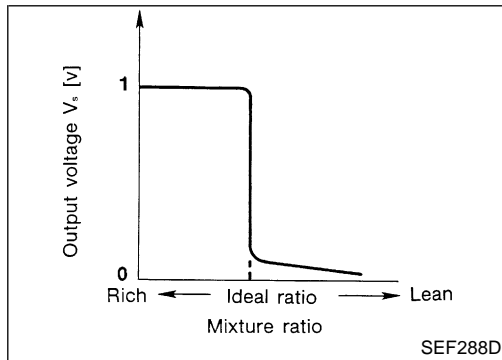
VG33ER

Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. ^{NEEC1165} It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1166

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NEEC1167

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

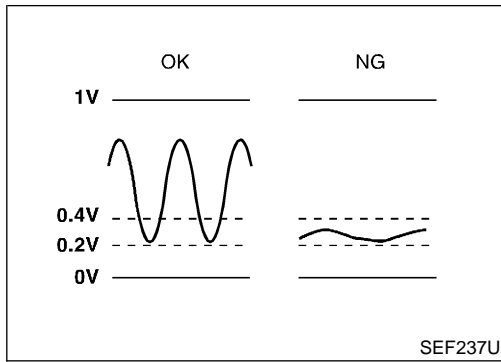
TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (bank 2)		

SEF002V

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 (front)^{NEEC1168} signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long. Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

POSSIBLE CAUSE

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

NEEC1168S01

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

On Board Diagnosis Logic (Cont'd)

5	HO2S1 (B1) P0130	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	COMPLETED	

SEF645Y

DTC Confirmation Procedure

=NEEC1169

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1)/(B2) P0130/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START".
- 4) Let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 4.

- 5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 2,700 rpm
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

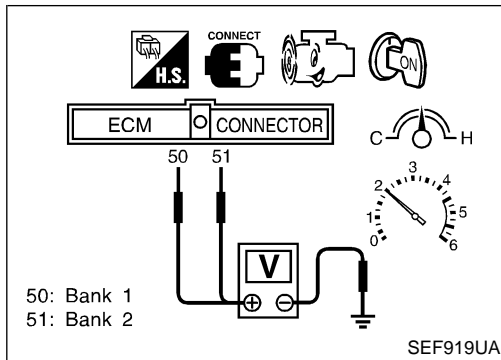
- 6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1406.

During this test, P1148 and P1168 may be stored in ECM.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC1170

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-1406.

GI

MA

EM

LC

EC

FE

CL

MT

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AX

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Wiring Diagram

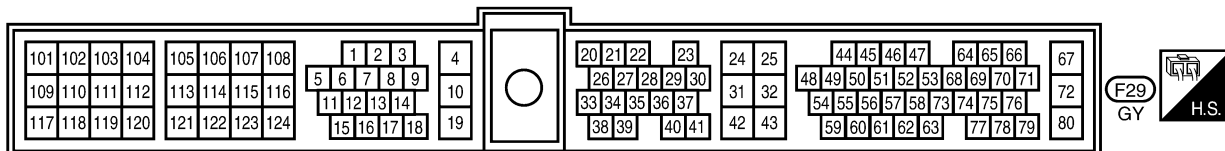
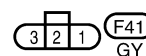
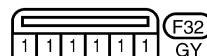
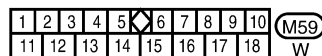
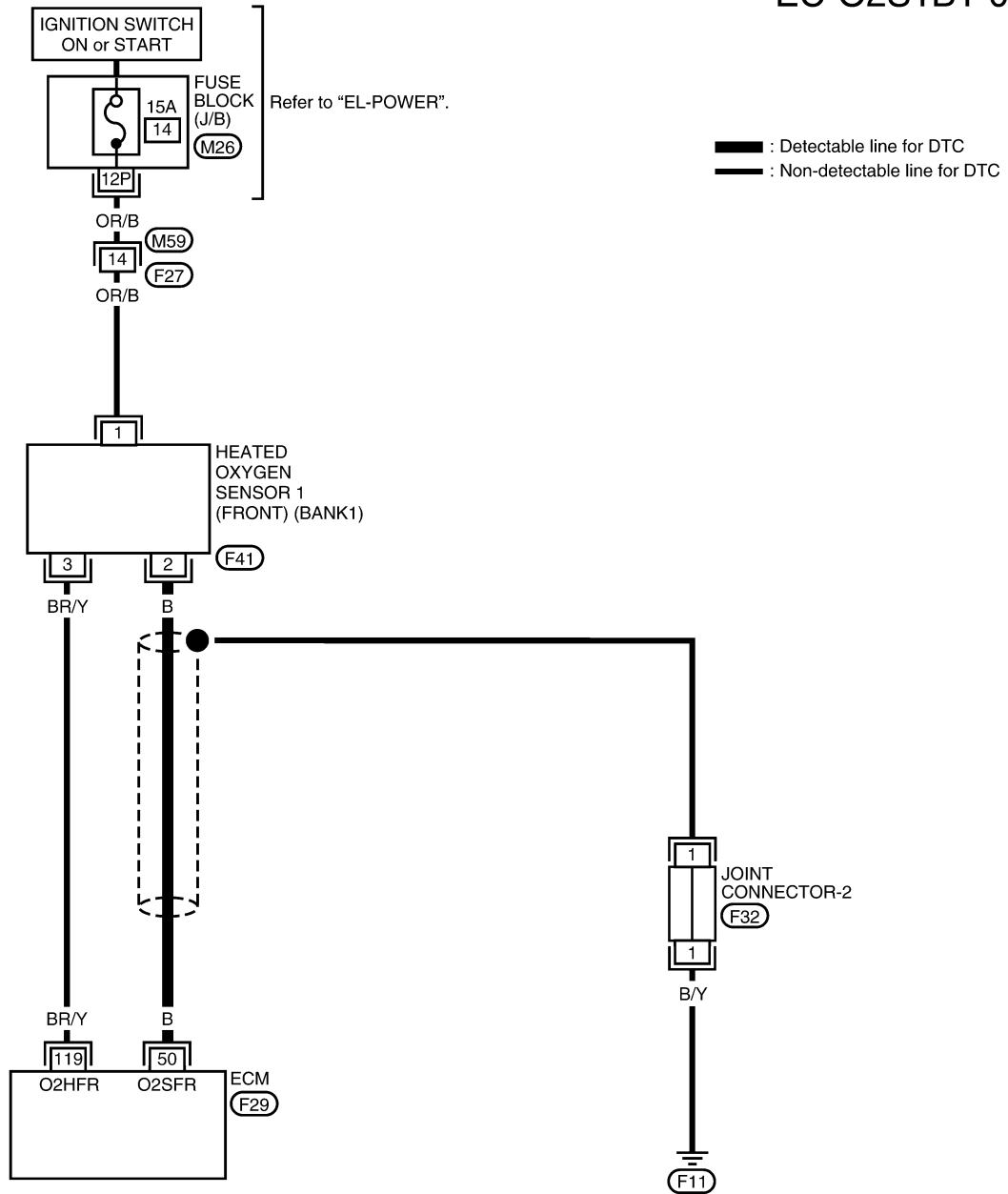
Wiring Diagram

NEEC1171

NEEC1171S01

RIGHT BANK

EC-O2S1B1-01



WEC788

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

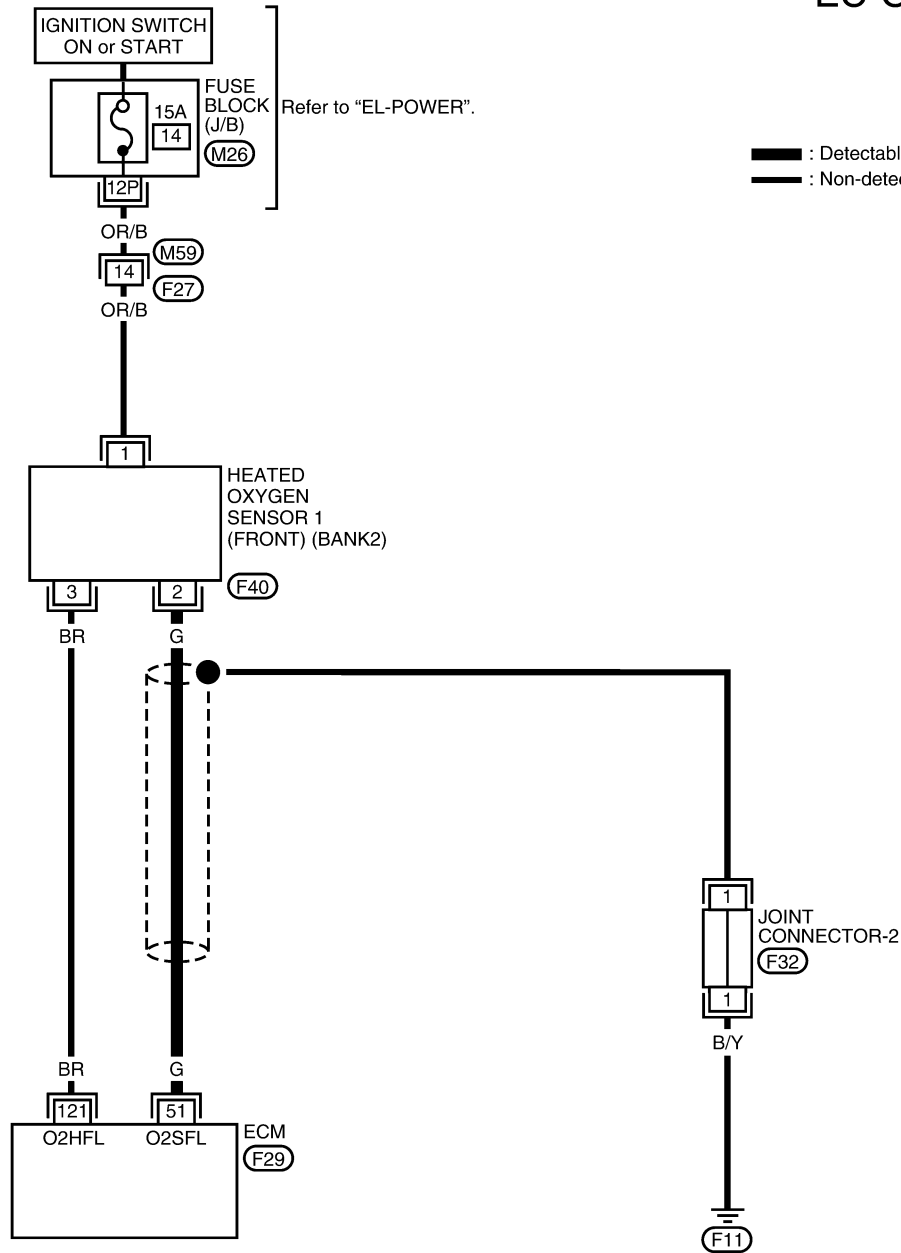
VG33ER

Wiring Diagram (Cont'd)

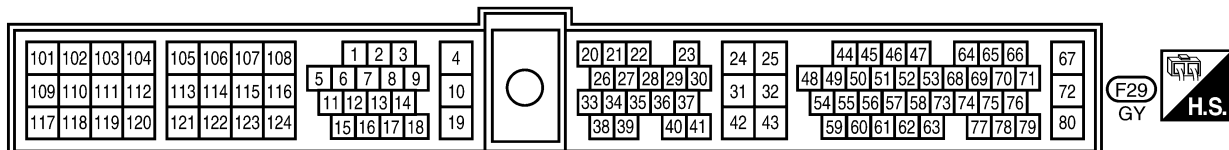
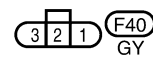
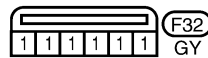
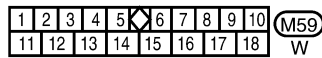
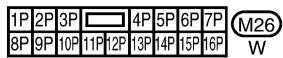
LEFT BANK

NEEC1171S02

EC-O2S1B2-01



- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST



WEC789

- RS
- BT
- HA
- SC
- EL
- IDX

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

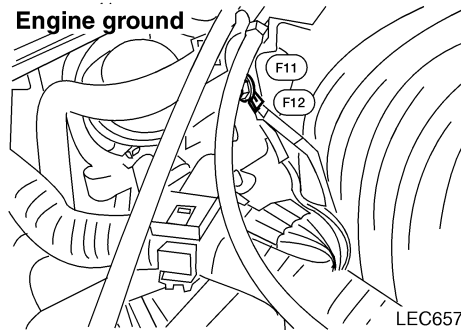
Diagnostic Procedure

Diagnostic Procedure

NEEC1172

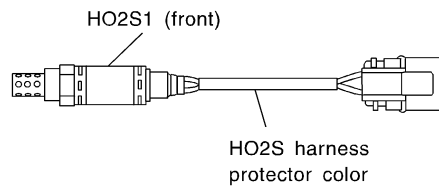
1 INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



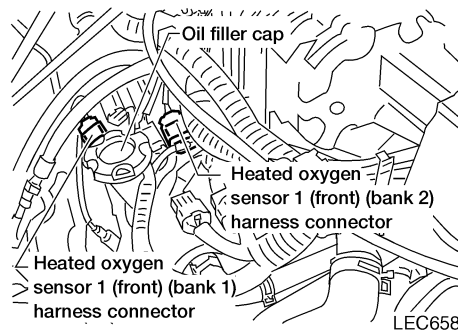
LEC657

3. Make sure HO2S 1 (front) harness protector color, and disconnect corresponding heated oxygen sensor 1 (front) harness connector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y



LEC658



GO TO 2.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

2 CHECK HO2S 1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0130	50	2	Bank 1 (Right)
P0150	51	2	Bank 2 (Left)

SEF803Z

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0130	50 or 2	Ground	Bank 1 (Right)
P0150	51 or 2	Ground	Bank 2 (Left)

SEF816Z

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 3.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI
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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

3 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

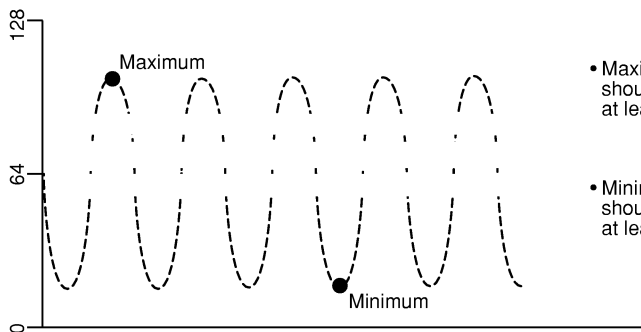
Bank 2
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

GI
 MA
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 AX
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 ST
 RS
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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

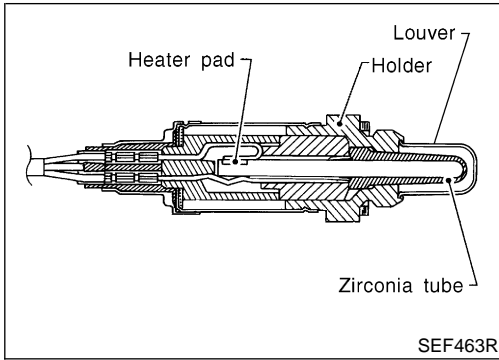
6	CHECK HO2S 1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect joint connector-2.	
OK or NG	
OK	▶▶ GO TO 7.
NG	▶▶ Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶▶ INSPECTION END

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

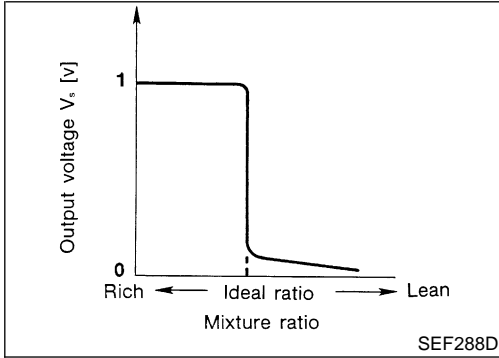
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC1173



CONSULT-II Reference Value in Data Monitor Mode

NEEC1174

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC1175

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

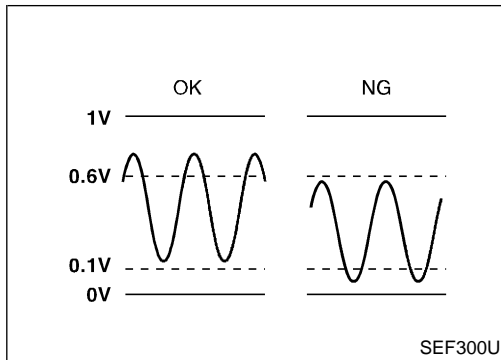
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor (bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor (bank 2)		

SEF002V

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC1176

To judge the malfunction, the output from the heated oxygen sensor (front) is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

POSSIBLE CAUSE

NEEC1176S01

- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

=NEEC1177

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.

GI

MA

EM

LC

EC

FE

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6

HO2S1 (B1) P0131	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEC300C

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch “ON” and select “HO2S1 (B1)/(B2) P0131/P0151” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

EGR SPEED	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1414.

6

HO2S1 (B1) P0131	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF335Z

6

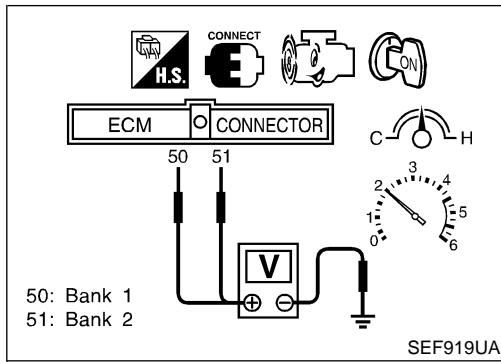
HO2S1 (B1) P0131	
COMPLETED	

SEF651Y

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Overall Function Check



Overall Function Check

NEEC1178

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1414.

Diagnostic Procedure

NEEC1179

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p> <p>LEC657</p> </div>	
▶ GO TO 2.	

LEC657

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front).</p> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶ GO TO 3.	

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA										
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <table border="1"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td>SELF-LEARNING CONT</td> <td>CLEAR</td> <td>B1 100 %</td> </tr> <tr> <td></td> <td></td> <td>B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? 			WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT											
SELF-LEARNING CONT	CLEAR	B1 100 %									
		B2 100 %									
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch OFF. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0100 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1506.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>			Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1506.	No	▶	GO TO 4.			
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1506.									
No	▶	GO TO 4.									

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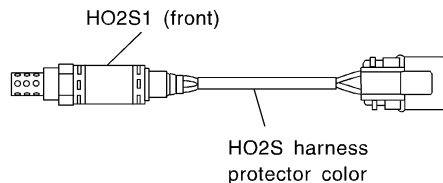
DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

4 CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

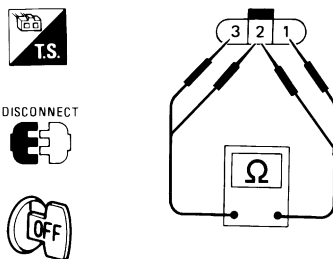
1. Stop engine.
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Check resistance between HO2S1 (front) terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

4. Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

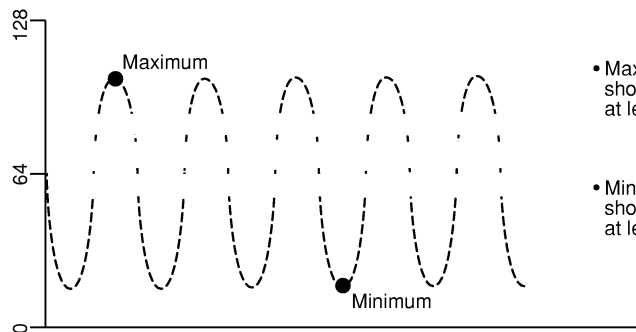
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

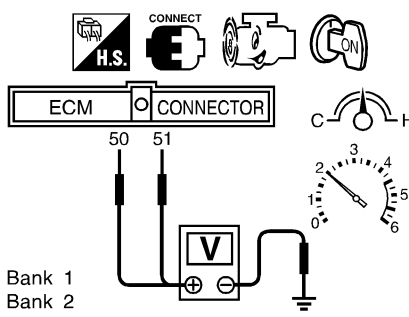
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

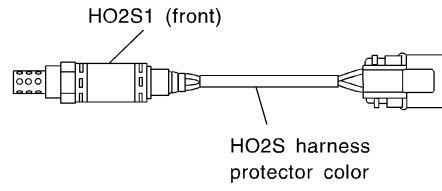
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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-1400.</p> <p>4. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>5. Also check harness for short to power.</p> <p>6. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

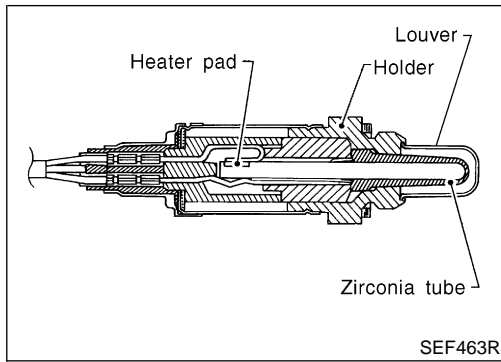
9	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p> <p>For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-1400.</p>		
	▶	INSPECTION END

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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

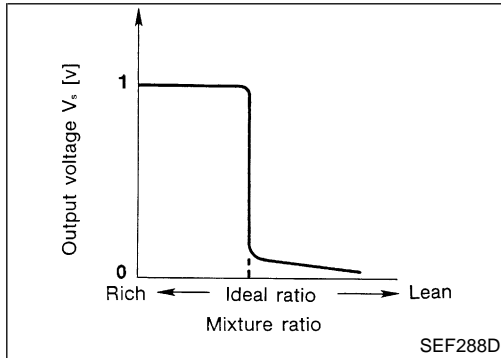
Component Description



Component Description

NEEC1180

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NEEC1181

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC1182

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

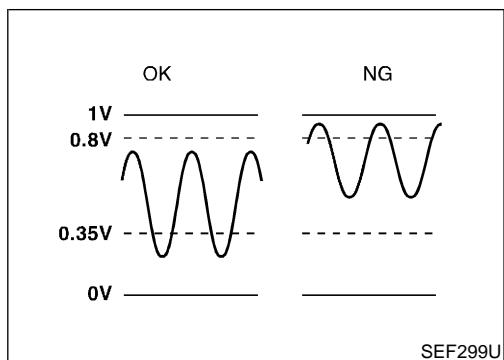
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		

SEF002V

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC1183

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

NEEC1183S01

- Heated oxygen sensor 1 (front)
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater (front)

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DTC Confirmation Procedure

=NEEC1184

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

6	HO2S1 (B1) P0132	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF336Z

6	HO2S1 (B1) P0132	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF337Z

6	HO2S1 (B1) P0132	
	COMPLETED	

SEF655Y

Ⓜ **With CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “HO2S1 (B1)/(B2) P0132/P0152” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

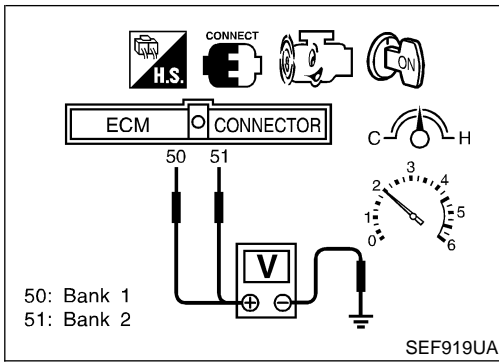
If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1423.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Overall Function Check



Overall Function Check

NEEC1185

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1423.

Diagnostic Procedure

NEEC1186

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
LEC657	
LEC657	
▶ GO TO 2.	

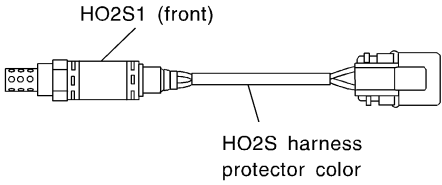
2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front). Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶ GO TO 3.	

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)




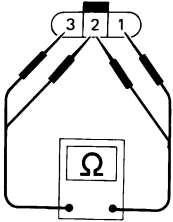
3	CLEAR THE SELF-LEARNING DATA								
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 2px;">Yes</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1515.</td> </tr> <tr> <td style="padding: 2px;">No</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 4.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1515.	No	▶	GO TO 4.		
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1515.							
No	▶	GO TO 4.							

4	CHECK HO2S 1 (FRONT) CONNECTOR FOR WATER						
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 (front) harness protector color. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">HO2S1 (front)</p> <p style="margin: 0;">HO2S harness protector color</p> </div> <p style="text-align: center; margin: 10px 0;"> HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue </p> <p style="text-align: right; margin-right: 20px;">SEF505Y</p> <ol style="list-style-type: none"> 3. Disconnect heated oxygen sensor 1 (front) harness connector. 4. Check connectors for water. <p style="color: blue; margin-left: 20px;">Water should not exist.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 5.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Repair or replace harness or connectors.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Repair or replace harness or connectors.
OK	▶	GO TO 5.					
NG	▶	Repair or replace harness or connectors.					

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">    </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 8.

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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

6 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

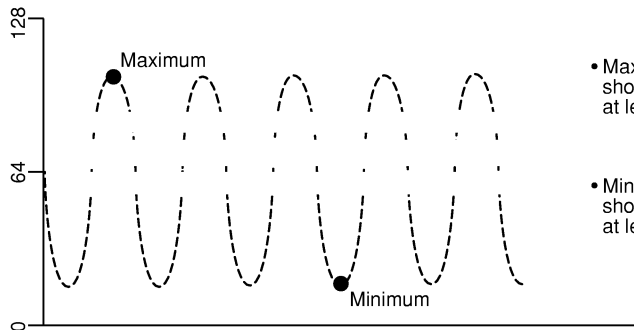
Bank 2
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

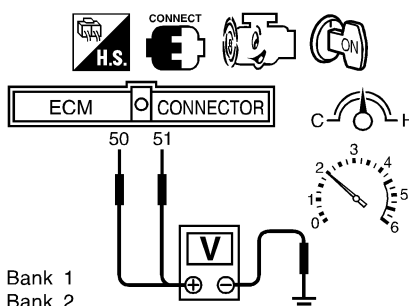
OK or NG

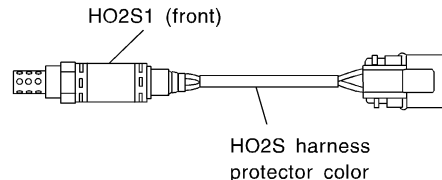
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

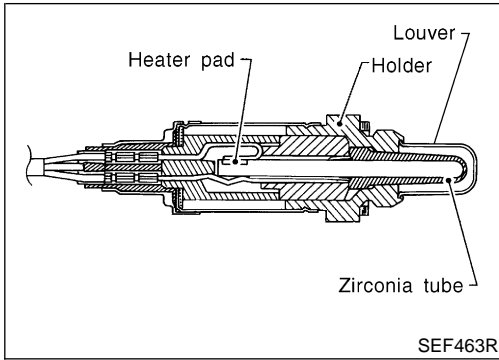
9	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector. For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-1400.</p> <p>3. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353. For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-1400.</p>	
	▶ INSPECTION END

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

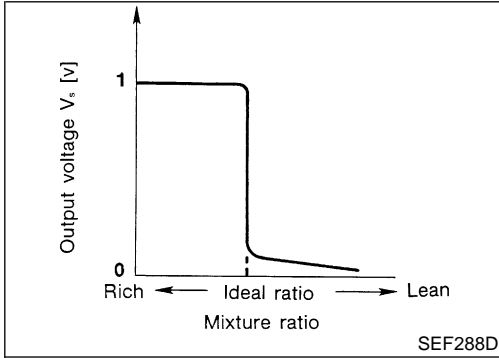
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC1187



CONSULT-II Reference Value in Data Monitor Mode

NEEC1188

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC1189

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

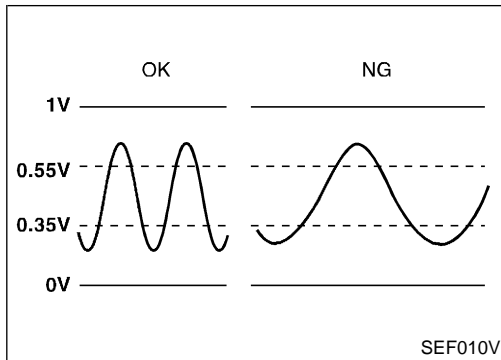
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		

SEF002V

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 (front) cycling time index) is inordinately long or not.

Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

DTC Confirmation Procedure (Cont'd)

6

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6

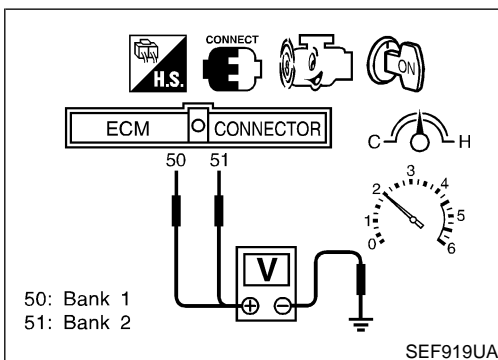
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133	
COMPLETED	

SEF658Y



With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,700 - 2,800 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1434.

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
 - 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
 - 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
- 4) If NG, go to "Diagnostic Procedure", EC-1434.

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Wiring Diagram

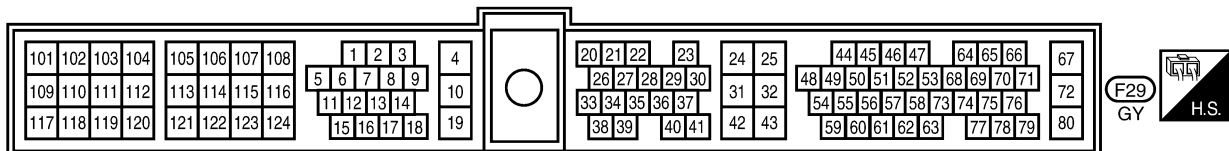
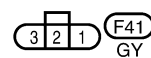
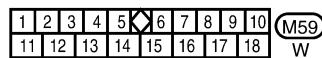
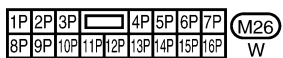
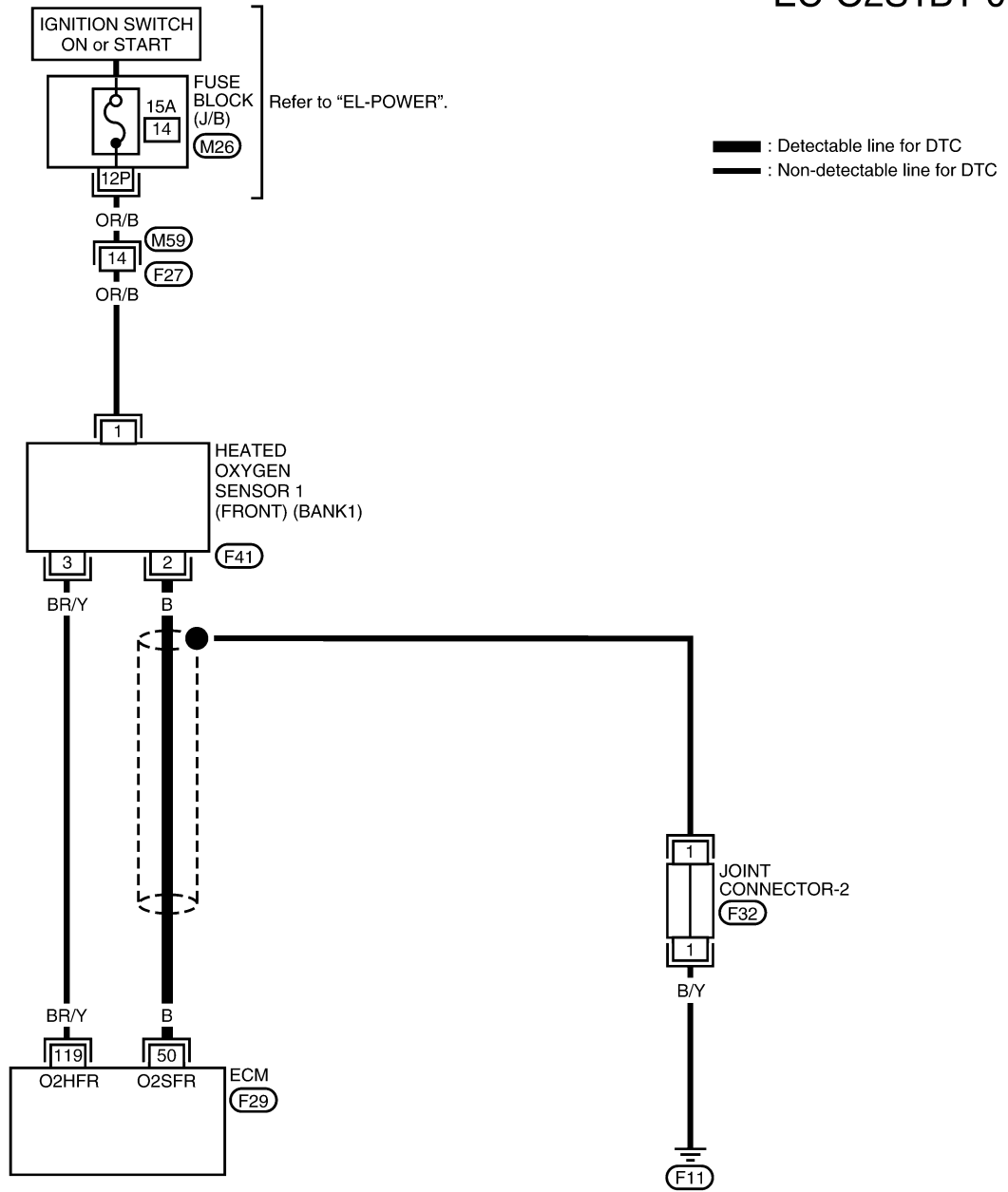
Wiring Diagram

NEEC1193

NEEC1193S01

RIGHT BANK

EC-O2S1B1-01



WEC788

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

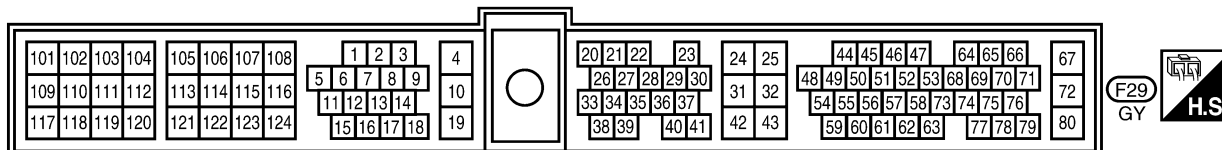
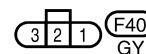
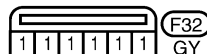
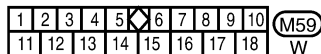
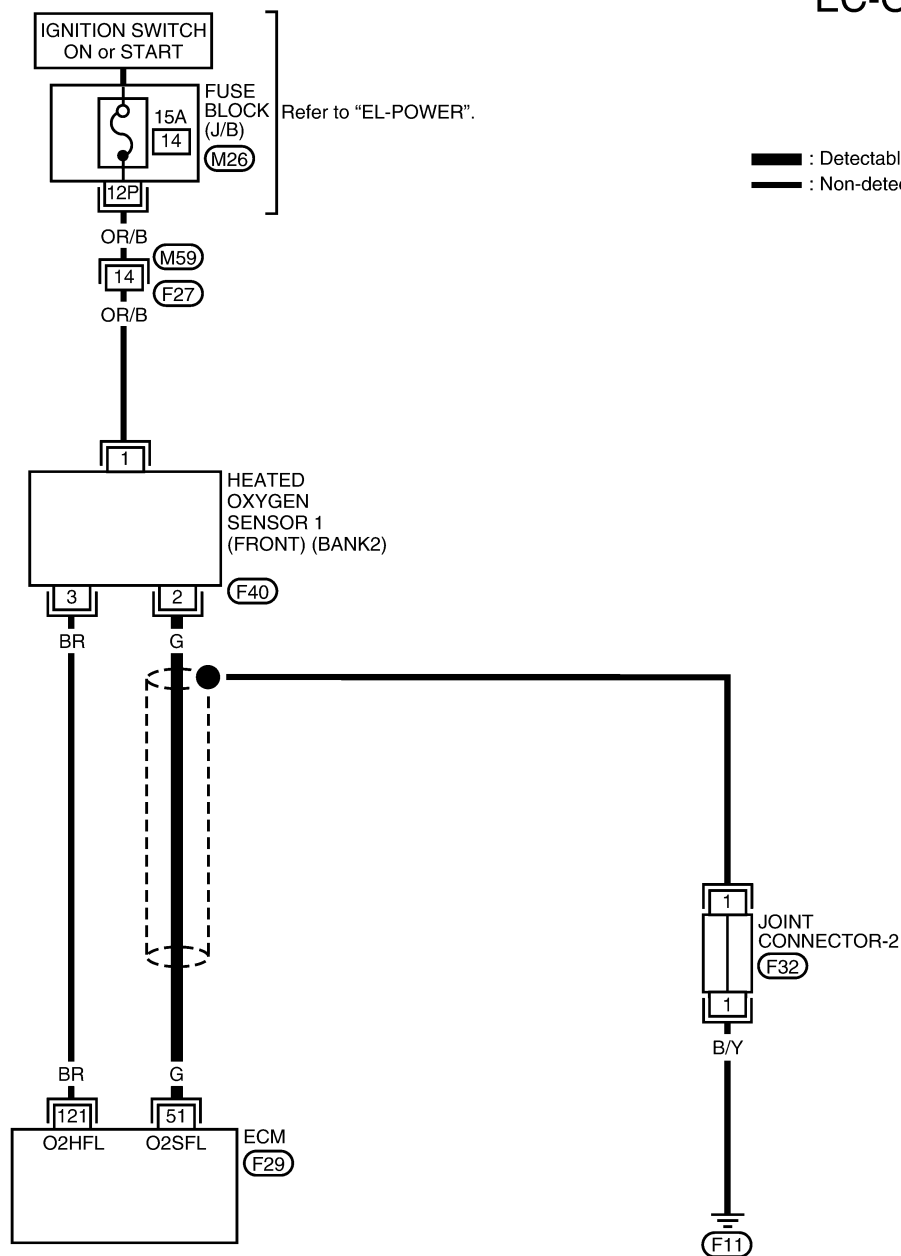
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1193S02

EC-O2S1B2-01

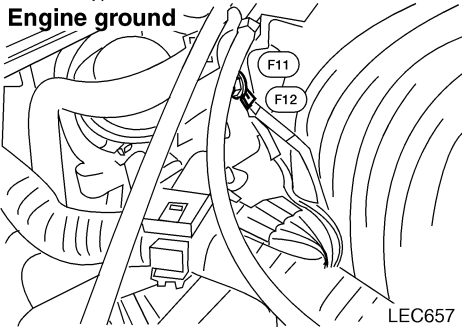


WEC789

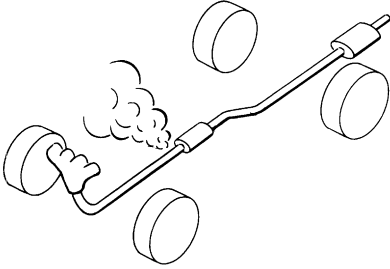
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Diagnostic Procedure

NEEC1194

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
LEC657	
▶ GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front). Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶ GO TO 3.	

3	CHECK FOR EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>	
	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK FOR INTAKE AIR LEAK
<p>Listen for an intake air leak after the mass air flow sensor.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 150px;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? 		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? <p style="text-align: center; margin-top: 10px;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 25%; padding: 2px;">Yes</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1506, 1515.</td> </tr> <tr> <td style="padding: 2px;">No</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 6.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1506, 1515.	No	▶	GO TO 6.		
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1506, 1515.							
No	▶	GO TO 6.							

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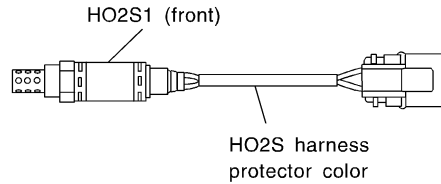
DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

6 CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

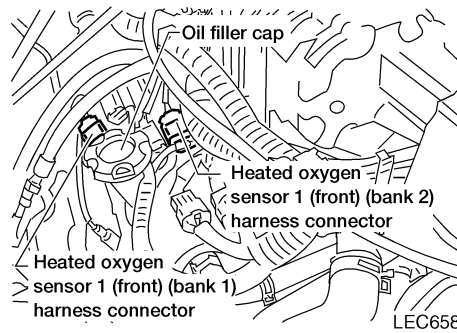
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 (front) harness protector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



LEC658

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1 (Right)
P0153	51	2	Bank 2 (Left)

MTBL0587

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Bank 1 (Right)
P0153	51 or 2	Ground	Bank 2 (Left)

MTBL0588

Continuity should not exist.

7. Also check harness for short to power.




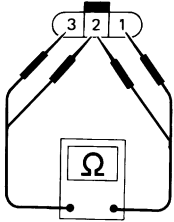
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">    </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 12.

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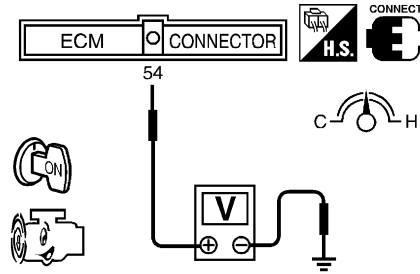
DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

8 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

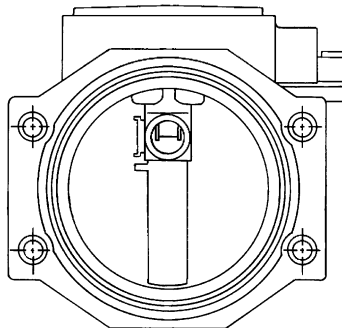


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



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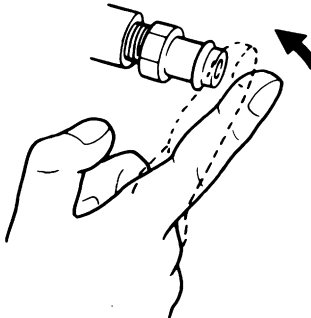
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK PCV VALVE	<p>With engine running at idle, remove PCV valve from rocker cover; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEC137A</p> <p style="text-align: center;">OK or NG</p>	
	OK (With CONSULT-II) ▶	GO TO 10.	
	OK (Without CONSULT-II) ▶	GO TO 11.	
	NG ▶	Replace PCV valve.	

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

10 CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

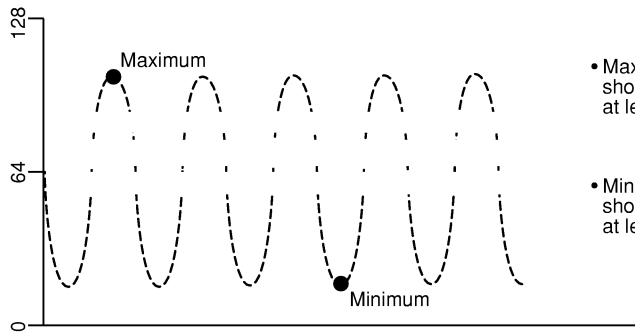
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

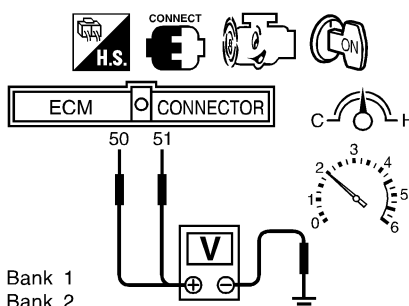
OK ► GO TO 12.

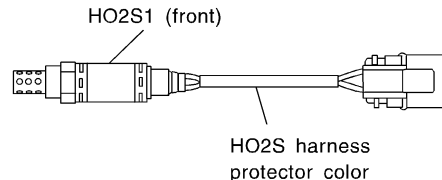
NG ► Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

11	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

12	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

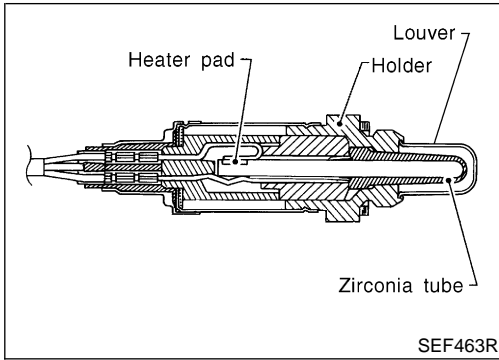
13	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect joint connector.	
OK or NG	
OK	▶ GO TO 14.
NG	▶ Repair open circuit or short to power in harness or connectors.

14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

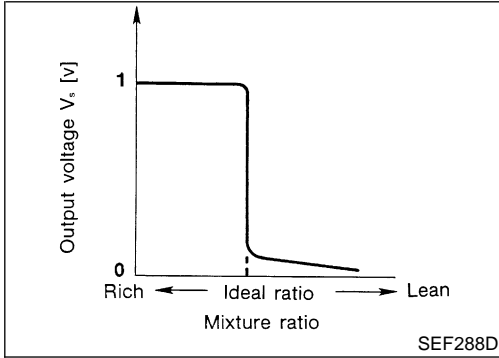
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NEEC1195



CONSULT-II Reference Value in Data Monitor Mode

NEEC1196

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NEEC1197

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

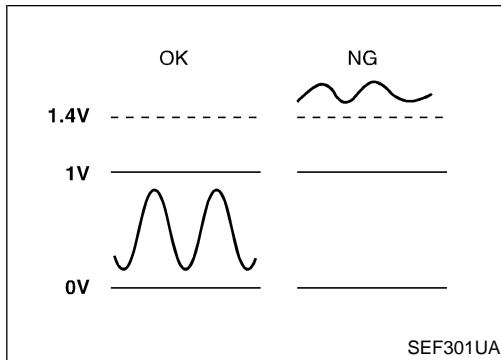
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) RH	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (front) LH		

SEF002V

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC1198

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NEEC1198S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NEEC1199

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 25 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1447.

With GST

Follow the procedure "With CONSULT-II".

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Wiring Diagram

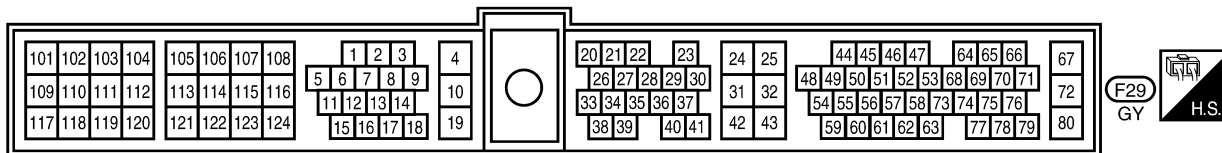
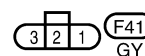
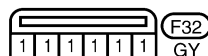
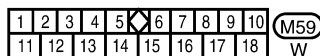
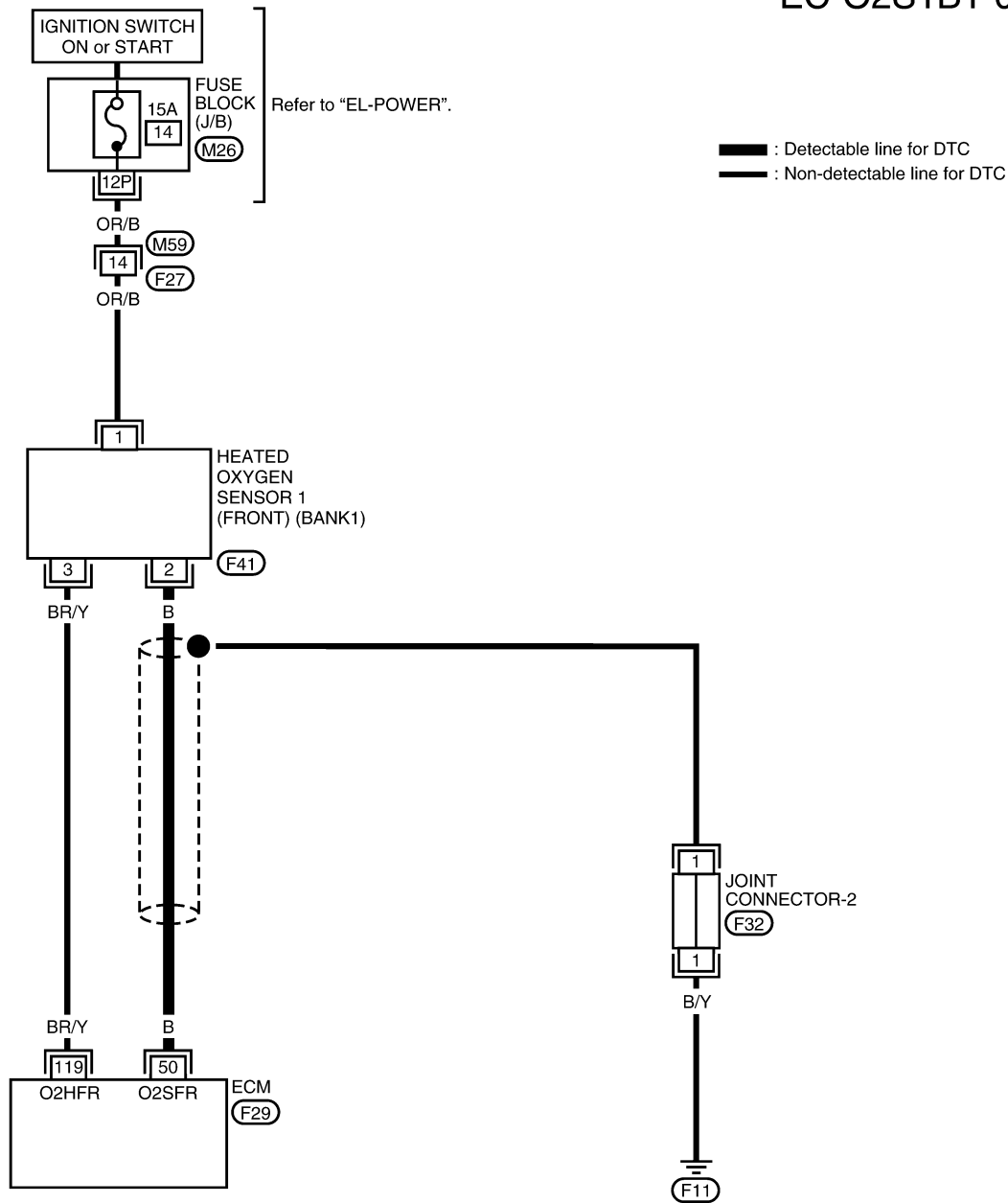
Wiring Diagram

RIGHT BANK

NEEC1200

NEEC1200S01

EC-O2S1B1-01



WEC788

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

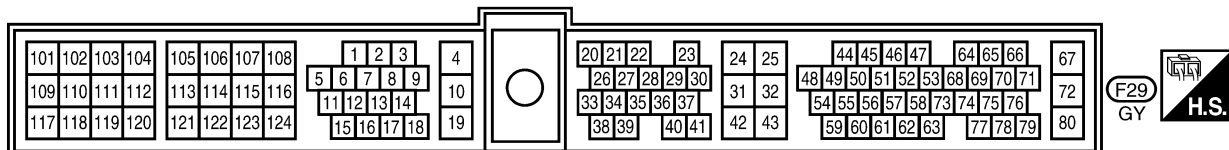
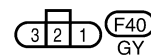
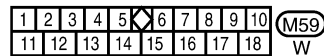
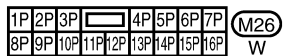
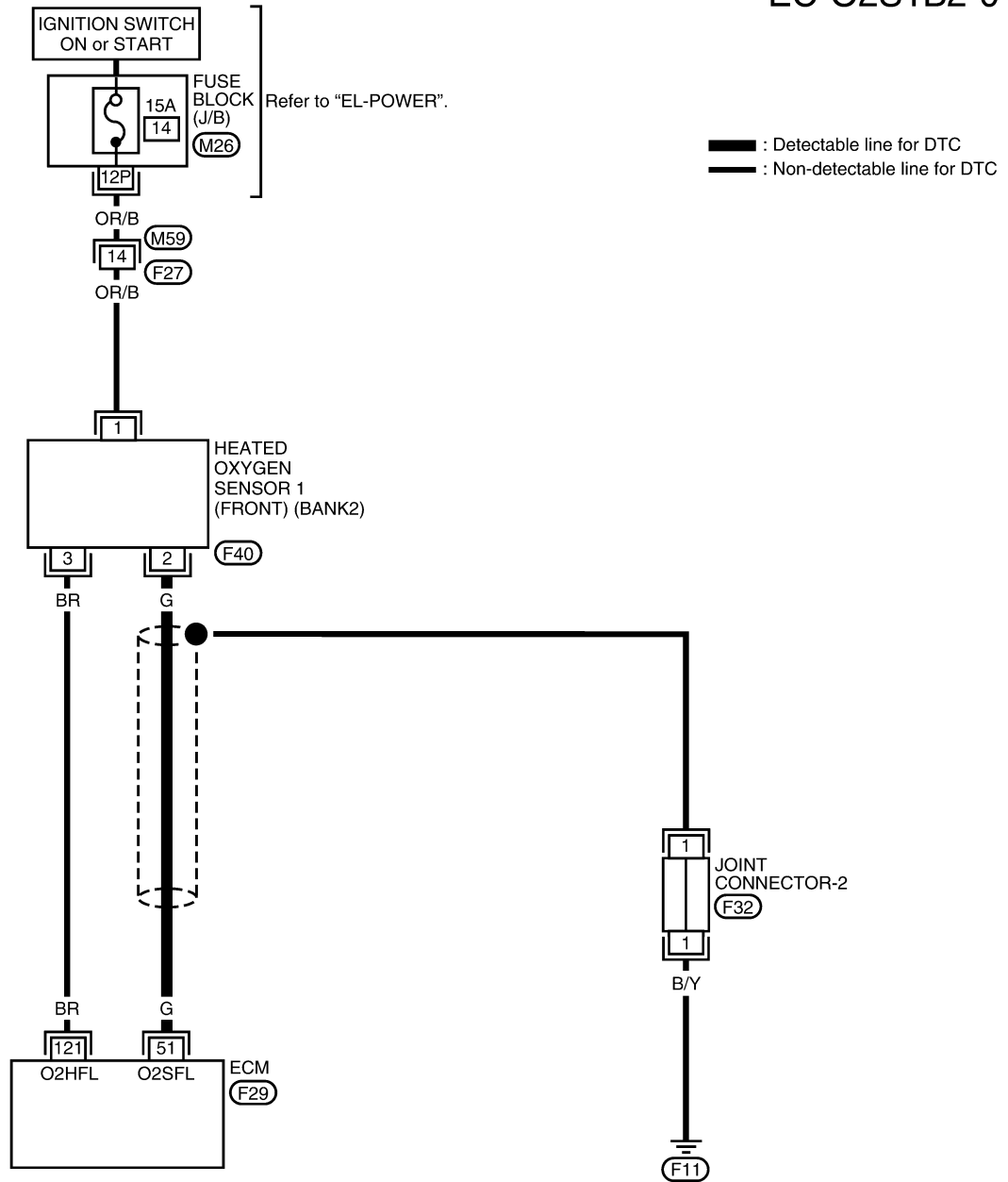
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1200S02

EC-O2S1B2-01



WEC789

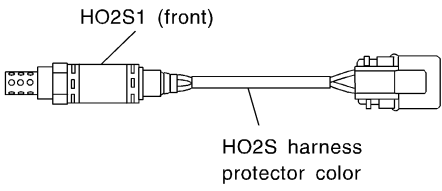
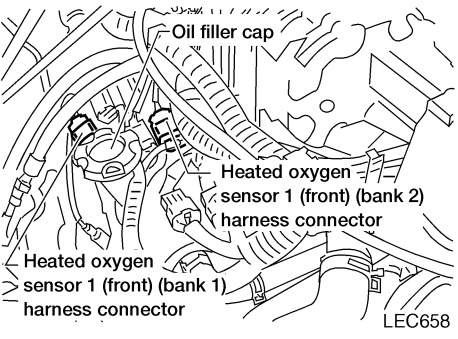
DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1201

1	INSPECTION START	<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 (front) harness protector.</p> <div style="text-align: center;"><p>HO2S1 (front)</p><p>HO2S harness protector color</p></div> <p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p> <p>3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <div style="text-align: center;"><p>Oil filler cap</p><p>Heated oxygen sensor 1 (front) (bank 2) harness connector</p><p>Heated oxygen sensor 1 (front) (bank 1) harness connector</p><p>LEC658</p></div>	GI MA EM LC EC FE CL MT AT TF PD
▶ GO TO 2.			

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	<p>1. Loosen and retighten corresponding heated oxygen sensor 1 (front). Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	AX SU BR ST RS BT HA SC EL IDX
▶ GO TO 3.			

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td>50</td> <td>2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td>51</td> <td>2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0134	50	2	Bank 1 (Right)	P0154	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0134	50	2	Bank 1 (Right)													
P0154	51	2	Bank 2 (Left)													
SEF819Z																
<p style="text-align: center; color: blue;">Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td>50 or 2</td> <td>Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td>51 or 2</td> <td>Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0134	50 or 2	Ground	Bank 1 (Right)	P0154	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0134	50 or 2	Ground	Bank 1 (Right)													
P0154	51 or 2	Ground	Bank 2 (Left)													
SEF820Z																
<p style="text-align: center; color: blue;">Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK FRONT HO2S1 (FRONT) CONNECTOR FOR WATER	
<p>1. Disconnect heated oxygen sensor 1 (front) harness connector. 2. Check connectors for water. Water should not exist.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

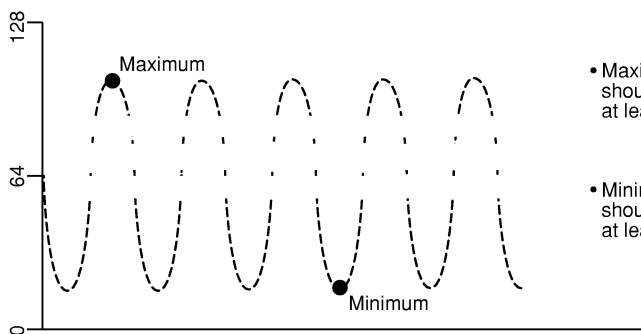
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

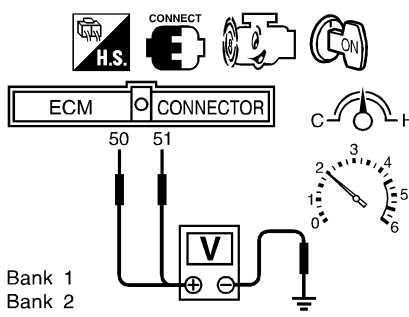
OK	▶	GO TO 8.
NG	▶	GO TO 7.

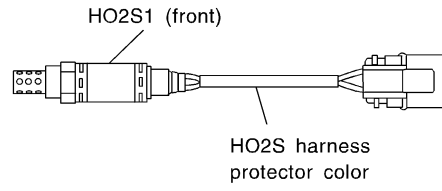
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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 		
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>		
SEF796Z		
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)	
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 		
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>		
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>		
SEF505Y		
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>		
▶		Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶		INSPECTION END

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER
Description

Description

SYSTEM DESCRIPTION

NEEC1202

NEEC1202S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heaters (front)

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters (front) corresponding to the engine speed.

OPERATION

NEEC1202S02

Engine speed rpm	Heated oxygen sensor 1 heaters (front)
Above 2,800	OFF
Below 2,800	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC1203

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 2,800 rpm	ON
HO2S1 HTR (B2)	● Engine speed: Above 2,800 rpm	OFF

ECM Terminals and Reference Value

NEEC1204

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119 (Bank 1)	BR/Y	Heated oxygen sensor 1 heater (front)	[Engine is running] ● Engine speed is below 2,800 rpm	Approximately 0.4V
121 (Bank 2)	BR		[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC1205

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]

POSSIBLE CAUSE

NEEC1205S01

- Harness or connectors [The heated oxygen sensor 1 heater (front) circuit is open or shorted.]
- Heated oxygen sensor 1 heater (front)

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER

DTC Confirmation Procedure

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC1206

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1455.

With GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 3) Start engine and run it for at 6 seconds at idle speed.
- 4) Select "MODE 3" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1455.

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER

Wiring Diagram

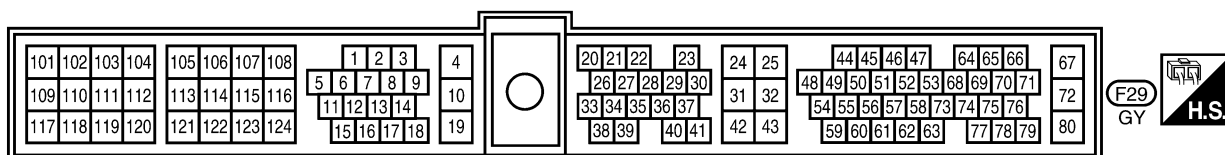
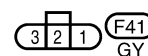
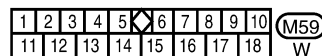
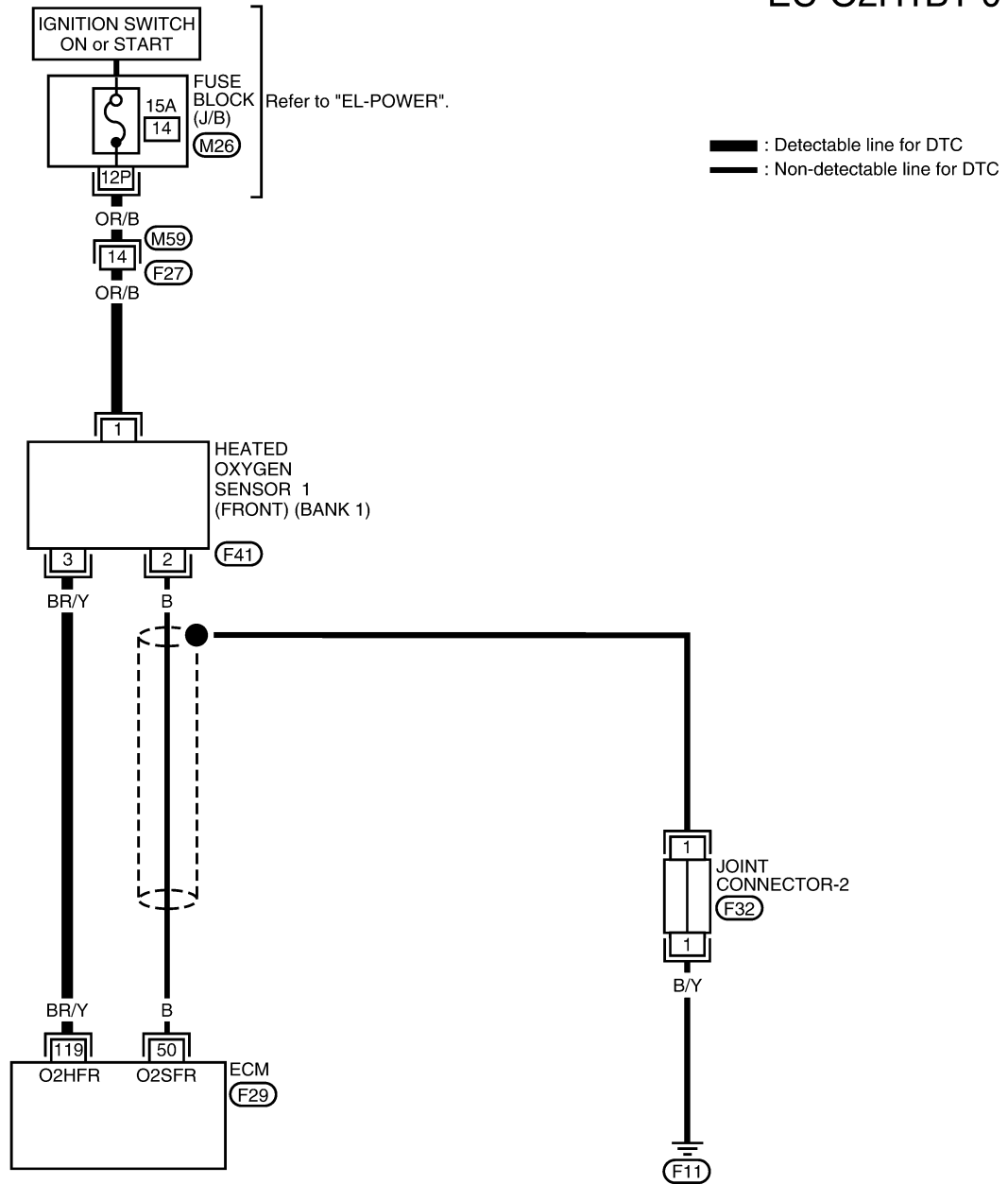
Wiring Diagram

NEEC1207

NEEC1207S01

RIGHT BANK

EC-O2H1B1-01



WEC790

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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

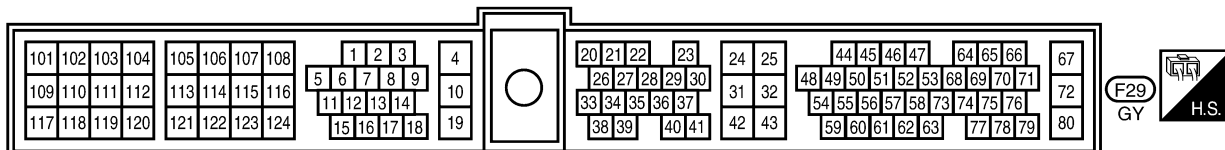
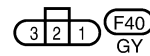
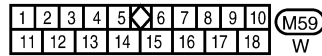
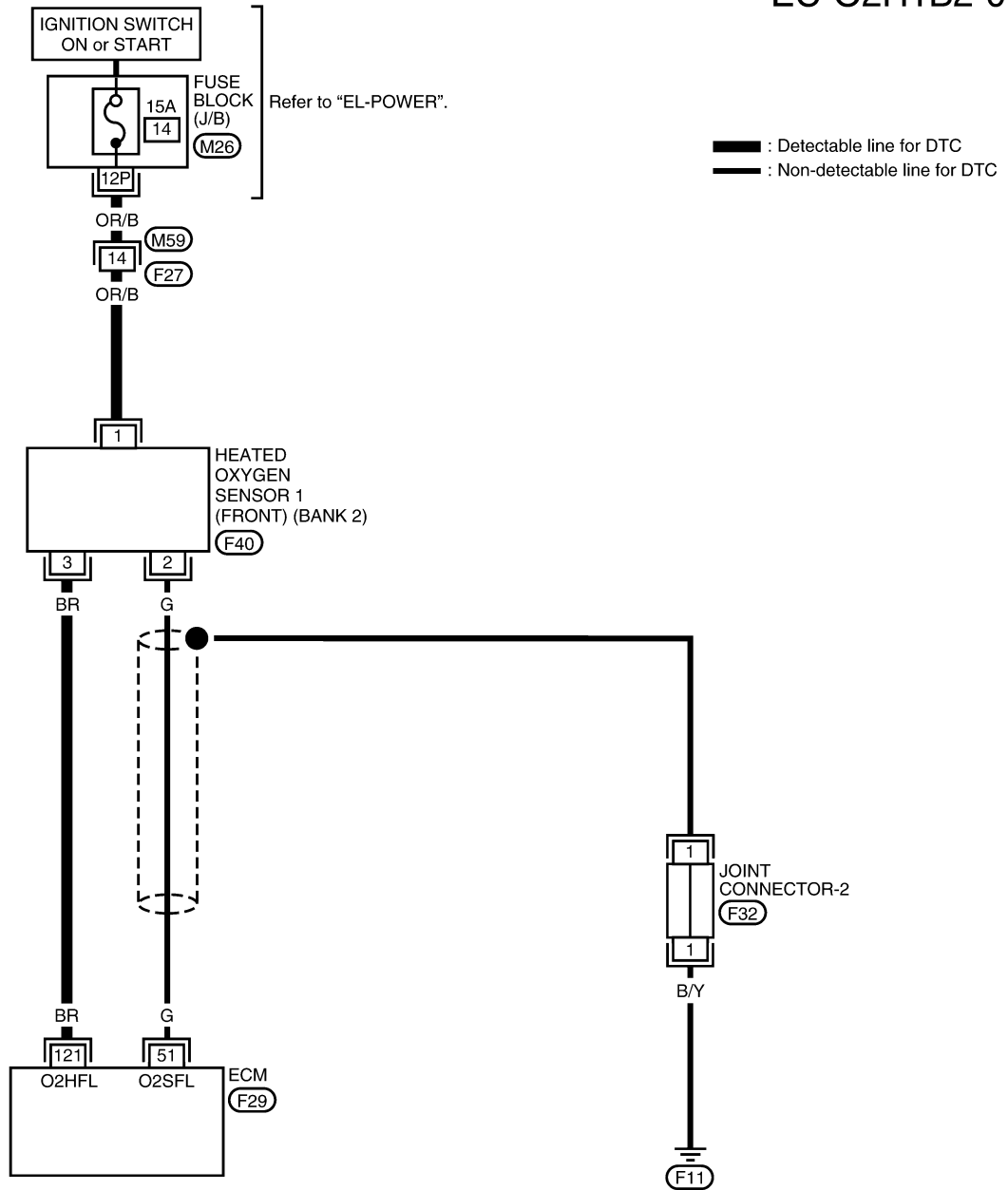
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1207S02

EC-O2H1B2-01



WEC791

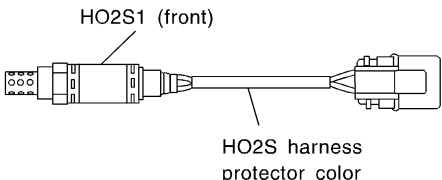
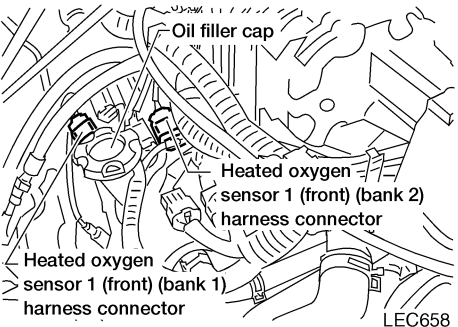
DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1208

1	CHECK HO2S1 (FRONT) POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Check heated oxygen sensor 1 (front) harness protector.</p> <div style="text-align: center;">  <p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <div style="text-align: center;">  </div> <p>4. Turn ignition switch ON.</p> <p>5. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>						
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	GO TO 2.		
OK	▶	GO TO 3.							
NG	▶	GO TO 2.							

