ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

CONTENTS (Cont'd)

Alphabetical Index

NHEC0001

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-159.

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
A/T 1ST GR FNCTN	P0731	0731	2	X	AT-137
A/T 2ND GR FNCTN	P0732	0732	2	X	AT-143
A/T 3RD GR FNCTN	P0733	0733	2	X	AT-149
A/T 4TH GR FNCTN	P0734	0734	2	X	AT-163
A/T TCC S/V FNCTN	P0744	0744	2	X	AT-163
ABSL PRES SEN/CIRC	P0107	0107	2	X	EC-197
ABSL PRES SEN/CIRC	P0108	0108	2	X	EC-197
APP SEN 1/CIRC	P2122	2122	1	X	EC-643
APP SEN 1/CIRC	P2123	2123	1	X	EC-643
APP SEN 2/CIRC	P2127	2127	1	X	EC-650
APP SEN 2/CIRC	P2128	2128	1	X	EC-650
APP SENSOR	P2138	2138	1	X	EC-662
ASCD BRAKE SW	P1572	1572	1	—	EC-612
ASCD SW	P1564	1564	1	—	EC-605
ASCD VHL SPD SEN	P1574	1574	1	—	EC-622
ATF TEMP SEN/CIRC	P0710	0710	2	—	AT-115
BRAKE SW/CIRCUIT	P1805	1805	2	—	EC-637
CAN COMM CIRCUIT	U1000	1000*5	1	X or —	EC-159
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-159
CKP SEN/CIRCUIT	P0335	0335	2	X	EC-310
CLOSED LOOP-B1	P1148	1148	1	X	EC-504
CLOSED LOOP-B2	P1168	1168	1	X	EC-504
CMP SEN/CIRC-B1	P0340	0340	2	X	EC-317
CMP SEN/CIRC-B2	P0345	0345	2	X	EC-317
CTP LEARNING	P1225	1225	2	—	EC-528
CTP LEARNING	P1226	1226	2	—	EC-530
CYL 1 MISFIRE	P0301	0301	2	X	EC-296
CYL 2 MISFIRE	P0302	0302	2	X	EC-296
CYL 3 MISFIRE	P0303	0303	2	X	EC-296
CYL 4 MISFIRE	P0304	0304	2	X	EC-296
CYL 5 MISFIRE	P0305	0305	2	X	EC-296
CYL 6 MISFIRE	P0306	0306	2	X	EC-296
ECM	P0605	0605	1 or 2	X or —	EC-435

Alphabetical Index (Cont'd)

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
ECM BACK UP/CIRCUIT	P1065	1065	2	X	EC-441
ECT SEN/CIRC	P0117	0117	1	X	EC-203
ECT SEN/CIRC	P0118	0118	1	X	EC-203
ECT SENSOR	P0125	0125	1	X	EC-214
ENG OVER TEMP	P1217	1217	1	X	EC-510
ENGINE SPEED SIG	P0725	0725	2	X	AT-126
ETC MOT	P1128	1128	1	X	EC-467
ETC MOT PWR	P1124	1124	1	X	EC-461
ETC MOT PWR	P1126	1126	1	X	EC-461
ETC ACTR	P1121	1121	1	X	EC-451
ETC FUNCTION/CIRC	P1122	1122	1	X	EC-453
EVAP GROSS LEAK	P0455	0455	2	X	EC-385
EVAP VERY SML LEAK	P0456	0456	2	X	EC-397
EVAP VERY SML LEAK	P1456	1456	2	X	EC-568
EVAP PURG FLOW/MON	P0441	0441	2	X	EC-331
EVAP SMALL LEAK	P0442	0442	2	X	EC-341
EVAP SYS PRES SEN	P0452	0452	2	X	EC-370
EVAP SYS PRES SEN	P0453	0453	2	X	EC-376
FTT SEN/CIRCUIT	P0182	0182	2	X	EC-285
FTT SEN/CIRCUIT	P0183	0183	2	X	EC-285
FTT SENSOR	P0181	0181	2	X	EC-282
FUEL LEV SEN SLOSH	P0460	0460	2	X	EC-412
FUEL LEVEL SENSOR	P0461	0461	2	X	EC-416
FUEL LEVL SEN/CIRC	P0462	0462	2	X	EC-418
FUEL LEVL SEN/CIRC	P0463	0463	2	X	EC-418
FUEL LEVL SEN/CIRC	P1464	1464	2	X	EC-584
FUEL SYS-LEAN-B1	P0171	0171	2	X	EC-267
FUEL SYS-LEAN-B2	P0174	0174	2	X	EC-267
FUEL SYS-RICH-B1	P0172	0172	2	X	EC-275
FUEL SYS-RICH-B2	P0175	0175	2	X	EC-275
HO2S1 (B1)	P0132	0132	2	X	EC-221
HO2S1 (B1)	P0133	0133	2	X	EC-229
HO2S1 (B1)	P0134	0134	2	X	EC-241
HO2S1 (B1)	P1143	1143	2	X	EC-472
HO2S1 (B1)	P1144	1144	2	X	EC-479
HO2S1 (B2)	P0152	0152	2	X	EC-221

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
HO2S1 (B2)	P0153	0153	2	X	EC-229
HO2S1 (B2)	P0154	0154	2	X	EC-241
HO2S1 (B2)	P1163	1163	2	X	EC-472
HO2S1 (B2)	P1164	1164	2	X	EC-479
HO2S1 HTR (B1)	P0031	0031	2	X	EC-171
HO2S1 HTR (B1)	P0032	0032	2	X	EC-171
HO2S1 HTR (B2)	P0051	0051	2	X	EC-171
HO2S1 HTR (B2)	P0052	0052	2	X	EC-171
HO2S2 (B1)	P0138	0138	2	X	EC-250
HO2S2 (B1)	P0139	0139	2	X	EC-258
HO2S2 (B1)	P1146	1146	2	X	EC-486
HO2S2 (B1)	P1147	1147	2	X	EC-495
HO2S2 (B2)	P0158	0158	2	X	EC-250
HO2S2 (B2)	P0159	0159	2	X	EC-258
HO2S2 (B2)	P1166	1166	2	X	EC-486
HO2S2 (B2)	P1167	1167	2	X	EC-495
HO2S2 HTR (B1)	P0037	0037	2	X	EC-178
HO2S2 HTR (B1)	P0038	0038	2	X	EC-178
HO2S2 HTR (B2)	P0057	0057	2	X	EC-178
HO2S2 HTR (B2)	P0058	0058	2	X	EC-178
IAT SEN/CIRCUIT	P0112	0112	2	X	EC-199
IAT SEN/CIRCUIT	P0113	0113	2	X	EC-199
IAT SENSOR	P0127	0127	2	X	EC-217
INT/V TIM CONT-B1	P0011	0011	2	X	EC-162
INT/V TIM CONT-B2	P0021	0021	2	X	EC-162
ISC SYSTEM	P0506	0506	2	X	EC-426
ISC SYSTEM	P0507	0507	2	X	EC-428
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-305
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-305
L/PRESS SOL/CIRC	P0745	0745	2	X	AT-173
MAF SEN/CIRCUIT	P0101	0101	1	X	EC-184
MAF SEN/CIRCUIT	P0102	0102	1	X	EC-191
MAF SEN/CIRCUIT	P0103	0103	1	X	EC-191
MAF SENSOR	P1102	1102	1	X	EC-445
MIL/CIRC	P0650	0650	2	—	EC-437
MULTI CYL MISFIRE	P0300	0300	2	X	EC-296

Alphabetical Index (Cont'd)

Items (CONSULT-II screen terms)	DTC*1		Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
NATS MALFUNCTION	P1610-P1615	1610-1615	2	—	EL-375
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	—	EC-91
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	**—**
O/R CLTCH SOL/CIRC	P1760	1760	2	X	AT-196
P-N POS SW/CIRCUIT	P1706	1706	2	X	EC-627
PNP SW/CIRC	P0705	0705	2	—	AT-109
PURG VOLUME CONT/V	P0444	0444	2	X	EC-356
PURG VOLUME CONT/V	P0445	0445	2	X	EC-356
PURG VOLUME CONT/V	P1444	1444	2	X	EC-538
PW ST P SEN/CIRC	P0550	0550	2	—	EC-430
SENSOR POWER/CIRC	P1229	1229	1	X	EC-532
SFT SOL A/CIRC	P0750	0750	1	X	AT-179
SFT SOL B/CIRC	P0755	0755	1	X	AT-184
TCC SOLENOID/CIRC	P0740	0740	2	X	AT-158
TCS/CIRC	P1212	1212	2	—	EC-508
TCS C/U FUNCTN	P1211	1211	2	—	EC-506
THERMSTAT FNCTN	P0128	0128	2	X	EC-219
TP SEN 1/CIRC	P0222	0222	1	X	EC-290
TP SEN 1/CIRC	P0223	0223	1	X	EC-290
TP SEN 2/CIRC	P0122	0122	1	X	EC-208
TP SEN 2/CIRC	P0123	0123	1	X	EC-208
TP SENSOR	P2135	2135	1	X	EC-656
TP SEN/CIRC A/T	P1705	1705	1	X	AT-189
TW CATALYST SYS-B1	P0420	0420	2	X	EC-326
TW CATALYST SYS-B2	P0430	0430	2	X	EC-326
VC/V BYPASS/V	P1490	1490	2	X	EC-587
VC CUT/V BYPASS/V	P1491	1491	2	X	EC-593
VEH SPD SEN/CIR AT*6	P0720	0720	2	X	AT-121
VEH SPEED SEN/CIRC*6	P0500	0500	2	X	EC-422
VENT CONTROL VALVE	P0447	0447	2	X	EC-363
VENT CONTROL VALVE	P1446	1446	2	X	EC-551
VENT CONTROL VALVE	P1448	1448	2	X	EC-559
VIAS S/V CIRC	P1800	1800	2	—	EC-632

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

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.

DTC No. Index

NHEC1408

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-159.

X: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	EC-91
U1000	1000*5	CAN COMM CIRCUIT	1	X or —	EC-159
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-159
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	**—**
P0011	0011	INT/V TIM CONT-B1	2	X	EC-162
P0021	0021	INT/V TIM CONT-B2	2	X	EC-162
P0031	0031	HO2S1 HTR (B1)	2	X	EC-171
P0032	0032	HO2S1 HTR (B1)	2	X	EC-171
P0037	0037	HO2S2 HTR (B1)	2	X	EC-178
P0038	0038	HO2S2 HTR (B1)	2	X	EC-178
P0051	0051	HO2S1 HTR (B2)	2	X	EC-171
P0052	0052	HO2S1 HTR (B2)	2	X	EC-171
P0057	0057	HO2S2 HTR (B2)	2	X	EC-178
P0058	0058	HO2S2 HTR (B2)	2	X	EC-178
P0101	0101	MAF SEN/CIRCUIT	1	X	EC-184
P0102	0102	MAF SEN/CIRCUIT	1	X	EC-191
P0103	0103	MAF SEN/CIRCUIT	1	X	EC-191
P0107	0107	ABSL PRES SEN/CIRC	2	X	EC-197
P0108	0108	ABSL PRES SEN/CIRC	2	X	EC-197
P0112	0112	IAT SEN/CIRCUIT	2	X	EC-199
P0113	0113	IAT SEN/CIRCUIT	2	X	EC-199
P0117	0117	ECT SEN/CIRC	1	X	EC-203
P0118	0118	ECT SEN/CIRC	1	X	EC-203
P0122	0122	TP SEN 2/CIRC	1	X	EC-208
P0123	0123	TP SEN 2/CIRC	1	X	EC-208
P0125	0125	ECT SENSOR	1	X	EC-214
P0127	0127	IAT SENSOR	2	X	EC-217
P0128	0128	THERMSTAT FNCTN	2	X	EC-219

DTC No. Index (Cont'd)

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0132	0132	HO2S1 (B1)	2	X	EC-221
P0133	0133	HO2S1 (B1)	2	X	EC-229
P0134	0134	HO2S1 (B1)	2	X	EC-241
P0138	0138	HO2S2 (B1)	2	X	EC-250
P0139	0139	HO2S2 (B1)	2	X	EC-258
P0152	0152	HO2S1 (B2)	2	X	EC-221
P0153	0153	HO2S1 (B2)	2	X	EC-229
P0154	0154	HO2S1 (B2)	2	X	EC-241
P0158	0158	HO2S2 (B2)	2	X	EC-250
P0159	0159	HO2S2 (B2)	2	X	EC-258
P0171	0171	FUEL SYS-LEAN-B1	2	X	EC-267
P0172	0172	FUEL SYS-RICH-B1	2	X	EC-275
P0174	0174	FUEL SYS-LEAN-B2	2	X	EC-267
P0175	0175	FUEL SYS-RICH-B2	2	X	EC-275
P0181	0181	FTT SENSOR	2	X	EC-282
P0182	0182	FTT SEN/CIRCUIT	2	X	EC-285
P0183	0183	FTT SEN/CIRCUIT	2	X	EC-285
P0222	0222	TP SEN 1/CIRC	1	X	EC-290
P0223	0223	TP SEN 1/CIRC	1	X	EC-290
P0300	0300	MULTI CYL MISFIRE	2	X	EC-296
P0301	0301	CYL 1 MISFIRE	2	X	EC-296
P0302	0302	CYL 2 MISFIRE	2	X	EC-296
P0303	0303	CYL 3 MISFIRE	2	X	EC-296
P0304	0304	CYL 4 MISFIRE	2	X	EC-296
P0305	0305	CYL 5 MISFIRE	2	X	EC-296
P0306	0306	CYL 6 MISFIRE	2	X	EC-296
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-305
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-305
P0335	0335	CKP SEN/CIRCUIT	2	X	EC-310
P0340	0340	CMP SEN/CIRC-B1	2	X	EC-317
P0345	0345	CMP SEN/CIRC-B2	2	X	EC-317
P0420	0420	TW CATALYST SYS-B1	2	X	EC-326
P0430	0430	TW CATALYST SYS-B2	2	X	EC-326
P0441	0441	EVAP PURG FLOW/MON	2	X	EC-331
P0442	0442	EVAP SMALL LEAK	2	X	EC-341
P0444	0444	PURG VOLUME CONT/V	2	X	EC-356

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0445	0445	PURG VOLUME CONT/V	2	X	EC-356
P0447	0447	VENT CONTROL VALVE	2	X	EC-363
P0452	0452	EVAP SYS PRES SEN	2	X	EC-370
P0453	0453	EVAP SYS PRES SEN	2	X	EC-376
P0455	0455	EVAP GROSS LEAK	2	X	EC-385
P0456	0456	EVAP VERY SML LEAK	2	X	EC-397
P0460	0460	FUEL LEV SEN SLOSH	2	X	EC-412
P0461	0461	FUEL LEVEL SENSOR	2	X	EC-416
P0462	0462	FUEL LEVL SEN/CIRC	2	X	EC-418
P0463	0463	FUEL LEVL SEN/CIRC	2	X	EC-418
P0500	0500	VEH SPEED SEN/CIRC*6	2	X	EC-422
P0506	0506	ISC SYSTEM	2	X	EC-426
P0507	0507	ISC SYSTEM	2	X	EC-428
P0550	0550	PW ST P SEN/CIRC	2	—	EC-430
P0605	0605	ECM	1 or 2	X or —	EC-435
P0650	0650	MIL/CIRC	2	—	EC-437
P0705	0705	PNP SW/CIRC	2	X	AT-109
P0710	0710	ATF TEMP SEN/CIRC	2	X	AT-115
P0720	0720	VEH SPD SEN/CIR AT*6	2	X	AT-121
P0725	0725	ENGINE SPEED SIG	2	X	AT-126
P0731	0731	A/T 1ST GR FNCTN	2	X	AT-131
P0732	0732	A/T 2ND GR FNCTN	2	X	AT-137
P0733	0733	A/T 3RD GR FNCTN	2	X	AT-143
P0734	0734	A/T 4TH GR FNCTN	2	X	AT-149
P0740	0740	TCC SOLENOID/CIRC	2	X	AT-158
P0744	0744	A/T TCC S/V FNCTN	2	X	AT-163
P0745	0745	L/PRESS SOL/CIRC	2	X	AT-173
P0750	0750	SFT SOL A/CIRC	1	X	AT-179
P0755	0755	SFT SOL B/CIRC	1	X	AT-184
P1065	1065	ECM BACK UP/CIRCUIT	2	X	EC-441
P1102	1102	MAF SENSOR	1	X	EC-445
P1121	1121	ETC ACTR	1	X	EC-451
P1122	1122	ETC FUNCTION/CIRC	1	X	EC-453
P1124	1124	ETC MOT PWR	1	X	EC-461
P1126	1126	ETC MOT PWR	1	X	EC-461
P1128	1128	ETC MOT	1	X	EC-467

DTC No. Index (Cont'd)

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1143	1143	HO2S1 (B1)	2	X	EC-472
P1144	1144	HO2S1 (B1)	2	X	EC-479
P1146	1146	HO2S2 (B1)	2	X	EC-486
P1147	1147	HO2S2 (B1)	2	X	EC-495
P1148	1148	CLOSED LOOP-B1	1	X	EC-504
P1163	1163	HO2S1 (B2)	2	X	EC-472
P1164	1164	HO2S1 (B2)	2	X	EC-479
P1166	1166	HO2S2 (B2)	2	X	EC-486
P1167	1167	HO2S2 (B2)	2	X	EC-495
P1168	1168	CLOSED LOOP-B2	1	X	EC-504
P1211	1211	TCS C/U FUNCTN	2	—	EC-506
P1212	1212	TCS/CIRC	2	—	EC-508
P1217	1217	ENG OVER TEMP	1	X	EC-510
P1225	1225	CTP LEARNING	2	—	EC-528
P1226	1226	CTP LEARNING	2	—	EC-530
P1229	1229	SENSOR POWER/CIRC	1	X	EC-532
P1444	1444	PURG VOLUME CONT/V	2	X	EC-538
P1446	1446	VENT CONTROL VALVE	2	X	EC-551
P1448	1448	VENT CONTROL VALVE	2	X	EC-559
P1456	1456	EVAP VERY SML LEAK	2	X	EC-568
P1464	1464	FUEL LEVL SEN/CIRC	2	X	EC-584
P1490	1490	VC/V BYPASS/V	2	X	EC-587
P1491	1491	VC CUT/V BYPASS/V	2	X	EC-593
P1564	1564	ASCD SW	1	—	EC-605
P1572	1572	ASCD BRAKE SW	1	—	EC-612
P1574	1574	ASCD VHL SPD SEN	1	—	EC-622
P1610-P1615	1610-1615	NATS MALFUNCTION	2	—	EL-375
P1705	1705	TP SEN/CIRC A/T	1	X	AT-189
P1706	1706	P-N POS SW/CIRCUIT	2	X	EC-627
P1760	1760	O/R CLTCH SOL/CIRC	2	X	AT-196
P1800	1800	VIAS S/V CIRC	2	—	EC-632
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-637
P2122	2122	APP SEN 1/CIRC	1	X	EC-643
P2123	2123	APP SEN 1/CIRC	1	X	EC-643
P2127	2127	APP SEN 2/CIRC	1	X	EC-650
P2128	2128	APP SEN 2/CIRC	1	X	EC-650

DTC*1		Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P2135	2135	TP SENSOR	1	X	EC-656
P2138	2138	APP SENSOR	1	X	EC-662

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.

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

NHEC0002

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. The SRS system composition which is available to INFINITI MODEL I35 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, crash zone sensor, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

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 INFINITI 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. SRS wiring harnesses can be identified by yellow and/or orange harness connector.**

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

NHEC0003

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-8, “HARNESS CONNECTOR (SLIDE-LOCKING TYPE)”.**
- **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 EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM or TCM (Transmission control module) before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

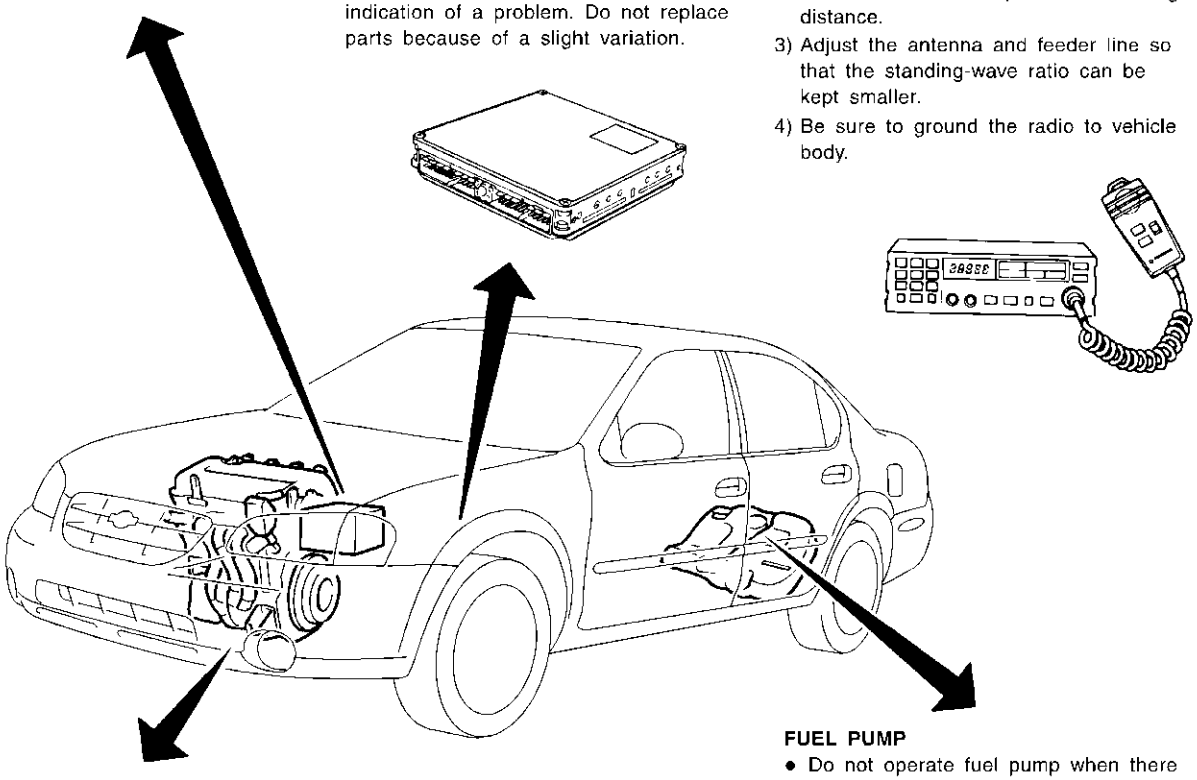
NHEC0004

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

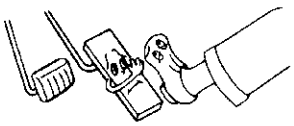
ECM
- Do not disassemble ECM.
- Do not turn dignosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT
- When installing C.B. 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 ECM.
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.



ENGINE CONTROL 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.
- 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.



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.

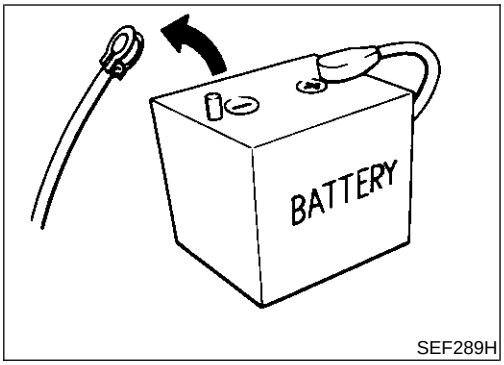
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

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 engine control system harness at least 10 cm (3.9 in) away from adjacent harnesses to prevent an engine control system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF242XD

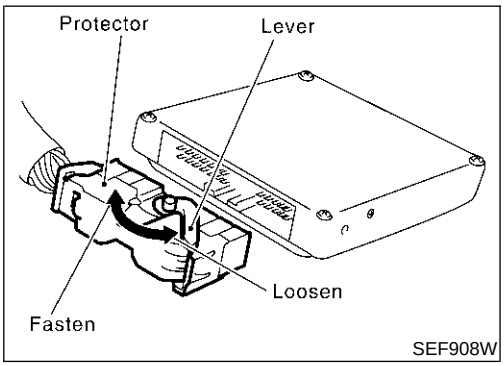
Precautions

NHEC0005



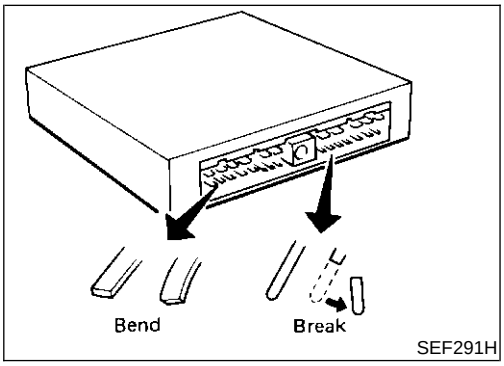
SEF289H

- **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.**



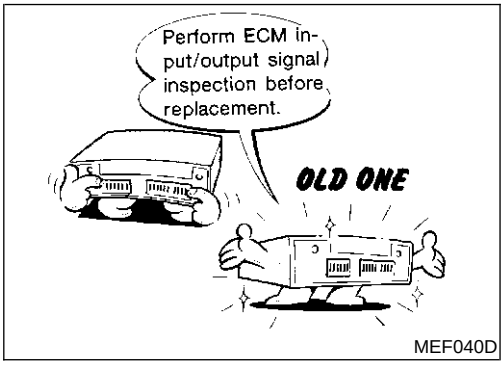
SEF908W

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at left.**



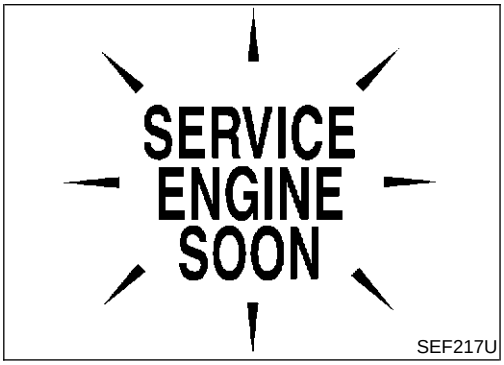
SEF291H

- **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.



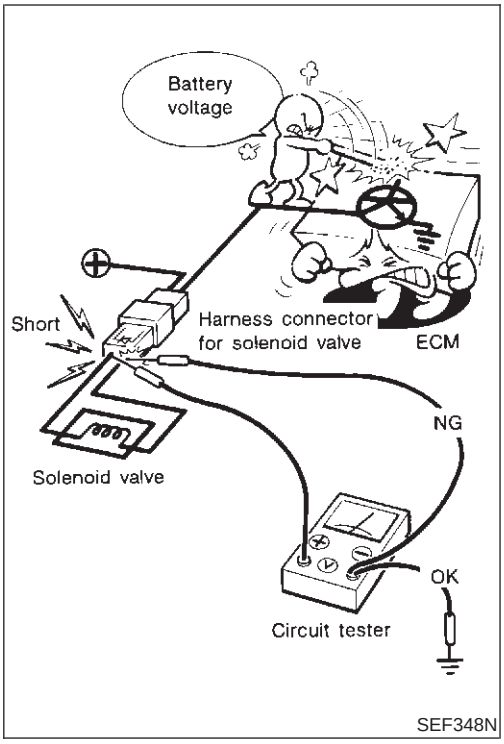
MEF040D

- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-136.**

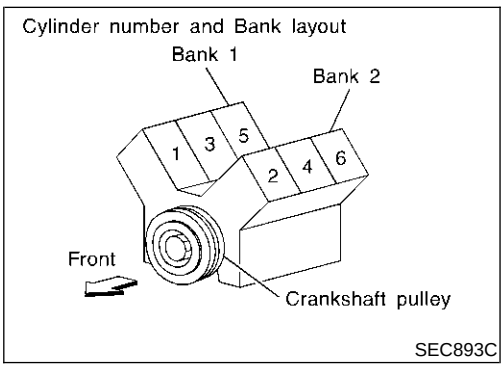


SEF217U

- **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.



- **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.**



- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**

Wiring Diagrams and Trouble Diagnosis

NHEC0006

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-11, "POWER SUPPLY ROUTING" for power distribution circuit

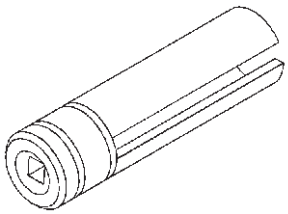
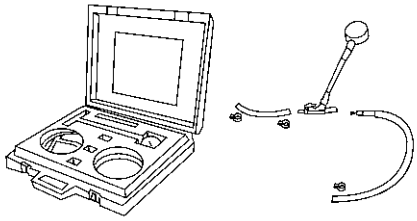
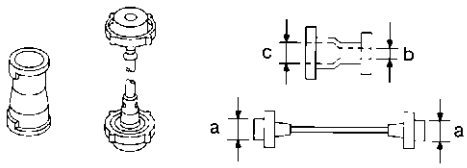
When you perform trouble diagnosis, refer to the following:

- GI-25, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-21, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

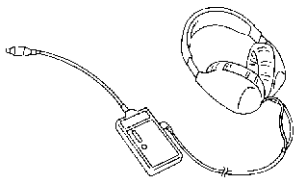
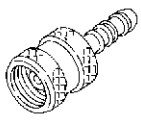
NHEC1417

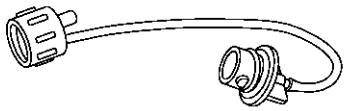
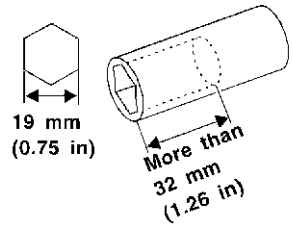
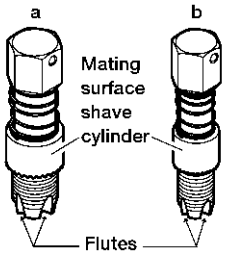
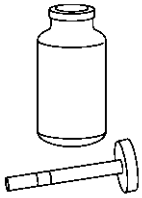
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379 — Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
(J44321) Fuel pressure gauge kit	 LEC642 — Checking fuel pressure with pressure gauge
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564 — Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)

Commercial Service Tools

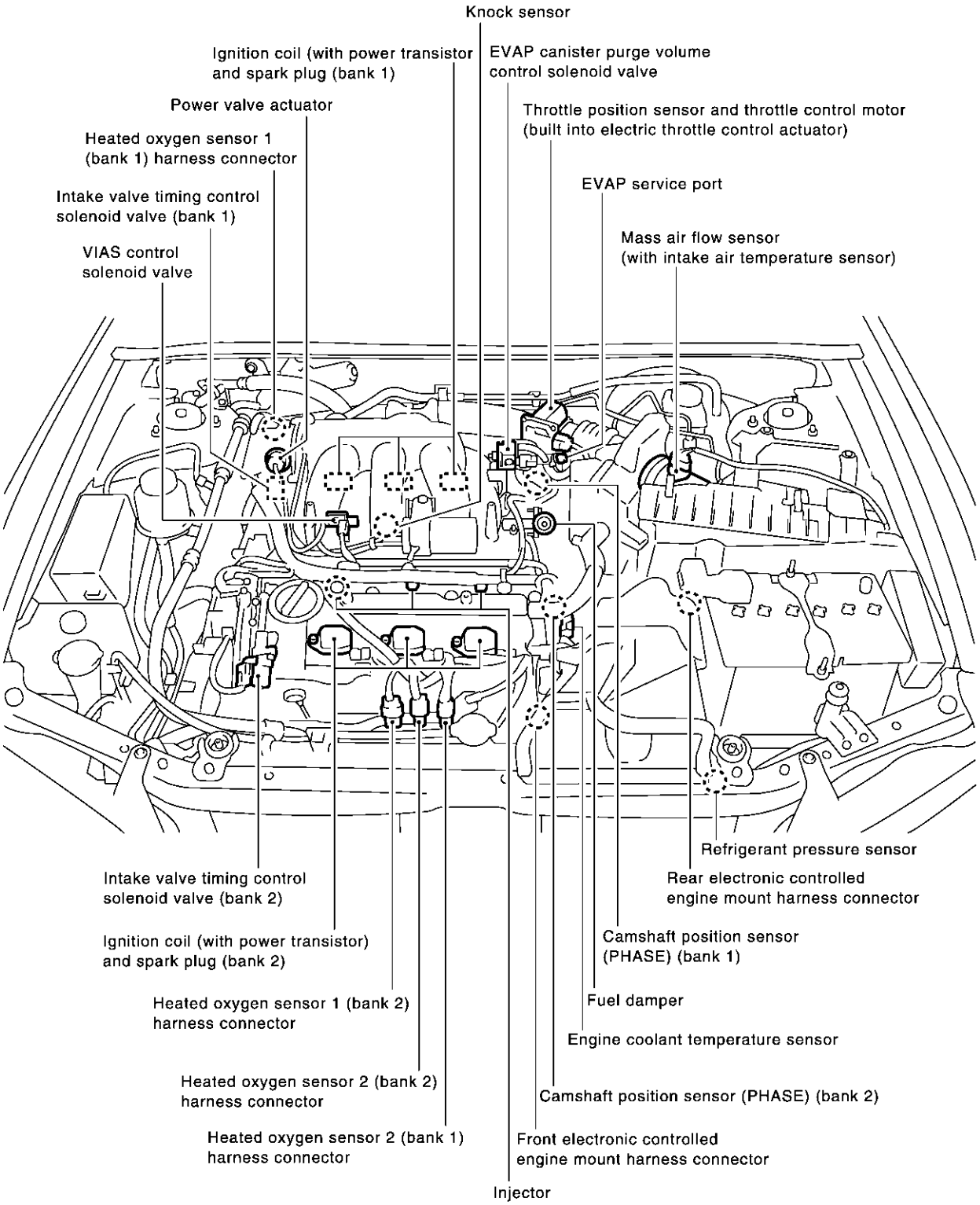
NHEC1418

Tool name (Kent-Moore No.)	Description
Leak detector ie: (J41416)	 NT703 — Locating the EVAP leak
EVAP service port adapter ie: (J41413-OBD)	 NT704 — Applying positive pressure through EVAP service port

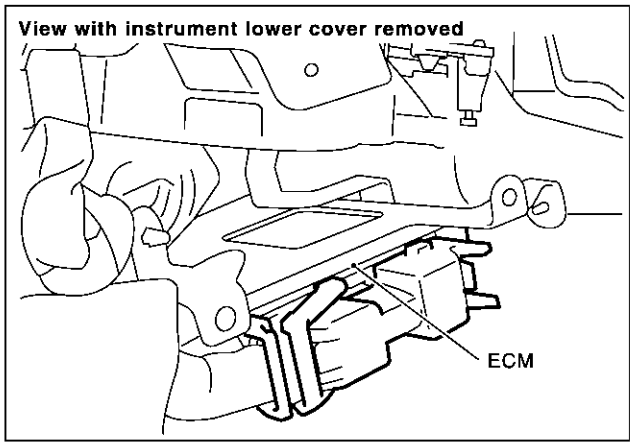
Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter ie: (MLR-8382)	 NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **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**
Anti-seize lubricant ie: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

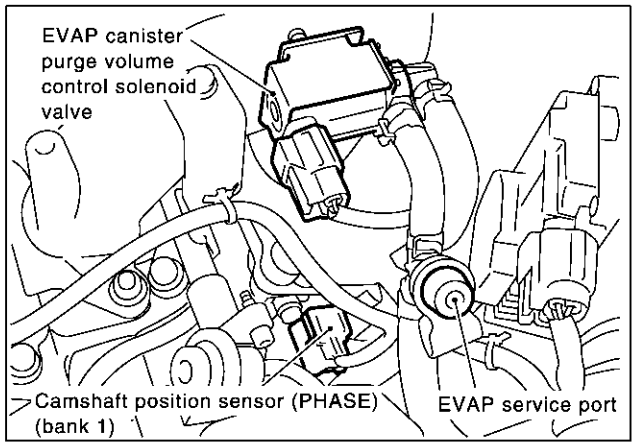
Engine Control Component Parts Location

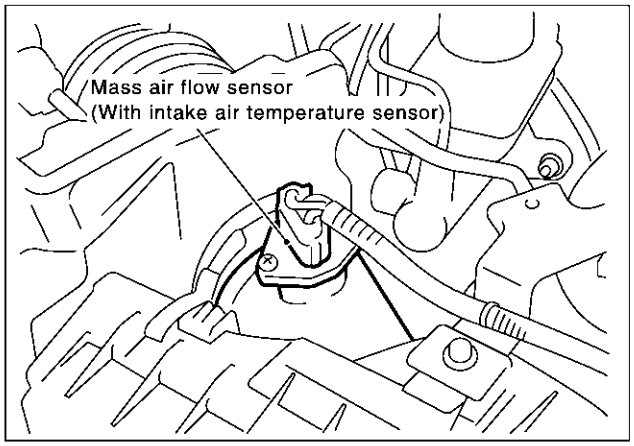
NHEC1419

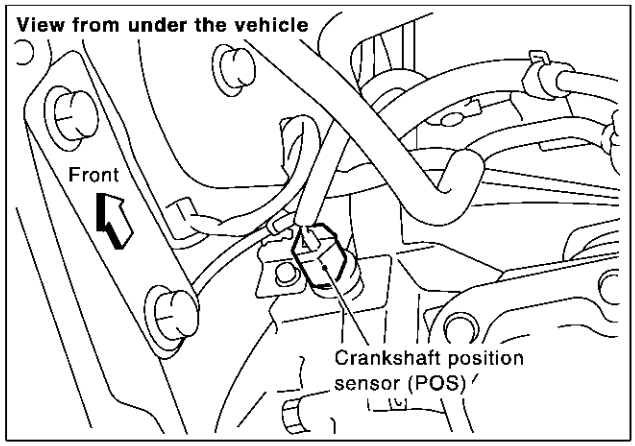


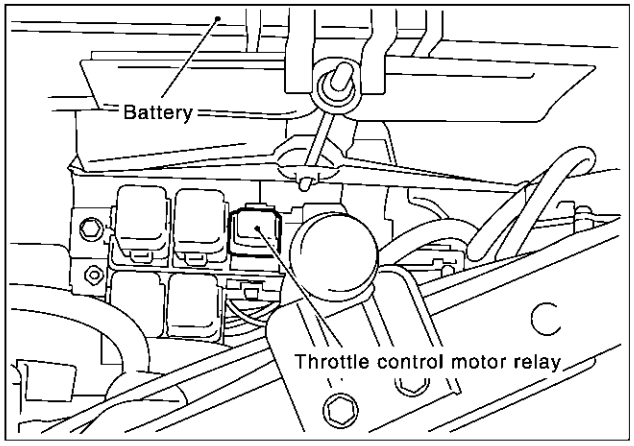
SEC993CA

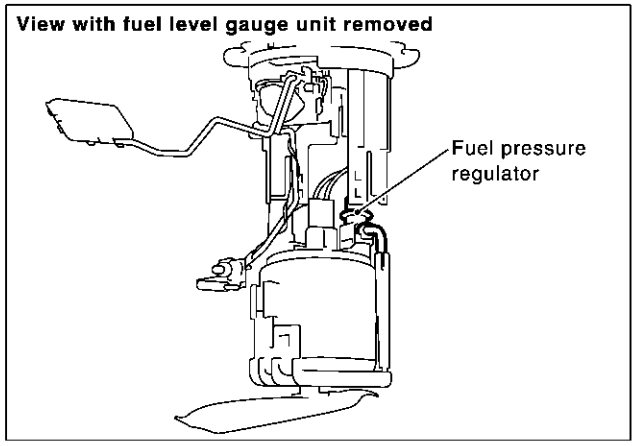

View with instrument lower cover removed
ECM


EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE) (bank 1)
EVAP service port