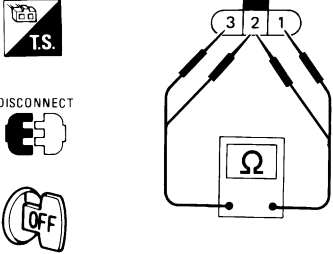
2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 1 (front) and fuse <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair harness or connectors.</td> </tr> </table>		▶	Repair harness or connectors.	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
	▶	Repair harness or connectors.				

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER

Diagnostic Procedure (Cont'd)

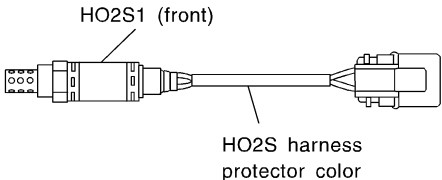

3	CHECK HO2S1 HEATER (FRONT) OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0135</td> <td>119</td> <td>3</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0155</td> <td>121</td> <td>3</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0135	119	3	Bank 1 (Right)	P0155	121	3	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0135	119	3	Bank 1 (Right)													
P0155	121	3	Bank 2 (Left)													
SEF821Z																
<p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														


4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals 3 and 1.</p>		
		
AEC158A		
<p style="color: blue;">Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2. Continuity should not exist.</p> <p style="color: red;">CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

VG33ER

Diagnostic Procedure (Cont'd)

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 (front) harness protector color.</p>	
 <p>The diagram shows a cross-section of the HO2S1 (front) sensor and its electrical harness. A label 'HO2S1 (front)' points to the sensor tip, and another label 'HO2S harness protector color' points to the protective sleeve on the harness.</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
<p>SEF505Y</p>	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
	Replace malfunctioning heated oxygen sensor 1 (front).

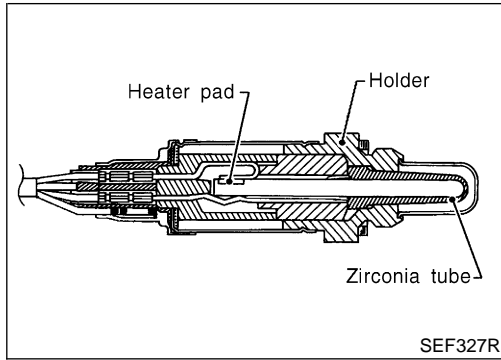
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	INSPECTION END

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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1210

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

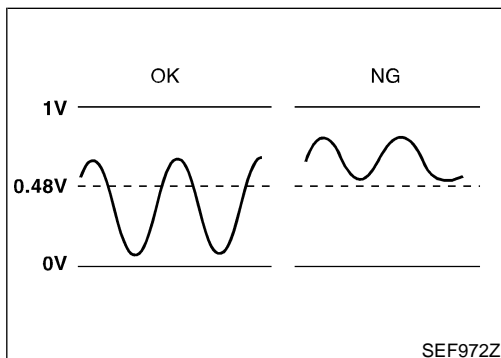
Specification data are reference values and are measured between each terminal and ground.

NEEC1211

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut. Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

NEEC1212

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC1212S01

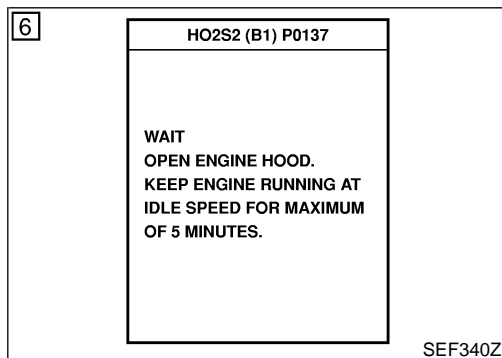
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors

GI

MA

EM

LC



DTC Confirmation Procedure

NEEC1213

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0137/P0157" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF_DIAG RESULTS".

EC

FE

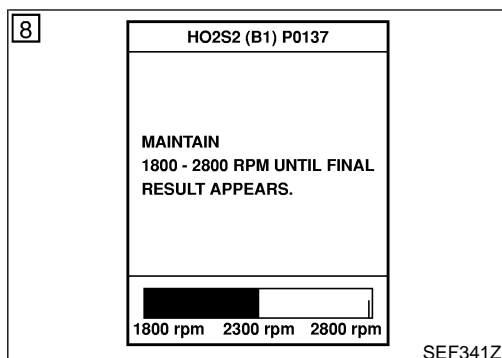
CL

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PD



If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1463.

If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

- a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
- b) Turn ignition switch ON.
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

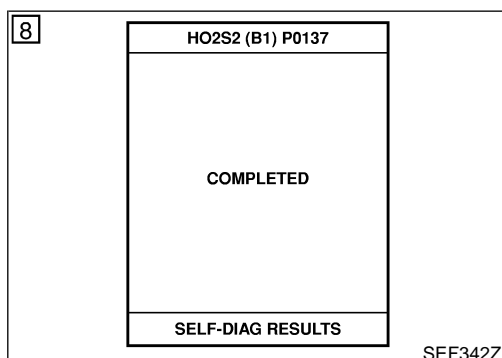
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RS



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HA

SC

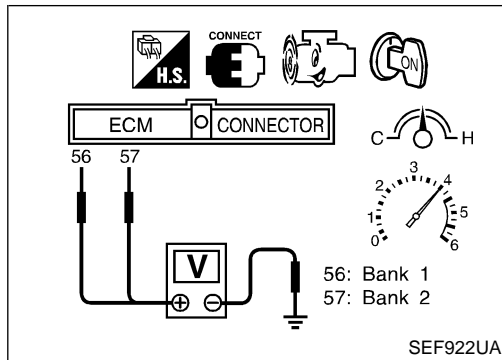
EL

IDX

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC1214

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 0.48V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be below 0.48V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1463.

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Wiring Diagram

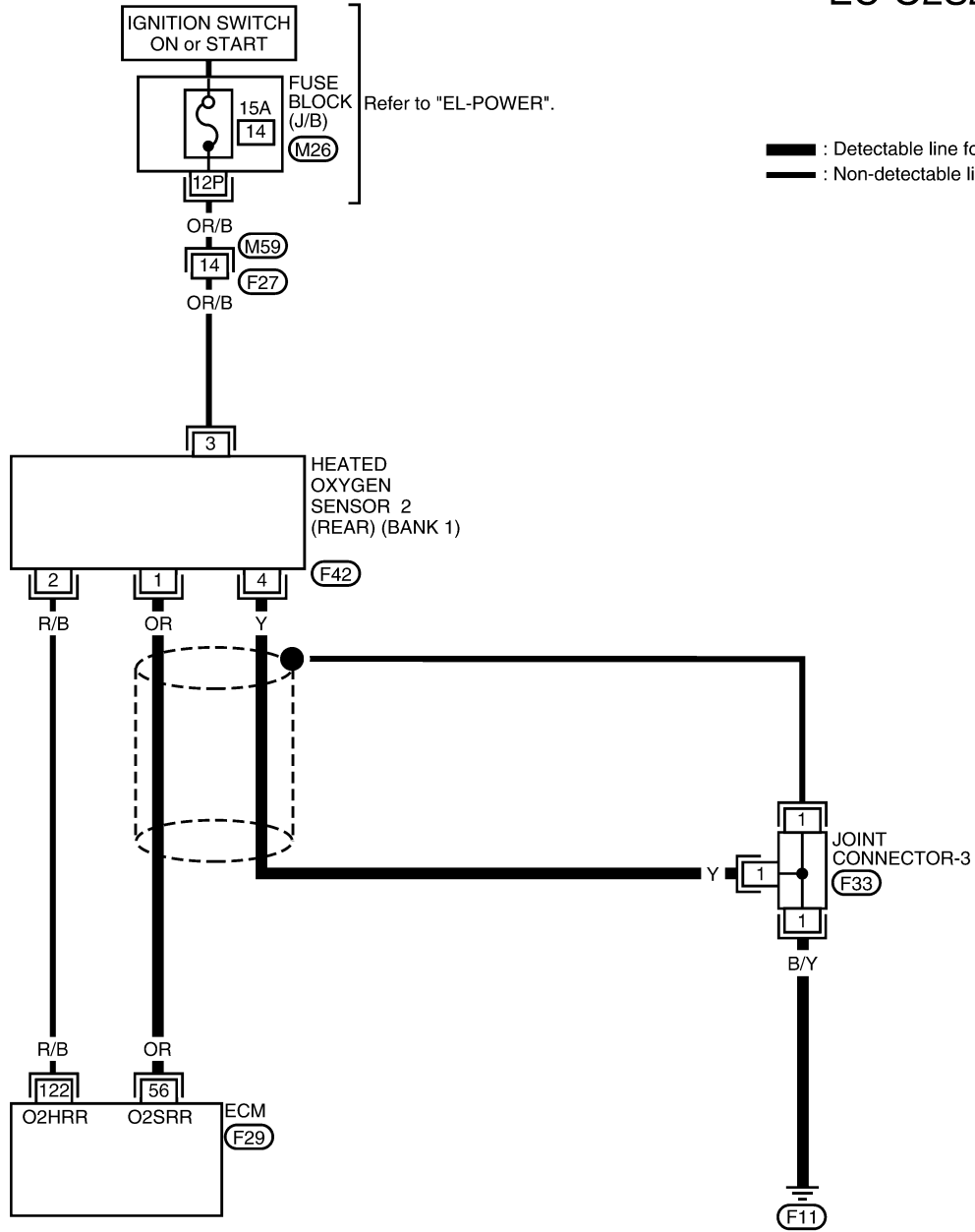
Wiring Diagram

NEEC1215

NEEC1215S01

RIGHT BANK

EC-O2S2B1-01



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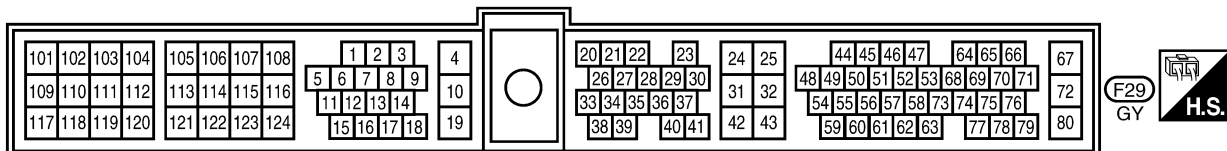
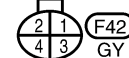
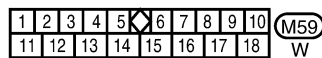
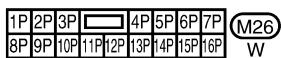
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WEC792

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

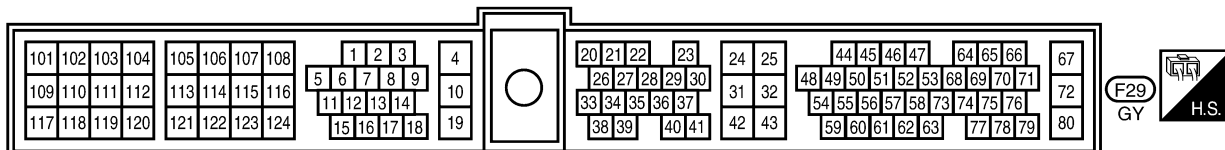
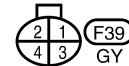
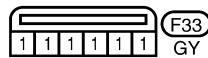
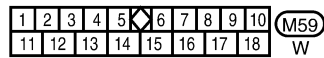
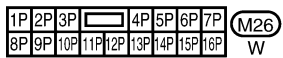
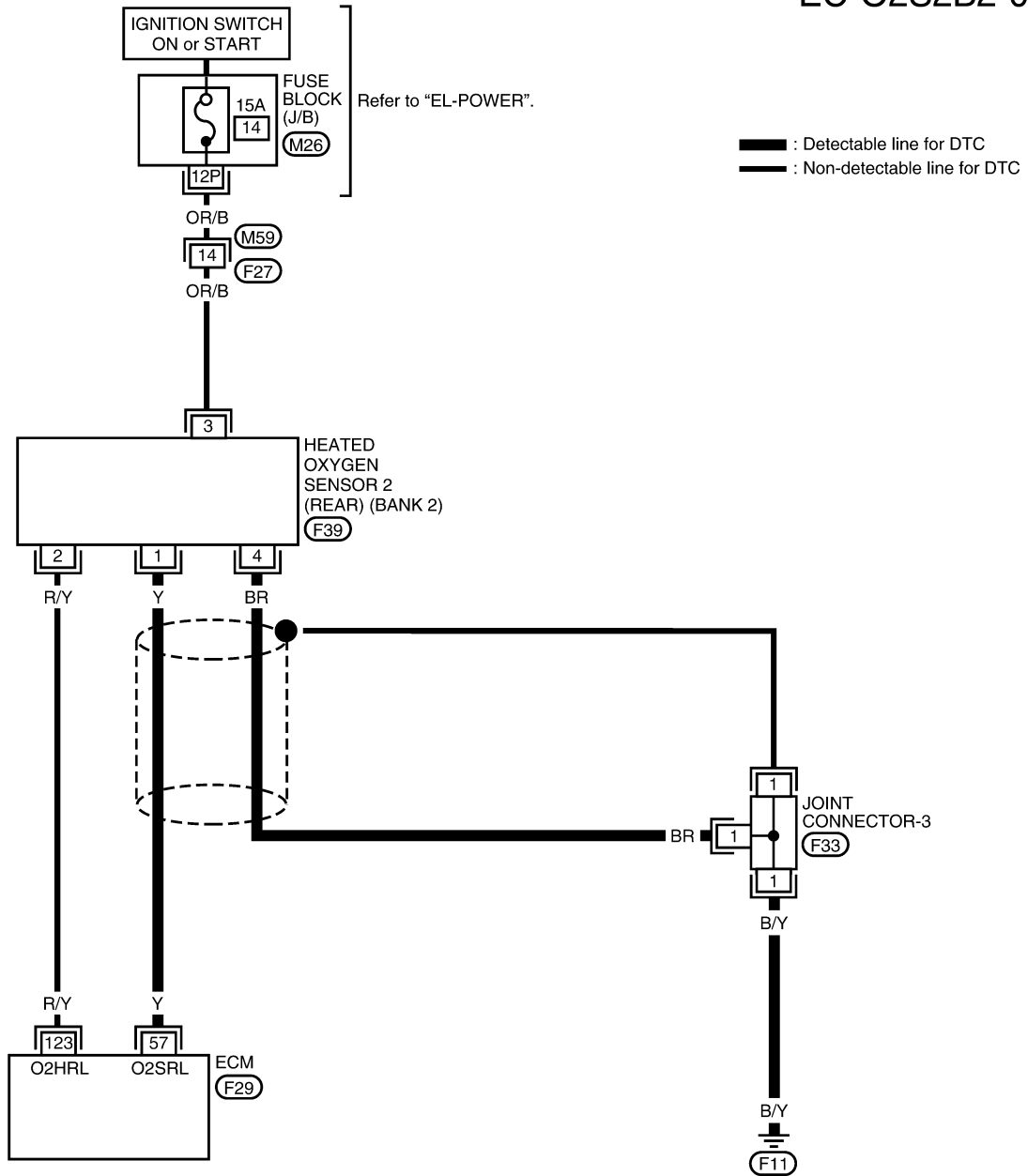
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1215S02

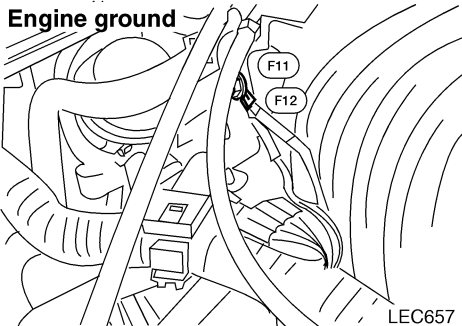
EC-O2S2B2-01



WEC793

Diagnostic Procedure

NEEC1216

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	
LEC657	
▶ GO TO 2.	

GI
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2	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">WORK SUPPORT</th> </tr> <tr> <td style="text-align: center;">SELF-LEARNING CONT</td> <td style="text-align: center;">CLEAR</td> </tr> <tr> <td></td> <td style="text-align: right;">B1 100 %</td> </tr> <tr> <td></td> <td style="text-align: right;">B2 100 %</td> </tr> </table> </div>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
SEF968Y									
<p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p>									
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p>									
Yes or No									
Yes	▶ Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1516.								
No	▶ GO TO 3.								

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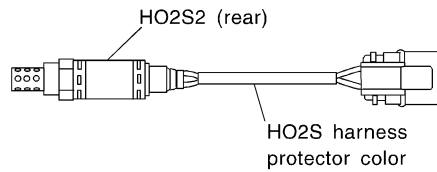
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

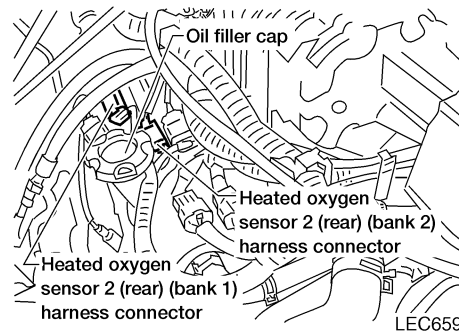
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): Gray
HO2S2 (rear) (bank 2): Red Brown

SEC301C

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



LEC659

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	56	1	Bank 1 (Right)
P0157	57	1	Bank 2 (Left)

MTBL0589

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0137	56 or 1	Ground	Bank 1 (Right)
P0157	57 or 1	Ground	Bank 2 (Left)

MTBL0590

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK HO2S GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

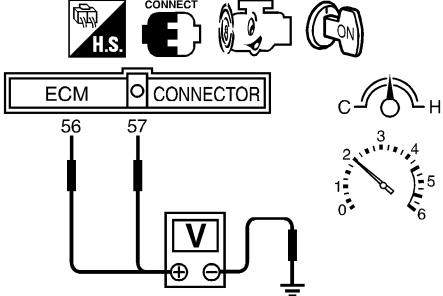
6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
<p style="text-align: center;">(Reference data)</p> <p>The voltage should be above 0.62V at least one time.</p> <p>The voltage should be below 0.48V at least one time.</p> <p style="text-align: right;">SEF989RD</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

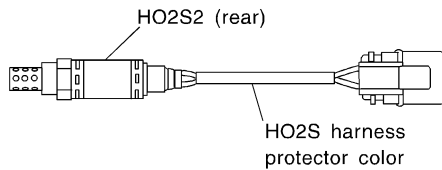
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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="margin-left: 20px;">56: Bank 1 57: Bank 2</p> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 9.</td> </tr> <tr> <td style="padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="margin-left: 20px; margin-top: 10px;"> <p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p> <p style="text-align: right; font-size: small;">SEC301C</p> </div> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2 (rear).</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2 (rear).
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).		

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-3.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) <p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-3.</p>	
	OK or NG	
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

GI
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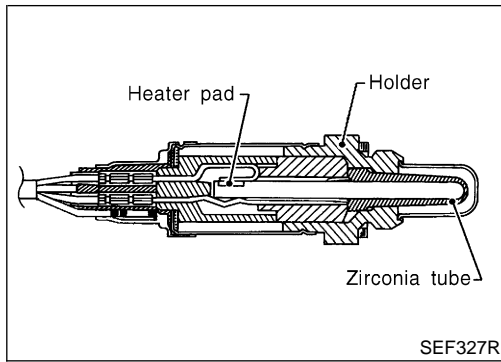
10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶	INSPECTION END

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1218

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

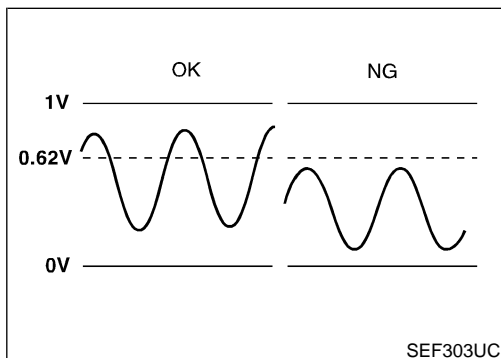
Specification data are reference values and are measured between each terminal and ground.

NEEC1219

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut. Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

NEEC1220

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC1220S01

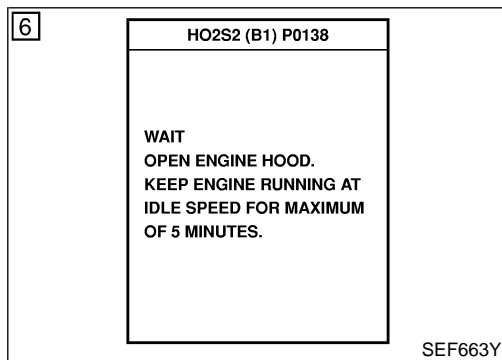
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks

GI

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LC



DTC Confirmation Procedure

NEEC1221

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2), P0138/P0158" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".

EC

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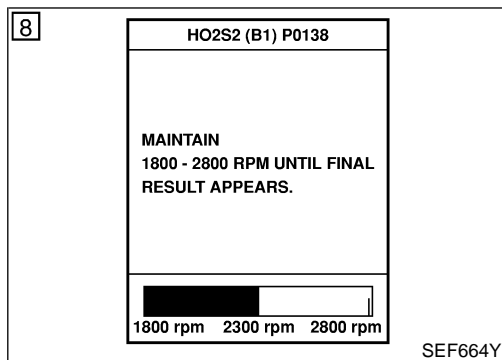
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If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1473.

If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

- a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
- b) Turn ignition switch ON.
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

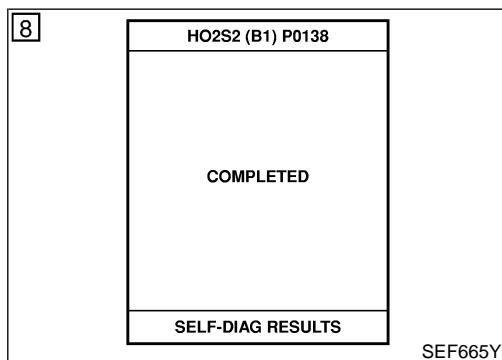
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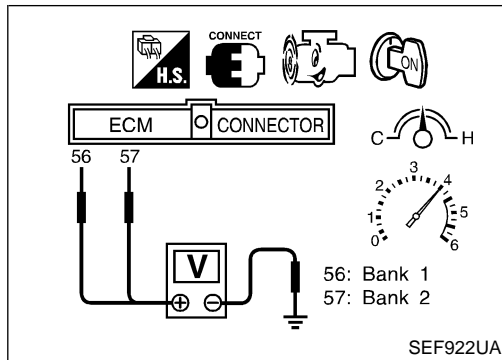
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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC1222

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.62V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be above 0.62V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1473.

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Wiring Diagram

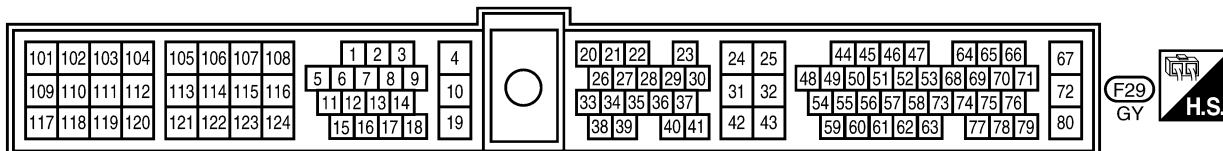
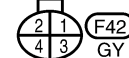
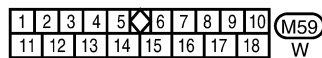
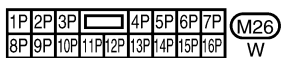
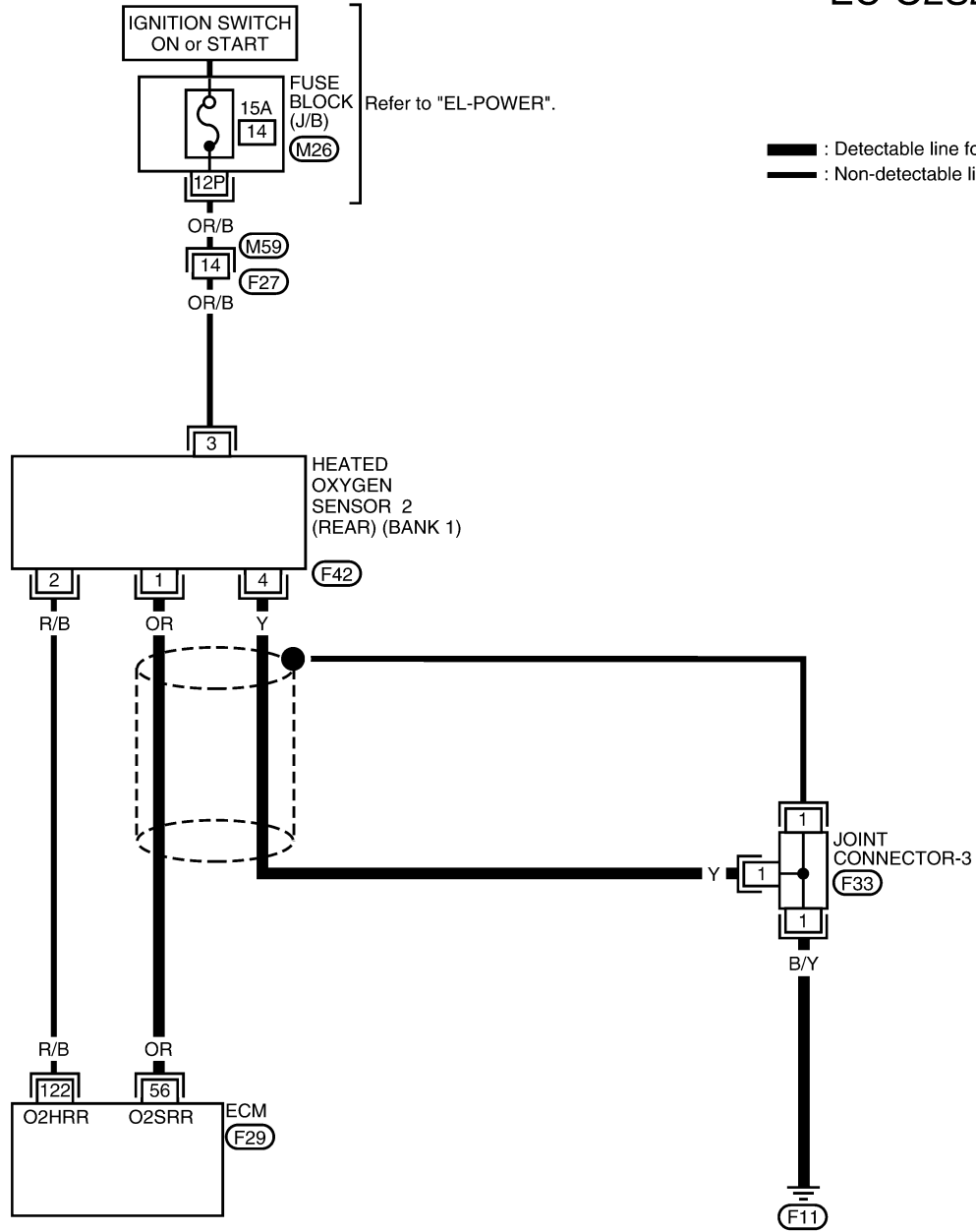
Wiring Diagram

NEEC1223

NEEC1223S01

RIGHT BANK

EC-O2S2B1-01



WEC792

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

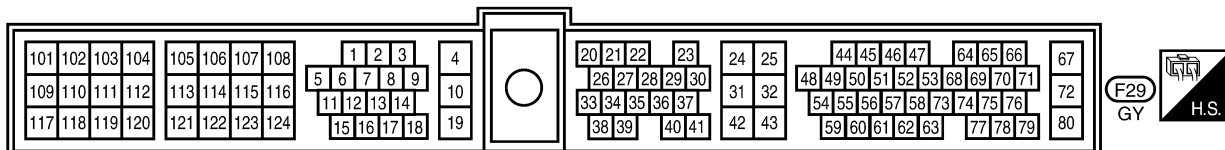
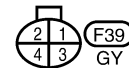
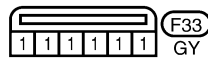
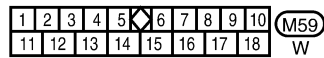
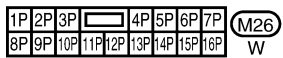
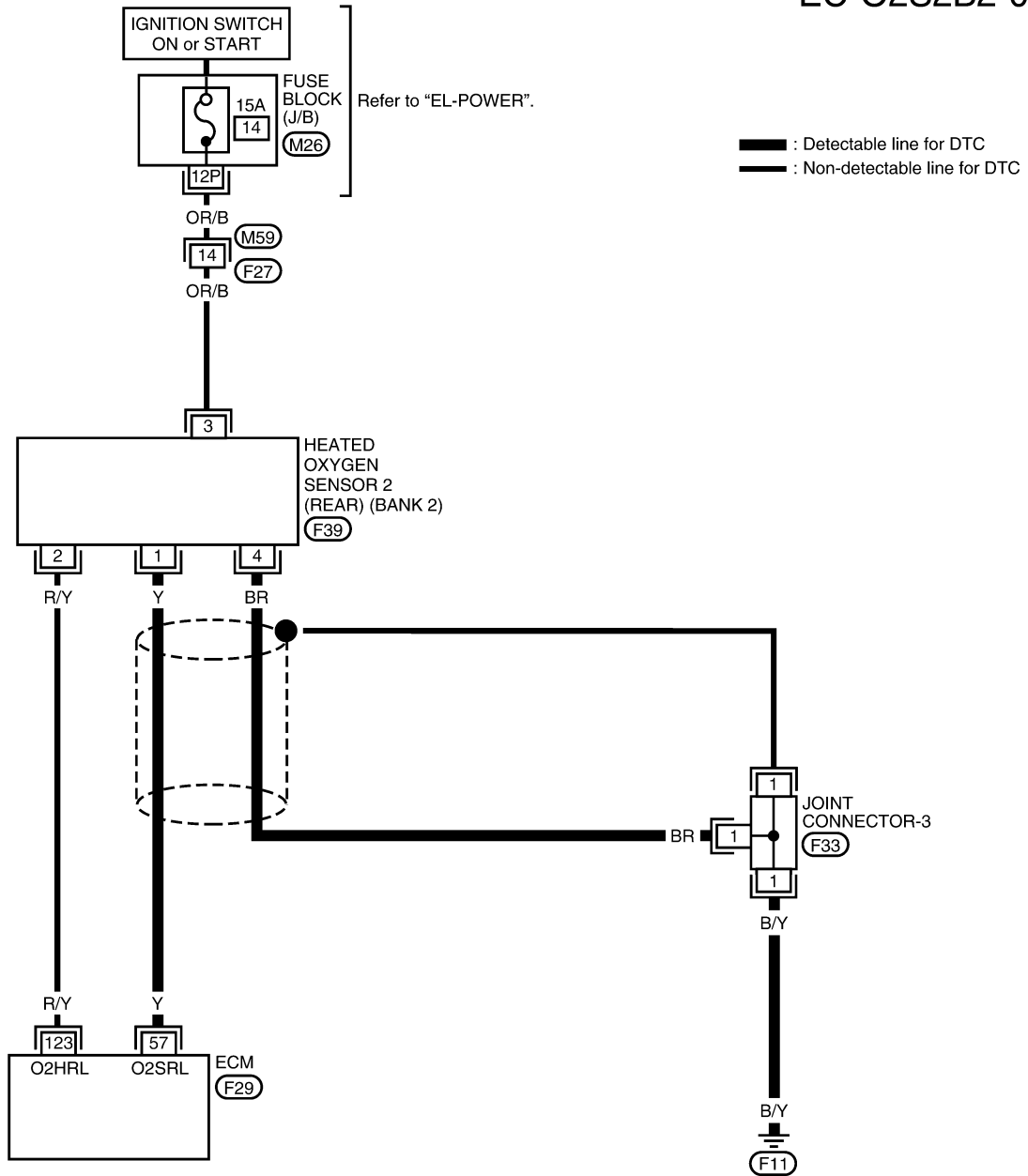
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1223S02

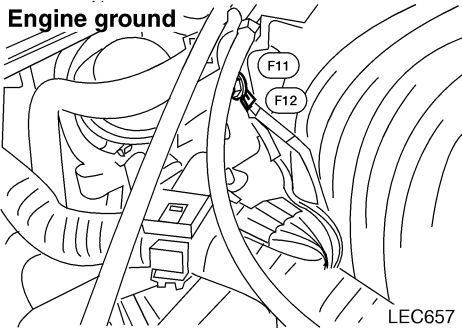
EC-O2S2B2-01



WEC793

Diagnostic Procedure

NEEC1224

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	
LEC657	
▶ GO TO 2.	

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2	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">WORK SUPPORT</th> </tr> <tr> <td style="text-align: center;">SELF-LEARNING CONT</td> <td style="text-align: center;">CLEAR</td> </tr> <tr> <td></td> <td style="text-align: right;">B1 100 %</td> </tr> <tr> <td></td> <td style="text-align: right;">B2 100 %</td> </tr> </table> </div>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
SEF968Y									
<p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p>									
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p>									
Yes or No									
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1507.								
No	▶ GO TO 3.								

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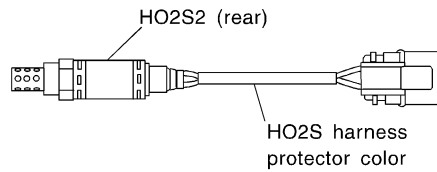
DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): Gray
HO2S2 (rear) (bank 2): Red Brown

SEC301C

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1 (Right)
P0158	57	1	Bank 2 (Left)

SEF824Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0138	56 or 1	Ground	Bank 1 (Right)
P0158	57 or 1	Ground	Bank 2 (Left)

SEF825Z

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%. 		
<p style="text-align: center;">(Reference data)</p> <p style="text-align: right;">SEF989RD</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) 	
<p>The voltage should be above 0.62V at least once during this procedure.</p>	
SEF797ZB	
<ol style="list-style-type: none"> Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. 	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 (rear) harness protector color. 	
<p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p>	
SEC301C	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p>	
	OK or NG	
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

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10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶	INSPECTION END

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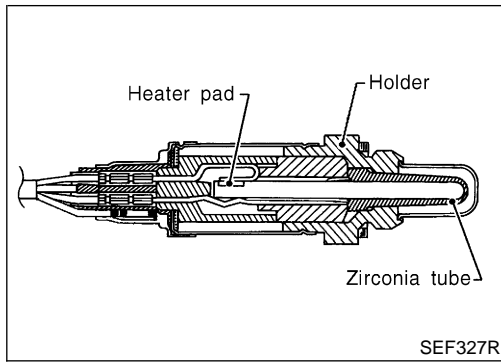
EL

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1226

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

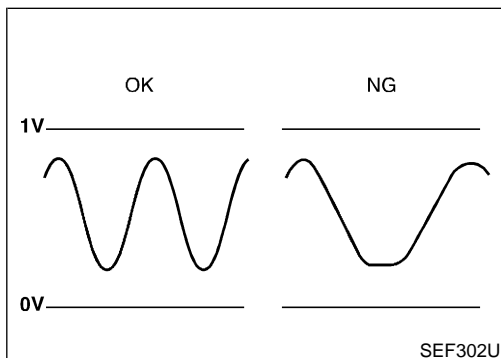
Specification data are reference values and are measured between each terminal and ground.

NEEC1227

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut. Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

NEEC1228

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC1228S01

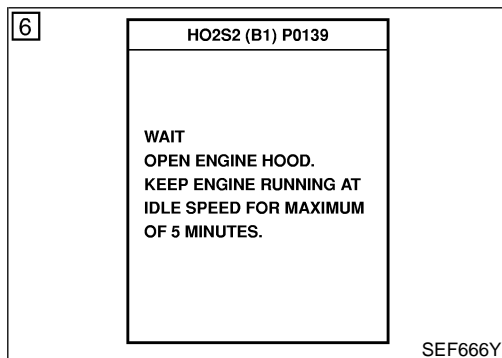
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks

GI

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DTC Confirmation Procedure

NEEC1229

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0139/P0159" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".

EC

FE

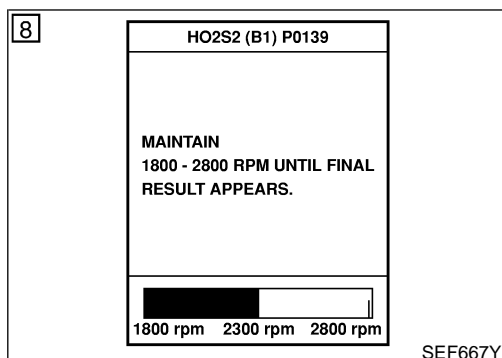
CL

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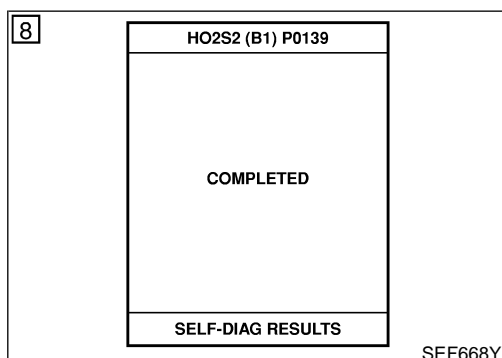


If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1483.

If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

AX

SU



- a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
- b) Turn ignition switch ON.
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

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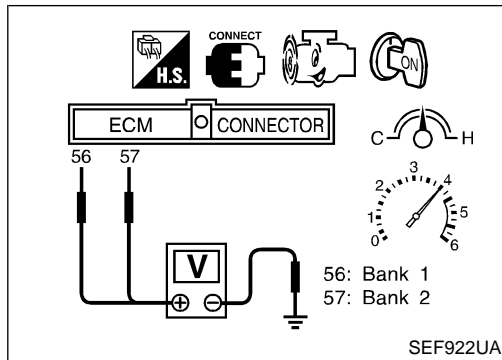
EL

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC1230

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1483.

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Wiring Diagram

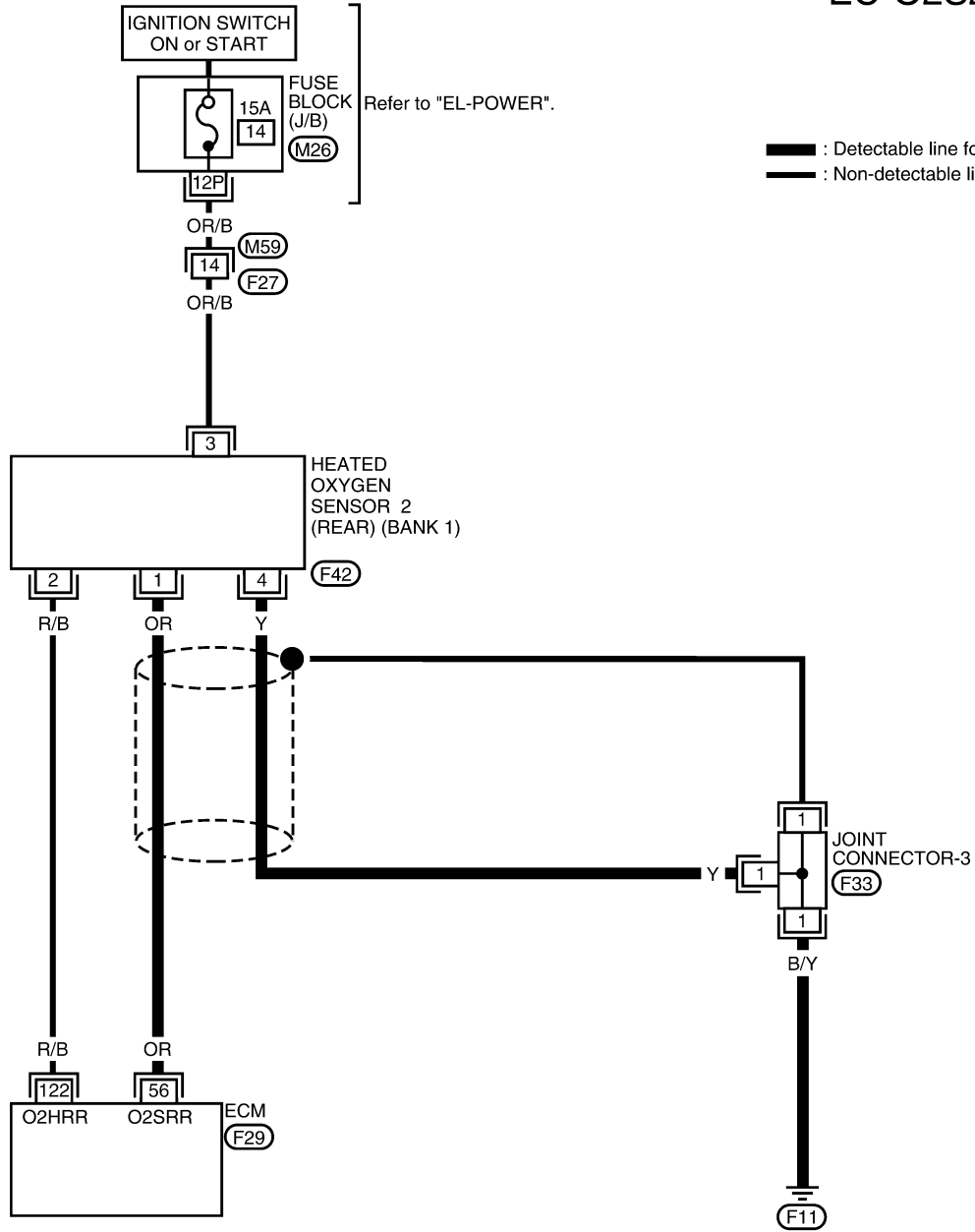
Wiring Diagram

NEEC1231

NEEC1231S01

RIGHT BANK

EC-O2S2B1-01



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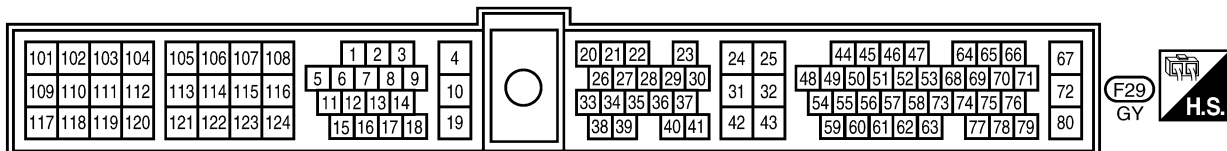
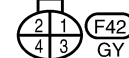
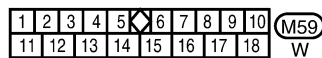
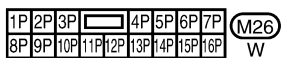
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WEC792

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

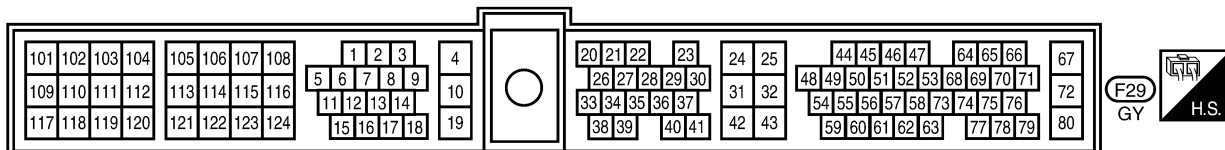
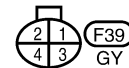
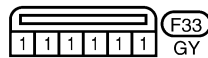
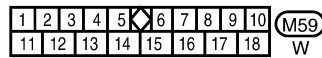
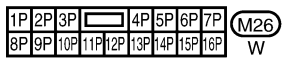
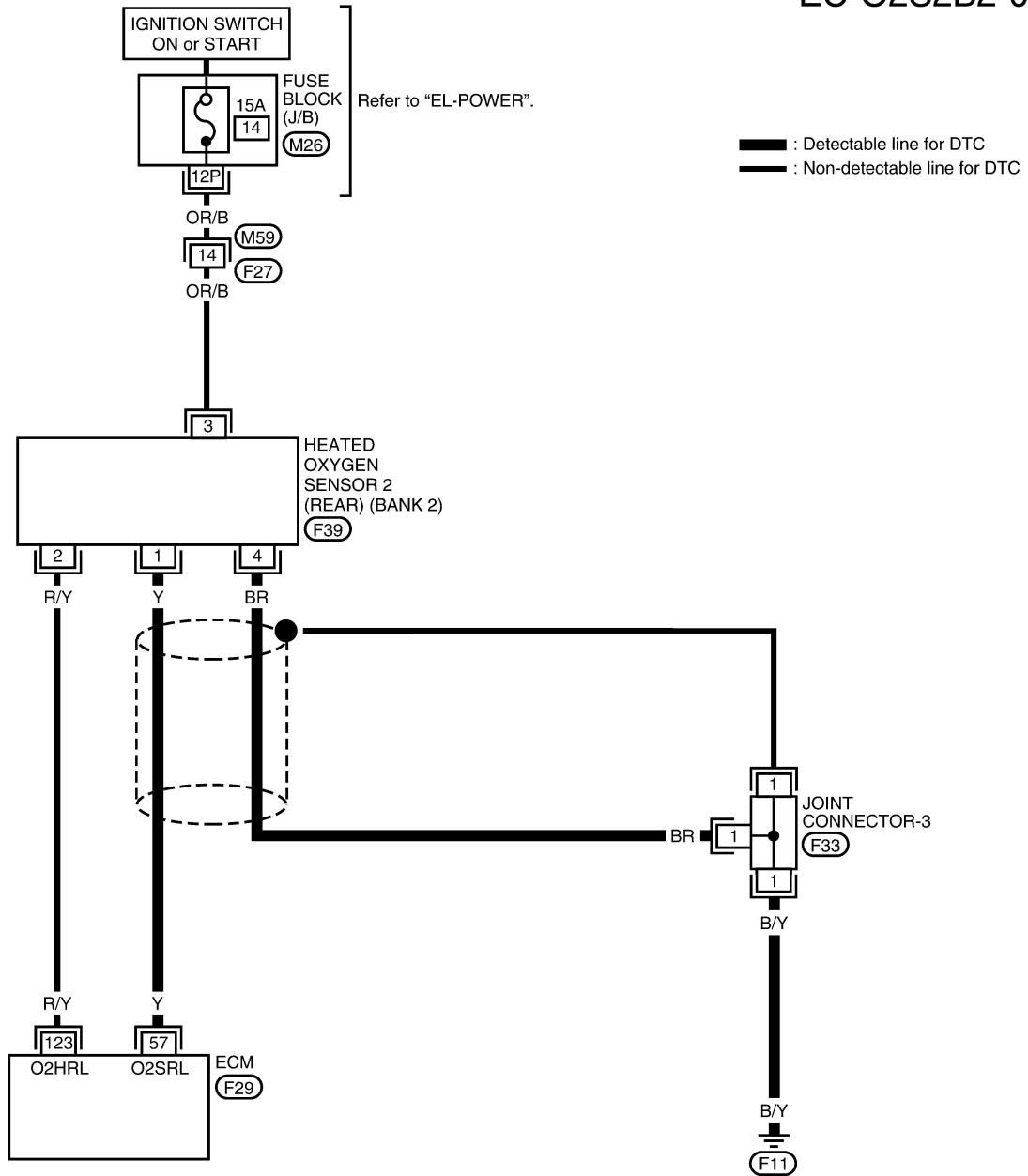
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1231S02

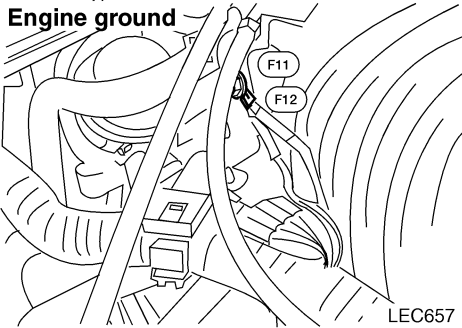
EC-O2S2B2-01



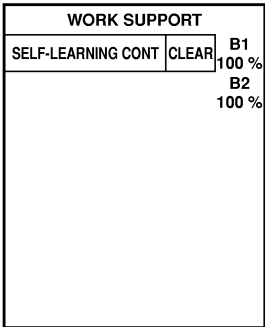
WEC793

Diagnostic Procedure

NEEC1232

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	
LEC657	
▶ GO TO 2.	

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2	CLEAR THE SELF-LEARNING DATA
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF968Y</p> <p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p>	
<p><input type="checkbox"/> Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1287. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p>	
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1506, 1515.
No	▶ GO TO 3.

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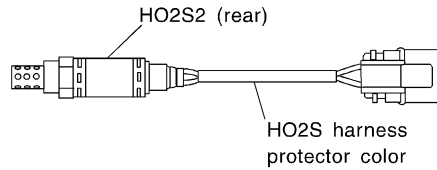
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

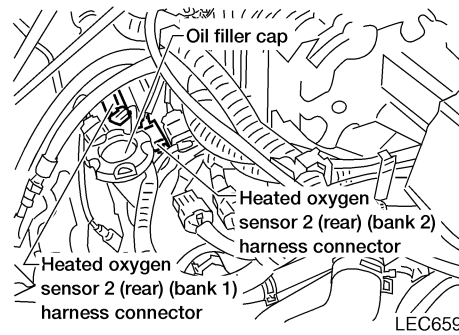
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): Gray
HO2S2 (rear) (bank 2): Red Brown

SEC301C

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



LEC659

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1 (Right)
P0159	57	1	Bank 2 (Left)

MTBL0591

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Bank 1 (Right)
P0159	57 or 1	Ground	Bank 2 (Left)

MTBL0592

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 (rear) terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
		▶ Repair open circuit or short to power in harness or connectors.

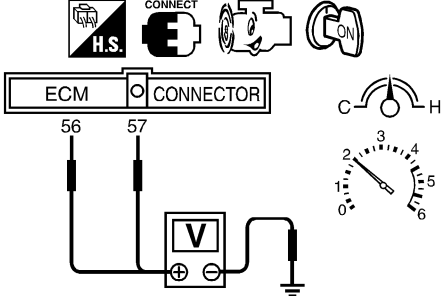
6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.		
(Reference data)		
<p style="text-align: center;"> The voltage should be above 0.62V at least one time. The voltage should be below 0.48V at least one time. </p> <p style="text-align: right; font-size: small;">SEF989RD</p>		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

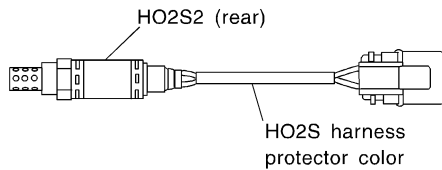
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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="margin-left: 20px;">56: Bank 1 57: Bank 2</p> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 9.</td> </tr> <tr> <td style="padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="margin-left: 20px; margin-top: 10px;"> <p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p> <p style="text-align: right; font-size: small;">SEC301C</p> </div> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2 (rear).</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2 (rear).
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).		

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNES LAYOUT".) <p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p>	
	OK or NG	
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

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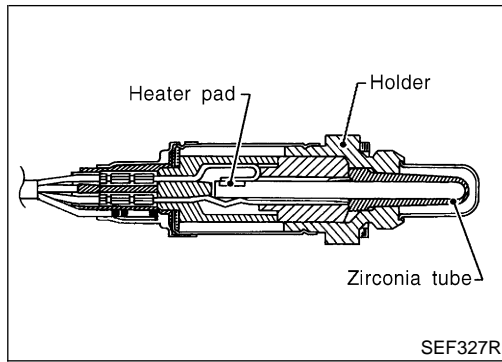
10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶	INSPECTION END

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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Component Description



Component Description

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear). This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NEEC1234

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

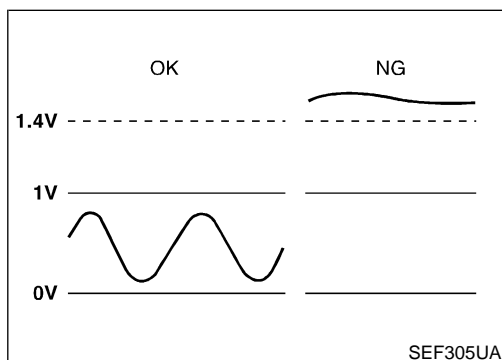
Specification data are reference values and are measured between each terminal and ground.

NEEC1235

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

NEEC1236

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

NEEC1236S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)

GI

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5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

DTC Confirmation Procedure

NEEC1237

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive seconds.

EC

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END SPEED	Less than 3,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

PD

AX

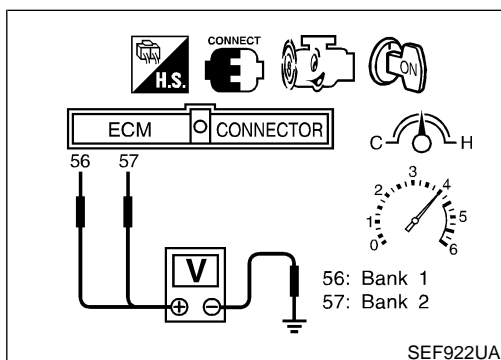
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1493.

SU

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Overall Function Check

NEEC1238

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

ⓧ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load

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EC-1489

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Overall Function Check (Cont'd)

at least 10 times.

(depress and release accelerator pedal as soon as possible)

The voltage should be below 1.4V during this procedure.

- 5) If NG, go to "Diagnostic Procedure", EC-1493.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Wiring Diagram

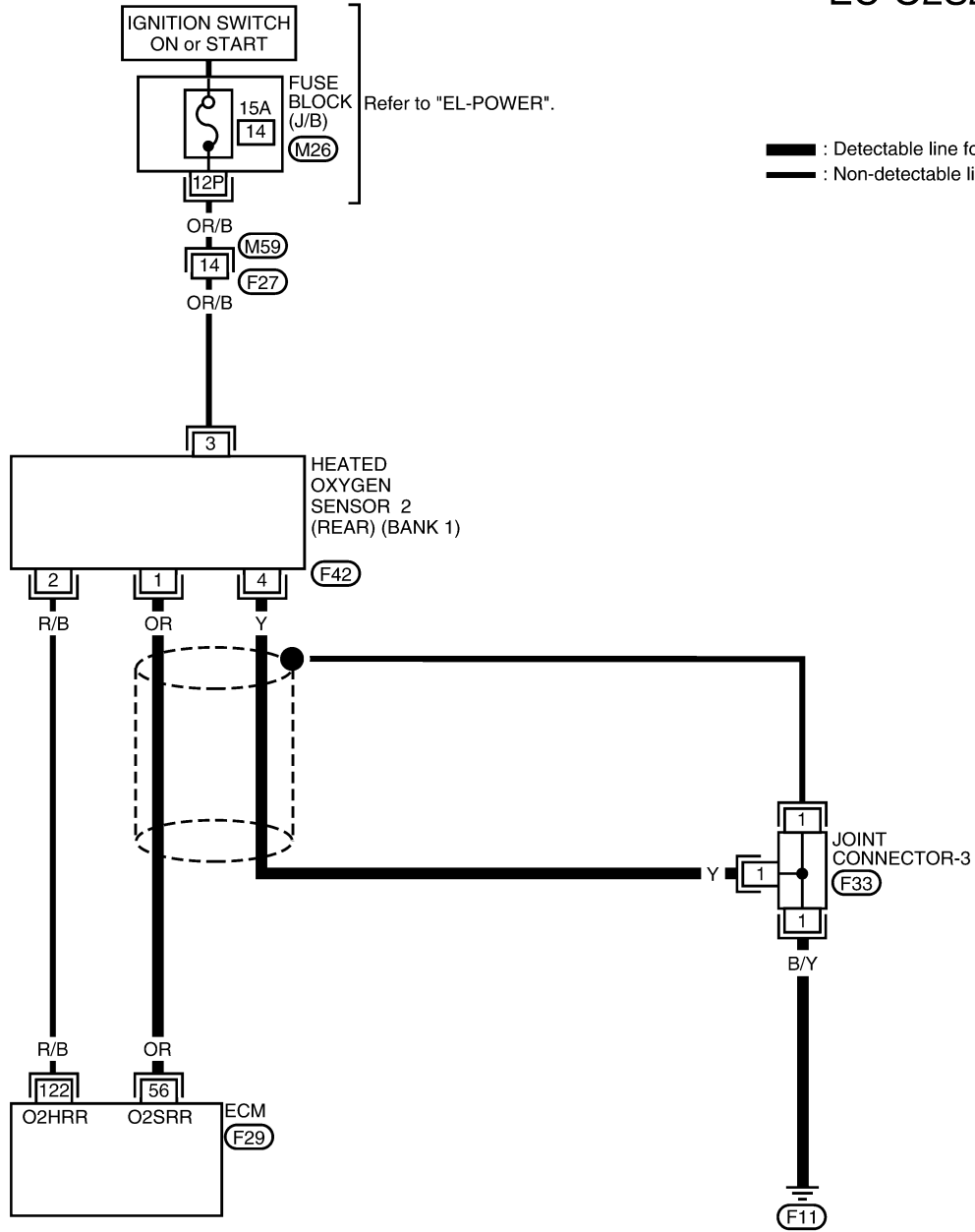
Wiring Diagram

NEEC1239

NEEC1239S01

RIGHT BANK

EC-O2S2B1-01



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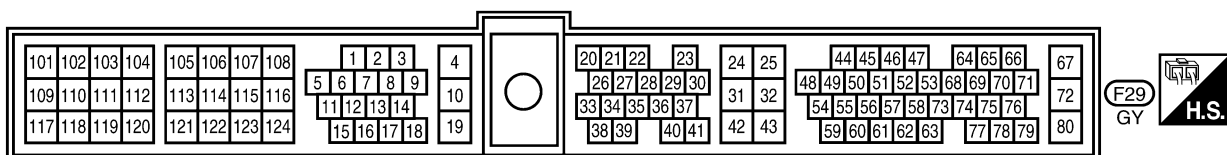
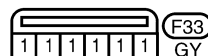
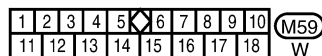
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WEC792

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

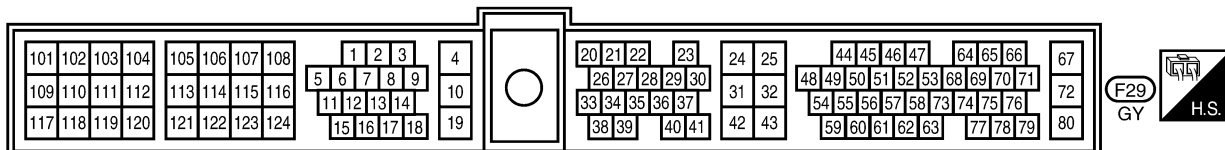
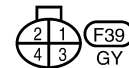
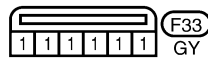
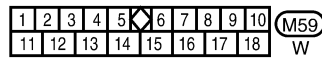
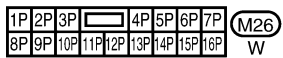
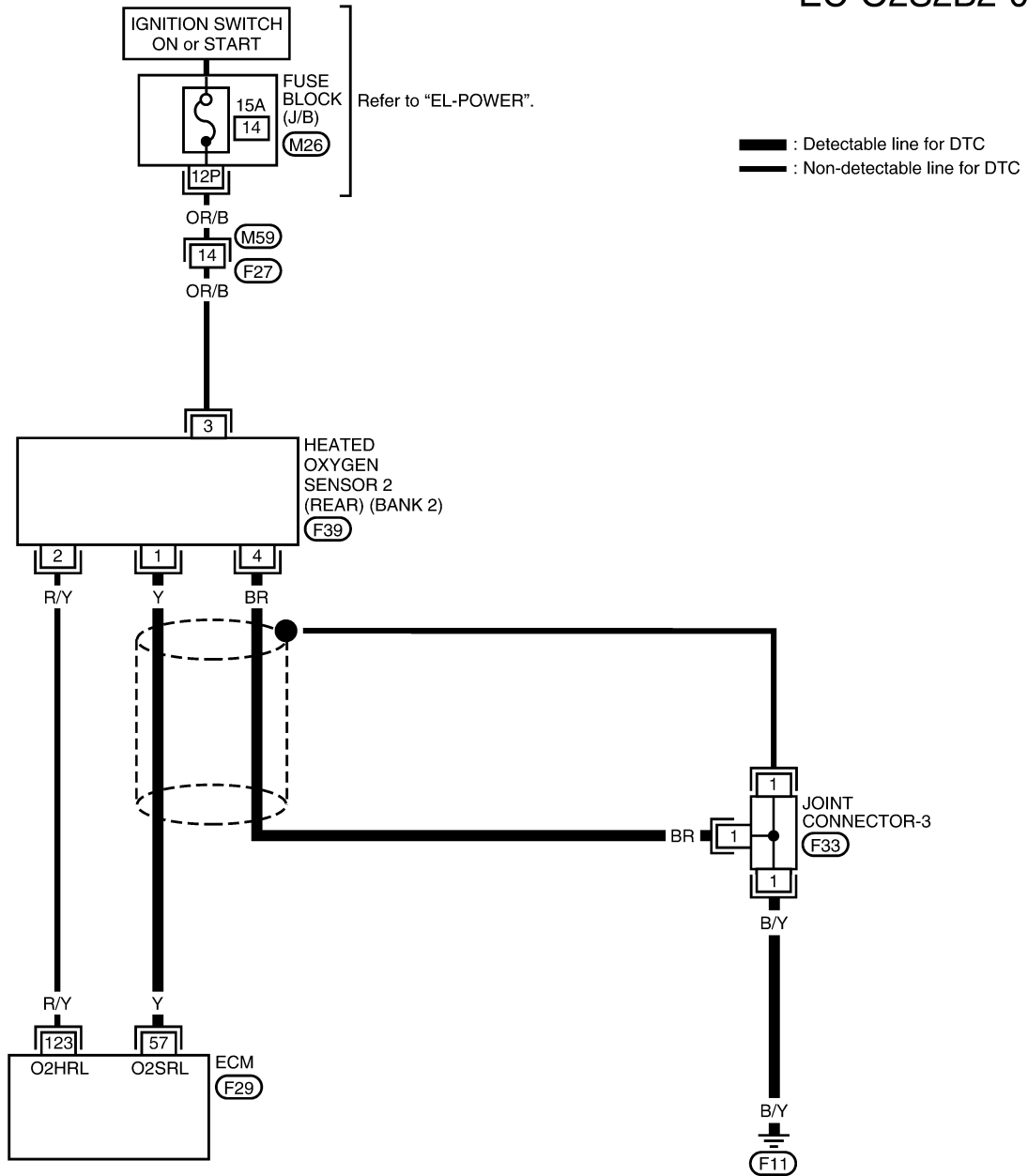
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1239S02

EC-O2S2B2-01



WEC793

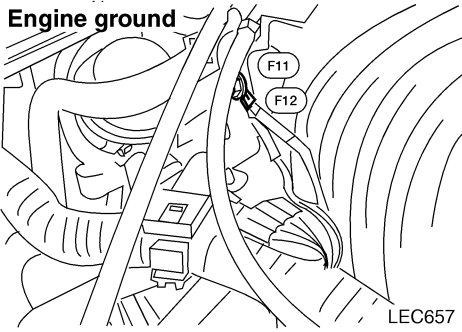
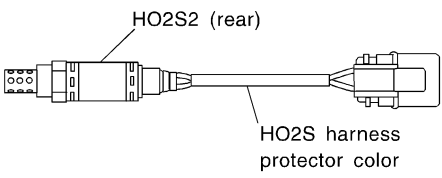

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1240

1	INSPECTION START
<ol style="list-style-type: none">1. Turn ignition switch OFF.2. Loosen and retighten engine ground screws.	
 <p>Engine ground</p> <p>F11</p> <p>F12</p> <p>LEC657</p>	
<ol style="list-style-type: none">3. Check heated oxygen sensor 2 (rear) harness protector color.	
 <p>HO2S2 (rear)</p> <p>HO2S harness protector color</p> <p>LEC657</p>	
<p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p>	
<ol style="list-style-type: none">4. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.5. Disconnect ECM harness connector.	
	GO TO 2.

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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

2	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">56</td> <td style="text-align: center;">1</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">57</td> <td style="text-align: center;">1</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0140	56	1	Bank 1 (Right)	P0160	57	1	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0140	56	1	Bank 1 (Right)													
P0160	57	1	Bank 2 (Left)													
SEF828Z																
<p style="color: blue; text-align: center;">Continuity should exist.</p> <p>2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">56 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">57 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0140	56 or 1	Ground	Bank 1 (Right)	P0160	57 or 1	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0140	56 or 1	Ground	Bank 1 (Right)													
P0160	57 or 1	Ground	Bank 2 (Left)													
SEF829Z																
<p style="color: blue; text-align: center;">Continuity should not exist.</p> <p>3. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 3.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p style="color: blue; text-align: center;">Continuity should exist.</p> <p>2. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground. 		
OK or NG		
▶ Repair open circuit to ground or short to power in harness or connectors.		

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

5	CHECK HO2S2 (REAR) CONNECTORS FOR WATER	
Check heated oxygen sensor 2 (rear) connector and harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

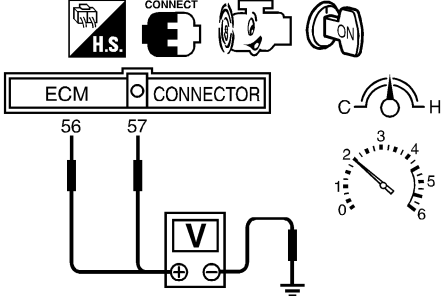
6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
(P) With CONSULT-II 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.		
(Reference data)		
<p style="text-align: center;">The voltage should be above 0.62V at least one time.</p> <p style="text-align: center;">The voltage should be below 0.48V at least one time.</p> <p style="text-align: right;">SEF989RD</p>		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION:		
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

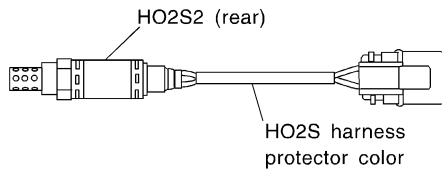
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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; margin-right: 50px;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 20px 0;">  </div> <div style="text-align: center; margin: 10px 0;"> <p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p> </div> <p style="text-align: right; margin-right: 50px;">SEC301C</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2 (rear).</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2 (rear).
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).		

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-238, "HARNESS LAYOUT".) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

GI
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EC

10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶	INSPECTION END

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

Description

Description

NEEC1241

SYSTEM DESCRIPTION

NEEC1241S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters (rear) corresponding to the engine speed.