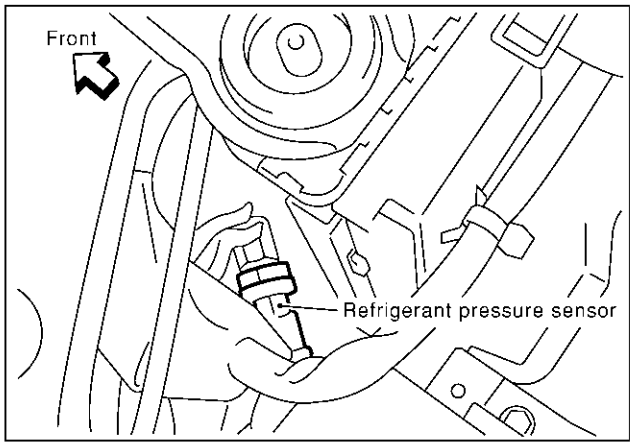

Mass air flow sensor (With intake air temperature sensor)

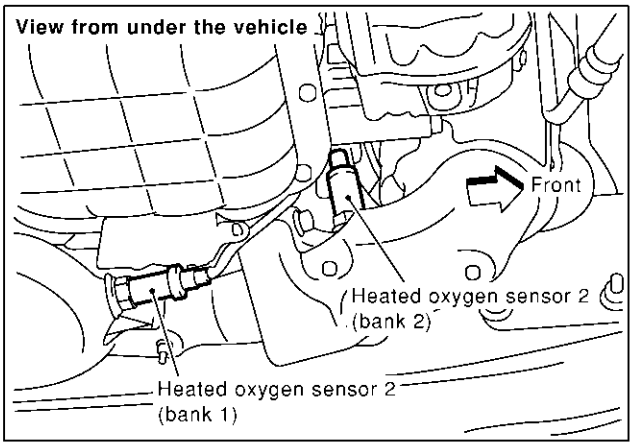

View from under the vehicle
Front
Crankshaft position sensor (POS)

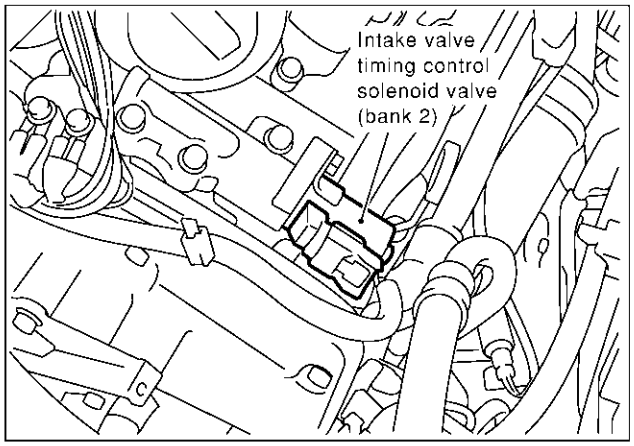

Battery
Throttle control motor relay

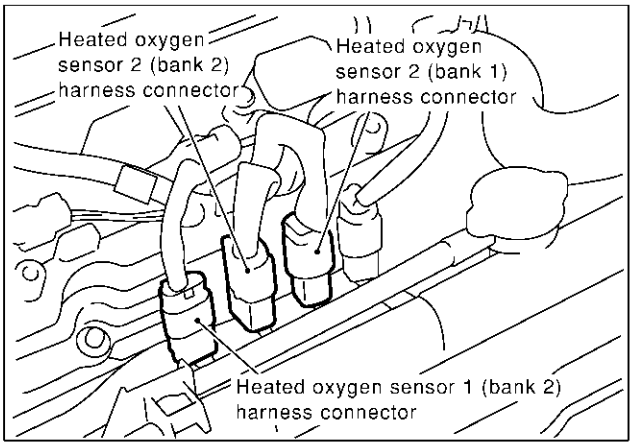

View with fuel level gauge unit removed
Fuel pressure regulator

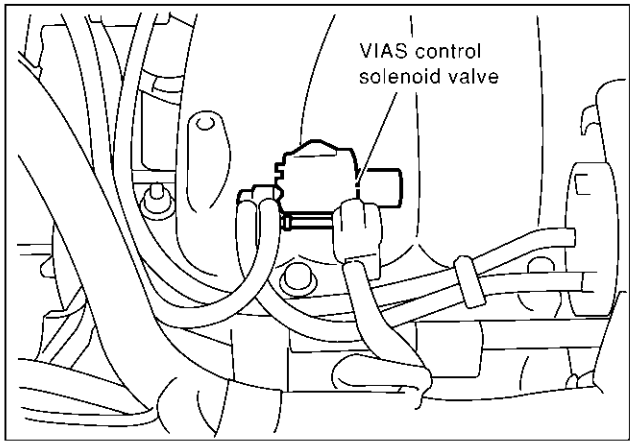
SEC994C

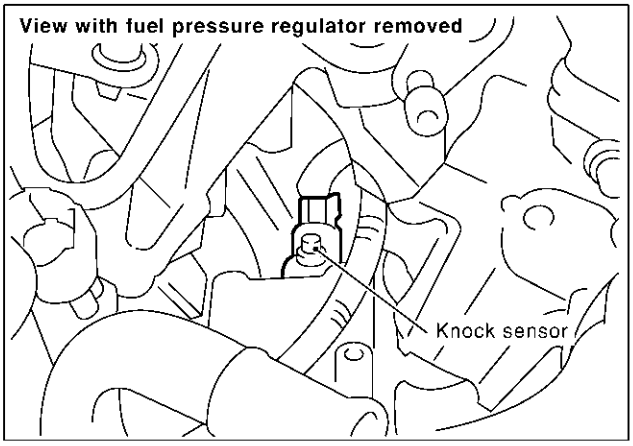

Front
Refrigerant pressure sensor


View from under the vehicle
Front
Heated oxygen sensor 2 (bank 2)
Heated oxygen sensor 2 (bank 1)

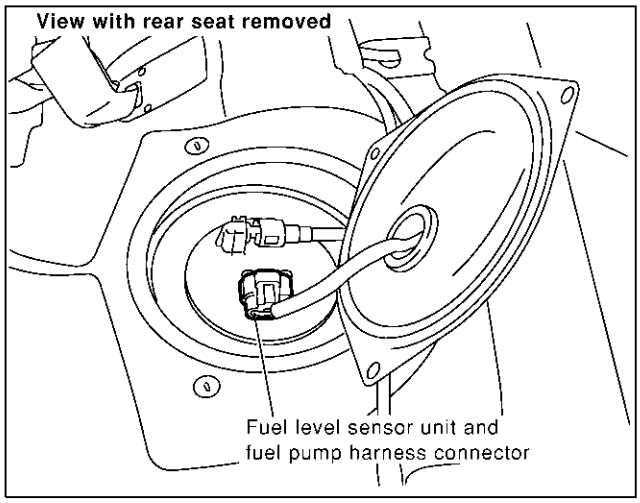

Intake valve timing control solenoid valve (bank 2)

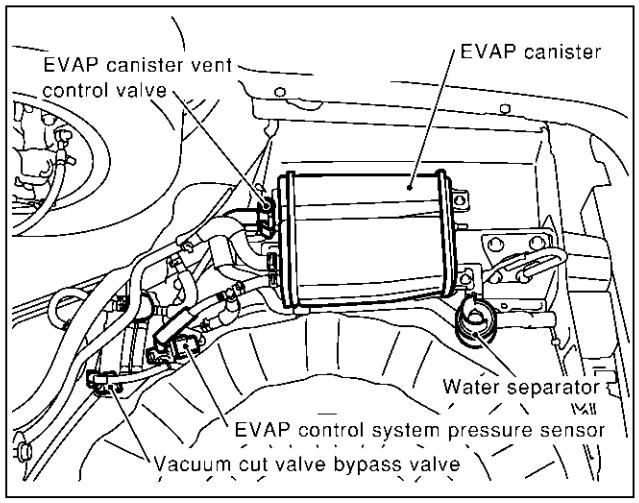

Heated oxygen sensor 2 (bank 2) harness connector
Heated oxygen sensor 2 (bank 1) harness connector
Heated oxygen sensor 1 (bank 2) harness connector

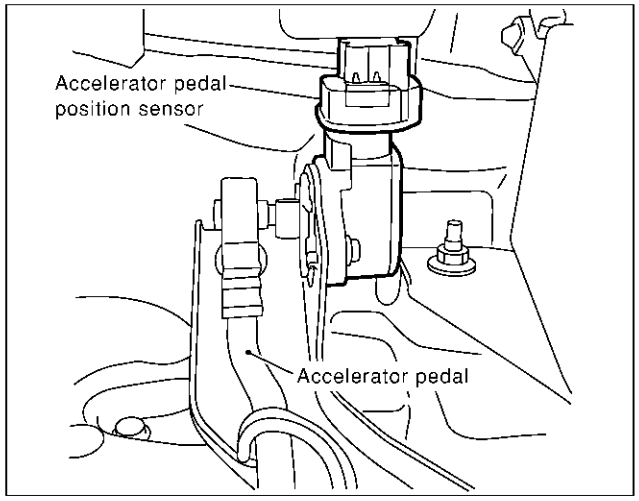

VIAS control solenoid valve

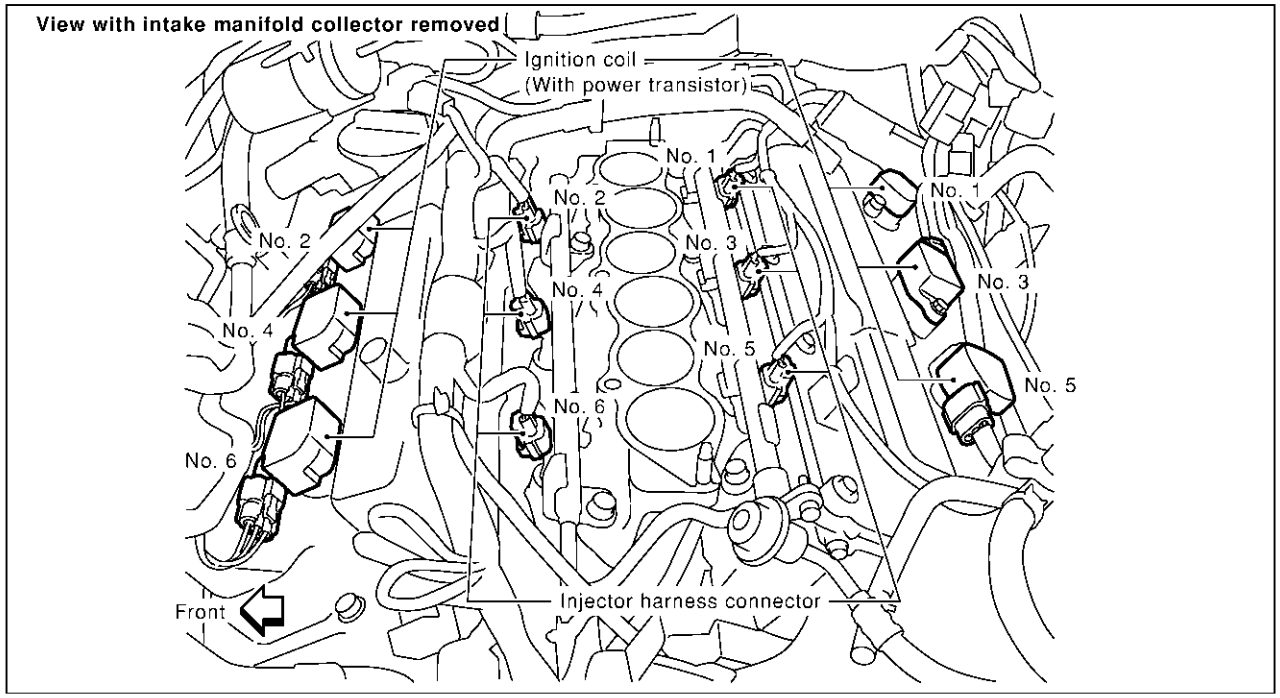

View with fuel pressure regulator removed
Knock sensor

SEC995C


View with rear seat removed
Fuel level sensor unit and
fuel pump harness connector


EVAP canister vent
control valve
EVAP canister
Water separator
EVAP control system pressure sensor
Vacuum cut valve bypass valve

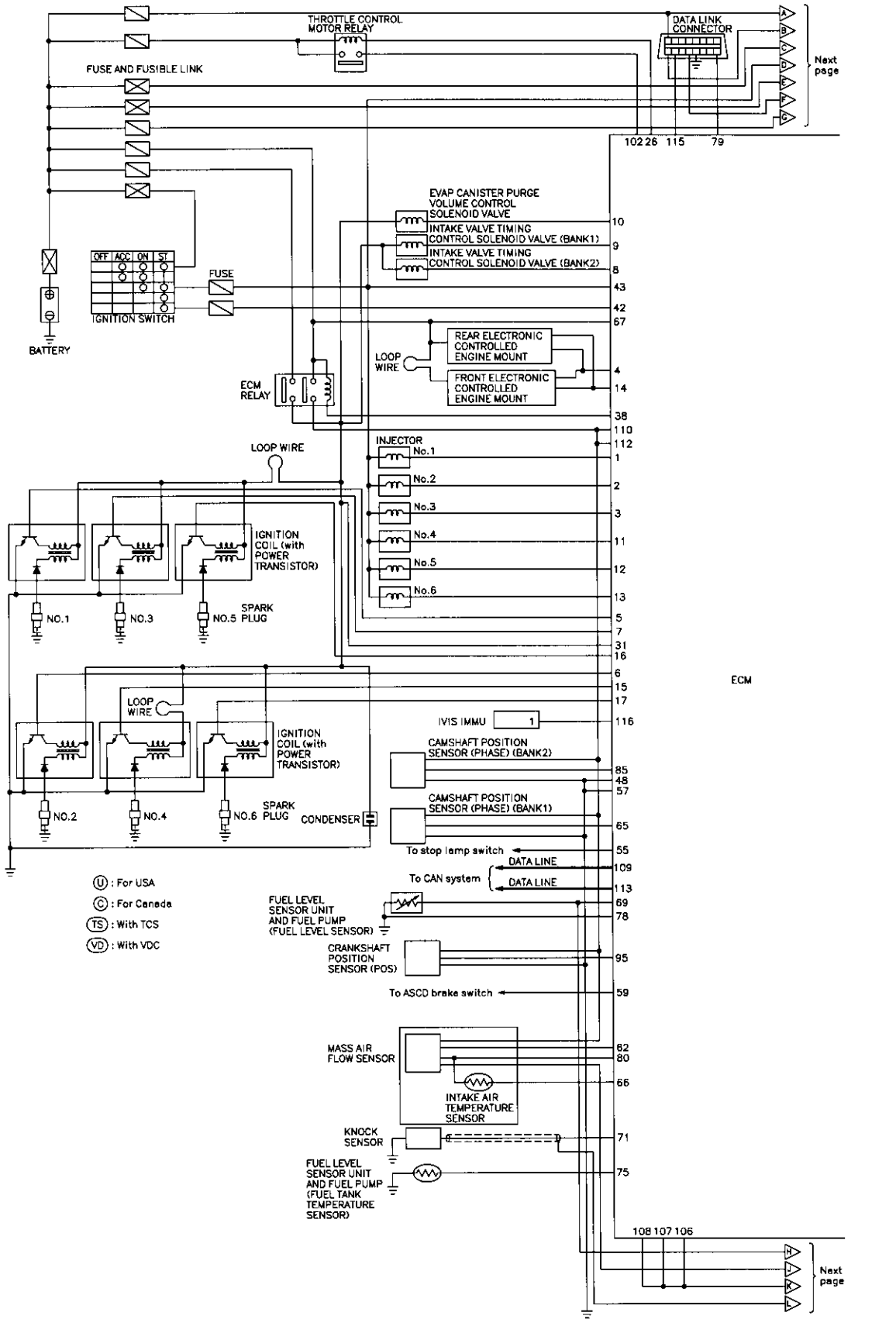

Accelerator pedal
position sensor
Accelerator pedal


View with intake manifold collector removed
Ignition coil
(With power transistor)
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
Injector harness connector
Front

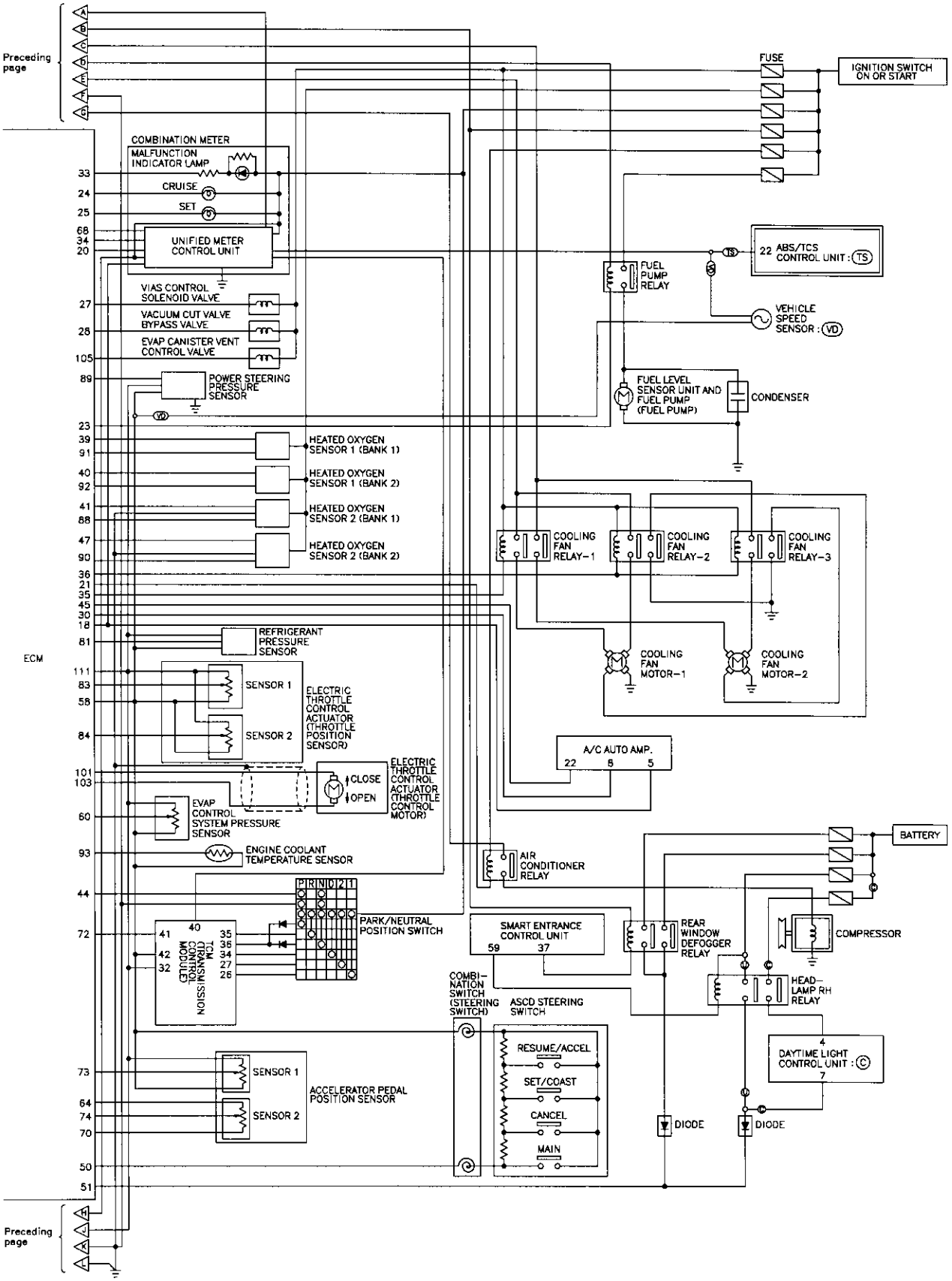
SEC996C

Circuit Diagram

NHEC0010



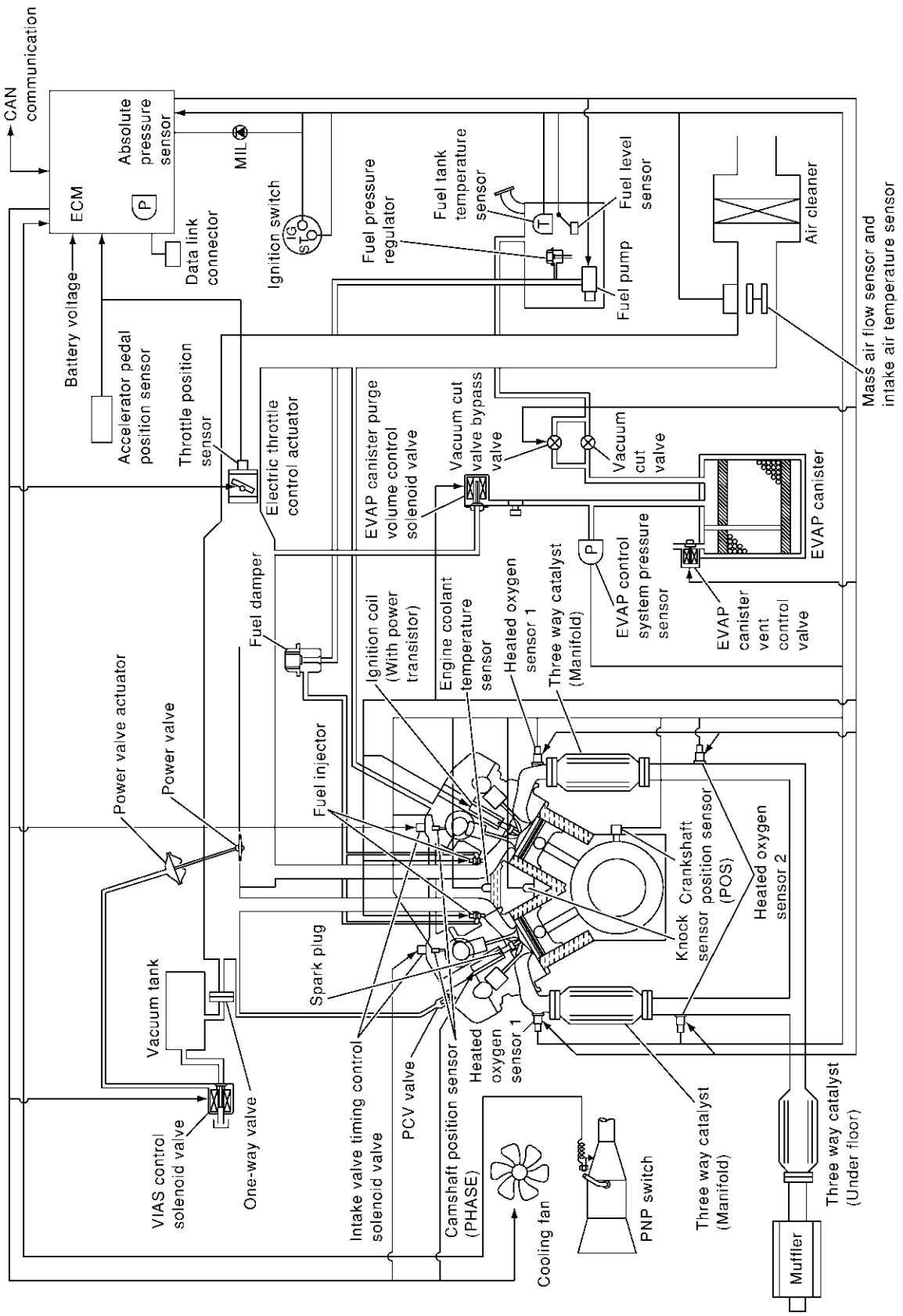
MEC346E


Preceding page
FUSE
IGNITION SWITCH ON OR START
COMBINATION METER
MALFUNCTION INDICATOR LAMP
CRUISE
SET
UNIFIED METER CONTROL UNIT
22 ABS/TCS CONTROL UNIT : TS
FUEL PUMP RELAY
VEHICLE SPEED SENSOR : VD
VIAS CONTROL SOLENOID VALVE
VACUUM CUT VALVE BYPASS VALVE
EVAP CANISTER VENT CONTROL VALVE
POWER STEERING PRESSURE SENSOR
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL PUMP)
CONDENSER
HEATED OXYGEN SENSOR 1 (BANK 1)
HEATED OXYGEN SENSOR 1 (BANK 2)
HEATED OXYGEN SENSOR 2 (BANK 1)
HEATED OXYGEN SENSOR 2 (BANK 2)
COOLING FAN RELAY–1
COOLING FAN RELAY–2
COOLING FAN RELAY–3
COOLING FAN MOTOR–1
COOLING FAN MOTOR–2
ECM
REFRIGERANT PRESSURE SENSOR
SENSOR 1
SENSOR 2
ELECTRIC THROTTLE CONTROL ACTUATOR (THROTTLE POSITION SENSOR)
A/C AUTO AMP.
CLOSE
OPEN
ELECTRIC THROTTLE CONTROL ACTUATOR (THROTTLE CONTROL MOTOR)
EVAP CONTROL SYSTEM PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
AIR CONDITIONER RELAY
BATTERY
P R N D 2 1
PARK/NEUTRAL POSITION SWITCH
SMART ENTRANCE CONTROL UNIT
REAR WINDOW DEFOGGER RELAY
COMPRESSOR
HEAD–LAMP RH RELAY
COMBI–NATION SWITCH (STEERING SWITCH)
ASCD STEERING SWITCH
RESUME/ACCEL
SET/COAST
CANCEL
MAIN
4 DAYTIME LIGHT CONTROL UNIT : C 7
ACCELERATOR PEDAL POSITION SENSOR
DIODE
DIODE
Preceding page

MEC347E

System Diagram

NHEC0011

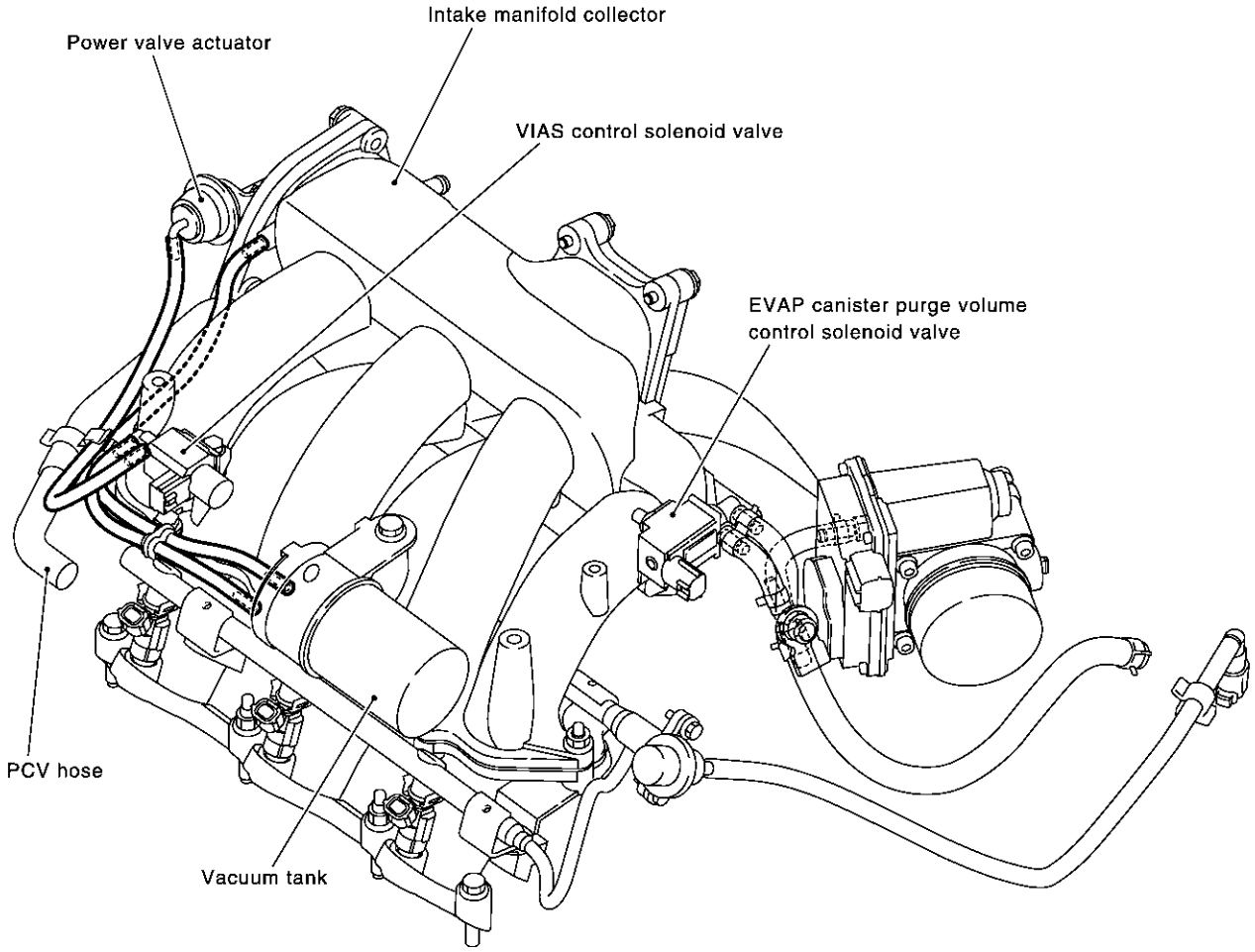


SEC389D

Vacuum Hose Drawing

NHEC1420

Refer to “System Diagram”, EC-30 for Vacuum control system.



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

SEC895CA

System Chart

NHEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 • Ignition switch • Throttle position sensor • Accelerator pedal position sensor • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • Absolute pressure sensor • EVAP control system pressure sensor*1 • Battery voltage • Power steering pressure sensor • Vehicle speed (From combination meter) • Fuel tank temperature sensor*1 • Crankshaft position sensor (POS) • Heated oxygen sensor 2*2 • TCM (Transmission control module)*3 • Refrigerant pressure sensor • Electrical load • Fuel level sensor*1 • ASCD steering switch • ASCD brake switch • Stop lamp switch	Fuel injection & mixture ratio control	Injectors
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	ASCD vehicle speed control	Electric throttle control actuator
	Cooling fan control	Cooling fan relays
	Power valve control	VIAS control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: This signal is sent to the ECM through CAN communication line.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NHEC0014

NHEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed Piston position	Fuel injection & mixture ratio control	Injectors
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed (From combination meter)	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Ambient air barometric pressure		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

*: This sensor is not used to control the engine system under normal conditions.

Basic Multiport Fuel Injection System

NHEC0014S02

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 crankshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NHEC0014S03

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

<Fuel increase>

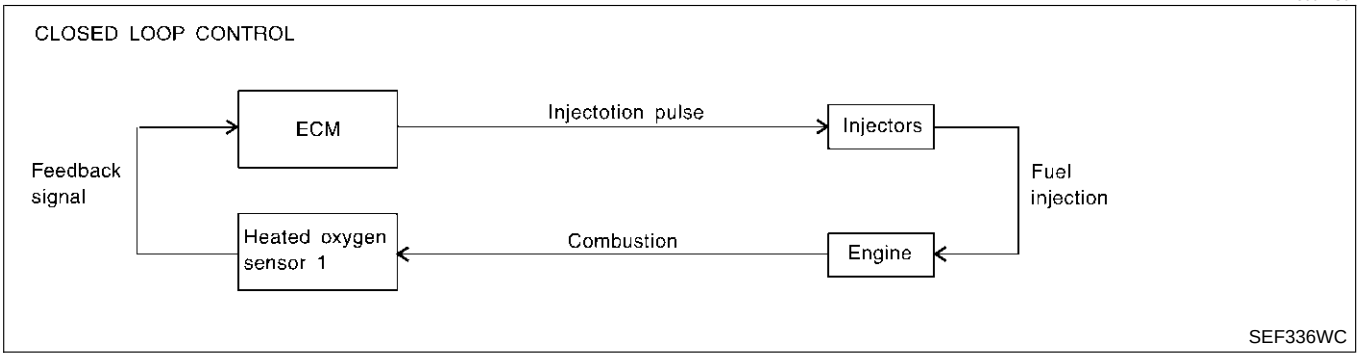
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NHEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (Manifold) can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor whether 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, refer to EC-241. 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 is located downstream of the three way catalyst (Manifold). Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

NHEC0014S05

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 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from "N" to "D"
- When starting the engine

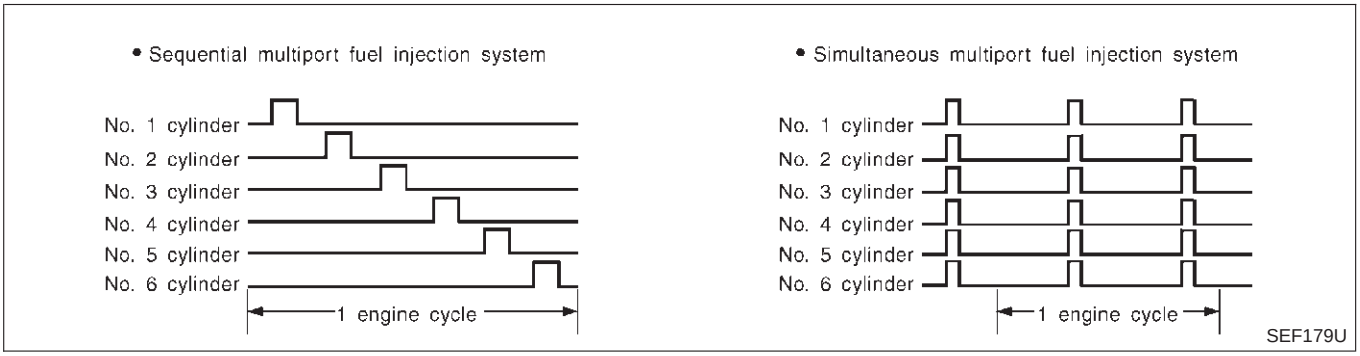
Mixture Ratio Self-learning Control

NHEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1. 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 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.

Fuel Injection Timing

NHEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NHEC0014S0701

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

NHEC0014S0702

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

NHEC0014S08

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

Electronic Ignition (EI) System

DESCRIPTION

Input/Output Signal Chart

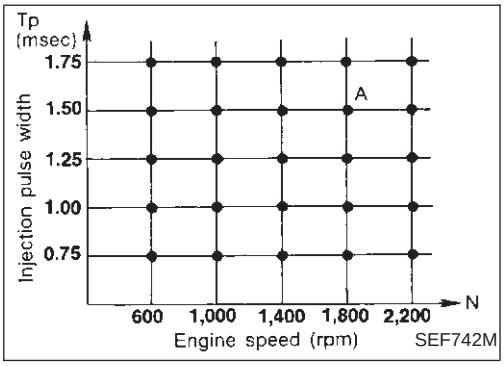
NHEC0015

NHEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Vehicle speed (From combination meter)	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

System Description

NHEC0015S02



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

NHEC0016

Input/Output Signal Chart

NHEC0016S01

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		
Crankshaft position sensor (POS)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed (From combination meter)	Vehicle speed		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		

System Description

NHEC0016S02

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.
- When refrigerant pressure is excessively low or high.

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

DESCRIPTION

Input/Output Signal Chart

NHEC0017

NHEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed (From combination meter)	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed		

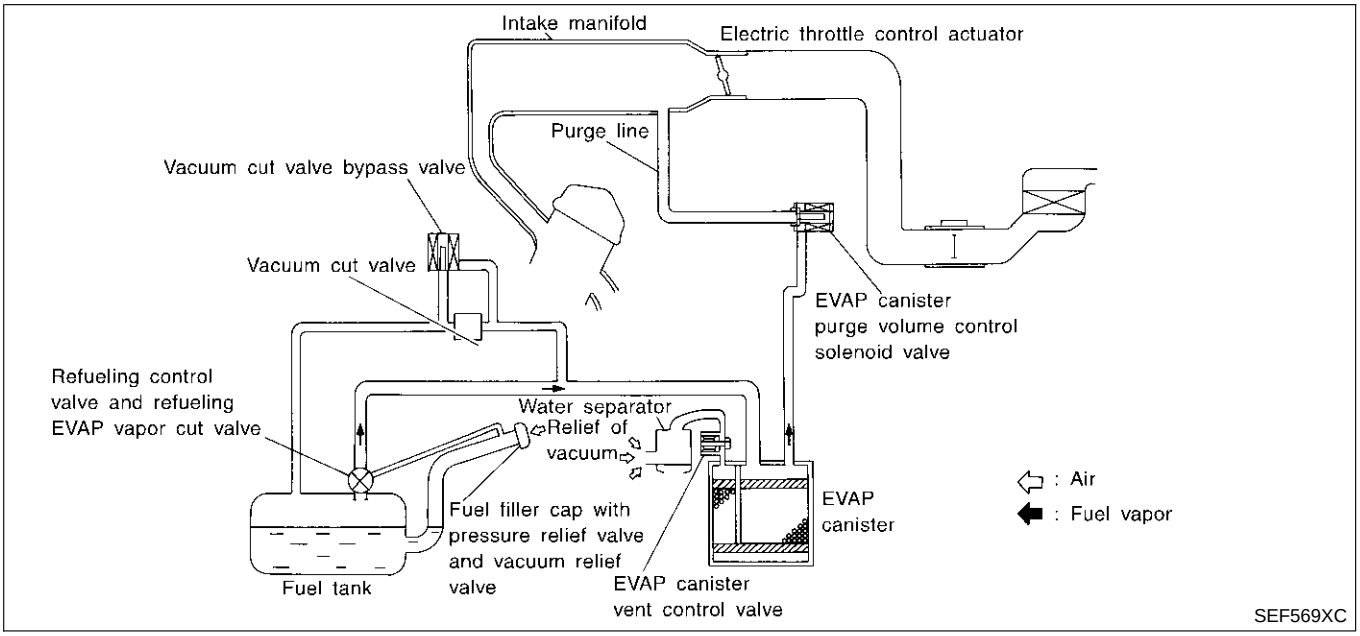
If the engine speed is above 1,800 rpm with no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-33.

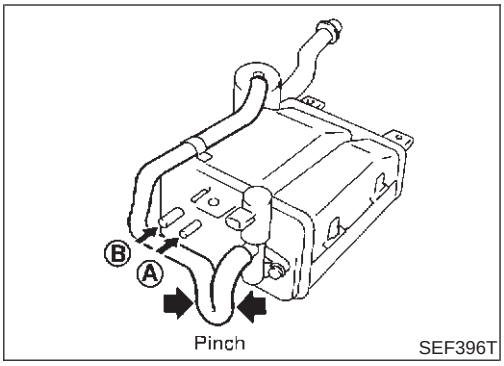
Evaporative Emission System

DESCRIPTION

NHEC0018



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

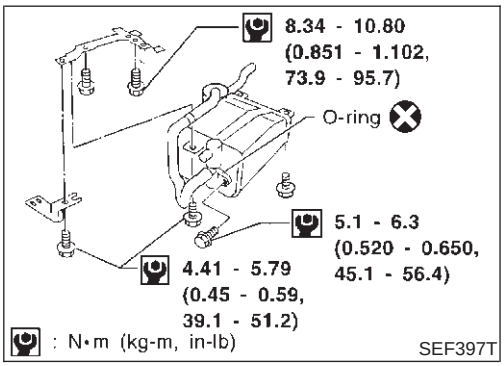
NHEC0019

EVAP Canister

NHEC0019S01

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**.

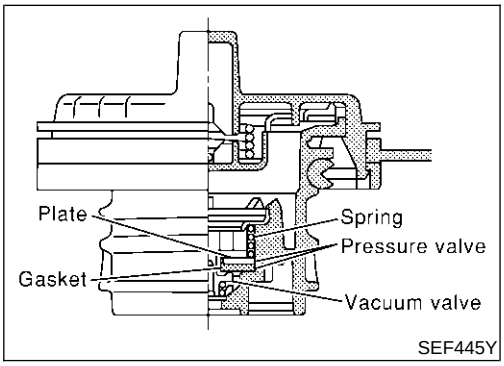


Tightening Torque

NHEC0019S02

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)

NHEC0019S03

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

   Pressure:

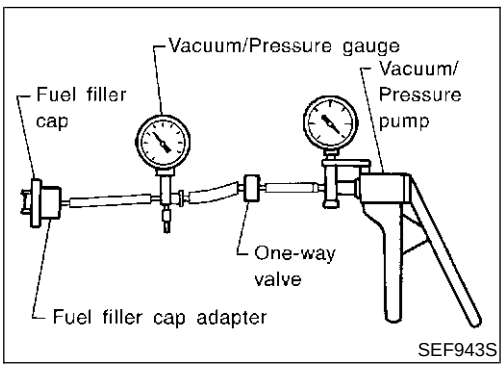
   15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)

   Vacuum:

   −6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −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

NHEC0019S04

Refer to EC-593.

EVAP Canister Purge Volume Control Solenoid Valve

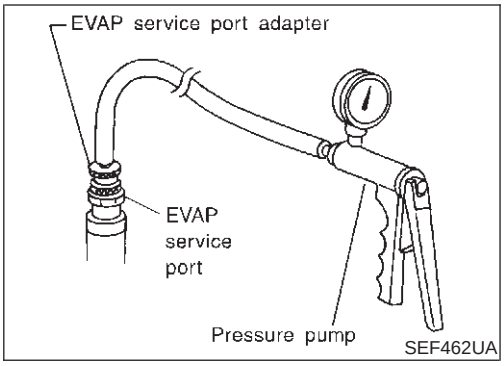
NHEC0019S05

Refer to EC-356.

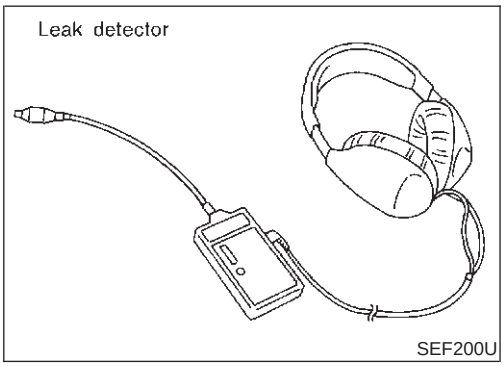
Fuel Tank Temperature Sensor

NHEC0019S06

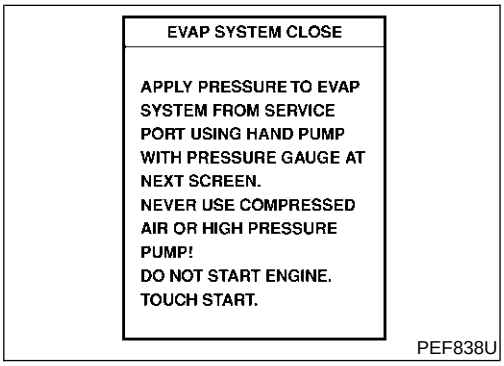
Refer to EC-285.



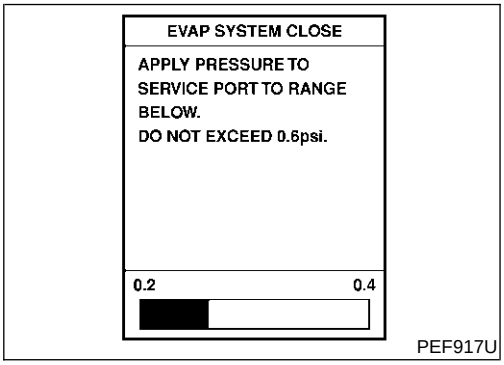
SEF462UA



SEF200U



PEF838U



PEF917U

EVAP Service Port

NHEC0019S07

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

NHEC0019S08

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

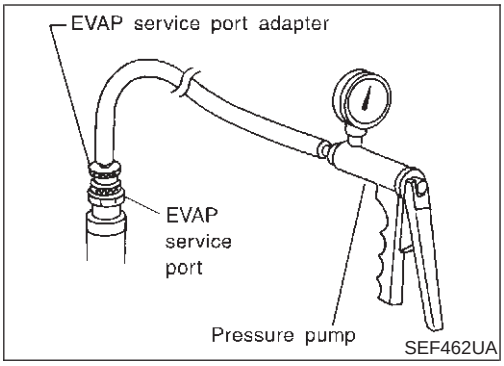
NOTE:

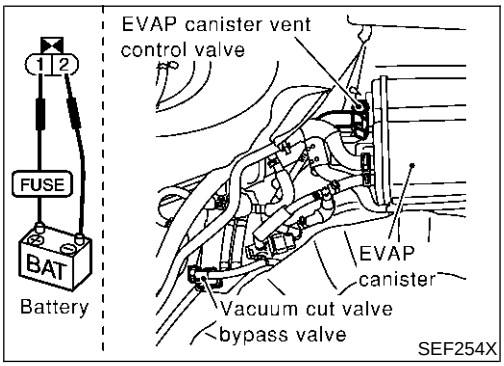
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

Ⓔ With CONSULT-II

NHEC0019S0801

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-41.





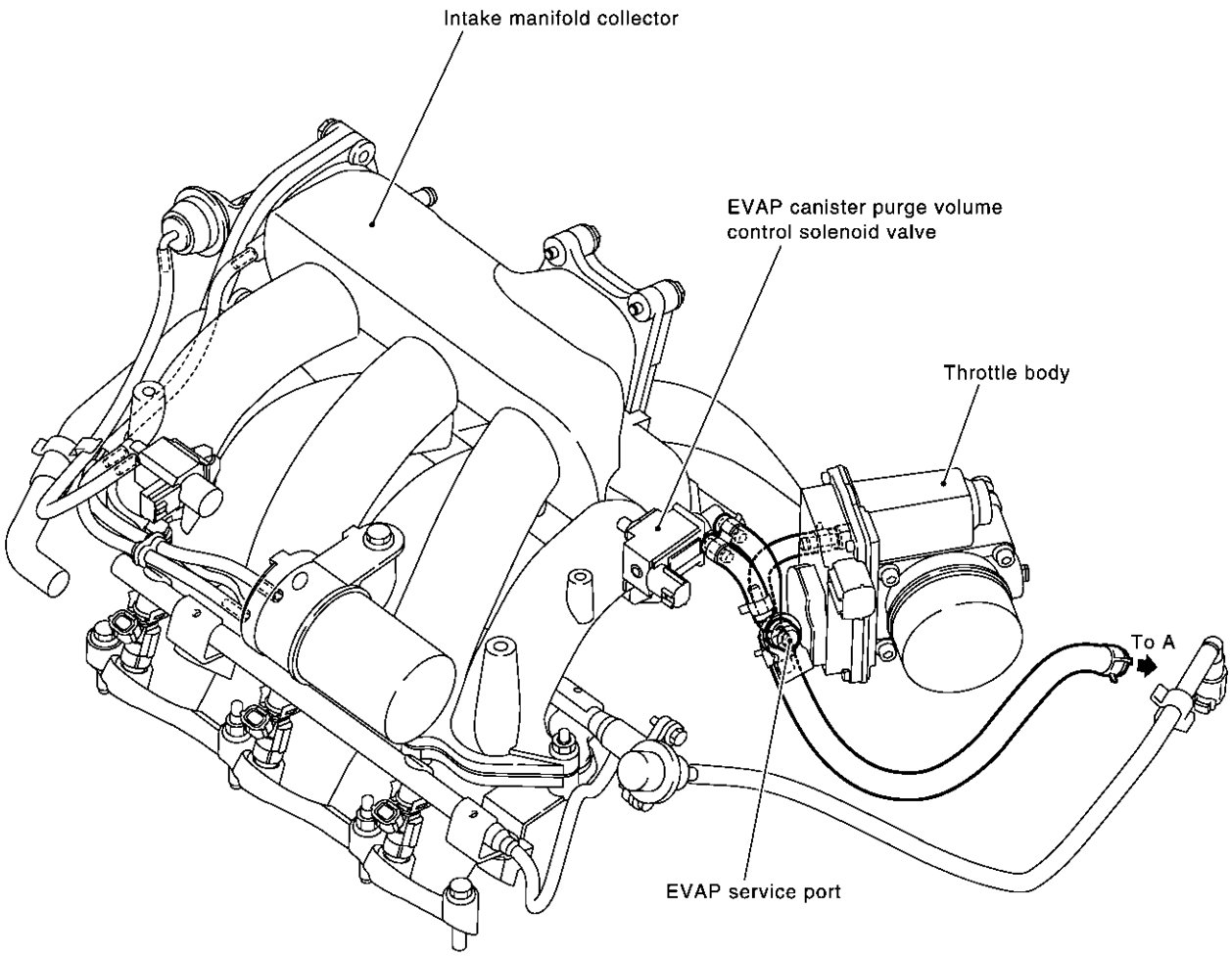
Without CONSULT-II

NHEC0019S0802

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/cm^2, 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-41.

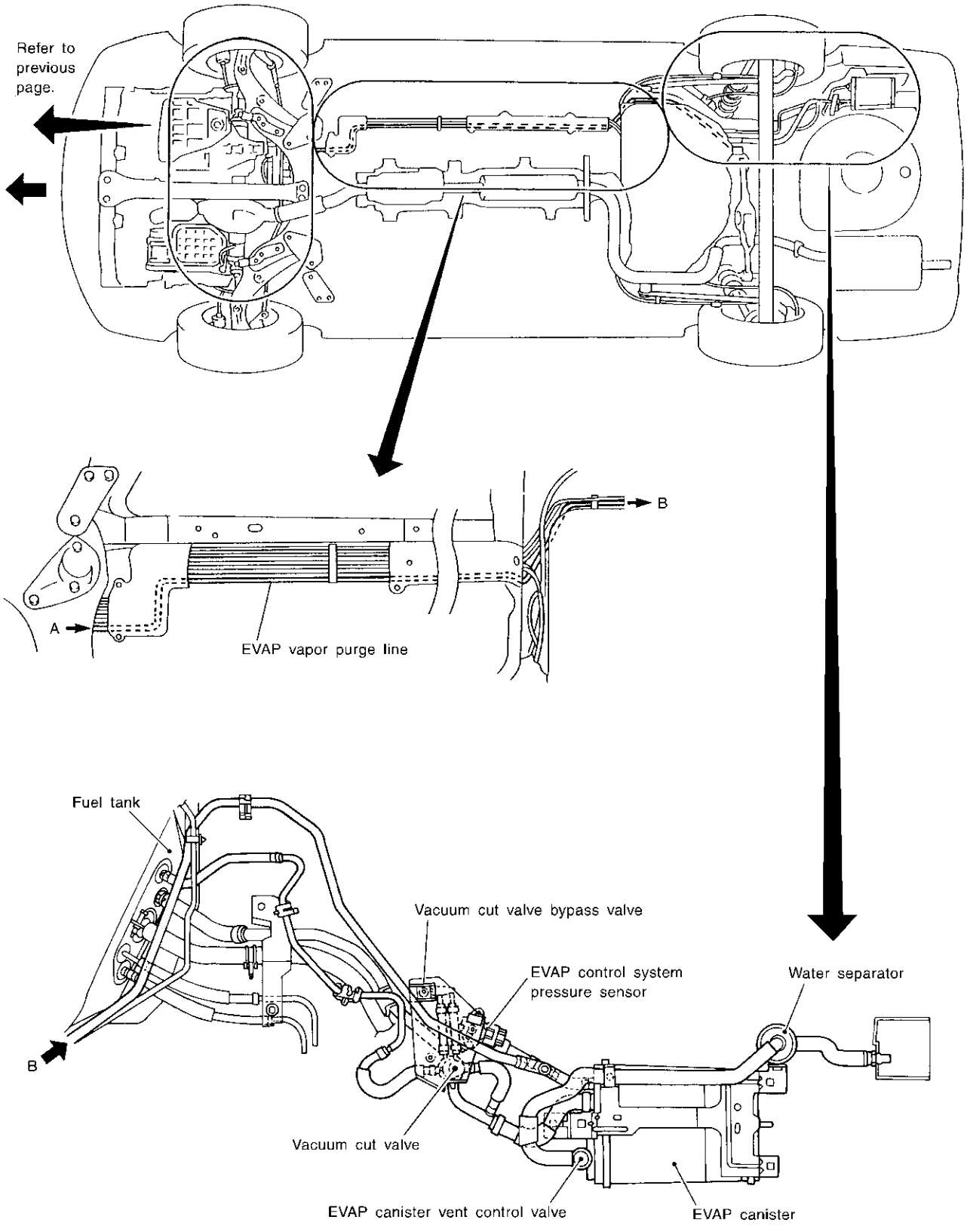
EVAPORATIVE EMISSION LINE DRAWING

NHEC1421



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

SEC896CA


Refer to previous page.
A
B
EVAP vapor purge line
Fuel tank
B
Vacuum cut valve bypass valve
EVAP control system pressure sensor
Water separator
Vacuum cut valve
EVAP canister vent control valve
EVAP canister

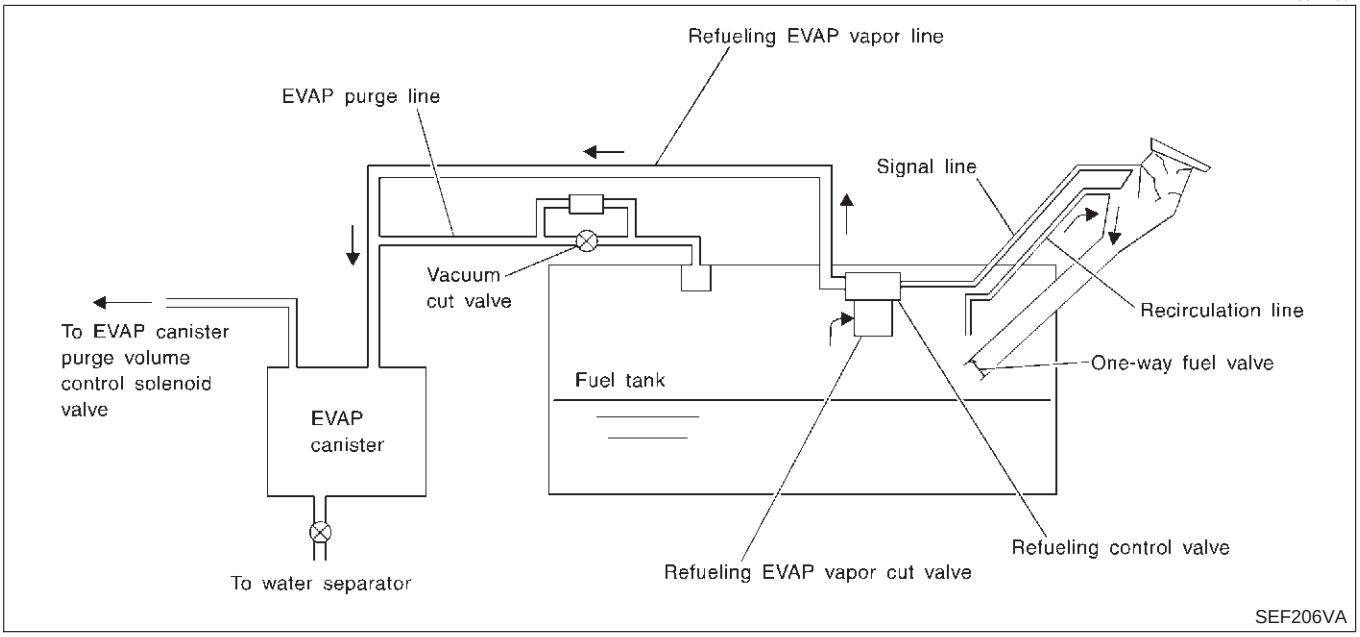
SEF253XA

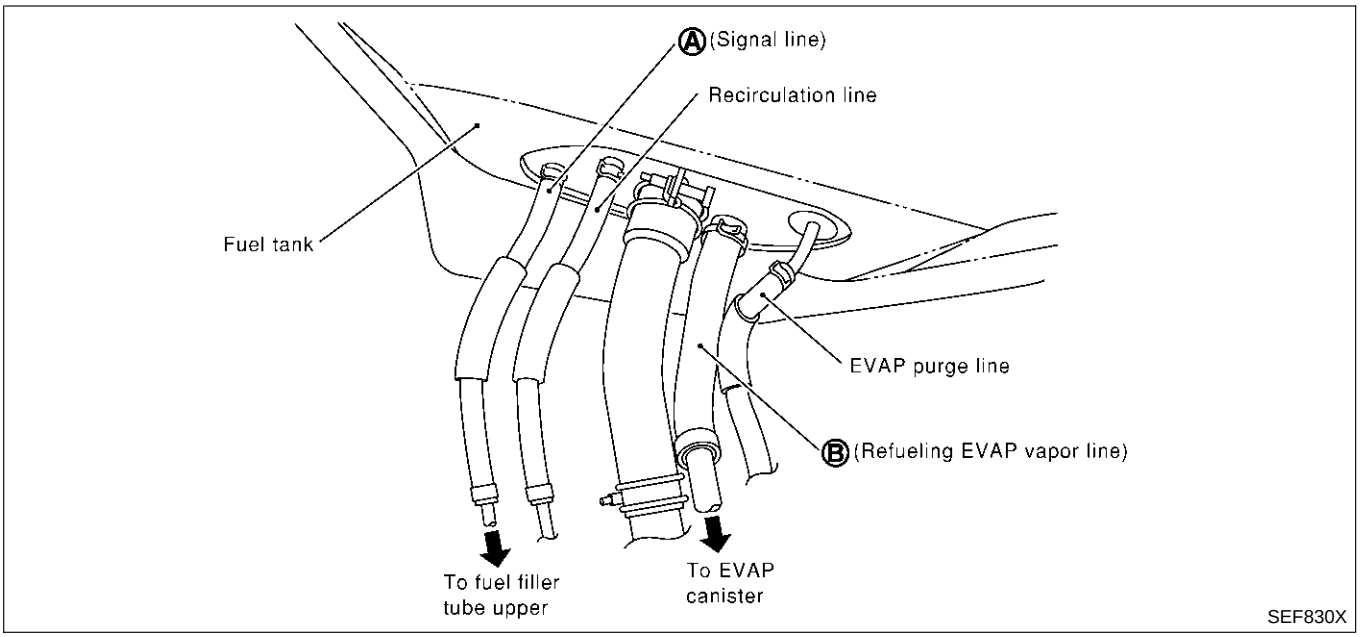
On Board Refueling Vapor Recovery (ORVR)

NHEC0744

SYSTEM DESCRIPTION

NHEC0744S01





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 CO_2 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-56.
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.**

DIAGNOSTIC PROCEDURE

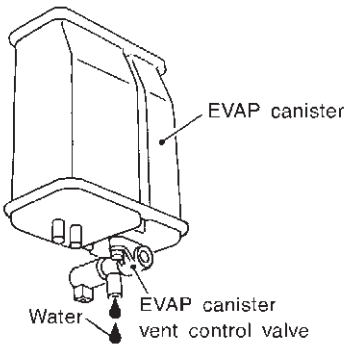
NHEC0744S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NHEC0744S0201

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?	



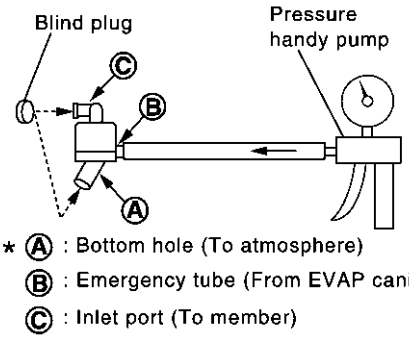
SEF596U

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.

4	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.



PBIB1032E

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.

6	CHECK REFUELING EVAP VAPOR CUT VALVE

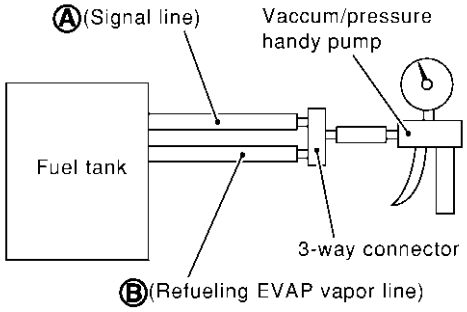
Ⓕ **With CONSULT-II**

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.



SEF968X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

7	CHECK REFUELING EVAP VAPOR CUT VALVE

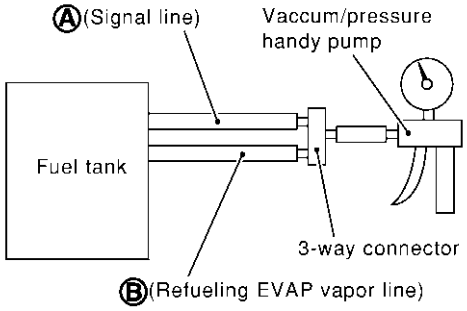
Without CONSULT-II

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.



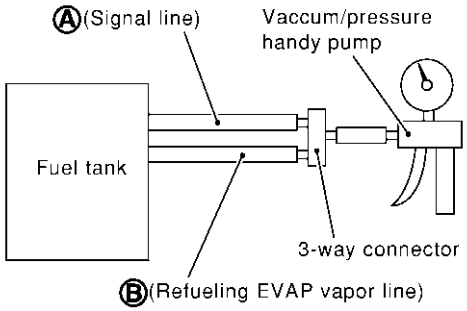
SEF968X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace refueling EVAP vapor cut valve with fuel tank.

8	CHECK REFUELING CONTROL VALVE

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.



SEF968X

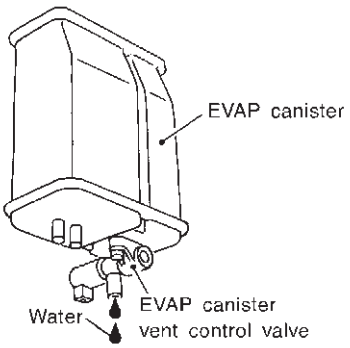
OK or NG

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.

NHEC0744S0202

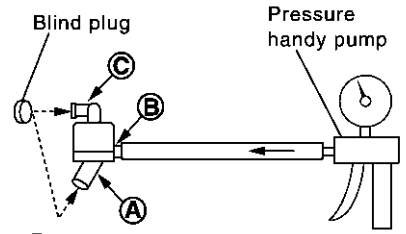
1	CHECK EVAP CANISTER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). **OK or NG**		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

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

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

4	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.



* Ⓐ : Bottom hole (To atmosphere)
Ⓑ : Emergency tube (From EVAP canister)
Ⓒ : Inlet port (To member)

PBIB1032E

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.

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

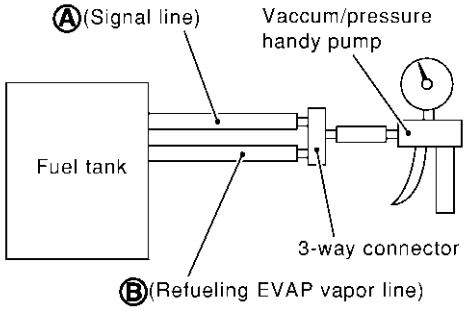
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE

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.



SEF968X

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.

9	CHECK REFUELING EVAP VAPOR CUT VALVE

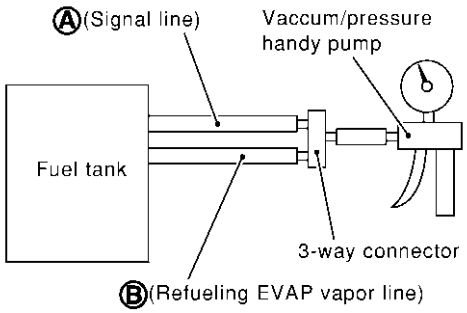
Ⓔ **With CONSULT-II**

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.



SEF968X

OK or NG

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

10	CHECK REFUELING EVAP VAPOR CUT VALVE

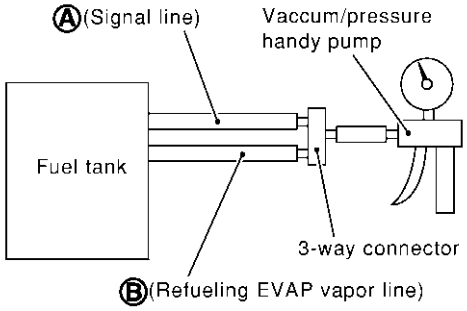
Without CONSULT-II

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.



SEF968X

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

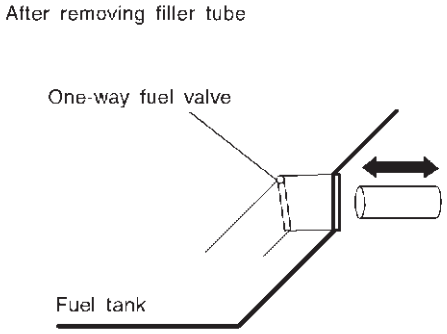
Check one-way valve for clogging.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair or replace one-way fuel valve with fuel tank.

13	CHECK ONE-WAY FUEL VALVE-II

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.



SEF665U

Do not drop any material into the tank.

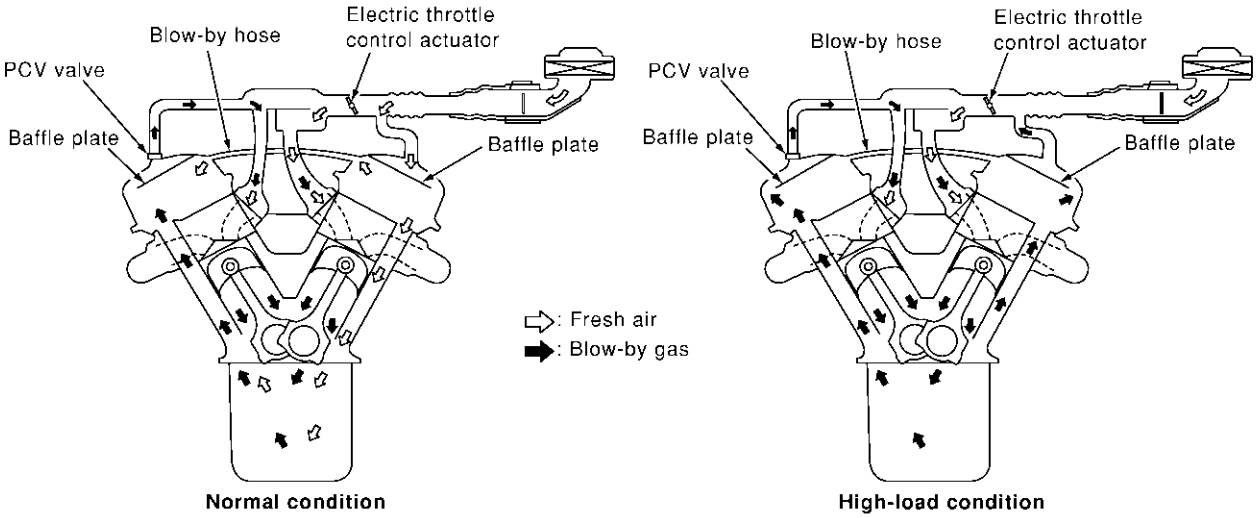
OK or NG

OK	▶	**INSPECTION END**
NG	▶	Replace fuel filler tube or replace one-way fuel valve with fuel tank.

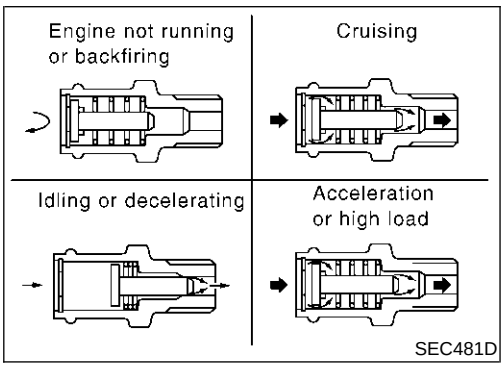
Positive Crankcase Ventilation

DESCRIPTION

NHEC0021



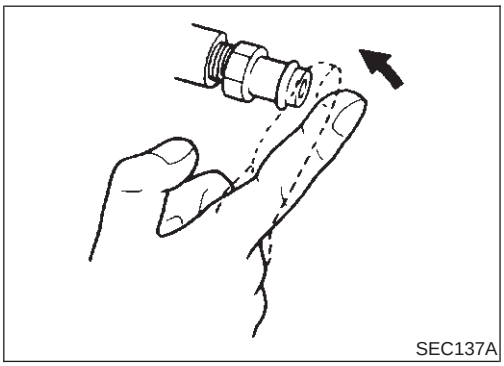
SEC921C



SEC481D

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.


SEC137A

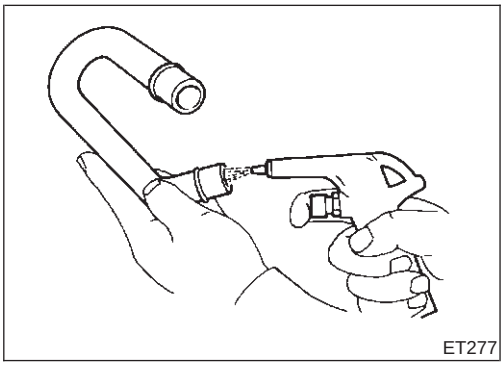
INSPECTION

NHEC0022

PCV (Positive Crankcase Ventilation) Valve

NHEC0022S01

With engine running at idle, remove PCV valve from rocker cover. 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 valve inlet.


ET277

PCV Valve Ventilation Hose

NHEC0022S02

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.

CAN Communication

NHEC1183

SYSTEM DESCRIPTION

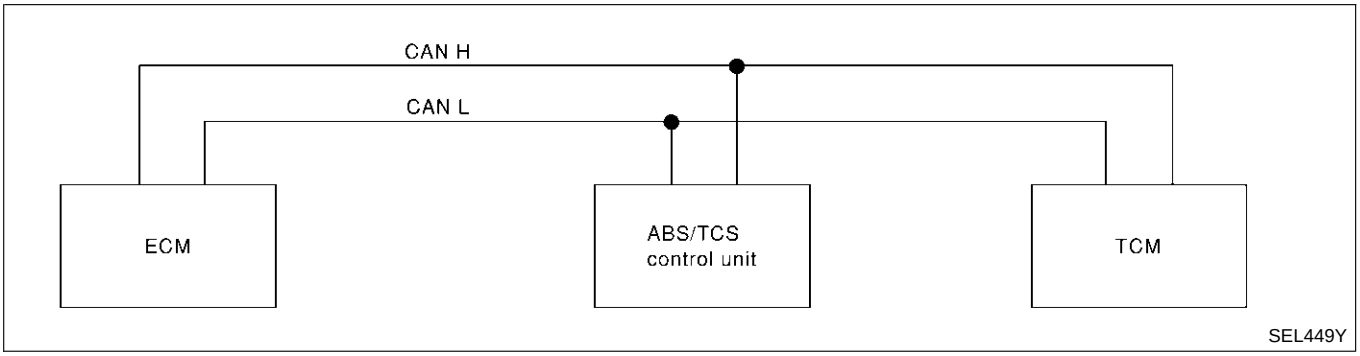
NHEC1183S01

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

For TCS Models

NHEC1183S0102

System Diagram



SEL449Y

CAN Communication (Cont'd)

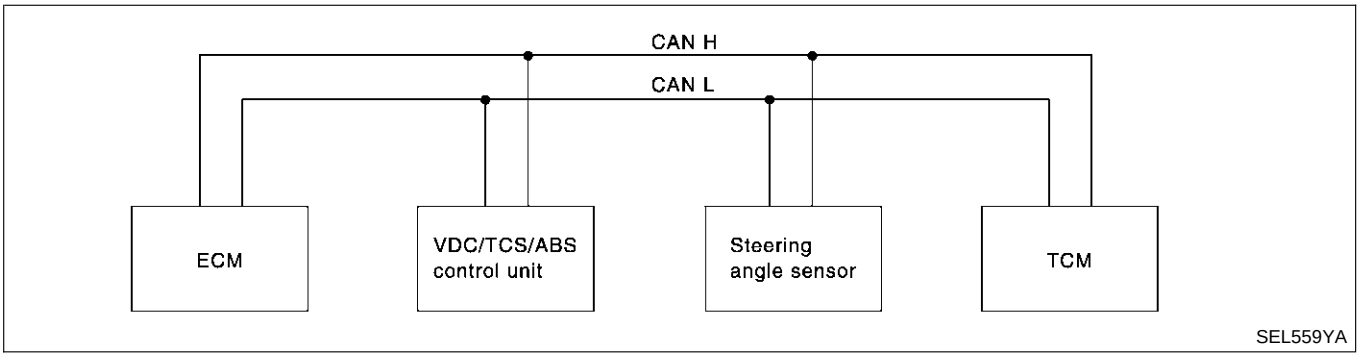
Input/Output Signal Chart
T: Transmit R: Receive

Signals	ECM	ABS/TCS control unit	TCM
Accelerator pedal position signal	T	R	R
Output shaft revolution signal	R		T
TCS self-diagnostic signal	R	T	
ABS self-diagnostic signal	R	T	

For VDC Models

NHEC1183S0104

System Diagram



Input/output Signal Chart
T: Transmit R: Receive

Signals	ECM	Steering angle sensor	VDC/TCS/ABS control unit	TCM
Output shaft revolution signal	R			T
VDC/TCS self-diagnostic signal	R		T	
ABS self-diagnostic signal	R		T	
Engine speed signal	T		R	
Accelerator pedal position signal	T		R	R
Steering angle sensor signal		T	R	

Automatic Speed Control Device (ASCD) System

DESCRIPTION

NHEC1184

Input/Output Signal Chart

NHEC1184S01

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch	Gear position		
Combination meter	Vehicle speed		
TCM	Power train revolution		

Basic ASCD System

NHEC1184S02

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle valve operating angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter.
If any malfunction occurs in ASCD system, it automatically deactivates control.

Set Operation

NHEC1184S03

Press ASCD CRUISE switch (Main switch). (Then CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET switch. (Then SET indicator in combination meter illuminates.)

Accel Operation

NHEC1184S04

If the RESUME/ACCEL switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

Cancel Operation

NHEC1184S05

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is depressed.
- More than 2 switches at ASCD steering switch are depressed at the same time (Set speed will be cleared.).
- Brake pedal is depressed.
- A/T selector lever is shifted to P, N or R position.
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

Coast Operation

NHEC1184S06

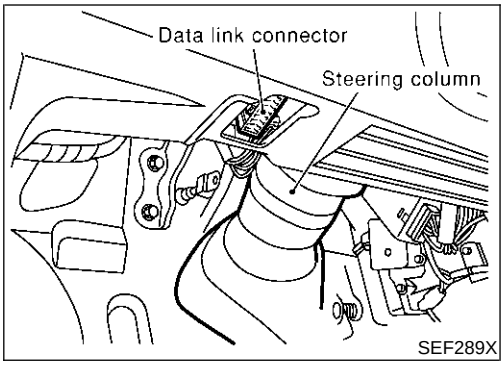
When the SET/COAST switch is depressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

Resume Operation

NHEC1184S07

When the RESUME/ACCEL switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- A/T selector lever is in other than P, N and R positions.
- Vehicle speed is greater than 40 km/h (25 MPH) and 144 km/h (89 MPH).



SEF289X

Fuel Pressure Release

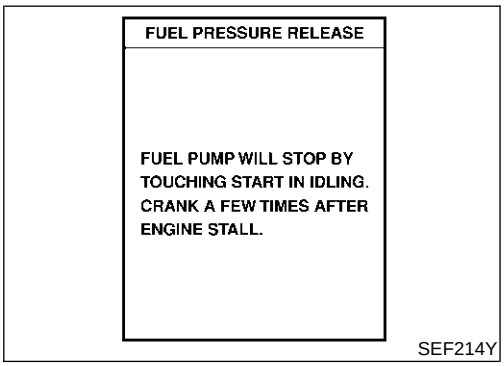
NHEC0023

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

Ⓔ WITH CONSULT-II

NHEC0023S01

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”.

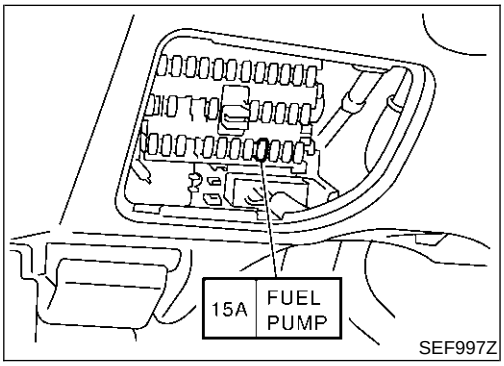


SEF214Y

Ⓚ WITHOUT CONSULT-II

NHEC0023S02

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.