OPERATION

NEEC1241S02

Engine speed rpm	Heated oxygen sensor 2 heaters (rear)
Above 2,800	OFF
Below 2,800	ON

CONSULT-II Reference Value in Data Monitor Mode

NEEC1242

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine is running above 2,800 rpm. 	OFF
	<ul style="list-style-type: none"> ● Engine is running below 2,800 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	ON

ECM Terminals and Reference Value

NEEC1243

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1244

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]

POSSIBLE CAUSE

NEEC1244S01

- Harness or connectors
(The heated oxygen sensor 2 heater (rear) circuit is open or shorted.)
- Heated oxygen sensor 2 heater (rear)

DTC Confirmation Procedure

NEEC1245

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine.
- 3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Stop vehicle and let engine idle for at least 6 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1502.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

Wiring Diagram

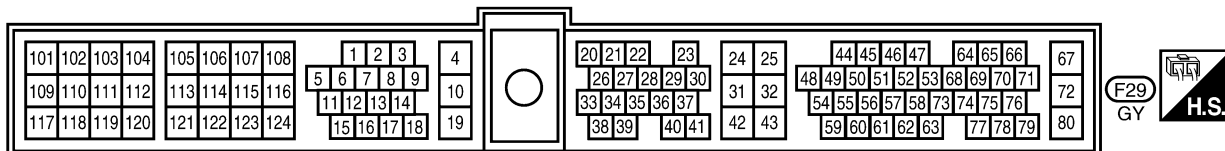
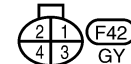
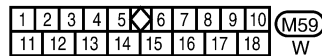
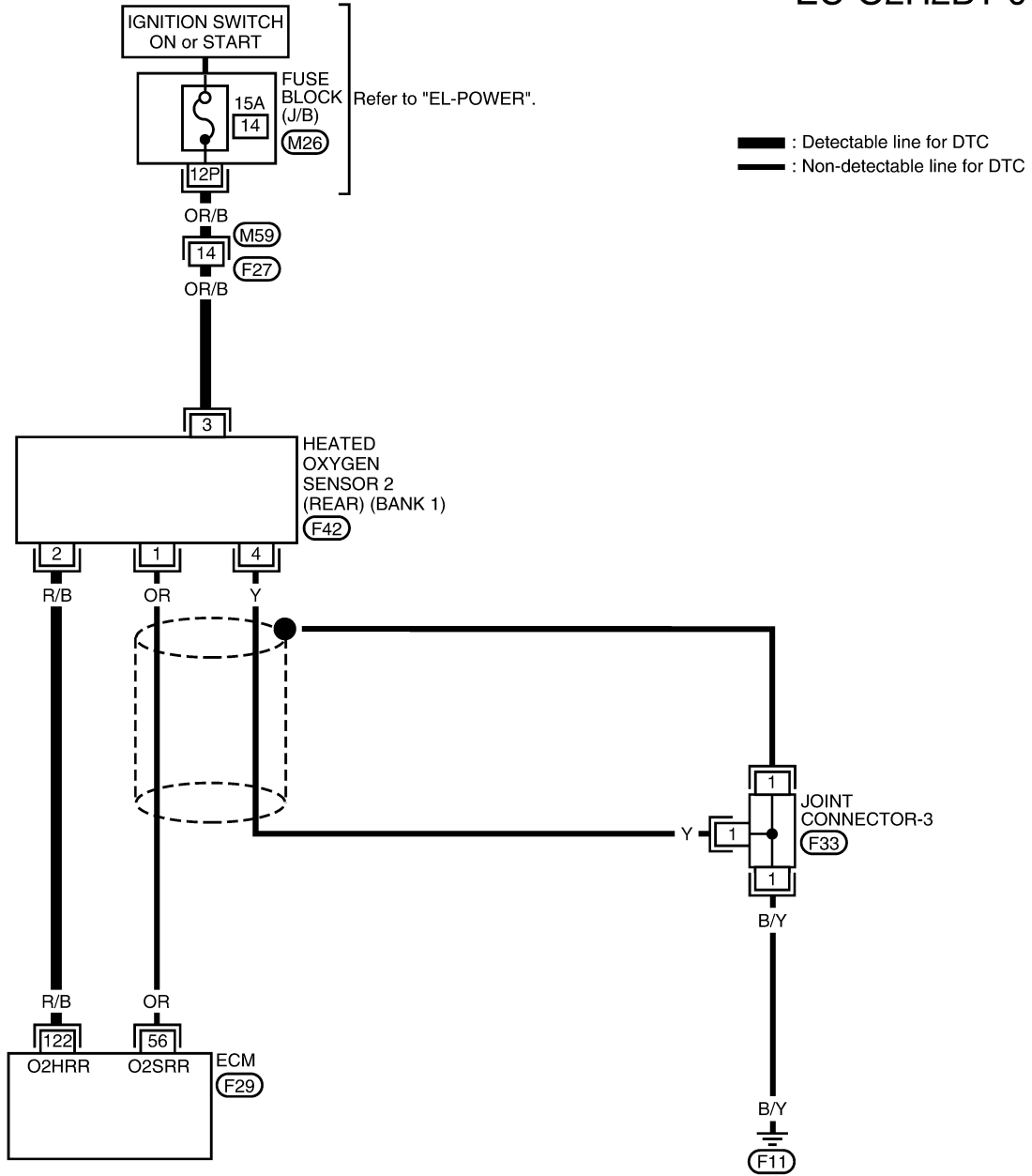
Wiring Diagram

NEEC1246

NEEC1246S01

RIGHT BANK

EC-O2H2B1-01



WEC794

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

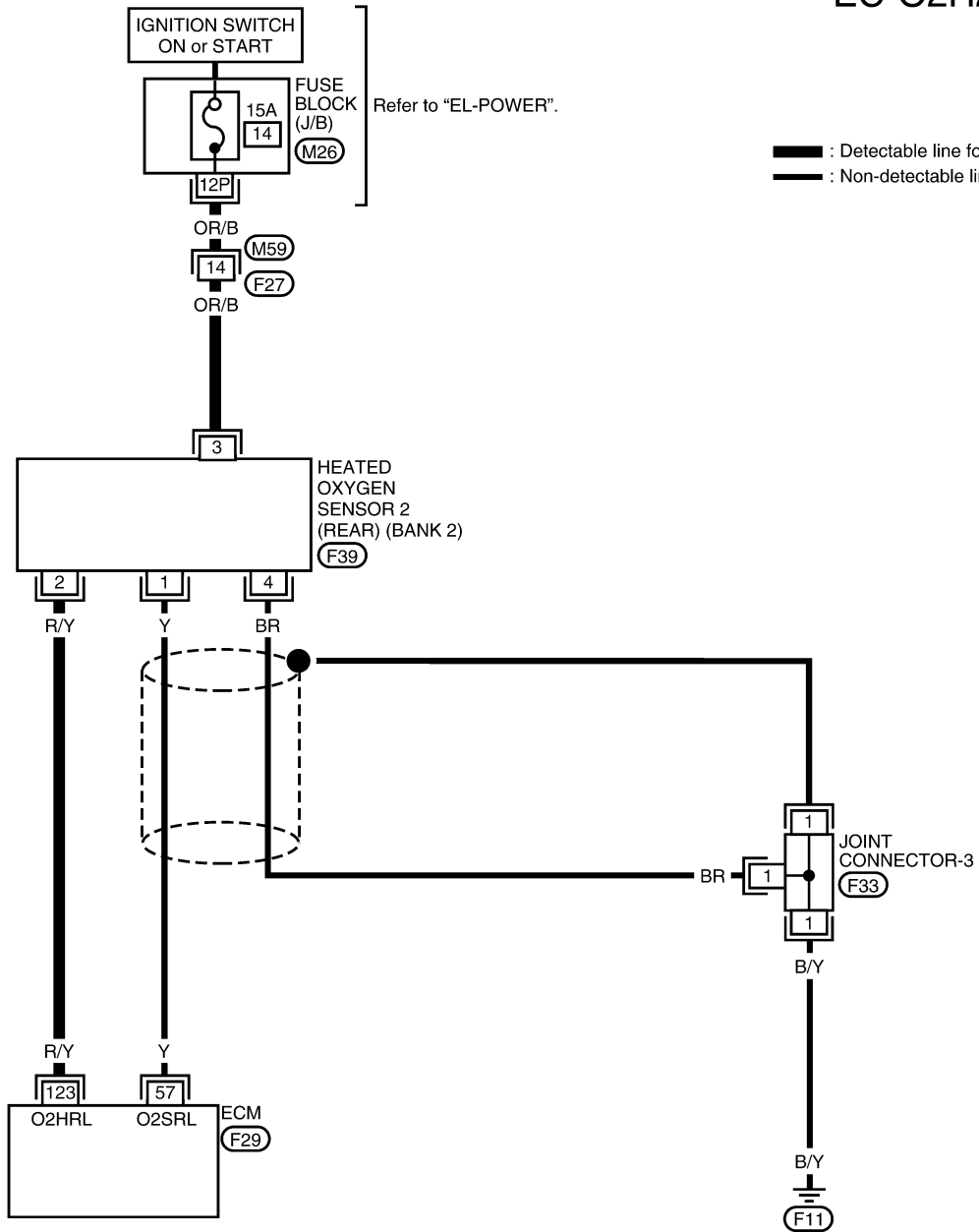
VG33ER

Wiring Diagram (Cont'd)

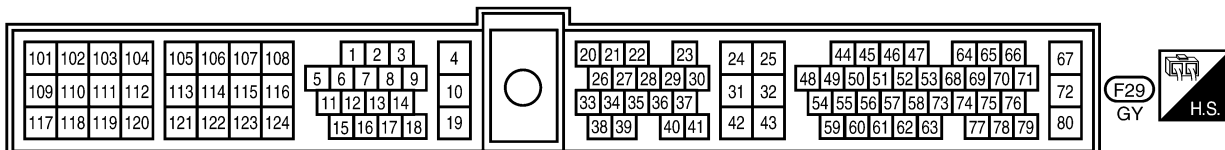
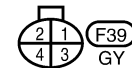
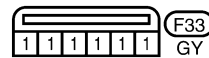
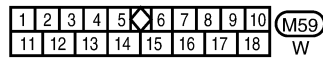
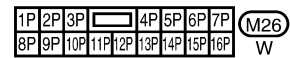
LEFT BANK

NEEC1246S02

EC-O2H2B2-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



WEC795

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

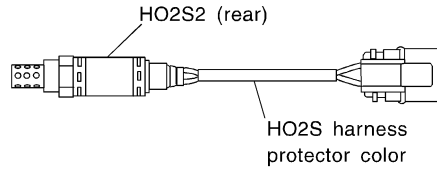
Diagnostic Procedure

Diagnostic Procedure

NEEC1247

1 CHECK HO2S2 (REAR) POWER SUPPLY CIRCUIT

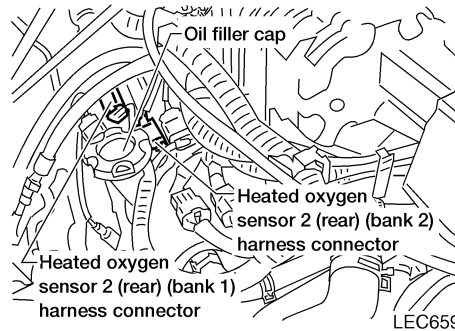
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): Gray
HO2S2 (rear) (bank 2): Red Brown

SEC301C

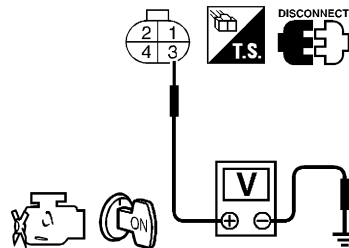
3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



LEC659

LEC659

4. Turn ignition switch ON.
5. Check voltage between HO2S2 terminal 3 and ground.



SEF637W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

▶ Repair harness or connectors.

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 HEATER (REAR) OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0141</td> <td style="text-align: center;">122</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0161</td> <td style="text-align: center;">123</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0141	122	2	Bank 1 (Right)	P0161	123	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0141	122	2	Bank 1 (Right)													
P0161	123	2	Bank 2 (Left)													
SEF830Z																
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 5.														
NG	▶	GO TO 4.														

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 ● Harness for open or short between heated oxygen sensor 2 (rear) and engine ground. 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

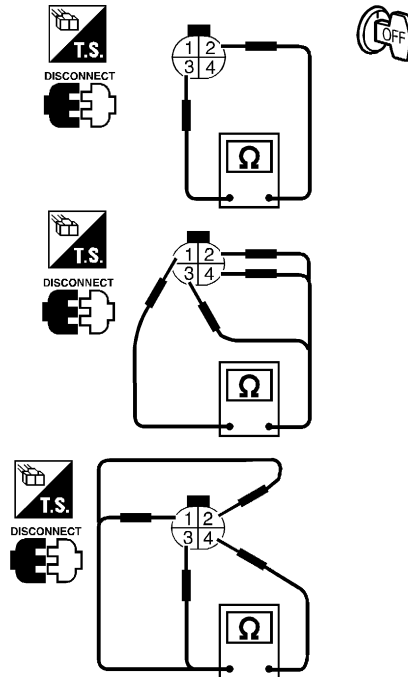
VG33ER

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between HO2S2 (rear) terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

SEF716W

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

MTBL0233

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

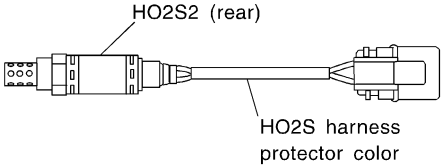
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/(BANK 2)

VG33ER

Diagnostic Procedure (Cont'd)

6	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
Check heated oxygen sensor 2 (rear) harness protector color.	
 <p>The diagram shows a cross-section of the HO2S2 (rear) sensor and its harness protector. The sensor is labeled 'HO2S2 (rear)' and the harness protector is labeled 'HO2S harness protector color'.</p>	
HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown	
SEC301C	
CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

NEEC1248

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NEEC1248S01

- Intake air leaks
- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

DTC Confirmation Procedure

4

WORK SUPPORT	
SELF-LEARNING CONT	CLEAR
	B1 100 %
	B2 100 %

SEF968Y

DTC Confirmation Procedure

=NEEC1249

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-1510.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-1510. If engine does not start, check exhaust and intake air leak visually.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Wiring Diagram

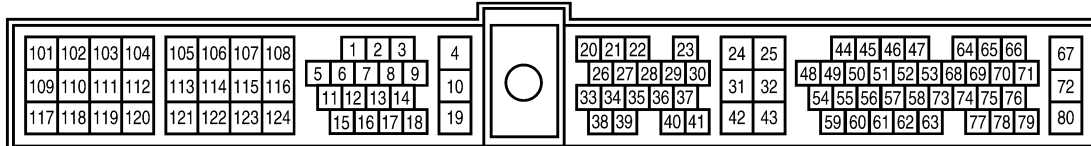
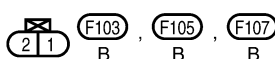
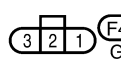
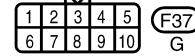
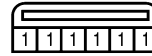
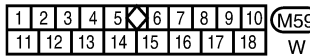
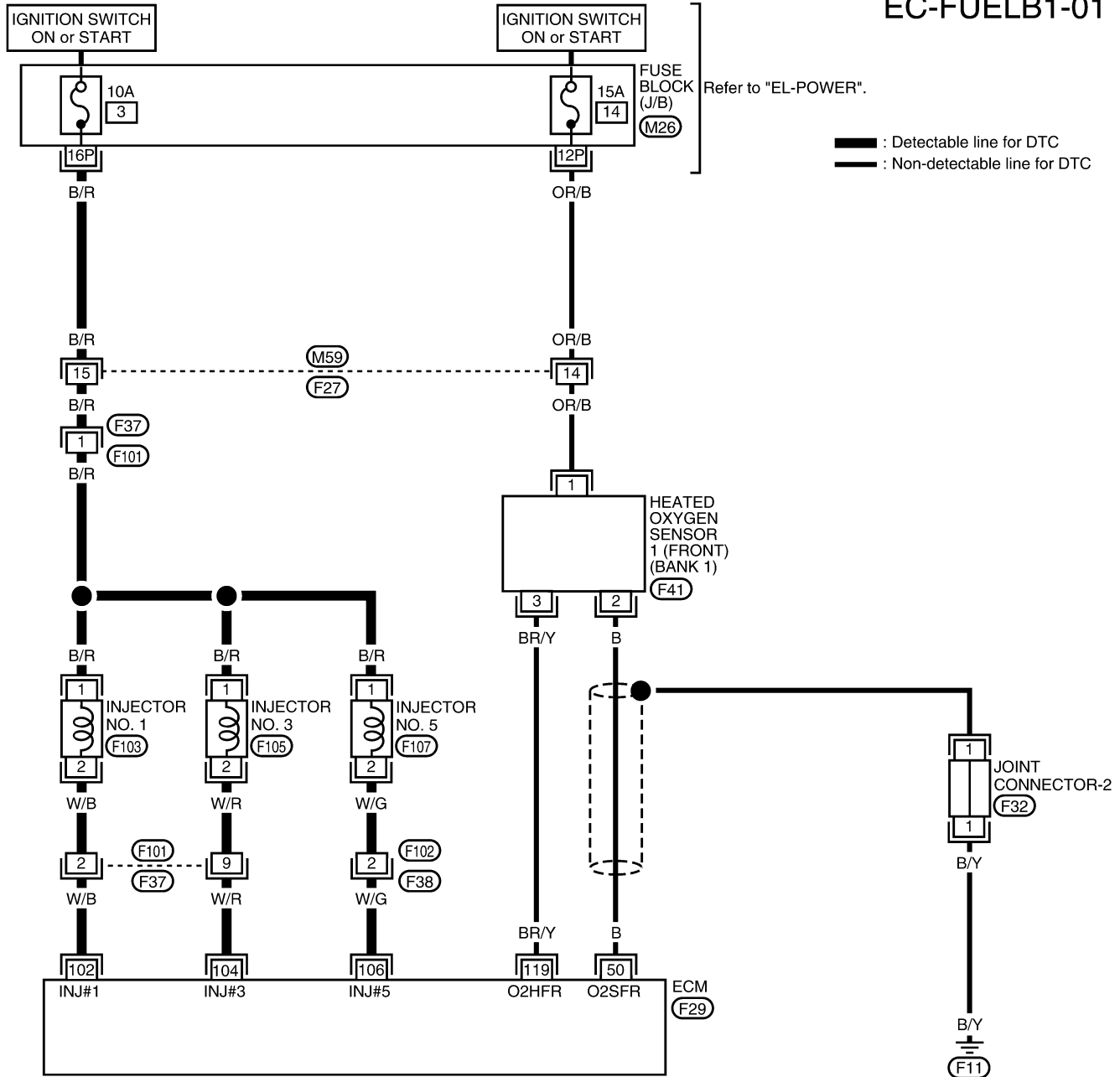
Wiring Diagram

NEEC1250

NEEC1250S01

RIGHT BANK

EC-FUELB1-01



LEC665

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

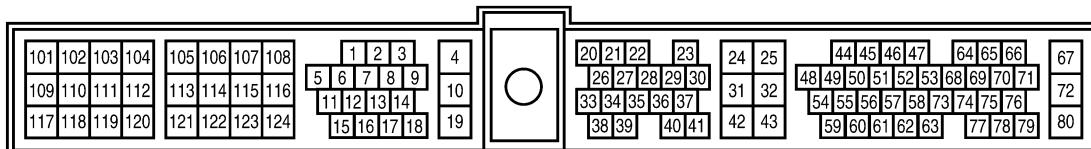
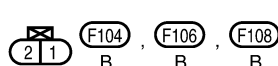
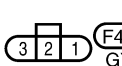
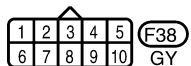
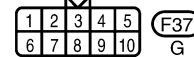
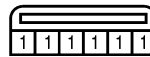
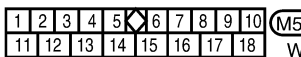
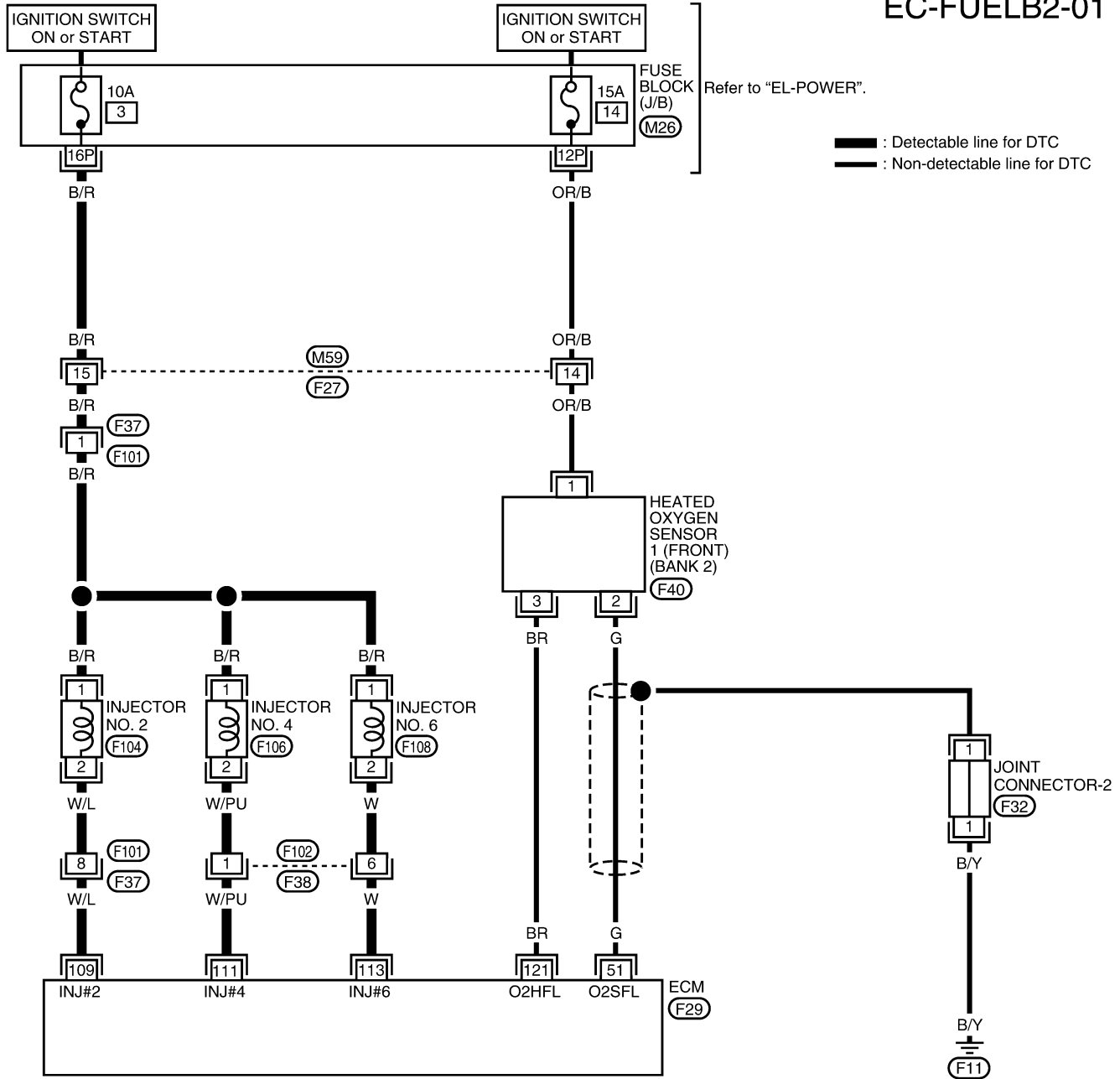
VG33ER

Wiring Diagram (Cont'd)

NEEC1250S02

LEFT BANK

EC-FUEL2-01



LEC666

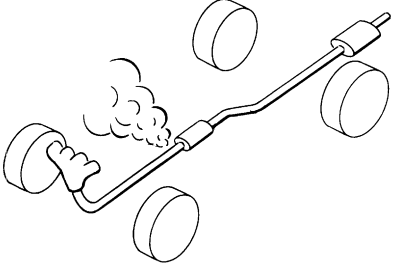
DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1251

1	CHECK EXHAUST AIR LEAK
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.	
	
SEF099P	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or replace.

2	CHECK FOR INTAKE AIR LEAK
Listen for an intake air leak after the mass air flow sensor.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0171	50	2	Bank 1 (Right)	P0174	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0171	50	2	Bank 1 (Right)													
P0174	51	2	Bank 2 (Left)													
SEF831Z																
<p>Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0171	50 or 2	Ground	Bank 1 (Right)	P0174	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0171	50 or 2	Ground	Bank 1 (Right)													
P0174	51 or 2	Ground	Bank 2 (Left)													
SEF832Z																
<p>Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

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4	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-1259.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="margin-left: 20px;">At idling:</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1801.) ● Fuel pressure regulator (Refer to EC-1260.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-29.) ● Fuel filter for clogging 		
▶		Repair or replace.
6	CHECK MASS AIR FLOW SENSOR	
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
ⓘ With GST <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1360.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Diagnostic Procedure (Cont'd)

7 CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

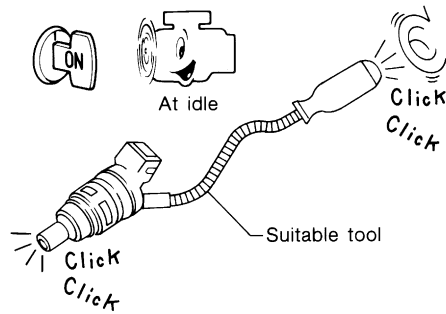
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

OK or NG

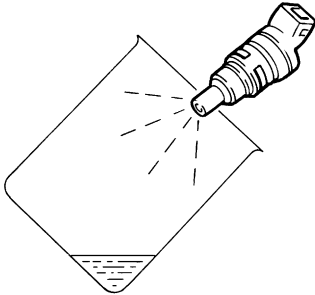
OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1793.

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR
<p>1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.</p> <p>2. Turn ignition switch OFF.</p> <p>3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).</p> <p>4. Remove injector gallery assembly. Refer to EC-1260. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.</p> <p>5. Disconnect all ignition coil harness connectors.</p> <p>6. Prepare pans or saucers under each injector.</p> <p>7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.</p>	
	
<p>Fuel should be sprayed evenly for each injector.</p> <p>SEF595Q</p>	
<p>OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

NEEC1252

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

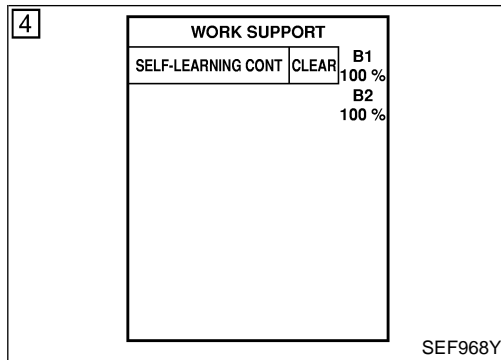
NEEC1252S01

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

DTC Confirmation Procedure



DTC Confirmation Procedure

=NEEC1253

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-1519.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-1519. If engine does not start, remove ignition plugs and check for fouling, etc.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

Wiring Diagram

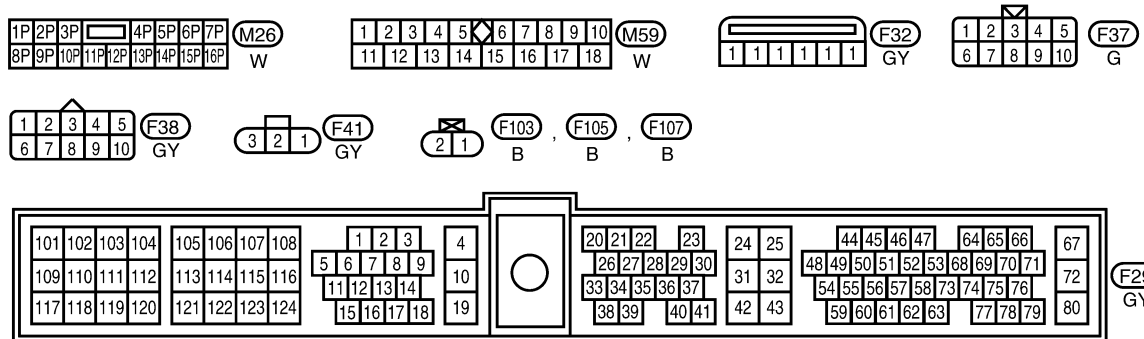
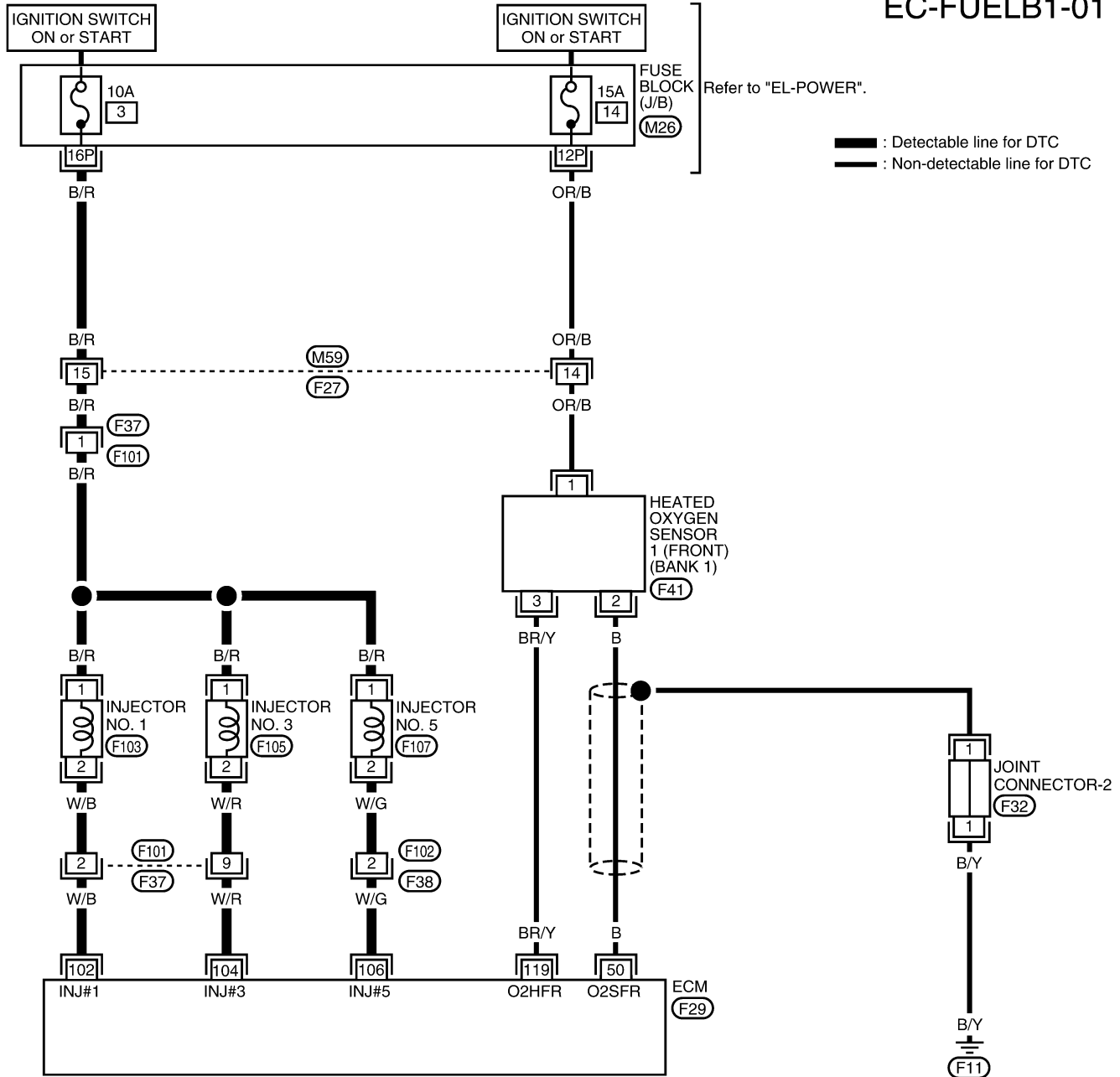
Wiring Diagram

NEEC1254

NEEC1254S01

RIGHT BANK

EC-FUELB1-01



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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

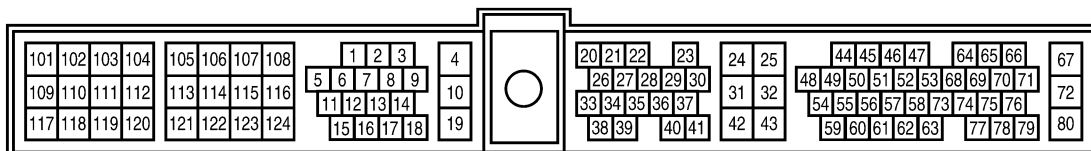
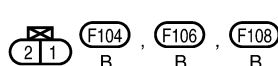
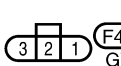
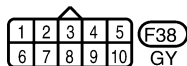
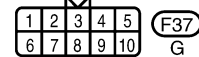
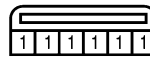
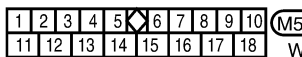
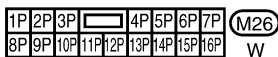
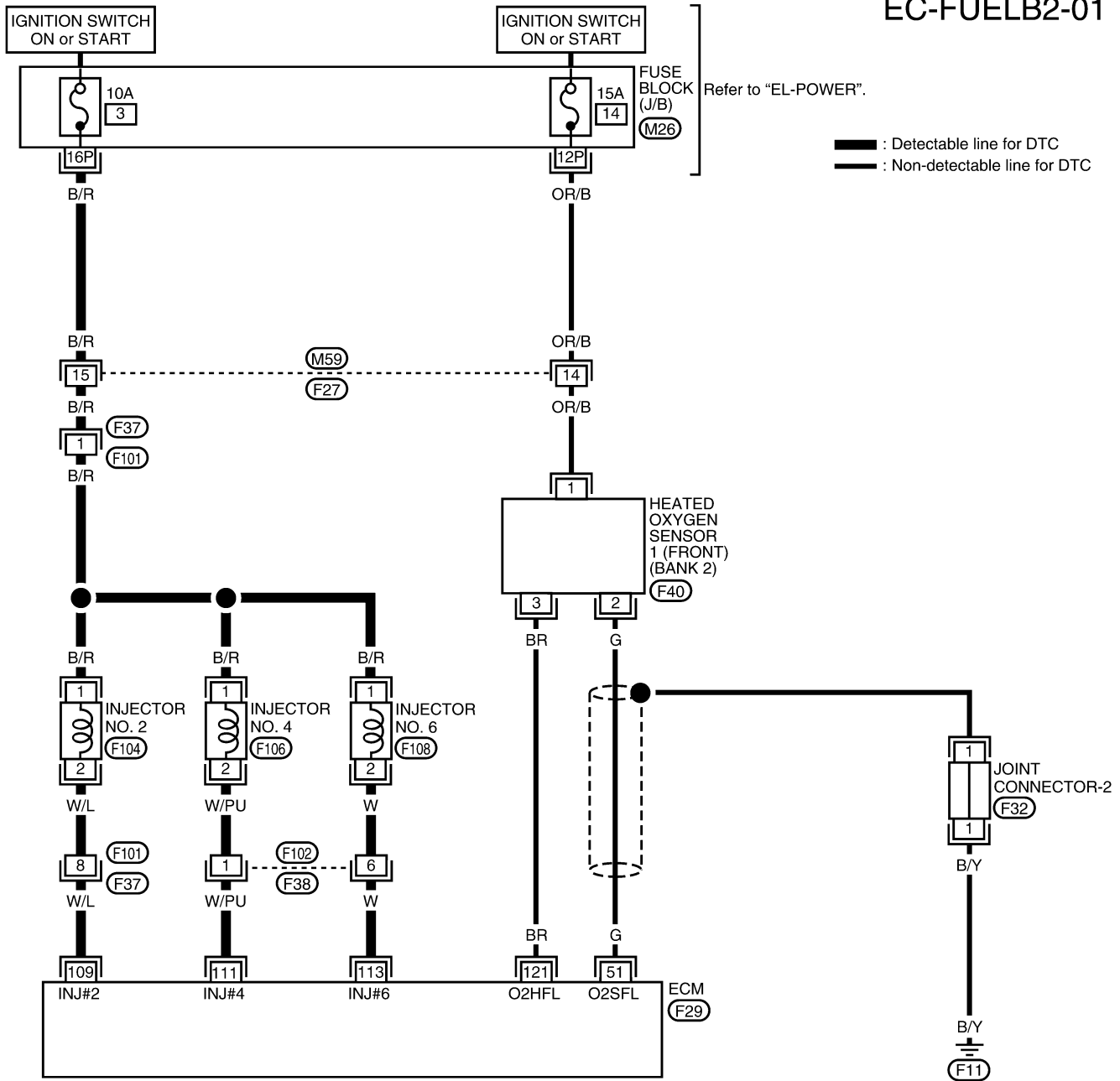
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NEEC1254S02

EC-FUEL2-01



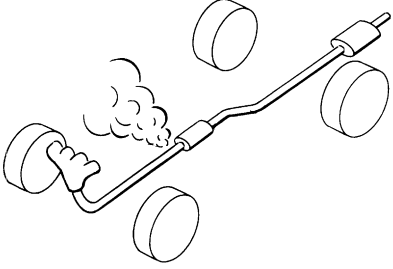
DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1255

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0172	50	2	Bank 1 (Right)	P0175	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0172	50	2	Bank 1 (Right)													
P0175	51	2	Bank 2 (Left)													
SEF833Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0172	50 or 2	Ground	Bank 1 (Right)	P0175	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0172	50 or 2	Ground	Bank 1 (Right)													
P0175	51 or 2	Ground	Bank 2 (Left)													
SEF834Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-1259.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

VG33ER

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1801.) ● Fuel pressure regulator (Refer to EC-1260.) 		
▶	Repair or replace.	
6	CHECK MASS AIR FLOW SENSOR	
(P) With CONSULT-II <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
(GST) With GST <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1360.

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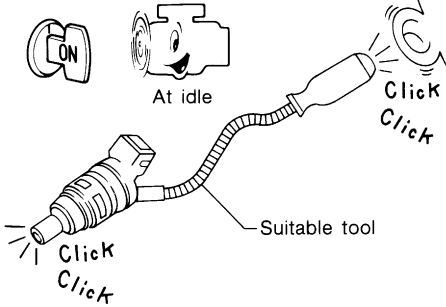
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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

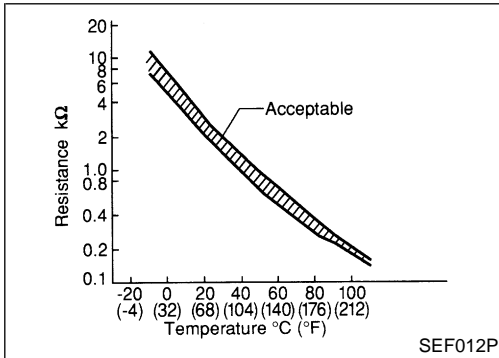
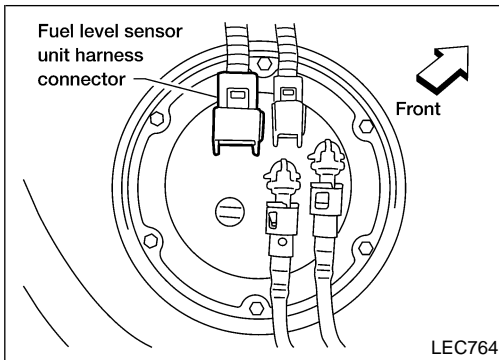
VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK FUNCTION OF INJECTORS																				
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																					
POWER BALANCE																					
MONITOR																					
ENG SPEED	XXX rpm																				
MAS AIF SE-B1	XXX V																				
IACV-AAC/V	XXX step																				
SEF070Y																					
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																					
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Listen to each injector operating sound. 																					
																					
<p>Clicking noise should be heard.</p>																					
<p>OK or NG</p>																					
OK	▶	GO TO 8.																			
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1793.																			

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Remove injector assembly. Refer to EC-1260. Keep fuel hose and all injectors connected to injector gallery. 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175). The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each injectors. 6. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 		
<p>OK or NG</p>		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END



Component Description

NEEC1256

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

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<Reference data>

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

EC

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*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

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CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

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On Board Diagnosis Logic

NEEC1257

Malfunction is detected when an excessively high or low voltage is sent to ECM, rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

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POSSIBLE CAUSE

NEEC1257S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

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DTC Confirmation Procedure

=NEEC1258

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If the result is NG, go to "Diagnostic Procedure", EC-1526.
If the result is OK, go to following step.
- 4) Check "COOLAN TEMP/S" value.
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1526.

With GST

Follow the procedure "With CONSULT-II".

DTC P0180 FUEL TANK TEMPERATURE SENSOR

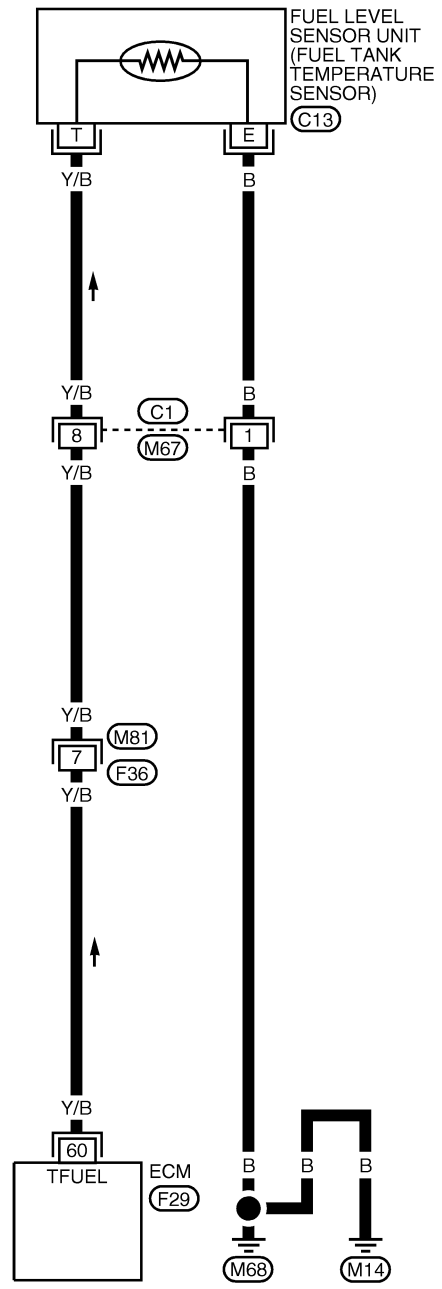
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1259

EC-FTTS-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

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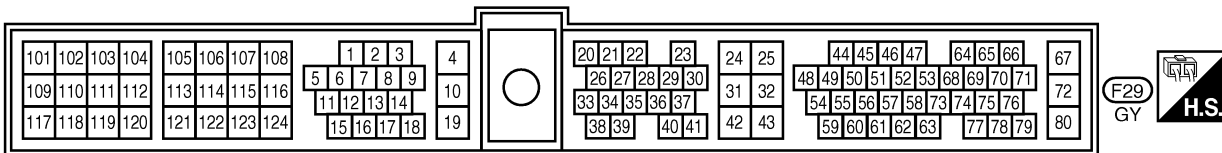
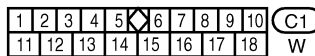
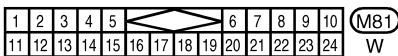
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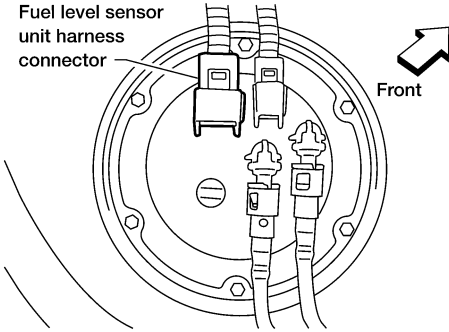
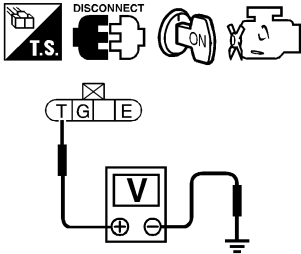
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LEC538

Diagnostic Procedure

NEEC1260

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT							
<p>1. Turn ignition switch OFF. 2. Disconnect fuel level sensor unit harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Fuel level sensor unit harness connector</p> <p style="margin-left: 200px;">Front</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between fuel level sensor unit terminal T and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-left: 100px;">Voltage: Approximately 5V</p> <p style="text-align: center; margin-left: 100px;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 3.</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 2.</td> </tr> </table>			OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.						
NG	▶	GO TO 2.						

LEC764
SEC310C

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 		
▶ Repair harness or connector.		

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT							
<p>1. Turn ignition switch OFF. 2. Check harness continuity between fuel level sensor unit terminal E and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center; margin-left: 100px;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black; padding: 5px;">OK</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 5.</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 4.</td> </tr> </table>			OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.						
NG	▶	GO TO 4.						

DTC P0180 FUEL TANK TEMPERATURE SENSOR

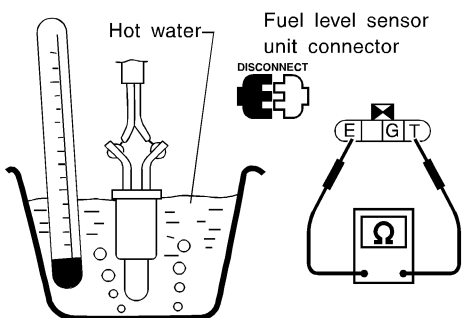
VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check harness for open between fuel tank temperature sensor and body ground.	
▶	Repair open circuit or short to power in harness or connectors.

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5	CHECK FUEL TANK TEMPERATURE SENSOR						
<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.</p>							
							
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ						
20 (68)	2.3 - 2.7						
50 (122)	0.79 - 0.90						
SEC311C							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace fuel tank temperature sensor.						

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6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

System Description

System Description

NEEC1261

COOLING FAN CONTROL

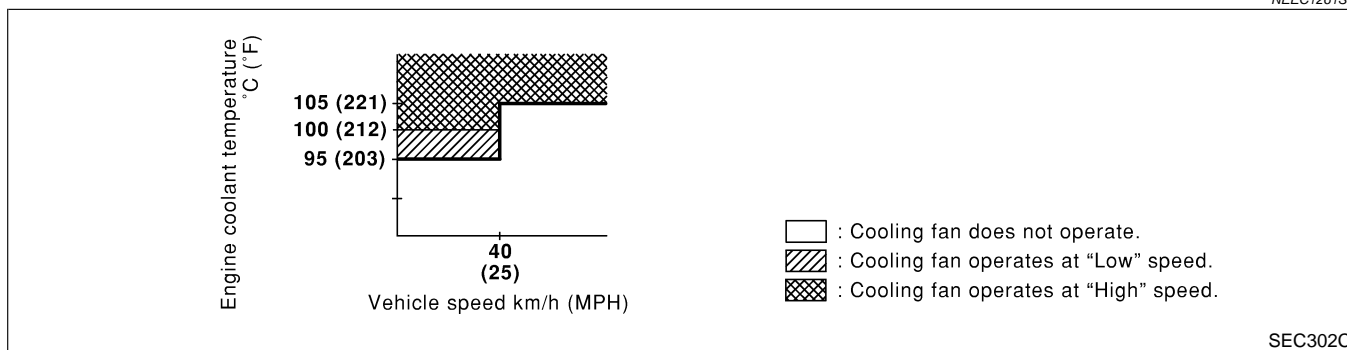
NEEC1261S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NEEC1261S02



SEC302C

CONSULT-II Reference Value in Data Monitor Mode

NEEC1262

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	Engine coolant temperature is 94°C (201°F) or less.	OFF
	<ul style="list-style-type: none"> Engine: Idling, after warming up Air conditioner switch: OFF Engine coolant temperature is between 95°C (203°F) and 100°C (212°F).	LOW
	Engine coolant temperature is 100°C (212°F) or more	HIGH

ECM Terminals and Reference Value

NEEC1263

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	G/R	Cooling fan relay (Low)	[Engine is running] <ul style="list-style-type: none"> Cooling fan is not operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Cooling fan is operating 	0 - 0.6V

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
38	LG/R	Cooling fan relay (High)	[Engine is running] ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 1V

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On Board Diagnosis Logic

NEEC1264

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy. When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip. Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

NEEC1265

- Harness or connectors
(The cooling fan circuit is open or shorted)
- Cooling fan
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1545.

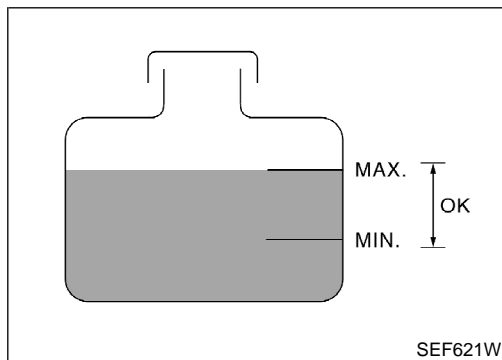
Overall Function Check

Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed. =NEEC1266

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator. NEEC1266S01

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-1534.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, **MA-27**.

- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, **MA-15**.
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-1534.

3. Turn ignition switch ON.

4. Perform “COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II.

- Set “COOLANT TEMP” to 95°C (194°F) and make sure that cooling fan operates. If NG, go to “Diagnostic Procedure”, EC-1534. After repair, go to next step.

5. Check for blocked coolant passage.

Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.

If NG, go to step 6 of “Diagnostic Procedure”, EC-1534. After repair, go to next step.

Be extremely careful not to touch any moving or adjacent parts.

6. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.

Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.

If NG, take appropriate action and then go to next step.

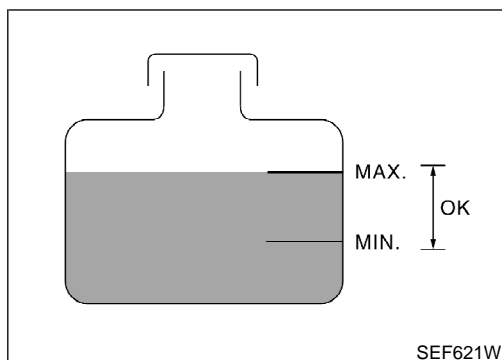
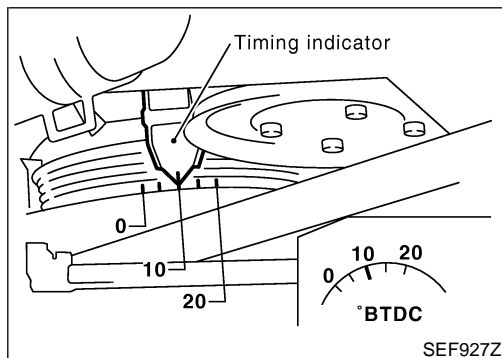
7. Check ECT sensor for proper operation. Refer to step 7 of

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Overall Function Check (Cont'd)

“Diagnostic Procedure”, EC-1534. If NG, replace ECT sensor and go to next step.



8. Check ignition timing. Refer to “Basic Inspection”, EC-1314. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

⊗ WITHOUT CONSULT-II

NEEC1266S02

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.
 - If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to step 3 of “Diagnostic Procedure”, EC-1534.
 - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, **MA-27**.
- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, **MA-15**.
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-1534.
3. Turn ignition switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.

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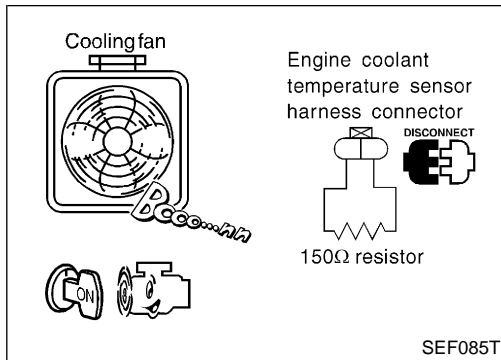
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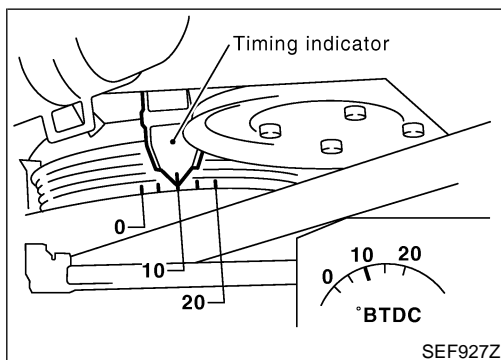
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Overall Function Check (Cont'd)



5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
If NG, go to step 9 of “Diagnostic Procedure”, EC-1534. After repair, go to next step.
7. Check for blocked coolant passage.
Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
If NG, go to step 6 of “Diagnostic Procedure”, EC-1534. After repair, go to next step.
Be extremely careful not to touch any moving or adjacent parts.
8. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
If NG, take appropriate action and then go to next step.
9. Check ECT sensor for proper operation. Refer to step 6 of “Diagnostic Procedure”, EC-1534. If NG, replace ECT sensor and go to next step.



10. Check ignition timing. Refer to “Basic Inspection”, EC-1314. Make sure that ignition timing is $10^\circ \pm 1^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

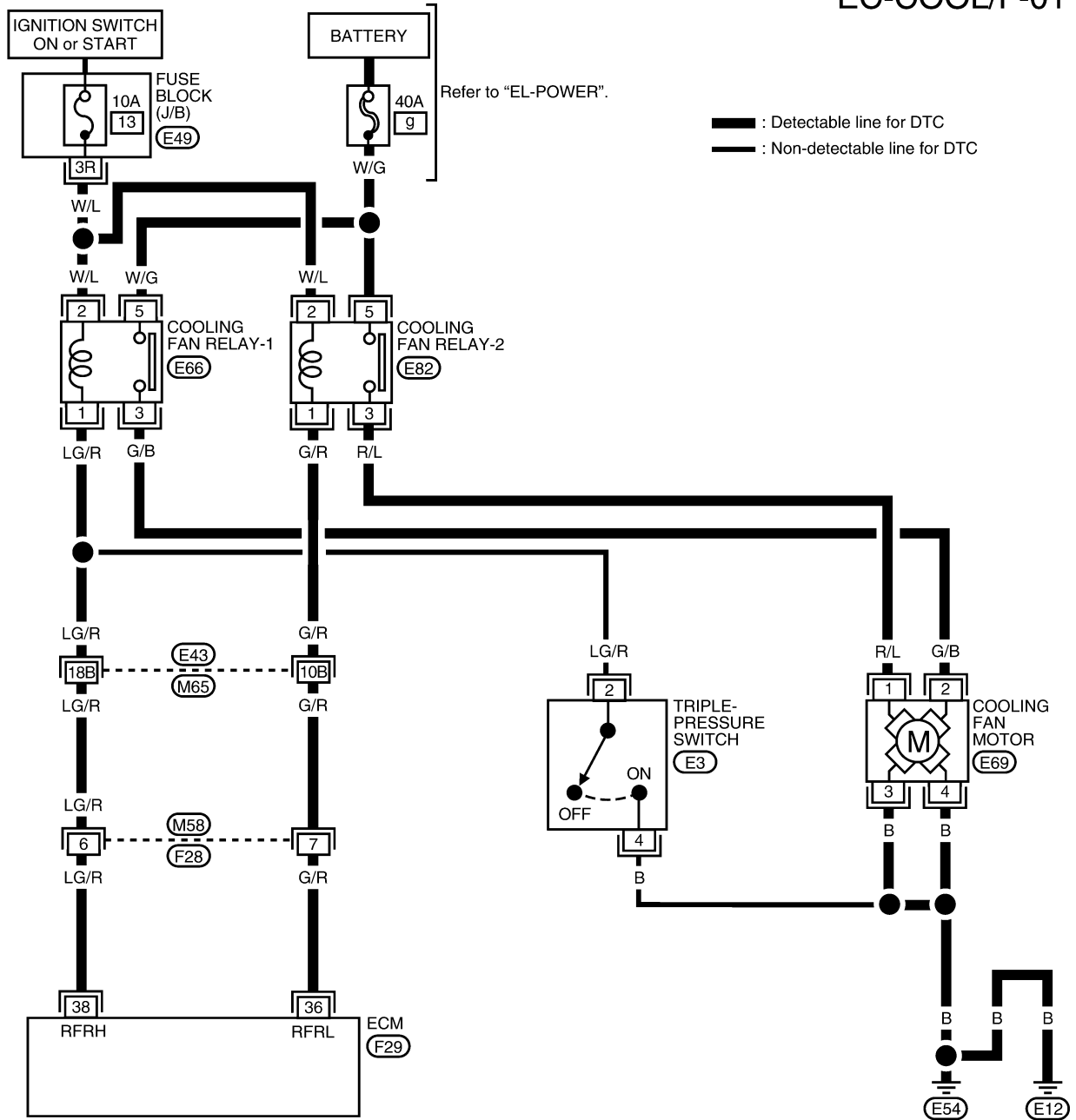
VG33ER

Wiring Diagram

Wiring Diagram

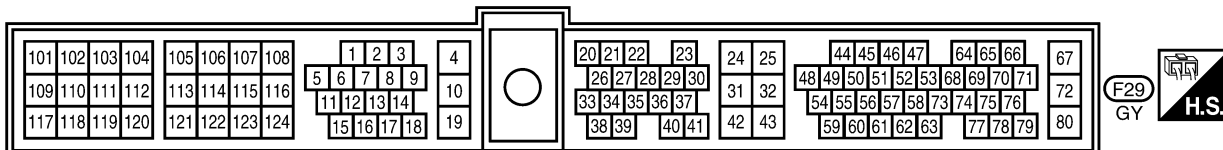
NEEC1267

EC-COOL/F-01



— : Detectable line for DTC
 - - - : Non-detectable line for DTC

Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC667

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

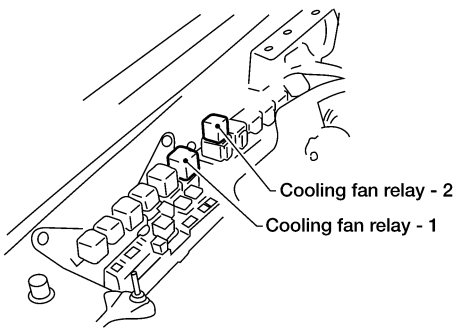
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Diagnostic Procedure

Diagnostic Procedure

NEEC1268

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK COOLING FAN LOW SPEED OPERATION																							
<p>📖 With CONSULT-II</p> <p>1. Disconnect cooling fan relay-1.</p>																								
																								
LEC765																								
<p>2. Turn ignition switch "ON".</p> <p>3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>4. Touch "LOW".</p>																								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>LOW</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	LOW	MONITOR		COOLAN TEMP/S	XXX °C														
ACTIVE TEST																								
COOLING FAN	LOW																							
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COOLAN TEMP/S	XXX °C																							
SEF784Z																								
5. Make sure that cooling fan operates at low speed.																								
OK or NG																								
OK	▶	GO TO 3.																						
NG	▶	GO TO 11.																						

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK COOLING FAN HIGH SPEED OPERATION																									
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect cooling fan relay-1. 3. Turn ignition switch "ON". 4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II. 5. Touch "HIGH". 																										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>HIGH</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	HIGH	MONITOR		COOLAN TEMP/S	XXX °C																
ACTIVE TEST																										
COOLING FAN	HIGH																									
MONITOR																										
COOLAN TEMP/S	XXX °C																									
<p>6. Make sure that cooling fan operates at higher speed than low speed.</p> <p style="margin-left: 100px;">OK or NG</p>																										
OK	▶	GO TO 6.																								
NG	▶	GO TO 16.																								

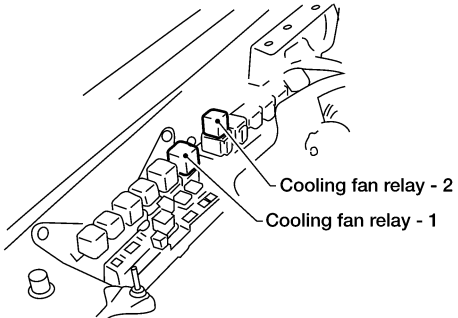
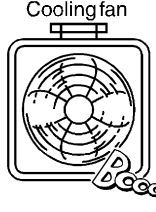
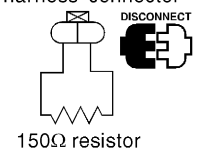

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

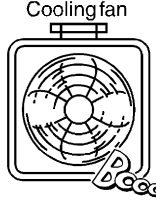
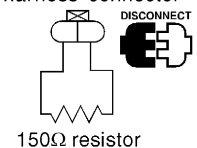

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK COOLING FAN LOW SPEED OPERATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect cooling fan relay-1. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 3. Disconnect engine coolant temperature sensor harness connector. 4. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 5. Start engine and make sure that cooling fan operate at low speed. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>Engine coolant temperature sensor harness connector</p>  <p>150Ω resistor</p> </div> </div> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 11.

LEC765

SEF085T

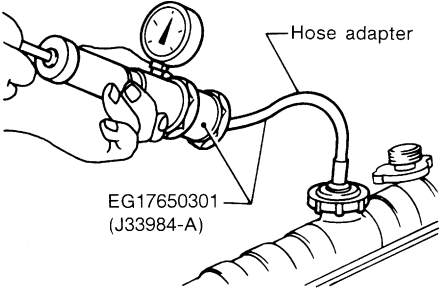
5	CHECK COOLING FAN HIGH SPEED OPERATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect cooling fan relay-1. 3. Restart engine and make sure that cooling fan operates at higher speed than low speed. <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>Engine coolant temperature sensor harness connector</p>  <p>150Ω resistor</p> </div> </div> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 16.

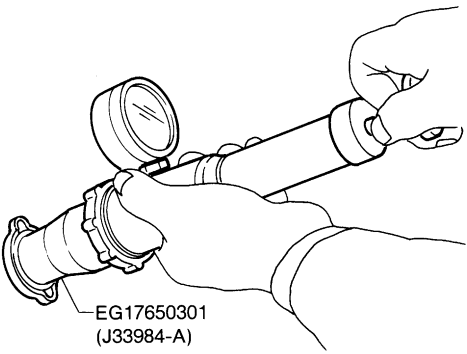
SEF085T

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK COOLING SYSTEM FOR LEAK	<p>Apply pressure to the cooling system with a tester, and check if the pressure drops.</p> <p>CAUTION: Higher than the specified pressure may cause radiator damage.</p> <p style="color: blue;">Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)</p> <div style="text-align: center;">  <p>EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC754A</p> <p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT
OK	▶	GO TO 7.	
NG	▶	<p>Check the following for leak:</p> <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump <p>Refer to LC-29, "Water Pump".</p>	

7	CHECK RADIATOR CAP	<p>Apply pressure to cap with a tester and check radiator cap relief pressure.</p> <div style="text-align: center;">  <p>EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC755A</p> <p style="color: blue;">Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>	TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 8.	
NG	▶	Replace radiator cap.	

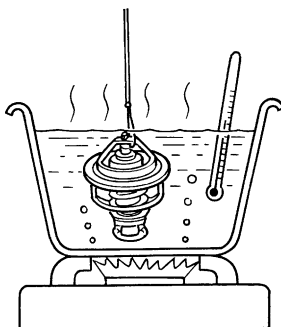
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

8 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]

Valve lift:
More than 10 mm/90°C (0.31 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to **LC-30**, "Thermostat".

OK or NG

OK



GO TO 9.

NG



Replace thermostat.

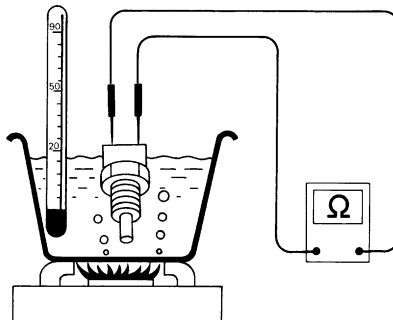
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

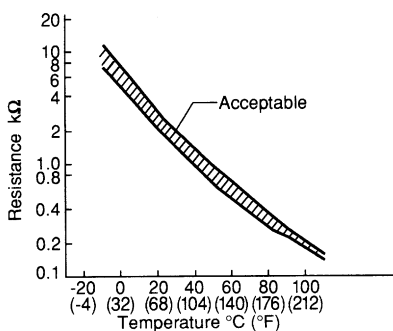
9 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

10 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1545.

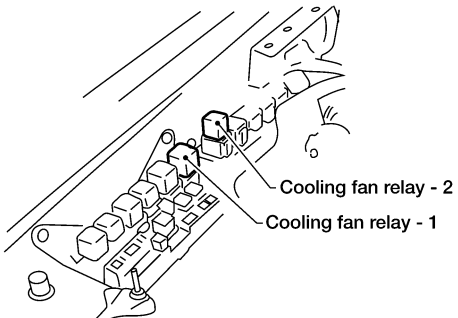
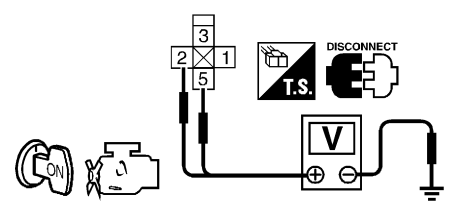
▶ **INSPECTION END**

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

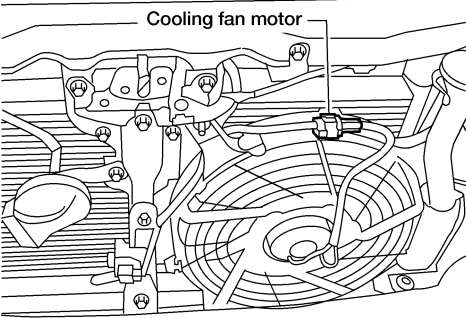
11	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan relay-2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">LEC765</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF667W</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

12	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay-2 and fuse ● Harness for open or short between cooling fan relay-2 and battery 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

13	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Cooling fan motor</p> </div> <p style="text-align: right; margin-right: 50px;">AEC931A</p> <p>3. Check harness continuity between cooling fan relay-2 terminal 3 and motor terminal 1, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 36 and cooling fan relay-2 terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 21.
NG	▶	GO TO 15.

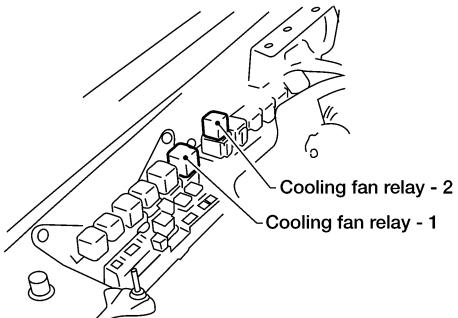
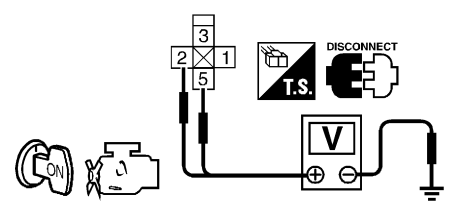
15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay-2 and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

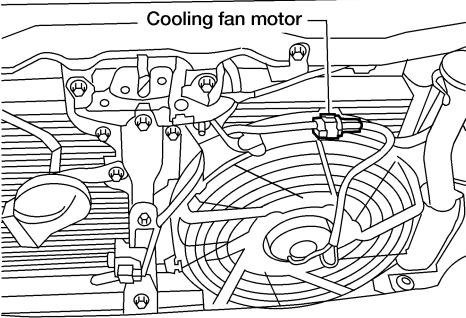
16	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect cooling fan relay-1.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">LEC765</p> <p>3. Turn ignition switch "ON". 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF667W</p> <p style="color: blue; font-weight: bold;">Voltage: Battery voltage</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ GO TO 17.

17	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay-1 and fuse ● Harness for open or short between cooling fan relay-1 and battery 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

18	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Cooling fan motor</p> </div> <p style="text-align: right; margin-right: 50px;">AEC931A</p> <p>3. Check harness continuity between cooling fan relay-1 terminal 3 and motor terminal 2, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 19.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

19	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 38 and cooling fan relay-1 terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

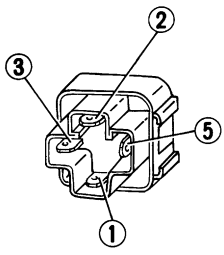
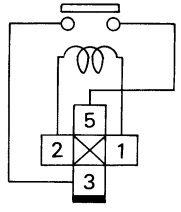
20	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay-1 and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

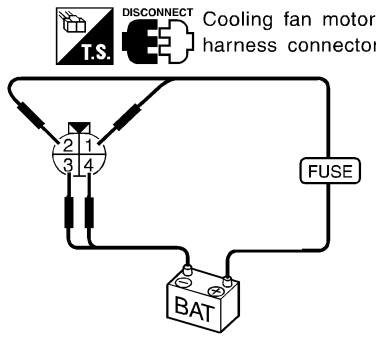
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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

21	CHECK COOLING FAN RELAY						
<p>Check continuity between terminals 3 and 5.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="text-align: right; margin-top: 10px;">SEF511P</div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No current supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">MTBL0252</div> <p style="text-align: center; margin-top: 10px;">OK or NG</p>		Conditions	Continuity	12V direct current supply between terminals 1 and 2	Yes	No current supply	No
Conditions	Continuity						
12V direct current supply between terminals 1 and 2	Yes						
No current supply	No						
OK	▶ GO TO 22.						
NG	▶ Replace cooling fan relay.						

22	CHECK COOLING FAN MOTOR													
<p>1. Disconnect cooling fan motor harness connector. 2. Supply cooling fan motor terminals with battery voltage and check operation.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th rowspan="2">Speed</th> <th colspan="2">Terminals</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">Cooling fan motor</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">1</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">High</td> <td style="text-align: center;">1, 2</td> <td style="text-align: center;">3, 4</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">MTBL0631</div> <div style="text-align: center; margin-top: 10px;">  <p style="margin-top: 5px;">OK or NG</p> </div> <div style="text-align: right; margin-top: 10px;">SEC303C</div>			Speed	Terminals		(+)	(-)	Cooling fan motor	Low	1	3	High	1, 2	3, 4
	Speed			Terminals										
		(+)	(-)											
Cooling fan motor	Low	1	3											
	High	1, 2	3, 4											
OK	▶ GO TO 23.													
NG	▶ Replace cooling fan motor.													

23	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>	
▶	INSPECTION END

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC1269

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA-13 .
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-27 .
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check" in LC-27 .
ON*2	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check" in LC-27 .
ON*2	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator" in LC-30, LC-32 .
ON*1	7	<ul style="list-style-type: none"> Cooling fan 	<ul style="list-style-type: none"> CONSULT-II 	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" (EC-1670).
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-27 .
OFF*4	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA-27 .
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM-96 .
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM-116 .

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS", **LC-35**.