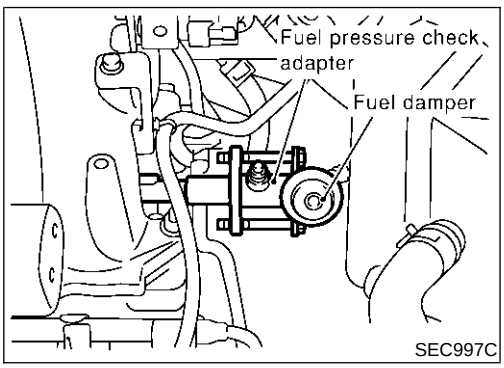
SEF997Z

Fuel Pressure Check

NHEC0024

- **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.**

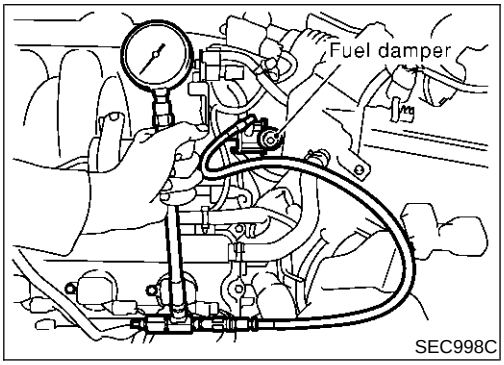
1. Release fuel pressure to zero.
2. Disconnect fuel tube joint between fuel damper and injector tube and set fuel pressure check adapter (J44321).



SEC997C

3. Install pressure gauge to the fuel pressure check adapter as shown in the figure.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)



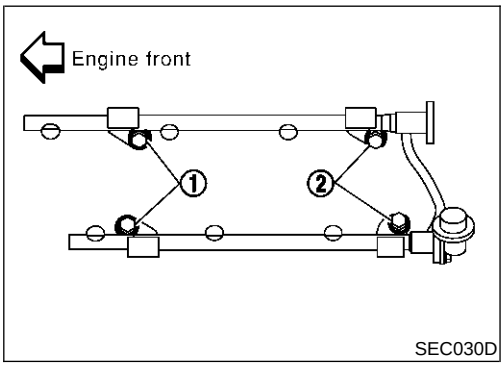
SEC998C

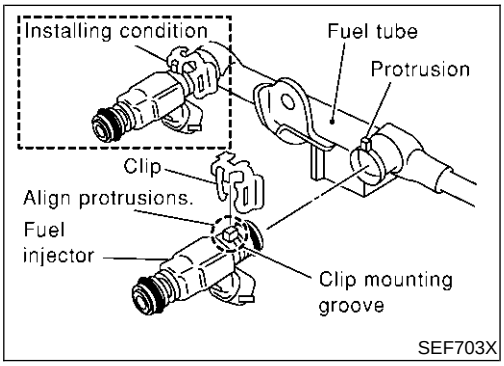
6. If results are unsatisfactory, go to next step.
7. Check the following.

- Fuel hoses and fuel tubes for clogging
- Fuel filter for clogging
- Fuel pump

- Fuel pressure regulator for clogging

  If OK, replace fuel pressure regulator.
  If NG, repair or replace.





Injector

REMOVAL AND INSTALLATION

NHEC0026

1. Release fuel pressure to zero.
2. Remove intake manifold collector. Refer to EM-29, "TIMING CHAIN".
3. Remove fuel tube assemblies in numerical sequence as shown in the figure at left.
4. Expand and remove clips securing fuel injectors.
5. Extract fuel injectors straight from fuel tubes.

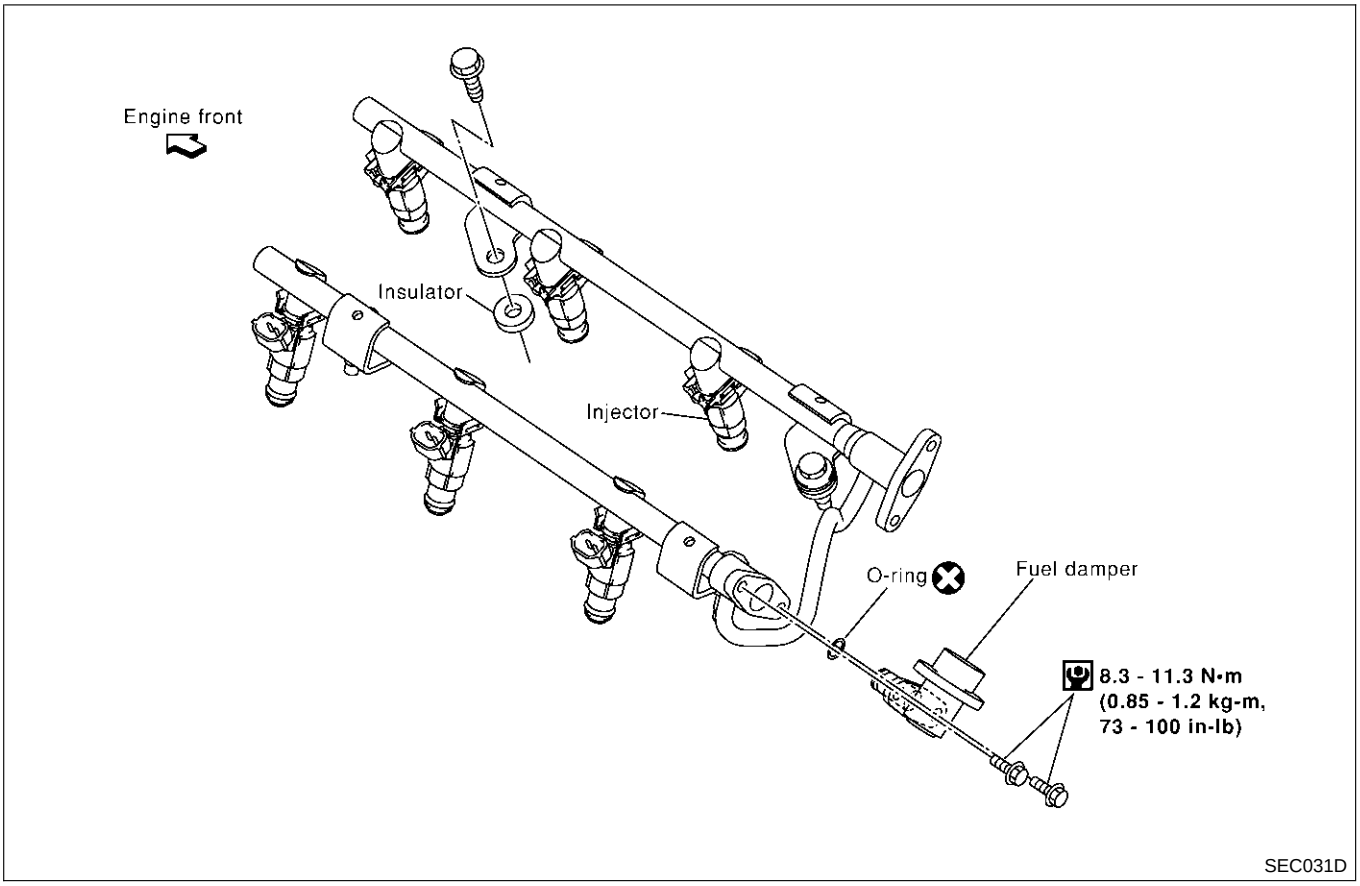
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

6. Carefully install O-rings.

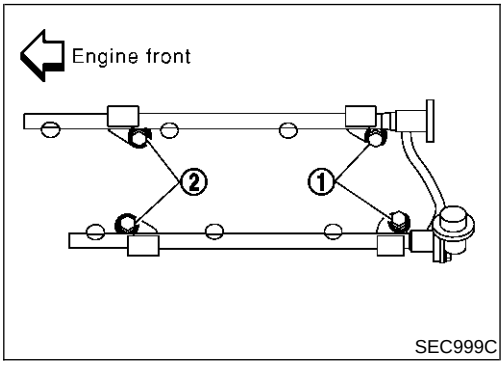
- **Lubricate O-rings with a smear of engine oil.**
- **Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings.**
- **Discard old clips; replace with new ones.**

7. Position clips in grooves on fuel injectors.

- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**



8. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
9. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tubes are engaged with clips.



10. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages.
    : Tightening torque N·m (kg-m, ft-lb)
    1st stage:
    9.3 - 10.8 (1.0 - 1.1, 6.9 - 7.9)
    2nd stage:
    20.6 - 26.5 (2.1 - 2.7, 16 - 19)
11. Install all parts removed in reverse order of removal.

CAUTION:
After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.

How to Check Idle Speed and Ignition Timing

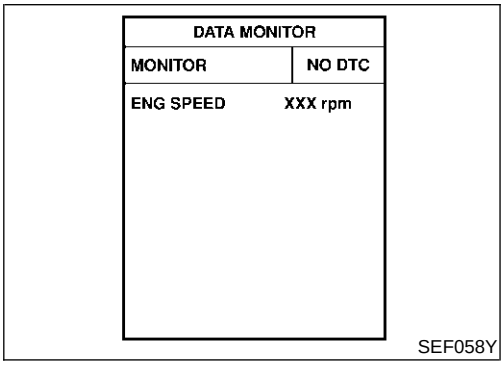
NHEC1422

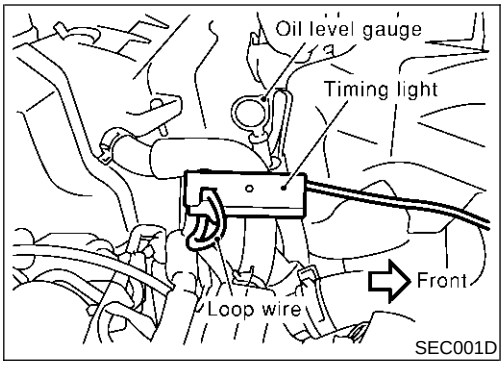
IDLE SPEED

NHEC1422S01

- **Using CONSULT-II**

Check idle speed in "DATA MONITOR" mode with CONSULT-II.





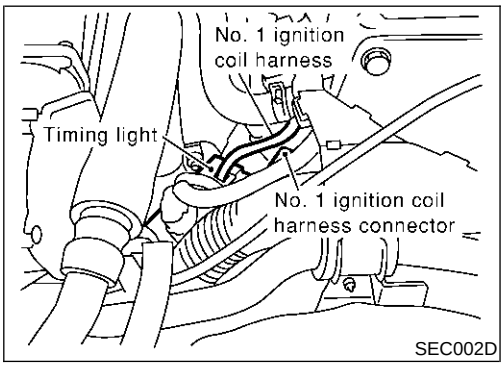
IGNITION TIMING

NHEC1422S02

Any of following two methods may be used.

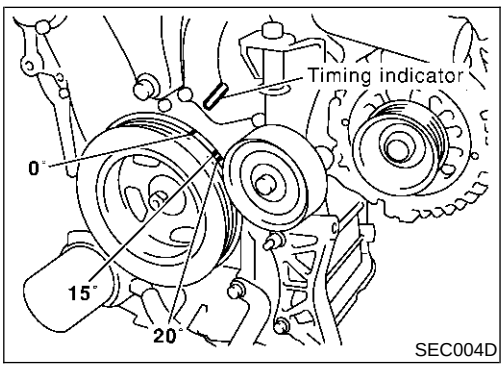
- **Method A**

a) Attach timing light to loop wire as shown.
b) Check ignition timing.



- **Method B**

a) Attach timing light to No. 1 ignition coil harness as shown.



b) Check ignition timing.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NHEC0028

PREPARATION

NHEC0028S01

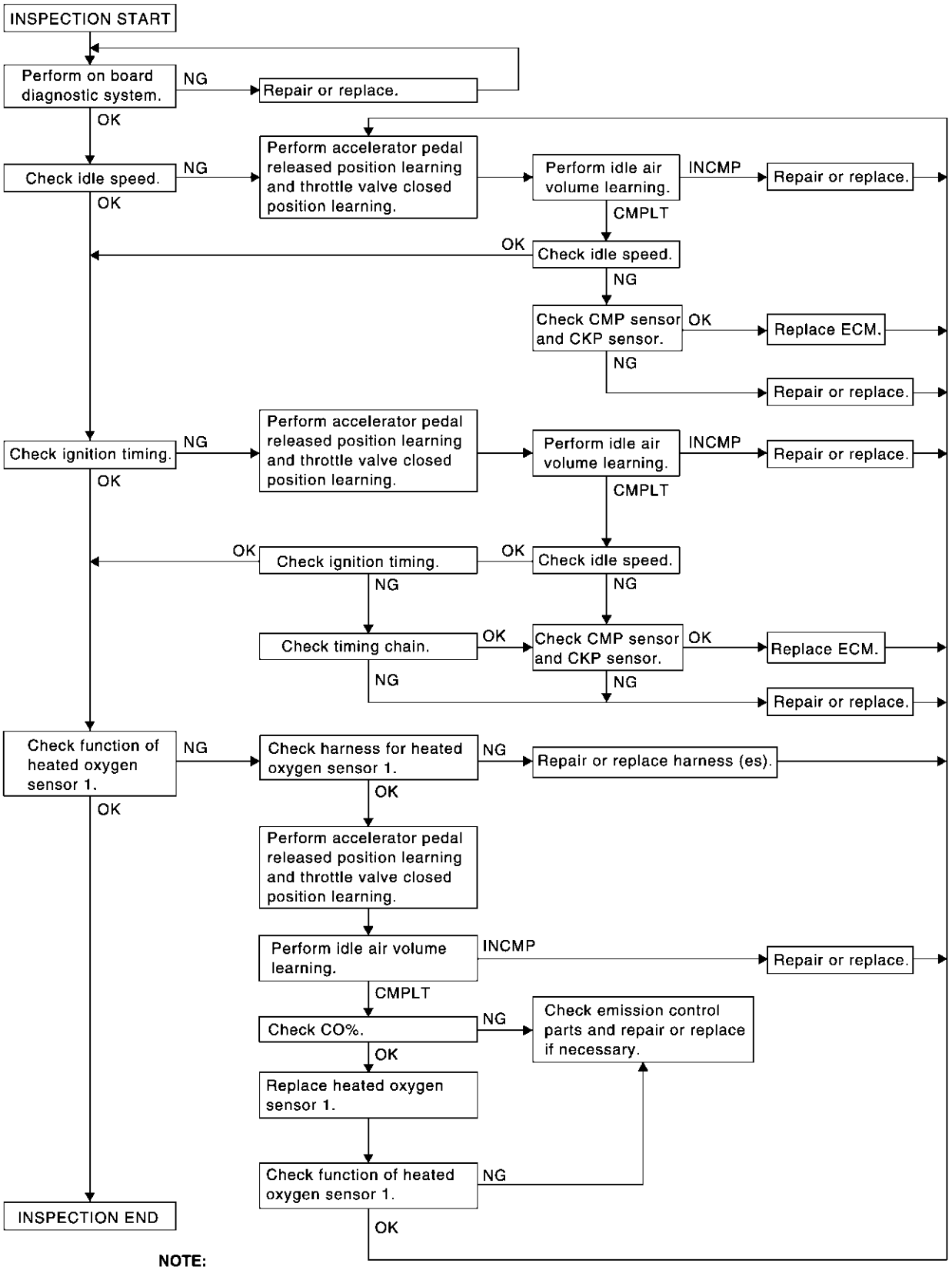
1) Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- Throttle valve
- Evaporative emission 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

NHEC0028S0101



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.

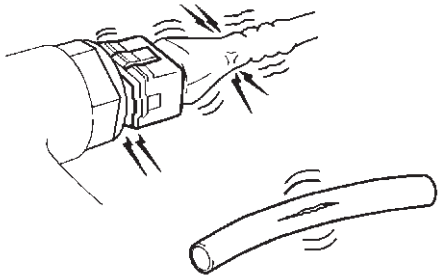
SEC154D

INSPECTION PROCEDURE

=NHEC0028S02

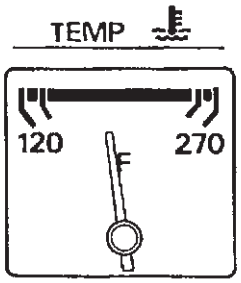
1	INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
– Harness connectors for improper connections
– Wiring harness for improper connections, pinches and cut
– Vacuum hoses for splits, kinks and improper connections
– Hoses and ducts for leaks
– Air cleaner clogging
– Gasket



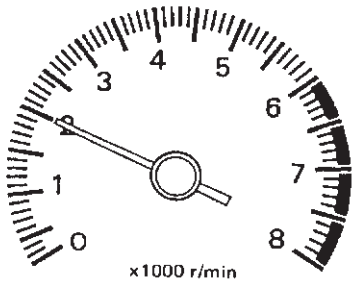
SEF983U

3. Confirm that electrical or mechanical loads are not 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.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.



SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no-load.



SEF977U

6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	REPAIR OR REPLACE

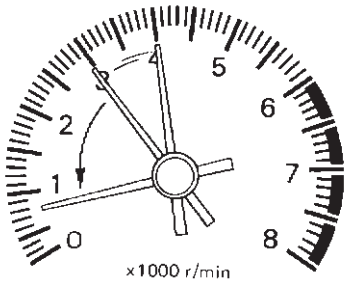
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".

	▶	GO TO 3.

3	CHECK TARGET IDLE SPEED

Ⓔ **With CONSULT-II**

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 for about 1 minute.



SEF978U

3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

675±50 rpm (in "P" or "N" position)

Ⓧ **Without CONSULT-II**

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 for about 1 minute.
3. Check idle speed.

675±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 4.

4	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-71.

	▶	GO TO 5.

5	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-71.

	▶	GO TO 6.

6	PERFORM IDLE AIR VOLUME LEARNING

Perform "Idle Air Volume Learning", EC-71.

Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes	▶	GO TO 7.
No	▶	1. Follow the instruction of "Idle Air Volume Learning". 2. GO TO 4.

7	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.
   675±50 rpm (in "P" or "N" position)

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   675±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to "DTC P0340, P0345 CMP SENSOR (PHASE)", EC-317.
- Check crankshaft position sensor (POS) and circuit. Refer to "DTC P0335 CKP SENSOR (POS)", EC-310.

OK or NG

OK	▶	GO TO 9.
NG	▶	1. Repair or replace. 2. GO TO 4.

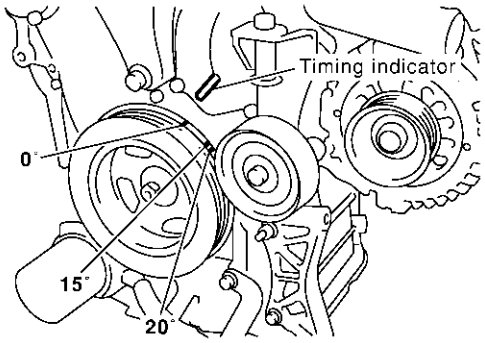
9	CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90.

	▶	GO TO 4.

10	CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.



SEC004D

15°±5° BTDC (in "P" or "N" position)

OK or NG

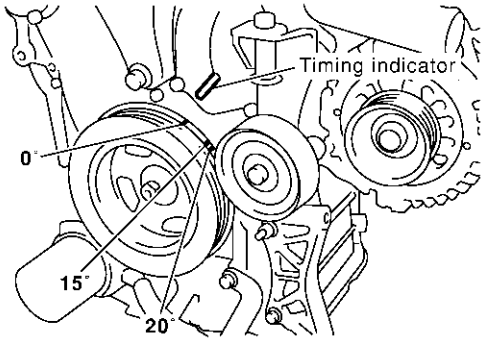
OK (With CONSULT-II)	▶	GO TO 19.
OK (Without CONSULT-II)	▶	GO TO 20.
NG	▶	GO TO 11.

11	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
1. Stop engine. 2. Perform "Accelerator Pedal Released Position Learning", EC-71.	
▶	GO TO 12.

12	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Perform "Throttle Valve Closed Position Learning", EC-71.	
▶	GO TO 13.

13	PERFORM IDLE AIR VOLUME LEARNING
Perform "Idle Air Volume Learning", EC-71. **Is Idle Air Volume Learning carried out successfully?**	
Yes or No	
Yes ▶	GO TO 14.
No ▶	1. Follow the instruction of "Idle Air Volume Learning". 2. GO TO 4.

14	CHECK TARGET IDLE SPEED AGAIN
Ⓔ **With CONSULT-II** 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in "DATA MONITOR" mode with CONSULT-II. **675±50 rpm (in "P" or "N" position)**	
Ⓚ **Without CONSULT-II** 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **675±50 rpm (in "P" or "N" position)**	
OK or NG	
OK ▶	GO TO 15.
NG ▶	GO TO 17.

15	CHECK IGNITION TIMING AGAIN
1. Run engine at idle. 2. Check ignition timing with a timing light.	
 SEC004D	
15°±5° BTDC (in "P" or "N" position)	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 19.
OK (Without CONSULT-II) ▶	GO TO 20.
NG ▶	GO TO 16.

16	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-29, "TIMING CHAIN".		
OK or NG		
OK	▶	GO TO 17.
NG	▶	1. Repair the timing chain installation. 2. GO TO 4.

17	DETECT MALFUNCTIONING PART	
Check the following. ● Check camshaft position sensor (PHASE) and circuit. Refer to "DTC P0340, P0345 CMP SENSOR (PHASE)", EC-317. ● Check crankshaft position sensor (POS) and circuit. Refer to "DTC P0335 CKP SENSOR (POS)", EC-310.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	1. Repair or replace. 2. GO TO 4.

18	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.) 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90.		
	▶	GO TO 4.

19	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
Ⓕ **With CONSULT-II** 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.		
OK or NG		
OK	▶	GO TO 21.
NG (Monitor does not fluctuate.)	▶	GO TO 23.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 30.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB0120E

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

20	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

Without CONSULT-II

1. Stop engine and set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODE", EC-92.
2. Start engine and run it at about 2,000 rpm for about 2 minutes under no-load.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK	▶	GO TO 22.
NG (MIL does not come on)	▶	GO TO 23.
NG (MIL comes on less than 5 times)	▶	GO TO 30.

21	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

With CONSULT-II

1. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB0120E

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 24.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 31.

22	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

Without CONSULT-II

1. Switch the monitored sensor from bank 1 to bank 2. Refer to "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa", EC-92.
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK	▶	**INSPECTION END**
NG (MIL does not come on)	▶	GO TO 24.
NG (MIL comes on less than 5 times)	▶	GO TO 31.

23	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS
1. Turn ignition switch "OFF" and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 1) harness connector. 4. Check harness continuity between ECM terminal 91 and heated oxygen sensor 1 (bank 1) terminal 1. Refer to "Wiring Diagram", EC-244 **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 25.
NG ▶	1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 1). 2. GO TO 4.

24	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS
1. Turn ignition switch "OFF" and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 2) harness connector. 4. Check harness continuity between ECM terminal 92 and heated oxygen sensor 1 (bank 2) terminal 1. Refer to "Wiring Diagram", EC-245. **Continuity should exist.** 5. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 25.
NG ▶	1. Repair or replace harness between ECM and heated oxygen sensor 1 (bank 2). 2. GO TO 4.

25	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
1. Reconnect ECM harness connector. 2. Perform "Accelerator pedal released position learning", EC-71.	
▶	GO TO 26.

26	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Perform "Throttle Valve Closed Position Learning", EC-71.	
▶	GO TO 27.

27	PERFORM IDLE AIR VOLUME LEARNING
Perform "Idle Air Volume Learning", EC-71. **Is Idle Air Volume Learning carried out successfully?**	
Yes or No	
Yes (With CONSULT-II) ▶	GO TO 28.
Yes (Without CONSULT-II) ▶	GO TO 29.
No ▶	1. Follow the instruction of "Idle Air Volume Learning". 2. GO TO 4.

28	CHECK "CO" %

Ⓕ **With CONSULT-II**

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch "OFF", wait at least 10 seconds and then turn "ON".
3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check "CO" %.

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

SEF172Y

Idle CO: 0.7 - 9.9 % and engine runs smoothly.

OK or NG

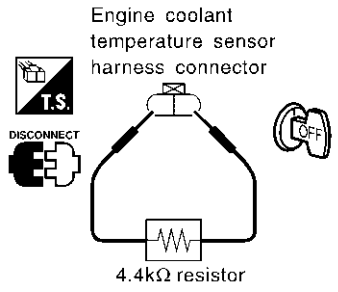
OK	▶	GO TO 31.
NG	▶	GO TO 30.

29	CHECK "CO" %

Ⓚ **Without CONSULT-II**

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch "OFF".
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check "CO" %.

   Idle CO: 0.7 - 9.9 % and engine runs smoothly.
7. After checking "CO" %, turn ignition switch "OFF", disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



SEF982UA

OK or NG

OK	▶	GO TO 31.
NG	▶	GO TO 30.

30	RECONNECT HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Reconnect heated oxygen sensor 1 harness connector.

	▶	GO TO 34.

31	REPLACE HEATED OXYGEN SENSOR 1	
1. Stop engine. 2. Replace heated oxygen sensor 1 on the malfunctioning bank.		
With CONSULT-II	▶	GO TO 32.
Without CONSULT-II	▶	GO TO 33.

32	CHECK HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) SIGNAL	
Ⓕ **With CONSULT-II** 1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. 2. See "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (The 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**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 34.

33	CHECK HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) SIGNAL	
Ⓚ **Without CONSULT-II** 1. Set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to "How to Switch Diagnostic Test Mode", EC-92. 2. Switch the monitored sensor to the malfunctioning bank. Refer to "How to Switch Monitored Sensor from Bank 1 to Bank 2 or Vice Versa", EC-92. 3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 34.

34	DETECT MALFUNCTIONING PART	
Check the following. ● Check mass air flow sensor and its circuit, and repair or replace if necessary. Refer to EC-191. ● Check injector and its circuit, and repair or replace if necessary. Refer to EC-688. ● Check engine coolant temperature sensor and its circuit, and repair or replace if necessary. Refer to EC-203. ● Check fuel pressure and repair or replace if necessary. Refer to EC-56.		
OK or NG		
OK	▶	GO TO 36.
NG	▶	1. Repair or replace. 2. GO TO 35.

35	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC might be displayed. Erase the stored memory in ECM and TCM. Refer to "How to Erase Emission-related Diagnostic Information", EC-89 and AT-39.		
	▶	GO TO 4.

36	CHECK ECM FUNCTION
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.) 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS", EC-90.	
▶	GO TO 4.

Accelerator Pedal Released Position Learning

NHEC1186

DESCRIPTION

NHEC1186S01

"Accelerator Pedal Released Position Learning" is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

NHEC1186S02

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch "ON" and wait at least 2 seconds.
3. Turn ignition switch "OFF" wait at least 10 seconds.
4. Turn ignition switch "ON" and wait at least 2 seconds.
5. Turn ignition switch "OFF" wait at least 10 seconds.

Throttle Valve Closed Position Learning

NHEC1187

DESCRIPTION

NHEC1187S01

"Throttle Valve Closed Position Learning" is an operation to learn the fully closed position of the throttle valve by monitorizing the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

NHEC1187S02

1. Turn ignition switch "ON".
2. Turn ignition switch "OFF" wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

NHEC1188

DESCRIPTION

NHEC1188S01

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

NHEC1188S02

Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 99°C (158 - 210°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started, the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)

- Vehicle speed: Stopped
- Transmission: Warmed-up
  For models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For models without CONSULT-II, drive vehicle for 10 minutes.

OPERATION PROCEDURE

NHEC1188S03

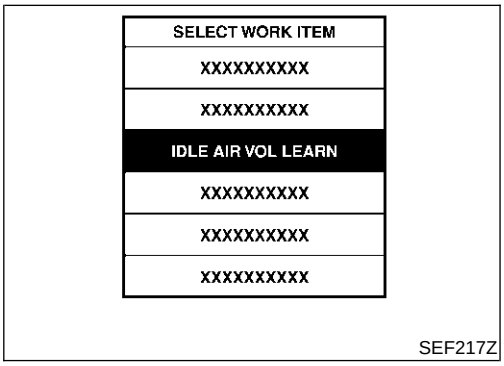
Ⓔ With CONSULT-II

NHEC1188S0301

NOTE:

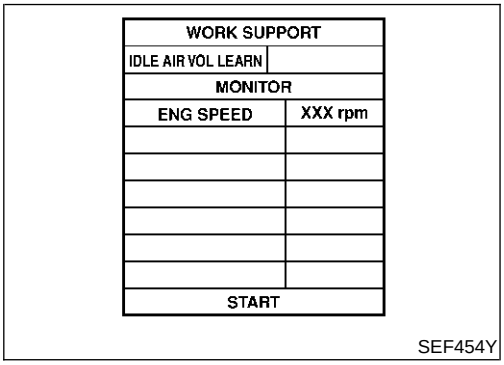
Before perform "Idle Air Volume Learning", make sure that "Accelerator Pedal Released Position Learning" and "Throttle Valve Closed Position Learning" are completed.
If not, perform "Accelerator Pedal Released Position Learning", EC-71 and "Throttle Valve Closed Position Learning", EC-71.

1. Start engine and warm it up to normal operating temperature.
2. Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.



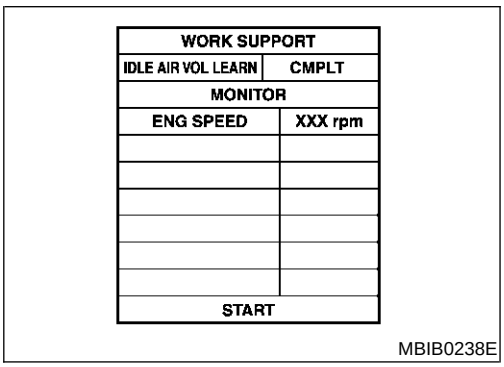
SEF217Z

3. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.



SEF454Y

4. Touch "START" and wait 20 seconds.



MBIB0238E

5. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "CMPLT" is not displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the incident by referring to the "Diagnostic Procedure" below.
6. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	675±50 rpm (in "P" or "N" position)
Ignition timing	15±5° BTDC (in "P" or "N" position)

Without CONSULT-II

NHEC1188S0302

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

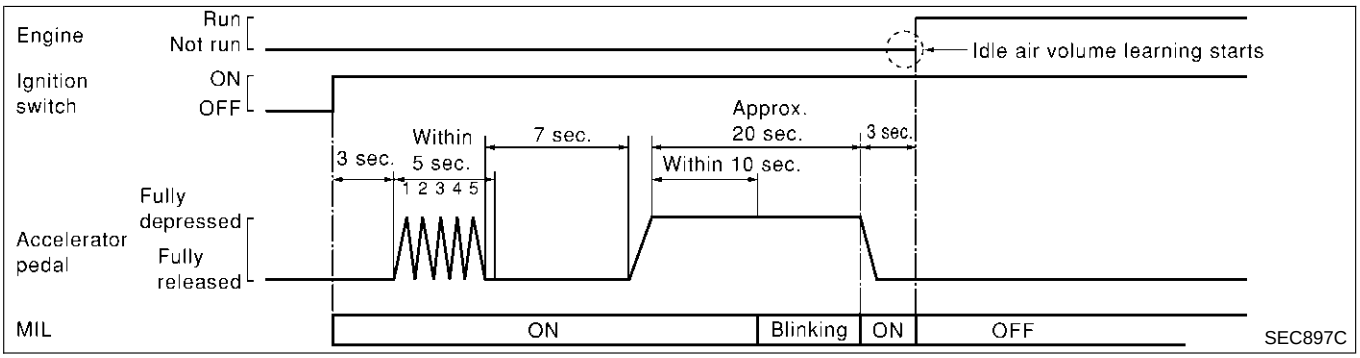
NOTE:

Before perform "Idle Air Volume Learning", make sure that "Accelerator Pedal Released Position Learning" and "Throttle Valve Closed Position Learning" are completed.
If not, perform "Accelerator Pedal Released Position Learning", EC-71 and "Throttle Valve Closed Position Learning", EC-71.

1. Start engine and warm it up to normal operating temperature.
2. Check that all items listed under the topic "PREPARATION" (previously mentioned) are in good order.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Confirm that accelerator pedal is fully released, turn ignition switch "ON" and wait 3 seconds.
5. Repeat the following procedure quickly five times within 5 seconds.

1) Fully depress the accelerator pedal.
2) Fully release the accelerator pedal.

6. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turns ON.
7. Fully release the accelerator pedal within 3 seconds after the MIL turns ON.
8. Start engine and let it idle.
9. Wait 20 seconds.



10. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	675±50 rpm (in "P" or "N" position)
Ignition timing	15±5° BTDC (in "P" or "N" position)

11. If idle speed and ignition timing are not within the specification, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the incident by referring to the "Diagnostic Procedure" below.

DIAGNOSTIC PROCEDURE

NHEC1188S04

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**

2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to incident EC-147, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE".
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform "Idle air volume learning" all over again:**

- **Engine stalls.**
- **Erroneous idle.**

Introduction

NHEC1423

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
Calibration ID	Mode 9 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
ECM	X	X*2	—	—	—	—

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

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

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

NHEC1424

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 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
One trip detection diagnoses (Refer to EC-9)	—	X	—	—	X	—	—	—
Except above	—	—	—	X	—	X	X	—

Emission-related Diagnostic Information

NHEC0031

DTC AND 1ST TRIP DTC

NHEC0031S01

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-89.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-85. 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 malfunction. 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-117. Then perform “DTC Confirmation Procedure” or “Overall Function Check” to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NHEC0031S0101

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: P0117, P0340, P1065, etc.

These DTCs are prescribed by SAE J2012.

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

NO TOOLS

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC.

Example: 0117, 0340, 1065, etc.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II 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 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	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NHEC0031S02

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. 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-103.

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-89.

SYSTEM READINESS TEST (SRT) CODE

NHEC0031S03

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

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require 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; 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.

SRT Item

=NHEC0031S0310

The table below 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	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	1	EVAP control system	P0442
	2	EVAP control system	P0456, P1456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1	P0132, P0152
		Heated oxygen sensor 1	P0133, P0153
		Heated oxygen sensor 1	P0134, P0154
		Heated oxygen sensor 1	P1143, P1163
		Heated oxygen sensor 1	P1144, P1164
		Heated oxygen sensor 2	P0138, P0158
		Heated oxygen sensor 2	P0139, P0159
		Heated oxygen sensor 2	P1146, P1166
		Heated oxygen sensor 2	P1147, P1167
HO2S HTR	2	Heated oxygen sensor 1 heater	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

*: 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

=NHEC0031S0311

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF	← ON →	OFF ← ON → OFF ← ON →
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 NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses showed 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 table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) for the following reasons:

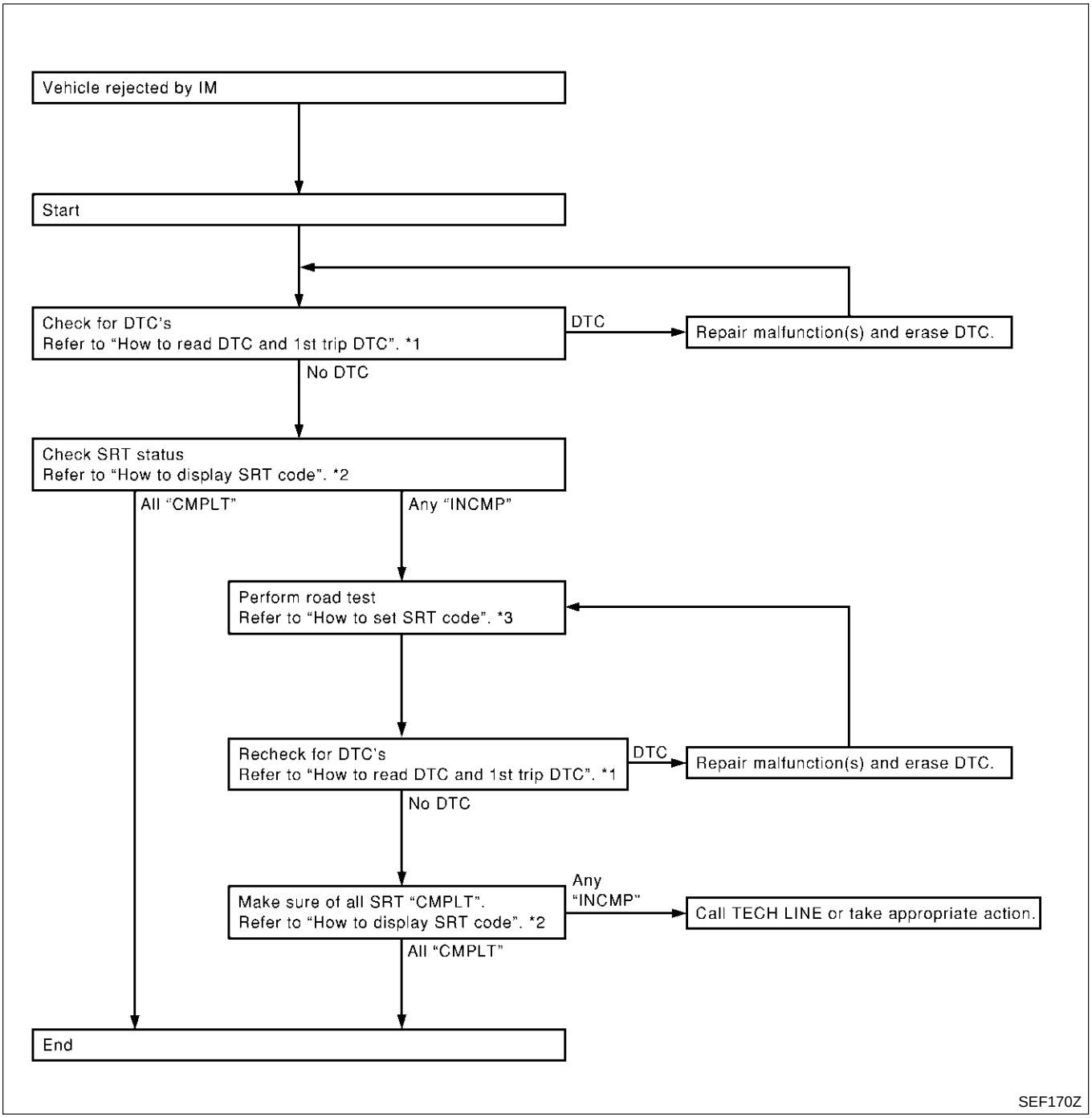
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory 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

NHEC0031S0312

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.