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring. NEEC1270

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change. When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

POSSIBLE CAUSE

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1 (front)
- Incorrect distributor rotor

NEEC1270S01

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
	B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NEEC1271

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1547.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NEEC1272

1	CHECK FOR INTAKE AIR LEAK	
<ol style="list-style-type: none"> 1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak. 		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

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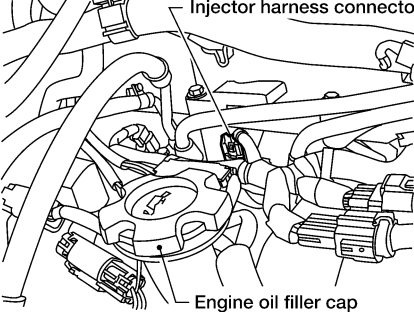
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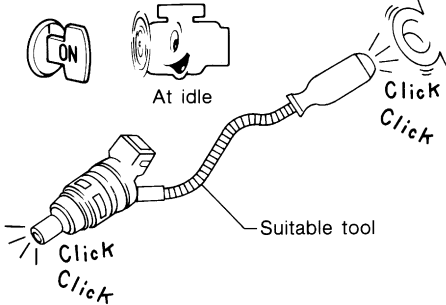
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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

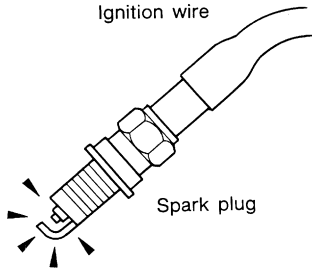
3	PERFORM POWER BALANCE TEST																				
<p>With CONSULT-II</p> <p>1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> <p style="text-align: right;">SEF070Y</p> <p>2. Is there any cylinder which does not produce a momentary engine speed drop?</p>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																					
POWER BALANCE																					
MONITOR																					
ENG SPEED	XXX rpm																				
MAS AIF SE-B1	XXX V																				
IACV-AAC/V	XXX step																				
<p>Without CONSULT-II</p> <p>When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Injector harness connector</p> <p style="margin-left: 100px;">Engine oil filler cap</p> </div> <p style="text-align: right;">LEC809</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> </table>		Yes	▶	GO TO 4.	No	▶	GO TO 7.														
Yes	▶	GO TO 4.																			
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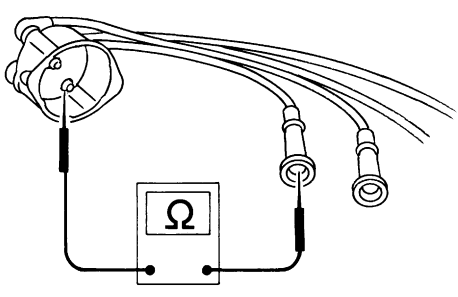
4	CHECK INJECTOR						
<p>Does each injector make an operating sound at idle?</p> <div style="text-align: center;">  </div> <p style="text-align: right;">MEC703B</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Check injector(s) and circuit(s). Refer to EC-1793.</td> </tr> </table>		Yes	▶	GO TO 5.	No	▶	Check injector(s) and circuit(s). Refer to EC-1793.
Yes	▶	GO TO 5.					
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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

5	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF282G</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 7.
NG	▶	GO TO 6.

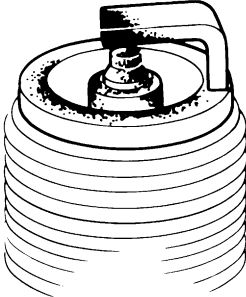
6	CHECK IGNITION WIRES	<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF174P</p> <p>Resistance:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">Cylinder No.</th> <th style="text-align: center;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Approximately 6.5</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Approximately 10.0</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Approximately 12.5</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">Approximately 11.0</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0235</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>	Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]															
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2	Approximately 10.0															
3	Approximately 8.5															
4	Approximately 12.5															
5	Approximately 8.5															
6	Approximately 11.0															
OK	▶	Check the following: <ul style="list-style-type: none"> ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1786.														
NG	▶	Replace.														

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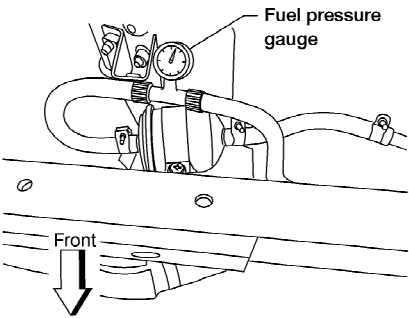
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.		
		
SEF156I		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", MA-32 .

8	CHECK COMPRESSION PRESSURE	
Refer to EM-78 .		
<ul style="list-style-type: none"> ● Check compression pressure. 		
<ul style="list-style-type: none"> Standard: <li style="padding-left: 40px;">1,196 kPa (12.2 kg/cm², 173 psi)/300 rpm Minimum: <li style="padding-left: 40px;">883 kPa (9.0 kg/cm², 128 psi)/300 rpm Difference between each cylinder: <li style="padding-left: 40px;">98 kPa (1.0 kg/cm², 14 psi)/300 rpm 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE	
<ol style="list-style-type: none"> 1. Install any parts removed. 2. Release fuel pressure to zero. Refer to EC-1259. 3. Install fuel pressure gauge and check fuel pressure. 		
		
AEC064B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1801.) ● Fuel pressure regulator (Refer to EC-1260.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-29.) ● Fuel filter for clogging 	
▶	Repair or replace.

11	CHECK IGNITION TIMING										
<p>Check the following items. Refer to "Basic Inspection", EC-1314.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II) ▶	GO TO 12.										
OK (Without CONSULT-II) ▶	GO TO 13.										
NG ▶	Adjust ignition timing.										

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

12 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

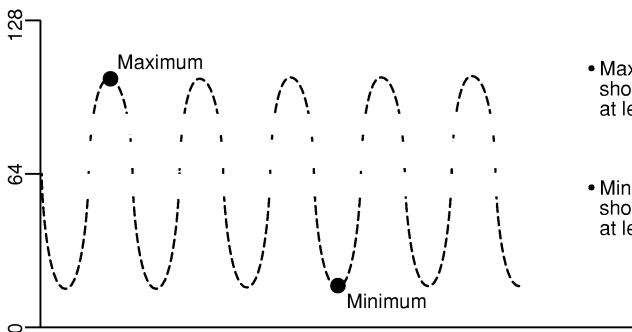
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

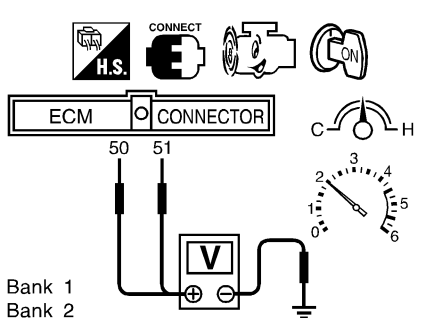
OK or NG

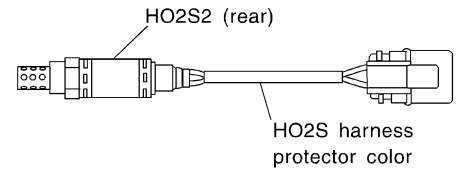
OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1 (front).

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 14.



14	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. 	
	
<p>HO2S2 (rear) (bank 1): Gray HO2S2 (rear) (bank 2): Red Brown</p>	
SEC301C	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

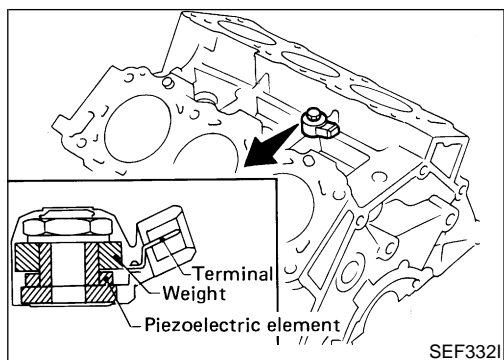
Diagnostic Procedure (Cont'd)

15	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p>		
<p> With GST Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 16.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1360.

16	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-1331. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-1287.		
	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
	▶	INSPECTION END



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

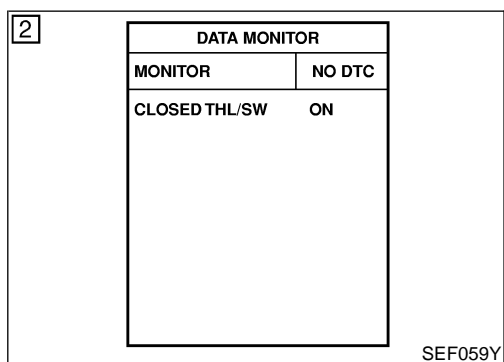
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
(The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-1557.

With GST

Follow the procedure "With CONSULT-II".

DTC P0325 KNOCK SENSOR (KS)

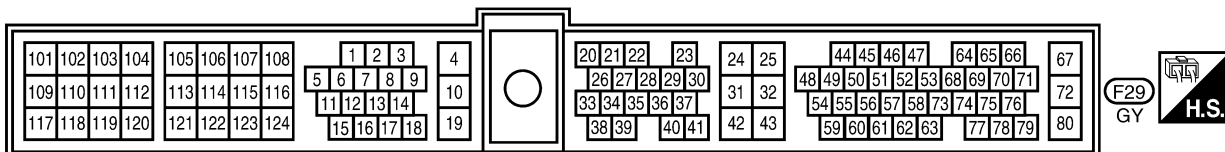
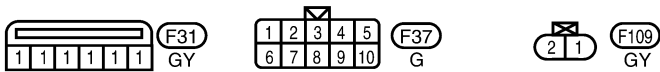
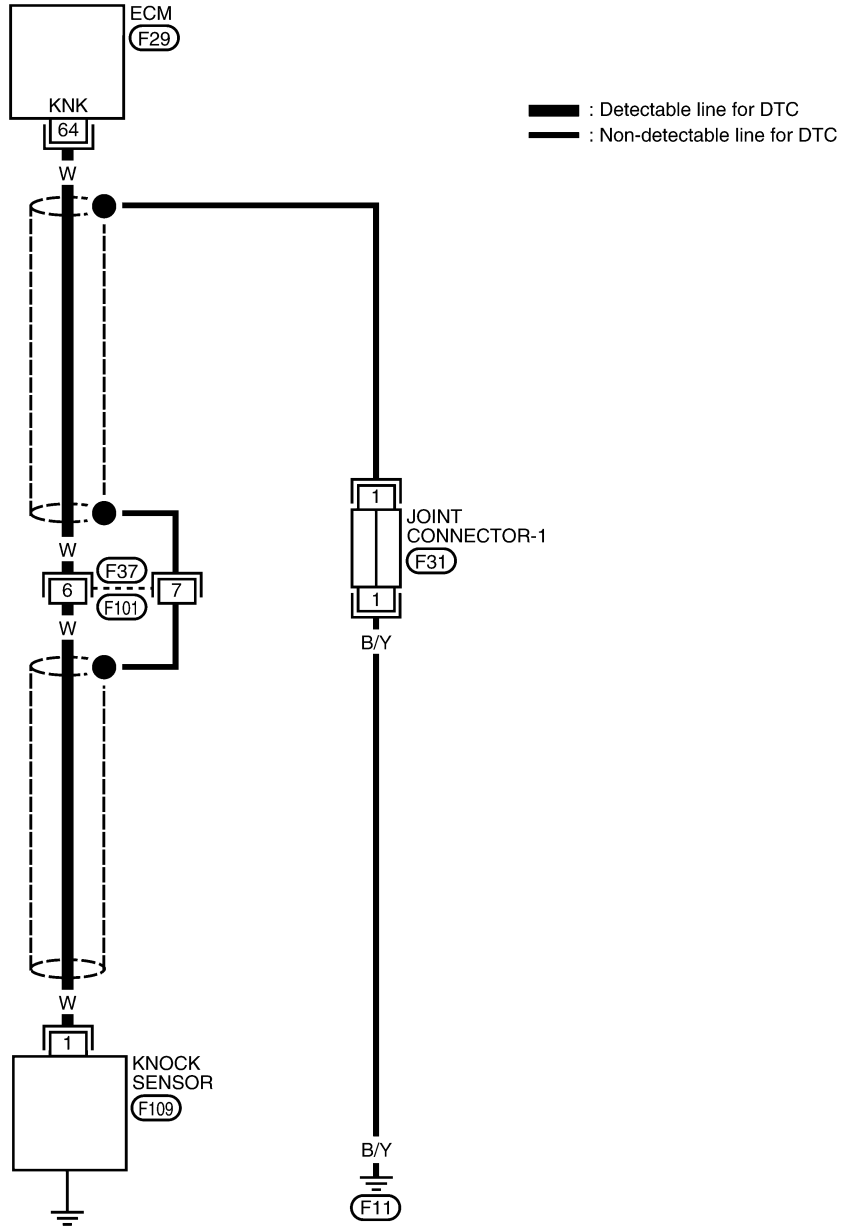
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1277

EC-KS-01



LEC668

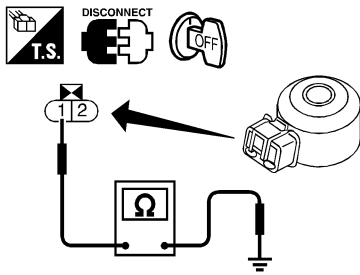
Diagnostic Procedure

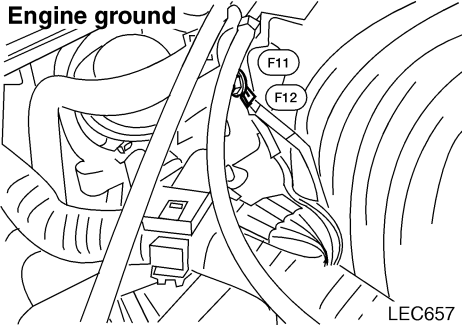
NEEC1278

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check resistance between ECM terminal 64 and engine ground.</p> <p>NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ.</p> <p style="color: blue;">Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)]</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-II	
<p>1. Disconnect knock sensor harness connector.</p> <p>2. Check harness continuity between ECM terminal 64 and knock sensor terminal 1. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connector F37, F101 ● Harness for open or short between ECM and knock sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

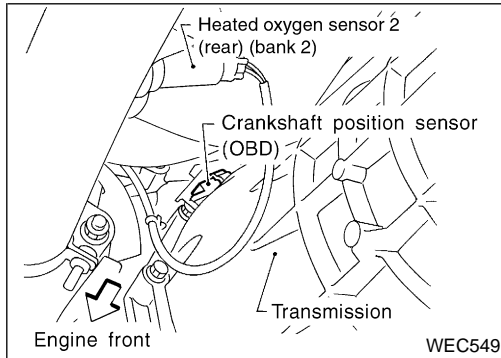
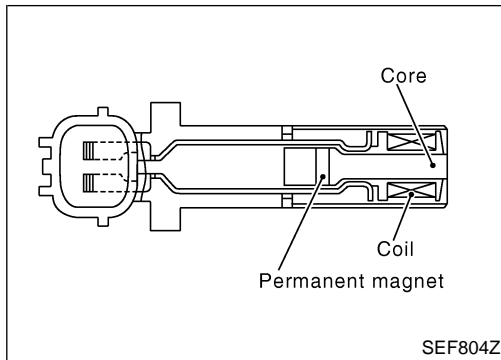
4	CHECK KNOCK SENSOR	
<ul style="list-style-type: none"> ● Use an ohmmeter which can measure more than 10 MΩ. <p>1. Disconnect knock sensor harness connector.</p> <p>2. Check resistance between terminal 1 and ground.</p> <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;"> <div style="text-align: center;">  </div> <div style="margin-left: 20px;"> <p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> </div> </div> <p style="color: red;">CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS
Loose and retighten engine ground screws.	
 <p style="text-align: right; margin-right: 50px;">LEC657</p>	
LEC657	
▶ GO TO 6.	

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect harness connectors F37, F101. 2. Check harness continuity between harness connector F37 terminal 7 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Joint connectors-1 ● Harness for open between harness connector F37 and engine ground 	
▶ Repair open circuit or short to power in harness or connectors.	

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶ INSPECTION END	



Component Description

NEEC1279

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system. It is used only for the on board diagnosis.

GI

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ECM Terminals and Reference Value

NEEC1280

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

AT

TF

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	<p>1 - 2V (AC range)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p>

PD

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HA

SC

EL

IDX

On Board Diagnosis Logic

Malfunction is detected when the proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. NEEC1281

POSSIBLE CAUSE

- Harness or connectors
[The crankshaft position sensor (OBD) circuit is open.]
- Crankshaft position sensor (OBD)

NEEC1281S01

2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <td style="text-align: center;">MONITOR</td> <td style="text-align: center;">NO DTC</td> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						

SEF058Y

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC1282

With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and run it for at least 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1562.

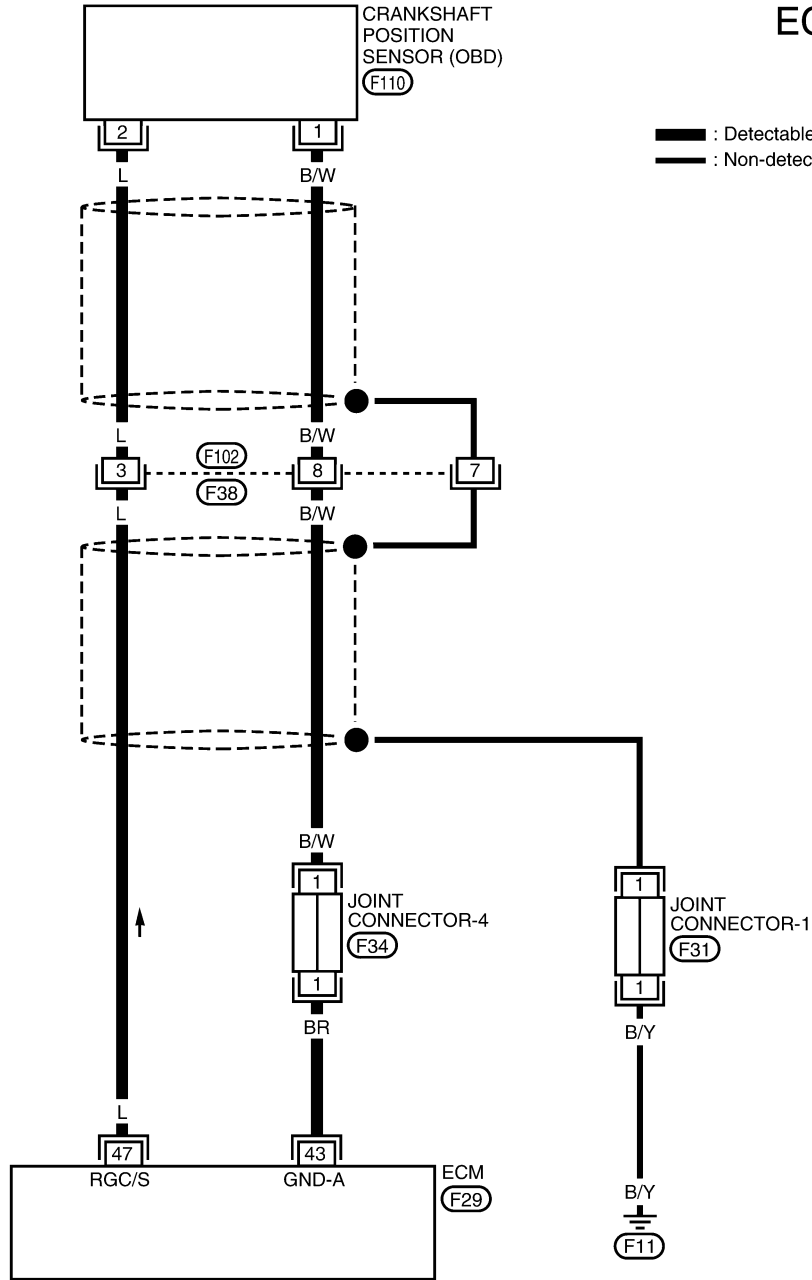
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NEEC1283

EC-CKPS-01



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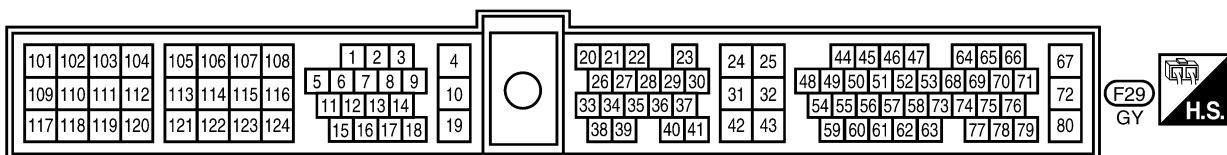
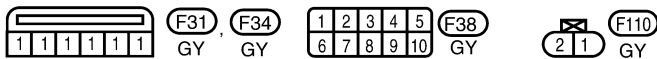
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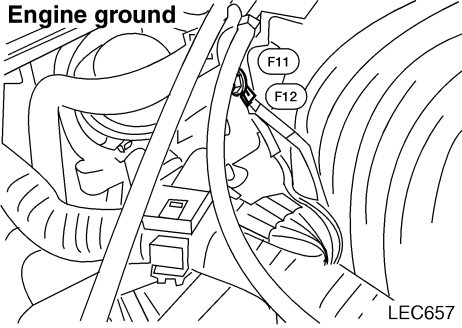
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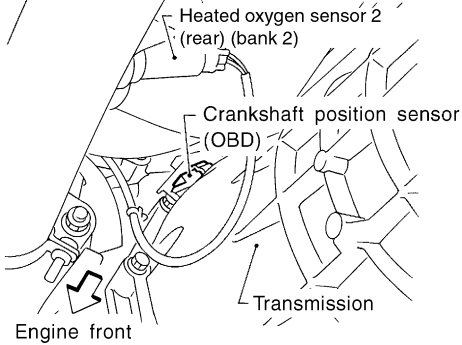
IDX



Diagnostic Procedure

NEEC1284

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
 <p>The diagram shows a close-up of the engine compartment with two ground screws labeled F11 and F12. The text 'Engine ground' is written above the screws. The reference code 'LEC657' is located at the bottom right of the diagram.</p>	
LEC657	
▶ GO TO 2.	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p>	
 <p>The diagram shows the front of the engine with labels for 'Heated oxygen sensor 2 (rear) (bank 2)', 'Crankshaft position sensor (OBD)', and 'Transmission'. An arrow points to the 'Engine front'.</p>	
WEC549	
<p>2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

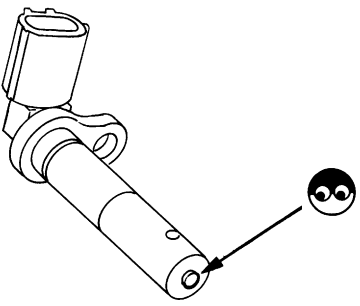
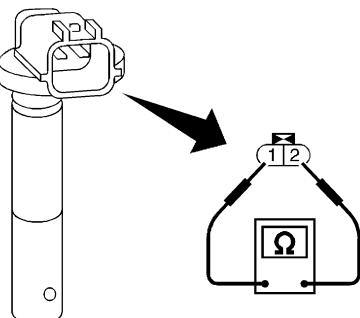
3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Reconnect ECM harness connector. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶		Repair open circuit or short to power in harness or connectors.

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.		
		
5. Check resistance as shown in the figure.		
		
Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

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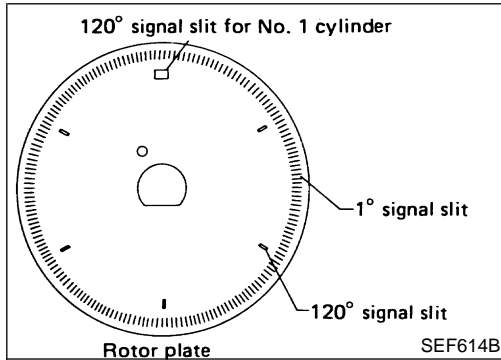
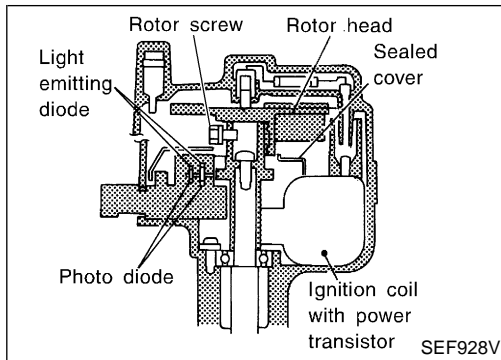
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT		
<p>1. Disconnect harness connectors F38, F102.</p> <p>2. Check harness continuity between harness connector F38 terminal 7 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶		GO TO 9.
NG	▶		GO TO 8.

8	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-1● Harness for open between harness connector F38 and engine ground			
	▶		Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.			
	▶		INSPECTION END



Component Description

NEEC1285

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

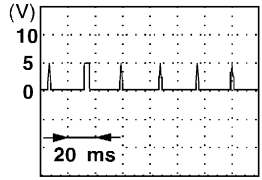
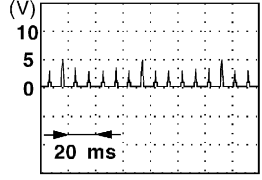
ECM Terminals and Reference Value

NEEC1286

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

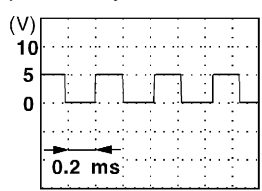
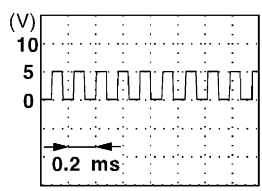
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V 
48	PU		[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V 

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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

VG33ER

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 2.5V 
			[Engine is running] <ul style="list-style-type: none"> • Engine speed is 2,000 rpm 	Approximately 2.5V 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> • Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC1287

Malfunction is detected when

(Malfunction A) either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking,

(Malfunction B) either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed,

(Malfunction C) the relation between 1° and 120° signal is not in the normal range during the specified engine speed.

POSSIBLE CAUSE

NEEC1287S01

- Harness or connectors
(The camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Starter motor (Refer to **SC-10**.)
- Starting system circuit (Refer to **SC-10**.)
- Dead (Weak) battery

DTC Confirmation Procedure

NEEC1288

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

NEEC1288S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1569.

With GST

Follow the procedure “With CONSULT-II”.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NEEC1288S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1569.

With GST

Follow the procedure “With CONSULT-II”.

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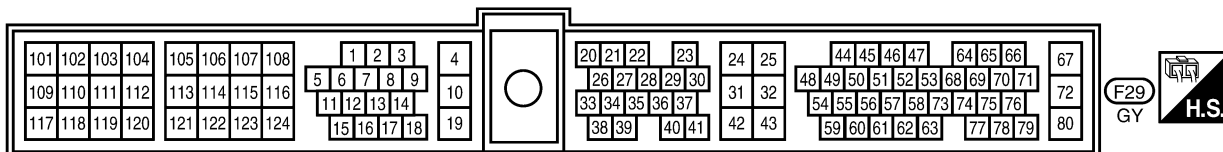
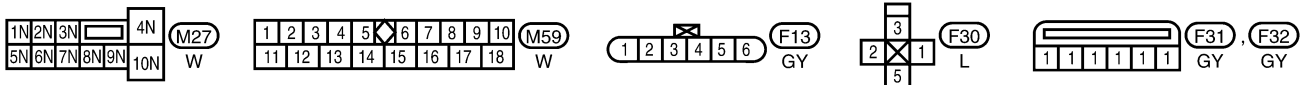
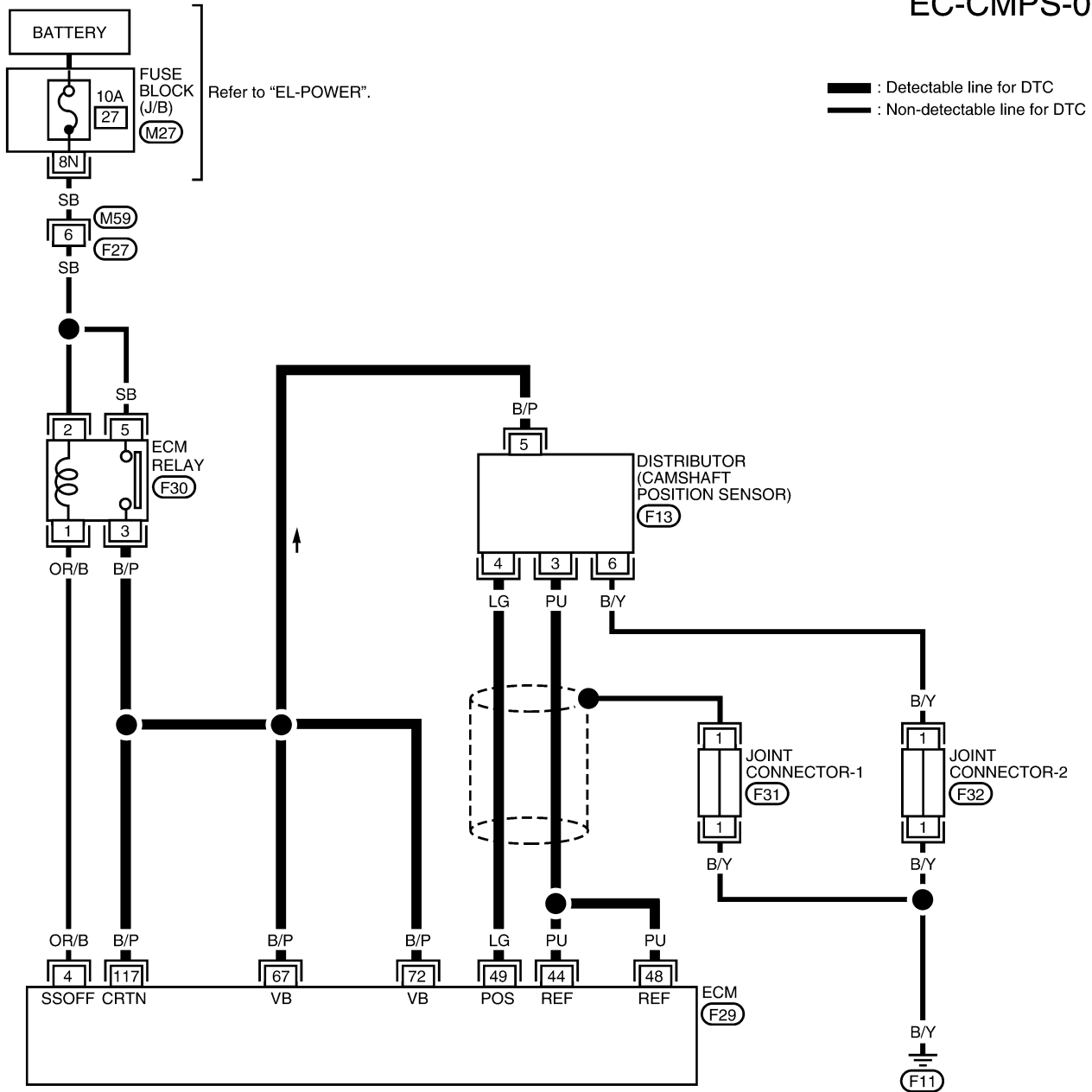
EL

IDX

Wiring Diagram

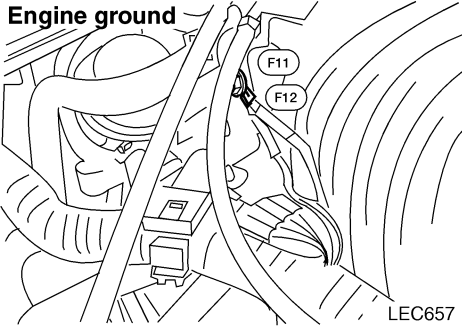
NEEC1289

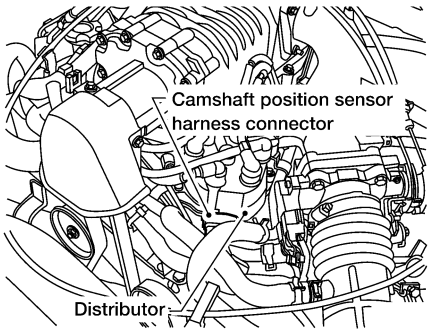
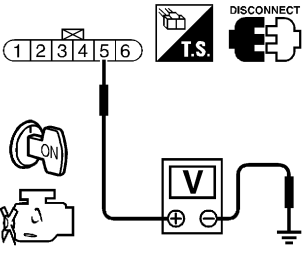
EC-CMPS-01



Diagnostic Procedure

NEEC1290

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	<p>GI MA EM LC EC FE CL</p>
▶ GO TO 2.		LEC657	

2	CHECK CMPS POWER SUPPLY CIRCUIT	<p>1. Disconnect camshaft position sensor harness connector.</p> <div style="text-align: center;">  <p>Camshaft position sensor harness connector</p> <p>Distributor</p> <p>LEC810</p> </div> <p>2. Turn ignition switch ON. 3. Check voltage between CMPS terminal 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	<p>MT AT TF PD AX SU BR ST RS BT HA SC EL IDX</p>
▶ GO TO 4.			
▶ GO TO 3.			

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS)

VG33ER

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness for open or short between camshaft position sensor and ECM relay● Harness for open or short between camshaft position sensor and ECM	
	▶ Repair harness or connectors.

4	CHECK CMPS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between CMPS terminal 4 and ECM terminal 49, CMPS terminal 3 and ECM terminals 44, 48. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

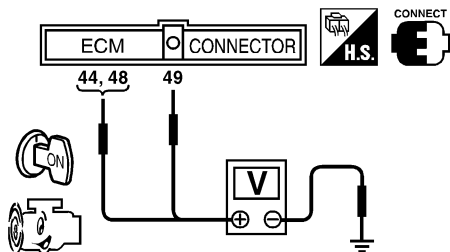
5	CHECK CMPS GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between CMPS terminal 6 and engine ground. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Joint connector-2● Harness for open between camshaft position sensor and engine ground	
	▶ Repair open circuit or short to power in harness or connector.

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7 CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

AEC072B

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace distributor assembly with camshaft position sensor.

8 CHECK CMPS SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector-1.
3. Check the following.
 - Continuity between joint connector terminal 1 and ground
 - Joint connector-1
(Refer to **EL-238**, "HARNES LAYOUT".)
Continuity should exist.
4. Also check harness for short to power.
5. Then reconnect joint connector-1.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9 CHECK INTERMITTENT INCIDENT

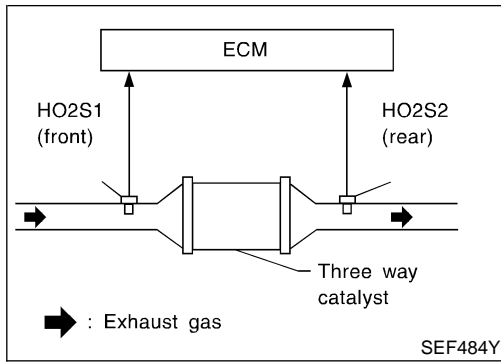
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

	▶	INSPECTION END
--	---	-----------------------

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33ER

On Board Diagnosis Logic



On Board Diagnosis Logic

NEEC1291

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 (front) and 2 (rear) approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

POSSIBLE CAUSE

NEEC1291S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NEEC1292

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II TESTING CONDITION

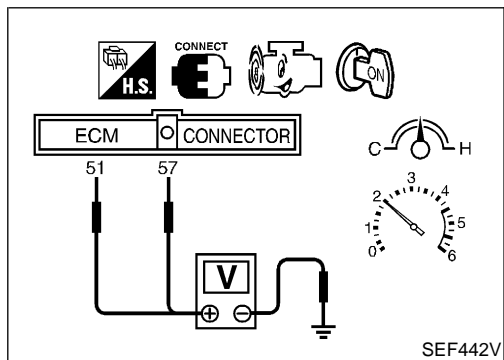
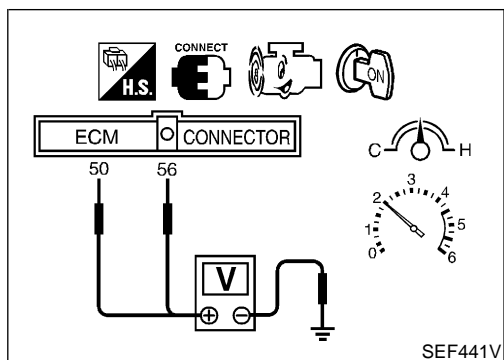
- Open engine hood before conducting the following procedure.
- Do not hold engine speed for more than the specified minutes below.
 - 1) Turn ignition switch ON.
 - 2) Select "DTC & SRT CONFIRMATION" the SRT WORK SUPPORT" mode with CONSULT-II.
 - 3) Start engine.
 - 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
 - 5) Wait 5 seconds at idle.
 - 6) Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minute.).
 - 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II. If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-1574. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and retest from step 1).

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33ER

Overall Function Check

NEEC1293



Overall Function Check

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 [heated oxygen sensor 1 (front) (bank 1) signal], 51 [heated oxygen sensor 1 (front) (bank 2) signal] and engine ground, and ECM terminals 56 [heated oxygen sensor 2 (rear) (bank 1) signal], 57 [heated oxygen sensor 2 (rear) (bank 2) signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 (rear) voltage switching frequency

B: Heated oxygen sensor 1 (front) voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-1574.

NOTE:

If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-1429.)

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DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

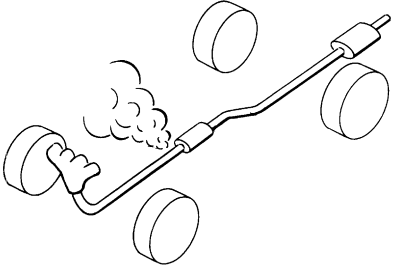
VG33ER

Diagnostic Procedure

Diagnostic Procedure

=NEEC1294

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
		
SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

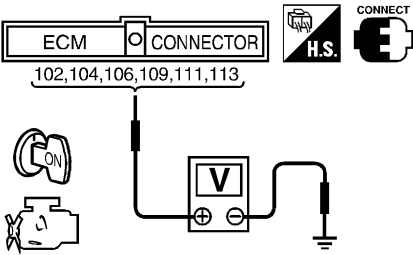
3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING											
Check the following items. Refer to "Basic Inspection", EC-1314.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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MTBL0576												
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

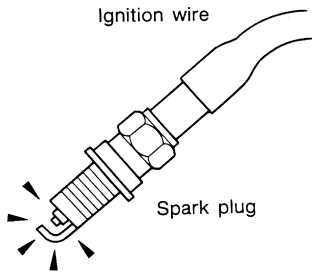
DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33ER

Diagnostic Procedure (Cont'd)

5	CHECK INJECTOR CIRCUITS	<ol style="list-style-type: none"> 1. Refer to WIRING DIAGRAM for Injectors, EC-1793. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester.
		
		<p>Battery voltage should exist.</p> <p>OK or NG</p>
OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1794.

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6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark.
		
		<p>OK or NG</p>
OK	▶	GO TO 8.
NG	▶	GO TO 7.

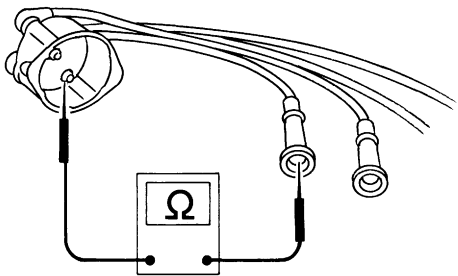
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DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK IGNITION WIRES															
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 																
																
<p>Resistance:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Cylinder No.</th> <th style="text-align: center;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Approximately 6.5</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Approximately 10.0</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Approximately 12.5</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">Approximately 11.0</td> </tr> </tbody> </table>			Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]															
1	Approximately 6.5															
2	Approximately 10.0															
3	Approximately 8.5															
4	Approximately 12.5															
5	Approximately 8.5															
6	Approximately 11.0															
SEF174P																
MTBL0235																
<p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>Check ignition coil, power transistor and their circuits. Refer to EC-1786.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace.</td> </tr> </table>			OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1786.	NG	▶	Replace.								
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1786.														
NG	▶	Replace.														

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-1260. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch ON. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
Trouble is fixed	▶	INSPECTION END
Trouble is not fixed	▶	Replace warm-up three way catalyst.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1295

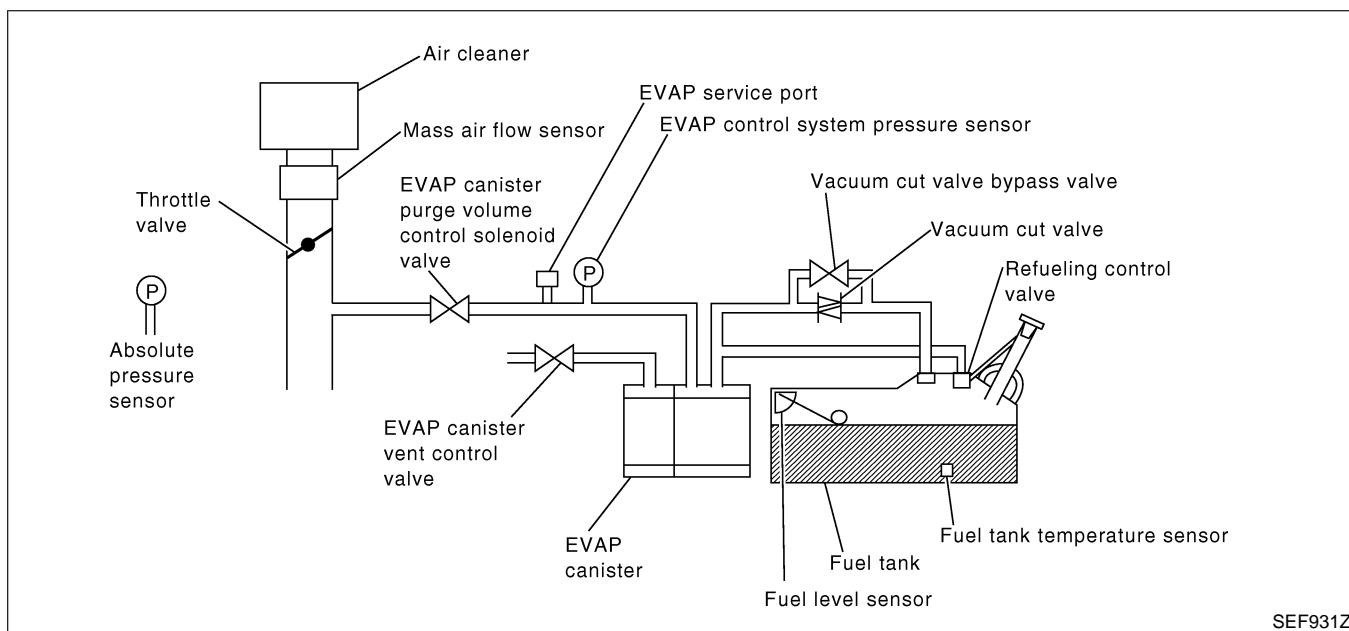
NOTE:

If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1747.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



SEF931Z

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC1295S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.

EC-1577

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit.
- Refueling EVAP vapor cut
- ORVR system leaks

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

On Board Diagnosis Logic (Cont'd)

NEEC1296

5

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
-FUEL LEVEL: 1/4-3/4
-AMBIENT TEMP: 0-30 C(32-86F)
-OPEN ENGINE HOOD.
2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
3)TOUCH START.

SEF565X

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EVAP SML LEAK P0440/P1440

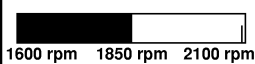
WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

5

EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)



1600 rpm 1850 rpm 2100 rpm

SEF874X

5

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NOTE:

- If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1747.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 4) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 5) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1314.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1580.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Ⓜ With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-1281 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-1281.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-1281.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P0440 is displayed on the screen, go to “Diagnostic Procedure”, EC-1580.
 - If P1447 is displayed on the screen, go to “Diagnostic Procedure” for “DTC P1447”, EC-1738.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

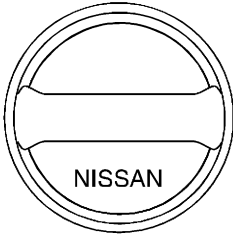
VG33ER

DTC Confirmation Procedure (Cont'd)

- If P0440 and P1447 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NEEC1297

1	CHECK FUEL FILLER CAP DESIGN	
<p>1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF915U</p>		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
<p>Check that the cap is tightened properly by rotating the cap clockwise.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
<p>Check for air releasing sound while opening the fuel filler cap.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE	
<p>Refer to "Evaporative Emission System", EC-1241.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

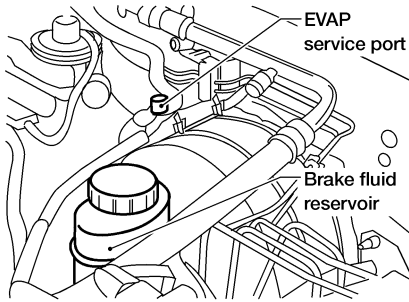
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

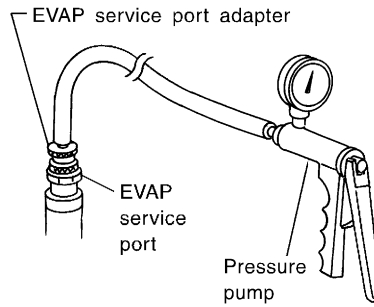
Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CON- SULT-II ▶	GO TO 7.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

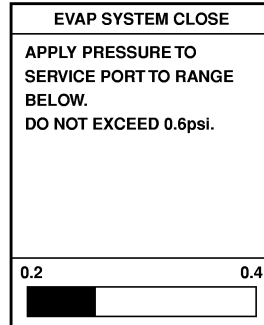
6 CHECK FOR EVAP LEAK

Ⓜ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

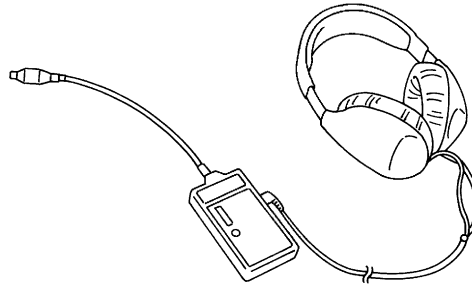
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

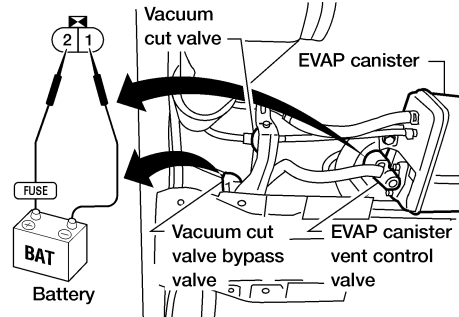
VG33ER

Diagnostic Procedure (Cont'd)

7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

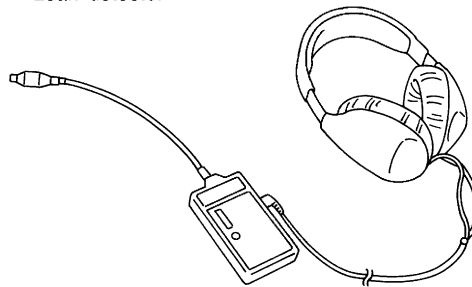
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.**

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

Leak detector



SEF200U

OK or NG

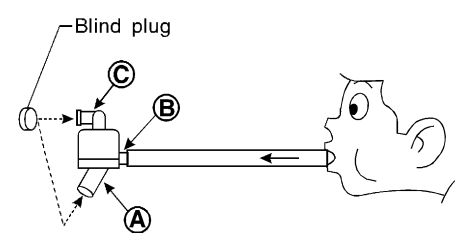
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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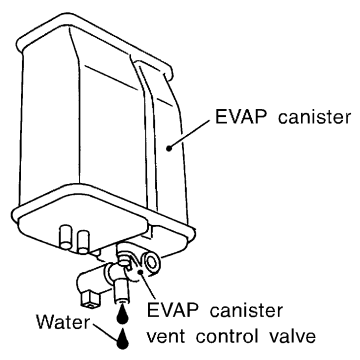
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; margin-right: 20px;">SEF829T</p>	
5. In case of NG in items 2 - 4, replace the parts. NOTE:	
<ul style="list-style-type: none"> ● Do not disassemble water separator. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-1600.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">Water</p> </div> <p style="text-align: right; margin-right: 20px;">SEF596U</p>	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
☑ With CONSULT-II <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
☒ Without CONSULT-II <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. Vacuum should exist.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1235.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

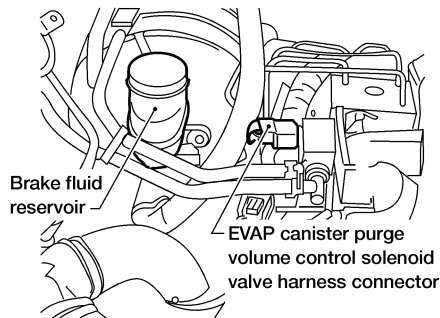
VG33ER

Diagnostic Procedure (Cont'd)

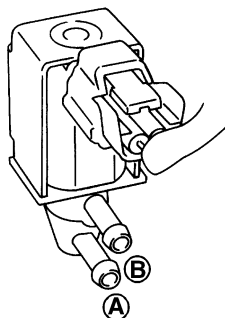
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



AEC652A

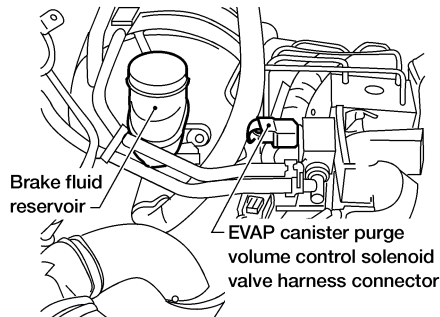


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

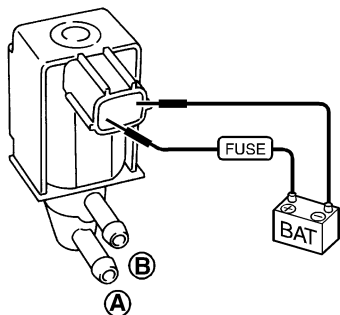
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



AEC652A



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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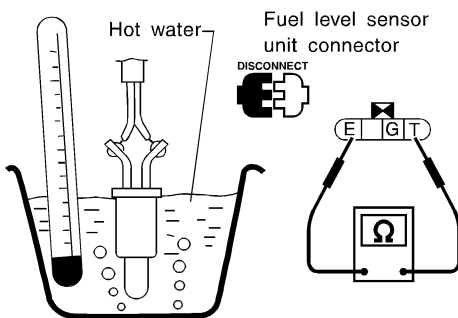
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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

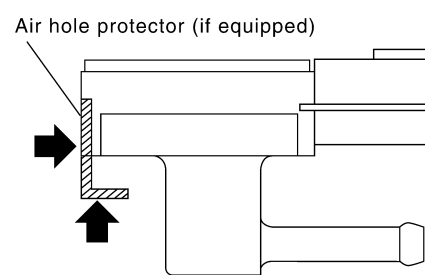
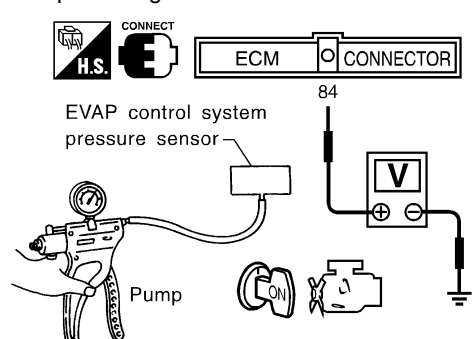
Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR						
<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.</p>							
							
<table border="1" style="border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ						
20 (68)	2.3 - 2.7						
50 (122)	0.79 - 0.90						
SEC311C							
OK or NG							
OK	▶ GO TO 19.						
NG	▶ Replace fuel tank temperature sensor.						

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF799W</p> <p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure. <p>5. Check input voltage between ECM terminal 84 and ground.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pressure (Relative to atmospheric pressure)</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 kPa (0 mmHg, 0 inHg)</td> <td style="text-align: center;">3.0 - 3.6</td> </tr> <tr> <td style="text-align: center;">-9.3 kPa (-70 mmHg, -2.76 inHg)</td> <td style="text-align: center;">0.4 - 0.6</td> </tr> </tbody> </table> </div> </div> <p style="text-align: right;">SEF342X</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. <p style="text-align: center;">OK or NG</p>	Pressure (Relative to atmospheric pressure)	Voltage V	0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6	-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6
Pressure (Relative to atmospheric pressure)	Voltage V							
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6							
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6							
OK	▶	GO TO 20.						
NG	▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-1241.</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE	<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p>
	▶	GO TO 22.

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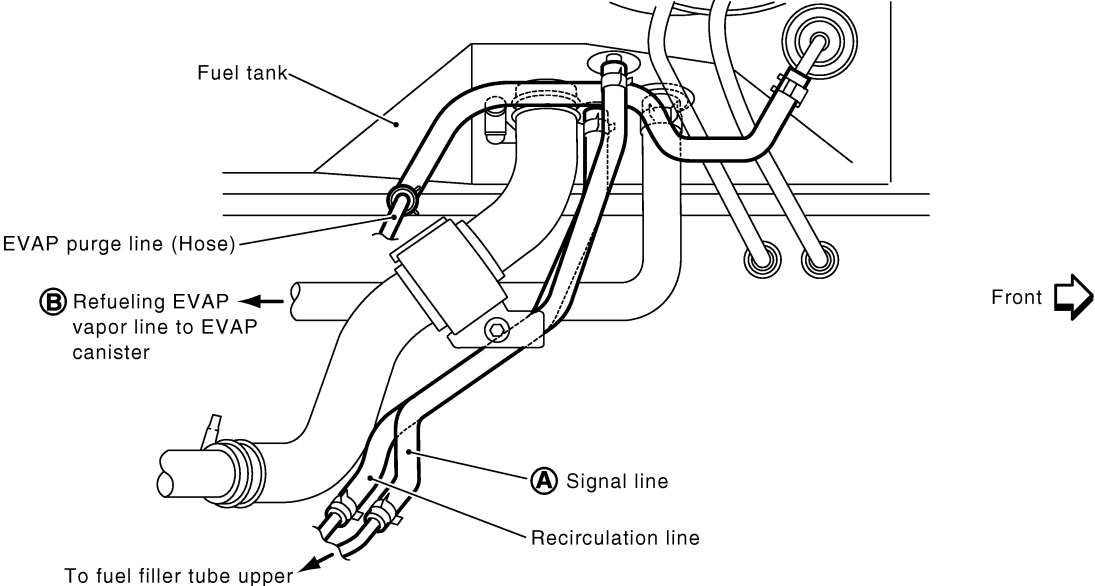
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

22	CHECK REFUELING EVAP VAPOR LINE		
<p>Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-1247.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 23.	
NG	▶	Repair or replace hoses and tubes.	

23	CHECK SIGNAL LINE AND RECIRCULATION LINE		
<p>Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 24.	
NG	▶	Repair or replace hoses, tubes or filler neck tube.	

24	CHECK REFUELING CONTROL VALVE		
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 			
			
OK or NG			
OK	▶	GO TO 25.	
NG	▶	Replace refueling control valve with fuel tank.	

25	CHECK FUEL LEVEL SENSOR		
<p>Refer to EL-82, "FUEL LEVEL SENSOR UNIT CHECK".</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 26.	
NG	▶	Replace fuel level sensor unit.	

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

VG33ER

Diagnostic Procedure (Cont'd)

26	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33ER

Description

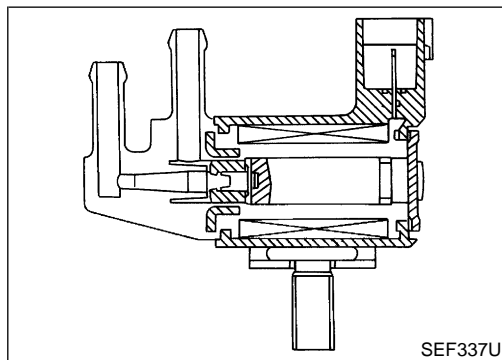
Description SYSTEM DESCRIPTION

NEEC1298

NEEC1298S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC1298S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1299

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
	2,000 rpm	0%
		—

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33ER

ECM Terminals and Reference Value

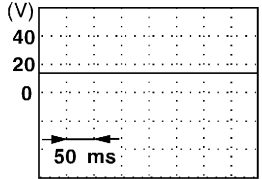
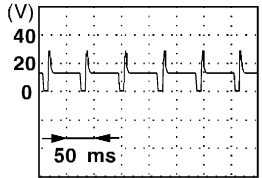
ECM Terminals and Reference Value

NEEC1300

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	0 - 1.5V
			[Ignition switch OFF] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V) <div style="text-align: right; margin-top: 5px;">  </div>
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V) <div style="text-align: right; margin-top: 5px;">  </div>
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through the valve. =NEEC1301

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
 - EVAP canister purge volume control solenoid valve
- NEEC1301S01

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC1302

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 13 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1596.

With GST

Follow the procedure "With CONSULT-II".

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

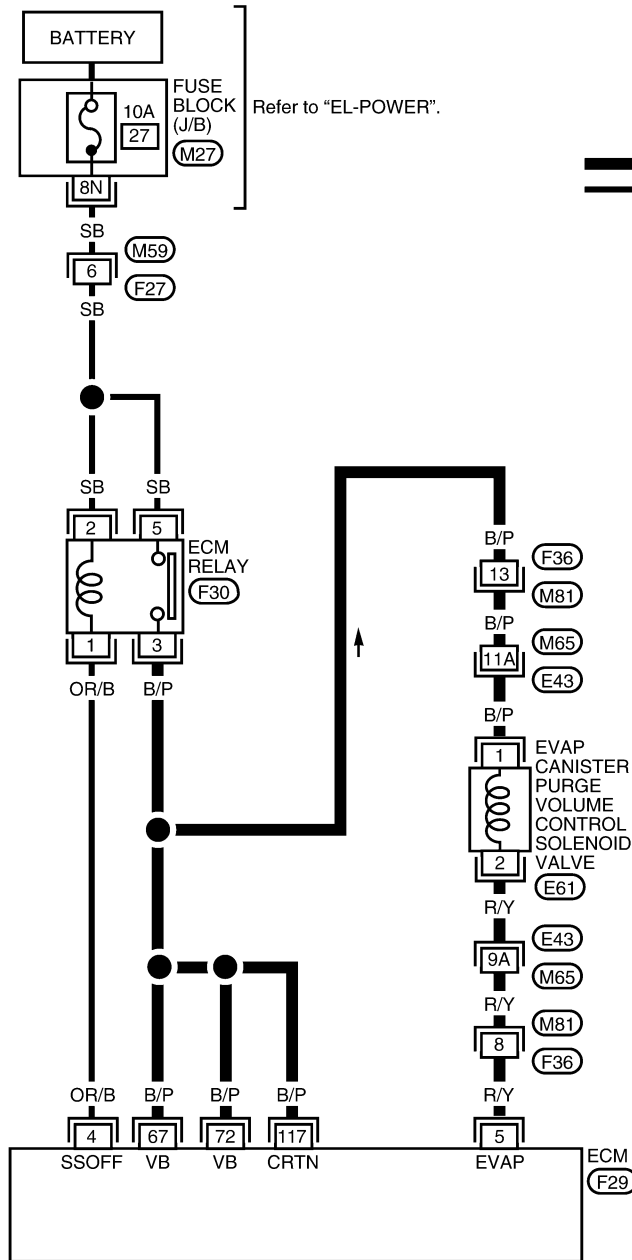
VG33ER

Wiring Diagram

Wiring Diagram

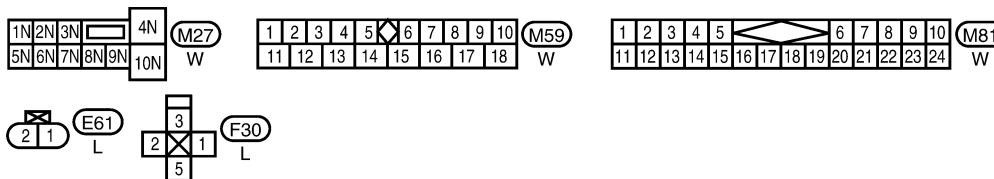
NEEC1303

EC-PGC/V-01

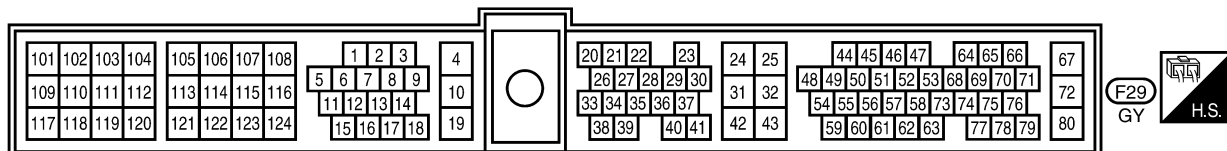


: Detectable line for DTC
 : Non-detectable line for DTC

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST



Refer to the following.
 M65, E43 - SUPER
 MULTIPLE JUNCTION (SMJ)



RS
BT
HA
SC
EL
IDX

LEC813

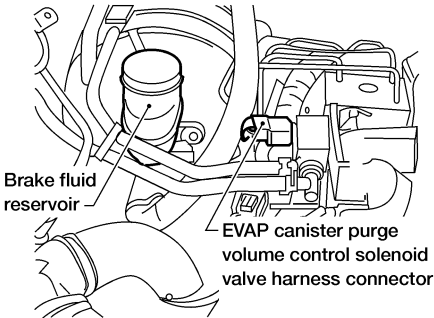
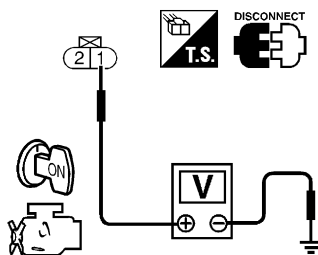
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1304

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M82, E74 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay 	
▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 5.
OK (Without CONSULT-II)	▶ GO TO 6.
NG	▶ GO TO 4.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">RICH</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK	GO TO 7.																				
NG	GO TO 6.																				

GI
 MA
 EM
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DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

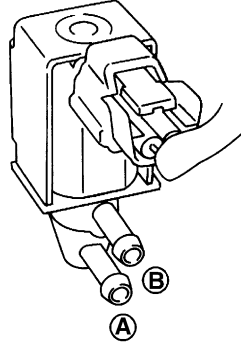
VG33ER

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



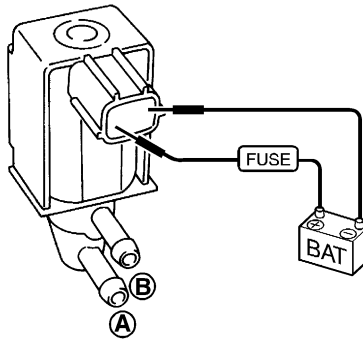
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7 CHECK INTERMITTENT INCIDENT

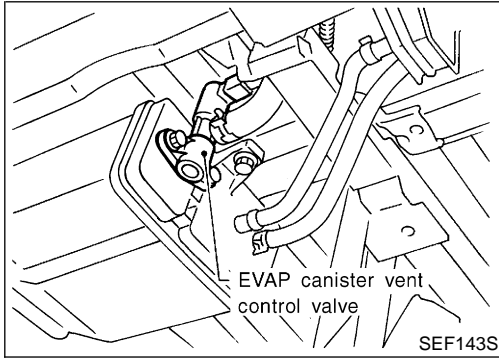
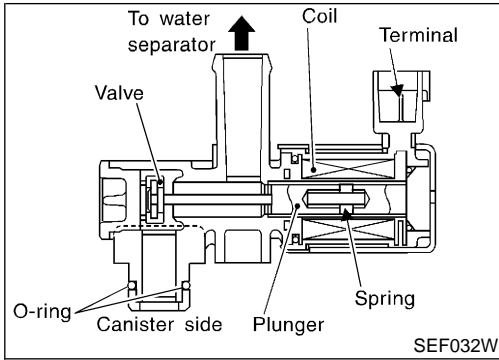
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

▶ **INSPECTION END**

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33ER

Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC1305

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI
MA
EM
LC
EC

CONSULT-II Reference Value in Data Monitor Mode

NEEC1306

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

FE
CL
MT
AT

ECM Terminals and Reference Value

NEEC1307

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

TF
PD
AX
SU
BR
ST

RS
BT
HA
SC
EL
IDX

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve. =NEEC1308

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
- EVAP canister vent control valve

NEEC1308S01

DTC Confirmation Procedure

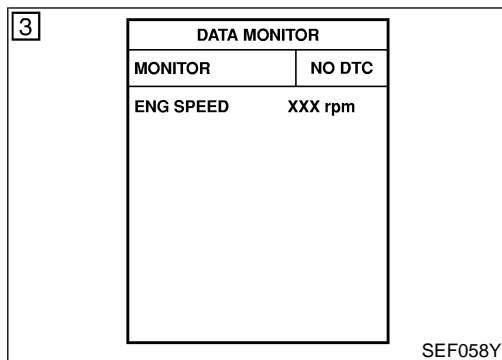
NEEC1309

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.



With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 8 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1602.

With GST

Follow the procedure "With CONSULT-II".

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

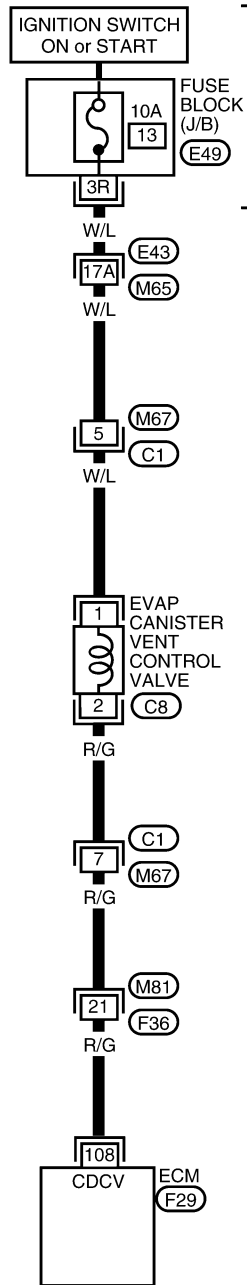
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1310

EC-VENT/V-01



Refer to "EL-POWER".

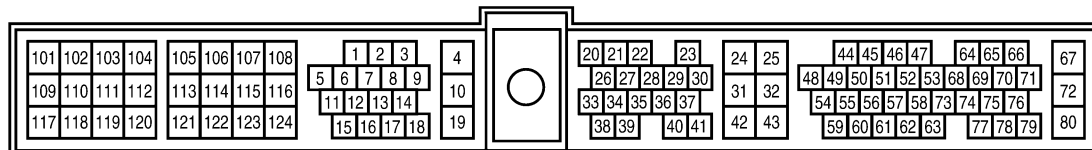
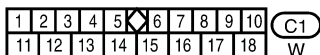
— : Detectable line for DTC
 — : Non-detectable line for DTC

GI
 MA
 EM
 LC
EC
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 CL
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 TF
 PD
 AX
 SU
 BR
 ST



Refer to the following.

(M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



RS
 BT
 HA
 SC
 EL
 IDX

LEC814

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1311

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

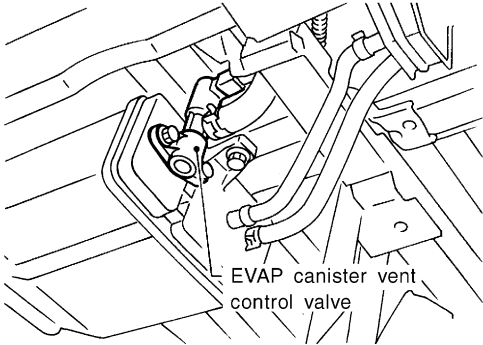
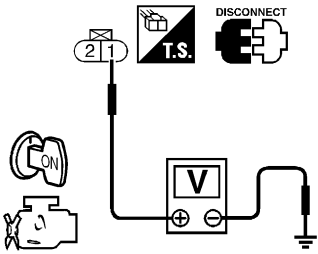
2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p>1. Turn ignition switch "OFF" and then turn "ON".</p> <p>2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>3. Touch "ON/OFF" on CONSULT-II screen.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 (B1)	XXX V																					
HO2S1 (B2)	XXX V																					
THRTL POS SEN	XXX V																					
<p>4. Check for operating sound of the valve. Clicking noise should be heard.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF989Y

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect EVAP canister vent control valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch "ON".</p> <p>4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>						
		<p>SEF143S</p> <p>SEF648W</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	GO TO 4.	
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M67, C1 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between EVAP canister vent control valve and fuse <p style="text-align: right;">▶ Repair harness or connectors.</p>	<p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>
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5	CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 108 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p>						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	GO TO 6.	
OK	▶	GO TO 7.							
NG	▶	GO TO 6.							

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

VG33ER

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE																								
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time. 																									
	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 (B1)	XXX V																								
HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									

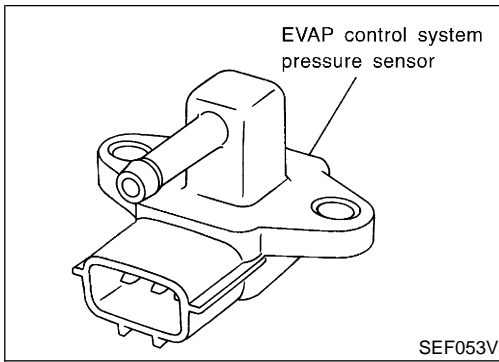
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Check air passage continuity and operation delay time under the following conditions. 							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
<p>If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If portion B is rusted, replace control valve.</p>							
AEC783A							
Make sure new O-ring is installed properly.							
OK or NG							
OK	GO TO 8.						
NG	Replace EVAP canister vent control valve.						

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	INSPECTION END

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

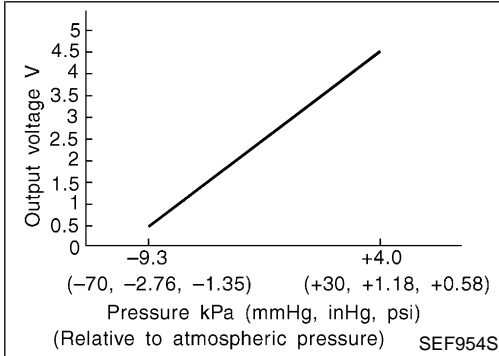
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NEEC1312



CONSULT-II Reference Value in Data Monitor Mode

NEEC1313

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NEEC1314

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM. =NEEC1315

POSSIBLE CAUSE

NEEC1315S01

- Harness or connectors
(The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NEEC1316

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

6	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	FUEL T/TMP SE	XXX °C

SEF194Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1608.

With GST

Follow the procedure "With CONSULT-II".