*1 EC-76 *2 EC-80 *3 EC-81

How to Display SRT Code

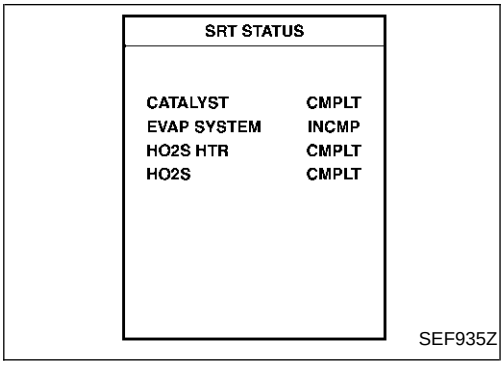
NHEC0031S0301

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.

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.



How to Set SRT Code

NHEC0031S0302

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**

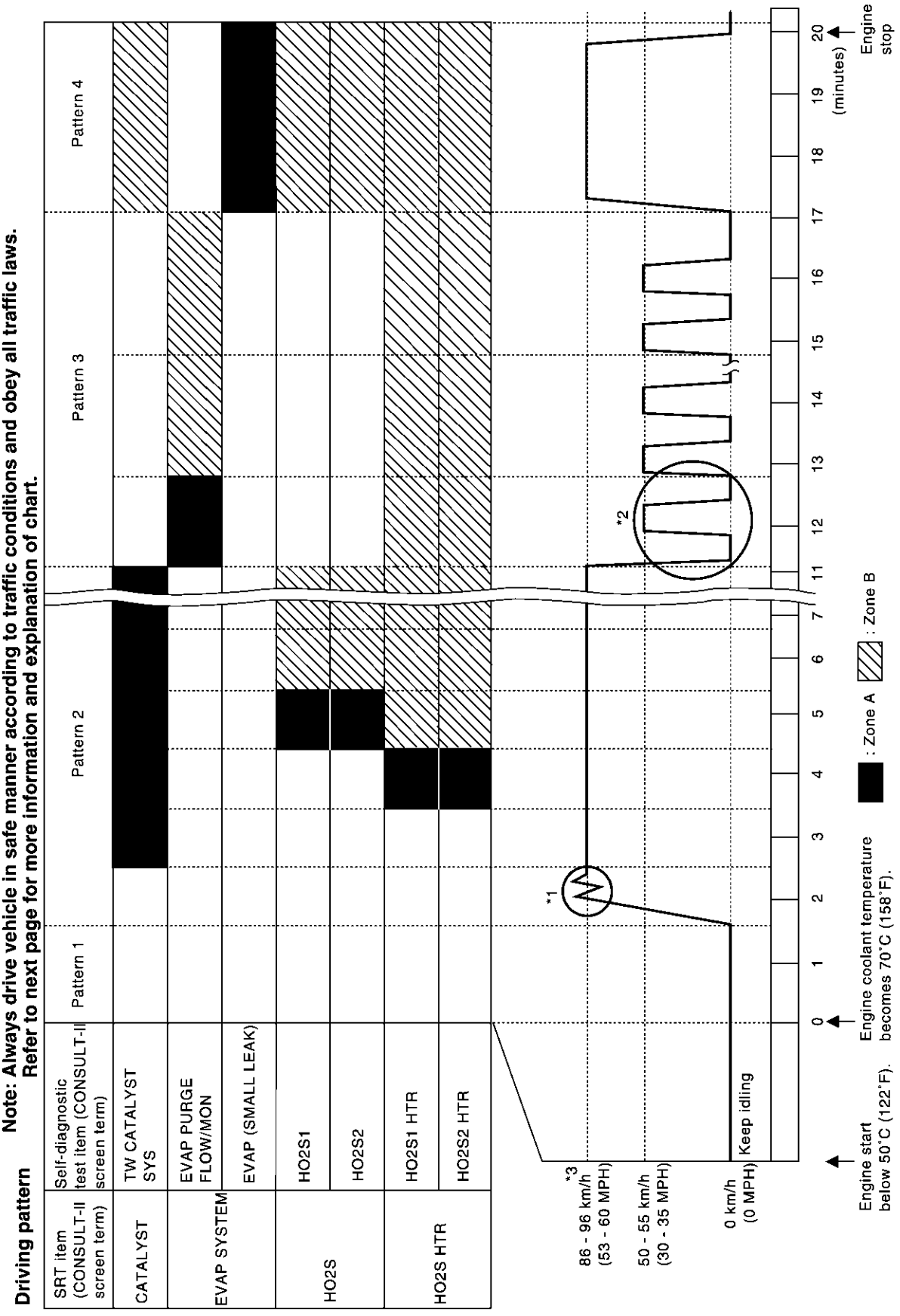
Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-78.

Ⓚ **Without CONSULT-II**

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

Driving Pattern

NHEC0031S0303



SEC390D

- 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 93 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 93 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 75 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:

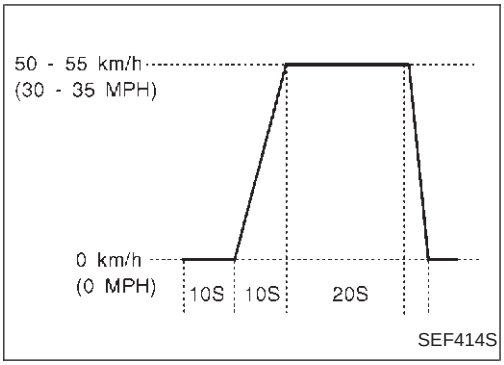
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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 GST is advised.

Suggested Transmission Gear Position

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

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

NHEC0031S04

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 (Bank 1)	01H	01H	Max.	X
	Three way catalyst function (Bank 2)	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
HO2S	Heated oxygen sensor 1 (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 (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 (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
HO2S HTR	Heated oxygen sensor 1 heater (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 heater (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 heater (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 heater (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NHEC0031S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*6	—	—	—	EC-159
CAN COMM CIRCUIT	U1001	1001*6	—	—	X	EC-159
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**	**—**	**—**	**—**
INT/V TIM CONT-B1	P0011	0011	—	—	X	EC-162
INT/V TIM CONT-B2	P0021	0021	—	—	X	EC-162
HO2S1 HTR (B1)	P0031	0031	X	X	X*5	EC-171
HO2S1 HTR (B1)	P0032	0032	X	X	X*5	EC-171
HO2S2 HTR (B1)	P0037	0037	X	X	X*5	EC-178
HO2S2 HTR (B1)	P0038	0038	X	X	X*5	EC-178
HO2S1 HTR (B2)	P0051	0051	X	X	X*5	EC-171
HO2S1 HTR (B2)	P0052	0052	X	X	X*5	EC-171
HO2S2 HTR (B2)	P0057	0057	X	X	X*5	EC-178
HO2S2 HTR (B2)	P0058	0058	X	X	X*5	EC-178
MAF SEN/CIRCUIT	P0101	0101	—	—	—	EC-184
MAF SEN/CIRCUIT	P0102	0102	—	—	—	EC-191
MAF SEN/CIRCUIT	P0103	0103	—	—	—	EC-191
ABSL PRES SEN/CIRC	P0107	0107	—	—	X	EC-197
ABSL PRES SEN/CIRC	P0108	0108	—	—	X	EC-197
IAT SEN/CIRCUIT	P0112	0112	—	—	X	EC-199
IAT SEN/CIRCUIT	P0113	0113	—	—	X	EC-199
ECT SEN/CIRC	P0117	0117	—	—	—	EC-203
ECT SEN/CIRC	P0118	0118	—	—	—	EC-203
TP SEN 2/CIRC	P0122	0122	—	—	—	EC-208
TP SEN 2/CIRC	P0123	0123	—	—	—	EC-208
ECT SENSOR	P0125	0125	—	—	—	EC-214
IAT SENSOR	P0127	0127	—	—	X	EC-217
THERMSTAT FNCTN	P0128	0128	—	—	X	EC-219
HO2S1 (B1)	P0132	0132	X	X	X*5	EC-221
HO2S1 (B1)	P0133	0133	X	X	X*5	EC-229
HO2S1 (B1)	P0134	0134	X	X	X*5	EC-241
HO2S2 (B1)	P0138	0138	X	X	X*5	EC-250
HO2S2 (B1)	P0139	0139	X	X	X*5	EC-258
HO2S1 (B2)	P0152	0152	X	X	X*5	EC-221
HO2S1 (B2)	P0153	0153	X	X	X*5	EC-229

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
	CONSULT-II GST*2	ECM*3				
HO2S1 (B2)	P0154	0154	X	X	X*5	EC-241
HO2S2 (B2)	P0158	0158	X	X	X*5	EC-250
HO2S2 (B2)	P0159	0159	X	X	X*5	EC-258
FUEL SYS-LEAN-B1	P0171	0171	—	—	X	EC-267
FUEL SYS-RICH-B1	P0172	0172	—	—	X	EC-275
FUEL SYS-LEAN-B2	P0174	0174	—	—	X	EC-267
FUEL SYS-RICH-B2	P0175	0175	—	—	X	EC-275
FTT SENSOR	P0181	0181	—	—	X	EC-282
FTT SEN/CIRCUIT	P0182	0182	—	—	X	EC-285
FTT SEN/CIRCUIT	P0183	0183	—	—	X	EC-285
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-290
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-290
MULTI CYL MISFIRE	P0300	0300	—	—	X	EC-296
CYL 1 MISFIRE	P0301	0301	—	—	X	EC-296
CYL 2 MISFIRE	P0302	0302	—	—	X	EC-296
CYL 3 MISFIRE	P0303	0303	—	—	X	EC-296
CYL 4 MISFIRE	P0304	0304	—	—	X	EC-296
CYL 5 MISFIRE	P0305	0305	—	—	X	EC-296
CYL 6 MISFIRE	P0306	0306	—	—	X	EC-296
KNOCK SEN/CIRC-B1	P0327	0327	—	—	X	EC-305
KNOCK SEN/CIRC-B1	P0328	0328	—	—	X	EC-305
CKP SEN/CIRCUIT	P0335	0335	—	—	X	EC-310
CMP SEN/CIRCUIT	P0340	0340	—	—	X	EC-317
CMP SEN/CIRC-B2	P0345	0345	—	—	X	EC-317
TW CATALYST SYS-B1	P0420	0420	X	X	X*5	EC-326
TW CATALYST SYS-B2	P0430	0430	X	X	X*5	EC-326
EVAP PURG FLOW/MON	P0441	0441	X	X	X*5	EC-331
EVAP SMALL LEAK	P0442	0442	X	X	X*5	EC-341
PURG VOLUME CONT/V	P0444	0444	—	—	X	EC-356
PURG VOLUME CONT/V	P0445	0445	—	—	X	EC-356
VENT CONTROL VALVE	P0447	0447	—	—	X	EC-363
EVAP SYS PRES SEN	P0452	0452	—	—	X	EC-370
EVAP SYS PRES SEN	P0453	0453	—	—	X	EC-376
EVAP GROSS LEAK	P0455	0455	—	X	X*5	EC-385
EVAP VERY SML LEAK	P0456	0456	X*4	X	X*5	EC-397
FUEL LEV SEN SLOSH	P0460	0460	—	—	X	EC-412

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST*2	ECM*3				
FUEL LEVEL SENSOR	P0461	0461	—	—	X	EC-416
FUEL LEVL SEN/CIRC	P0462	0462	—	—	X	EC-418
FUEL LEVL SEN/CIRC	P0463	0463	—	—	X	EC-418
VEH SPEED SEN/CIRC*7	P0500	0500	—	—	X	EC-422
ISC SYSTEM	P0506	0506	—	—	X	EC-426
ISC SYSTEM	P0507	0507	—	—	X	EC-428
PW ST P SEN/CIRC	P0550	0550	—	—	X	EC-430
ECM	P0605	0605	—	—	X	EC-435
MIL/CIRC	P0650	0650	—	—	X	EC-437
PNP SW/CIRC	P0705	0705	—	—	X	AT-109
ATF TEMP SEN/CIRC	P0710	0710	—	—	X	AT-115
VEH SPD SEN/CIR AT*7	P0720	0720	—	—	X	AT-121
ENGINE SPEED SIG	P0725	0725	—	—	X	AT-126
A/T 1ST GR FNCTN	P0731	0731	—	—	X	AT-131
A/T 2ND GR FNCTN	P0732	0732	—	—	X	AT-137
A/T 3RD GR FNCTN	P0733	0733	—	—	X	AT-143
A/T 4TH GR FNCTN	P0734	0734	—	—	X	AT-149
TCC SOLENOID/CIRC	P0740	0740	—	—	X	AT-158
A/T TCC S/V FNCTN	P0744	0744	—	—	X	AT-163
L/PRESS SOL/CIRC	P0745	0745	—	—	X	AT-173
SFT SOL A/CIRC	P0750	0750	—	—	—	AT-179
SFT SOL B/CIRC	P0755	0755	—	—	—	AT-184
ECM BACK UP/CIRCUIT	P1065	1065	—	—	X	EC-441
MAF SENSOR	P1102	1102	—	—	—	EC-445
ETC ACTR	P1121	1121	—	—	—	EC-451
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-453
ETC MOT PWR	P1124	1124	—	—	—	EC-461
ETC MOT PWR	P1126	1126	—	—	—	EC-461
ETC MOT	P1128	1128	—	—	—	EC-467
HO2S1 (B1)	P1143	1143	X	X	X*5	EC-472
HO2S1 (B1)	P1144	1144	X	X	X*5	EC-479
HO2S2 (B1)	P1146	1146	X	X	X*5	EC-486
HO2S2 (B1)	P1147	1147	X	X	X*5	EC-495
CLOSED LOOP-B1	P1148	1148	—	—	—	EC-504
HO2S1 (B2)	P1163	1163	X	X	X*5	EC-472
HO2S1 (B2)	P1164	1164	X	X	X*5	EC-479

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
	CONSULT-II GST*2	ECM*3				
HO2S2 (B2)	P1166	1166	X	X	X*5	EC-486
HO2S2 (B2)	P1167	1167	X	X	X*5	EC-495
CLOSED LOOP-B2	P1168	1168	—	—	—	EC-504
TCS C/U FUNCTN	P1211	1211	—	—	X	EC-506
TCS/CIRC	P1212	1212	—	—	X	EC-508
ENG OVER TEMP	P1217	1217	—	—	—	EC-510
CTP LEARNING	P1225	1225	—	—	X	EC-528
CTP LEARNING	P1226	1226	—	—	X	EC-530
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-532
PURG VOLUME CONT/V	P1444	1444	—	—	X	EC-538
VENT CONTROL VALVE	P1446	1446	—	—	X	EC-551
VENT CONTROL VALVE	P1448	1448	—	—	X	EC-559
EVAP VERY SML LEAK	P1456	1456	X*4	X	X*5	EC-568
FUEL LEVL SEN/CIRC	P1464	1464	—	—	X	EC-584
VC/V BYPASS/V	P1490	1490	—	—	X	EC-587
VC CUT/V BYPASS/V	P1491	1491	—	—	X	EC-593
ASCD SW	P1564	1564	—	—	—	EC-605
ASCD BRAKE SW	P1572	1572	—	—	—	EC-612
ASCD VHL SPD SEN	P1574	1574	—	—	—	EC-622
NATS MALFUNCTION	P1610-P1615	1610-1615	—	—	X	EL-375
TP SEN/CIRC A/T	P1705	1705	—	—	—	AT-189
P-N POS SW/CIRCUIT	P1706	1706	—	—	X	EC-627
O/R CLTCH SOL/CIRC	P1760	1760	—	—	X	AT-196
VIAS S/V CIRC	P1800	1800	—	—	X	EC-632
BRAKE SW/CIRCUIT	P1805	1805	—	—	X	EC-637
APP SEN 1/CIRC	P2122	2122	—	—	—	EC-643
APP SEN 1/CIRC	P2123	2123	—	—	—	EC-643
APP SEN 2/CIRC	P2127	2127	—	—	—	EC-650
APP SEN 2/CIRC	P2128	2128	—	—	—	EC-650
TP SENSOR	P2135	2135	—	—	—	EC-656
APP SENSOR	P2138	2138	—	—	—	EC-662

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: SRT code will not be set if the self-diagnostic result is NG.
*5: This is not displayed with GST.
*6: The troubleshooting for this DTC needs CONSULT-II.
*7: When the fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.

NOTE:

Regarding I35 models, "-B1" indicates bank 1 and "-B2" indicates bank 2.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NHEC0031S06

How to Erase DTC (With CONSULT-II)

NHEC0031S0601

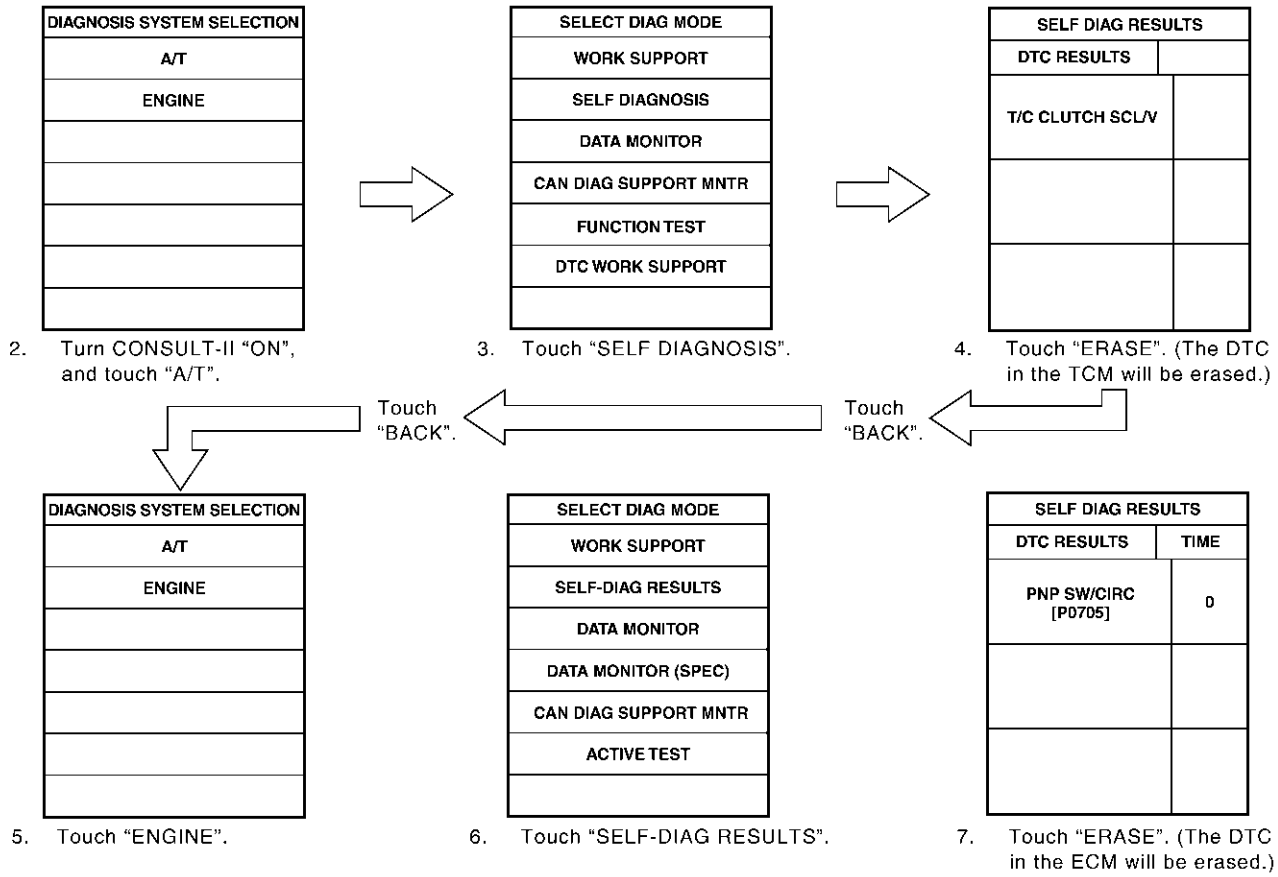
NOTE:
If the DTC is not for A/T related items (see EC-9), skip steps 2 through 4.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 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).

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 10 seconds and then turn it "ON" (engine stopped) again.



SAT859K

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

How to Erase DTC (With GST)

NHEC0031S0602

NOTE:
If the DTC is not for A/T related items (see EC-9), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "How to Erase DTC (with GST)", AT-40. (The DTC in TCM will be erased.)
3. Select Mode 4 with GST (Generic Scan Tool).

How to Erase DTC (NO TOOLS) No Tools)

NHEC0031S0604

NOTE:
If the DTC is not for A/T related items (see EC-9), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "How to Erase DTC (No Tools)", AT-40. (The DTC in TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-92, "HOW TO SWITCH DIAGNOSTIC MODE".

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 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.

IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)

NHEC0031S08

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF515Y

- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using IVIS program card. Refer to "IVIS (Infiniti Vehicle Immobilizer System — NATS)" EL-375.**
- **Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of IVIS (NATS) initialization and IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

NHEC1189

DESCRIPTION

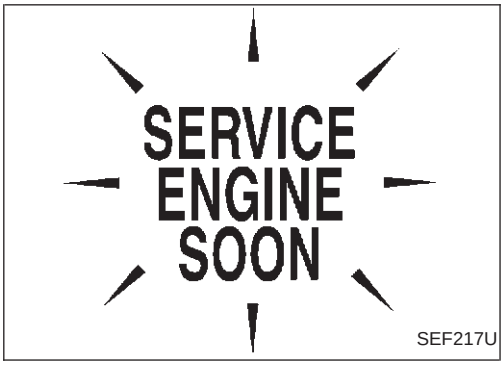
NHEC1189S01

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 "WARNING LAMPS", EL-150 or see DTC P0650 MIL (CIRCUIT), EC-437.

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.



SEF217U

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

NHEC1189S02

The on board diagnostic system has the following four 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.
	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. ● "Misfire (Possible three way catalyst damage)" ● "One trip detection diagnoses"
Mode II	Ignition switch in "ON" position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

MIL Flashing without DTC

NHEC1189S0201

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. How to Switch Diagnostic Test Mode.

How to switch the diagnostic test (function) modes, and details of the above functions are described later. How to Switch Diagnostic Test Mode.

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

HOW TO SWITCH DIAGNOSTIC TEST MODE

NHEC1189S03

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned "OFF".**

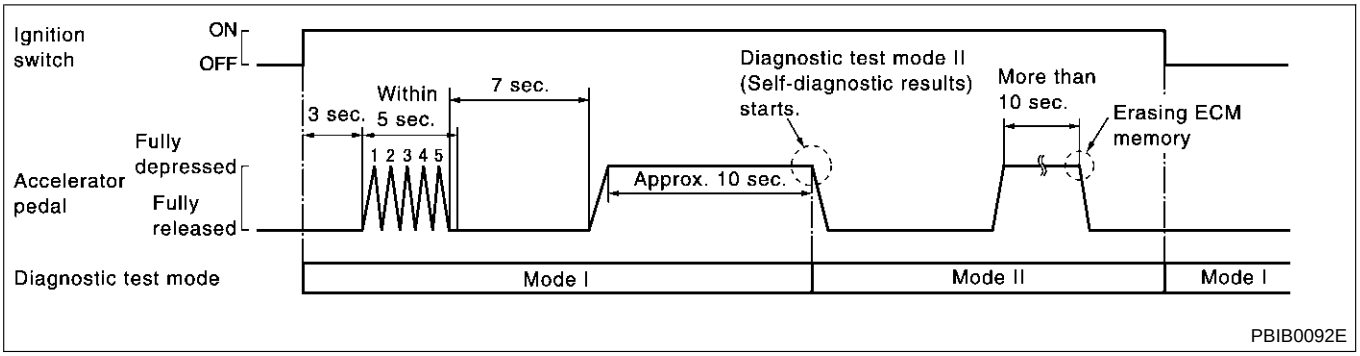
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

NHEC1189S0301

1. Confirm that accelerator pedal is fully released, turn ignition switch "ON" and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

1) Fully depress the accelerator pedal.
2) Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

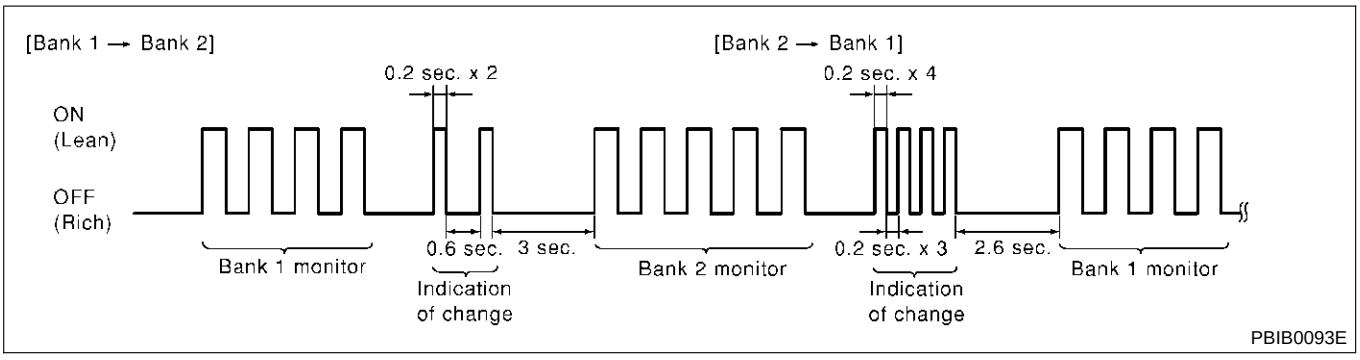
NHEC1189S0302

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to How to Set Diagnostic Test Mode II (Self-diagnostic Results).
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor.

How to Set Diagnostic Switch Monitored Sensor from Bank 1 to Bank 2 or Vice versa

NHEC1189S0303

1. Fully depress the accelerator pedal quickly and then release it immediately.
2. Make sure that monitoring sensor has changed by MIL blinking as follows.



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

NHEC1189S0304

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to How to Set Diagnostic Test Mode II (Self-diagnostic Results).
2. Fully depress the accelerator pedal and keep it for more than 10 seconds. The emission-related diagnostic information has been erased from the backup memory in the ECM.

3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

NHEC1189S04

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to "WARNING LAMPS", EL-150 or see DTC P0650 MIL (CIRCUIT), EC-437.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

NHEC1189S05

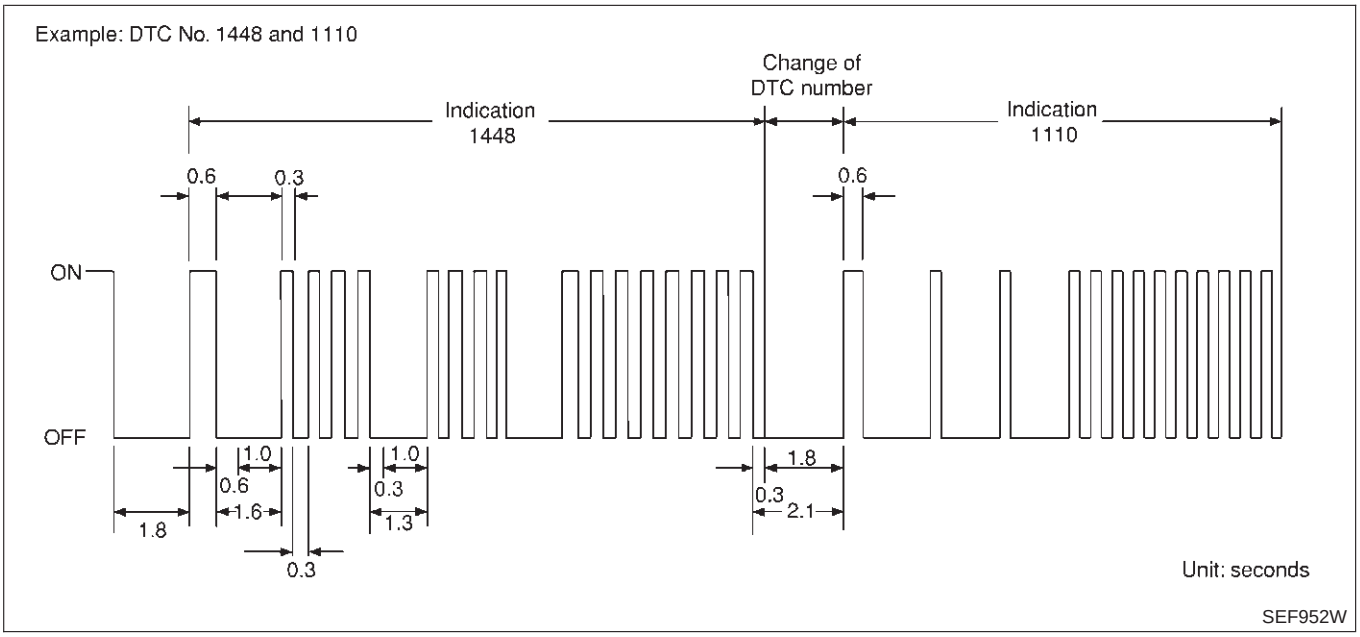
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

NHEC1189S06

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0000" refers to no malfunction. (See "TROUBLE DIAGNOSIS — INDEX", EC-9.)

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

NHEC1189S0601

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to How to Switch Diagnostic Test Mode.

- **If the battery is disconnected, the DTC will be lost from the backup memory after within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

NHEC1189S07

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

NHEC0033

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

NHEC0033S01

- 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-75.
- 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

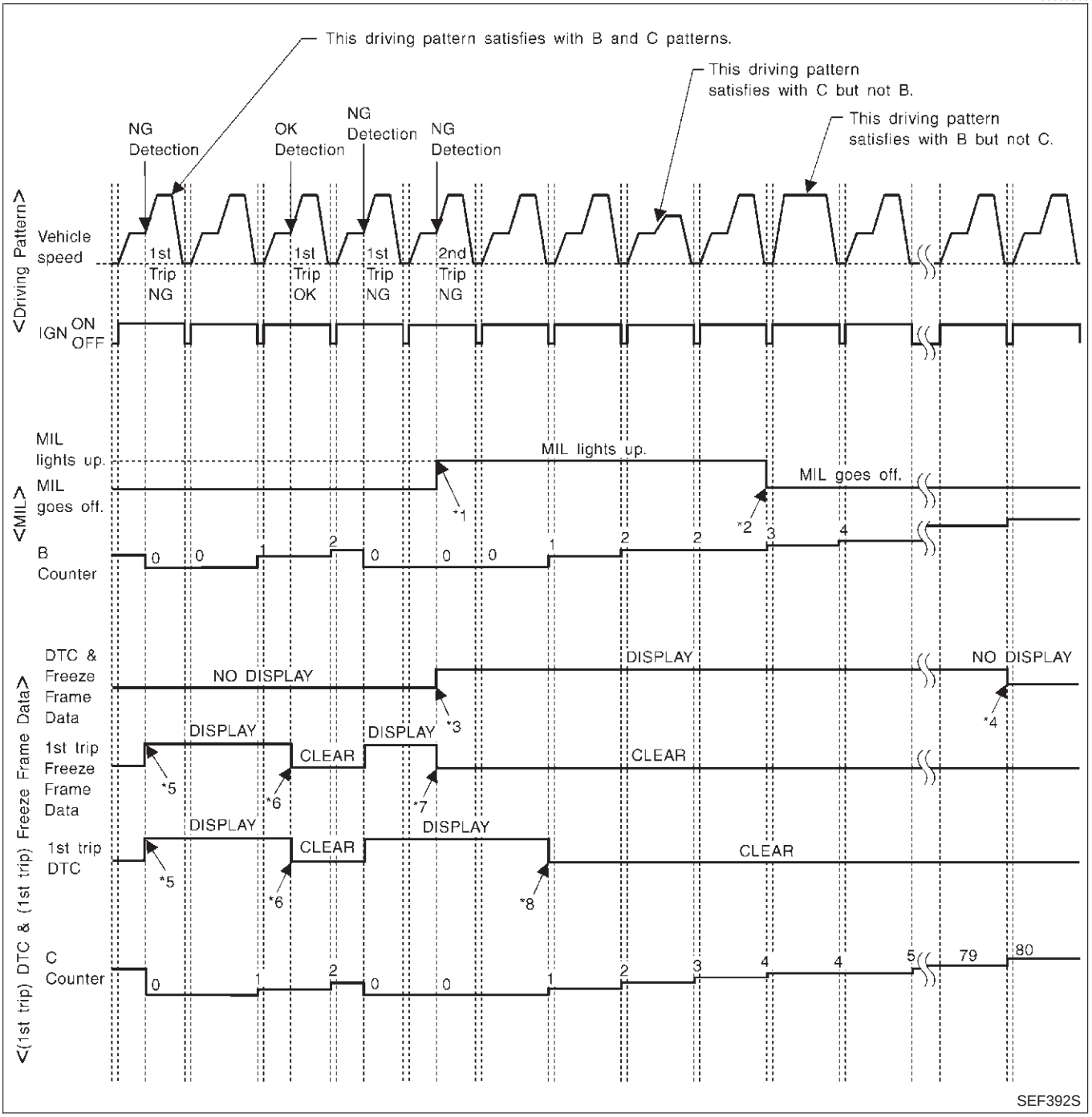
NHEC0033S02

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-96.
For details about patterns "A" and "B" under "Other", see EC-98.
*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"

=NHEC0033S03



*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"

NHEC0033S04

<Driving Pattern B>

NHEC0033S0401

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>

NHEC0033S0402

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) x (1±0.1) [%]
   Engine coolant temperature (T) condition:

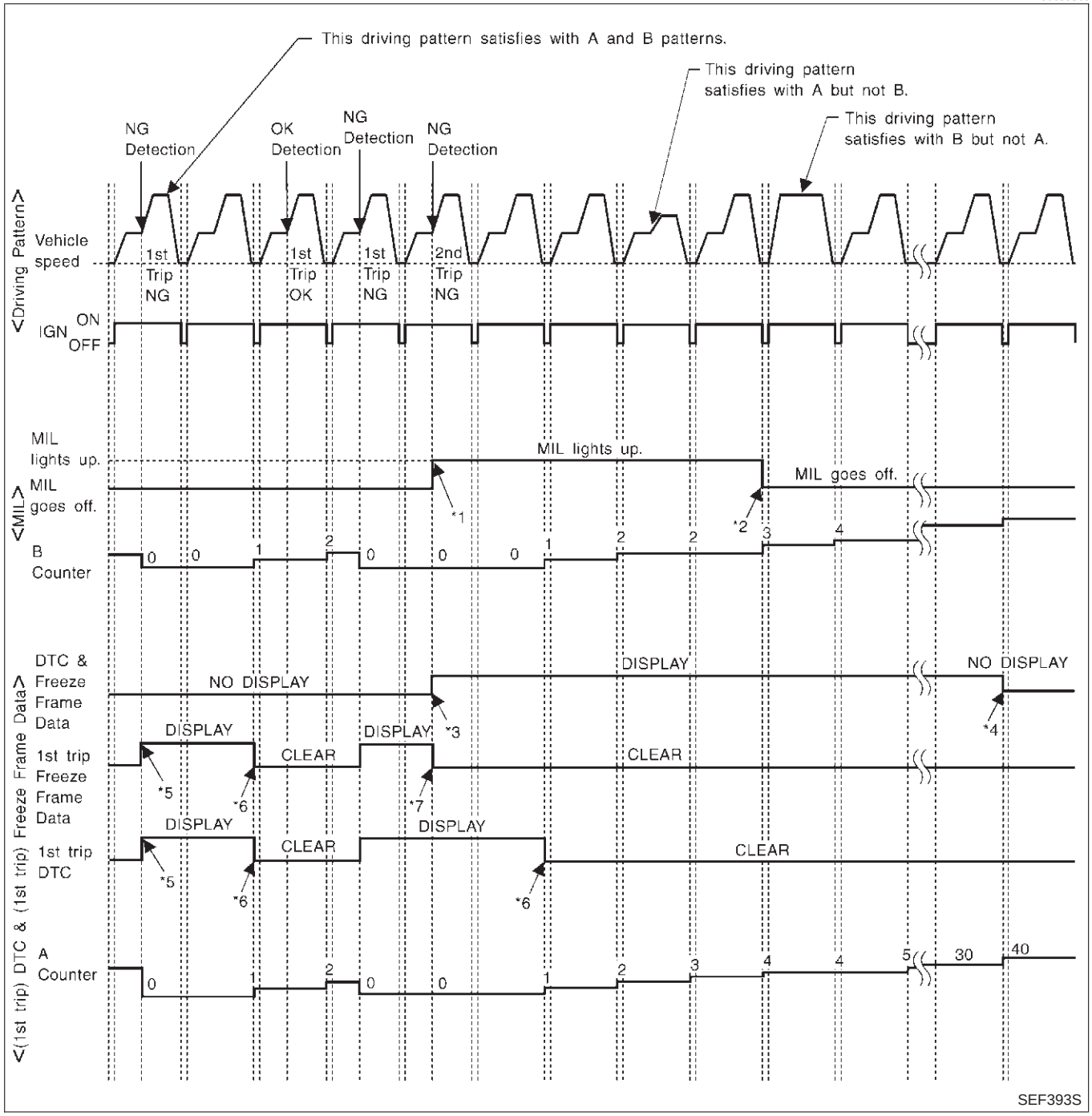
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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"

NHEC0033S05



*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.

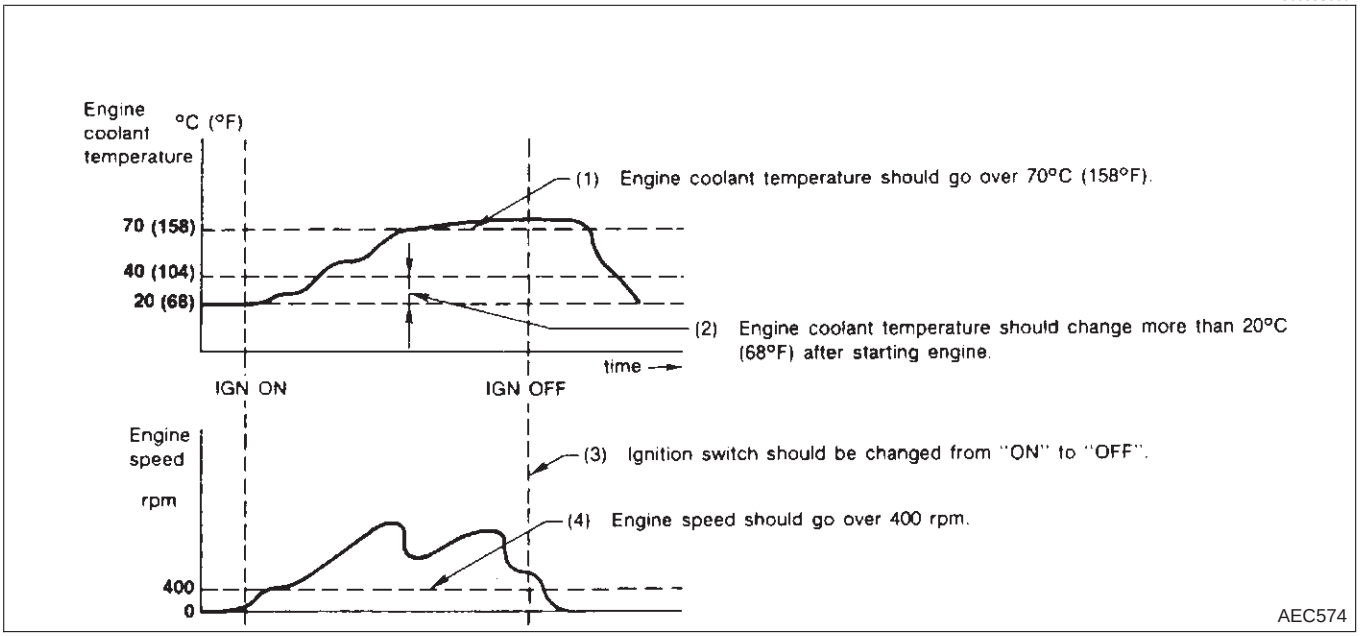
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NHEC0033S06

<Driving Pattern A>

NHEC0033S0601



- 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>

NHEC0033S0602

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", EC-94).