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

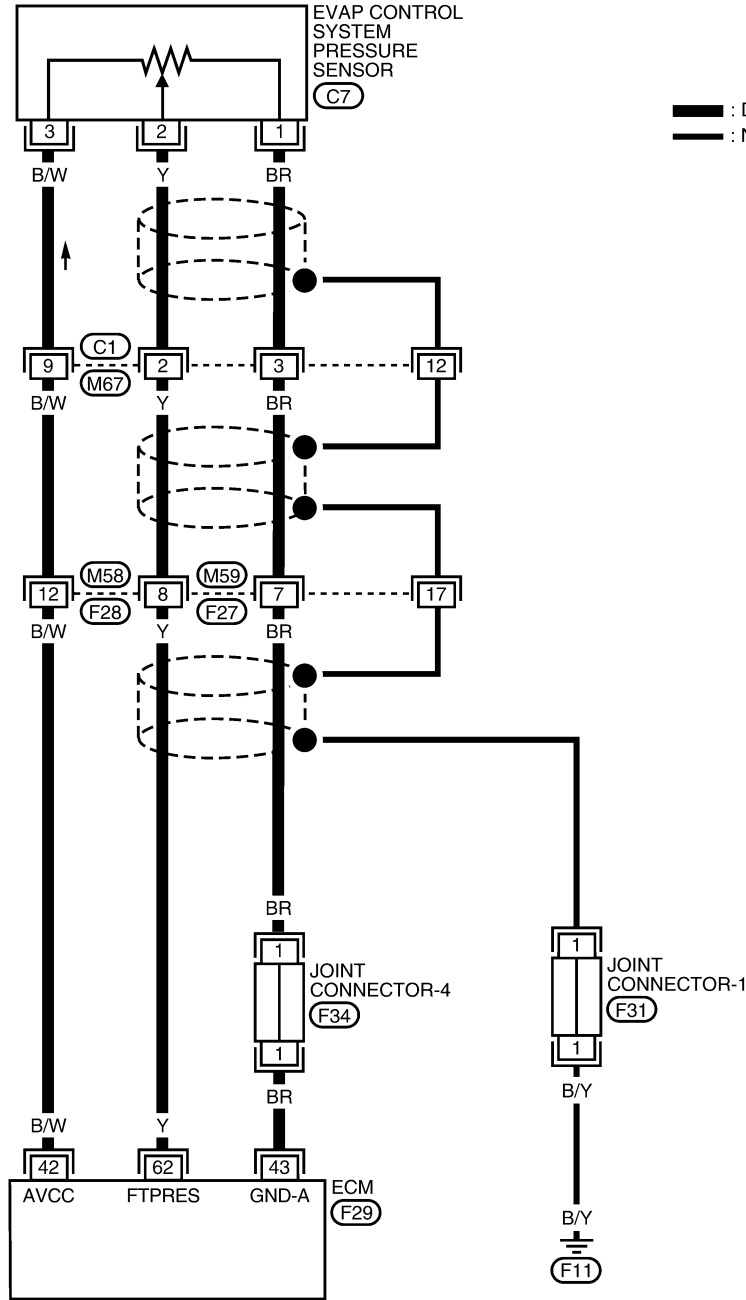
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1317

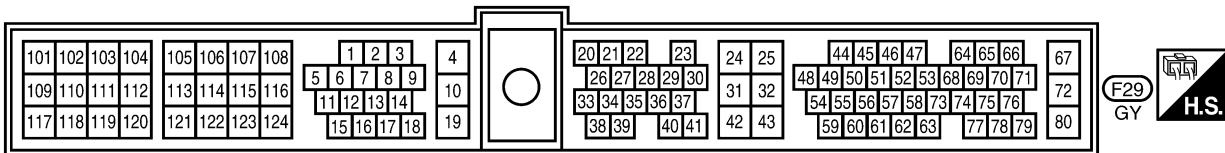
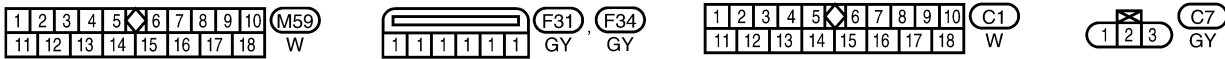
EC-PRE/SE-01



— : Detectable line for DTC
 - - - : Non-detectable line for DTC

- GI
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- EM
- LC
- EC**
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- AT
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- SC
- EL
- IDX



LEC670

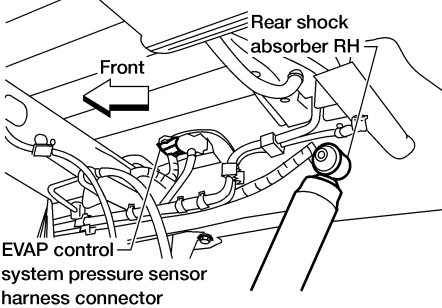
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

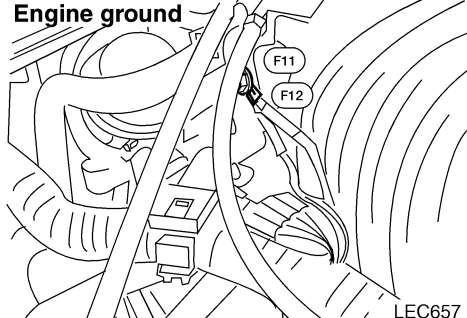
VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1318

1	CHECK RUBBER TUBE		
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection. 			
			
AEC651A			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Reconnect, repair or replace.	

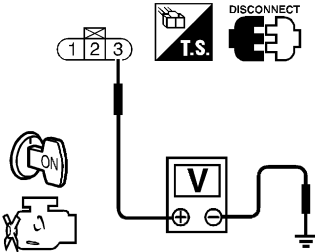
2	RETIGHTEN GROUND SCREWS		
<ol style="list-style-type: none"> 1. Loosen and retighten engine ground screws. 			
			
LEC657			
LEC657			
▶		GO TO 3.	

3	CHECK CONNECTOR		
<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. 2. Check sensor harness connector for water. Water should not exist. 			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Repair or replace harness connector.	

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "ON". 2. Check voltage between terminal 3 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Approximately 5V</p> <p style="text-align: right;">SEF889U</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

GI
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5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M58, F28 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶ Repair harness or connectors.		

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6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

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7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Joint connector-4 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶ Repair open circuit or short to power in harness or connectors.		

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 10.
OK (Without CONSULT-II) ▶		GO TO 11.
NG ▶		GO TO 9.

9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>FR O2 MNTR-B1</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>FR O2 MNTR-B2</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	FR O2 MNTR-B1	RICH	FR O2 MNTR-B2	RICH	THRTL POS SEN	XXX V	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
FR O2 MNTR-B1	RICH																					
FR O2 MNTR-B2	RICH																					
THRTL POS SEN	XXX V																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
OK or NG																						
OK ▶		GO TO 12.																				
NG ▶		GO TO 11.																				

SEF068Y

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

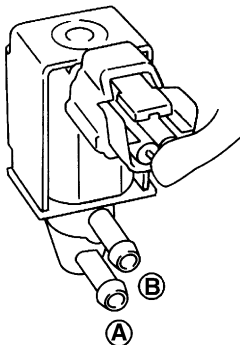
VG33ER

Diagnostic Procedure (Cont'd)

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



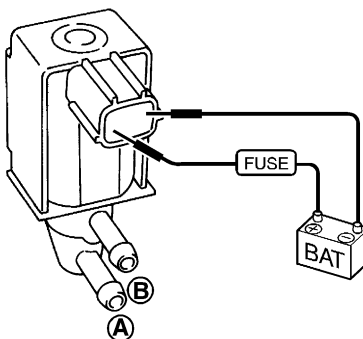
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

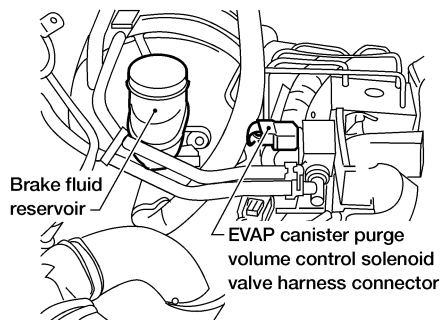
1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

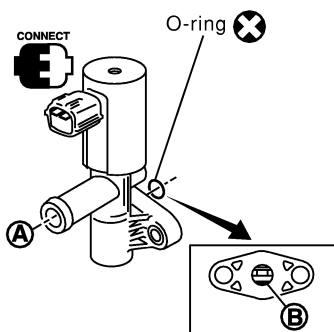
VG33ER

Diagnostic Procedure (Cont'd)

12 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

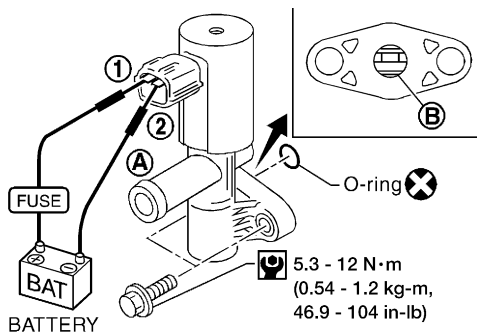
Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

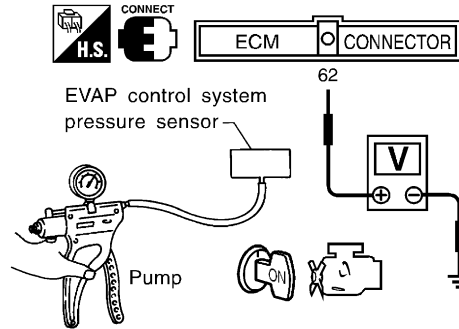
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

13 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



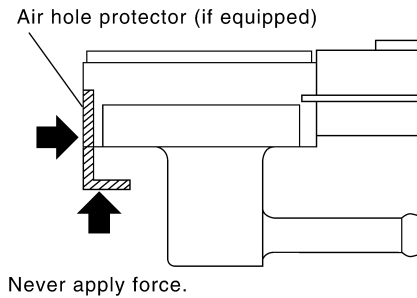
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

14 CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 15.
NG	▶	Clean, repair or replace rubber tube.

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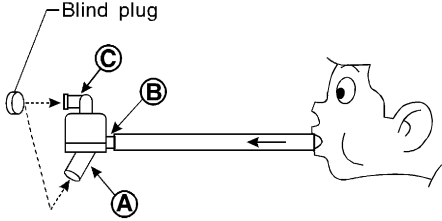
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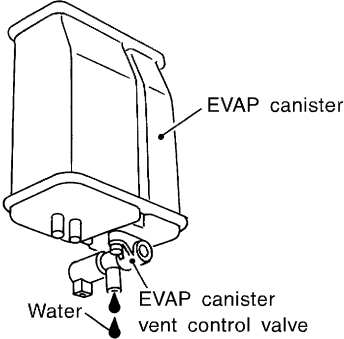
IDX

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK WATER SEPARATOR						
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) * (B) : Emergency tube (From EVAP canister) * (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 16.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace water separator.</td> </tr> </table>		OK	▶	GO TO 16.	NG	▶	Replace water separator.
OK	▶	GO TO 16.					
NG	▶	Replace water separator.					

16	CHECK IF EVAP CANISTER SATURATED WITH WATER						
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 17.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 19.</td> </tr> </table> </div>		Yes	▶	GO TO 17.	No	▶	GO TO 19.
Yes	▶	GO TO 17.					
No	▶	GO TO 19.					

17	CHECK EVAP CANISTER						
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 19.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 18.</td> </tr> </table>		OK	▶	GO TO 19.	NG	▶	GO TO 18.
OK	▶	GO TO 19.					
NG	▶	GO TO 18.					

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

18	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

GI

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19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors C1, M67. 3. Check harness continuity between harness connector M67 terminal 12 and engine ground. Continuity should exist. 4. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

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20	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connector M67 ● Harness connectors M59, F27 ● Joint connector-1 ● Harness for open between harness connector M67 and engine ground 		
▶		Repair open circuit or short to power in harness or connectors.

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21	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶		INSPECTION END

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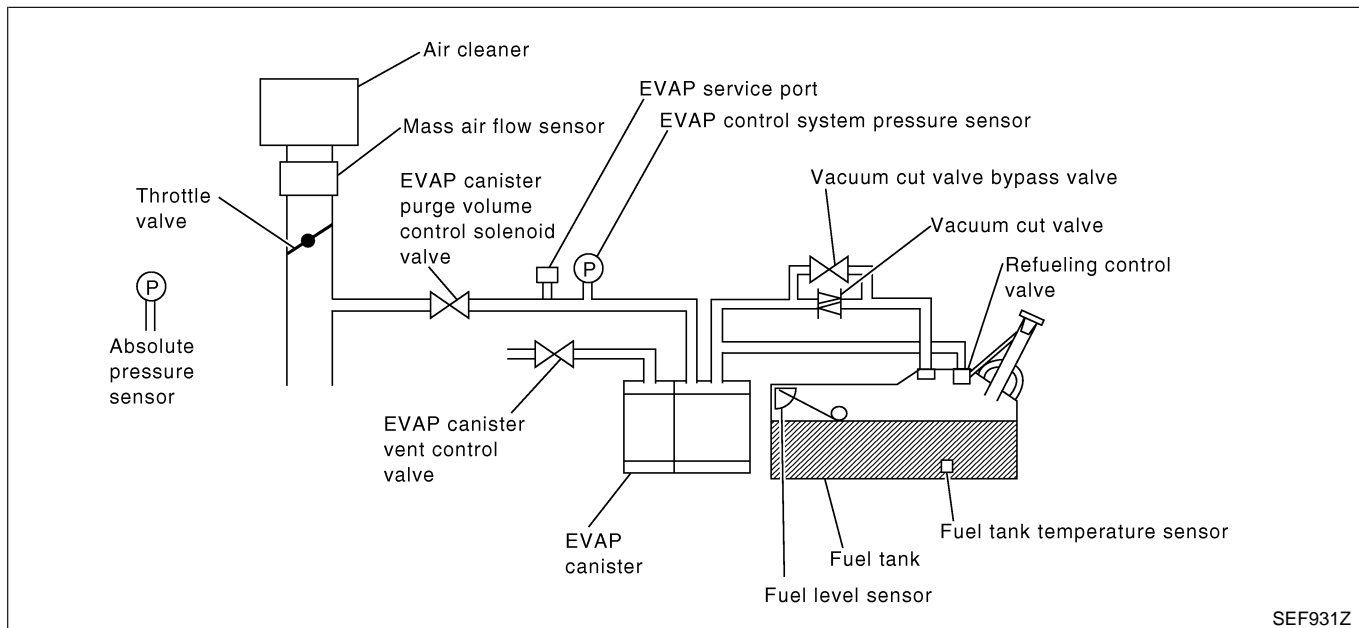
On Board Diagnosis Logic

NEEC1319

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1751.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



SEF931Z

Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Fuel filler cap remains open or fails to close.
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC1319S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor

- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

GI

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6 EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.

- FUEL LEVEL: 1/4-3/4
- AMBIENT TEMP: 0-30 C(32-86F)
- OPEN ENGINE HOOD.

2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.

3)TOUCH START.

SEF565X

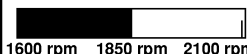
6 EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEF566X

6 EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL
RESULT APPEARS.
(APPROX. 3 MINUTES)



SEF874X

6 EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NEEC1320

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1751.)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

With CONSULT-II

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 6) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1314.

- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455] is displayed, refer to “Diagnostic Procedure”, EC-1619.
 If P0440 is displayed, perform “Diagnostic Procedure” for DTC P0440.

With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-1281 before driving vehicle.

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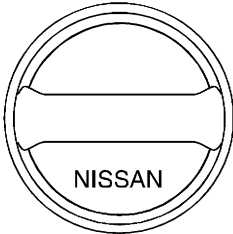
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- 1) Start engine.
- 2) Drive vehicle according to "Driving Pattern", EC-1281.
- 3) Stop vehicle.
- 4) Select "MODE 1" with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch "OFF" and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the "Driving Pattern", EC-1281.
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1619.
 - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-1580.
 - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1738.
 - If P0440, P0455 and P1447 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

=NEEC1321

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

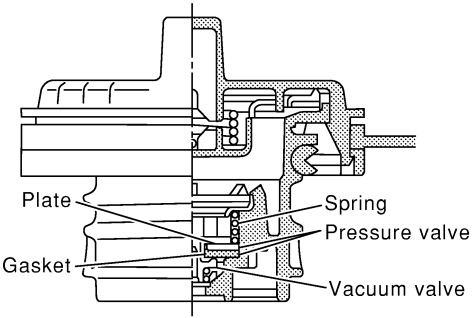
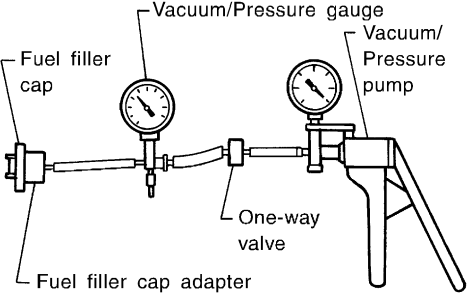
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2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

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3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)	
<p>1. Wipe clean valve housing. 2. Check valve opening pressure and vacuum.</p>		
		
SEF445Y		
		
SEF943S		
<p>Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

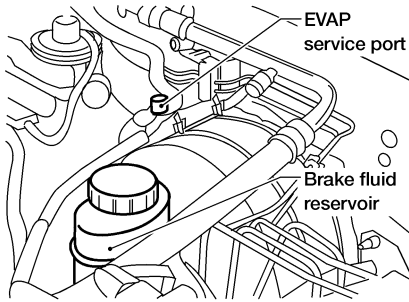
5	CHECK EVAP PURGE LINE	
<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-1242.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE
<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p> <p style="text-align: center;">▶</p>	
GO TO 7.	

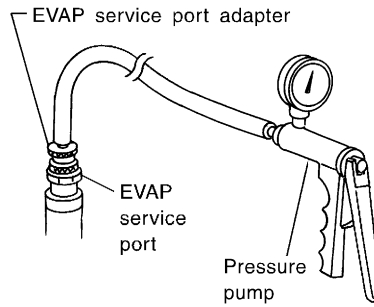
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
<p>Refer to "DTC Confirmation Procedure", EC-1600.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ►	GO TO 9.
Models without CONSULT-II ►	GO TO 10.

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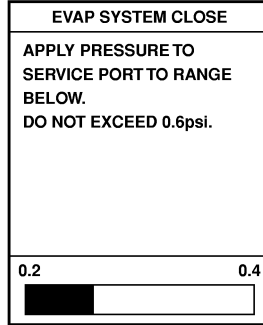
9 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

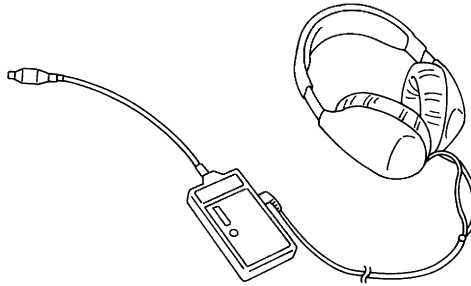
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

Leak detector



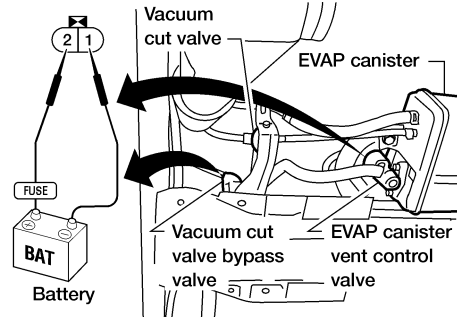
SEF200U

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10 CHECK FOR EVAP LEAK
⊗ Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



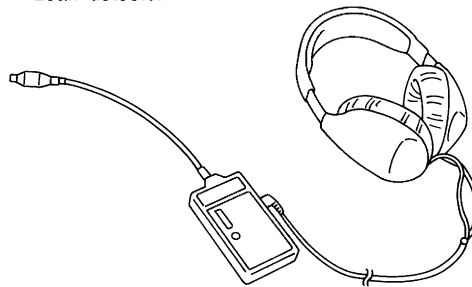
AEC632A

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

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11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>Vacuum should exist.</p>																						
<p>Vacuum should exist.</p>																						
<p>OK or NG</p>																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

SEF984Y

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1235.</p>		
<p>OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

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14 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

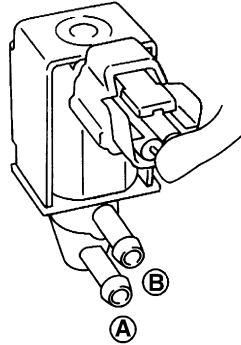
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

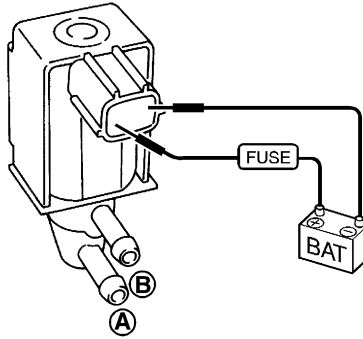
MTBL0241

OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 16. |
| NG | ▶ | Replace EVAP canister purge volume control solenoid valve. |

15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

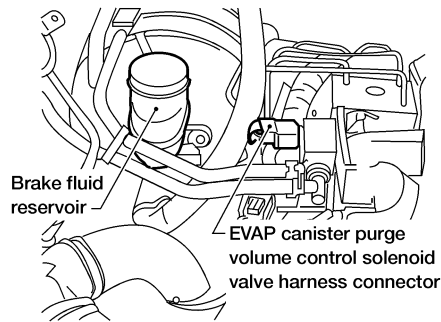
⊗ Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



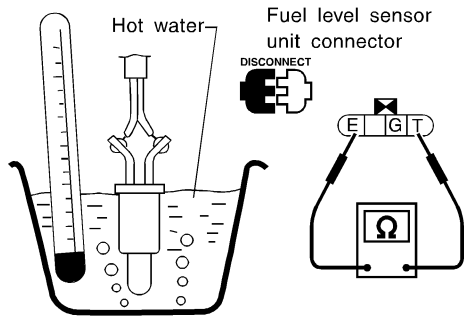
AEC652A

OK or NG

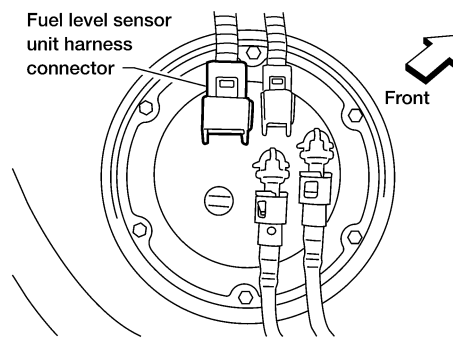
OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



SEC311C

LEC764

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor.

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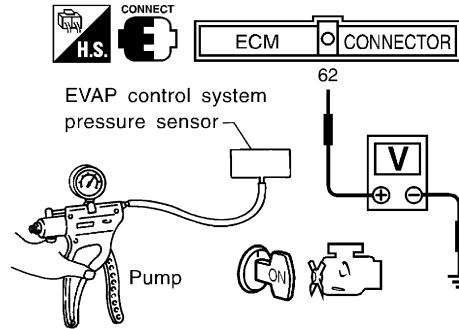
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17 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



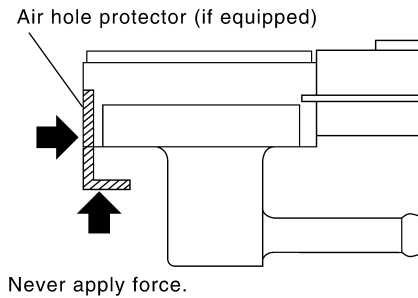
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

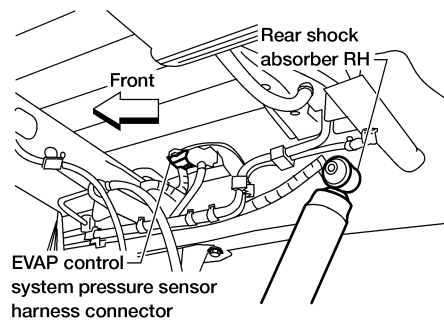
CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



AEC651A

OK or NG

OK ► GO TO 18.

NG ► Replace EVAP control system pressure sensor.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

VG33ER

Diagnostic Procedure (Cont'd)

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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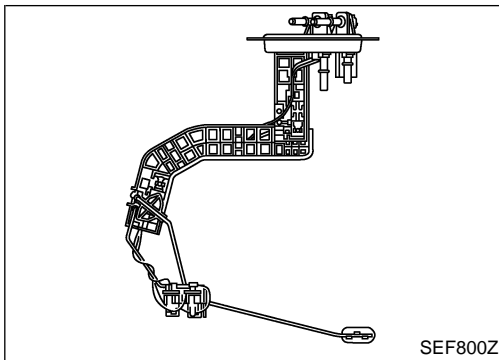
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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1322} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NEEC1323}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	G	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NEEC1324}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NEEC1324S01}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NEEC1325

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

NEEC1325S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1633.

WITH GST

NEEC1325S02

Follow the procedure "WITH CONSULT-II" above.

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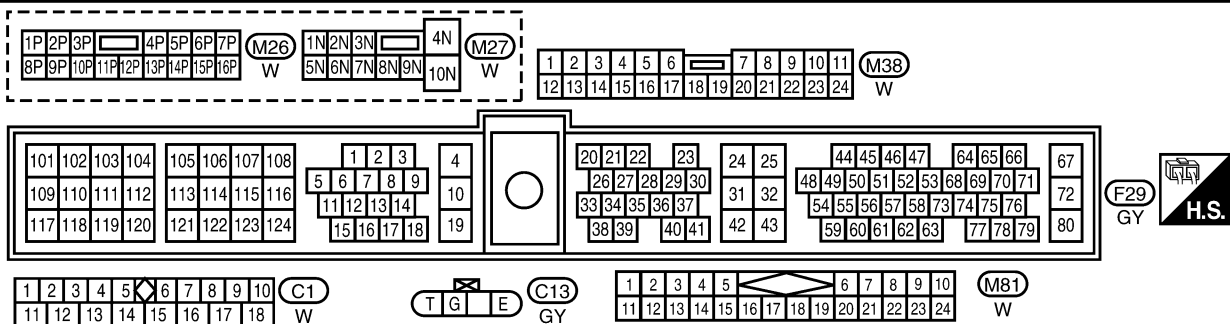
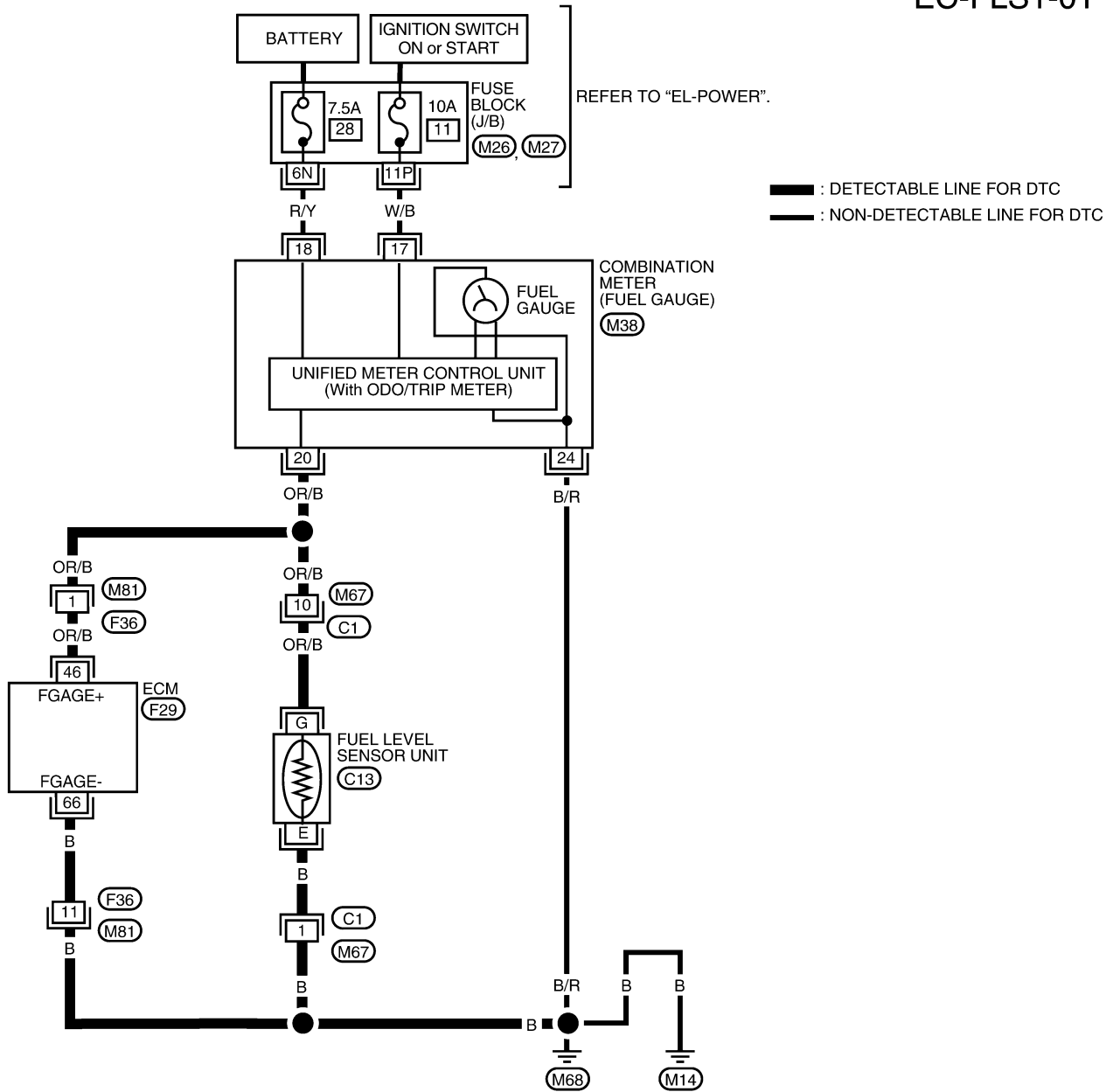
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Wiring Diagram

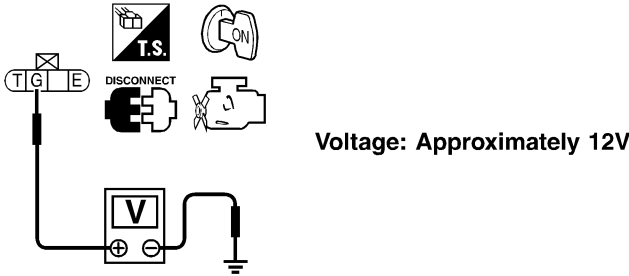
NEEC1326

EC-FLS1-01



Diagnostic Procedure

=NEEC1327

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal G and ground with CONSULT-II or a tester. 		
		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

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2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶ Repair or replace harness or connectors.		

AT

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3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal E and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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4	DETECT MALFUNCTIONING PART	
<p>Check the harness connectors C1, M67.</p>		
▶ Repair or replace harness or connectors.		

ST

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5	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal G, ECM terminal 66 and fuel level sensor unit terminal E. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

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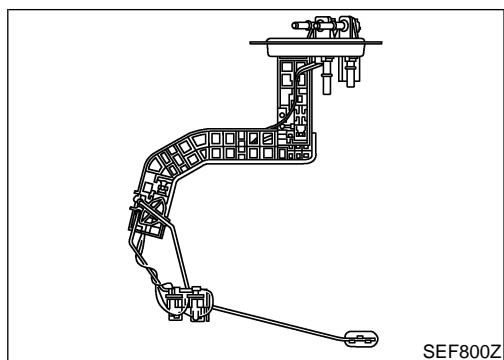
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DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

VG33ER

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M67, C1● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.
7	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{=NEEC1328} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

Driving long distances naturally affect fuel gauge level. ^{NEEC1329} This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

POSSIBLE CAUSE

- Harness or connectors
(The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. ^{NEEC1330}

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to *FE-5*, "FUEL TANK".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

Ⓜ WITH CONSULT-II

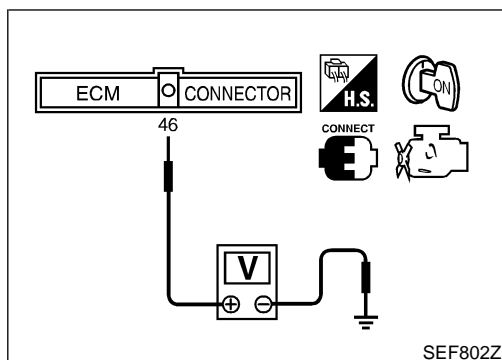
NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-1259.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

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- 5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



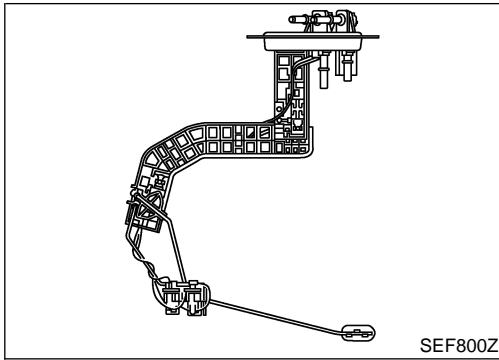
WITH GST

NEEC1330S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-1259.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to **EL-82**, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1331} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NEEC1332}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	G	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor circuit. ^{NEEC1333} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

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DTC Confirmation Procedure

NEEC1334

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch “ON”.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

 **WITH CONSULT-II**

NEEC1334S01

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1640.

 **WITH GST**

NEEC1334S02

Follow the procedure “WITH CONSULT-II” above.

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

VG33ER

Wiring Diagram

Wiring Diagram

NEEC1335

EC-FLS2-01

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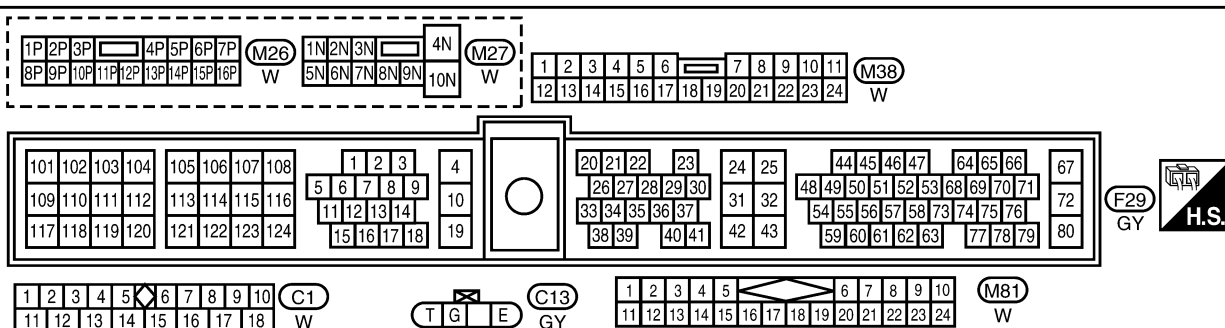
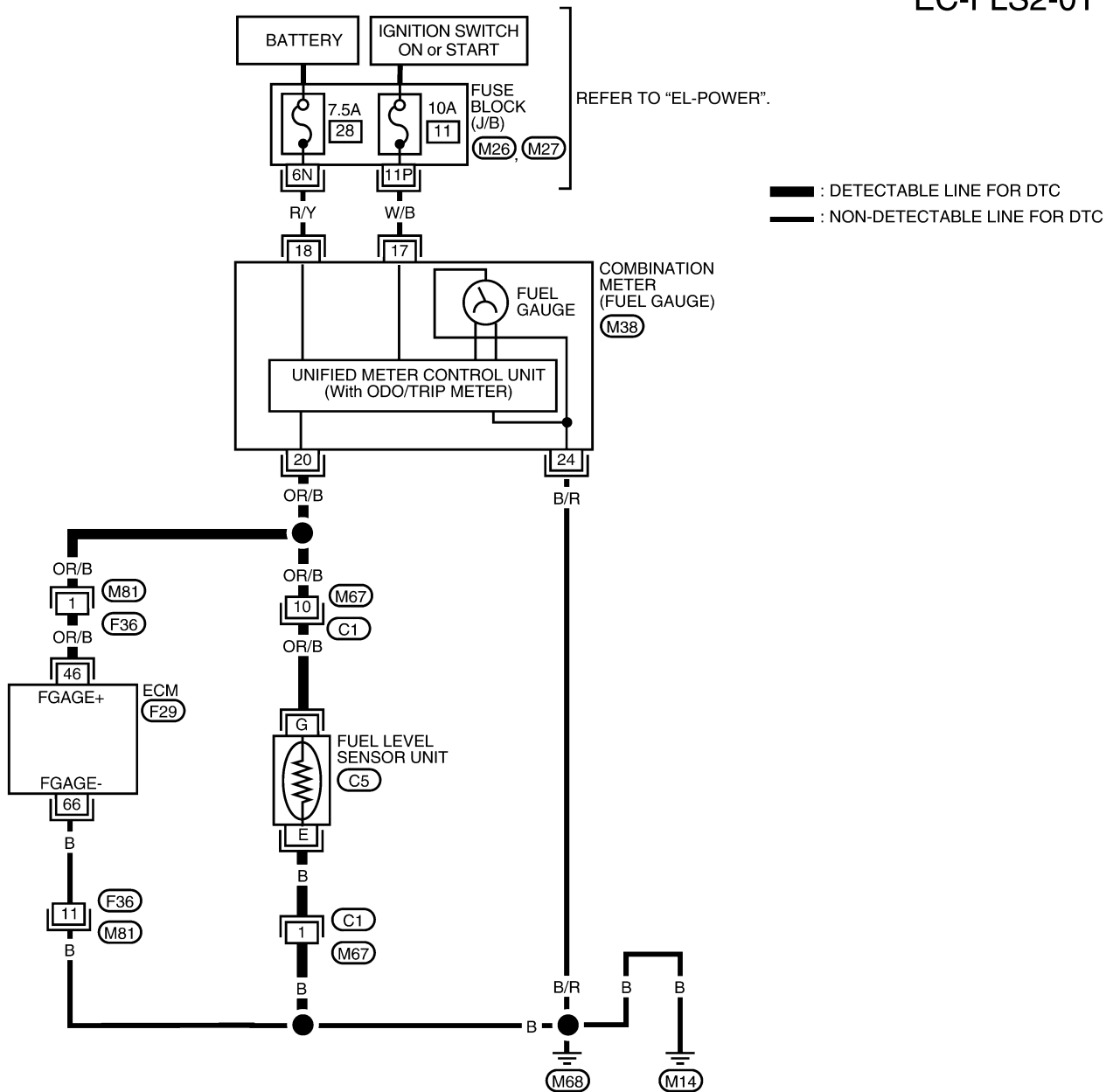
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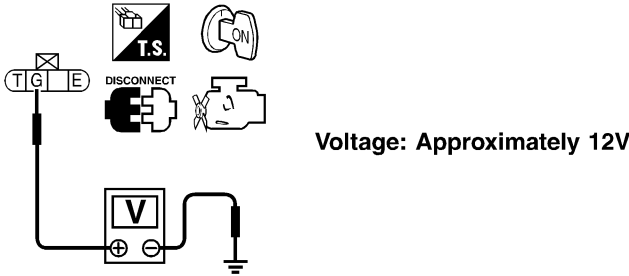
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WEC819

Diagnostic Procedure

=NEEC1336

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal G and ground with CONSULT-II or tester. 		
		
SEF904Z		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶		Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal E and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the harness connectors C1, M67.		
▶		Repair or replace harness or connectors.

5	CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal G. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

VG33ER

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M67, C1● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to ground or short to power in harness on connectors.

GI

MA

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7	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.

LC

EC

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

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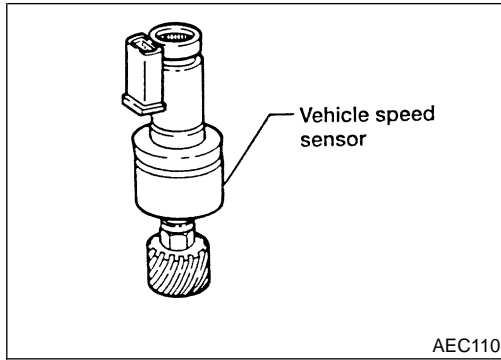
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Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

NEEC1337

ECM Terminals and Reference Value

NEEC1338

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> Lift up the vehicle In 1st gear position Vehicle speed is 40 km/h (25 MPH) 	<p>2 - 3V</p> <p>SEF996U</p>

On Board Diagnosis Logic

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.

NEEC1339

POSSIBLE CAUSE

- Harness or connector (The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor

NEEC1339S01

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

NEEC1340

DTC P0500 VEHICLE SPEED SENSOR (VSS)

VG33ER

DTC Confirmation Procedure (Cont'd)

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

With CONSULT-II

- 1) Start engine
- 2) Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to "Diagnostic Procedure", EC-1645.
If OK, go to following step.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Warm engine up to normal operating temperature.
- 5) Maintain the following conditions for at least 10 consecutive seconds.

END SPEED	More than 1,800 rpm (A/T models) More than 1,900 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 16.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1645.

Overall Function Check

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

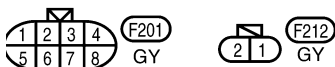
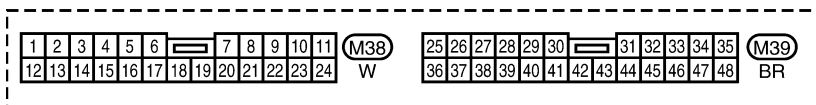
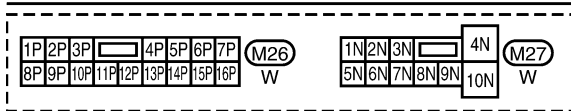
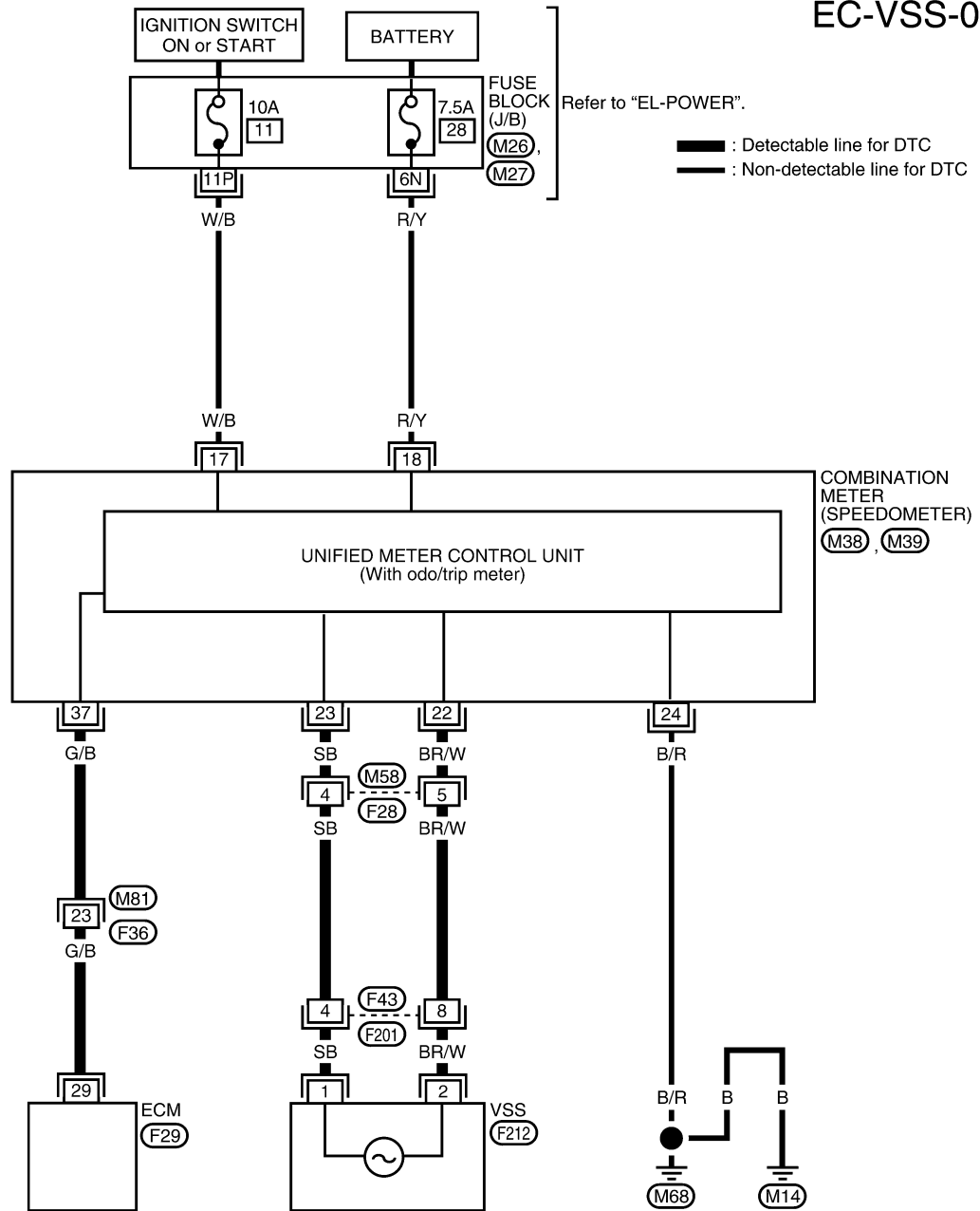
- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-1645.

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Wiring Diagram

NEEC1342

EC-VSS-01



Refer to the following.
(F29) - ELECTRICAL UNITS

Diagnostic Procedure

NEEC1343

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
	1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 29 and combination meter terminal 37. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. <div style="text-align: center;">OK or NG</div>	
OK	▶	GO TO 3.
NG	▶	GO TO 2.

GI
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2	DETECT MALFUNCTIONING PART	
	Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and combination meter 	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

EC
FE
CL

3	CHECK SPEEDOMETER FUNCTION	
	Make sure that speedometer functions properly. <div style="text-align: center;">OK or NG</div>	
OK	▶	GO TO 5.
NG	▶	GO TO 4.

MT
AT
TF

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT	
	Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors F43, F201 ● Harness for open or short between combination meter and vehicle speed sensor <div style="text-align: center;">OK or NG</div>	
OK	▶	Check combination meter and vehicle speed sensor. Refer to EL-69 , "METERS AND GAUGES".
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

PD
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5	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353. <div style="text-align: center;">INSPECTION END</div>	

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DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33ER

Description

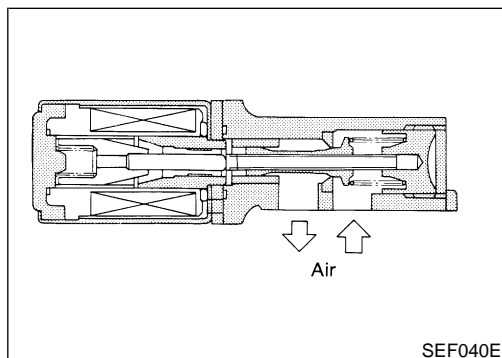
Description SYSTEM DESCRIPTION

NEEC1344

NEEC1344S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



COMPONENT DESCRIPTION IACV-AAC Valve

NEEC1344S02

NEEC1344S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33ER

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC1345

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	10 - 20%
		2,000 rpm	—

ECM Terminals and Reference Value

NEEC1346

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>8 - 11V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	<p>7 - 10V</p>

On Board Diagnosis Logic

NEEC1347

Malfunction is detected when
 (Malfunction A) the IACV-AAC valve does not operate properly,
 (Malfunction B) the IACV-AAC valve does not operate properly.

POSSIBLE CAUSE

NEEC1347S01

- Harness or connectors
(The IACV-AAC valve circuit is open.)
- Harness or connectors
(The IACV-AAC valve circuit is shorted.)
- IACV-AAC valve

DTC Confirmation Procedure

NEEC134B

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

2		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </tbody> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR								
MONITOR	NO DTC							
ENG SPEED	XXX rpm							

SEF058Y

PROCEDURE FOR MALFUNCTION A

NEEC134BS01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Wait at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1650.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

4		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> </tbody> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C
DATA MONITOR										
MONITOR	NO DTC									
ENG SPEED	XXX rpm									
COOLAN TEMP/S	XXX °C									

SEF174Y

PROCEDURE FOR MALFUNCTION B

NEEC134BS02

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 1 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1650.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

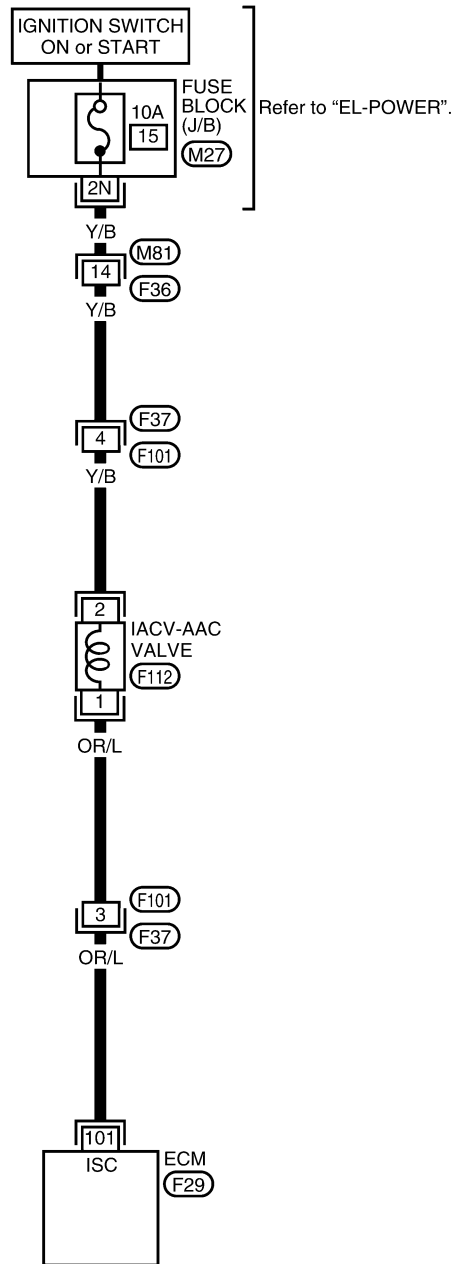
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1349

EC-AAC/V-01



Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC

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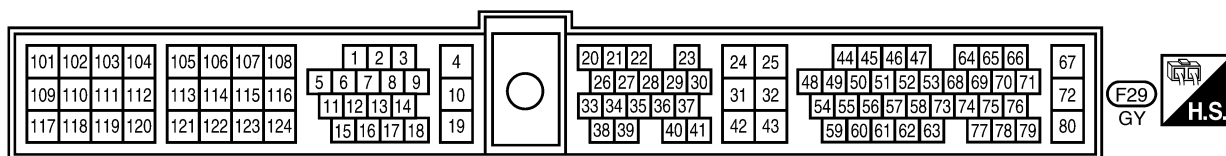
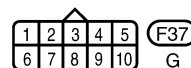
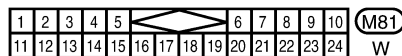
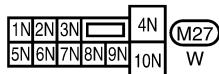
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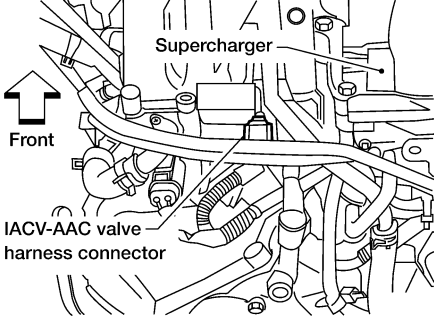
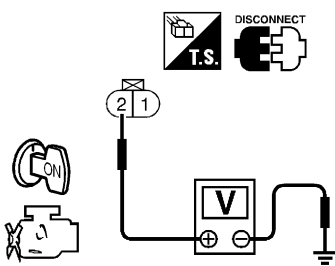
DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1350

1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT							
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>			OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.						
NG	▶	GO TO 2.						

LEC766

SEF651W

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between IACV-AAC valve and fuse 		
▶ Repair harness or connectors.		

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT							
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>			OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.						
NG	▶	GO TO 4.						

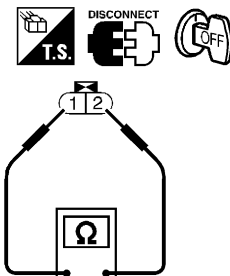
DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F101, F37 ● Harness for open or short between IACV-AAC valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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5	CHECK IACV-AAC VALVE
1. Disconnect IACV-AAC valve harness connector. 2. Remove IACV-AAC valve. <ul style="list-style-type: none"> ● Check IACV-AAC valve resistance. 	
	
<p>Resistance: Approximately 10Ω [at 20°C (68°F)]</p> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. 3. Supply battery voltage between IACV-AAC valve connector terminals. Plunger should move.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace IACV-AAC valve.

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6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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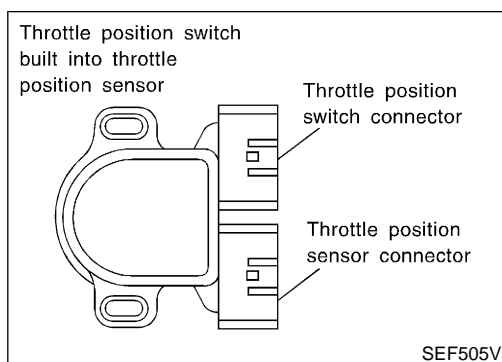
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Component Description



Component Description

NEEC1351

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1352

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF

ECM Terminals and Reference Value

NEEC1353

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NEEC1354

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

POSSIBLE CAUSE

NEEC1354S01

- Harness or connectors (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

NEEC1355

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then start engine.
- 3) Select “CLSD THL/P SW” in “DATA MONITOR” mode.
- 4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-1655.
If OK, go to following step.

- 5) Select “DATA MONITOR” mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1655.

Overall Function Check

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

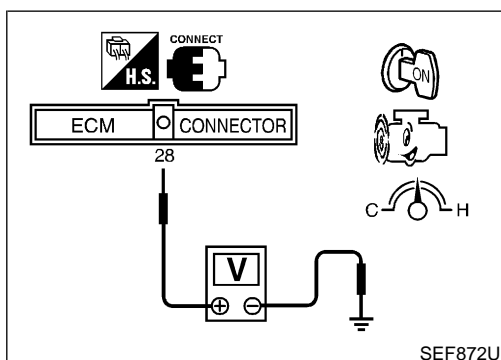
Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

- 3) If NG, go to “Diagnostic Procedure”, EC-1655.



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DTC P0510 CLOSED THROTTLE POSITION SWITCH

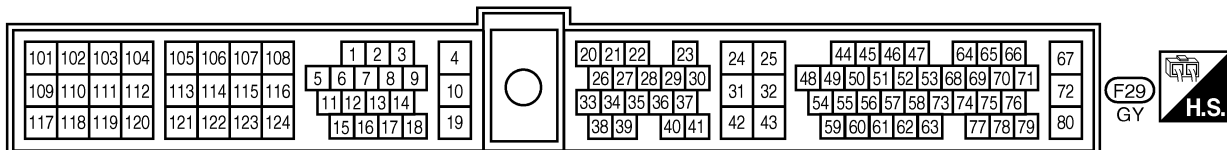
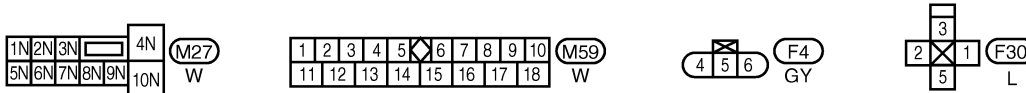
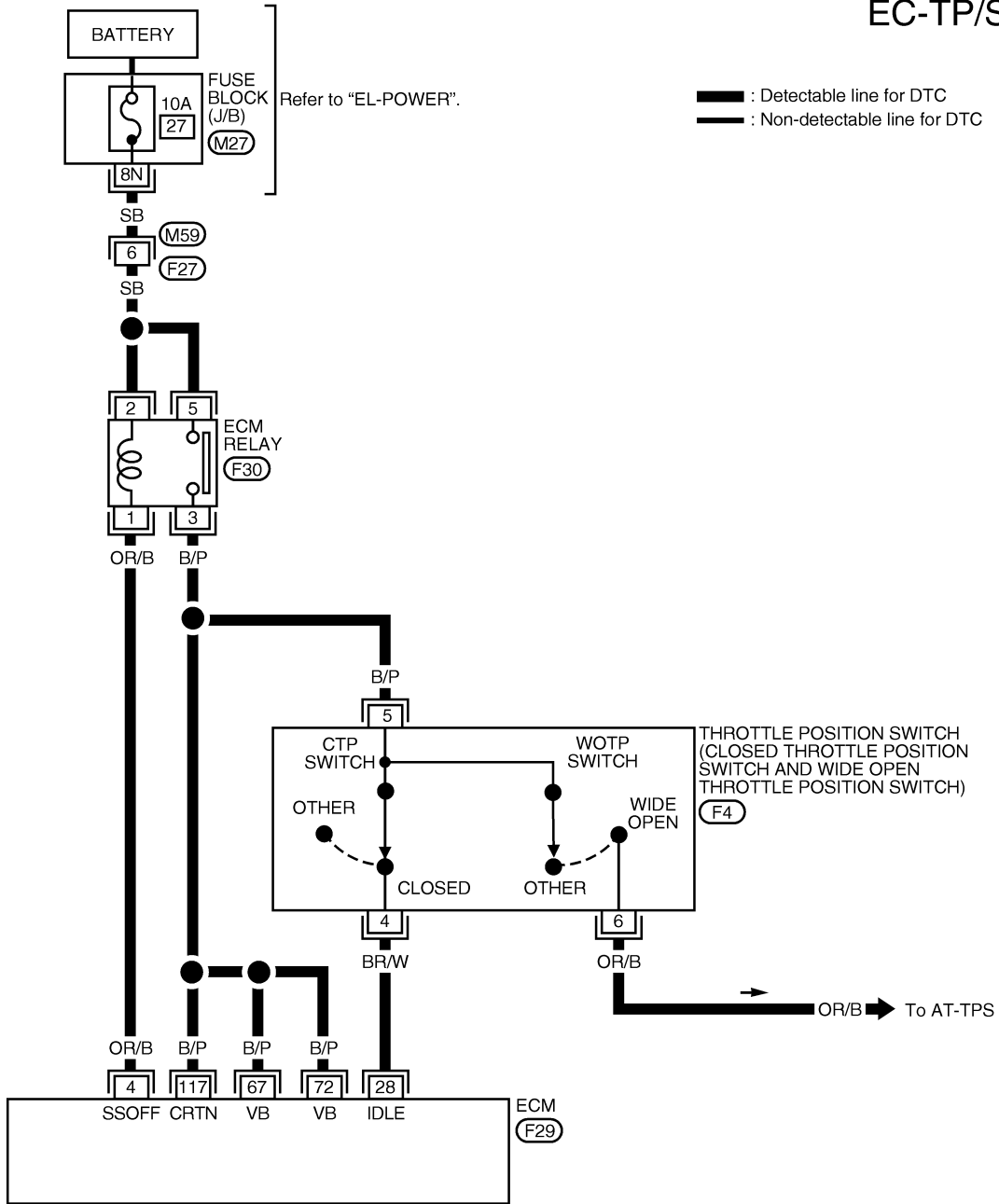
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1357

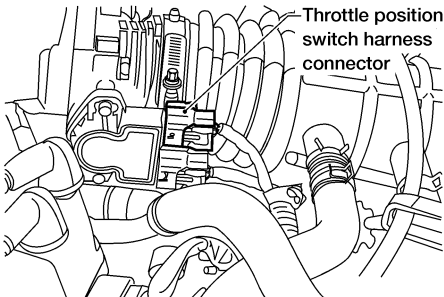
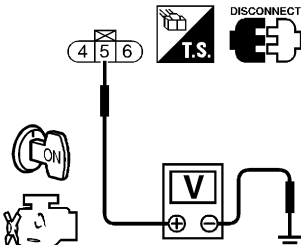
EC-TP/SW-01



AEC964A

Diagnostic Procedure

NEEC1358

1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector.</p> <div style="text-align: center;">  <p>Throttle position switch harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT T.S. ECM</p> </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
<small>AEC653A</small>	
<small>SEF715U</small>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between throttle position switch and ECM relay ● Harness for open or short between throttle position switch and ECM 	
▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and throttle position switch terminal 4. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

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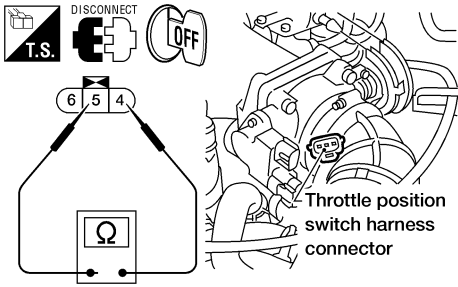
DTC P0510 CLOSED THROTTLE POSITION SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

4		CHECK IGNITION TIMING AND ENGINE IDLE SPEED									
Check the following items. Refer to "Basic Inspection", EC-1314.											
		<table border="1"><thead><tr><th>Items</th><th>Specifications</th></tr></thead><tbody><tr><td>Ignition timing</td><td>10° ± 2° BTDC</td></tr><tr><td>Base idle speed</td><td>700 ± 50 rpm (in "P" or "N" position)</td></tr><tr><td>Target idle speed</td><td>750 ± 50 rpm (in "P" or "N" position)</td></tr></tbody></table>	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Target idle speed	750 ± 50 rpm (in "P" or "N" position)	
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
Base idle speed	700 ± 50 rpm (in "P" or "N" position)										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
MTBL0632											
with CONSULT-II	▶	GO TO 5.									
without CONSULT-II	▶	GO TO 6.									

5		CHECK CLOSED THROTTLE POSITION SWITCH							
④ With CONSULT-II									
1. Start engine and warm it up to normal operating temperature.									
2. Turn ignition switch OFF.									
3. Turn ignition switch ON.									
4. Select "DATA MONITOR" mode with CONSULT-II.									
5. Check indication of "CLSD THL/P SW".									
Measurement must be made with closed throttle position switch installed in vehicle.									
		<table border="1"><thead><tr><th>Throttle valve conditions</th><th>CLSD THL/P SW</th></tr></thead><tbody><tr><td>Completely closed</td><td>ON</td></tr><tr><td>Partially open or completely open</td><td>OFF</td></tr></tbody></table>	Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	
Throttle valve conditions	CLSD THL/P SW								
Completely closed	ON								
Partially open or completely open	OFF								
MTBL0355									
OK or NG									
OK	▶	GO TO 8.							
NG	▶	GO TO 7.							

6	CHECK CLOSED THROTTLE POSITION SWITCH							
<p>Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect closed throttle position switch harness connector. 4. Check continuity between closed throttle position switch terminals 4 and 5. Resistance measurement must be made with closed throttle position switch installed in vehicle. 								
								
AEC654A								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 60%;">Throttle valve conditions</th> <th style="width: 40%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity							
Completely closed	Yes							
Partially open or completely open	No							
MTBL0247								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	GO TO 7.						

7	ADJUST THROTTLE POSITION SWITCH											
<p>Check the following items. Refer to "Basic Inspection", EC-1314.</p>												
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 45%;">Items</th> <th style="width: 55%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
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Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
<p>If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p>												
OK or NG												
OK (with CONSULT-II)	▶	GO TO 8.										
OK (without CONSULT-II)	▶	GO TO 9.										
NG	▶	Replace throttle position switch.										

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DTC P0510 CLOSED THROTTLE POSITION SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR									
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN". 										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	THRTL POS SEN									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0230										
<p>Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1314.</p> <p style="text-align: center;">OK or NG</p>										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

9	CHECK THROTTLE POSITION SENSOR									
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p>Voltage measurement must be made with throttle position sensor installed in vehicle.</p>										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0231										
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1314.</p> <p style="text-align: center;">OK or NG</p>										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶		INSPECTION END

System Description

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration. NEEC1359

Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC1360

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
33	W/G	A/T signal No. 4	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
34	R/Y	A/T signal No. 5	[Engine is running] ● Idle speed	Approximately 8V
35	G/R	A/T signal No. 3	[Engine is running] ● Idle speed	Approximately 0 - 1.0V

On Board Diagnosis Logic

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously. NEEC1361

POSSIBLE CAUSE

- Harness or connectors
[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.] NEEC1361S01

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

=NEEC1362

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1662.

Wiring Diagram

NEEC1363

EC-AT/C-01

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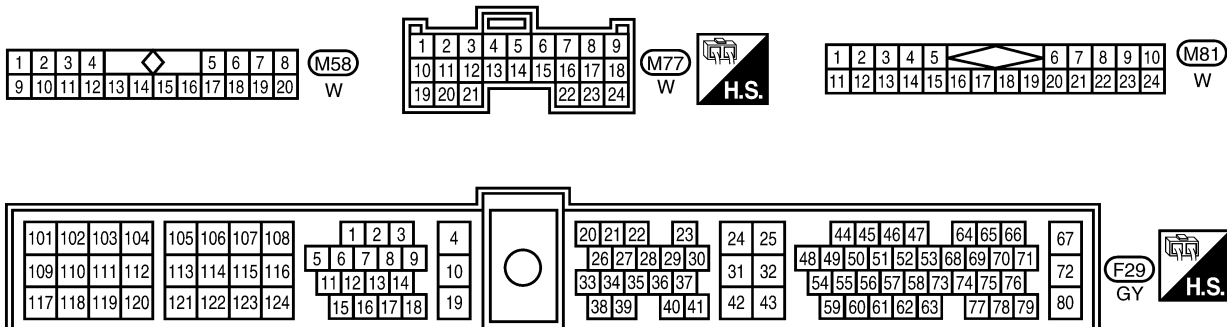
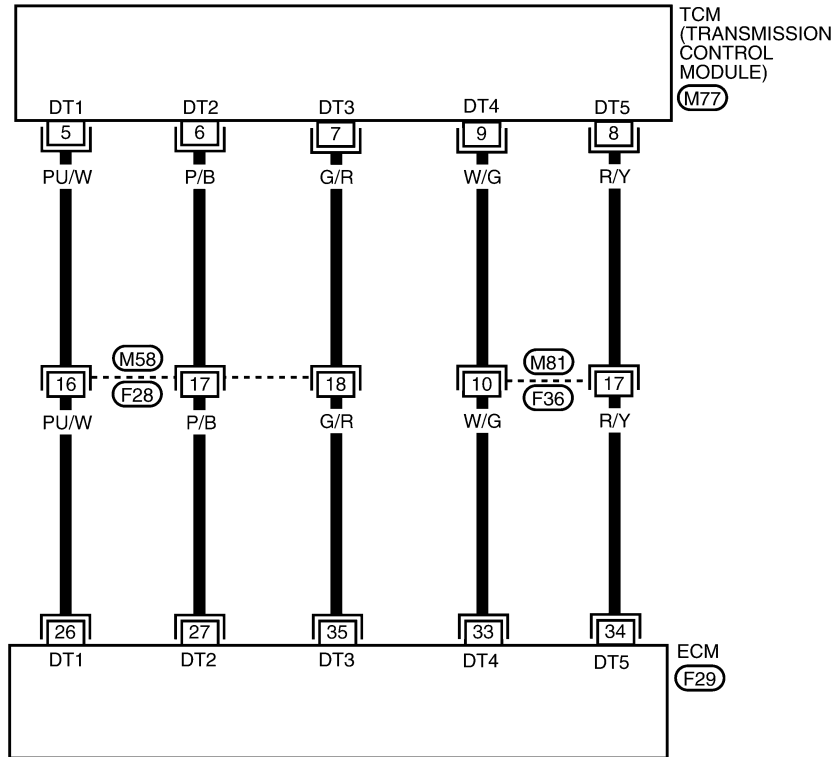
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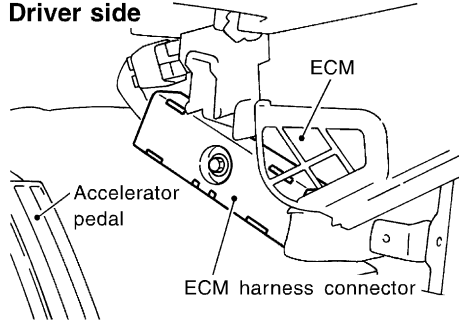
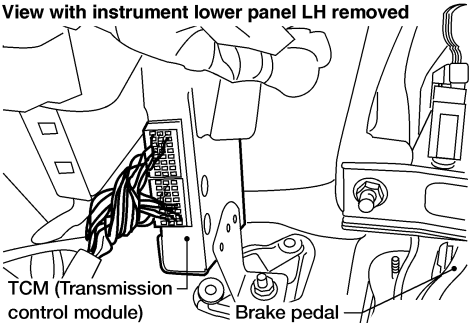
— : Detectable line for DTC
 - - - : Non-detectable line for DTC



LEC673

Diagnostic Procedure

NEEC1364

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p>	
<p>Driver side</p>  <p>SEF324V</p>	
<p>View with instrument lower panel LH removed</p>  <p>AEC655A</p>	
<p>3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 33 and TCM terminal 9, ECM terminal 34 and TCM terminal 8, ECM terminal 35 and TCM terminal 7. Refer to Wiring Diagram. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors M81, F36 ● Harness for open or short between ECM and TCM (Transmission Control Module) 	
▶	Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT
<p>1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 33 and ground, ECM terminal 34 and ground, ECM terminal 35 and ground. Refer to Wiring Diagram. Continuity should not exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P0600 A/T CONTROL

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission Control Module).	
▶	Repair open circuit or short to ground or short to power in harness.

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5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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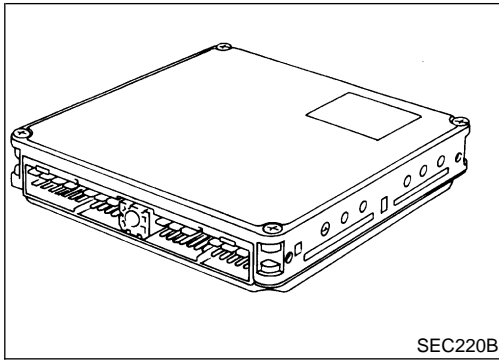
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Component Description



Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. NEEC1365

On Board Diagnosis Logic

Malfunction is detected when ECM calculation function is malfunctioning. NEEC1366

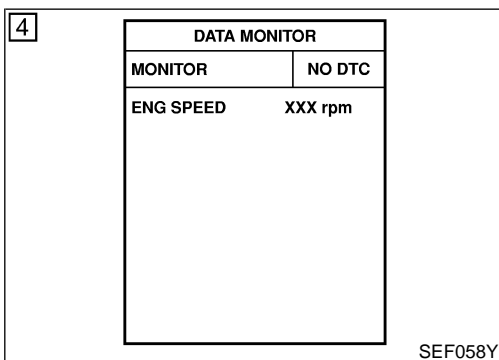
POSSIBLE CAUSE

- ECM NEEC1366S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC1367



With CONSULT-II



- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 2 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1665.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NEEC1368

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1664. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1664. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

GI

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On Board Diagnosis Logic

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. NEEC1369

This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

POSSIBLE CAUSE

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

NEEC1369S01**DTC Confirmation Procedure**NEEC1370**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 70°C (158°F).

WITH CONSULT-II

- 1) Replace thermostat with new one. Refer to **LC-30**, "Thermostat". Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on. NEEC1370S01
- 2) Turn ignition switch "ON".
- 3) Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 4) Check that the "COOLAN TEMP/S" is above 70°C (158°F).
If it is below 70°C (158°F), go to following step.
If it is above 70°C (158°F), stop engine and cool down the engine to less than 70°C (158°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)
---------------	-----------------------------

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1667.

WITH GST

- 1) Follow the procedure "WITH CONSULT-II" above.

NEEC1370S02

DTC P1126 THERMOSTAT FUNCTION

VG33ER

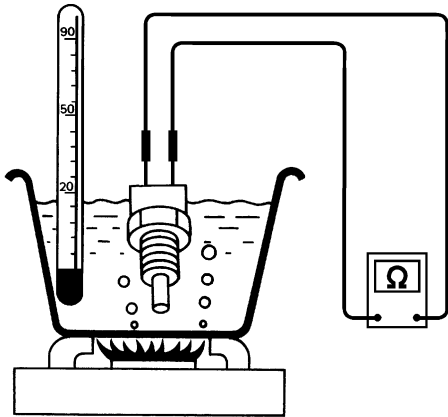
Diagnostic Procedure

Diagnostic Procedure

NEEC1371

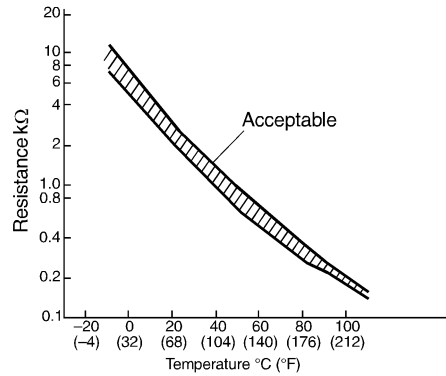
1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK



INSPECTION END

NG



Replace engine coolant temperature sensor.

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DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

★ The closed loop control has the one trip detection logic. NEEC1372

Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

POSSIBLE CAUSE

- The heated oxygen sensor 1 (front) circuit is open or shorted. NEEC1372S01
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NEEC1373

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Never raise engine speed above 2,800 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V	

SEF967Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Hold engine speed at 2,000 rpm and check one of the following.
 - “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
 - “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.If the check result is NG, perform “Diagnosis Procedure”, EC-1669.

EC-1668

DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

VG33ER

DTC Confirmation Procedure (Cont'd)

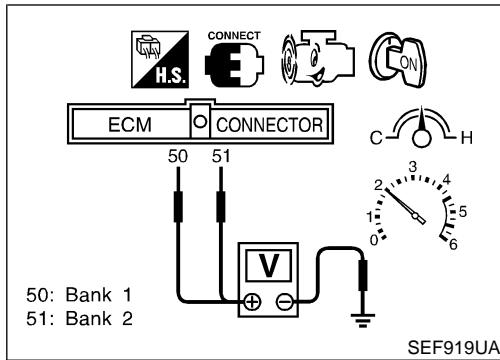
If the check result is OK, perform the following step.

- 4) Let engine idle at least 5 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	2.0 msec or more
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1669.



Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [heated oxygen sensor 1 (front) (bank 1) signal] or 51 [heated oxygen sensor 1 (front) (bank 2) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no-load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-1669.

Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", EC-1429.

System Description

NEEC1376

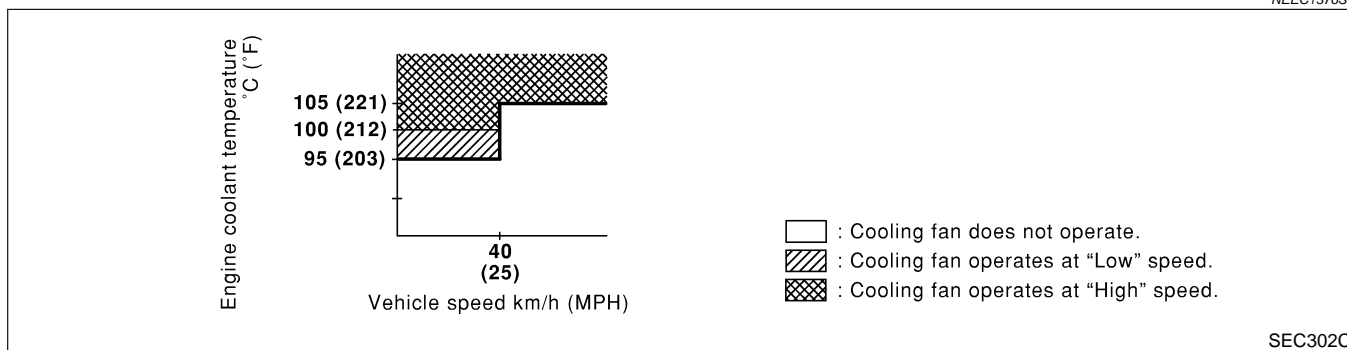
COOLING FAN CONTROL

NEEC1376S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NEEC1376S02

SEC302C

CONSULT-II Reference Value in Data Monitor Mode

NEEC1377

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	<ul style="list-style-type: none"> ● Engine: Idling, after warming up ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less. OFF
		Engine coolant temperature is between 95°C (203°F) and 100°C (212°F) LOW
		Engine coolant temperature is 100°C (212°F) or more. HIGH

ECM Terminals and Reference Value

NEEC1378

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	G/R	Cooling fan relay (Low)	[Engine is running] <ul style="list-style-type: none"> ● Cooling fan is not operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Cooling fan is operating 	0 - 0.6V

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
38	LG/R	Cooling fan relay (High)	[Engine is running] ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 1V

On Board Diagnosis Logic

NEEC1379

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-27. Also, replace the engine oil.

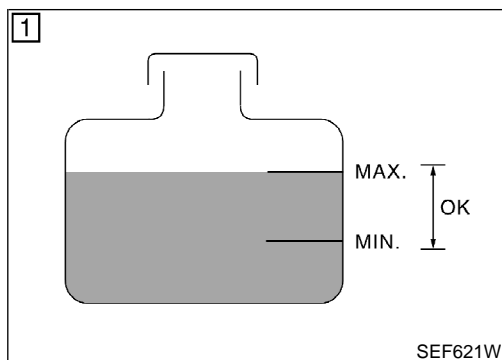
- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS", MA-15.
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

NEEC1379S01

- Harness or connectors
(The cooling fan circuit is open or shorted.)
- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

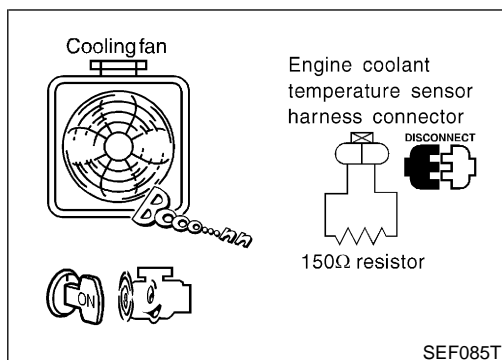
For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1685.



4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X



Overall Function Check

Use this procedure to check the overall function of the cooling fan. NEEC1380
During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

With CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1674.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1674.
- 3) Turn ignition switch ON.
- 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
- 5) Make sure that cooling fan operates.
- 6) If NG, go to "Diagnostic Procedure", EC-1674.

Without CONSULT-II

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1674.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1674.
- 3) Turn ignition switch OFF.
- 4) Disconnect engine coolant temperature sensor harness connector.
- 5) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 6) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
- 7) If NG, go to "Diagnostic Procedure", EC-1674.

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

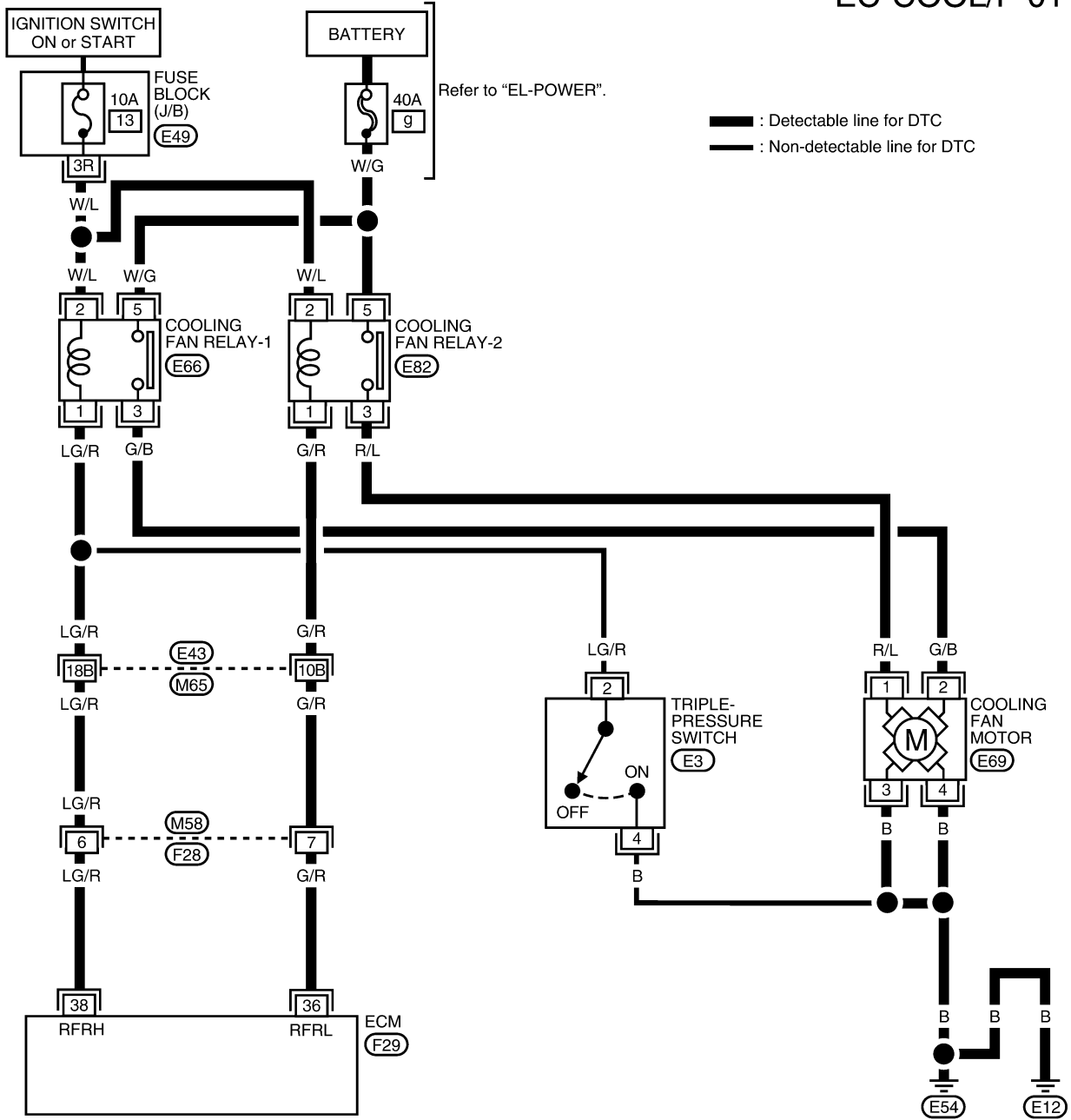
VG33ER

Wiring Diagram

Wiring Diagram

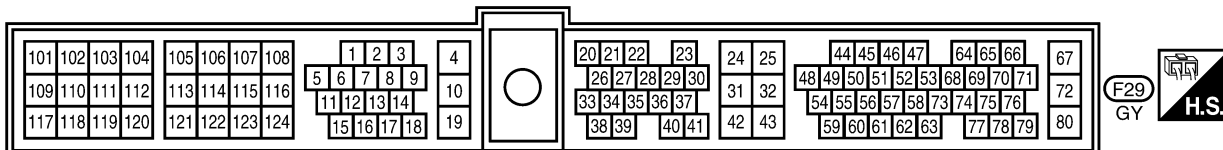
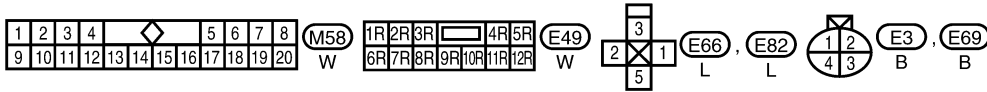
NEEC1381

EC-COOL/F-01



— : Detectable line for DTC
 - - - : Non-detectable line for DTC

Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



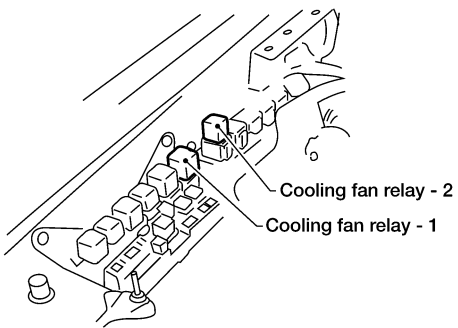
LEC667

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Diagnostic Procedure

NEEC1382

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK COOLING FAN LOW SPEED OPERATION																							
<p>📖 With CONSULT-II</p> <p>1. Disconnect cooling fan relay-1.</p>																								
																								
<small>LEC765</small>																								
<p>2. Turn ignition switch "ON".</p> <p>3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>4. Touch "LOW".</p>																								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>LOW</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	LOW	MONITOR		COOLAN TEMP/S	XXX °C														
ACTIVE TEST																								
COOLING FAN	LOW																							
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COOLAN TEMP/S	XXX °C																							
<small>SEF784Z</small>																								
5. Make sure that cooling fan operates at low speed.																								
OK or NG																								
OK	▶	GO TO 3.																						
NG	▶	GO TO 11.																						

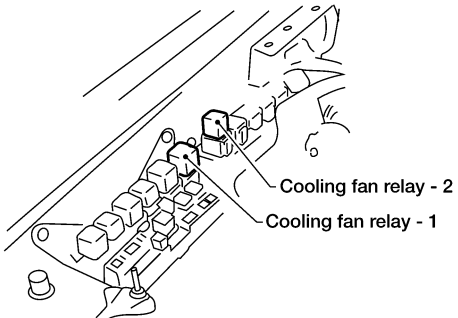
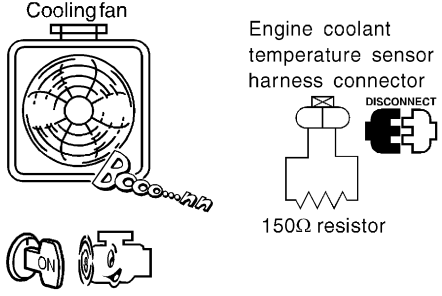
DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

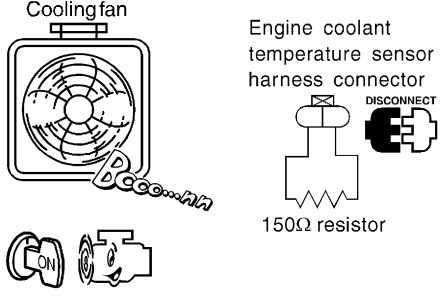
VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK COOLING FAN HIGH SPEED OPERATION																							
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect cooling fan relay-1. 3. Turn ignition switch "ON". 4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II. 5. Touch "HIGH". 																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>COOLING FAN</th> <th>HIGH</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>COOLAN TEMP/S</th> <th>XXX °C</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		COOLING FAN	HIGH	MONITOR		COOLAN TEMP/S	XXX °C														
ACTIVE TEST																								
COOLING FAN	HIGH																							
MONITOR																								
COOLAN TEMP/S	XXX °C																							
SEF785Z																								
<p>6. Make sure that cooling fan operates at higher speed than low speed.</p> <p style="text-align: center;">OK or NG</p>																								
OK	▶	GO TO 6.																						
NG	▶	GO TO 16.																						

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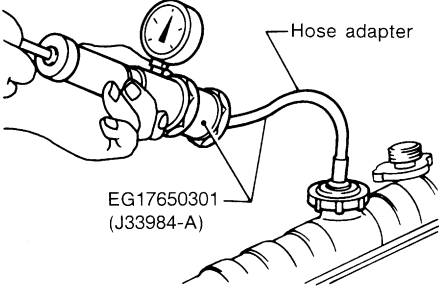
4	CHECK COOLING FAN LOW SPEED OPERATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect cooling fan relay-1. 	
	
<ol style="list-style-type: none"> 3. Disconnect engine coolant temperature sensor harness connector. 4. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 5. Start engine and make sure that cooling fan operates at low speed. 	
LEC765	
	
SEF085T	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 11.

5	CHECK COOLING FAN HIGH SPEED OPERATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect cooling fan relay-1. 3. Restart engine and make sure that cooling fan operates at higher speed than low speed. 	
	
SEF085T	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 16.

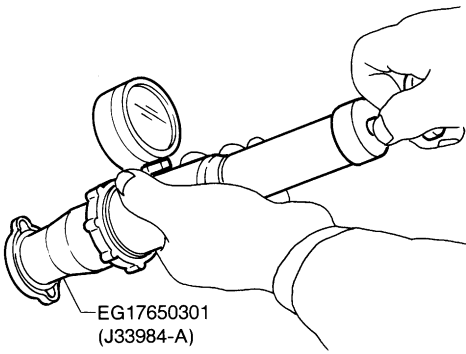
DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK COOLING SYSTEM FOR LEAK	
<p>Apply pressure to the cooling system with a tester, and check if the pressure drops.</p> <p>CAUTION: Higher than the specified pressure may cause radiator damage.</p> <p>Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)</p>		
		
SLC754A		
<p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	<p>Check the following for leak</p> <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump <p>Refer to "Water Pump", LC-29.</p>

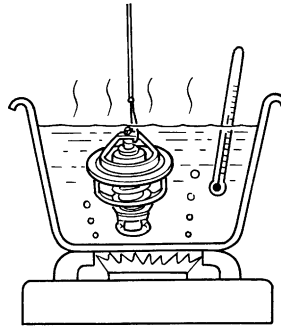
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7	CHECK RADIATOR CAP	
<p>Apply pressure to cap with a tester and check radiator cap relief pressure.</p>		
		
SLC755A		
<p>Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Replace radiator cap.

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8 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]

Valve lift:
More than 10 mm/90°C (0.39 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to "Thermostat", **LC-30**.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace thermostat

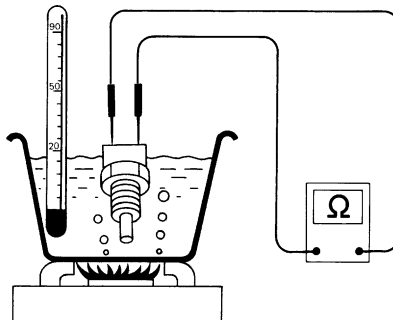
DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Diagnostic Procedure (Cont'd)

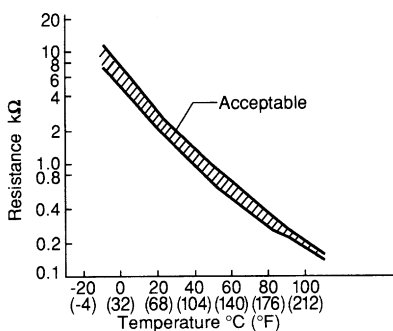
9 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

10 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1685.

▶ **INSPECTION END**

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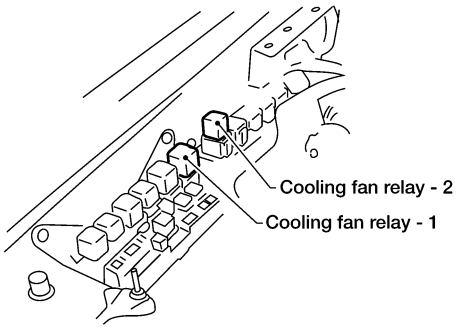
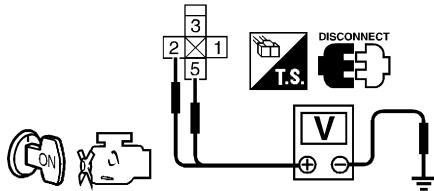
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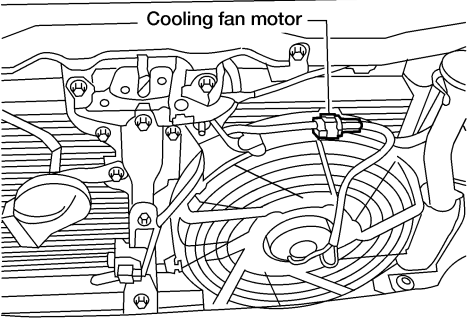
11	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan relay-2.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
LEC765	
SEF667W	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

12	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay-2 and fuse ● Harness for open or short between cooling fan relay-2 and battery 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Diagnostic Procedure (Cont'd)

13	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Check harness continuity between cooling fan relay-2 terminal 3 and motor terminal 1, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 36 and cooling fan relay-2 terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 21.
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay-2 and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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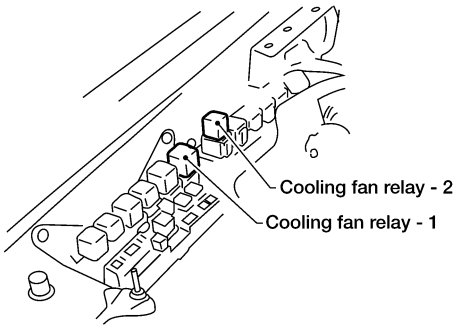
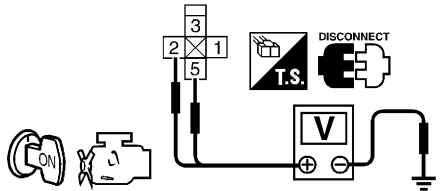
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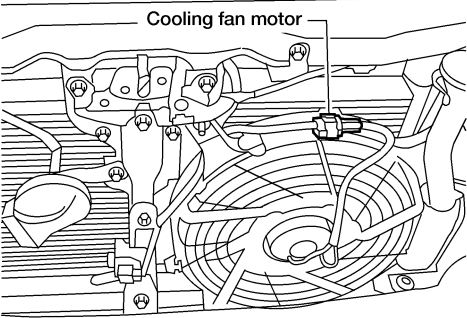
16	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect cooling fan relay-1.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">LEC765</p> <p>3. Turn ignition switch "ON". 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF667W</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ GO TO 17.

17	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● 40A fusible link ● Harness for open or short between cooling fan relay-1 and fuse ● Harness for open or short between cooling fan relay-1 and battery 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Diagnostic Procedure (Cont'd)

18	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF". 2. Disconnect cooling fan motor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right; font-size: small;">AEC931A</p> <p>3. Check harness continuity between cooling fan relay-1 terminal 3 and motor terminal 2, motor terminals 3, 4 and body ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 19.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

19	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 38 and cooling fan relay-1 terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 21.
NG	▶ GO TO 20.

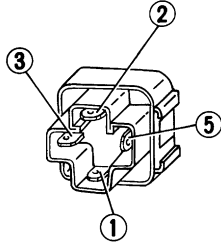
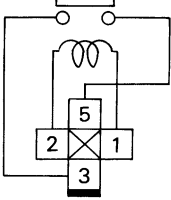
20	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Harness for open or short between cooling fan relay-1 and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

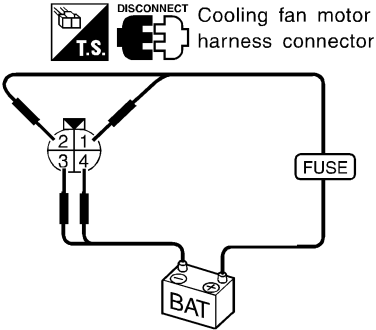
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DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Diagnostic Procedure (Cont'd)

21	CHECK COOLING FAN RELAY	<p>Check continuity between terminals 3 and 5.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>							
		SEF511P							
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No current supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>	Conditions	Continuity	12V direct current supply between terminals 1 and 2	Yes	No current supply	No	MTBL0252
Conditions	Continuity								
12V direct current supply between terminals 1 and 2	Yes								
No current supply	No								
OK or NG									
OK	▶	GO TO 22.							
NG	▶	Replace cooling fan relay.							

22	CHECK COOLING FAN MOTOR	<p>1. Disconnect cooling fan motor harness connector. 2. Supply cooling fan motor terminals with battery voltage and check operation.</p>														
		MTBL0631														
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th rowspan="2">Speed</th> <th colspan="2">Terminals</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Cooling fan motor</td> <td>Low</td> <td style="text-align: center;">1</td> <td style="text-align: center;">3</td> </tr> <tr> <td>High</td> <td style="text-align: center;">1, 2</td> <td style="text-align: center;">3, 4</td> </tr> </tbody> </table>		Speed	Terminals		(+)	(-)	Cooling fan motor	Low	1	3	High	1, 2	3, 4	SEC303C
	Speed	Terminals														
		(+)	(-)													
Cooling fan motor	Low	1	3													
	High	1, 2	3, 4													
																
OK or NG																
OK	▶	GO TO 23.														
NG	▶	Replace cooling fan motor.														

23	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>	
		▶	INSPECTION END

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

VG33ER

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NEEC1383

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS", MA-13 .
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-27 .
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM", LC-27 .
ON*2	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check", "ENGINE COOLING SYSTEM", LC-27 .
ON*2	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM", LC-30, LC-32 .
ON*1	7	<ul style="list-style-type: none"> Cooling fan 	<ul style="list-style-type: none"> CONSULT-II 	Operating	See "TROUBLE DIAGNOSIS FOR OVERHEAT" EC-1670.
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-27 .
OFF*4	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE", MA-25 .
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD DISTORTION", EM-96 .
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK DISTORTION AND WEAR", EM-117 .

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to "Engine Cooling System", "OVERHEATING CAUSE ANALYSIS", **LC-35**.

DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

Description

Description SYSTEM DESCRIPTION

NEEC1384

NEEC1384S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Super-charged air control	SCB valve control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

This system controls supercharged air according to the engine operating conditions.

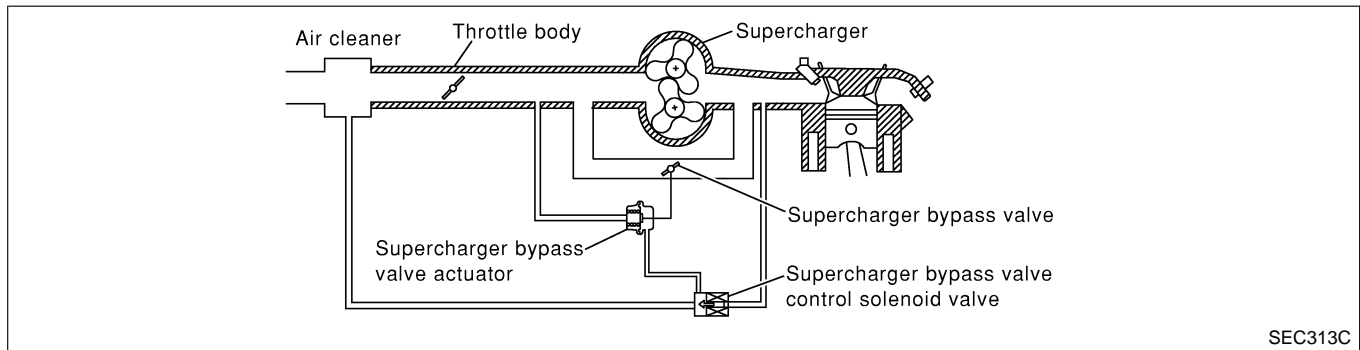
This control operation is accomplished through the ECM and the SCB valve control solenoid valve.

When the solenoid valve is ON, the SCB valve shuts. Then intake air is lead to supercharger, and supercharged air is sent to the cylinder.

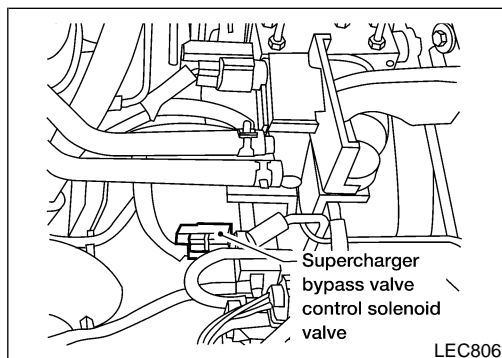
When the solenoid valve is OFF, the SCB valve opens. Then intake air is sent to the cylinder directly.

When the ECM detects any of the following conditions, current does not flow through the solenoid valve.

- Engine stopped
- Engine starting
- High-load, high-speed engine operation
- Excessively low engine coolant temperature
- Mass air flow sensor malfunction
- Engine coolant temperature sensor malfunction
- Throttle position sensor malfunction



SEC313C



LEC806

COMPONENT DESCRIPTION

NEEC1384S02

SCB Valve Control Solenoid Valve

NEEC1384S0201

The SCB valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the SCB valve actuator. This operation closes the SCB valve. When the ECM sends an OFF signal, the vacuum signal is cut and the SCB valve opens.

DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC1385

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SCB/V CON S/V	More than 5 seconds after turning ignition switch ON (Engine stopped)	OFF
	Engine speed: Idle	ON

ECM Terminals and Reference Value

NEEC1386

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	G/W	SCB valve control solenoid valve	[Ignition switch ON] ● Engine stopped	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NEEC1387

Malfunction is detected when the improper voltage signal is sent to ECM through SCB valve control solenoid valve.

Freeze frame data will not be stored in the ECM for the SCB valve control solenoid. The MIL will not light for SCB valve control solenoid malfunction.

POSSIBLE CAUSE

NEEC1387S01

- Harness or connectors (The SCB valve control solenoid valve circuit is open or shorted.)
- SCB valve control solenoid valve

DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

DTC Confirmation Procedure

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NEEC1388

④ With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1690.

④ With GST

Follow the procedure "WITH CONSULT-II" above.

DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

Wiring Diagram

Wiring Diagram

NEEC1389

EC-S/CHGR-01

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MA

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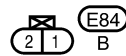
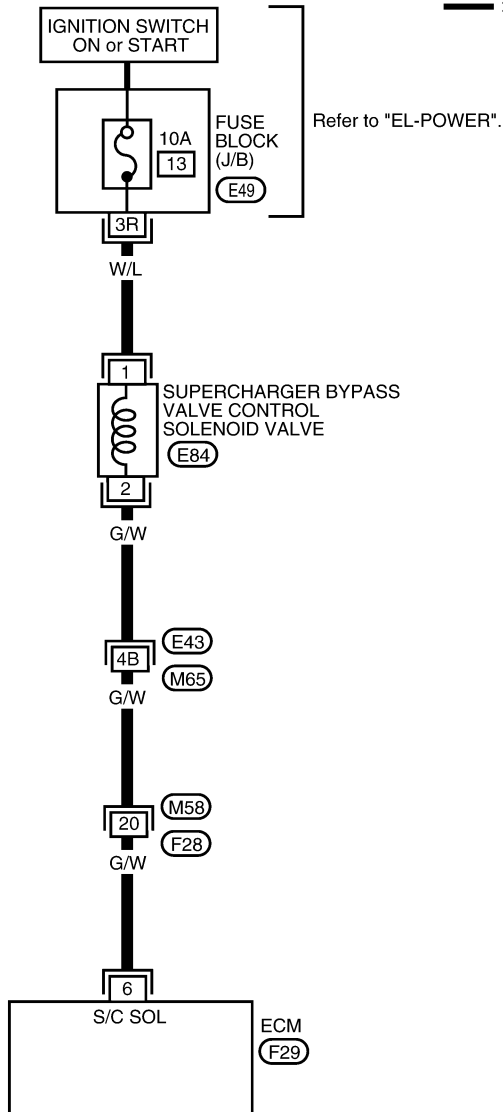
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SC

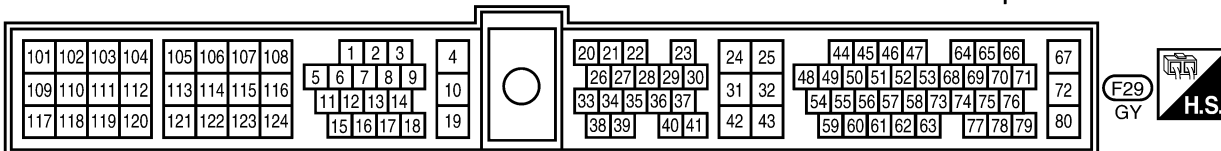
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IDX

— : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)



LEC683

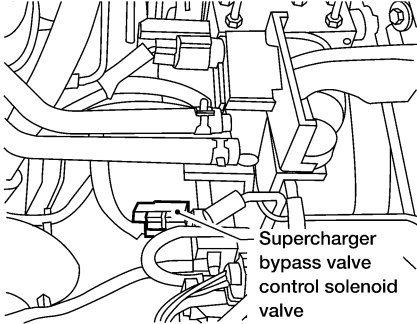
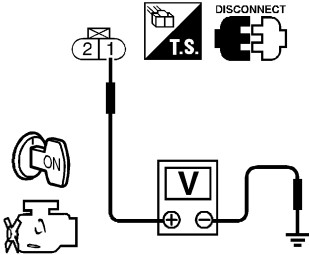
DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1390

1	CHECK SCB VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect SCB valve control solenoid valve harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 150px;">Supercharger bypass valve control solenoid valve</p> </div> <p style="text-align: right;">LEC806</p> <p>3. Turn ignition switch "ON". 4. Check voltage between SCB valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF657W</p>		
OK		▶ GO TO 3.
NG		▶ GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between SCB valve control solenoid valve and fuse 		
▶		Repair harness or connectors.

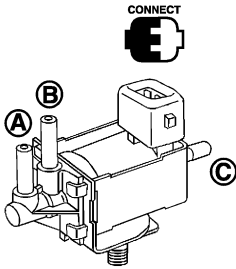
3	CHECK SCB VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 6 and SCB valve control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 5.
NG		▶ Repair open circuit or short to ground or short to power in harness or connectors.

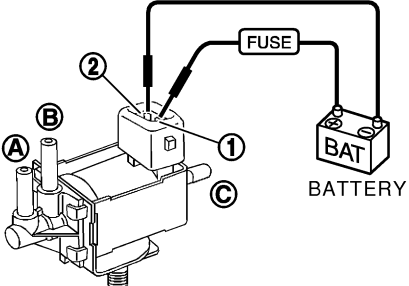
DTC P1243 SUPERCHARGER BYPASS (SCB) VALVE CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M58, F28 ● Harness for open or short between SCB valve control solenoid valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK SCB VALVE CONTROL SOLENOID VALVE																		
(E) With CONSULT-II 1. Perform "SCB/V CONT SOL/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time under the following conditions.																			
	<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>SCB/V CONT SOL/V</td><td>ON</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXXrpm</td></tr> <tr><td>IACV-AAC/V</td><td>XXX%</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	ACTIVE TEST		SCB/V CONT SOL/V	ON	MONITOR		ENG SPEED	XXXrpm	IACV-AAC/V	XXX%								
ACTIVE TEST																			
SCB/V CONT SOL/V	ON																		
MONITOR																			
ENG SPEED	XXXrpm																		
IACV-AAC/V	XXX%																		
<table border="1" style="margin: auto;"> <thead> <tr> <th>Conditions</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>Yes</td> <td>No</td> </tr> </tbody> </table>		Conditions	Air passage continuity between A and B	Air passage continuity between A and C	ON	No	Yes	OFF	Yes	No									
Conditions	Air passage continuity between A and B	Air passage continuity between A and C																	
ON	No	Yes																	
OFF	Yes	No																	
SEC314C																			

(X) Without CONSULT-II Check air passage continuity and operation delay time under the following conditions.										
	<table border="1" style="margin: auto;"> <thead> <tr> <th>Conditions</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>Yes</td> <td>No</td> </tr> </tbody> </table>	Conditions	Air passage continuity between A and B	Air passage continuity between A and C	12V direct current supply between terminals 1 and 2	No	Yes	No supply	Yes	No
Conditions	Air passage continuity between A and B	Air passage continuity between A and C								
12V direct current supply between terminals 1 and 2	No	Yes								
No supply	Yes	No								
SEC315C										
OK or NG										
OK	▶	GO TO 6.								
NG	▶	Replace SCB valve control solenoid valve.								

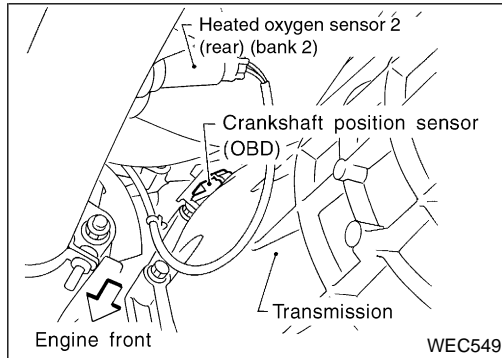
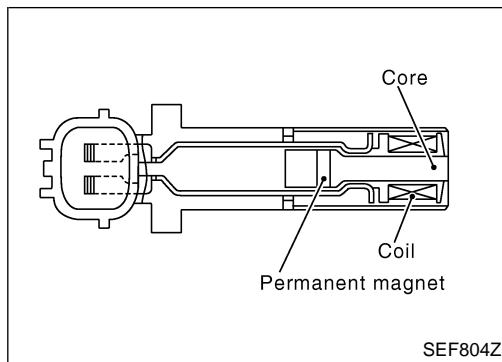
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

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DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

Component Description



Component Description

NEEC1391

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

ECM Terminals and Reference Value

NEEC1392

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> Warm-up condition Idle speed 	<p>1 - 2V (AC range)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p>

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. NEEC1393

POSSIBLE CAUSE

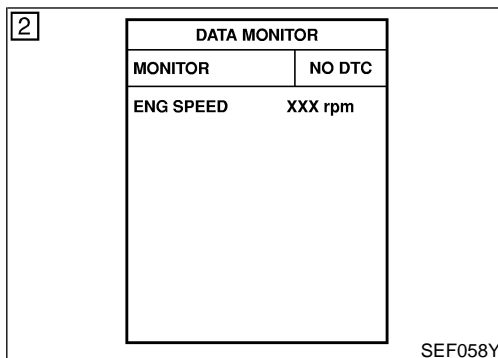
- Harness or connectors
- Crankshaft position sensor (OBD)
- Drive plate/Flywheel

NEEC1393S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC1394



④ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1695.

④ With GST

Follow the procedure "With CONSULT-II".

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DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

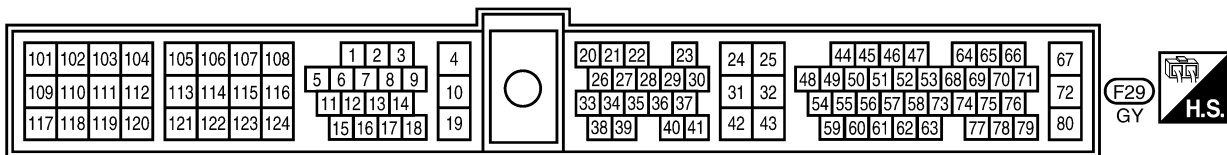
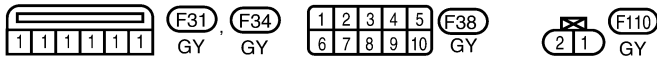
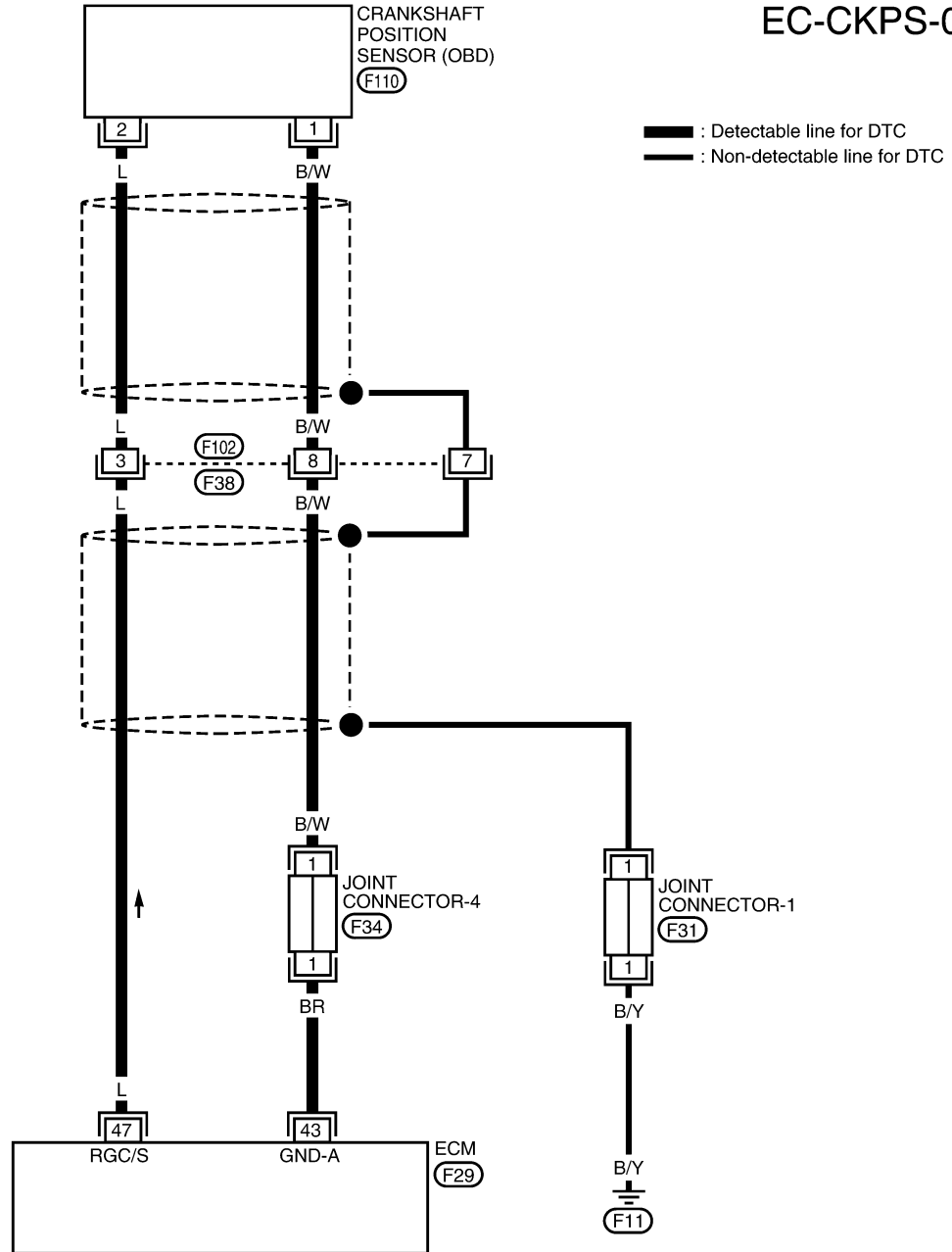
VG33ER

Wiring Diagram

Wiring Diagram

NEEC1395

EC-CKPS-01



LEC669

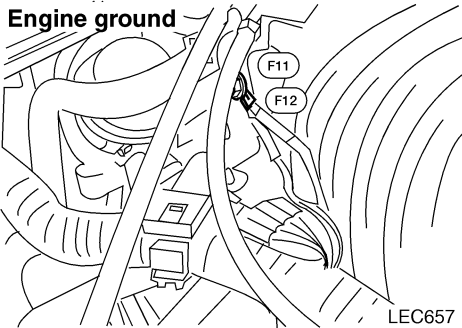
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

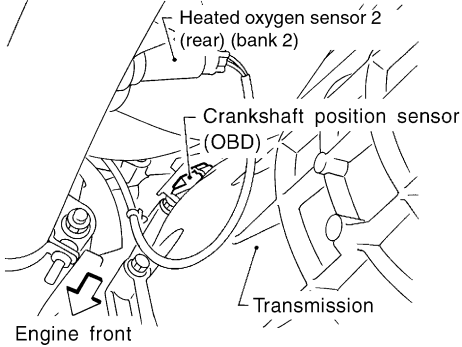
Diagnostic Procedure

Diagnostic Procedure

NEEC1396

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
 <p>Engine ground</p> <p>F11</p> <p>F12</p> <p>LEC657</p>	
LEC657	
▶ GO TO 2.	

GI
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EC

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p>							
 <p>Heated oxygen sensor 2 (rear) (bank 2)</p> <p>Crankshaft position sensor (OBD)</p> <p>Transmission</p> <p>Engine front</p> <p>WEC549</p>							
<p>2. Check continuity between ECM terminal 47 and CKPS (OBD) terminal 2. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border: none;">OK</td> <td style="width: 5%; border: none; text-align: center;">▶</td> <td style="border: none;">GO TO 4.</td> </tr> <tr> <td style="border: none;">NG</td> <td style="border: none; text-align: center;">▶</td> <td style="border: none;">GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

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3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

RS
BT

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SC
EL

IDX

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT
1. Reconnect ECM harness connectors. 2. Check harness continuity between CKPS (OBD) terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

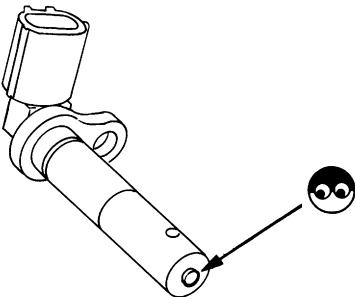
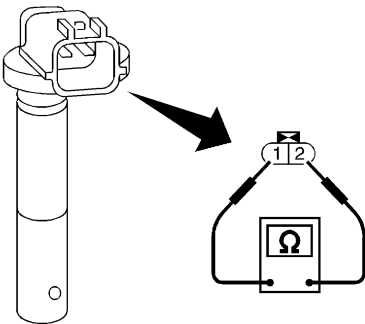
5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-4● Harness for open between crankshaft position sensor (OBD) and ECM	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IMPROPER INSTALLATION
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform "DTC Confirmation Procedure", EC-1693 again. <p style="text-align: center;">Is a 1st trip DTC P1336 detected?</p>	
Yes	▶ GO TO 7.
No	▶ INSPECTION END

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK CRANKSHAFT POSITION SENSOR (OBD)	<p>1. Disconnect crankshaft position sensor (OBD) harness connector.</p> <p>2. Loosen the fixing bolt of the sensor.</p> <p>3. Remove the sensor.</p> <p>4. Visually check the sensor for chipping.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>5. Check resistance as shown in the figure.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: center; color: blue;">Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p>
OK	▶	GO TO 8.	
NG	▶	Replace crankshaft position sensor (OBD).	

8	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect harness connectors F38, F102.</p> <p>2. Check harness continuity between harness connector F38 terminal 7 and engine ground. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>SU</p> <p>BR</p> <p>ST</p>
OK	▶	GO TO 10.	
NG	▶	GO TO 9.	

9	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-1 ● Harness for open between harness connector F38 and engine ground <p style="text-align: center;">OK or NG</p>	<p>BT</p> <p>HA</p>
	▶	Repair open circuit or short to power in harness or connectors.	

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (OBD) (COG)

VG33ER

Diagnostic Procedure (Cont'd)

10	CHECK GEAR TOOTH
Visually check for chipping flywheel or drive plate gear tooth (cog).	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

NEEC1397

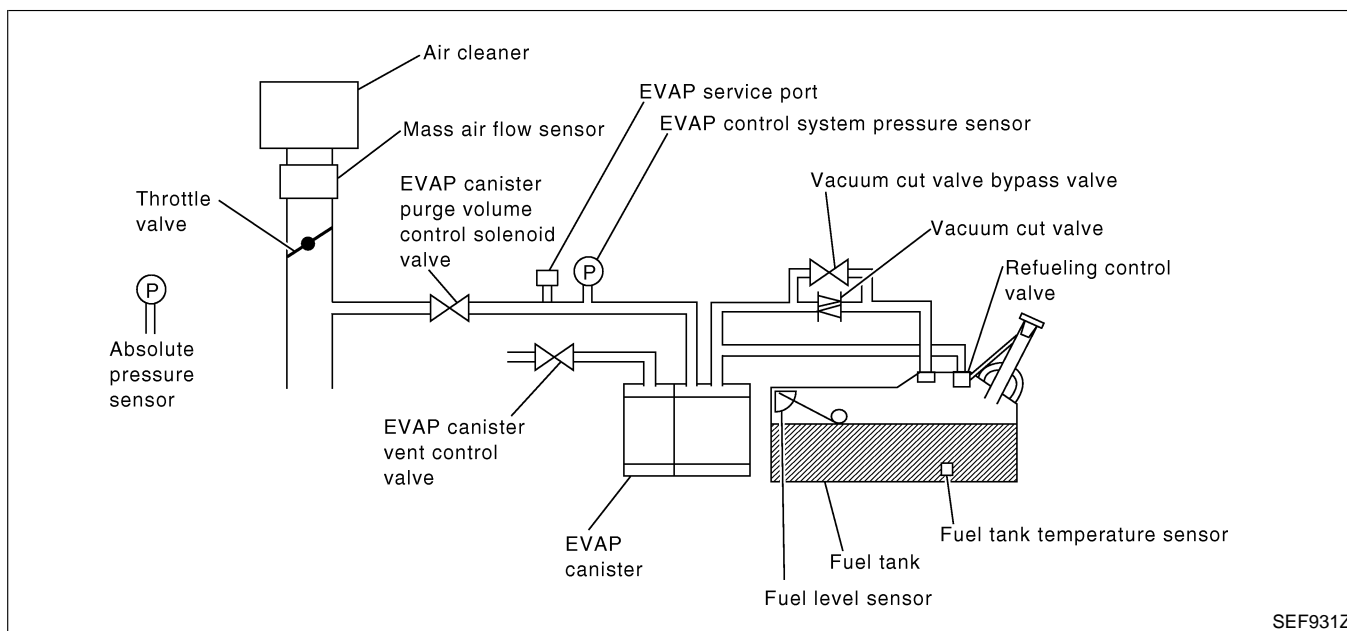
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1747.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC1397S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent

DTC P1440 EVAP CONTROL SYSTEM (SMALL LEAK) (POSITIVE PRESSURE)

VG33ER

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1701. ^{NEEC1398}

Diagnostic Procedure

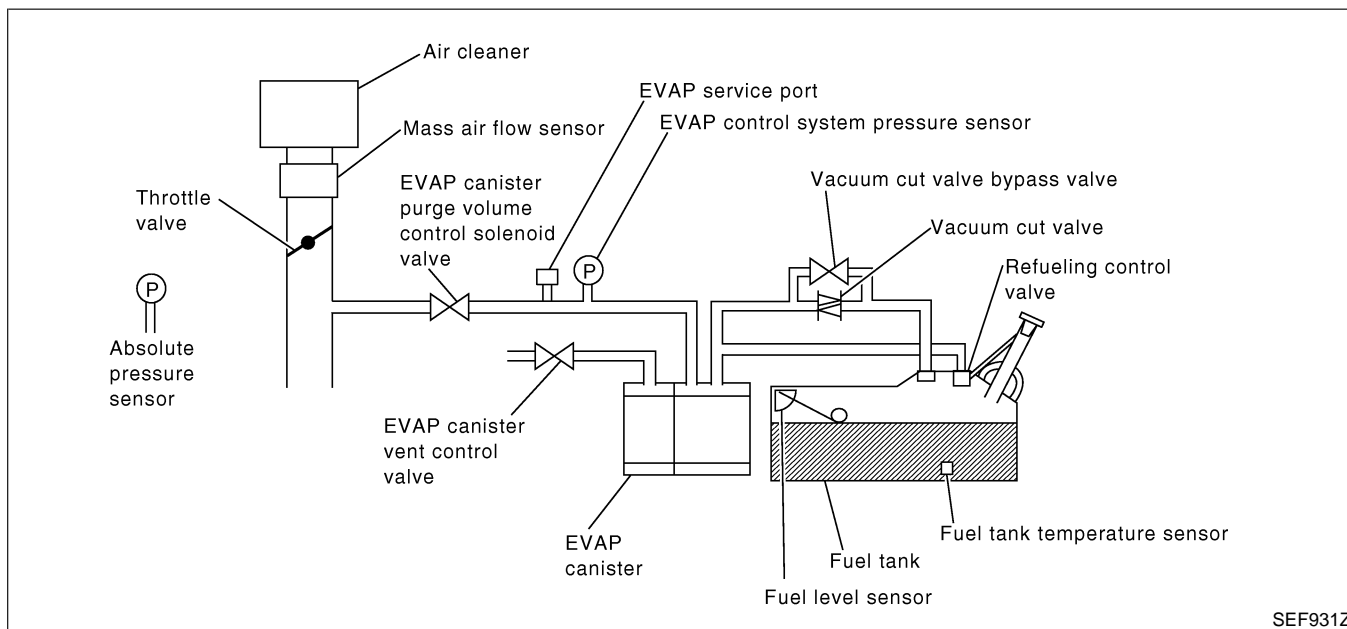
Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1701. ^{NEEC1399}

On Board Diagnosis Logic

NEEC1400

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NEEC1400S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

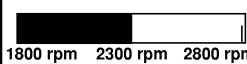
VG33ER

On Board Diagnosis Logic (Cont'd)

- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

EVAP V/S LEAK P1441	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEF881X

EVAP V/S LEAK P1441		
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.		
		
1800 rpm	2300 rpm	2800 rpm

SEF882X

EVAP V/S LEAK P1441	
OK	

SEF883X

DTC Confirmation Procedure

NEEC1401

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.
FUEL LEVEL SE: 1.08 - 0.2V
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
INT A/TEMP SE: More than 0°C (32°F)
If NG, turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
- 3) Turn ignition switch “OFF” and wait at least 5 seconds.
- 4) Turn ignition switch “ON”.
- 5) Select “EVAP VERY/SML LEAK P1441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
Follow the instruction displayed.
- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1447.

EC-1702

NOTE:

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic inspection”, EC-1314.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

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Overall Function Check

NEEC1402

With GST

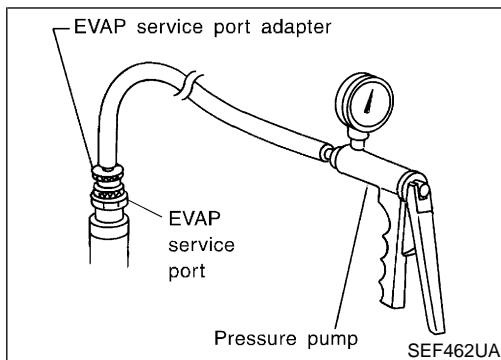
Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

EC

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MT



CAUTION:

- Never use compressed air, doing so may damage the EVAP system.
 - Do not start engine.
 - Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch “ON”.
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

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Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

ST

If NG, go to diagnostic procedure, EC-1447.

RS

NOTE:

For more information, refer to GST instruction manual.

BT

HA

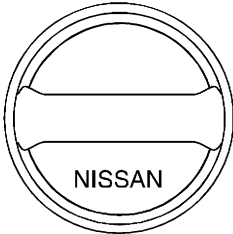
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Diagnostic Procedure

NEEC1403

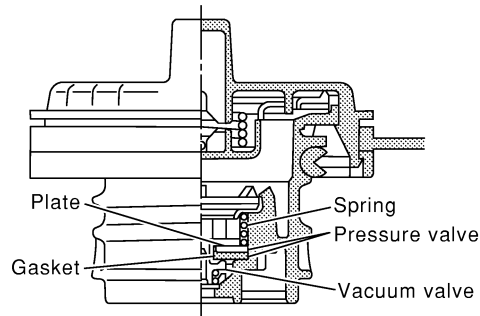
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
<small>SEF915U</small>		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

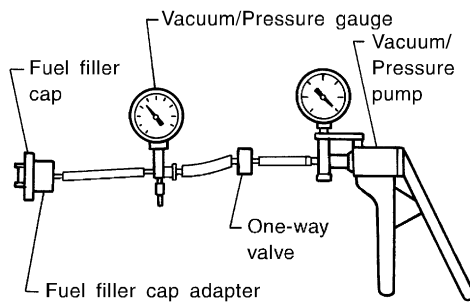
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK ► GO TO 5.

NG ► Replace fuel filler cap with a genuine one.

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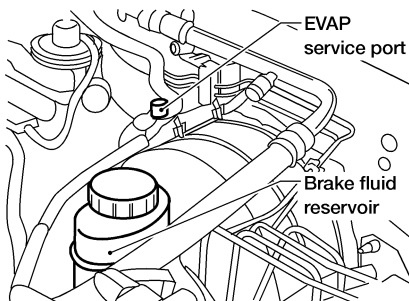
DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33ER

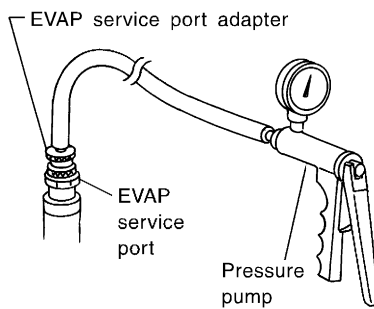
Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ► GO TO 6.

Models without CON- ► GO TO 7.
SULT-II

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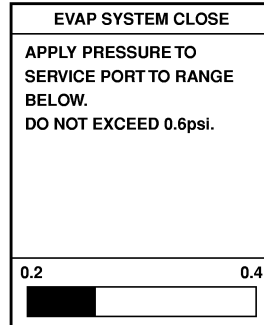
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

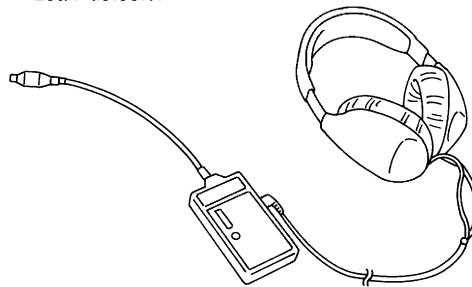
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

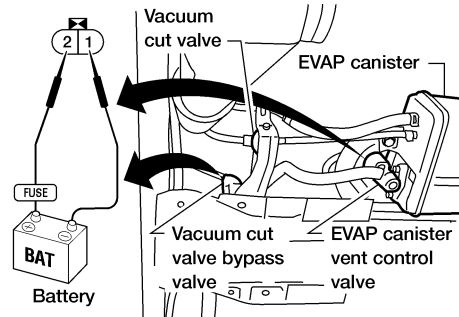
VG33ER

Diagnostic Procedure (Cont'd)

7 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

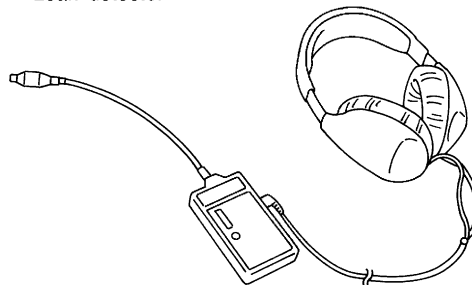
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

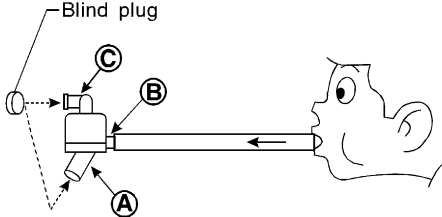
Leak detector



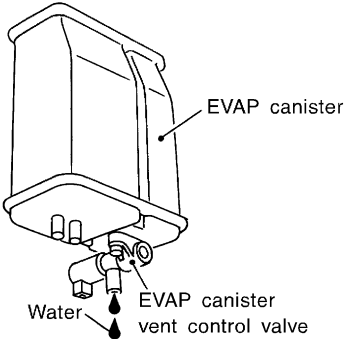
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) * (B) : Emergency tube (From EVAP canister) * (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
<p>Refer to "DTC Confirmation Procedure", EC-1600.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister?</p> <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> </div> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33ER

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
		▶ Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">LEAN</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
ⓘ Without CONSULT-II <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue; margin-left: 20px;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1235.		
OK or NG		
OK (With CONSULT-II) ▶▶	GO TO 16.	
OK (Without CONSULT-II) ▶▶	GO TO 17.	
NG ▶▶	Repair or reconnect the hose.	

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">RICH</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK ▶▶	GO TO 18.																					
NG ▶▶	GO TO 17.																					

GI
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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

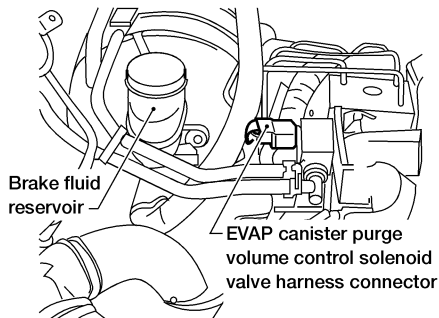
VG33ER

Diagnostic Procedure (Cont'd)

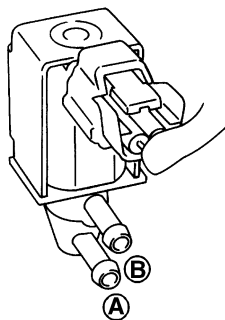
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

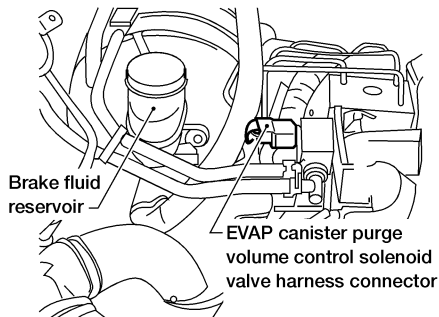


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

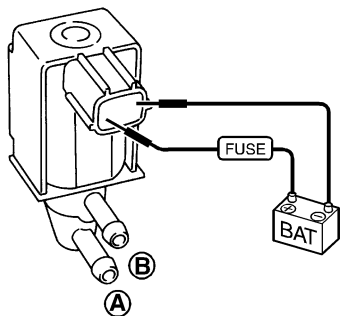
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK



GO TO 18.

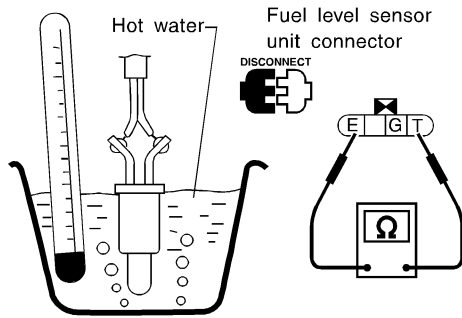
NG



Replace EVAP canister purge volume control solenoid valve.

18 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEC311C

OK or NG

- | | | |
|----|---|---------------------------------|
| OK | ▶ | GO TO 19. |
| NG | ▶ | Replace fuel level sensor unit. |

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

VG33ER

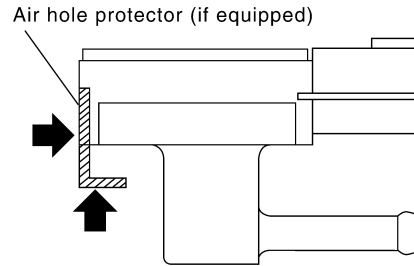
Diagnostic Procedure (Cont'd)

19 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

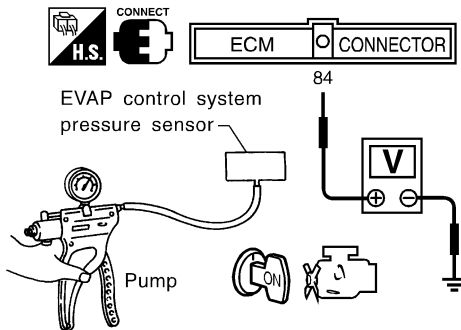
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.

5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK ► GO TO 20.

NG ► Replace EVAP control system pressure sensor.

20 CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-1241.

OK or NG

OK ► GO TO 21.

NG ► Repair or reconnect the hose.

21 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

► GO TO 22.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) VG33ER

Diagnostic Procedure (Cont'd)

22	CHECK FUEL LEVEL SENSOR	
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Replace fuel level sensor unit.

GI

MA

EM

23	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
	▶	INSPECTION END

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Description

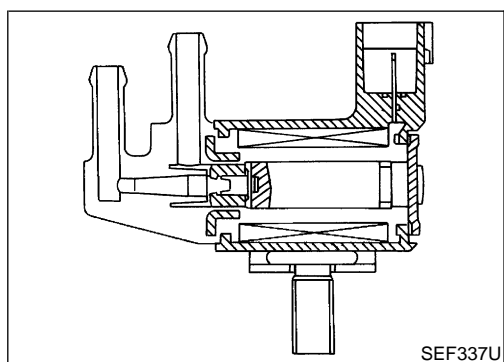
Description SYSTEM DESCRIPTION

NEEC1404

NEEC1404S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NEEC1404S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1405

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
	2,000 rpm	0%
		—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

ECM Terminals and Reference Value

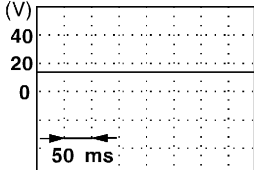
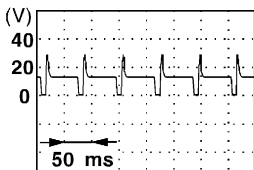
ECM Terminals and Reference Value

NEEC1406

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NEEC1407

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

POSSIBLE CAUSE

NEEC1407S01

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

DTC Confirmation Procedure

- Hoses
(Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

NEEC1408

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

6	PURG VOL CN/V P1444					
	OUT OF CONDITION					
	MONITOR					
	<table border="0"> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL
ENG SPEED	XXX rpm					
THRTL POS SEN	XXX V					
B/FUEL SCHDL	XXX msec					

SEF205Y

6	PURG VOL CN/V P1444					
	TESTING					
	MONITOR					
	<table border="0"> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL
ENG SPEED	XXX rpm					
THRTL POS SEN	XXX V					
B/FUEL SCHDL	XXX msec					

SEF206Y

6	PURG VOL CN/V P1444
	COMPLETED

SEF237Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
- 6) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1720.

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 20 seconds.
- 4) Select "MODE 7" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1720.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

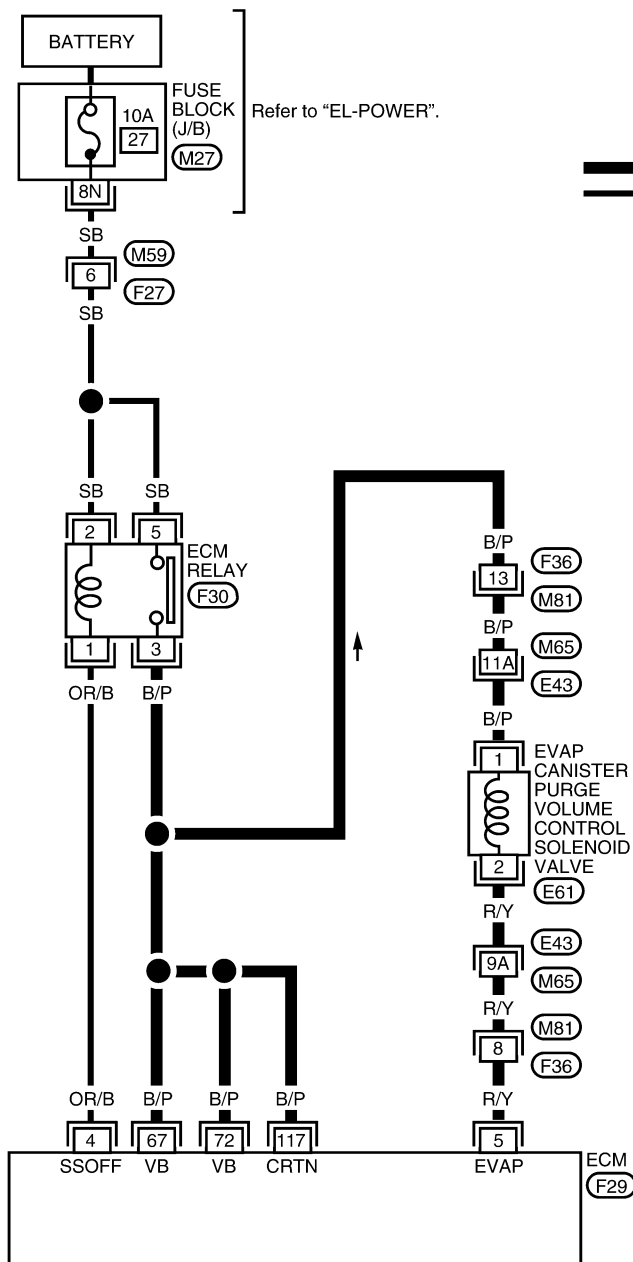
VG33ER

Wiring Diagram

Wiring Diagram

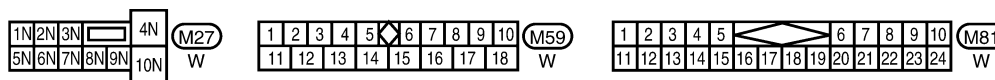
NEEC1409

EC-PGC/V-01

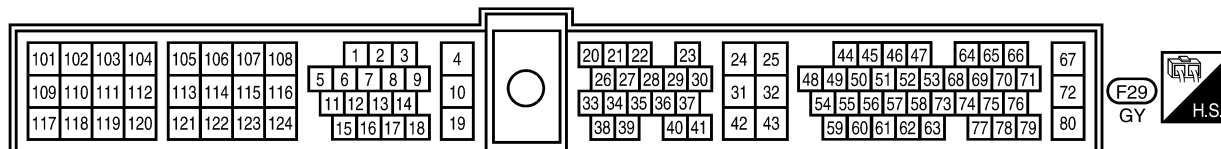
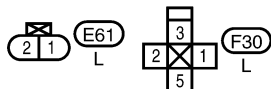


: Detectable line for DTC
 : Non-detectable line for DTC

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Refer to the following.
 (M65, E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



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LEC813

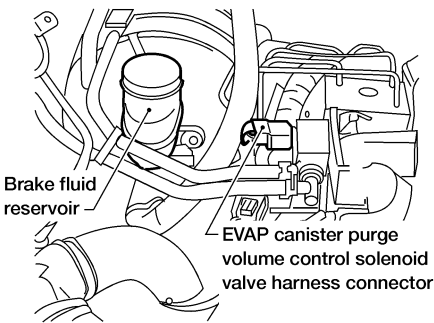
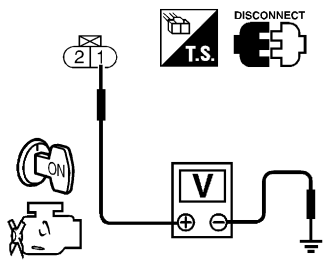
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1410

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p style="text-align: right;">AEC652A</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: right;">SEF646W</p> </div> <p style="text-align: center; color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M82, E74 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART		
Check the following. <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 			
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI

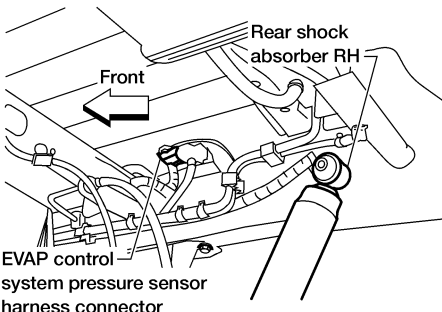
MA

EM

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE		
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.			
OK or NG			
OK		▶	GO TO 6.
NG		▶	Repair it.