CONSULT-II

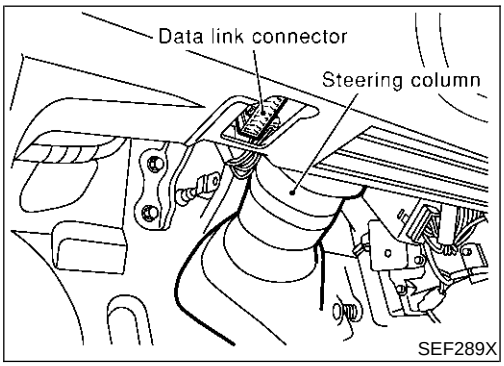
=NHEC0034

INSPECTION PROCEDURE

NHEC0034S01

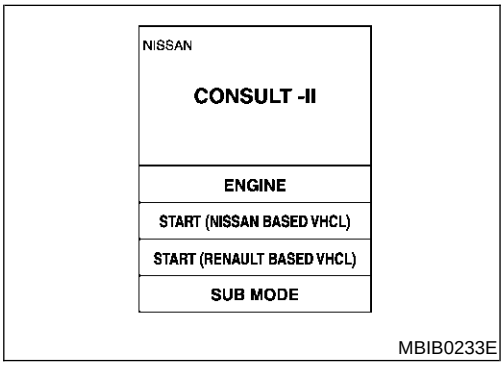
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.



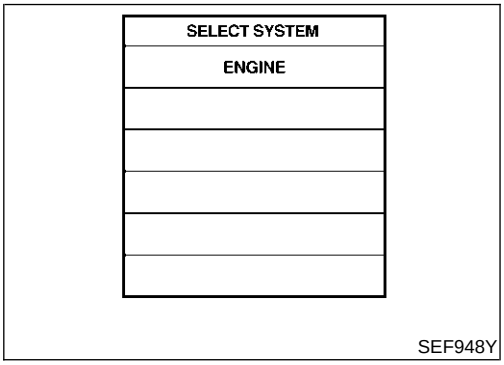
SEF289X

1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel near the fuse box cover.



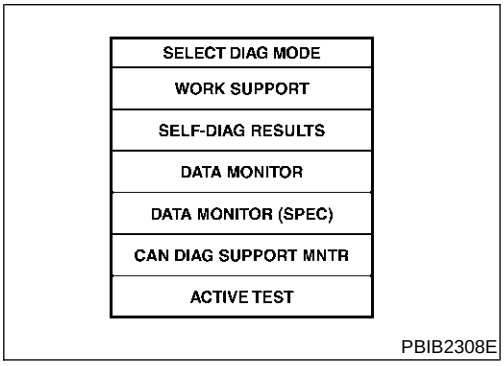
MBIB0233E

3. Turn ignition switch ON.
4. Touch “START” (NISSAN BASED VHCL).



SEF948Y

5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-42, “CONSULT-II Data Link Connector (DLC) Circuit”.



PBIB2308E

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

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

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NHEC0034S02

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 STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		X	X	X	X			
		Camshaft position sensor (PHASE)		X						
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1		X		X	X		X	X
		Heated oxygen sensor 2		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Accelerator pedal position sensor		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			
		Knock sensor		X						
		Refrigerant pressure sensor				X	X			
		Ignition switch (start signal)				X	X			
		Closed throttle position switch (accelerator pedal position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering pressure sensor		X		X	X			
		Battery voltage				X	X			
		Load signal				X	X			
		Fuel level sensor		X		X	X			
		ASCD steering switch		X		X	X			
		ASCD brake switch		X		X	X			

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 STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)				X	X	X		
		Throttle control motor relay		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		
		Heated oxygen sensor 1 heater		X		X	X		X	
		Heated oxygen sensor 2 heater		X		X	X		X	
		EVAP canister vent control valve	X	X		X	X	X		
		Vacuum cut valve bypass valve	X	X		X	X	X		X
		VIAS control solenoid valve		X		X	X	X		
		Intake valve timing control sole-noid valve		X		X	X	X		
		Electronic controlled engine mount				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-77.

CONSULT-II (Cont'd)

FUNCTION

=NHEC0034S03

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-DIAG 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.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication 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.
FUNCTION TEST	Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG".
DTC & SRT 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

=NHEC0034S04

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
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. ● 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" ● 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 IGN TIM ADJ*	● IDLE CONDITION	● When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light. ● If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed.
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed

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

SELF-DIAGNOSTIC MODE

NHEC0034S05

DTC and 1st Trip DTC

NHEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-9.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NHEC0034S0502

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-9.)

CONSULT-II (Cont'd)

Freeze frame data item*1	Description
FUEL SYS-B1	• "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	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	• "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 [%]	• "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]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• 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.

DATA MONITOR MODE

=NHEC0034S06

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE)	• 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]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• 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]	○	○	• The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S1 (B2) [V]	○			
HO2S2 (B1) [V]	○		• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2) [V]	○			
HO2S1 MNTR (B1) [RICH/LEAN]	○	○	• Display of heated oxygen sensor 1 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.	• 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]	○		• Display of heated oxygen sensor 2 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.	• When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	○	○	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	○			
THRTL SEN 1 [V]	○	○	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	○			
FUEL T/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○	○	• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ABSOL PRES/SE [V]	○		• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering system (determined by the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
BRAKE SW [ON/OFF]			• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
PURG VOL C/V [%]			• 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.	
A/F ALPHA-B1 [%]		○	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• 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 [%]		○		
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			• 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]			• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• 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 [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
INT/V TIM (B1) [°CA]			• Indicate [°CA] of intake camshaft advanced angle.	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			• The control condition of the intake valve timing control solenoid valve is indicated.	
INT/V SOL (B2) [%]				
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
VIAS S/V [ON/OFF]			• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. • OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating.	
IDL A/V LEARN			• Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENGINE MOUNT [IDLE/TRVL]			• The control condition of the electronic controlled engine mount (computed by ECM according to the input signals) is indicated. • IDLE ... Idle condition • TRVL ... Driving condition	
COOLING FAN [HI/LOW/OFF]			• Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HIGH ... High speed operation LOW ... Low speed operation OFF ... Stop	
THRTL RELAY [ON/OFF]			• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
AC PRESS SEN [V]			• The signal voltage from the refrigerant pressure sensor is displayed.	
BRAKE SW 1 [ON/OFF]			• Indicates [ON/OFF] condition from ASCD brake switch signal, and park/neutral position switch signal.	
BRAKE SW 2 [ON/OFF]			• Indicates [ON/OFF] condition of stop lamp switch signal.	
MAIN SW [ON/OFF]			• Indicates [ON/OFF] condition from CRUISE switch signal.	
CANCEL SW [ON/OFF]			• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			• Indicates [ON/OFF] condition from ACCEL/RES switch signal.	
SET SW [ON/OFF]			• Indicates [ON/OFF] condition from COAST/SET switch signal.	
VHCL SPEED SE [km/h] or [mph]			• The present vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD [km/h] or [mph]			• The preset vehicle speed is displayed.	
VHCL SPD CUT [NON/CUT]			• Indicates the vehicle cruise condition. NON...Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			• Indicates the vehicle cruise condition. NON...Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			• Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL [ON/OFF]			• Indicates [ON/OFF] condition of A/T OD cancel signal sent from the TCM.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
CRUISE LAMP [ON/OFF]			• Indicates [ON/OFF] condition CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Pulse width, frequency or duty cycle measured by the pulse probe. 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.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-low				

NOTE:

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

DATA MONITOR (SPEC) MODE

NHEC0034S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor specification is displayed.	• When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]			• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	• Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	• 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.

ACTIVE TEST MODE

NHEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensor
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• 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.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT-II.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor • Cooling fan relay
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
FUEL PUMP RELAY	• 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 an operating sound.	• Harness and connector • Fuel pump relay
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
ENGINE MOUNTING	• Engine: After warming up, run engine at idle speed. • Turn electronic controlled engine mount "IDLE" and "TRVL" with the CONSULT-II.	Electronic controlled engine mount makes an operating sound.	• Harness and connector • Electronic controlled engine mount
PURG VOL CONT/V	• 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.	• Harness and connector • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	• 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.	• Harness and connector • Solenoid valve
VC/V BYPASS/V	• 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.	• Harness and connector • Solenoid valve
V/T ASSIGN ANGLE	• Engine: After warming up, hold engine speed at 2,500 rpm. • Change the intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Intake valve timing control solenoid valve

*: Leaving cooling fan "OFF" with CONSULT-II while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

NHEC0034S08

SRT STATUS Mode

NHEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-77.

SRT Work Support Mode

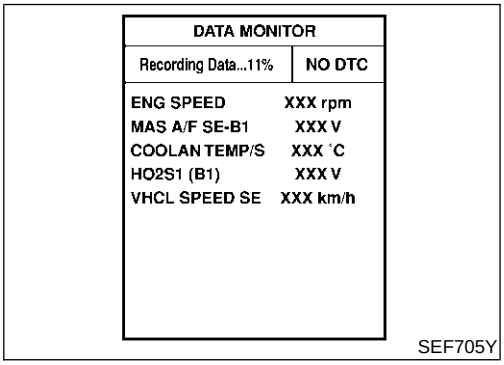
NHEC0034S0803

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

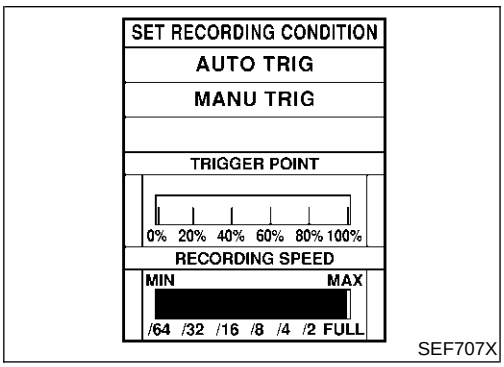
DTC Work Support Mode

NHEC0034S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURGE FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-331
	EVP SML LEAK P0442/P1442		EC-341
	EVP V/S LEAK P0456/P1456		EC-397
	PURG VOL CN/V P1444		EC-538
	VC CUT/V BP/V P1491		EC-593
HO2S1	HO2S1 (B1) P0133		EC-229
	HO2S1 (B1) P0134		EC-241
	HO2S1 (B1) P1143		EC-472
	HO2S1 (B1) P1144		EC-479
	HO2S1 (B2) P0153		EC-229
	HO2S1 (B2) P0154		EC-241
	HO2S1 (B2) P1163		EC-472
	HO2S1 (B2) P1164		EC-479
HO2S2	HO2S2 (B1) P0139		EC-258
	HO2S2 (B1) P1146		EC-486
	HO2S2 (B1) P1147		EC-495
	HO2S2 (B2) P0159		EC-258
	HO2S2 (B2) P1166		EC-486
	HO2S2 (B2) P1167		EC-495



SEF705Y



SEF707X

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

NHEC0034S10

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.

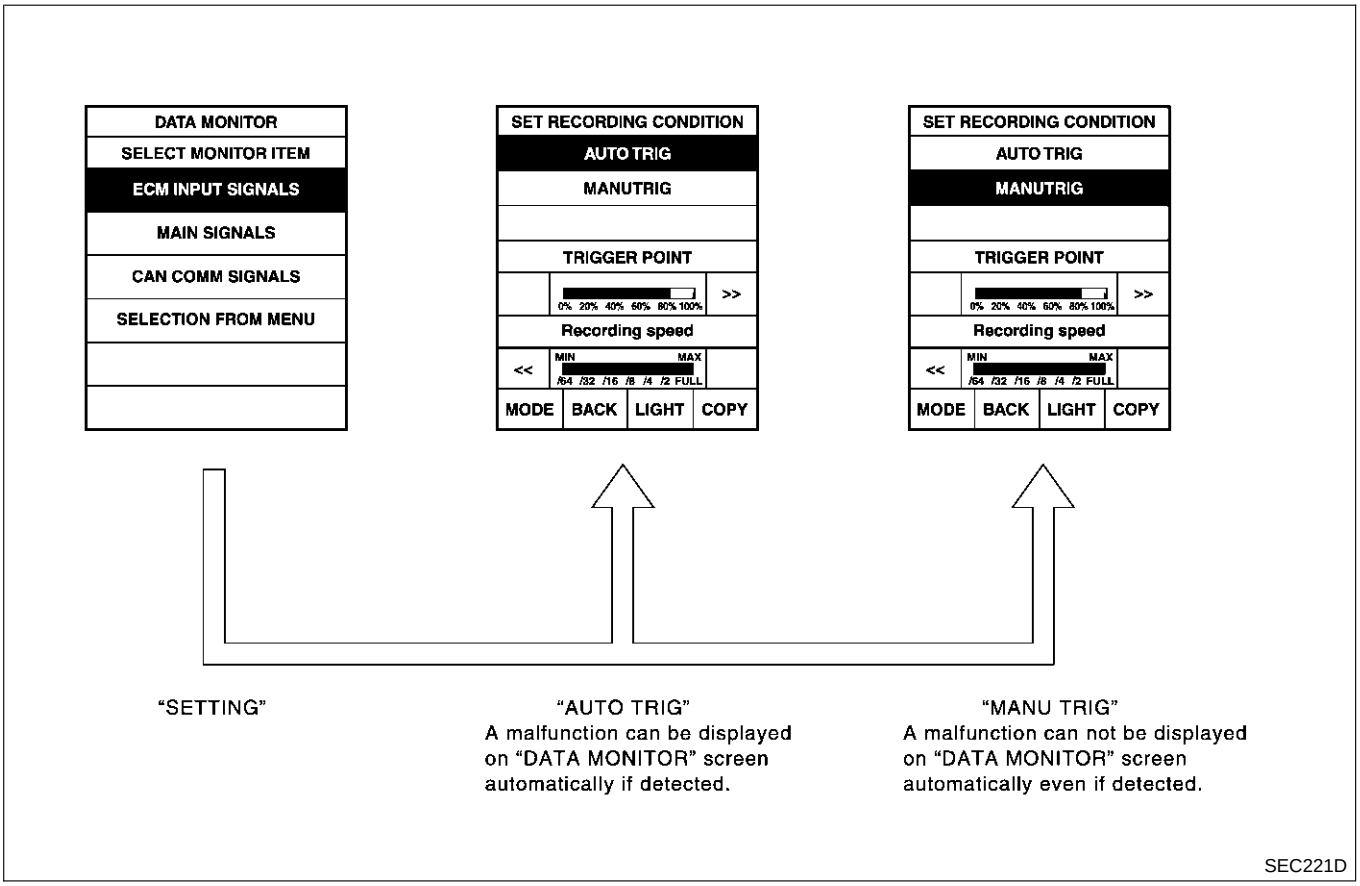
Use these triggers as follows:

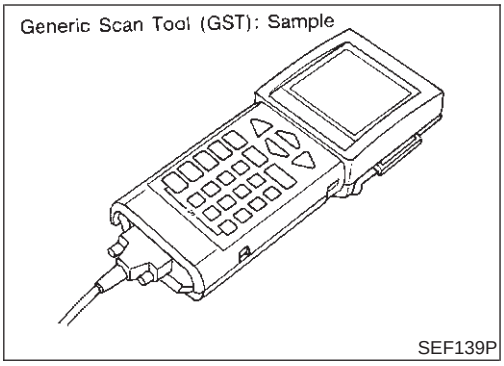
1) "AUTO TRIG"

- 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-21, "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.





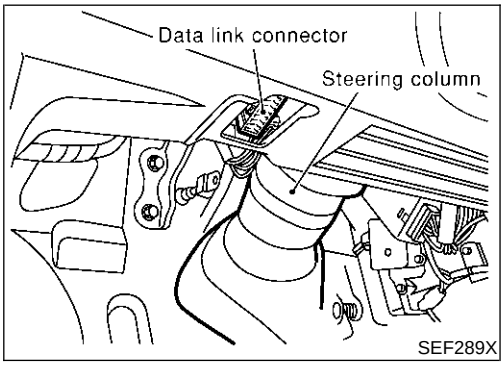
Generic Scan Tool (GST)

=NHEC0035

DESCRIPTION

NHEC0035S01

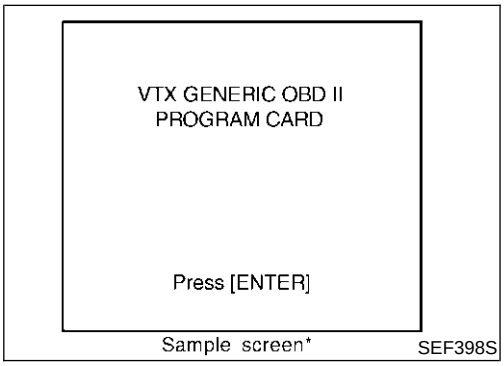
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



INSPECTION PROCEDURE

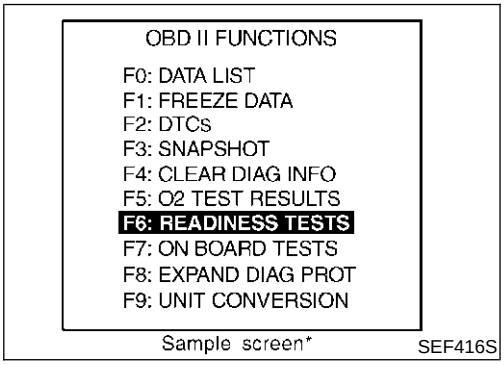
NHEC0035S02

1. Turn ignition switch OFF.
2. Connect GST to data link connector, 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.

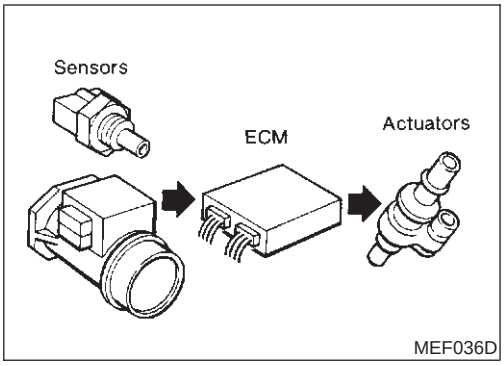
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

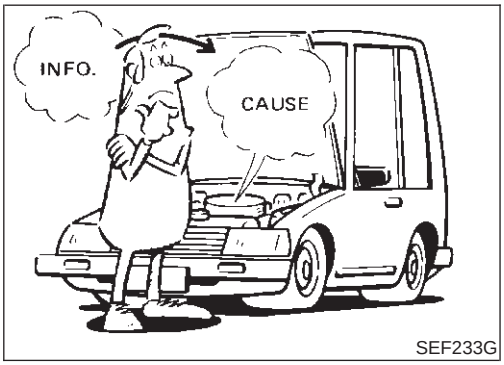
FUNCTION

NHEC0035S03

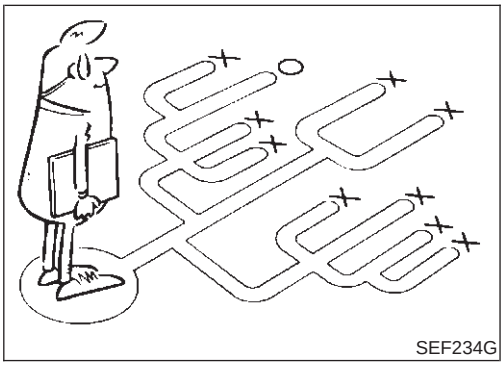
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-103).]
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: ● 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. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● 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 enables the off-board test device to request 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

NHEC0036

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 malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.

It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents 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 incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-117.

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 incidents, 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” malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NHEC0036S01

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 an incident. 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.

Worksheet Sample

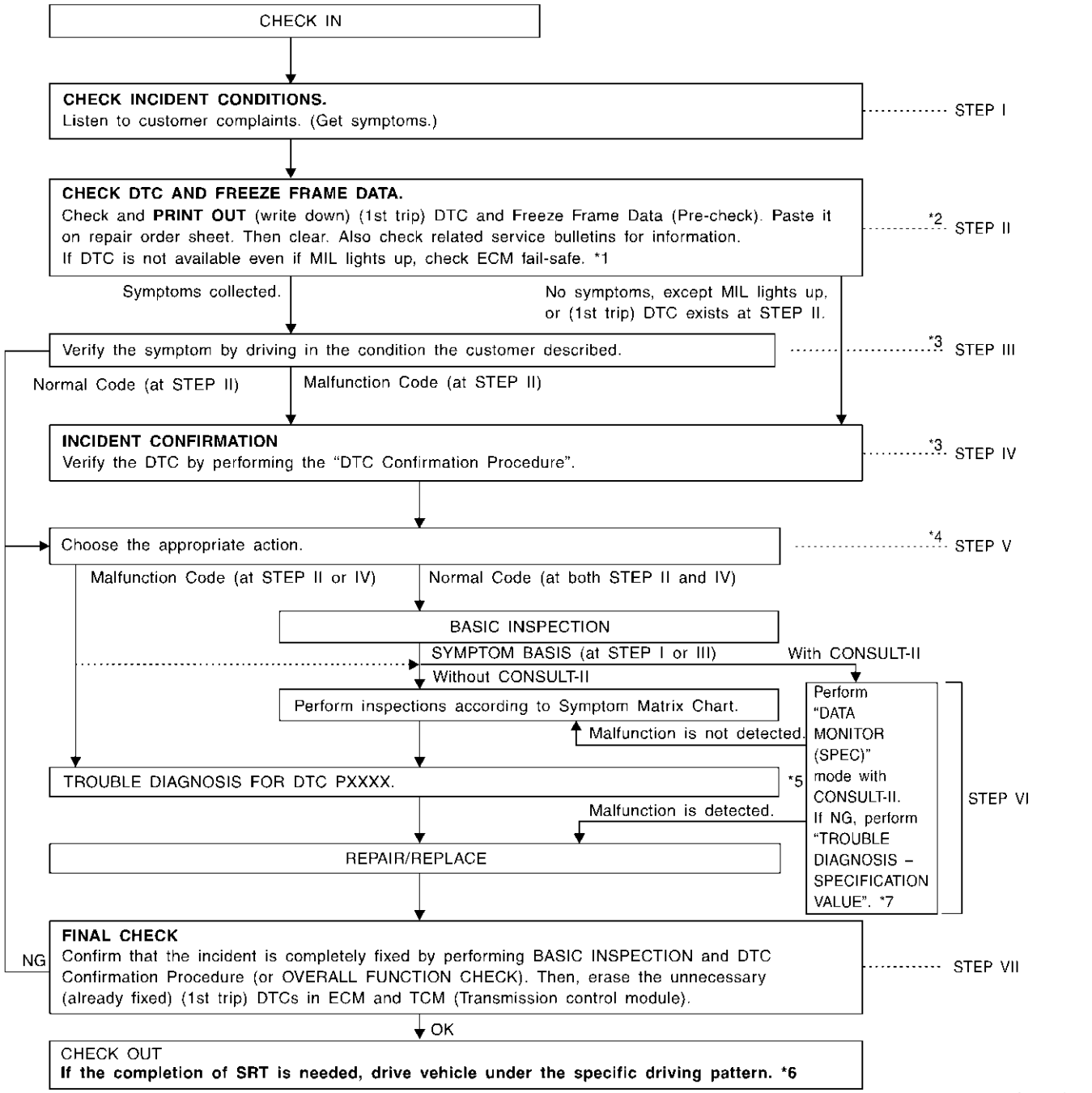
NHEC0036S0101

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

MTBL0017

Work Flow

NHEC0037



SEF510ZF

*1 EC-125

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

*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-152.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

*6 EC-82

*7 EC-147

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NHEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-116.
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-89.) 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-151. 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 "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151. 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-151. 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-119.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-147. (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-130, 136. 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-22, "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.
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] 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-89.)

Basic Inspection

NHEC0038

Precaution:

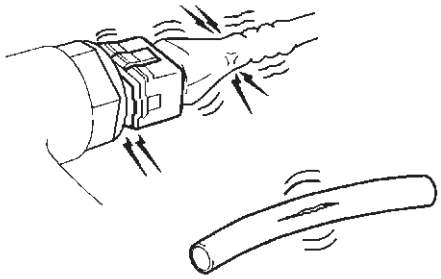
Perform Basic Inspection without electrical or mechanical loads applied;

- 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

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- Hoses and ducts for leaks



SEF983U

▶ GO TO 2.

2	REPAIR OR REPLACE

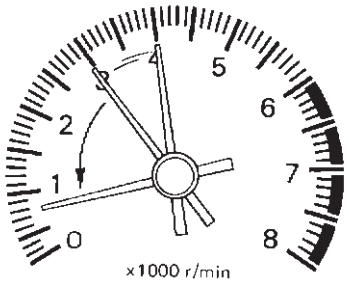
Repair or replace components as necessary according to corresponding “Diagnostic Procedure”.

▶ GO TO 3.

3	CHECK TARGET IDLE SPEED

With CONSULT-II

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 for about 1 minute.



SEF978U

3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.
   675±50 rpm (in "P" or "N" position)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

Without CONSULT-II

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 for about 1 minute.
3. Check idle speed.
   675±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 4.

4	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-71.

	▶	GO TO 5.

5	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-71.

	▶	GO TO 6.

6	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-71. **Is Idle Air Volume Learning carried out successfully?** **Yes or No**		
Yes	▶	GO TO 7.
No	▶	1. Follow the instruction of "Idle Air Volume Learning". 2. GO TO 4.

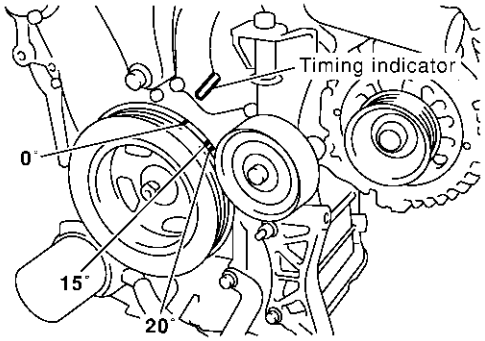
7	CHECK TARGET IDLE SPEED AGAIN	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Read idle speed in "DATA MONITOR" mode with CONSULT-II. **675±50 rpm (in "P" or "N" position)**		
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **675±50 rpm (in "P" or "N" position)** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Check camshaft position sensor (PHASE) and circuit. Refer to EC-317. ● Check crankshaft position sensor (POS) and circuit. Refer to EC-310. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	1. Repair or replace. 2. GO TO 4.

9	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a malfunction, but this is a rare case.) 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90.		
	▶	GO TO 4.

10	CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.



SEC004D

15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11.

11	PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform "Accelerator Pedal Released Position Learning", EC-71.

	▶	GO TO 12.

12	PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform "Throttle Valve Closed Position Learning", EC-71.

	▶	GO TO 13.

13	PERFORM IDLE AIR VOLUME LEARNING

Refer to "Idle Air Volume Learning", EC-71.
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes	▶	GO TO 14.
No	▶	1. Follow the instruction of "Idle Air Volume Learning". 2. GO TO 4.

14	CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

675±50 rpm (in "P" or "N" position)

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

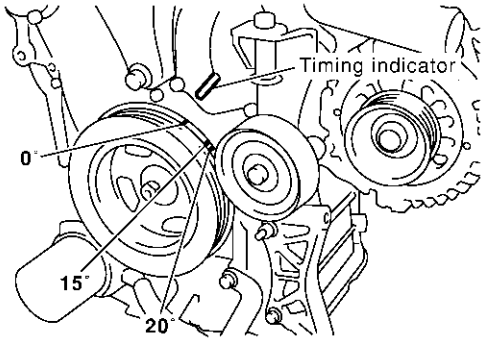
675±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 17.

15	CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.



SEC004D

15°±5° BTDC (in "P" or "N" position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 16.

16	CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-29, "TIMING CHAIN".

OK or NG

OK	▶	GO TO 17.
NG	▶	1. Repair the timing chain installation. 2. GO TO 4.

17	DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-317.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-310.

OK or NG

OK	▶	GO TO 18.
NG	▶	1. Repair or replace. 2. GO TO 4.

18	CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a malfunction, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90.

	▶	GO TO 4.

DTC Inspection Priority Chart

NHEC0039

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	• U1000, U1001 CAN communication line • P0101, P0102, P0103, P1102 MAF sensor • P0112, P0113, P0127 IAT sensor • P0117, P0118, P0125 ECT sensor • P0122, P0123, P0222, P0223, P1225, P1226, P1229, P2135 Throttle position sensor • P0128 Thermostat function • P0181, P0182, P0183 FTT sensor • P0327, P0328 KS • P0335 CKP sensor (POS) • P0340, P0345 CMP sensor (PHASE) • P0460, P0461, P0462, P0463, P1464 Fuel level sensor • P0500 VSS • P0605 ECM • P0705 Park/Neutral position switch • P1706 PNP switch • P2122, P2123, P2127, P2128, P2138 Accelerator pedal position sensor
2	• P0031, P0032, P0051, P0052 HO2S1 heater • P0037, P0038, P0057, P0058 HO2S2 heater • P0107, P0108 Absolute pressure sensor • P0132-P0134, P1143, P1144 and P0152-P0154, P1163, P1164 HO2S1 • P0138, P0139, P1146, P1147 and P0158, P0159, P1166, P1167 HO2S2 • P0441 EVAP control system purge flow monitoring • P0444, P0445, P1444 EVAP canister purge volume control solenoid valve • P0447, P1446, P1448 EVAP canister vent control valve • P0452, P0453 EVAP control system pressure sensor • P0550 Power steering pressure sensor • P0650 MIL • P0710, P0720, P0725, P0740, P0745, P0750, P1705, P1760 A/T related sensors, solenoid valves and switches • P1065 ECM power supply • P1122 Electric throttle control function • P1217 Engine overtemperature (OVERHEAT) • P1490, P1491 Vacuum cut valve bypass valve • P1800 VIAS control solenoid valve • P1805 Brake switch
3	• P0011, P0021 Intake valve timing control • P0171, P0172 and P0174, P0175 Fuel injection system function • P0300-P0306 Misfire • P0420, P0430 Three way catalyst function • P0442, P0456, P1456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506, P0507 ISC system • P0731-P0734, P0744 A/T function • P1121 Electric throttle control actuator • P1124, P1126 Throttle control motor relay • P1128 Throttle control motor • P1148, P1168 Closed loop control • P1211 ABS/TCS control unit • P1212 ABS/TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD Vehicle speed sensor

Fail-safe Chart

=NHEC1425

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103 P1102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	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: Just as ignition switch is turned ON or Start — Engine coolant temperature decided (CONSULT-II display): 40°C (104°F)
		Condition: More than approx. 4 minutes after ignition ON or Start — Engine coolant temperature decided (CONSULT-II display): 80°C (176°F)
		Condition: Except as shown above — Engine coolant temperature decided (CONSULT-II display): 40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1129	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates an opening speed of approx. 5 seconds to an opening of 10 degrees. So, the acceleration will be poor.

Symptom Matrix Chart

SYSTEM — BASIC ENGINE CONTROL SYSTEM

=NHEC0041

NHEC0041S01

		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 pump circuit	1	1	2	3	2		2	2			3		2	EC-698
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-56
	Injector circuit	1	1	2	3	2		2	2			2			EC-688
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-37
Air	Positive crankcase ventilation system												1		EC-52
	Incorrect idle speed adjustment						1	1	1	1		1			EC-119
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-451, 453, 461, 467
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-119
	Ignition circuit	1	1	2	2	2		2	2			2			EC-677
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-152
Air conditioner circuit							3			3				2	HA section
VDC/TCS/ABS control unit				4											EC-506, EC-508

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

(continued on next page)

		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 control	Crankshaft position sensor (POS) circuit	2	2												EC-310
	Camshaft position sensor (PHASE) circuit	3	2												EC-317
	Mass air flow sensor circuit	1			2										EC-184, 191, 445
	Heated oxygen sensor 1 circuit														EC-221, 229, 241, 472, 479
	Engine coolant temperature sensor circuit	1					3			3					EC-203, 214
	Throttle position sensor circuit						2			2					EC-656, 290, 208, 528, 530
	Accelerator pedal position sensor circuit			3		1	1	1	1	1					EC-662, 643, 650
	Vehicle speed sensor circuit		2	3		3									EC-422
	Knock sensor circuit			2											EC-305
	ECM	2	2	3	3	3	3	3	3	3	3				EC-435
	Start signal circuit	2													EC-694
	Park/Neutral position switch circuit			3		3									EC-627
	Power steering pressure sensor circuit		2												EC-430
	Electrical load signal circuit														EC-724

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NHEC0041S02

		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 section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	EL section
	Alternator circuit														
	Starter circuit	3													
	Flywheel/Drive plate	6													EM section
	PNP switch	4													AT section

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

(continued on next page)

		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	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			
	Camshaft														
	Intake valve timing control														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5	5	5		5					FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM, LC section
	Oil level (Low)/Filthy oil														LC section
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					
	Water pump														
	Water gallery														
	Cooling fan									5					
	Coolant level (low)/Contaminated coolant														MA section

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

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	
IVIS (INFINITI Vehicle Immobilizer System — NATS)	1	1												EC-90 or EL section

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

CONSULT-II Reference Value in Data Monitor Mode

NHEC1426

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.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	1.1 - 1.5V
		2,500 rpm	1.7 - 2.4V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	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)	• Warm-up condition • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V

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

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped) • Shift lever: "D"	Accelerator pedal: Released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 3.7V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: "D"	Accelerator pedal: Released	0.15 - 0.97V
		Accelerator pedal: Fully depressed	More than 3.5V
THRTL SEN 1 THRTL SEN 2*	• Ignition switch: ON (Engine stopped) • Shift lever: "D"	Accelerator pedal: Released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: "OFF"	OFF
		Air conditioner switch: "ON" (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.3 - 2.9 msec
		2,000 rpm	2.3 - 2.9 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	13 - 18° BTDC
		2,000 rpm	25 - 45° BTDC
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B1 A/F ALPHA-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 1 seconds) • Engine running or cranking		ON
	Except as shown above		OFF

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

MONITOR ITEM	CONDITION		SPECIFICATION
VENT CONT/V	• Ignition switch: ON		OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine: After warming up • Engine speed: Below 3,600 rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,600 rpm		OFF
	• Engine speed: Below 3,600 rpm after the following conditions are met. • After warming up • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	10 - 35%
		2,500 rpm	10 - 35%
BRAKE SW	• Ignition switch: ON	Brake pedal: Released	OFF
		Brake pedal: Slightly depressed	ON
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V
VIAS S/V	• Engine: After warming up	1,800 - 3,600 rpm	ON
		Except above conditions	OFF
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
AC PRESS SEN	• Ignition switch: ON (Engine stopped)		Approx. 0V
	• Engine: Idle • Air conditioner switch: OFF		1.0 - 4.0V
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever "N" • Quickly depressed accelerator pedal • No-load	Idle	−5 - 5° CA
		2,000 rpm	Approximately 0 - 30° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever "N" • Quickly depressed accelerator pedal • No-load	Idle	0 - 2%
		2,000 rpm	Approximately 25 - 50%
ENGINE MOUNT	• Engine: Running	Idle	"IDLE"
		2,000 rpm	"TRVL"
COOLING FAN	• After warming up engine, idle the engine. • After conditioner switch: "OFF"	Engine coolant temperature is 94°C (201°F) or less.	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F).	LOW
		Engine coolant temperature is 100°C (212°F) or more.	HIGH

MONITOR ITEM	CONDITION		SPECIFICATION
VHCL SPEED SE	Turn drive wheels and compare speedometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value
SET VHCL SPD	• ASCD set condition.		The preset vehicle speed is displayed.
MAIN SW	• Ignition switch: ON	• ON/OFF (MAIN) switch: Pressed	ON
		• ON/OFF (MAIN) switch: Released	OFF
CANCEL SW	• Ignition switch: ON	• CANCEL switch: Pressed	ON
		• CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	• ACCEL/RESUME switch: Pressed	ON
		• ACCEL/RESUME switch: Released	OFF
SET SW	• Ignition switch: ON	• COAST/SET switch: Pressed	ON
		• COAST/SET switch: Released	OFF
BRAKE SW 1	• Ignition switch: ON • Shift lever: Except "N" and "P" position	• Brake pedal: Released	ON
		• Brake pedal: Depressed	OFF
BRAKE SW 2	• Ignition switch: ON	• Brake pedal: Released	OFF
		• Brake pedal: Depressed	ON
CRUISE LAMP	• Ignition switch: ON	• ON/OFF (MAIN) switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• Ignition switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• SET lamp is indicated.	ON
		• SET lamp is not indicated.	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

Major Sensor Reference Graph in Data Monitor Mode

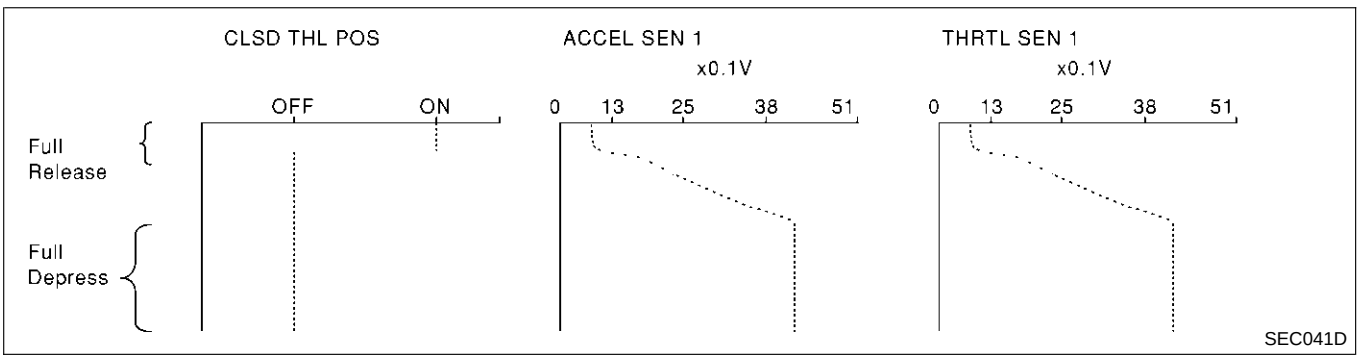
NHEC1427

The following are the major sensor reference graphs in "DATA MONITOR" mode.

CLSD THL POS, ACCEL SEN1, THRTL SEN1

NHEC1427S01

Below is the data for "CLSD THL POS", "ACCEL SEN1" and "THRTL SEN1" when depressing the accelerator pedal with the ignition switch "ON" and with selector lever in "D" position.
The signal of "ACCEL SEN1" and "THRTL SEN1" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



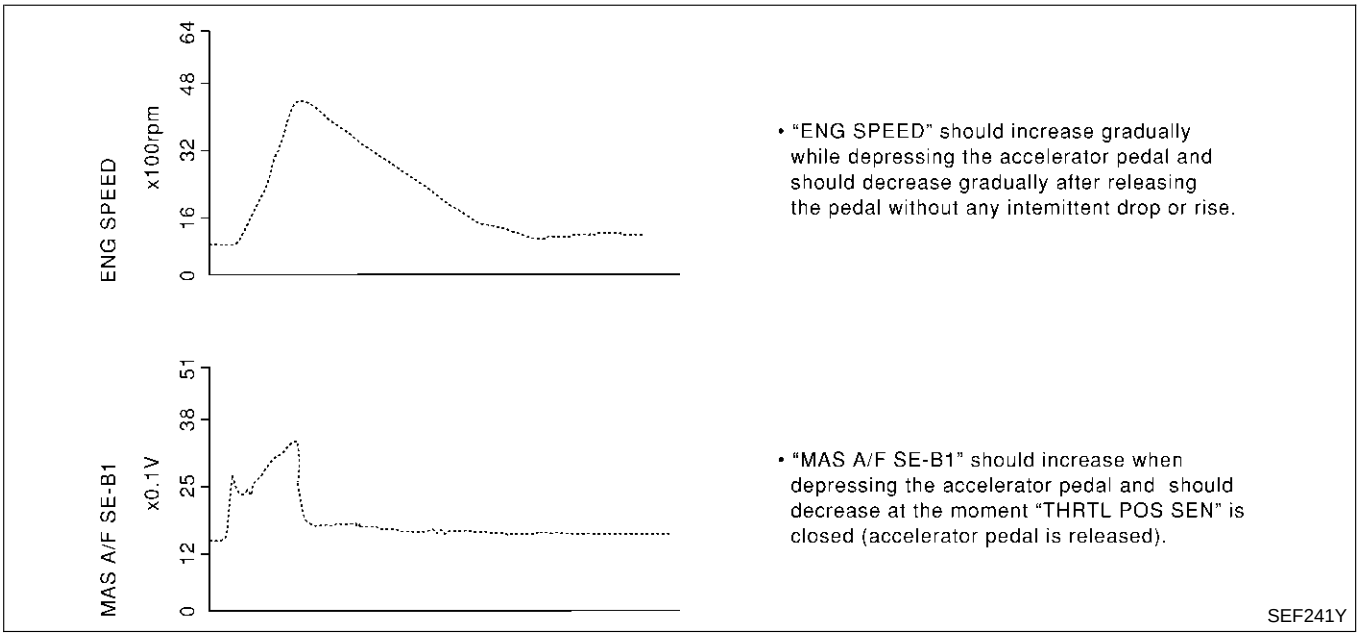
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)

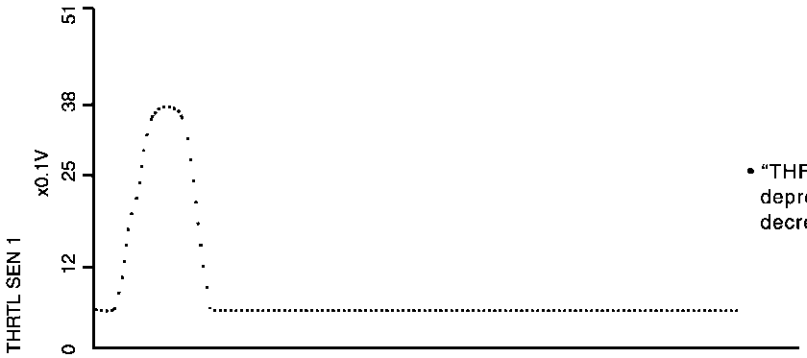
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NHEC1427S02

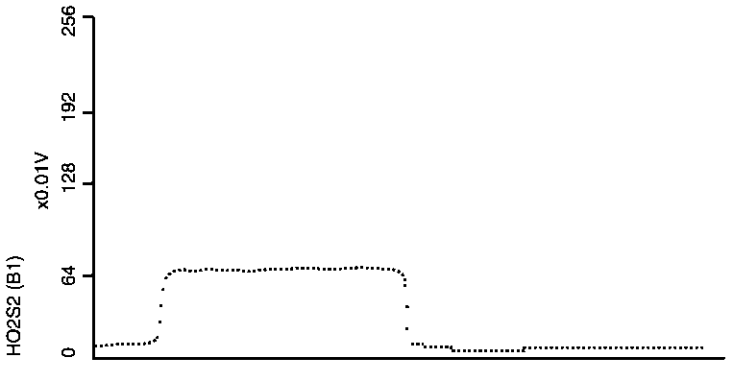
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

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

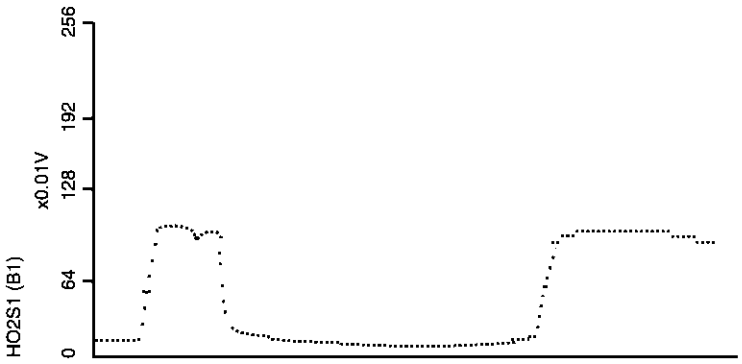




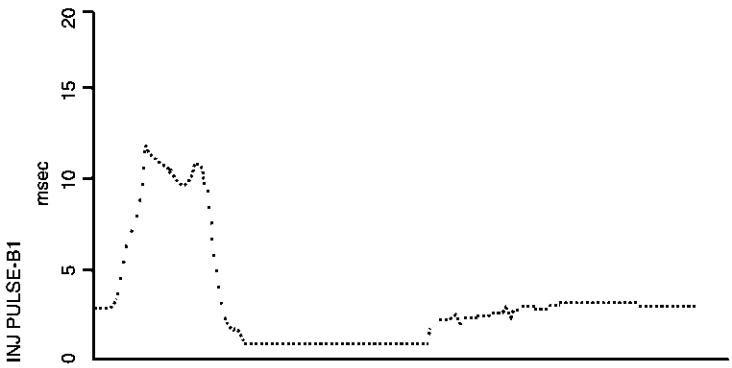
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

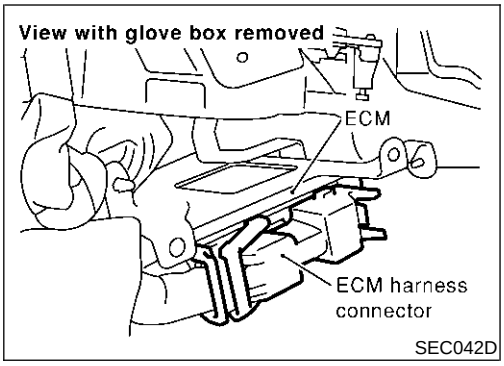


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

PBIB0668E



ECM Terminals and Reference Value

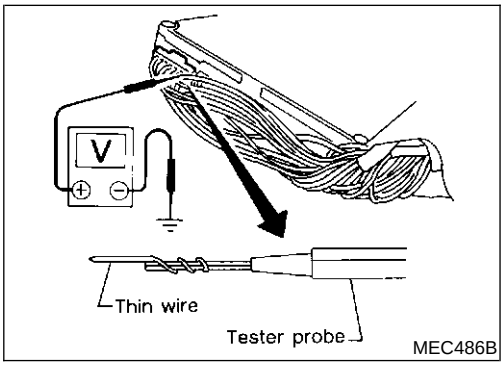
NHEC0044

PREPARATION

NHEC0044S01

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

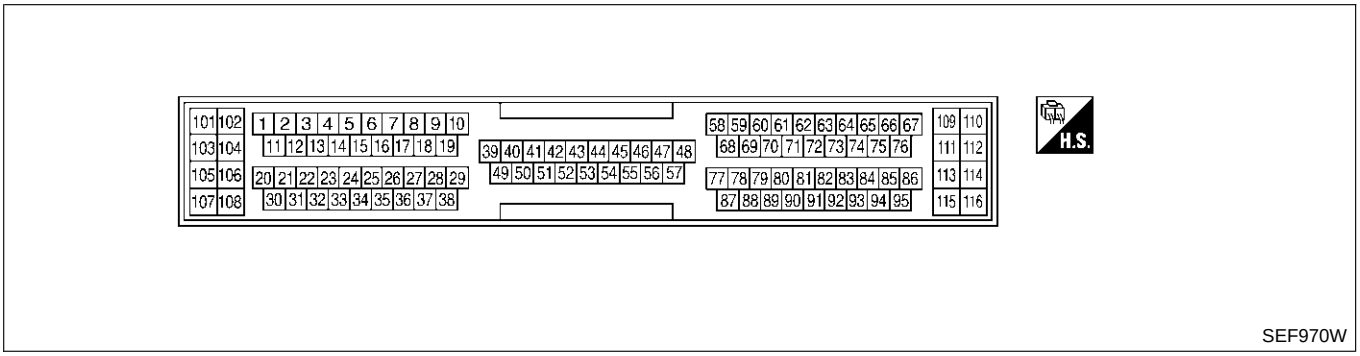
2. Remove ECM harness protector.



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

NHEC0044S02



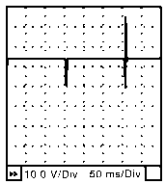
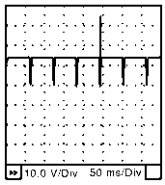
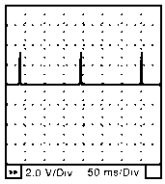
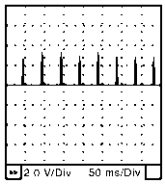
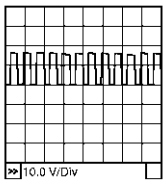
ECM INSPECTION TABLE

NHEC0044S03

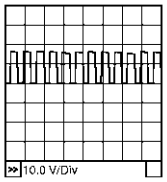
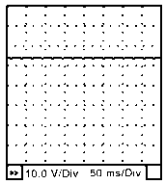
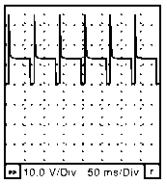
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

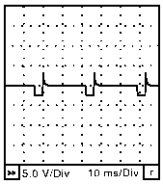
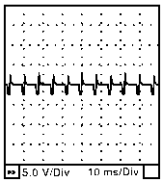
CAUTION:

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

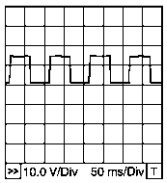
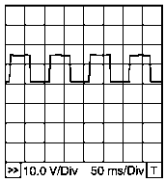
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1 2 3 11 12 13	R/B R/W R/Y R/L L/W PU/R	Injector No. 1 Injector No. 2 Injector No. 3 Injector No. 4 Injector No. 5 Injector No. 6	**[Engine is running]** ● Warm-up condition ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  SEC984C
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)★  SEC985C
4	W	Electronic controlled engine mount-1	**[Engine is running]** ● Idle speed	0 - 1V
			[Engine is running] ● Except the above	BATTERY VOLTAGE (11 - 14V)
5 6 7 15 16 17	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	**[Engine is running]** ● Warm-up condition ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  SEC986C
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEC987C
8	G	Intake valve timing control solenoid valve (bank 2)	**[Engine is running]** ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm.	7 - 12V★  PBIB1790E

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	L/W	Intake valve timing control solenoid valve (bank 1)	**[Engine is running]** ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm.	7 - 12V★  PBIB1790E
10	PU/R	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEC990C
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)★  SEC991C
14	W/R	Electronic controlled engine mount-2	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Except the above	0 - 1V
18	PU/W	Engine coolant temperature sensor signal output	**[Engine is running]** ● Idle speed	0 - 12V Output voltage varies with engine coolant temperature.
21	B/R	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor is operating).	0 - 1.0V
			[Engine is running] ● A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
23	B/P	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.5V
			[Ignition switch "ON"] ● More than 1 second after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

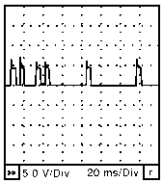
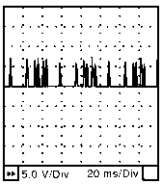
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	Y	ASCD CRUISE lamp	**[Ignition switch "ON"]** ● CRUISE switch is "ON".	0V
			[Ignition switch "ON"] ● CRUISE switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
25	R	ASCD SET lamp	**[Engine is running]** ● SET switch is "ON". ● ASCD control is operating.	0V
			[Engine is running] ● SET or CRUISE switch is "OFF". ● ASCD control is not operating.	BATTERY VOLTAGE (11 - 14V)
26	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
27	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is between 1,800 and 3,600 rpm.	0 - 1.0V
28	OR/G	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
30	PU	A/C cut signal	**[Engine is running]** ● Air conditioner is operating.	0 - 0.5V
31	R	Counter current return	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
33	LG/B	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
34	W/G	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	7 - 8V★  SEC992C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	7 - 8V★  SEC032D
35	BR/R	Cooling fan relay (LOW)	**[Engine is running]** ● Cooling fan is operating.	0 - 1.0V
			[Engine is running] ● Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)

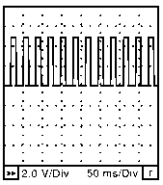
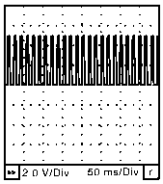
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	LG	Cooling fan relay (HIGH)	**[Engine is running]** ● Cooling fan is operating at high speed.	0 - 1.0V
			[Engine is running] ● Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
38	W/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "ON"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "ON"] ● A few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
39	OR/L	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
40	R/L	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
41	P/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: after warming up – Keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.5V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
42	BR/W	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
43	R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

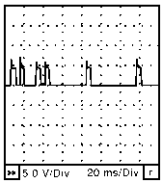
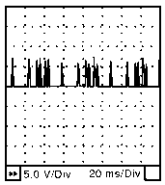
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	G/OR	PNP switch	**[Ignition switch "ON"]** ● General position is "P" or "N".	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
45	G/B	Air conditioner switch signal	**[Engine is running]** ● Both A/C switch and blower switch are "ON".	Approximately 0V
			[Engine is running] ● A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
47	R/L	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: after warming up – Keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.5V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
50	G/Y	ASCD steering switch	**[Ignition switch "ON"]** ● ASCD steering switch: "OFF"	Approximately 4.0V
			[Ignition switch "ON"] ● ON/OFF (MAIN) switch: Pressed	Approximately 0V
			[Ignition switch "ON"] ● CANCEL switch: Pressed	Approximately 1.0V
			[Ignition switch "ON"] ● ACCEL/RESUME switch: Pressed	Approximately 3.0V
			[Ignition switch "ON"] ● COAST/SET switch: Pressed	Approximately 2.0V
51	W/G	Electrical load signal	**[Engine is running]** ● Rear window defogger: ON ● Hi-beam headlamp: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Electrical load: OFF	0V
55	R/G	Stop lamp switch	**[Ignition switch "ON"]** Brake pedal is depressed.	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] Brake pedal is released.	Approximately 0V
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

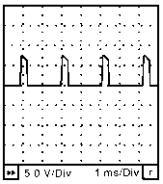
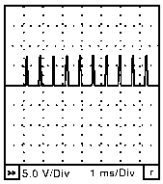
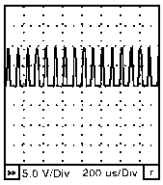
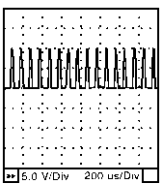
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
59	G/B	ASCD brake switch	**[Ignition switch "ON"]** ● Brake pedal is depressed.	0V
			[Ignition switch "ON"] ● Brake pedal is released.	BATTERY VOLTAGE (11 - 14V)
60	W	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
62	W	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.1 - 1.5V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.7 - 2.4V
64	OR	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
65	Y	Camshaft position sensor (PHASE) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  SEC033D
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  SEC034D
66	Y/G	Mass air flow sensor (Intake air temperature sensor)	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
68	P/L	Vehicle speed sensor	**[Engine is running]** ● Jack-up front wheels ● In 1st gear position ● 10 km/h (6 MPH)	Approximately 2.5V★  SEC039D
			[Engine is running] ● Jack-up front wheels ● In 2nd gear position ● 30 km/h (19 MPH)	Approximately 2.5V★  SEC040D
69	G	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
70	B/P	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V
71	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
72	W	Accelerator pedal position sensor signal output	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal released	Approximately 0.6V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	Approximately 4.0V
73	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal released	0.41 - 0.71V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 3.7V
74	W/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Accelerator pedal released	0.08 - 0.48V
			[Ignition switch "ON"] ● Engine stopped ● Accelerator pedal fully depressed	More than 1.8V
75	P/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
78	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
80	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
81	W	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V
83	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Gear position is "D" ● Accelerator pedal released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Gear position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
84	L	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Gear position is "D" ● Accelerator pedal released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Gear position is "D" ● Accelerator pedal fully depressed	More than 0.36V
85	R	Camshaft position sensor (PHASE) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  SEC033D
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  SEC034D
88	W	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. – After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
89	G	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
90	W	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met. – After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
91	W	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
92	W	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
93	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
95	W	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 2.4V★  SEC035D
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V★  SEC036D
101	Y	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Gear position is "D" ● Accelerator pedal fully depressing	0 - 14V★  SEC037D
102	R	Throttle control motor relay	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "OFF"]	0 - 1.0V
103	BR	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Gear position is "D" ● Accelerator pedal releasing	0 - 14V★  SEC038D

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105	OR/L	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
107	B	Throttle control motor ground	**[Ignition switch "ON"]**	Approximately 0V
109	L	CAN communication line	**[Ignition switch "ON"]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
110 112	R/G R/G	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	R	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
113	R	CAN communication line	**[Ignition switch "ON"]**	Approximately 1.7 - 2.3V Output voltage varies with the communication status.
115	OR	Data link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Description

NHEC0717

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)

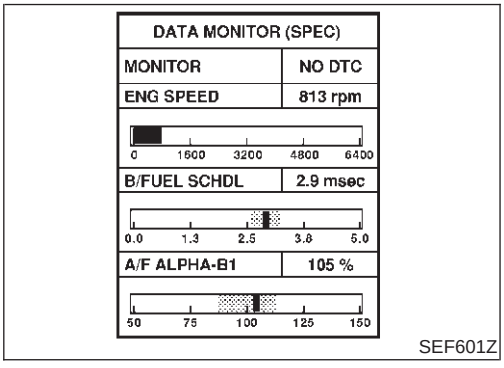
Testing Condition

NHEC0718

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- 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: 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.

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



Inspection Procedure

NHEC0719

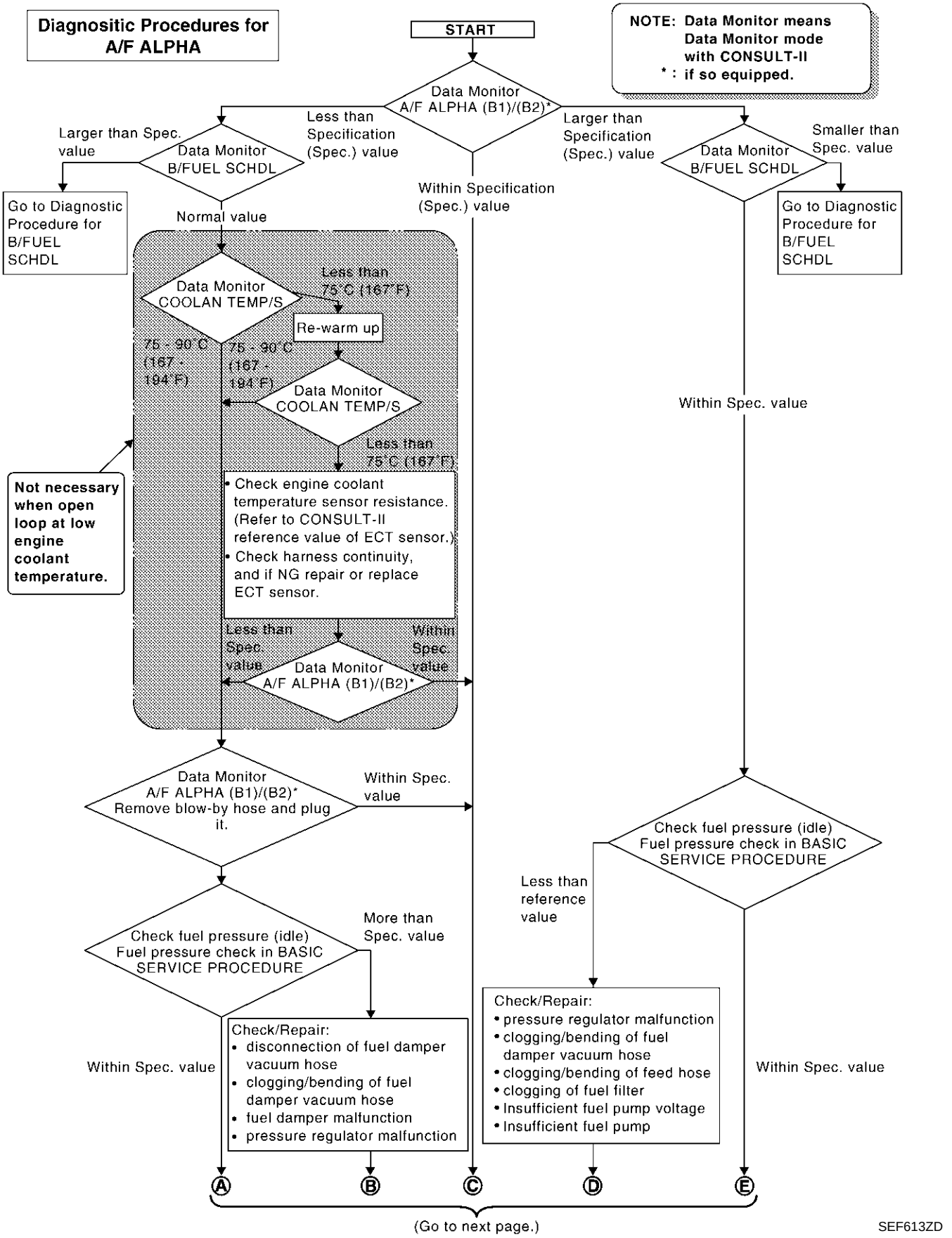
NOTE:

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

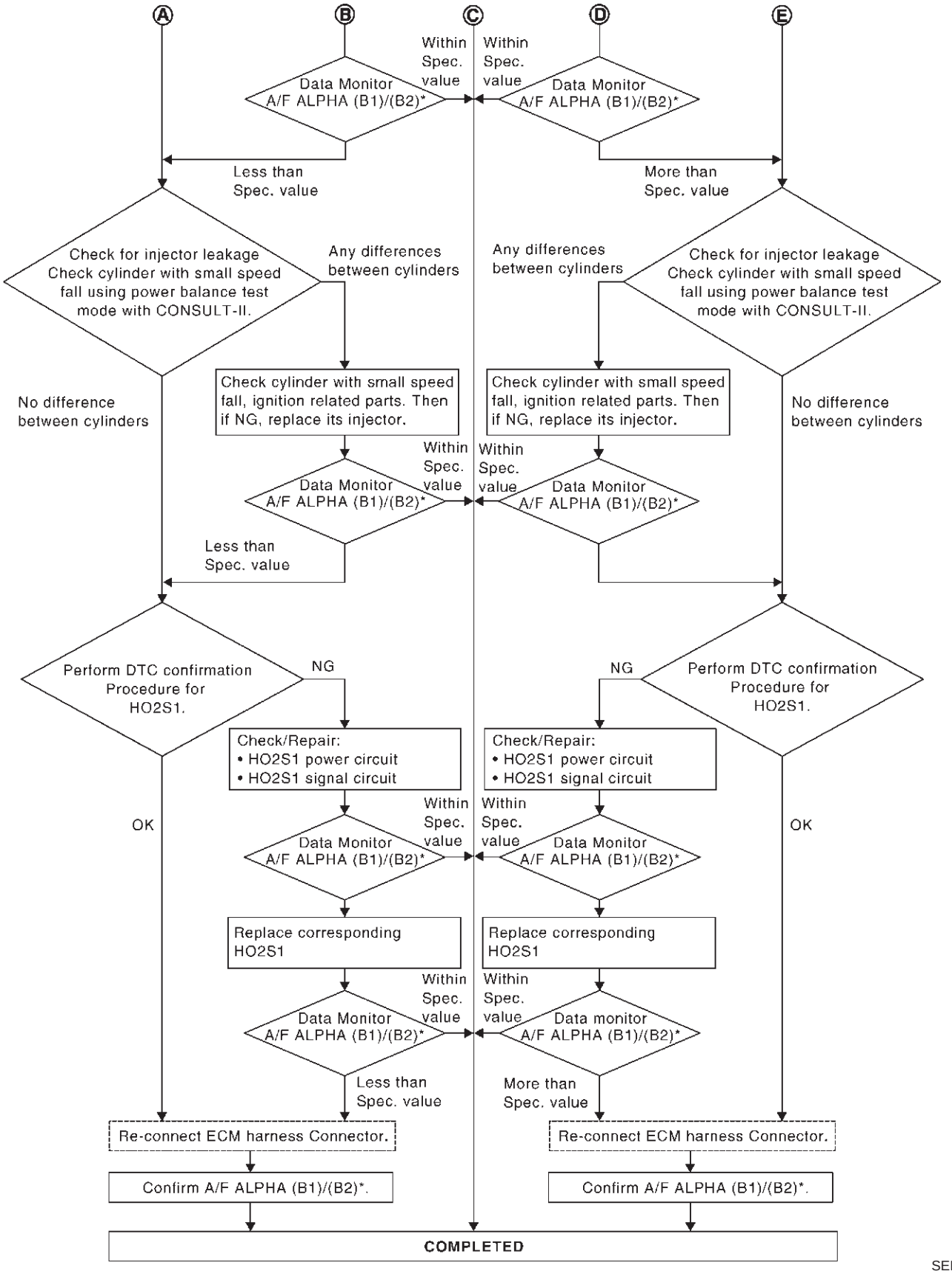
1. Perform "Basic Inspection", EC-119.
2. Confirm that the testing conditions indicated above are met.
3. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2" and "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to "Diagnostic Procedure", EC-148.

Diagnostic Procedure

NHEC0720

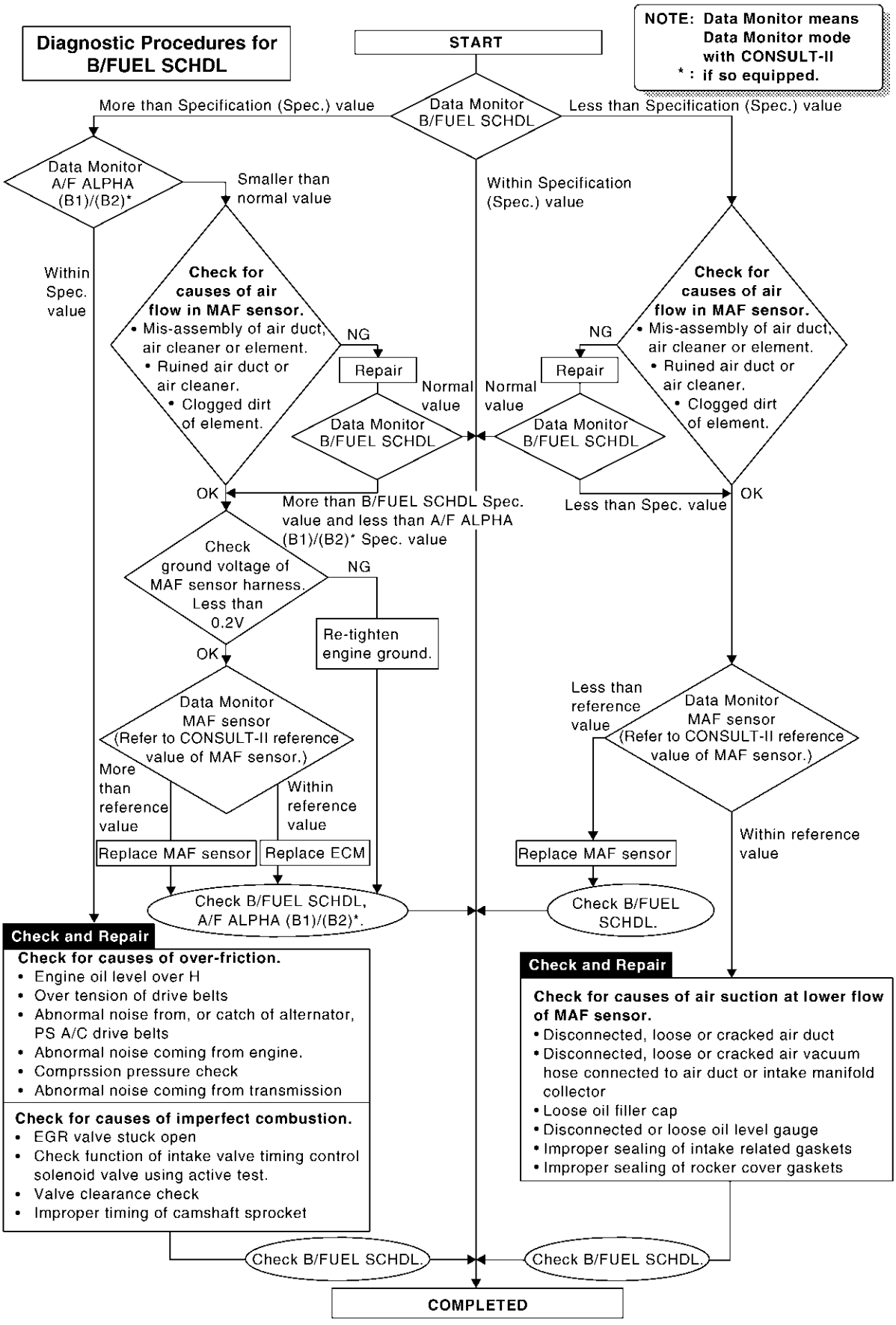


SEF613ZD


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Data Monitor A/F ALPHA (B1)/(B2)*
Within Spec. value
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Perform DTC confirmation Procedure for HO2S1.
NG
OK
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Replace corresponding HO2S1
Data monitor A/F ALPHA (B1)/(B2)*
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z

Diagnostic Procedure (Cont'd)



Description

NHEC0045

Intermittent incidents (I/I) may occur. In many cases, the malfunction 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 malfunctioning area.

COMMON I/I REPORT SITUATIONS

NHEC0045S01

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 malfunctioning area.

Diagnostic Procedure

NHEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-89.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS	
Check ground terminals for corroding or loose connection. Refer to GI-31, "GROUND INSPECTION".		
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Repair or replace.

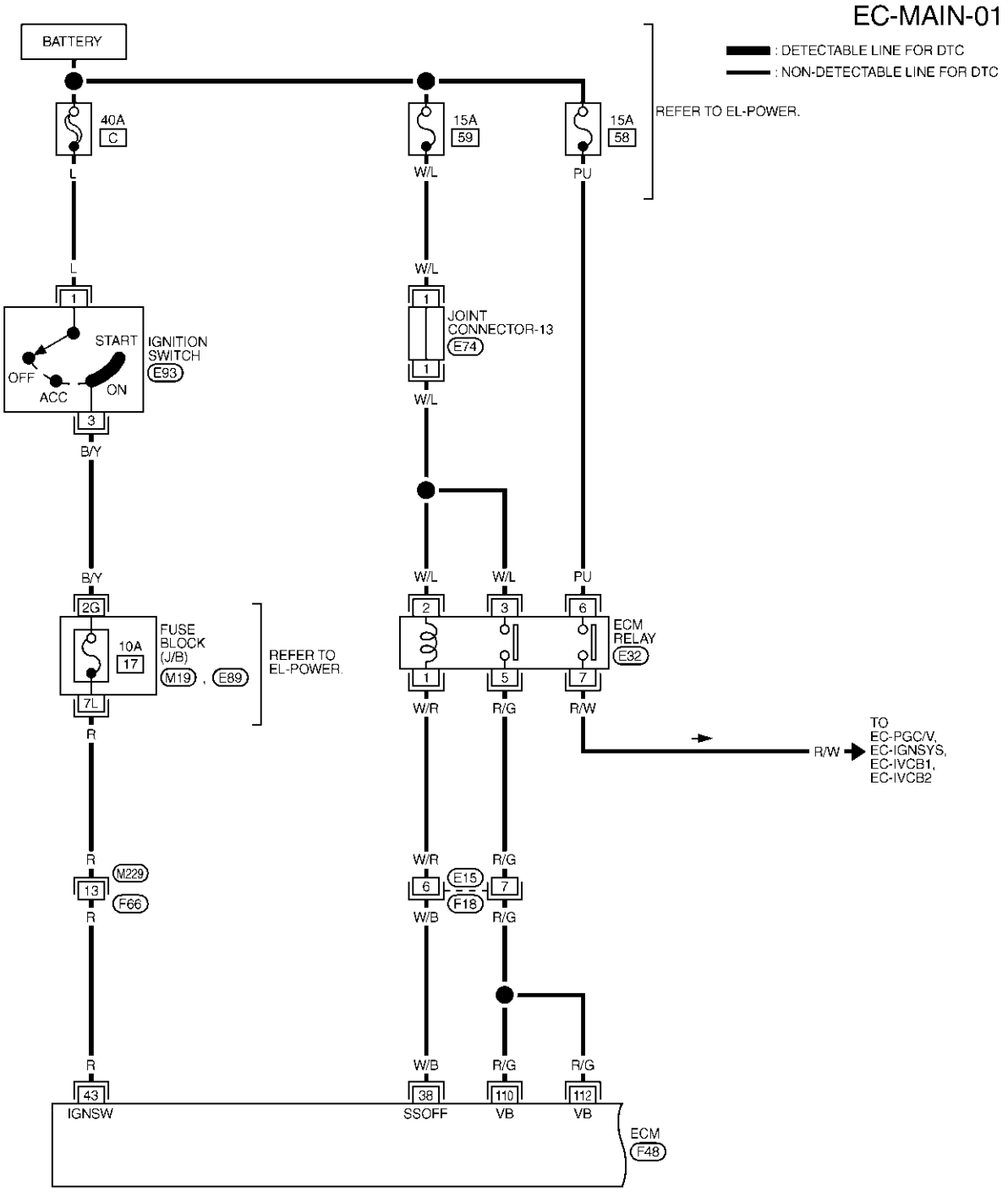
3	SEARCH FOR ELECTRICAL INCIDENT	
Perform GI-26, "Incident Simulation Tests".		
	OK or NG	
OK	▶	GO TO 4.
NG	▶	Repair or replace.

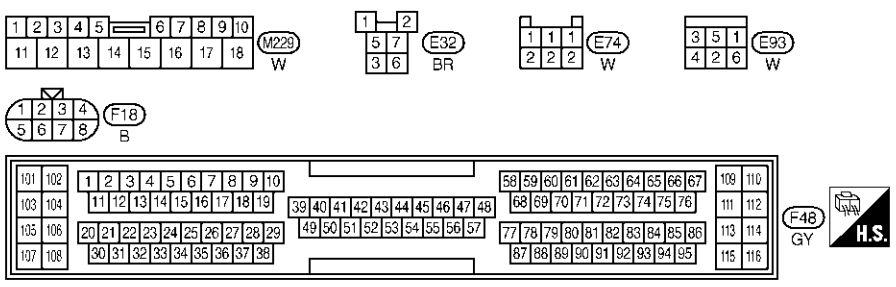
4	CHECK CONNECTOR TERMINALS	
Refer to GI-22, "How to Check Enlarged Contact Spring of Terminal".		
	OK or NG	
OK	▶	**INSPECTION END**
NG	▶	Repair or replace connector.

Main Power Supply and Ground Circuit

WIRING DIAGRAM

NHEC0047

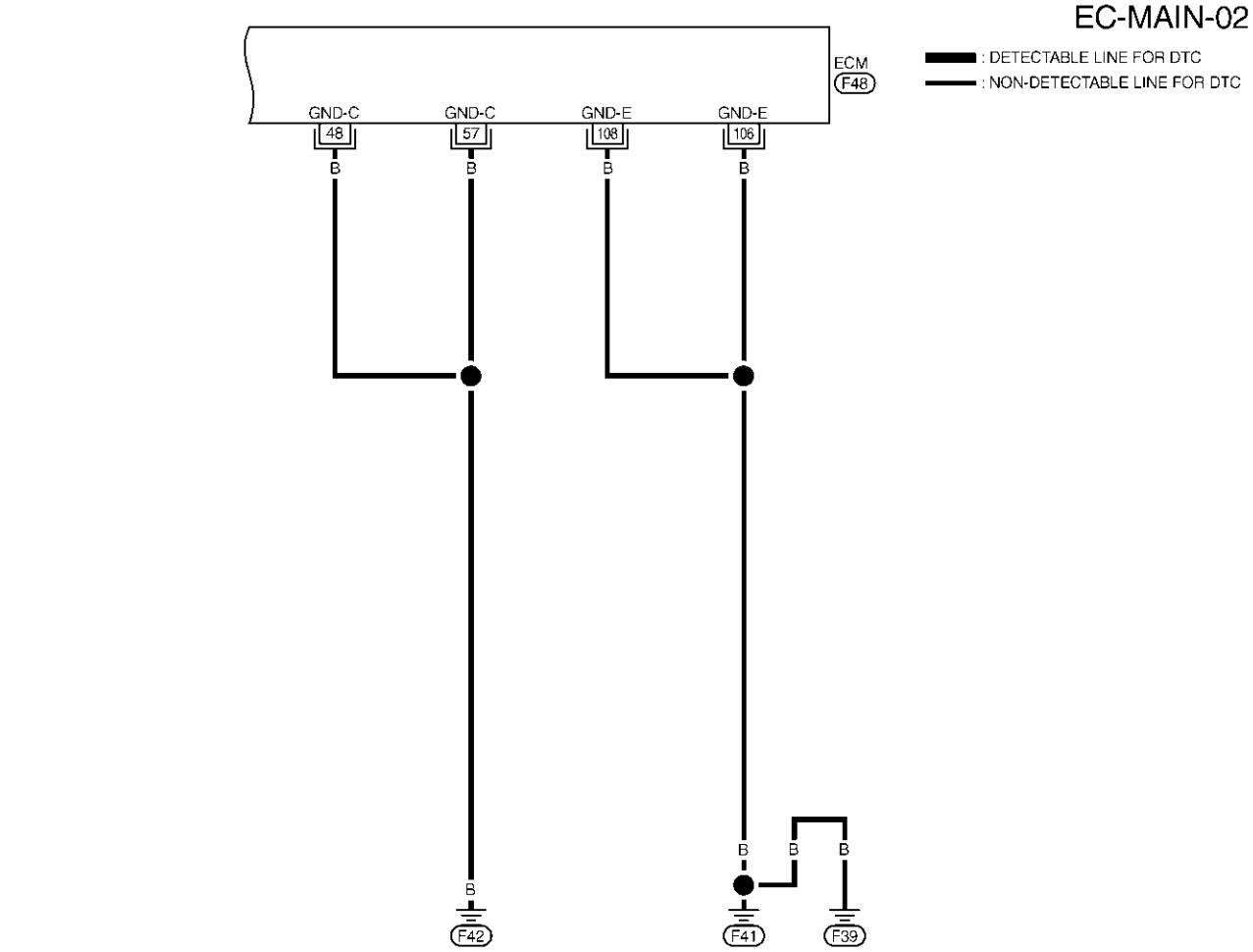




REFER TO THE FOLLOWING.
M19 , E89 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC529D

EC-MAIN-02



MEC717C

ECM TERMINALS AND REFERENCE VALUE 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.