LC

EC

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR		
1. Disconnect EVAP control system pressure sensor harness connector.			
			
AEC651A			
2. Check connectors for water. Water should not exist.			
OK or NG			
OK		▶	GO TO 7.
NG		▶	Replace EVAP control system pressure sensor.

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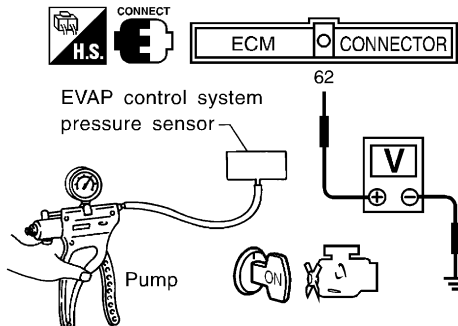
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

7 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



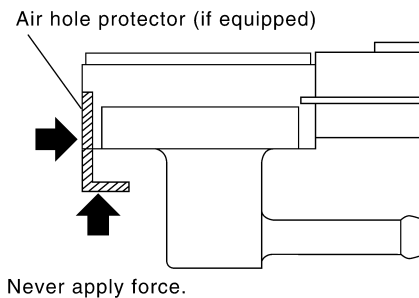
SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.
- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (with CONSULT-II)	▶	GO TO 8.
OK (without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

8 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

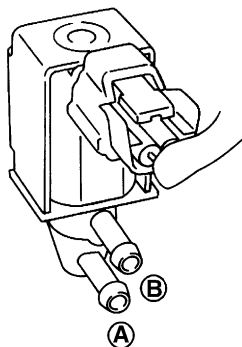
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.


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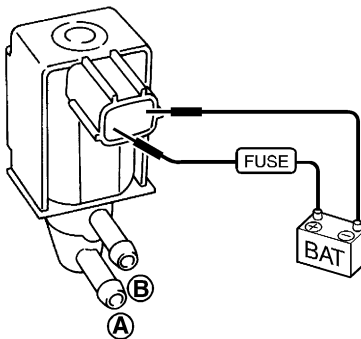
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

9 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **Without CONSULT-II**
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

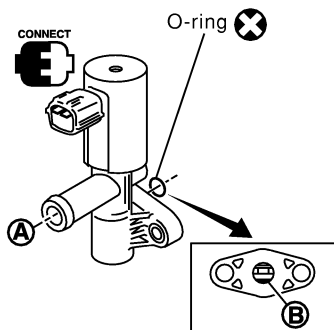
Diagnostic Procedure (Cont'd)

10 CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

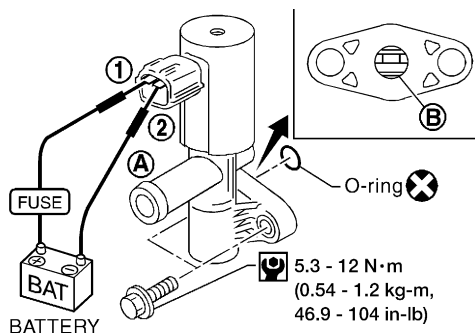
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11 CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

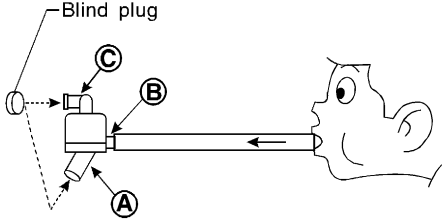
OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

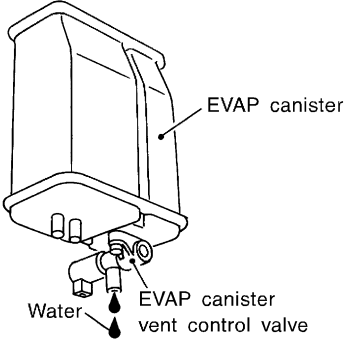
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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

12	CHECK WATER SEPARATOR						
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: ● Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace water separator.</td> </tr> </table>		OK	▶	GO TO 13.	NG	▶	Replace water separator.
OK	▶	GO TO 13.					
NG	▶	Replace water separator.					

13	CHECK IF EVAP CANISTER SATURATED WITH WATER						
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 16.</td> </tr> </table> </div>		Yes	▶	GO TO 14.	No	▶	GO TO 16.
Yes	▶	GO TO 14.					
No	▶	GO TO 16.					

14	CHECK EVAP CANISTER						
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 16.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 15.</td> </tr> </table>		OK	▶	GO TO 16.	NG	▶	GO TO 15.
OK	▶	GO TO 16.					
NG	▶	GO TO 15.					

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

15	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 	
	Repair hose or replace EVAP canister.

GI

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16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	INSPECTION END

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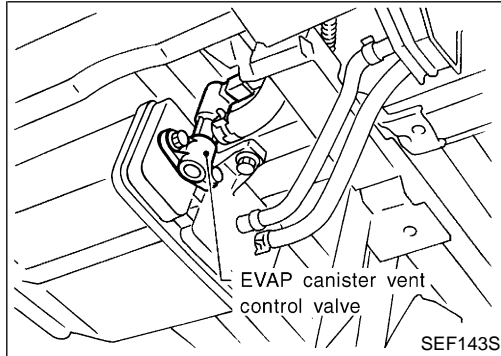
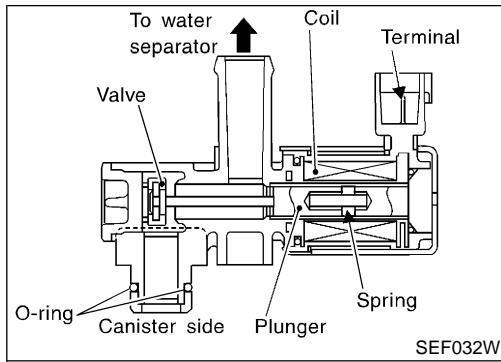
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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33ER

Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NEEC1411

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values. NEEC1412

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NEEC1413

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions. =NEEC1414

POSSIBLE CAUSE

- EVAP canister vent control valve
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.

NEEC1414S01

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF201Y

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1731.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

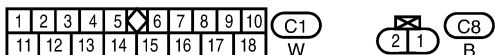
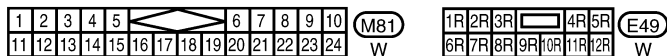
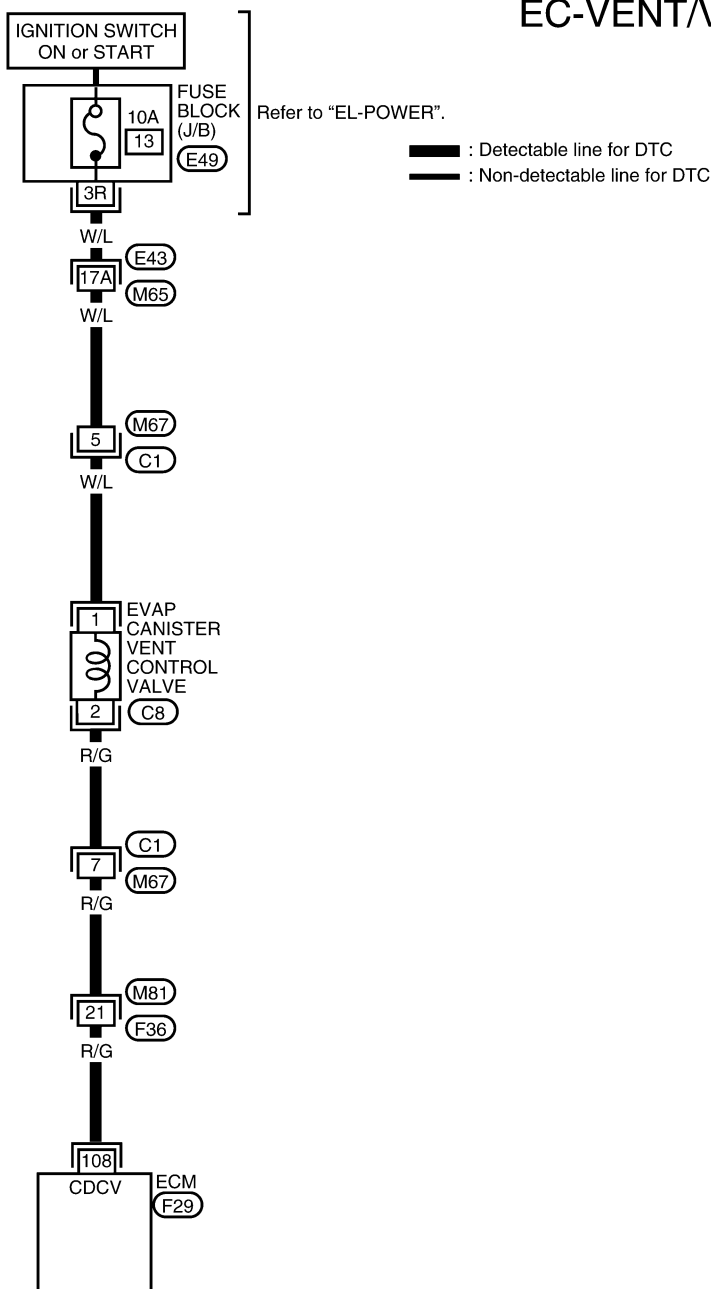
VG33ER

Wiring Diagram

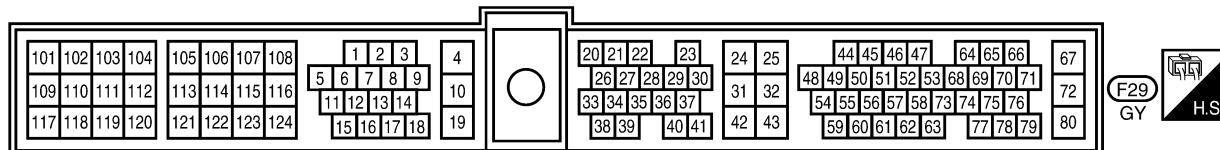
Wiring Diagram

NEEC1416

EC-VENT/V-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC814

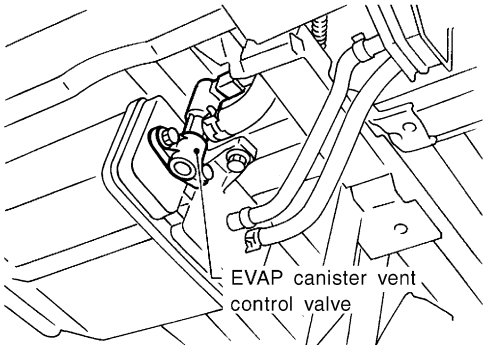
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

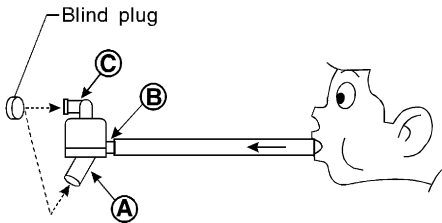
VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1417

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF. 2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p>
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE:</p> <ul style="list-style-type: none"> Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	<p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33ER

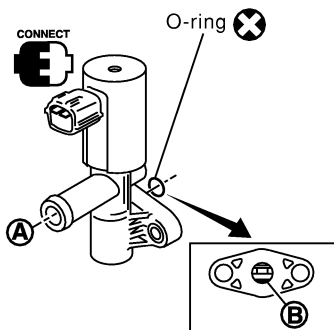
Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

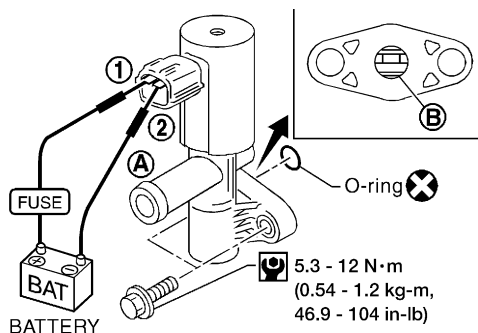
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK



GO TO 4.

NG

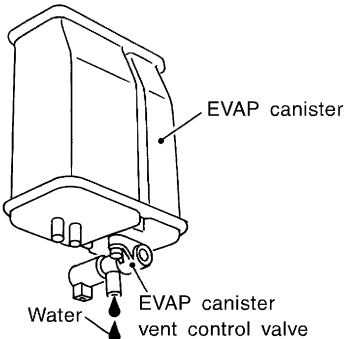


Replace EVAP canister vent control valve and O-ring.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 5.
No	▶	GO TO 7.

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5	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

MT
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6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

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7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair it.

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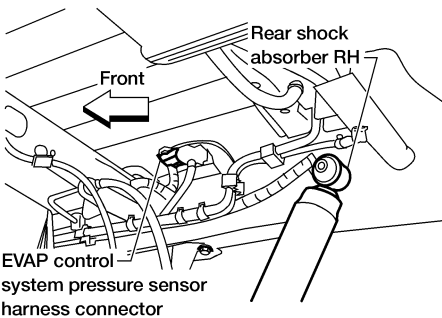
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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
		
2. Check connectors for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

AEC651A

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1606.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
	▶	INSPECTION END

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

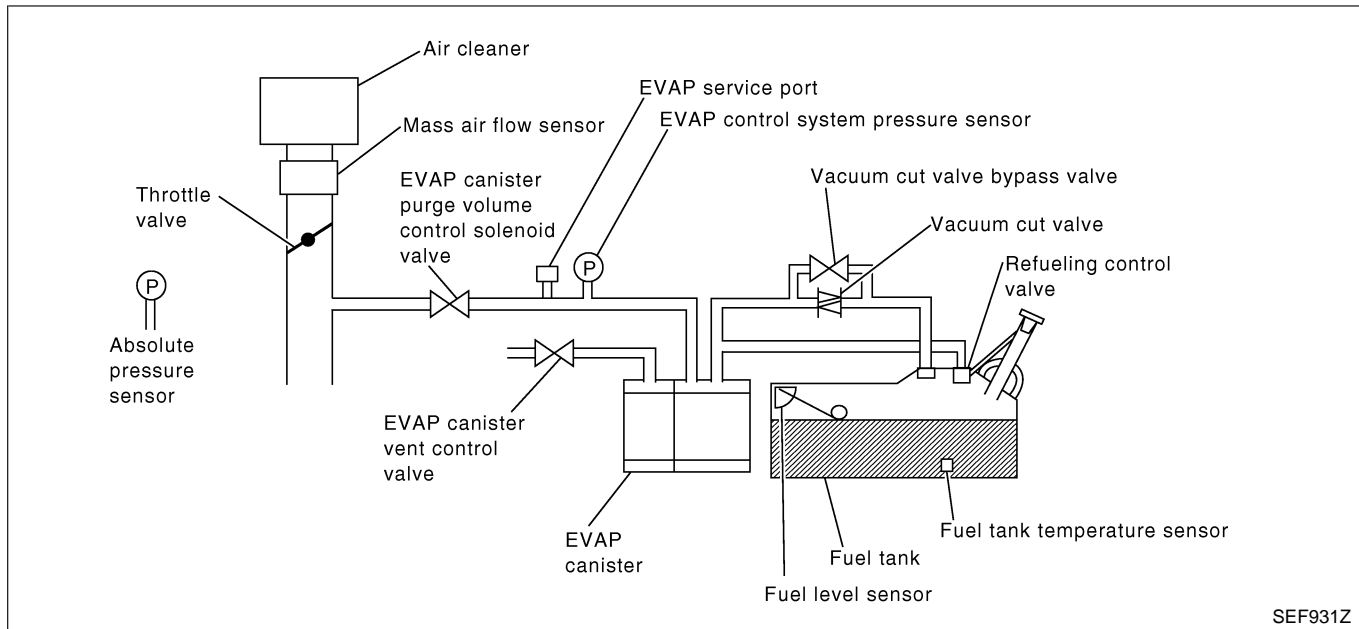
System Description

System Description

NEEC1418

NOTE:

If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1652.)



SEF931Z

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NEEC1419

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

POSSIBLE CAUSE

NEEC1419S01

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

On Board Diagnosis Logic (Cont'd)

5

PURG FLOW P1447	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF207Y

6

PURG FLOW P1447	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF208Y

6

PURG FLOW P1447	
COMPLETED	

SEF238Y

DTC Confirmation Procedure

NEEC1420

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 70 seconds.
- 4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 11.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

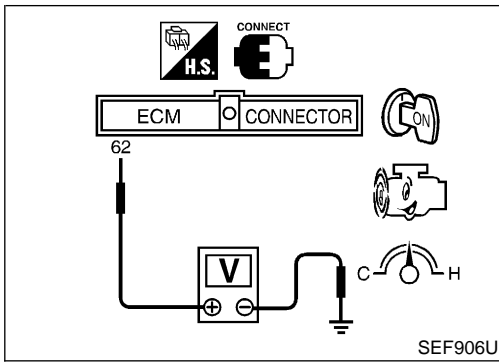
If "TESTING" is not changed for a long time, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1738.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Overall Function Check



Overall Function Check

=NEEC1421

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF, wait at least 5 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.
- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

- 8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- 9) If NG, go to "Diagnostic Procedure", EC-1738.

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

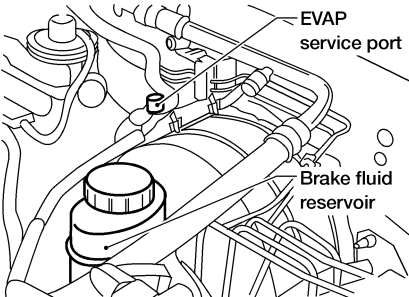
VG33ER

Diagnostic Procedure

Diagnostic Procedure

=NEEC1422

1	CHECK EVAP CANISTER	
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

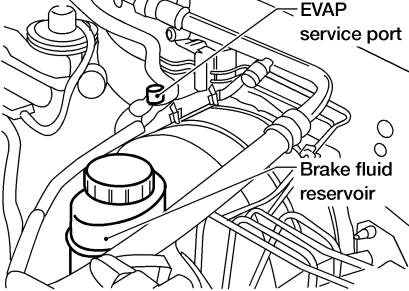
2	CHECK PURGE FLOW																											
(P) With CONSULT-II 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.																												
																												
AEC649A																												
2. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 4. Rev engine up to 2,000 rpm. 5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.																												
<table border="1" style="display: inline-table; margin-right: 20px;"> <thead> <tr><th colspan="2">ACTIVE TEST</th></tr> </thead> <tbody> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> <table border="1" style="display: inline-table;"> <thead> <tr><th>PURG VOL CONT/V</th><th>VACUUM</th></tr> </thead> <tbody> <tr><td>100.0%</td><td>Should exist</td></tr> <tr><td>0.0%</td><td>Should not exist</td></tr> </tbody> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V			PURG VOL CONT/V	VACUUM	100.0%	Should exist	0.0%	Should not exist
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PURG VOL CONT/V	VACUUM																											
100.0%	Should exist																											
0.0%	Should not exist																											
OK or NG																												
OK	▶	GO TO 7.																										
NG	▶	GO TO 4.																										

SEF012Z

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;">  <p style="font-size: small;">EVAP service port Brake fluid reservoir</p> </div> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 7.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 4.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	GO TO 4.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center; padding: 2px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p>
OK	▶	GO TO 7.							
NG	▶	GO TO 4.							

AEC649A

4	CHECK EVAP PURGE LINE	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 5.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Repair it.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	Repair it.	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 5.							
NG	▶	Repair it.							

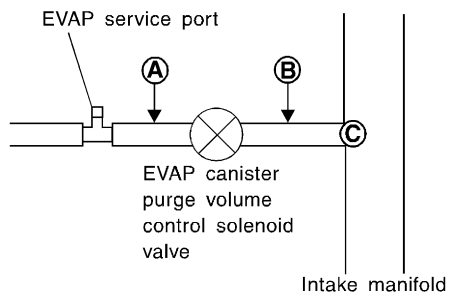
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

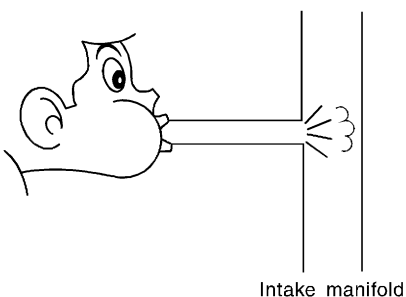
5 CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK (with CONSULT-II)	▶	GO TO 6.
OK (without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

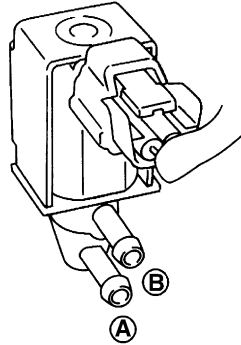
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

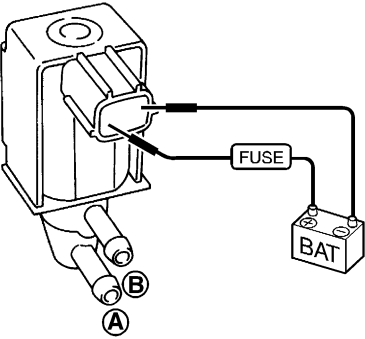
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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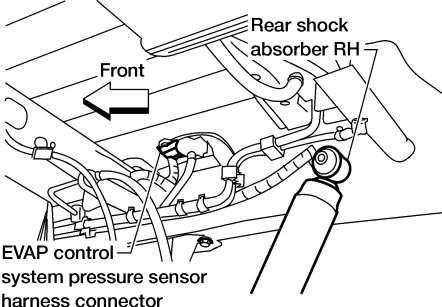
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE						
<p>⊗ Without CONSULT-II Check air passage continuity.</p>							
							
SEF661U							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals 1 and 2</td> <td style="padding: 5px;">Yes</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="padding: 5px;">No</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
MTBL0242							
<p>If NG, replace the EVAP canister purge volume control solenoid valve.</p> <p style="text-align: center;">OK or NG</p>							
OK	▶	GO TO 8.					
NG	▶	Replace EVAP canister purge volume control solenoid valve.					

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

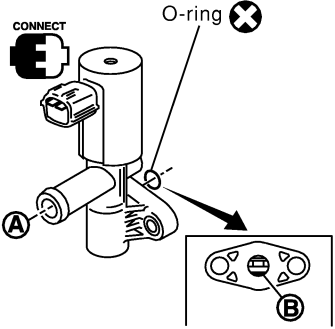
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p>		
		
AEC651A		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

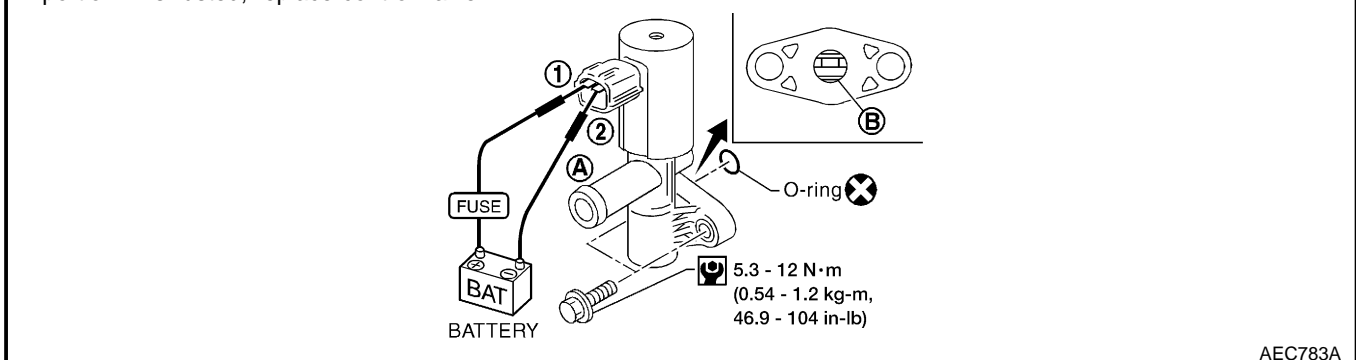
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1606.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="margin: auto;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>ON</td><td>No</td></tr> <tr><td>OFF</td><td>Yes</td></tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition	Air passage continuity between A and B	ON	No	OFF	Yes
	ACTIVE TEST																									
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II								
<table border="1" style="margin: auto;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>12V direct current supply between terminals 1 and 2</td><td>No</td></tr> <tr><td>OFF</td><td>Yes</td></tr> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	No							
OFF	Yes							

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



AEC783A

OK or NG		
OK (With CONSULT-II)	▶	GO TO 12.
OK (Without CONSULT-II)	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

Diagnostic Procedure (Cont'd)

12	CHECK CLOSED THROTTLE POSITION SWITCH																	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check indication of "CLSD THL/P SW". <p>Measurement must be made with closed throttle position switch installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0355</p> <p>If NG, adjust closed throttle position switch. Check the following items. Refer to "Basic Inspection", EC-1314.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p>6. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p> <p style="text-align: center;">OK or NG</p>			Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Throttle valve conditions	CLSD THL/P SW																	
Completely closed	ON																	
Partially open or completely open	OFF																	
Items	Specifications																	
Ignition timing	10° ± 2° BTDC																	
Base idle speed	700 ± 50 rpm (in "P" or "N" position)																	
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF																	
Target idle speed	750 ± 50 rpm (in "P" or "N" position)																	
OK	▶	GO TO 14.																
NG	▶	Replace throttle position switch with throttle position sensor.																

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

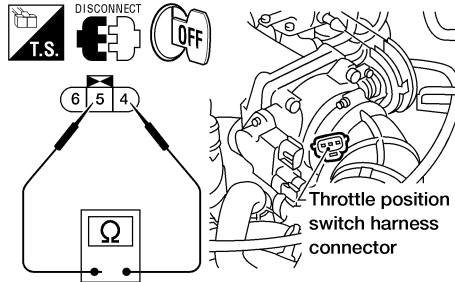
Diagnostic Procedure (Cont'd)

13 CHECK CLOSED THROTTLE POSITION SWITCH



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-1314.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

14 CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1245.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

15 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.
--	---	-----------

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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

VG33ER

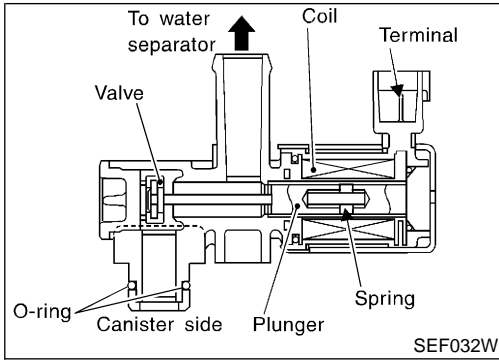
Diagnostic Procedure (Cont'd)

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

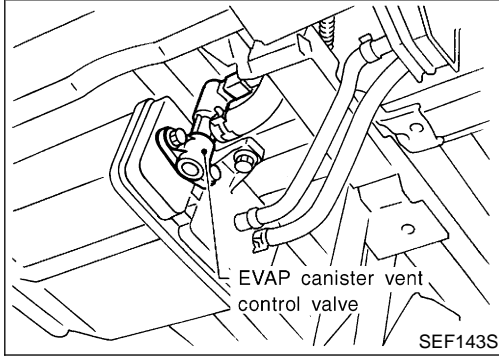
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

Component Description



SEF032W



SEF143S

Component Description

NEEC1423

NOTE:

If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

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CONSULT-II Reference Value in Data Monitor Mode

NEEC1424

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

TF
PD

ECM Terminals and Reference Value

NEEC1425

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

AX
SU
BR
ST

On Board Diagnosis Logic

NEEC1426

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

POSSIBLE CAUSE

NEEC1426S01

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

RS
BT
HA
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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

DTC Confirmation Procedure

DTC Confirmation Procedure

NEEC1427

NOTE:

- If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEF565X

EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEF566X

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

CONNECT O-ring

SEF013Z

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)

- 5) Select “EVAP SML LEAK P0440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1314.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, go to the following step.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn ON.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch ON and OFF alternately.

- 11) Make sure the following.

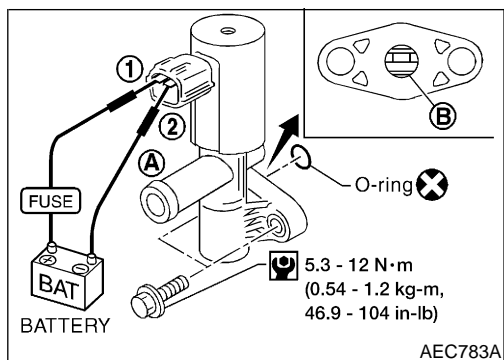
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

If the result is NG, go to “Diagnostic Procedure”, EC-1751.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-1577.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

Overall Function Check



Overall Function Check

NEEC1428

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-1751.
 If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-1577.

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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

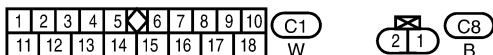
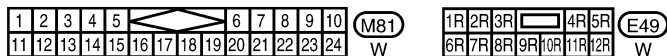
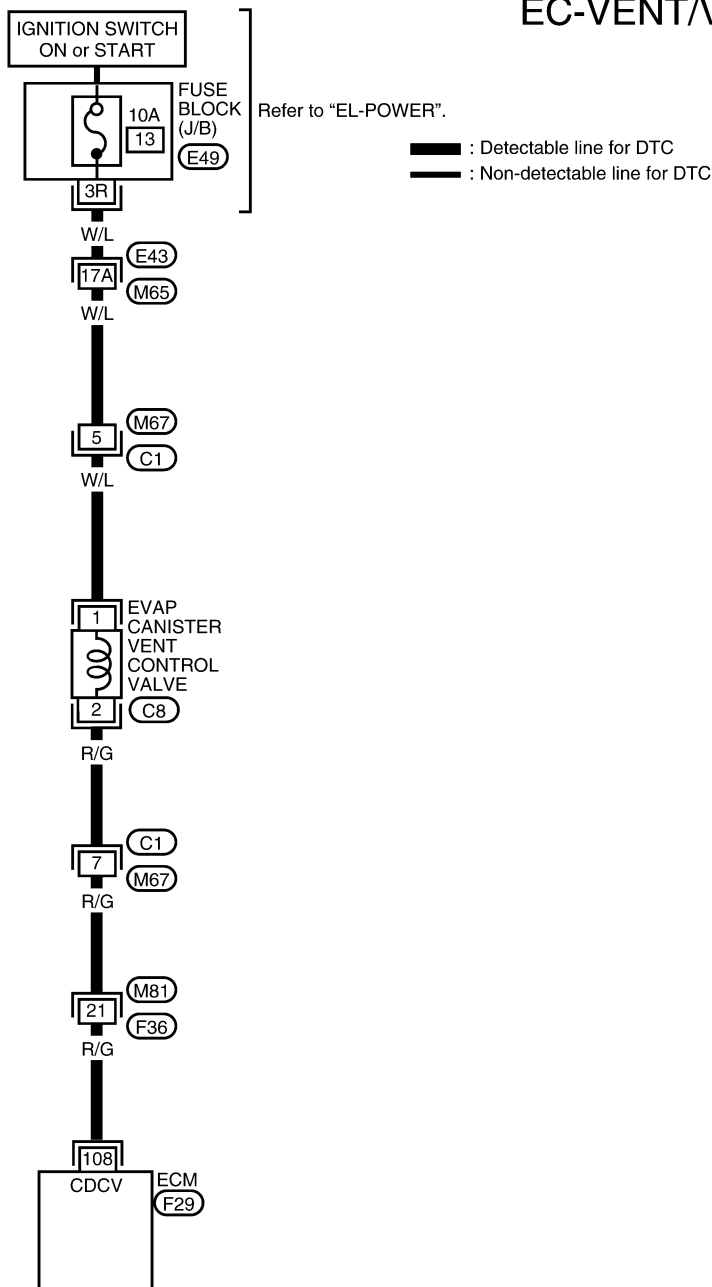
VG33ER

Wiring Diagram

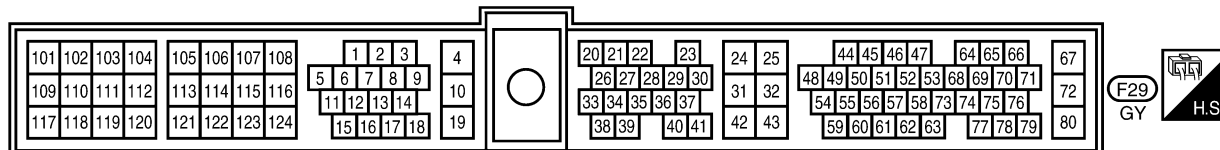
Wiring Diagram

NEEC1429

EC-VENT/V-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC814

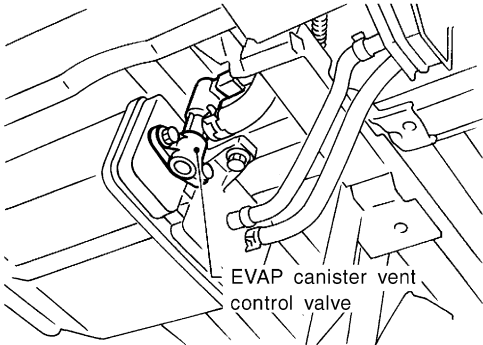
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NEEC1430

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF.</p> <p>2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF143S</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;"> </div> <p style="text-align: center;"> * (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member) </p> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

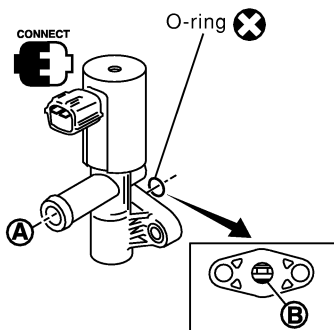
Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

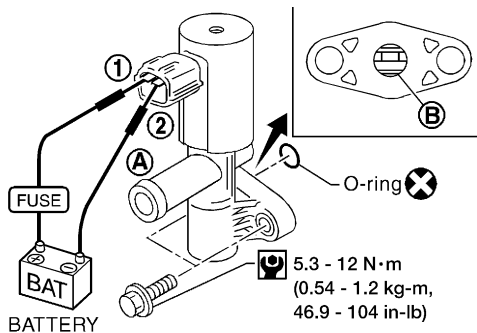
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

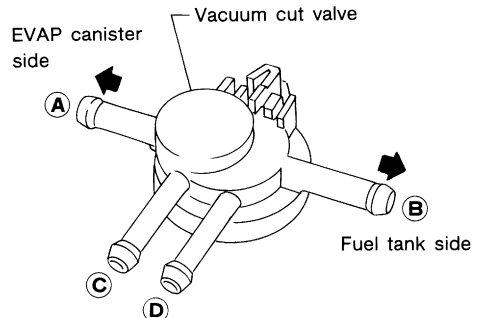
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

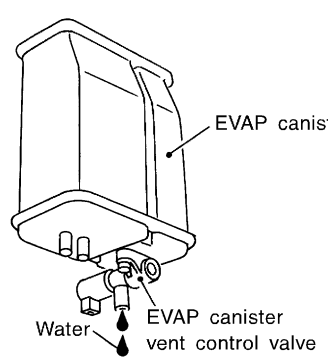
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	Replace vacuum cut valve.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p>
OK	▶	GO TO 5.							
NG	▶	Replace vacuum cut valve.							

SEF379Q

5	CHECK IF EVAP CANISTER SATURATED WITH WATER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center;">  </div> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>	OK	▶	GO TO 6.	NG	▶	GO TO 8.	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>
OK	▶	GO TO 6.							
NG	▶	GO TO 8.							

SEF596U

6	CHECK EVAP CANISTER	<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace the EVAP canister.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace the EVAP canister.	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 8.							
NG	▶	Replace the EVAP canister.							

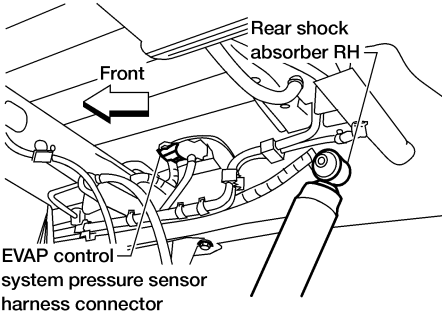
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

VG33ER

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 	
▶	Repair hose or replace EVAP canister.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	
	
AEC651A	
2. Check connectors for water. Water should not exist.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace EVAP control system pressure sensor.

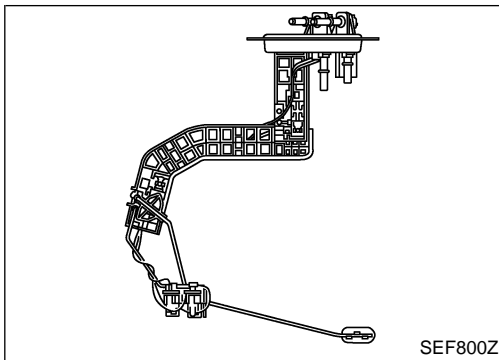
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1606.	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace EVAP control system pressure sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

VG33ER

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NEEC1431} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	G	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor. One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

VG33ER

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NEEC1434S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1758.

WITH GST

NEEC1434S02

Follow the procedure "WITH CONSULT-II" above.

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

VG33ER
Wiring Diagram

Wiring Diagram

NEEC1435

EC-FLS3-01

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

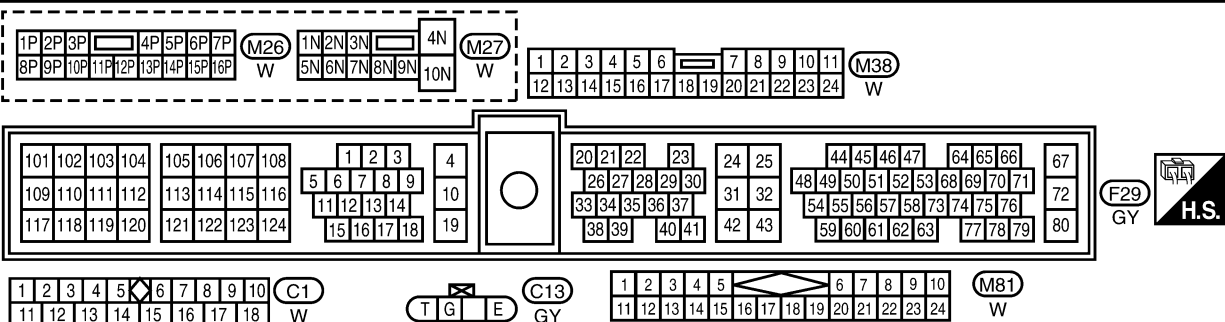
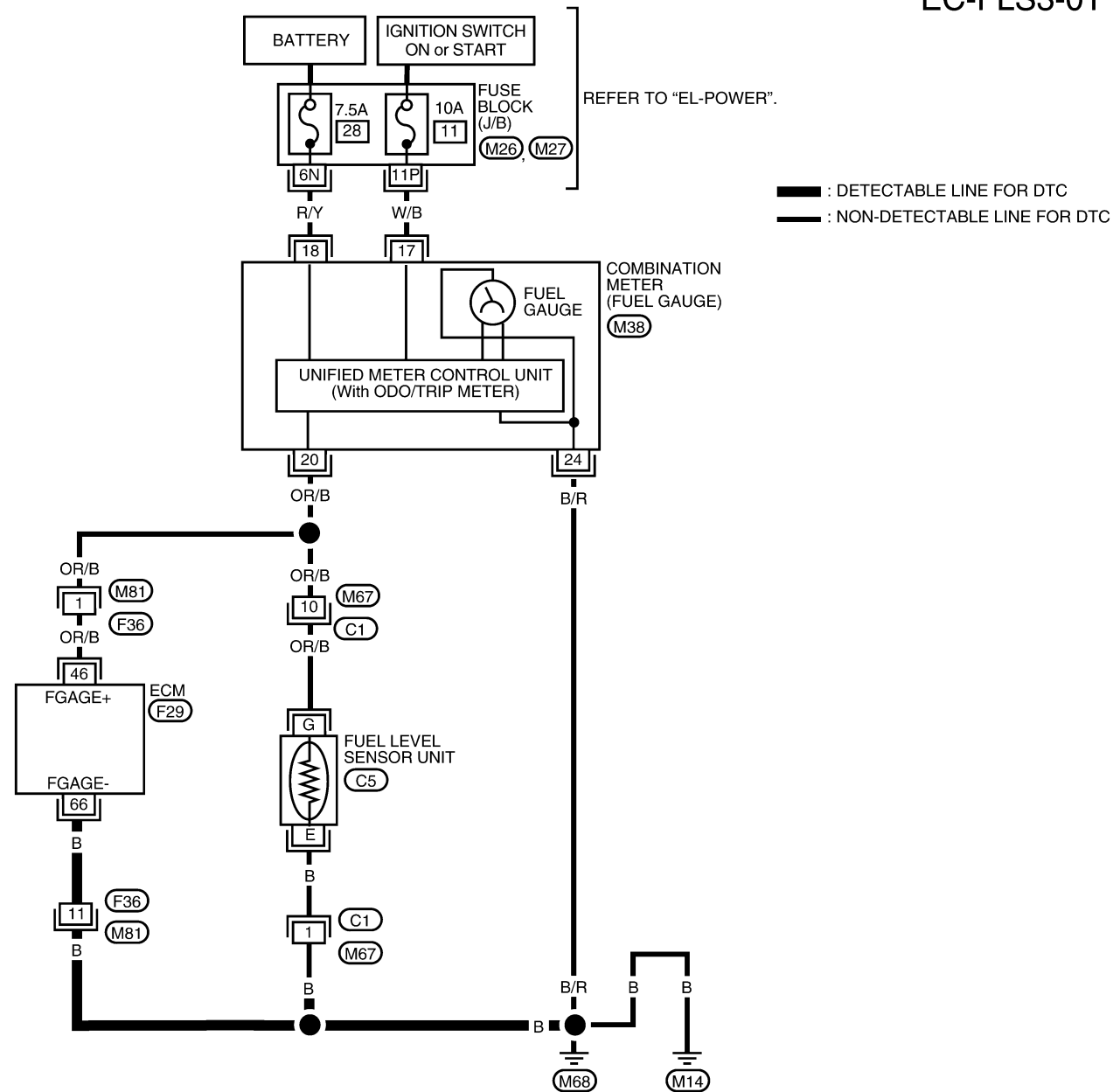
BT

HA

SC

EL

IDX



WEC820

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

VG33ER

Diagnostic Procedure

Diagnostic Procedure

=NEEC1436

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 66 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

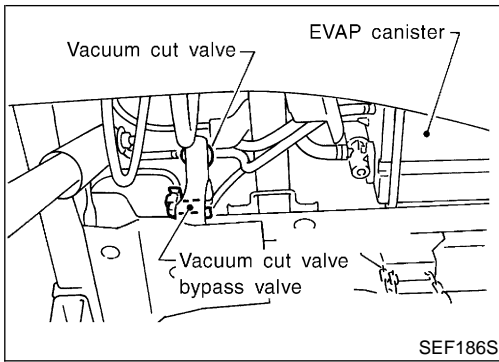
2	DETECT MALFUNCTIONING PART
1. Check the following. <ul style="list-style-type: none">● Harness connectors F36, M81● Harness for open and short between ECM and body ground	
▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR
Refer to EL-82 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353	
OK or NG	
▶	INSPECTION END

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

Description



Description

COMPONENT DESCRIPTION

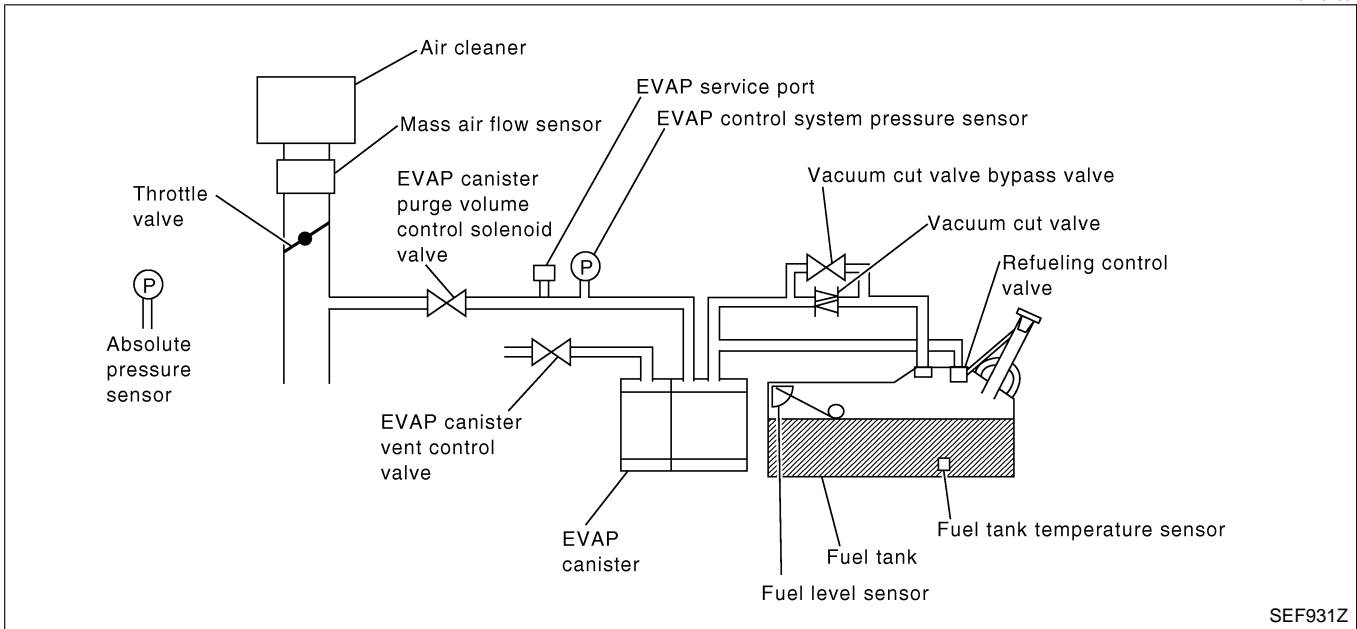
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve. NEEC1440

POSSIBLE CAUSE

- Harness or connectors
(The vacuum cut valve bypass valve circuit is open or shorted.) NEEC1440S01
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NEEC1441

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1762.

With GST

Follow the procedure "With CONSULT-II".

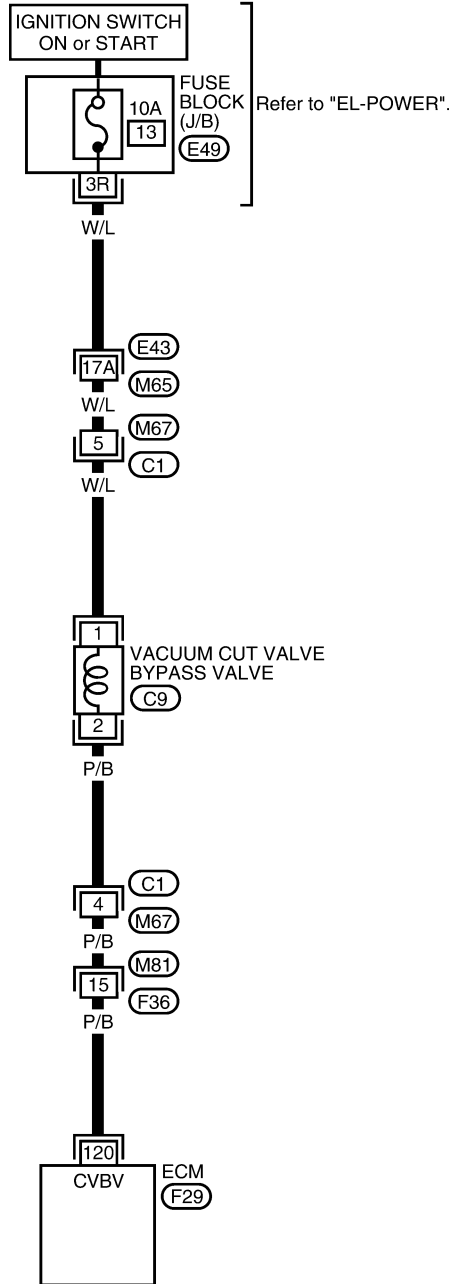
DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

Wiring Diagram

Wiring Diagram

NEEC1442

EC-BYPS/V-01



: Detectable line for DTC
 : Non-detectable line for DTC

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

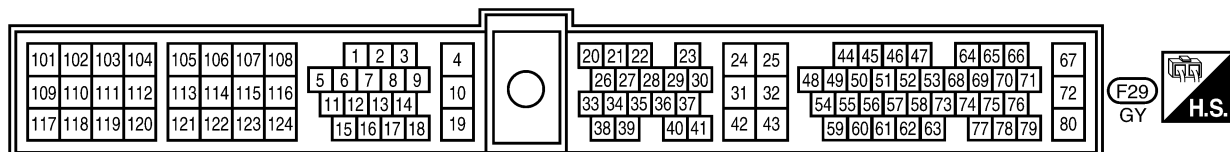
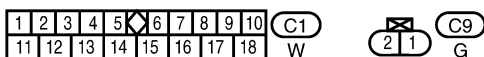
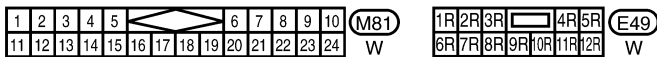
BT

HA

SC

EL

IDX



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

LEC815

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

Diagnostic Procedure

Diagnostic Procedure

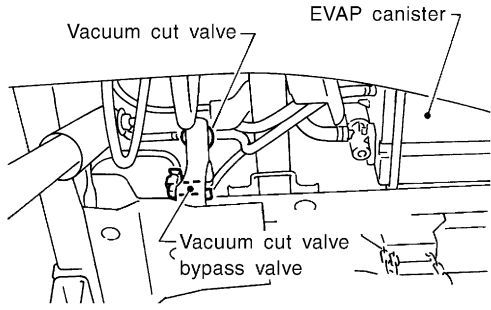
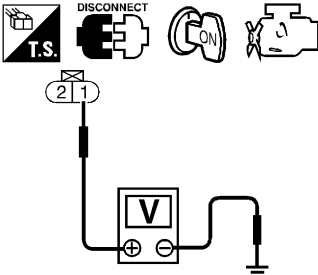
NEEC1443

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF" and then "ON". 2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON/OFF" on CONSULT-II screen. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="text-align: center;">VC/V BYPASS/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.</p> <p style="text-align: right;">SEF014Z</p> <p style="text-align: center;">OK or NG</p>																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect vacuum cut valve bypass valve harness connector. 	
	
SEF186S	
<ol style="list-style-type: none"> 3. Turn ignition switch "ON". 4. Check voltage between terminal 1 and ground with CONSULT-II or tester. 	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
SEF659W	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M67, C1 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between vacuum cut valve bypass valve and fuse 	
▶ Repair harness or connectors.	

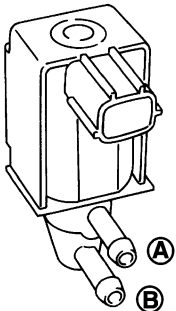
5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 120 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

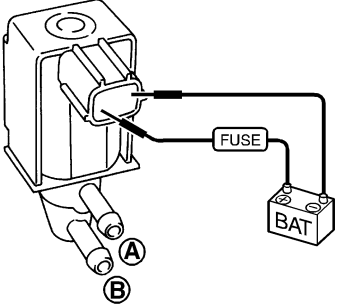
GI
MA
EM
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DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT) VG33ER

Diagnostic Procedure (Cont'd)

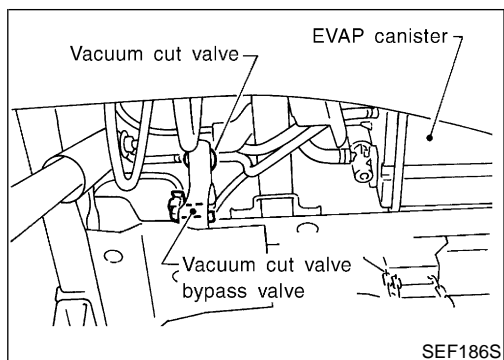
6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE																								
<p> With CONSULT-II</p> <p>1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.</p> <p>2. Check air passage continuity and operation delay time under the following conditions.</p>																									
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition VC/V BYPASS/V</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>ON</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>No</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	Condition VC/V BYPASS/V	Air passage continuity between A and B	ON	Yes	OFF	No
ACTIVE TEST																									
VC/V BYPASS/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
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HO2S1 MNTR (B1)	LEAN																								
HO2S1 MNTR (B2)	LEAN																								
THRTL POS SEN	XXX V																								
Condition VC/V BYPASS/V	Air passage continuity between A and B																								
ON	Yes																								
OFF	No																								
SEF016Z																									

<p> Without CONSULT-II</p> <p>1. Check air passage continuity and operation delay time under the following conditions.</p>							
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>No</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
OK or NG							
SEF557Y							

OK		GO TO 8.
NG		Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	INSPECTION END



Description

COMPONENT DESCRIPTION

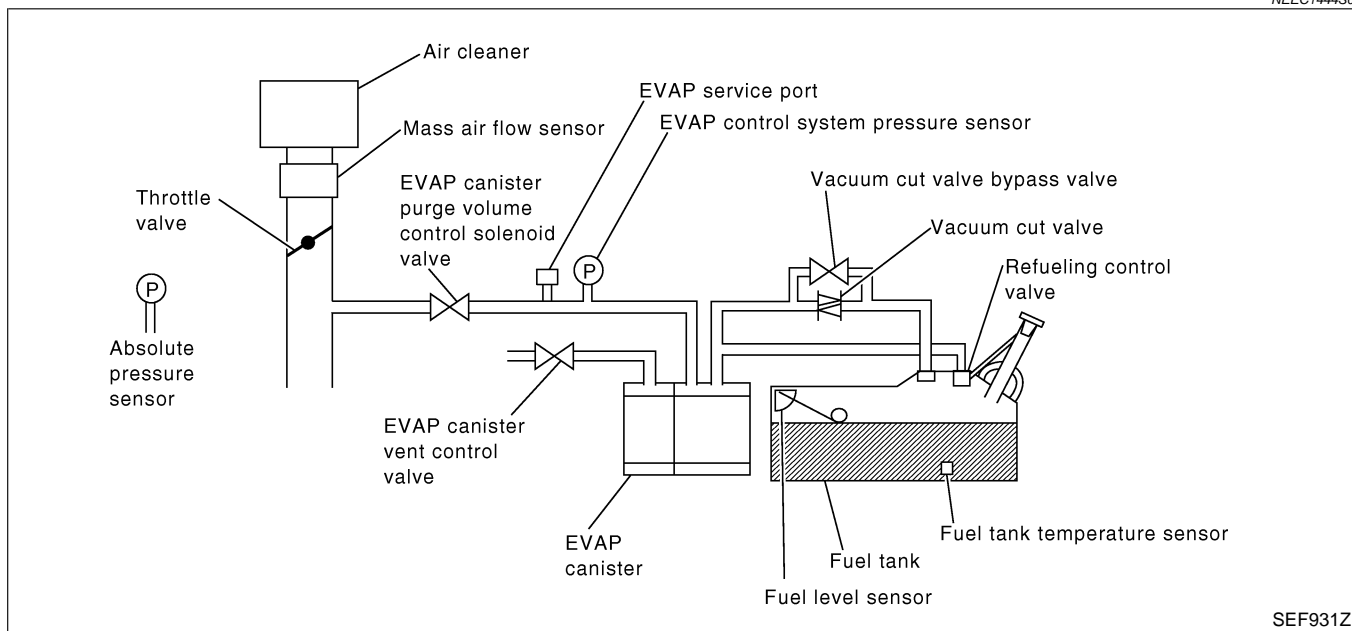
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when vacuum cut valve bypass valve does not operate properly. NEEC1447

POSSIBLE CAUSE

- Vacuum cut valve bypass valve NEEC1447S01
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

7	VC CUT/V BP/V P1491
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491
COMPLETED	

SEF239Y

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed. NEEC1448

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F).

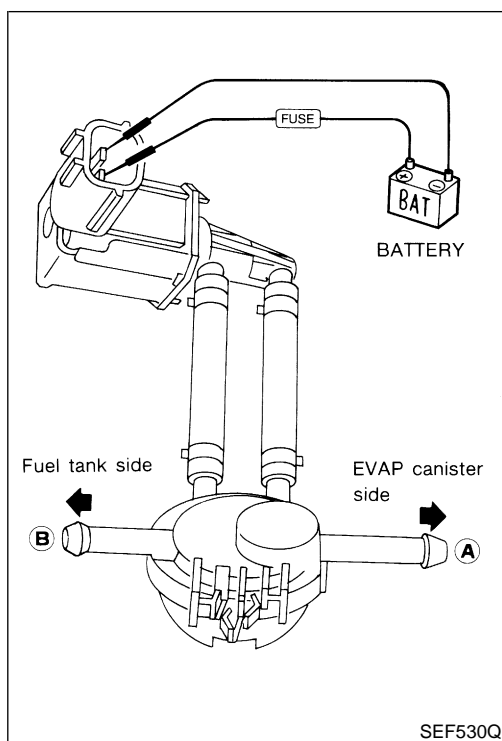
With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and let it idle for at least 70 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS-RPM (POS)	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 11.0 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1769.



Overall Function Check

NEEC1449

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- 2) Apply vacuum to port **A** and check that there is no suction from port **B**.
- 3) Apply vacuum to port **B** and check that there is suction from port **A**.
- 4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
- 5) Supply battery voltage to the terminal.
- 6) Blow air in port **A** and check that air flows freely out of port **B**.
- 7) Blow air in port **B** and check that air flows freely out of port **A**.
- 8) If NG, go to "Diagnostic Procedure", EC-1769.

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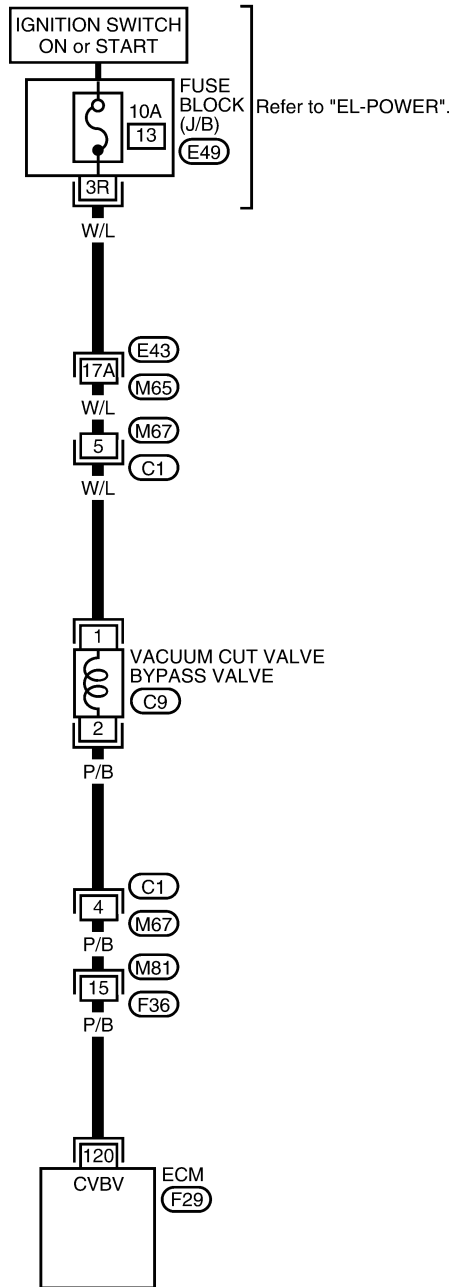
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Wiring Diagram

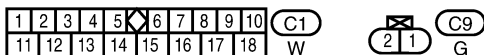
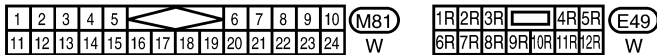
NEEC1450

EC-BYPS/V-01

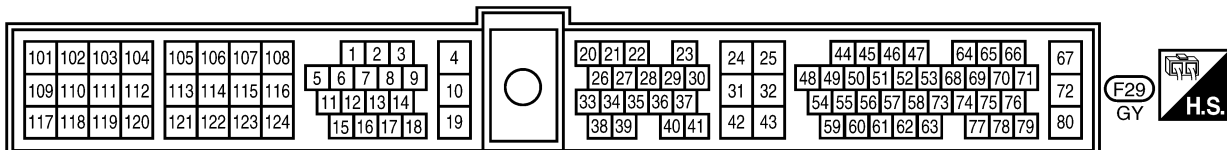


Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC



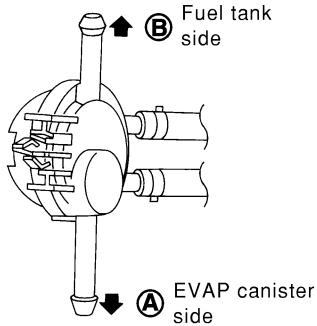
Refer to the following.
(M65), **(E43)** - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

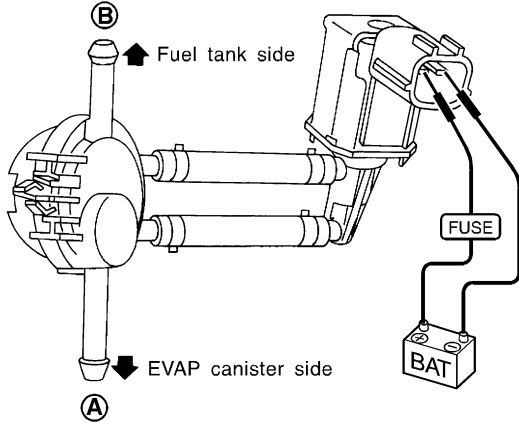
NEEC1451

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION																					
<p>With CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch OFF. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. Apply vacuum to port A and check that there is no suction from port B. Apply vacuum to port B and check that there is suction from port A. Blow air in port B and check that there is a resistance to flow out of port A. Turn ignition switch ON. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". Blow air in port A and check that air flows freely out of port B. Blow air in port B and check that air flows freely out of port A. 																						
																						
<table border="1"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VC/V BYPASS/V</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

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3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 		
		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 5.

SEF914U

4	CHECK EVAP PURGE LINE	
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-1242. 		
OK or NG		
OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

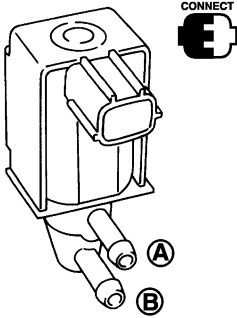
5	CHECK BYPASS HOSE	
Check bypass hoses for clogging.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

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6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

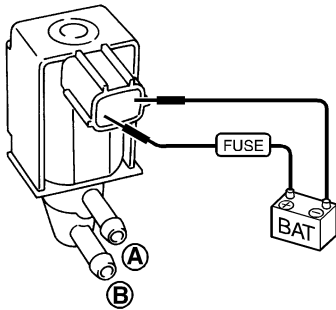
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

1. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

SEF557Y

OK or NG

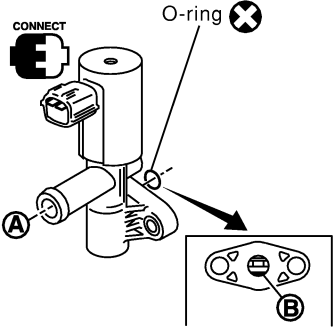
OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

7	CHECK VACUUM CUT VALVE
<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;"> </div>	
SEF379Q	
<ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. 	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. <div style="text-align: center;"> </div>	
AEC651A	
<ol style="list-style-type: none"> 2. Check connectors for water. Water should not exist. 	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace EVAP control system pressure sensor.

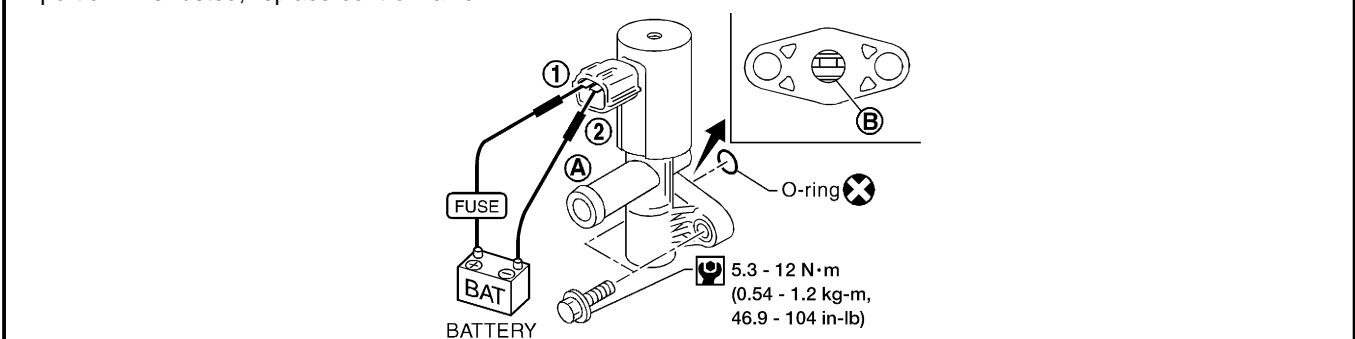
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-1606.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
	ACTIVE TEST																									
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	No							
OFF	Yes							

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



Make sure new O-ring is installed properly.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶		INSPECTION END

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Component Description

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) ^{NEEC1452} from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NEEC1453}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V

On Board Diagnosis Logic

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM. ^{NEEC1454}

POSSIBLE CAUSE

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.] ^{NEEC1454S01}
- Dead (Weak) battery
- TCM (Transmission control module)

3

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. ^{NEEC1455}

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 40 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1776.

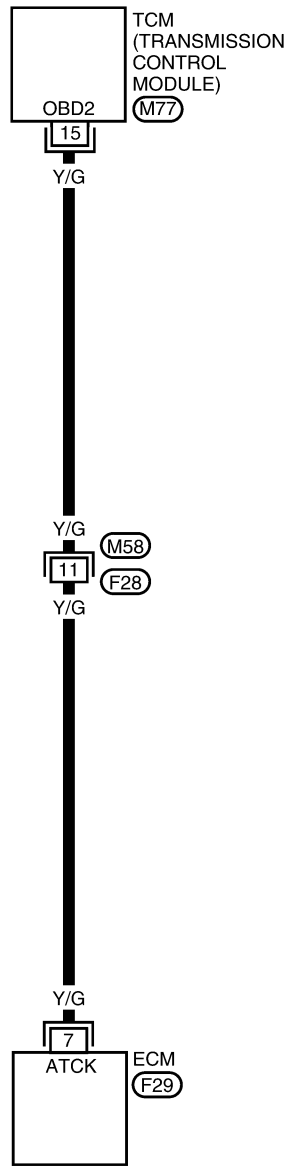
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NEEC1456

EC-ATDIAG-01



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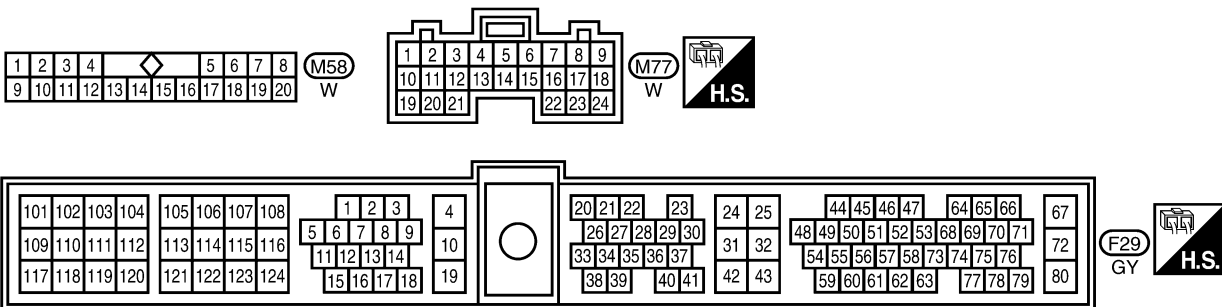
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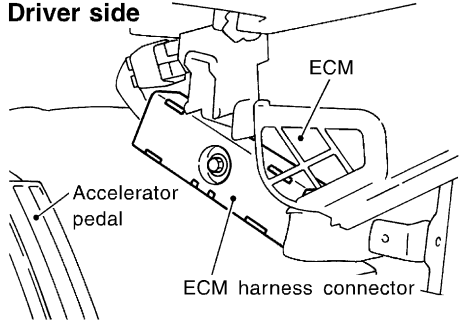
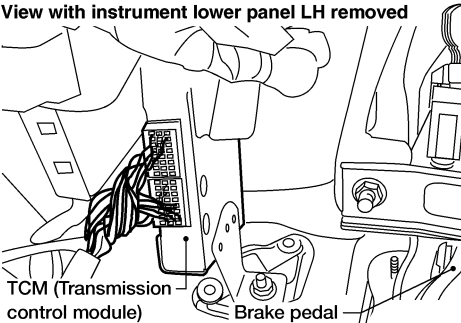
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LEC674

Diagnostic Procedure

NEEC1457

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  <p>Labels: Accelerator pedal, ECM, ECM harness connector</p> </div> <p style="text-align: right;">SEF324V</p> <div style="text-align: center;"> <p>View with instrument lower panel LH removed</p>  <p>Labels: TCM (Transmission control module), Brake pedal</p> </div> <p style="text-align: right;">AEC655A</p> <p>3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶▶	GO TO 3.
NG	▶▶	GO TO 2.

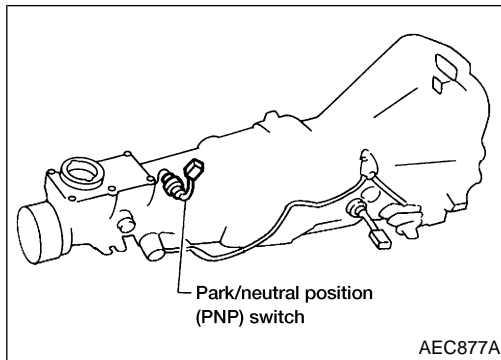
2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) 		
▶▶		Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶▶		INSPECTION END

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33ER

Component Description



Component Description

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".

ECM detects the position because the continuity of the line (the "ON" signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "P" or "N" ON
		Except above OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P" (A/T models) ● Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

- Harness or connectors
[The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NEEC1462

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

2	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>P/N POSI SW</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table>	DATA MONITOR		MONITOR	NO DTC	P/N POSI SW	ON
DATA MONITOR							
MONITOR	NO DTC						
P/N POSI SW	ON						

SEF212Y

5	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td style="text-align: center;">XXX °C</td> </tr> <tr> <td>VHCL SPEED SE</td> <td style="text-align: center;">XXX km/h</td> </tr> <tr> <td>P/N POSI SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td style="text-align: center;">XXX msec</td> </tr> </tbody> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	VHCL SPEED SE	XXX km/h	P/N POSI SW	OFF	B/FUEL SCHDL	XXX msec
DATA MONITOR															
MONITOR	NO DTC														
ENG SPEED	XXX rpm														
COOLAN TEMP/S	XXX °C														
VHCL SPEED SE	XXX km/h														
P/N POSI SW	OFF														
B/FUEL SCHDL	XXX msec														

SEF213Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-1781.

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and warm it up to normal operating temperature.
- 5) Maintain the following conditions for at least 60 consecutive seconds.

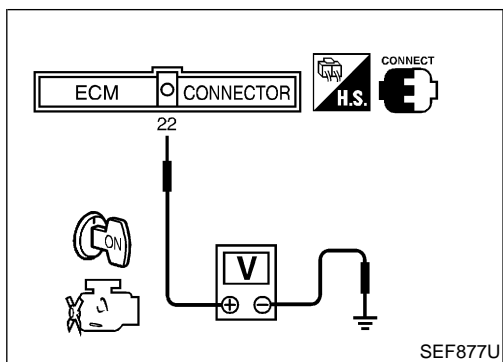
ENG SPEED	1,400 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 14.0 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1781.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33ER

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed. =NEEC1463

⊗ Without CONSULT-II

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-1781.

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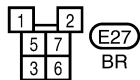
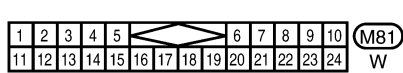
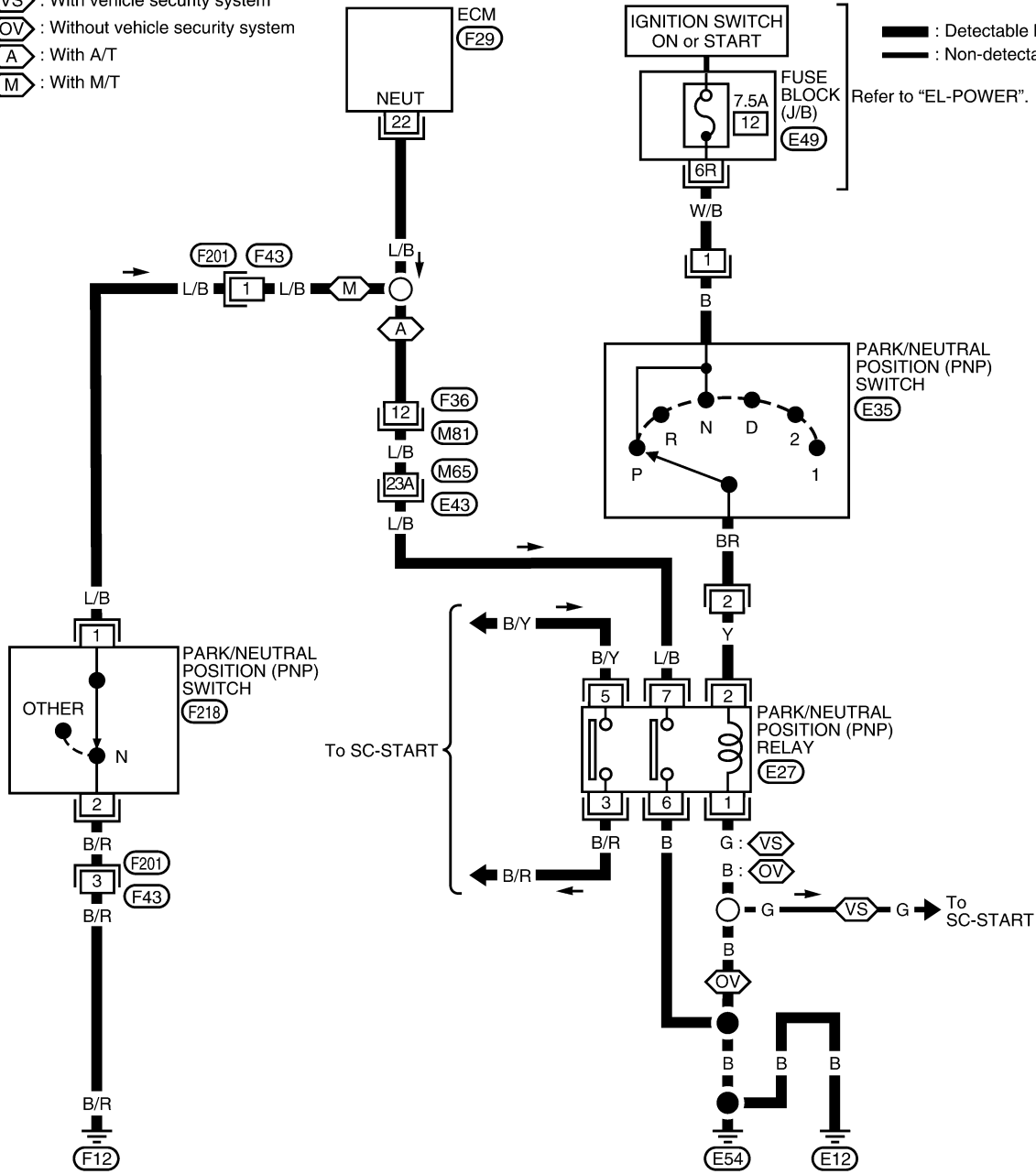
Wiring Diagram

NEEC1464

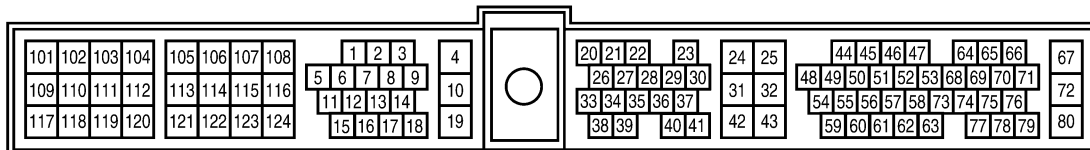
- : With vehicle security system
- : Without vehicle security system
- : With A/T
- : With M/T

EC-PNP/SW-01

: Detectable line for DTC
 : Non-detectable line for DTC

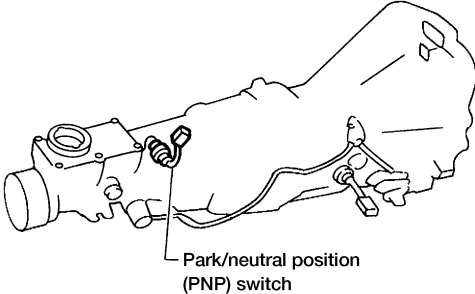


Refer to the following.
 , - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure FOR M/T MODELS

NEEC1465
NEEC1465S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p>3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F201, F43 ● Harness for open between park/neutral position (PNP) switch and engine ground 		
	▶	Repair open circuit or short to power in harness or connectors.

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F43, F201 ● Harness for open or short between ECM and park/neutral position (PNP) switch 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
<p>Refer to MT-40, "Position Switch Check".</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END


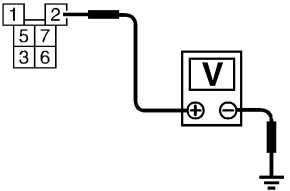
DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

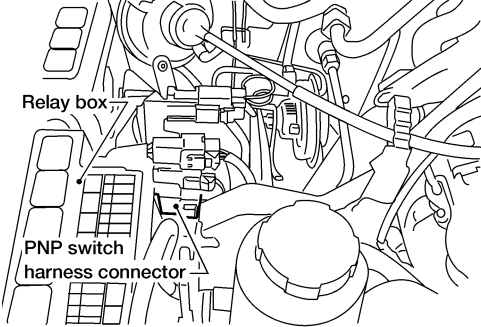
VG33ER

Diagnostic Procedure (Cont'd)

FOR A/T MODELS

=NEEC146S02

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) relay. 3. Turn ignition switch ON. 4. Shift selector lever to "P" or "N" position. 5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester. 		
		
		
<p>Voltage: Battery voltage</p> <p>OK or NG</p>		
OK		▶ GO TO 6.
NG		▶ GO TO 2.

2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector. 		
		
AEC662A		
<ol style="list-style-type: none"> 3. Check harness continuity between PNP switch terminal 2 and PNP relay terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 		
<p>OK or NG</p>		
OK		▶ GO TO 3.
NG		▶ Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III	
<ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Check voltage between PNP switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram. Voltage: Battery voltage 		
<p>OK or NG</p>		
OK		▶ GO TO 5.
NG		▶ GO TO 4.

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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Fuse block (J/B) connector E49● 7.5A fuse● Harness for open or short between PNP switch and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH
Refer to AT-254 , "Component Inspection".	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace park/neutral position (PNP) switch.

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between PNP relay terminals 1, 6 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 8.
NG (With theft warning system)	▶ GO TO 7.
NG (Without theft warning system)	▶ Repair open circuit or short to power in harness or connectors.

7	DETECT MALFUNCTIONING PART
Check the circuit between PNP relay and body ground. Refer to "STARTING SYSTEM", SC-10 .	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Repair or replace.

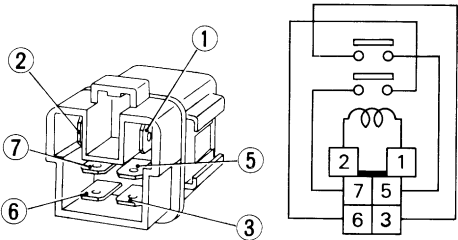
8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP relay terminal 7. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors F36, M81● Harness connectors M65, E43● Harness for open or short between ECM and park/neutral position (PNP) relay	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

VG33ER

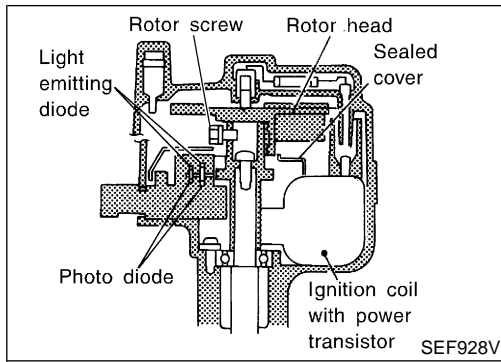
Diagnostic Procedure (Cont'd)

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY	
<p>1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2. 2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.</p>		
		
<p>12V (1 and 2) applied: Continuity should exist. No voltage applied: Continuity should not exist.</p>		
SEC202B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.		
▶		INSPECTION END

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Component Description



Component Description

IGNITION COIL & POWER TRANSISTOR

NEEC1466

NEEC1466S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: **3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)**

ECM Terminals and Reference Value

NEEC1467

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p> <p>SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p> <p>SEF989U</p>

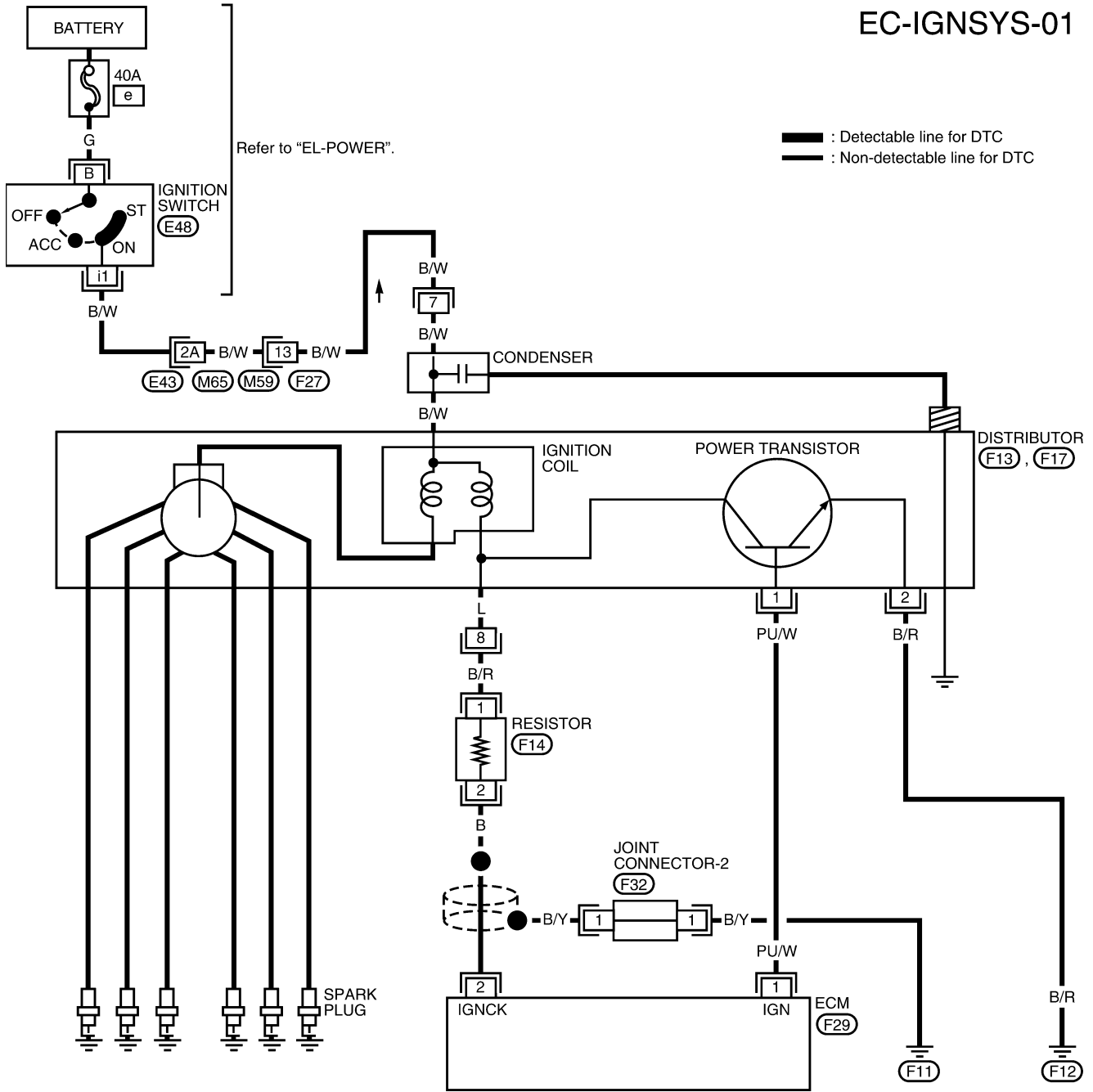
IGNITION SIGNAL

VG33ER
Wiring Diagram

Wiring Diagram

NEEC1468

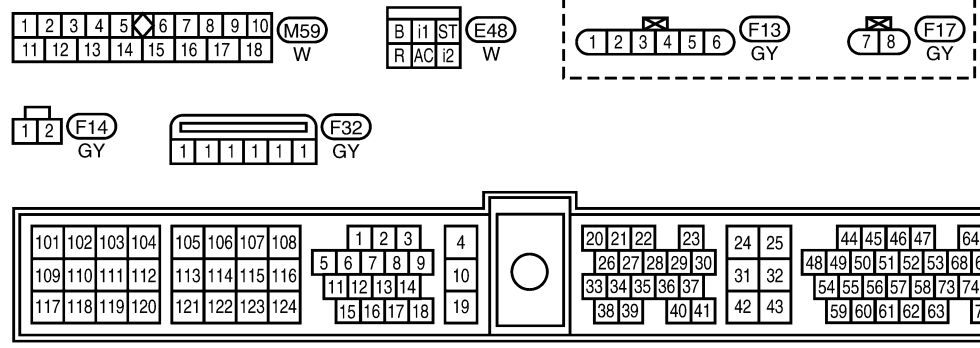
EC-IGNSYS-01



— : Detectable line for DTC
— : Non-detectable line for DTC

Refer to "EL-POWER".

Refer to the following.
M65, E43 - SUPER
MULTIPLE JUNCTION (SMJ)



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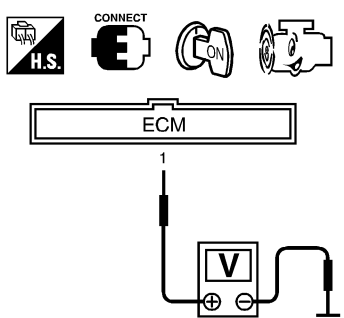
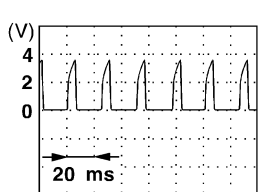
Diagnostic Procedure

NEEC1469

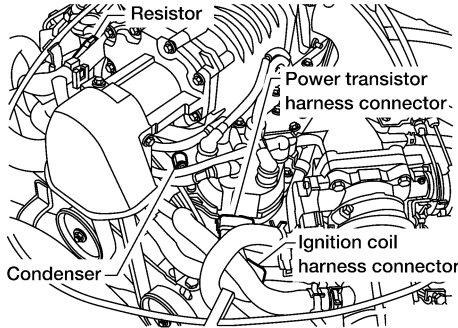
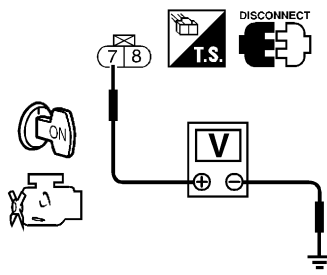
1	INSPECTION START	
Turn ignition switch "OFF", and restart engine. Is engine running?		
Yes or No		
Yes (With CONSULT-II) ▶		GO TO 2.
Yes (Without CONSULT-II) ▶		GO TO 3.
No ▶		GO TO 4.

2	CHECK OVERALL FUNCTION																					
④ With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>MAS AIF SE-B1</td> <td>XXX V</td> </tr> <tr> <td>IACV-AAC/V</td> <td>XXX step</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																						
POWER BALANCE																						
MONITOR																						
ENG SPEED	XXX rpm																					
MAS AIF SE-B1	XXX V																					
IACV-AAC/V	XXX step																					
OK or NG																						
OK ▶		INSPECTION END																				
NG ▶		GO TO 4.																				

SEF070Y

3	CHECK OVERALL FUNCTION	
⊗ Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
		
		
OK or NG		
OK ▶		INSPECTION END
NG ▶		GO TO 4.

SEC073C

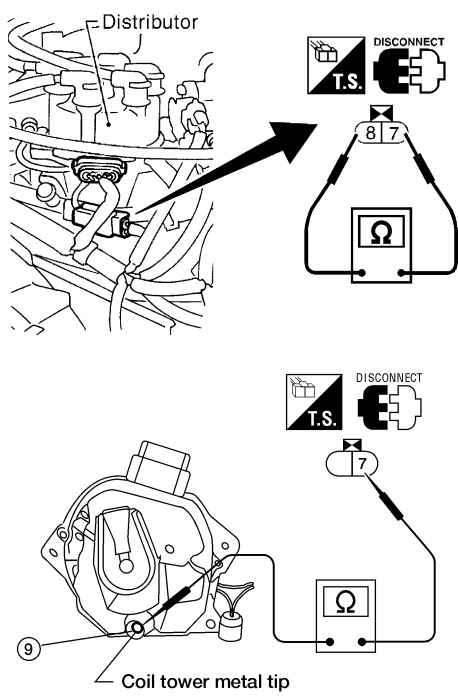
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect ignition coil harness connector.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 7 and ground with CONSULT-II or tester.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	<p style="text-align: center;">LEC811</p> <p style="text-align: center;">SEF721U</p>
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch <p style="text-align: right; margin-top: 10px;">▶ Repair harness or connectors.</p>	
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6	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Disconnect power transistor harness connector. 3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 7.	
NG	▶	Repair open circuit or short to power in harness or connectors.	

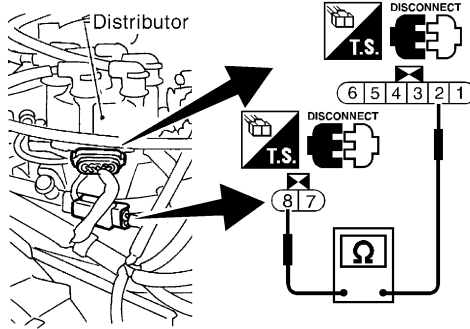
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7	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IGNITION COIL							
1. Disconnect ignition coil harness connector. 2. Check resistance as shown in the figure.								
 <p style="text-align: right; margin-right: 50px;">SEF013S</p> <p style="text-align: right; margin-right: 50px;">AEC657A</p>								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Terminal</th> <th style="padding: 5px;">Resistance [at 20°C (68°F)]</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">7 - 8 (Primary coil)</td> <td style="padding: 5px;">Approximately 1.0Ω</td> </tr> <tr> <td style="padding: 5px;">7 - 9 (Secondary coil)</td> <td style="padding: 5px;">Approximately 10 kΩ</td> </tr> </tbody> </table>			Terminal	Resistance [at 20°C (68°F)]	7 - 8 (Primary coil)	Approximately 1.0Ω	7 - 9 (Secondary coil)	Approximately 10 kΩ
Terminal	Resistance [at 20°C (68°F)]							
7 - 8 (Primary coil)	Approximately 1.0Ω							
7 - 9 (Secondary coil)	Approximately 10 kΩ							
MTBL0638								
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	Replace distributor assembly.						

9 CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



SEF015S

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0249

OK or NG

- | | | |
|----|---|-------------------------------|
| OK | ▶ | GO TO 10. |
| NG | ▶ | Replace distributor assembly. |

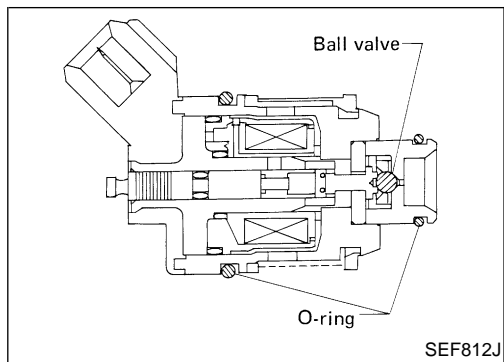
10 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.

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|---|-----------------------|
| ▶ | INSPECTION END |
|---|-----------------------|

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Component Description



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM^{NEEC1470} supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1471

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	2.4 - 3.7 msec
	2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto Idle	1.0 - 1.6 msec
	2,000 rpm	0.7 - 1.4 msec

ECM Terminals and Reference Value

NEEC1472

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

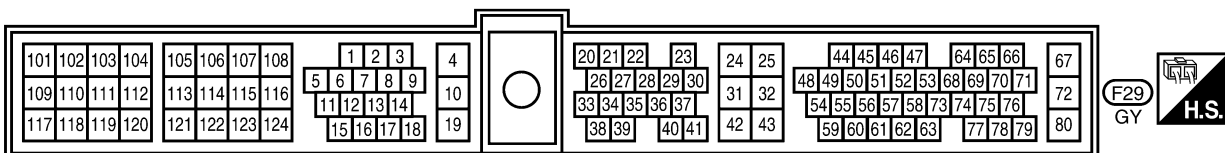
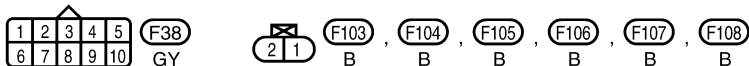
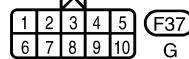
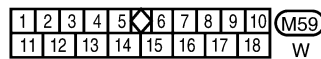
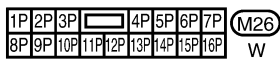
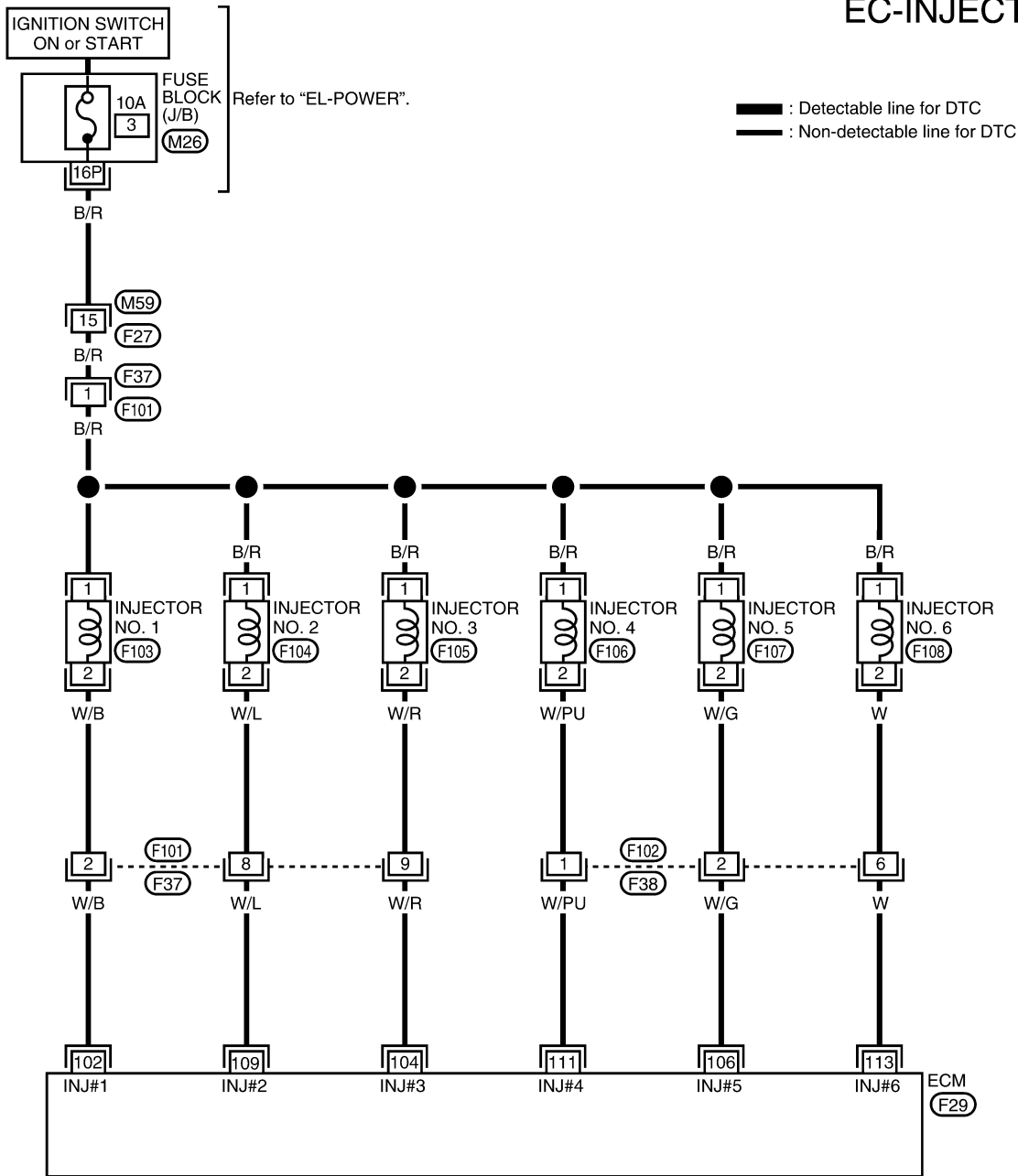
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p>

Wiring Diagram

NEEC1473

EC-INJECT-01



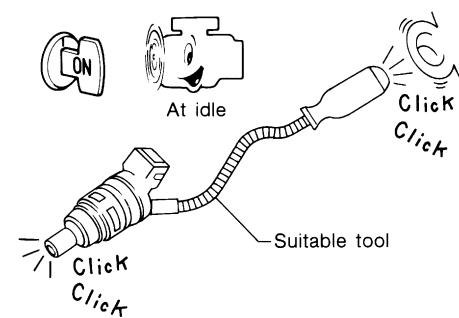


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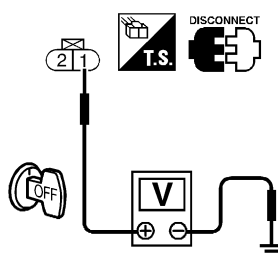
Diagnostic Procedure

NEEC1474

1	INSPECTION START	
Turn ignition switch to START. Is any cylinder ignited?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION																					
<p> With CONSULT-II</p> <p>1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																						
POWER BALANCE																						
MONITOR																						
ENG SPEED	XXX rpm																					
MAS AIF SE-B1	XXX V																					
IACV-AAC/V	XXX step																					
<small>SEF070Y</small>																						
3. Make sure that each circuit produces a momentary engine speed drop.																						
<p> Without CONSULT-II</p> <p>1. Start engine. 2. Listen to each injector operating sound.</p>																						
																						
Clicking noise should be heard.																						
OK or NG																						
OK	▶	INSPECTION END																				
NG	▶	GO TO 3.																				

MEC703B

3	CHECK INJECTOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect injector harness connector.</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF671W</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between injector and fuse 		
▶		Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. Refer to Wiring Diagram.</p> <p style="padding-left: 20px;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

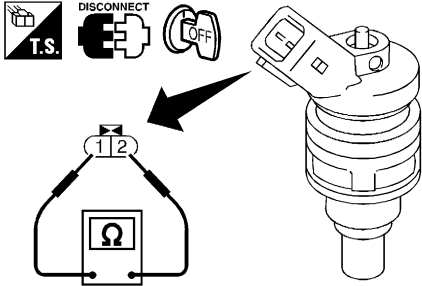
6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Harness connectors F38, F102 ● Harness for open or short between ECM and injector 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

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INJECTOR

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR
<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p>  <p>Resistance: 10 - 14Ω [at 25°C (77°F)]</p> <p>SEF625V</p> <p>OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ Replace injector.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
▶	INSPECTION END

START SIGNAL

VG33ER

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NEEC1475

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NEEC1476

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

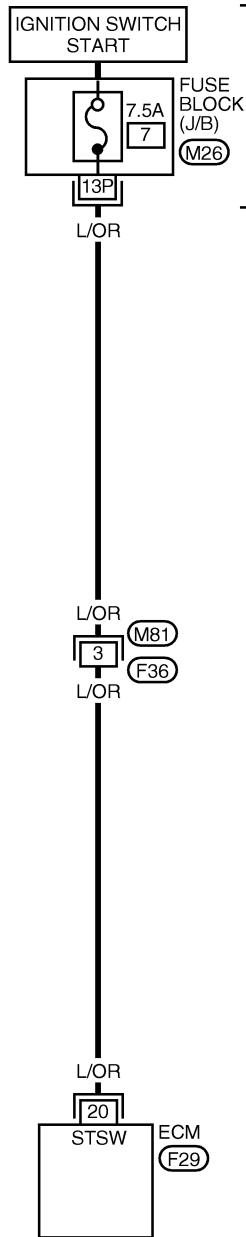
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)

GI
MA
EM
LC
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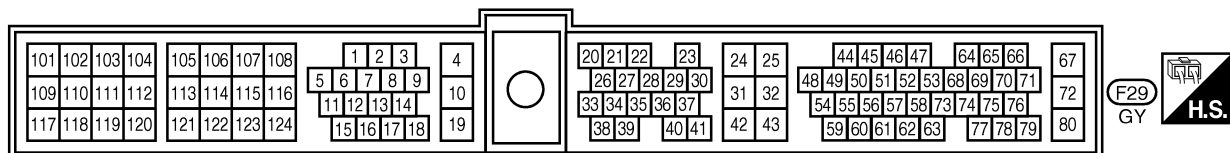
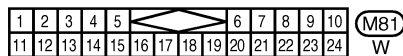
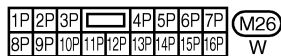
Wiring Diagram

NEEC1477

EC-S/SIG-01



: Detectable line for DTC
 : Non-detectable line for DTC



START SIGNAL

VG33ER


Diagnostic Procedure

Diagnostic Procedure


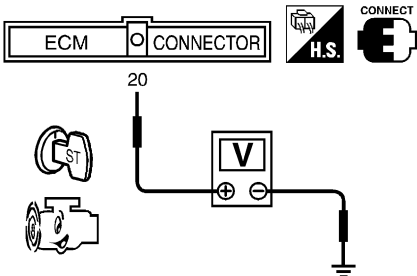
NEEC1478

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
MA
EM

2	CHECK OVERALL FUNCTION													
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON.</p> <p>2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>														
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>AIR COND SIG</td> <td>OFF</td> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF	CLSD THL POS	ON	AIR COND SIG	OFF	P/N POSI SW	ON
DATA MONITOR														
MONITOR	NO DTC													
START SIGNAL	OFF													
CLSD THL POS	ON													
AIR COND SIG	OFF													
P/N POSI SW	ON													
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON						
Condition	"START SIGNAL"													
Ignition switch "ON"	OFF													
Ignition switch "START"	ON													
SEF072Y														
OK or NG														
OK	▶	INSPECTION END												
NG	▶	GO TO 4.												

LC
EC
FE
CL
MT
AT

3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>Check voltage between ECM terminal 20 and ground under the following conditions.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Other positions</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Other positions	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Other positions	Approximately 0V							
SEF733U								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

PD
AX
SU
BR
ST
RS
BT

HA
SC
EL
IDX

START SIGNAL

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK STARTING SYSTEM
Turn ignition switch OFF, then turn it to START. Does starter motor operate?	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Refer to "STARTING SYSTEM", SC-10 .

5	CHECK FUSE
1. Turn ignition switch OFF. 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness for open or short between ECM and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END

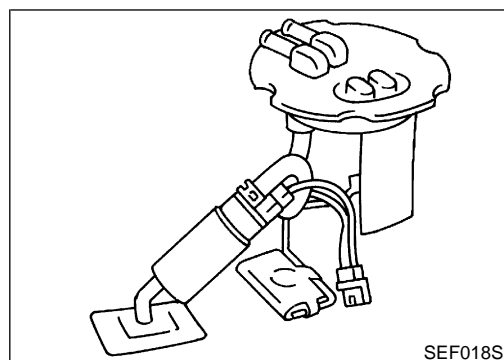
System Description

NEEC1479

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops



Component Description

NEEC1480

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NEEC1481

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON. (Operates for 5 seconds.) Engine running and cranking 	ON
	Except as shown above	OFF

FUEL PUMP

VG33ER

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NEEC1482

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch ON] <ul style="list-style-type: none">• For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch ON] <ul style="list-style-type: none">• More than 5 seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

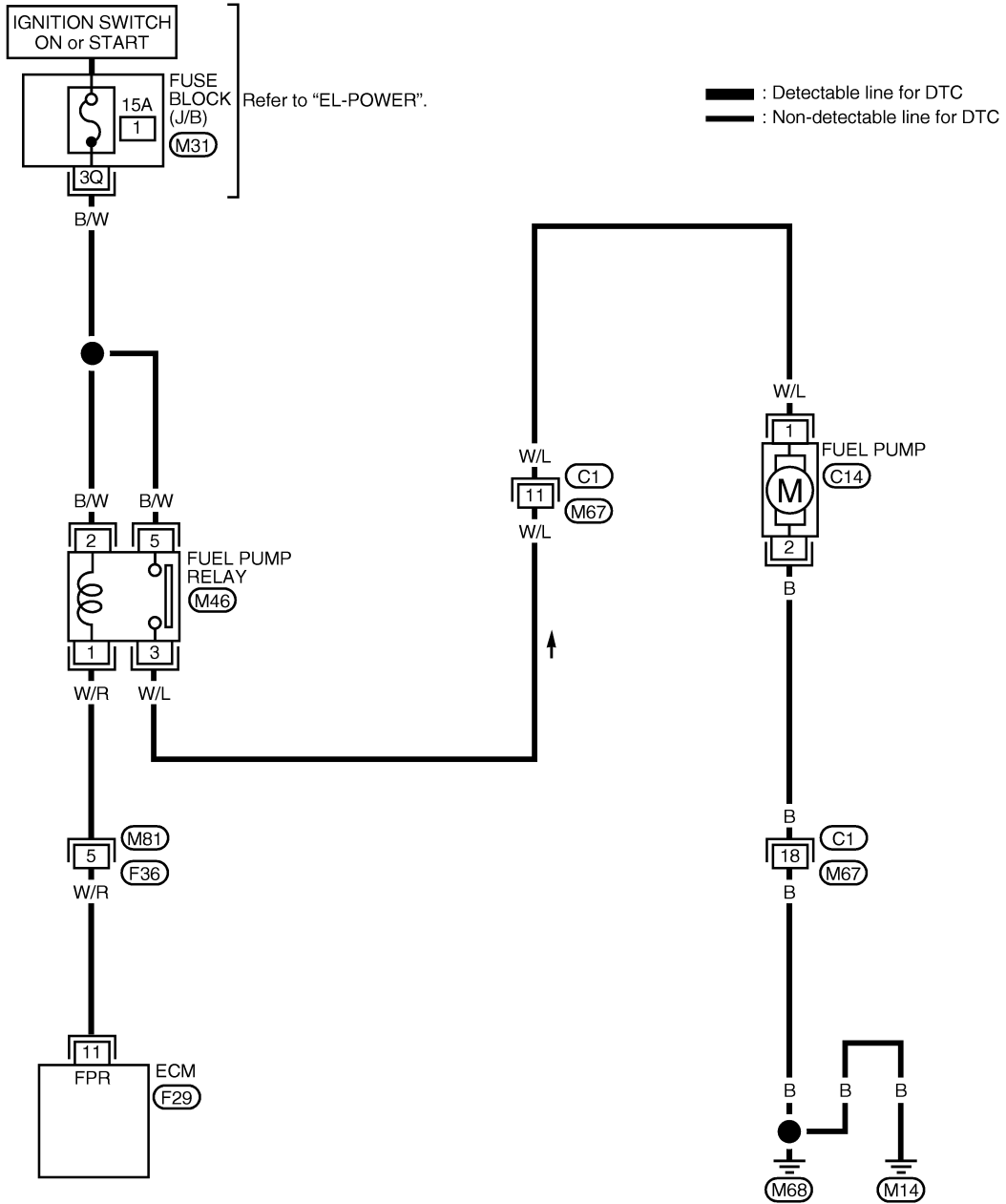
FUEL PUMP

VG33ER
Wiring Diagram

Wiring Diagram

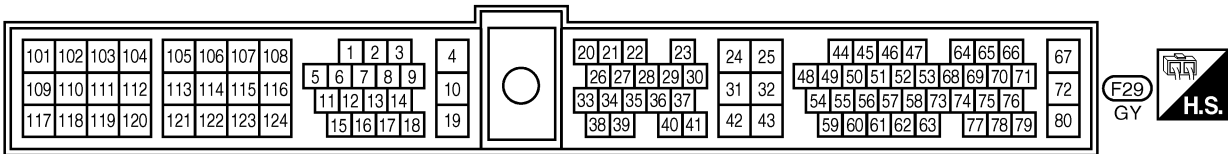
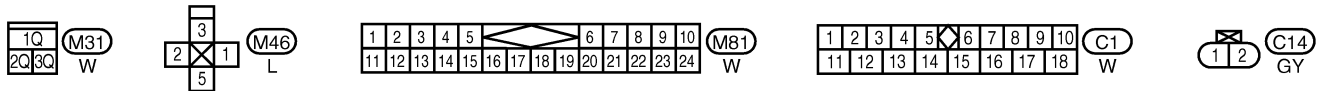
NEEC1483

EC-F/PUMP-01



- GI
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- BR
- ST

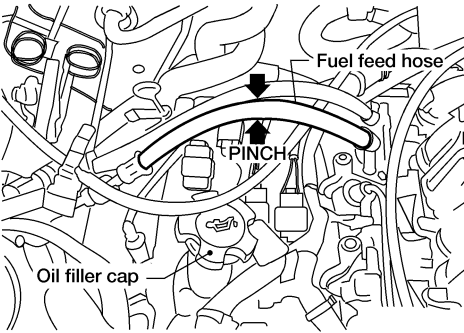
- RS
- BT
- HA
- SC
- EL
- IDX

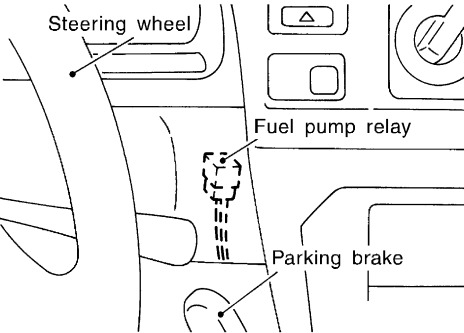
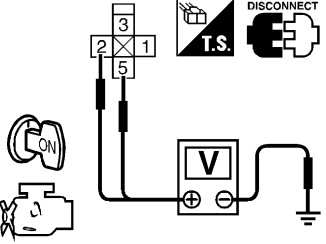


AEC020B

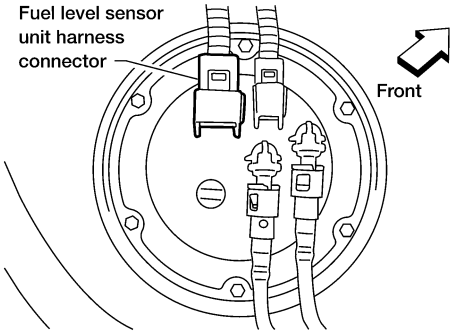
Diagnostic Procedure

NEEC1484

1	CHECK OVERALL FUNCTION
<ol style="list-style-type: none"> 1. Turn ignition switch "ON". 2. Pinch fuel feed hose with fingers. 	
	
AEC663A	
<p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".</p> <p>OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ GO TO 2.

2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel pump relay. 	
	
SEF349V	
<ol style="list-style-type: none"> 3. Turn ignition switch "ON". 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester. 	
	
SEF674W	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector M31 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay 	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect fuel pump harness connector.	
 <p style="text-align: right;">LEC764</p>	
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram. Continuity should exist.	
4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C1 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay terminal 1. Refer to Wiring Diagram. Continuity should exist.	
3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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8 CHECK FUEL PUMP RELAY

With CONSULT-II

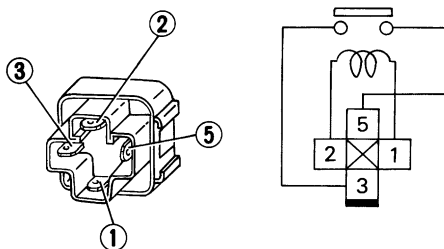
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

12V direct current supply between terminals 1 and 2

Continuity exists

No current supply

Continuity does not exist

OK or NG

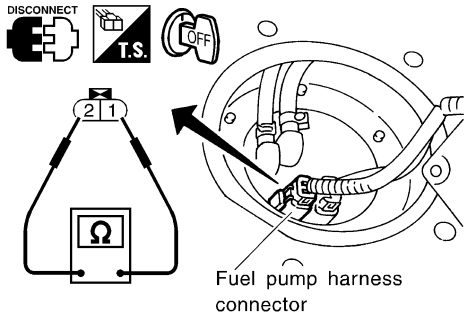
OK	▶	GO TO 9.
----	---	----------

NG	▶	Replace fuel pump relay.
----	---	--------------------------

FUEL PUMP

VG33ER

Diagnostic Procedure (Cont'd)

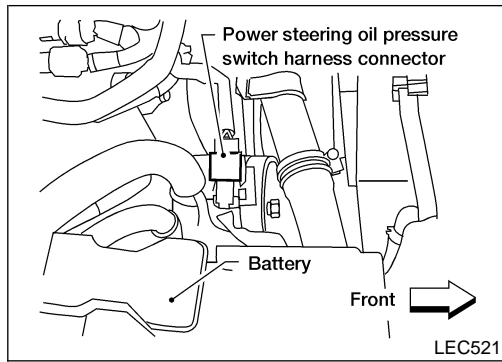
9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector. 2. Check resistance between terminals 1 and 2.</p> <div style="text-align: center;">  <p>Fuel pump harness connector</p> </div> <p style="color: blue;">Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>		<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p>
	OK	▶	GO TO 10.	
	NG	▶	Replace fuel pump.	

10	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>		<p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
		▶	INSPECTION END	

POWER STEERING OIL PRESSURE SWITCH

VG33ER

Component Description



Component Description

NEEC1485

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NEEC1486

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Steering wheel in neutral position (forward direction)	OFF
	The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NEEC1487

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is being fully turned 	0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not being turned 	Approximately 5V

POWER STEERING OIL PRESSURE SWITCH

VG33ER
Wiring Diagram

Wiring Diagram

NEEC1488

EC-PST/SW-01

GI

MA

EM

LC

EC

FE

CL

MT

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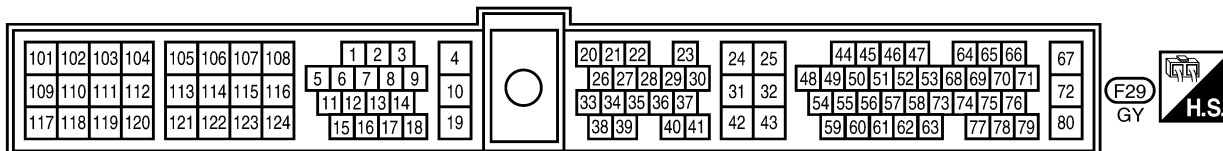
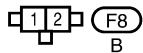
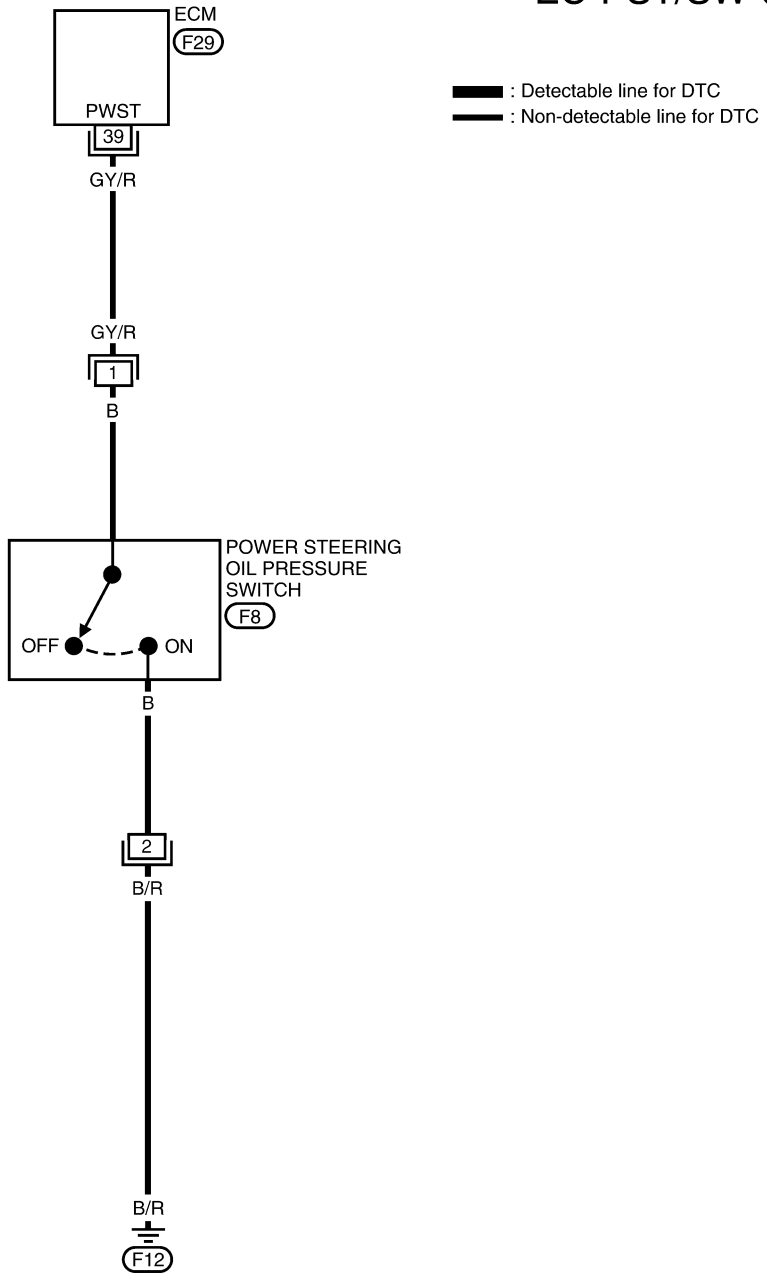
BT

HA

SC

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IDX



LEC677

Diagnostic Procedure

NEEC1489

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

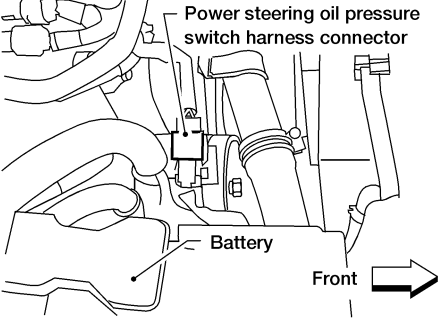
2	CHECK OVERALL FUNCTION							
Ⓜ With CONSULT-II 1. Start engine. 2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
PW/ST SIGNAL	OFF							
<table border="1" style="margin: auto;"> <tbody> <tr> <td>Steering is in neutral position</td> <td>OFF</td> </tr> <tr> <td>Steering is turned</td> <td>ON</td> </tr> </tbody> </table>			Steering is in neutral position	OFF	Steering is turned	ON		
Steering is in neutral position	OFF							
Steering is turned	ON							
SEF228Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

3	CHECK OVERALL FUNCTION							
ⓧ Without CONSULT-II 1. Start engine. 2. Check voltage between ECM terminal 39 and ground.								
SEF739U								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Steering is neutral position</td> <td>Approximately 5V</td> </tr> <tr> <td>Steering is turned to full position</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Steering is neutral position	Approximately 5V	Steering is turned to full position	Approximately 0V
Condition	Voltage							
Steering is neutral position	Approximately 5V							
Steering is turned to full position	Approximately 0V							
MTBL0145								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

POWER STEERING OIL PRESSURE SWITCH

VG33ER

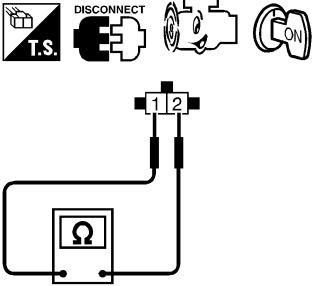
Diagnostic Procedure (Cont'd)

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect power steering oil pressure switch harness connector.</p>		
		
<p>3. Check harness continuity between switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connectors.

GI
MA
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LC
EC

5	CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

AT
TF
PD
AX

6	CHECK POWER STEERING OIL PRESSURE SWITCH							
<p>1. Disconnect power steering oil pressure switch harness connector then start engine. 2. Check continuity between terminals 1 and 2.</p>								
								
SEC312C								
<table border="1" style="margin: auto;"> <thead> <tr> <th style="width: 60%;">Conditions</th> <th>Continuity</th> </tr> </thead> <tbody> <tr> <td>Steering wheel is being fully turned</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Steering wheel is not being turned</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Conditions	Continuity	Steering wheel is being fully turned	Yes	Steering wheel is not being turned	No
Conditions	Continuity							
Steering wheel is being fully turned	Yes							
Steering wheel is not being turned	No							
MTBL0254								
OK or NG								
OK	▶	GO TO 7.						
NG	▶	Replace power steering oil pressure switch.						

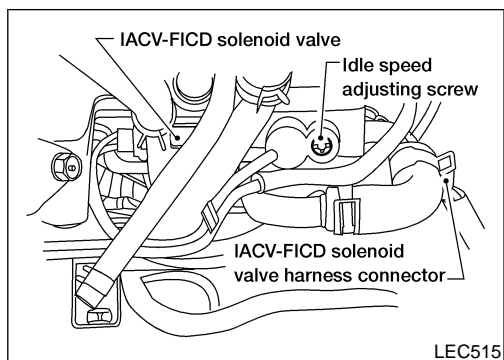
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POWER STEERING OIL PRESSURE SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.	
	▶ INSPECTION END



LEC515

Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

NEEC1490

ECM Terminals and Reference Value

NEEC1491

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

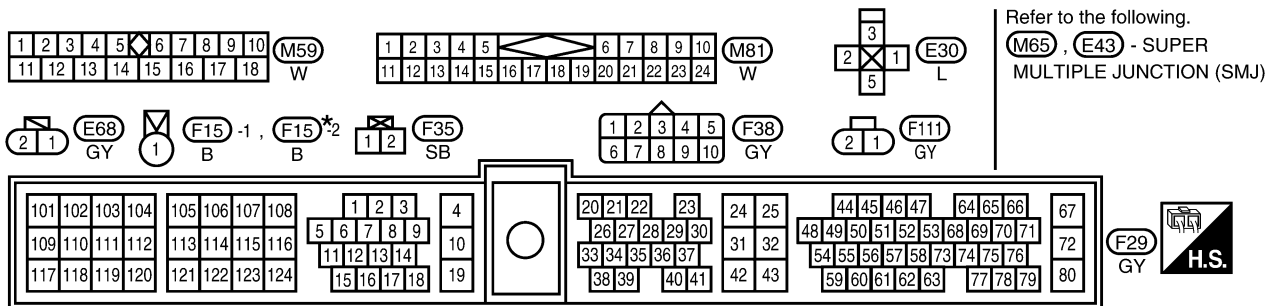
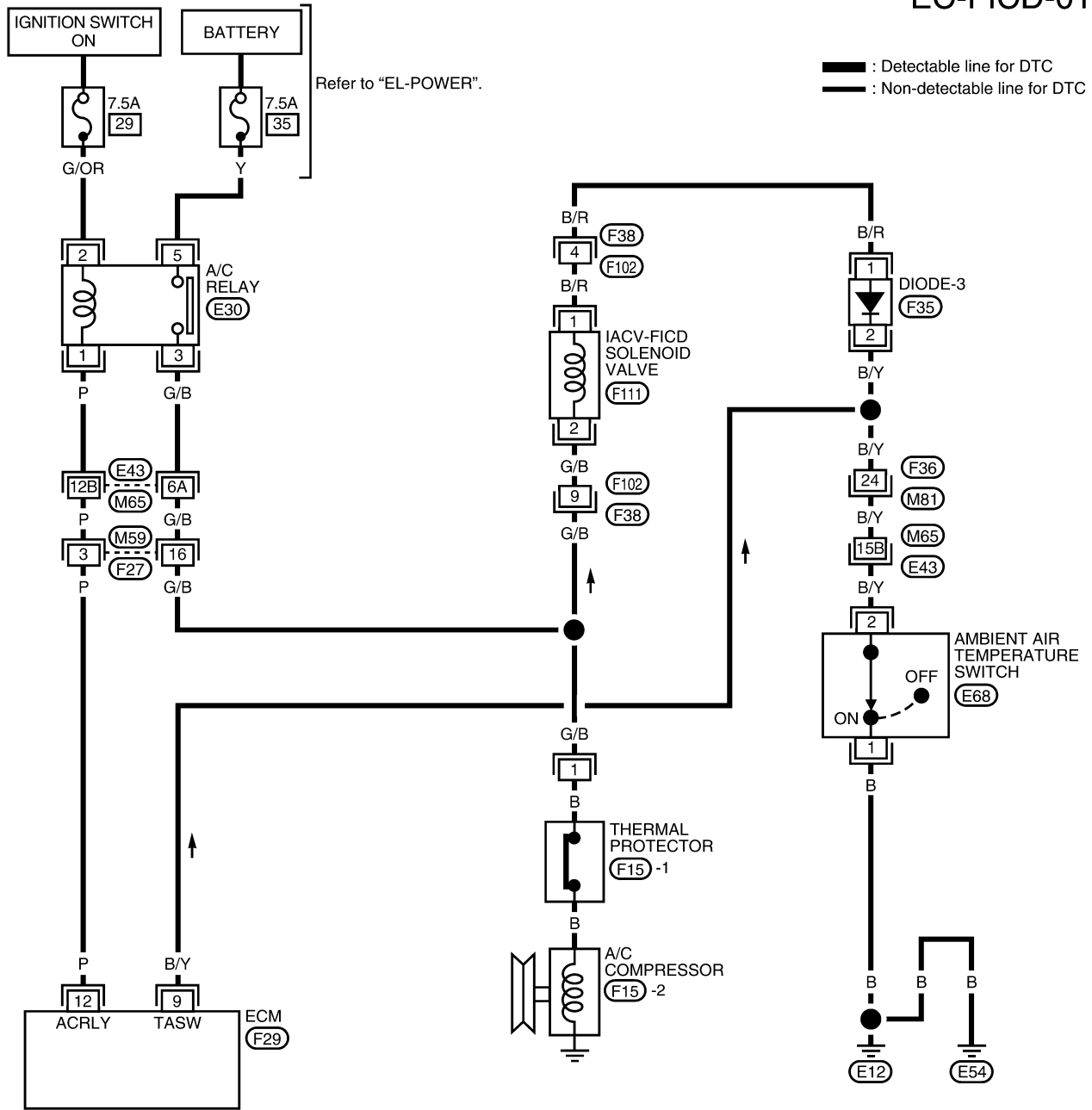
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
12	P	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON"* 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● A/C switch is "OFF" 	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner switch	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON" (Compressor operates)* 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> ● Air conditioner switch is "OFF" 	Approximately 5V

*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

Wiring Diagram

NEEC1492

EC-FICD-01



*: This connector is not shown in "HARNESS LAYOUT" of EL section.

Diagnostic Procedure

NEEC1493

1	CHECK OVERALL FUNCTION	
	1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) If NG, adjust idle speed. 3. Turn air conditioner switch and blower fan switch ON. 4. Recheck idle speed.	
	850 rpm or more (in "P" or "N" position)	
	OK or NG	
OK	▶	INSPECTION END
NG	▶	GO TO 2.

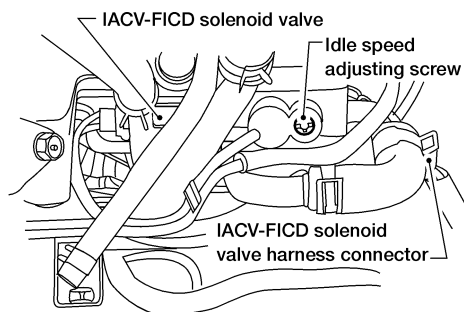
SEF742U

2	CHECK AIR CONDITIONER FUNCTION	
	Check if air conditioner compressor functions normally.	
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table", "TROUBLE DIAGNOSES", HA-28 .

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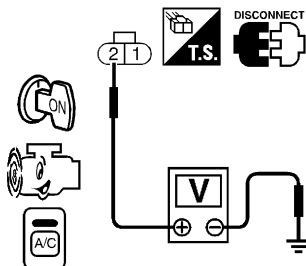
3 CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn air conditioner switch and blower fan switch OFF.
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.



LEC515

4. Start engine, then turn air conditioner switch and blower fan switch ON.
5. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF680W

Voltage: Battery voltage
OK or NG

OK ► GO TO 5.

NG ► GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open or short between IACV-FICD solenoid valve and harness connector F27

► Repair harness or connectors.

5 CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between ambient air temperature switch terminal 1 and body ground.
Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK ► GO TO 6.

NG ► Repair open circuit or short to power in harness or connectors.

IACV-FICD SOLENOID VALVE

VG33ER

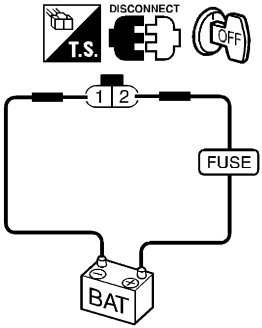
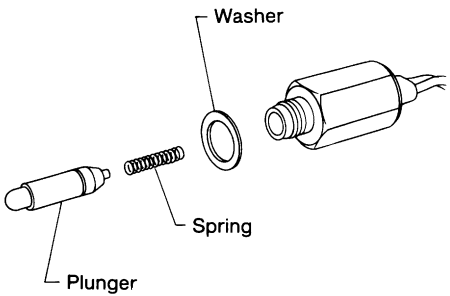
Diagnostic Procedure (Cont'd)

6	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-II	
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.		
<p>Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

SEF160X

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7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Diode-3 ● Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

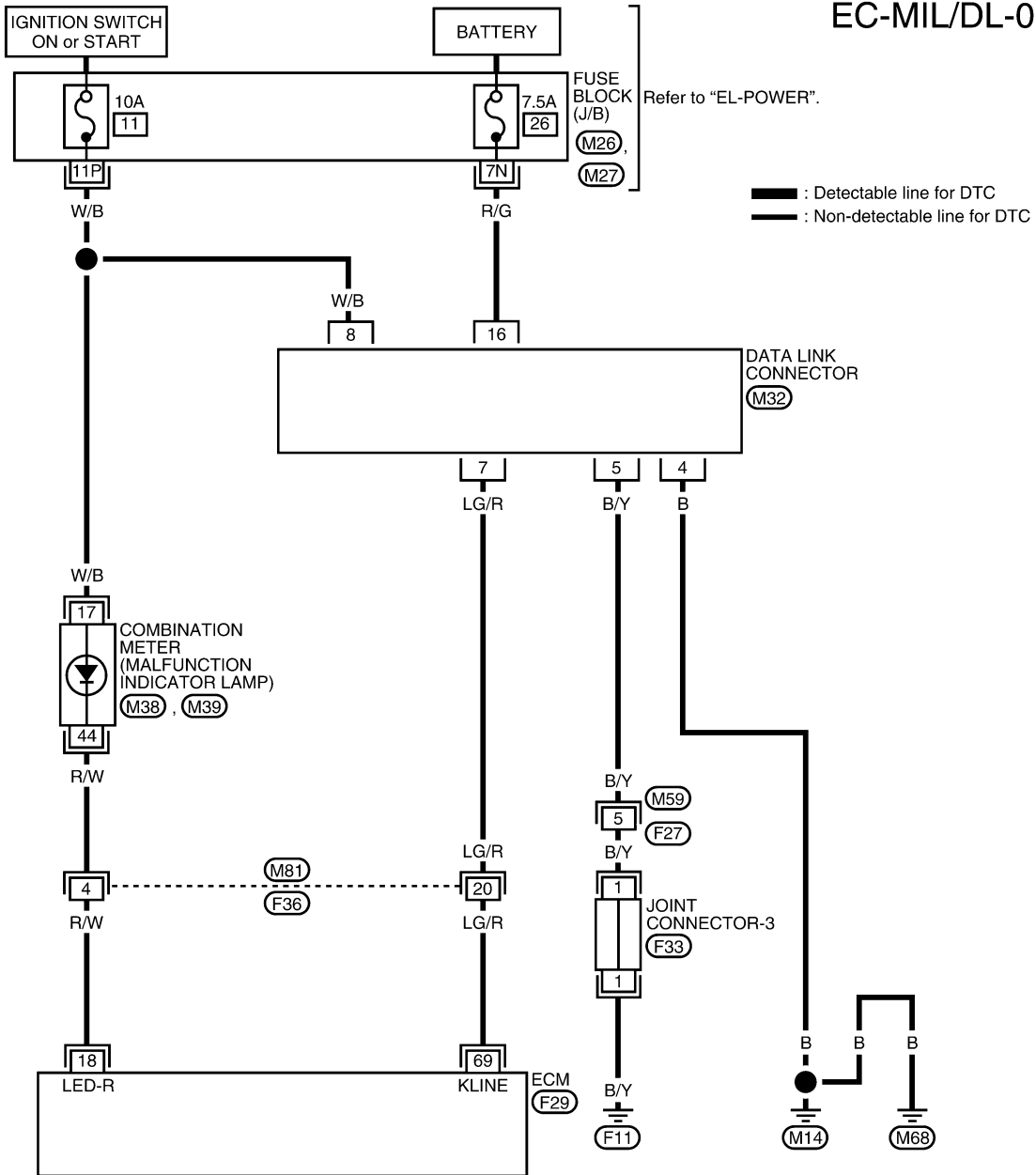
8	CHECK IACV-FICD SOLENOID VALVE	<p>Disconnect IACV-FICD solenoid valve harness connector.</p> <ul style="list-style-type: none"> ● Check for clicking sound when applying 12V direct current to terminals. <div style="text-align: center;">  </div> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF682W</p>	
OK or NG			SEF097K
OK	▶	GO TO 9.	
NG	▶	Replace IACV-FICD solenoid valve.	

9	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1353.</p>	
	▶	INSPECTION END	

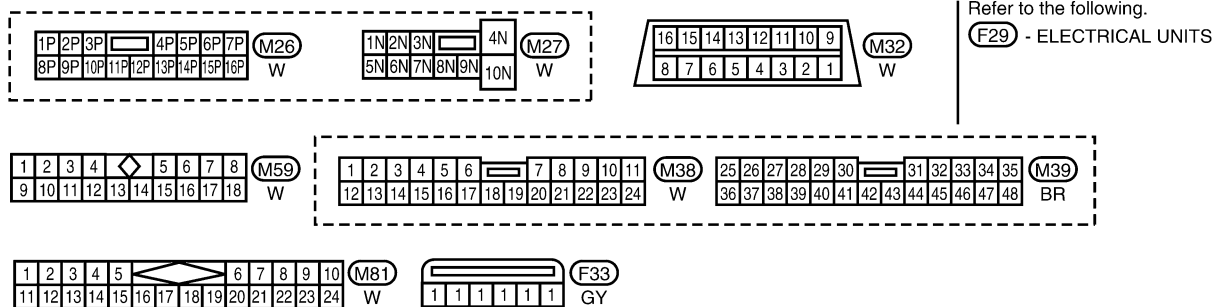
Wiring Diagram

NEEC1494

EC-MIL/DL-01



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Fuel Pressure Regulator

NEEC1495

Fuel pressure at idling kPa (kg/cm ² , psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NEEC1496

Base idle speed*1	No-load*4 (in "P" or N" position)	700±50 rpm
Target idle speed*2	No-load*4 (in "P" or N" position)	750±50 rpm
Air conditioner: ON	In "P" or N" position	850 rpm or more
Ignition timing*3	In "P" or N" position	10°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Throttle position sensor harness connector disconnected

*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NEEC1497

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NEEC1498

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g-m/sec at idle* 12.0 - 14.9 g-m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NEEC1499

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater (Front)

NEEC1500

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
-----------------------------	------------

Fuel Pump

NEEC1501

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω
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IACV-AAC Valve

NEEC1502

Resistance [at 20°C (68°F)]	Approximately 10.0Ω
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Injector

NEEC1503

Resistance [at 25°C (77°F)]	10 - 14Ω
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GI

Throttle Position Sensor

NEEC1504

Throttle valve conditions	Voltage [at normal operating temperature, engine off, ignition switch ON, (throttle opener disengaged, if so equipped)]
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MA

EM

LC

EC

Calculated Load Value

NEEC1505

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

FE

CL

Intake Air Temperature Sensor

NEEC1506

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

MT

AT

Heated Oxygen Sensor 2 Heater (Rear)

NEEC1507

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
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TF

PD

Crankshaft Position Sensor (OBD)

NEEC1508

Resistance [at 20°C (68°F)]	512 - 632Ω
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AX

Fuel Tank Temperature Sensor

NEEC1509

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SU

BR

ST

RS

BT

HA

SC

EL

IDX

NOTES