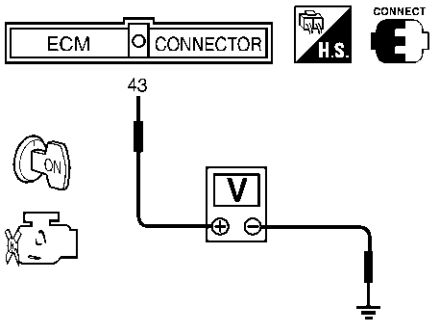
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
31	R	COUNTER CURRENT RETURN	IGN ON	BATTERY VOLTAGE
38	W/B	ECM RELAY (SELF-SHUTOFF)	ENGINE RUNNING FOR A FEW SECONDS AFTER TURNING IGN OFF	0 - 1.5V
			A FEW SECONDS PASSED AFTER TURNING IGN OFF	BATTERY VOLTAGE
43	R	IGN	IGN OFF	0V
			IGN ON	BATTERY VOLTAGE
48	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
57	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
106	B	ECM GROUND	ENGINE RUNNING AT IDLE SPEED	ENGINE GROUND
108	B			
110	R/G	POWER SUPPLY FOR ECM	IGN ON	BATTERY VOLTAGE
112	R/G			

SEC043D

DIAGNOSTIC PROCEDURE

NHEC0049

1	INSPECTION START
Start engine. **Is engine running?**	
Yes or No	
Yes ▶	GO TO 9.
No ▶	GO TO 2.

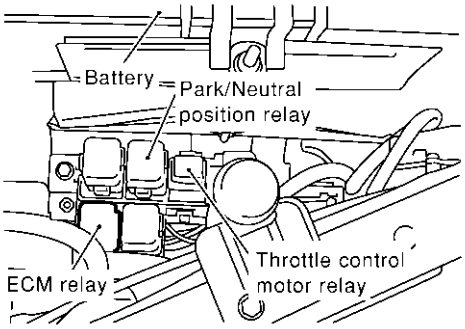
2	CHECK ECM POWER SUPPLY CIRCUIT-I
1. Turn ignition switch "OFF" and then "ON". 2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.	
 **Voltage: Battery voltage** SEF291X	
OK or NG	
OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● Harness connectors M229, F66 ● Fuse block (J/B) connectors M19, E89 ● Harness for open or short between ECM and ignition switch	
▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 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.

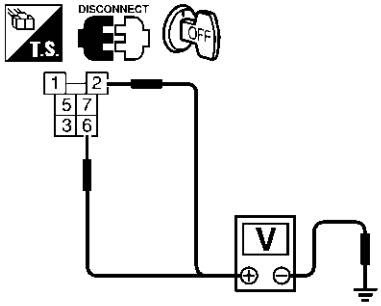
5	CHECK POWER SUPPLY-II

1. Disconnect ECM relay.



SEC044D

2. Check voltage between ECM relay terminals 2, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF292X

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuses
- Joint connector-13
- Harness for open or short between ECM relay and battery

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

7	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 38 and ECM relay terminal 1. Refer to WIRING DIAGRAM.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	Go to "IGNITION SIGNAL", EC-677.
NG	▶	GO TO 8.

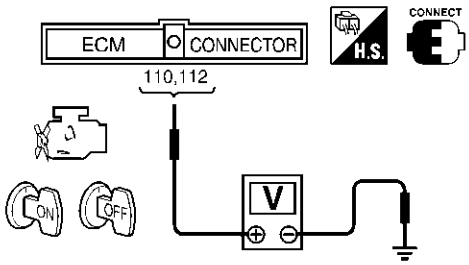
8	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 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 ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



Voltage:
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop approximately 0V.

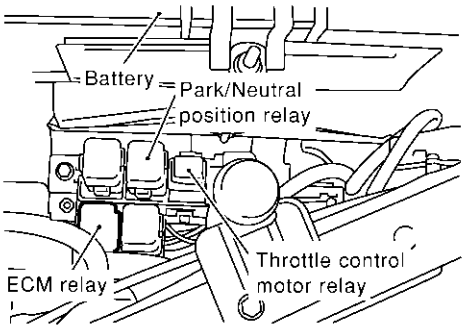
SEF294X

OK or NG

OK	▶	GO TO 15.
NG (Battery voltage does not exist.)	▶	GO TO 10.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 12.

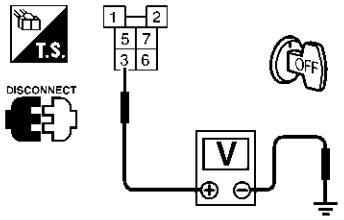
10	CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.



SEC044D

2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF295X

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-13 ● Harness for open or short between ECM relay and 15A fuse	
▶	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

1. Check harness continuity between ECM terminals and ECM relay terminals as follows.
   Refer to WIRING DIAGRAM.

ECM terminal	ECM relay terminal
31	7
110, 112	5

MTBL1139

Continuity should exist.

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

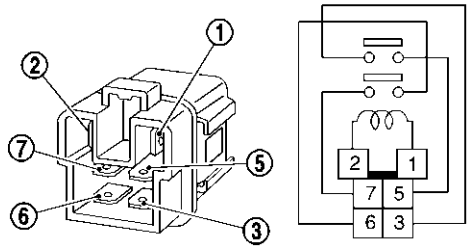
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E15, F18 ● Harness for open or short between ECM and ECM relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.



Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace ECM relay.

15	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II	
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. 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 16.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

Description

NHEC1245

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electonic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

NHEC1246

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	• ECM cannot communicate to other control unit. • ECM cannot communicate for more than the specified time.	• Harness or connectors (CAN communication line is open or shorted.)
U1001*2 1001*2			

*1: This self-diagnosis has the one trip detection logic.

*2: The MIL will not light up for this diagnosis.

DTC Confirmation Procedure

NHEC1247

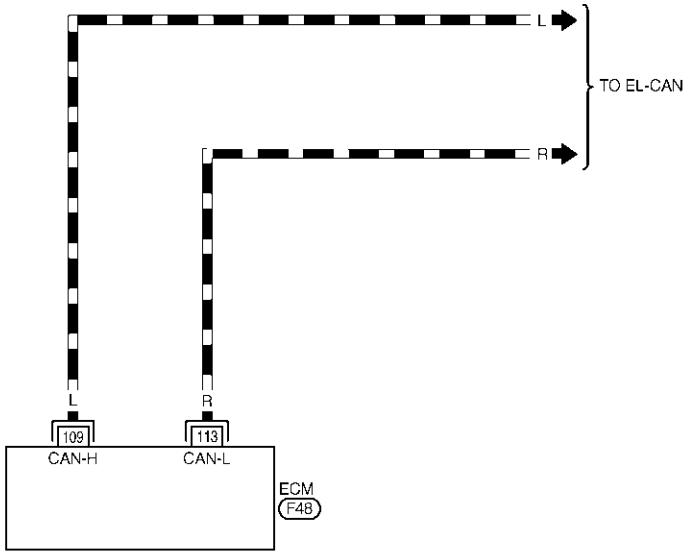
1. Turn ignition switch “ON” and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to “Diagnostic Procedure” EC-161.

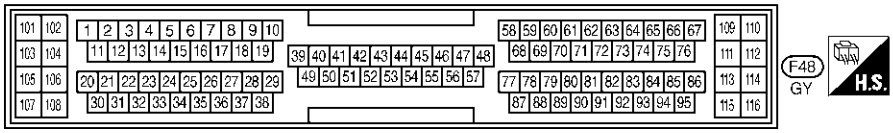
Wiring Diagram

NHEC1248

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





MEC578D

Diagnostic Procedure

NHEC1249

Go to EL-450 (With TCS models) or EL-463 (With VDC models), “CAN SYSTEM”.

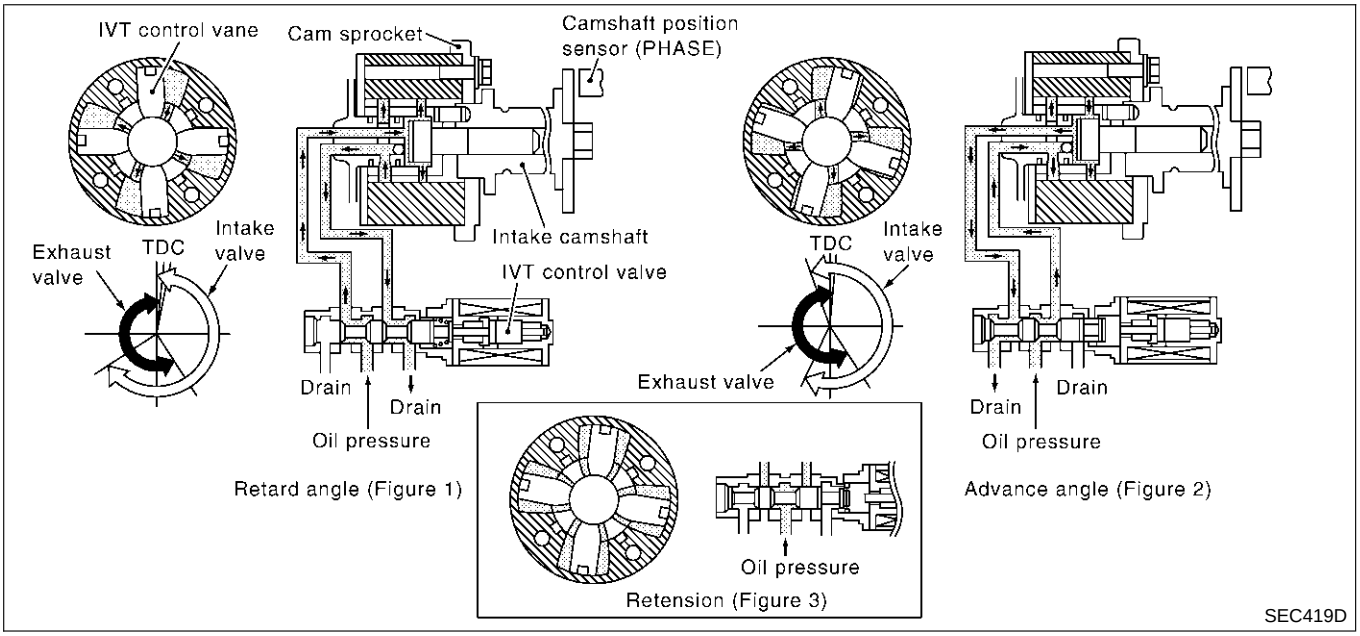
Description

NHEC0821

SYSTEM DESCRIPTION

NHEC0821S01

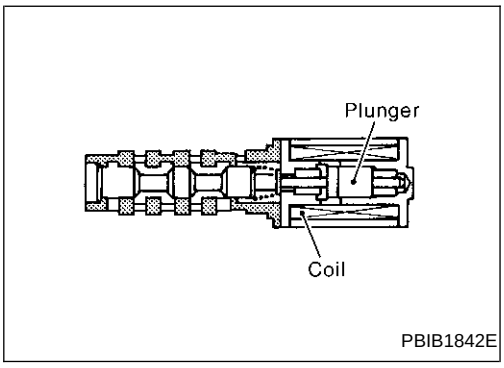
Sensor	Input signal to ECM function	ECM	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed sensor	Vehicle speed		



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the camshaft timing control valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

COMPONENT DESCRIPTION

NHEC0821S02



Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advantages valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0822

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever “N” • Quickly depressed accelerator pedal • No-load	Idle	−5 - 5° CA
		2,000 rpm	Approximately 0 - 30° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever “N” • Quickly depressed accelerator pedal • No-load	Idle	0 - 2%
		2,000 rpm	Approximately 25 - 50%

On Board Diagnosis Logic

NHEC0824

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0011 0011 (Bank 1) P0021 0021 (Bank 2)	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

NHEC0824S01

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function.

DTC Confirmation Procedure

NHEC0825

CAUTION:

Always drive at a safe speed.

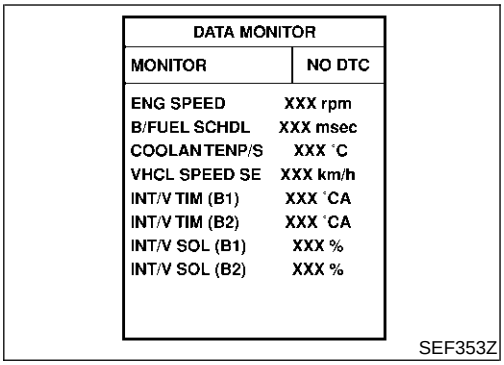
NOTE:

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 between 10V and 16V at idle.

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC0825S03

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 20 conecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105°C (158 - 221°F)
Selector lever	1st position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-168.

WITH GST

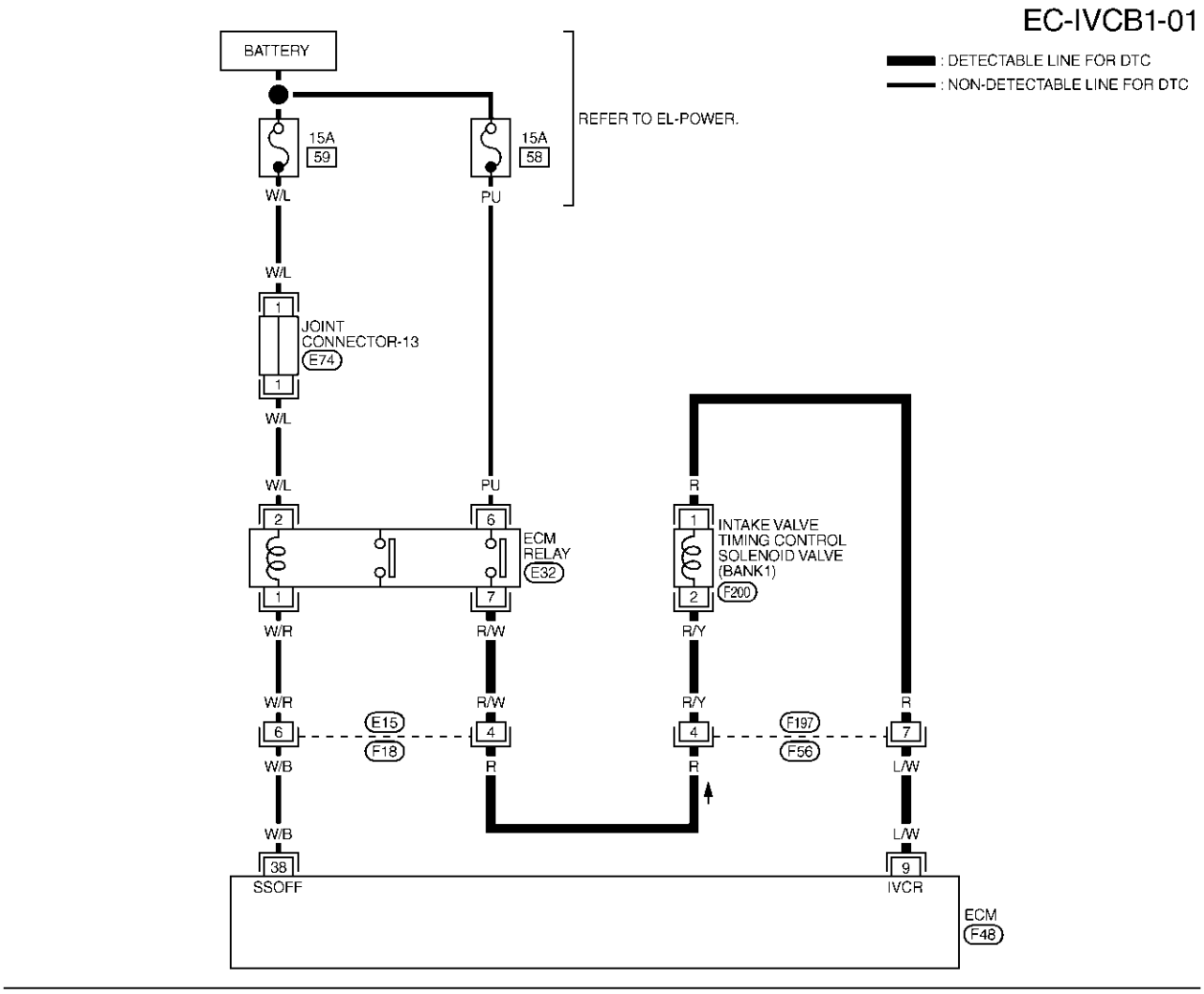
NHEC0825S04

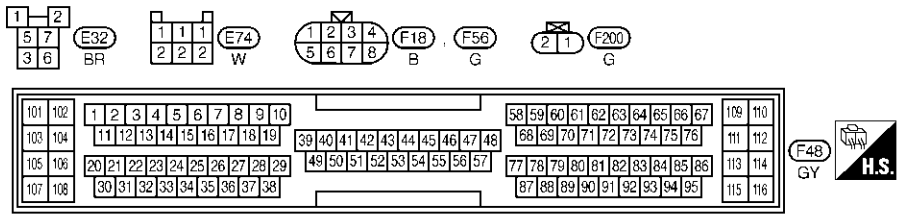
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC1409

BANK 1

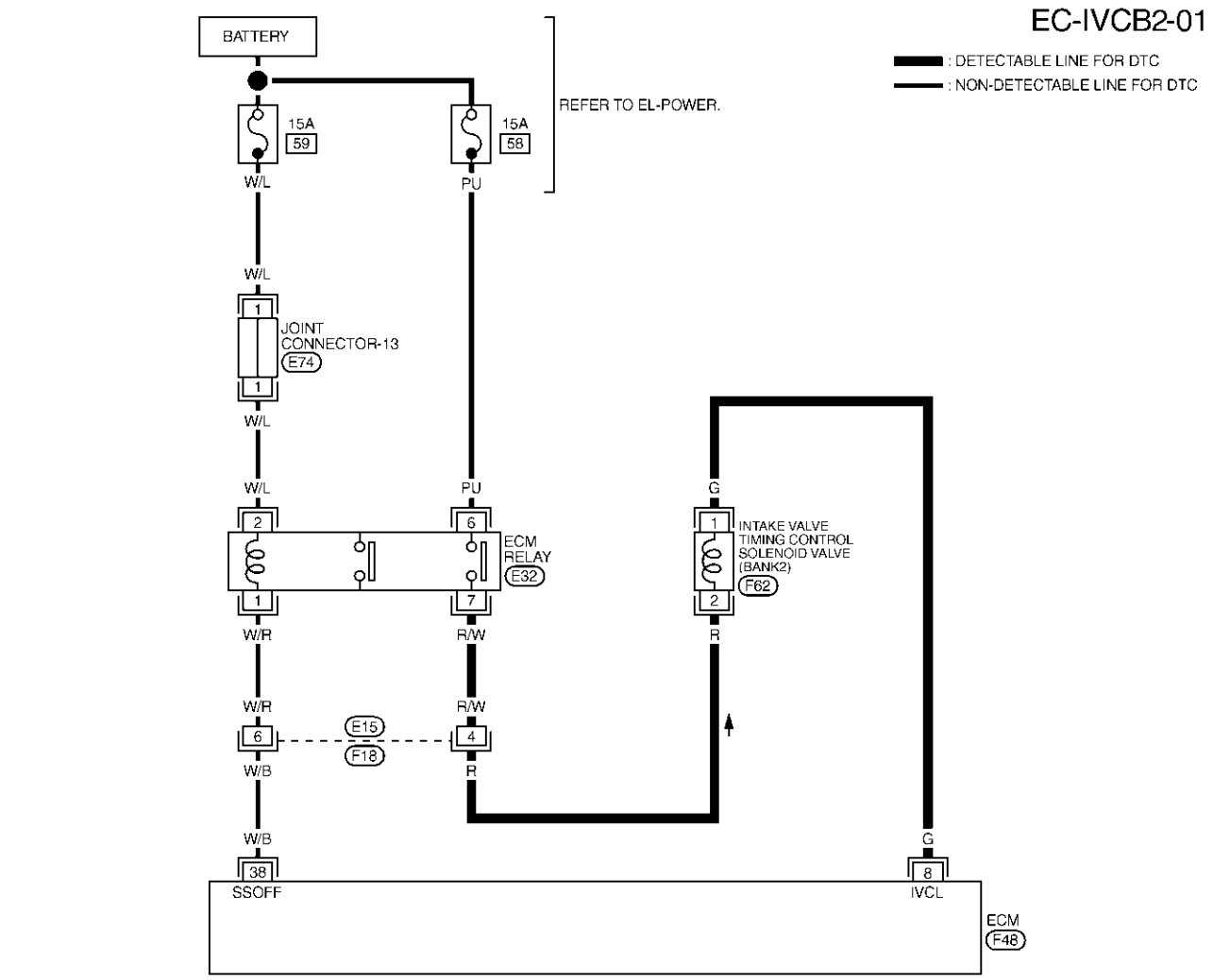


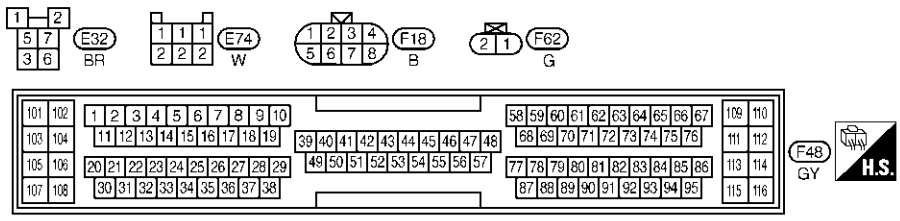


MEC575D

Wiring Diagram (Cont'd)

BANK 2



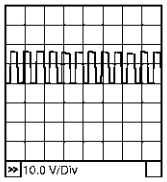
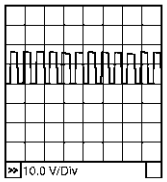


MEC348E

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

CAUTION:

Do not use ECM ground terminals when measuring 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)
8	G	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	7 - 12V★  PBIB1790E
9	L/W	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	7 - 12V★  PBIB1790E

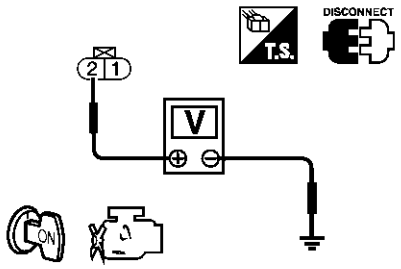
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

NHEC1410

1	CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.



PBIB0192E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTION PART

Check the following.
- Harness connectors E15, F18
- Harness connectors F56, F197
- Harness for open or short between intake valve timing control solenoid valve and ECM relay

	▶	Repair harness or connectors.

3	CHECK INTAKE VALVE TIMING CONTROL SOLENOID 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 9 (bank 1) or 8 (bank 2) and intake valve timing control solenoid valve terminal 1. 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	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

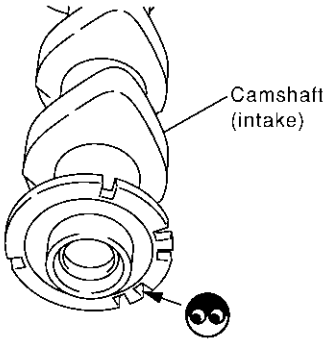
Check the following
- Harness connectors F56, F197
- Harness for open or short between intake valve timing control solenoid valve and ECM

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

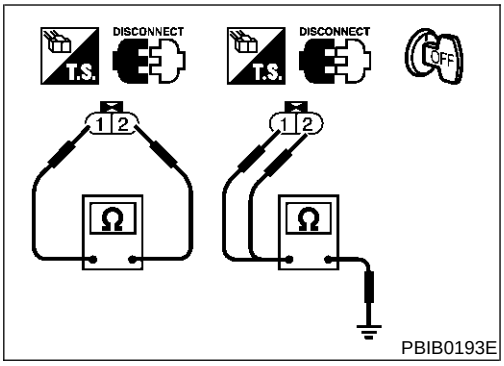
5	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE	
Refer to "Component Inspection", EC-170.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace intake valve timing control solenoid valve.

6	CHECK CRANKSHAFT POSITION SENSOR (POS)	
Refer to "Component Inspection", EC-316.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (POS).

7	CHECK CAMSHAFT POSITION SENSOR (PHASE)	
Refer to "Component Inspection", EC-325.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace.

8	CHECK CAMSHAFT (INTAKE)	
Visually check for chipped signal plate at camshaft rear.		
 SEC905C		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace camshaft.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
OK or NG		
	▶	**INSPECTION END**



Component Inspection

NHEC1411

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.0 - 7.5Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)

Description

NHEC0826

SYSTEM DESCRIPTION

NHEC0826S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heaters
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

NHEC0826S02

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 3,600	OFF
Below 3,600 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

NHEC0827

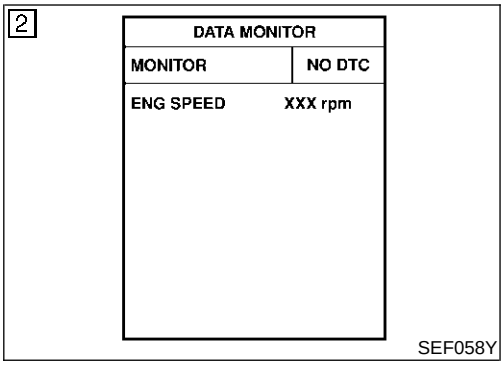
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine: After warming up • Engine speed: Below 3,600 rpm	ON
	• Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

NHEC0829

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0031 0031 (Bank 1) P0051 0051 (Bank 2)	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • Heated oxygen sensor 1 heater
P0032 0032 (Bank 1) P0052 0052 (Bank 2)	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) • Heated oxygen sensor 1 heater



DTC Confirmation Procedure

NHEC0830

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 between 10.5V and 16V at idle.

WITH CONSULT-II

NHEC0830S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
4) Start engine and run it for at least 6 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-176.

WITH GST

NHEC0830S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and run it for at least 6 seconds at idle speed.
4) Turn ignition switch “OFF” and wait at least 10 seconds.
5) Start engine and run it for at least 6 seconds at idle speed.
6) Select “MODE 3” with GST.
7) If DTC is detected, go to “Diagnostic Procedure”, EC-176.

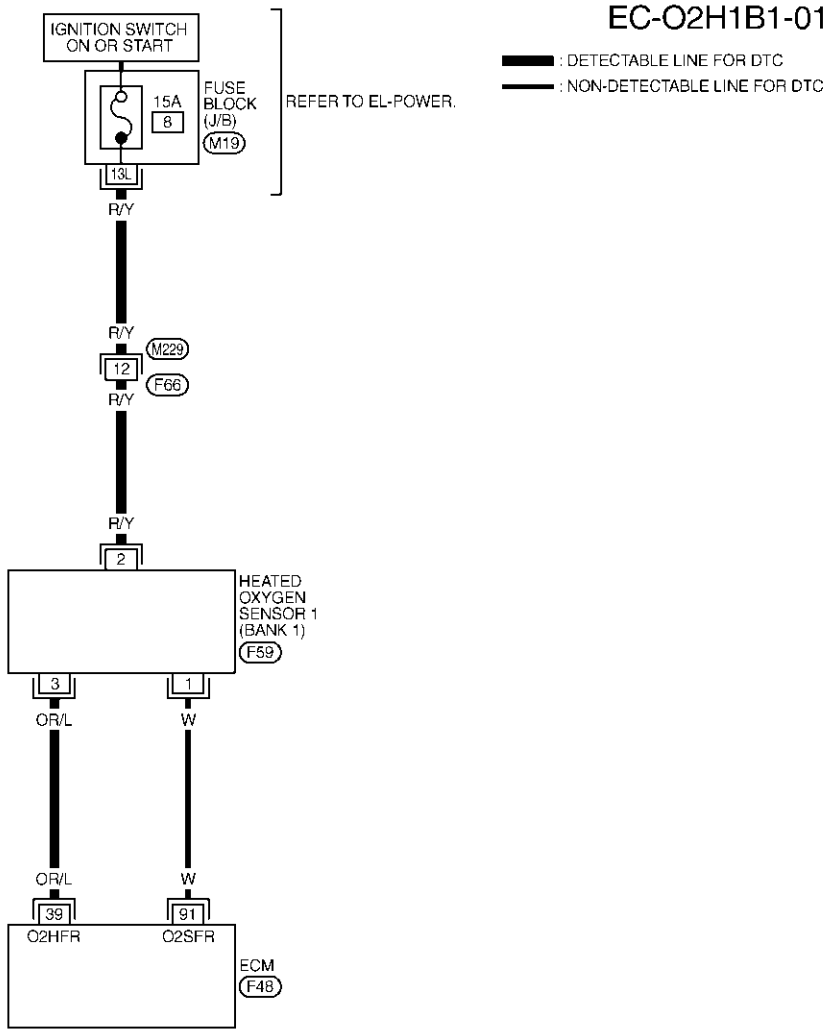
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

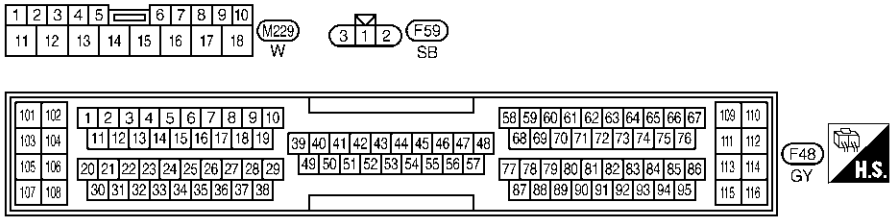
Wiring Diagram

NHEC0831

BANK 1

NHEC0831S01





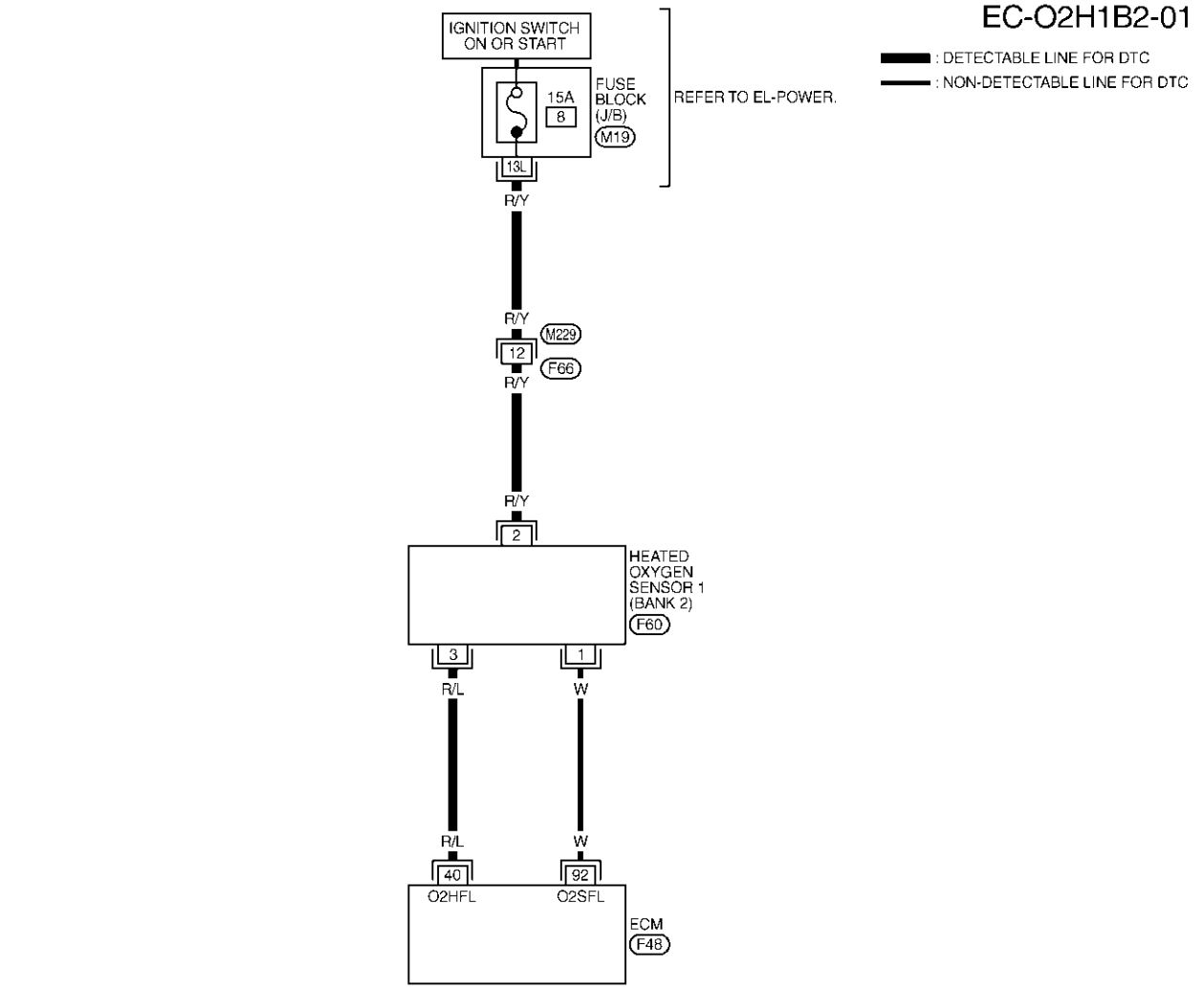
REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC539D

Wiring Diagram (Cont'd)

BANK 2

NHEC0831S02

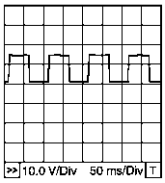
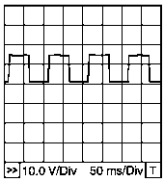


MEC540D

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	OR/L	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
40	R/L	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 7V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

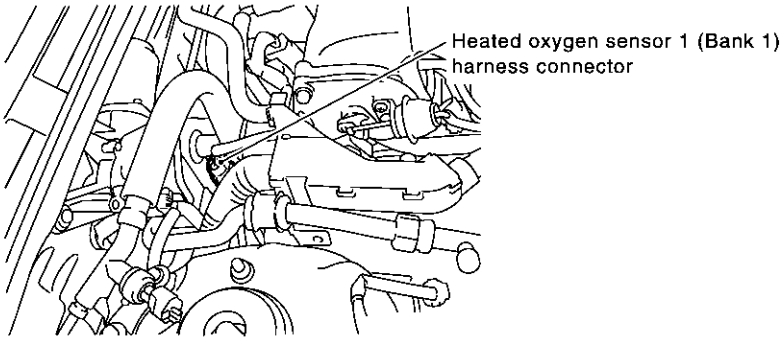
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

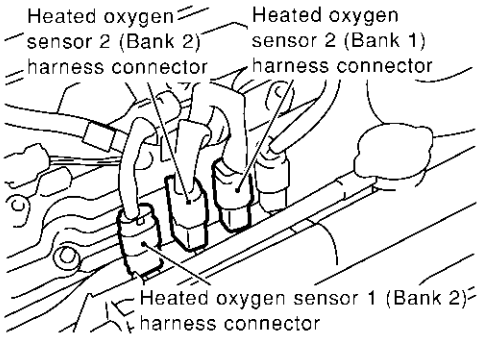
NHEC0832

1	CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.

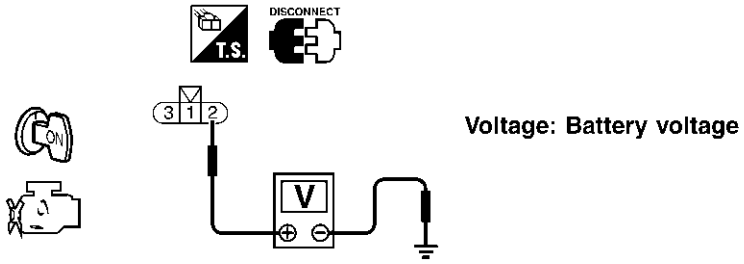


SEC099D



SEC134D

3. Turn ignition switch “ON”.
4. Check voltage between HO2S1 terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF311X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

	▶	Repair harness or connectors.

3	CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0031, P0032	39	3	Bank 1
P0051, P0052	40	3	Bank 2

MTBL1140

Continuity should exist.

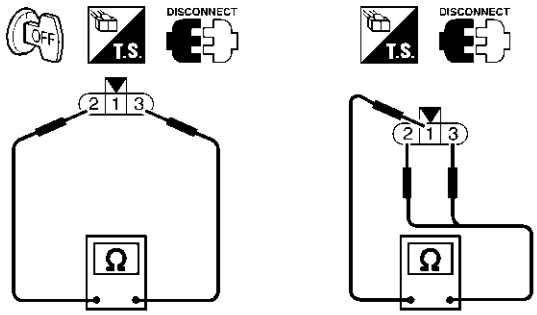
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
2 and 3	3.3 - 4.0Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310XA

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.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**

Description

NHEC0833

SYSTEM DESCRIPTION

NHEC0833S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor heater 2 control	Heated oxygen sensor 2 heaters
Engine coolant temperature sensor	Engine coolant temperature		
Main air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

NHEC0833S02

Engine speed rpm	Heated oxygen sensor 2 heaters
Above 3,600	OFF
Below 3,600 (After the following conditions are met.) ● After warming up ● After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

NHEC0834

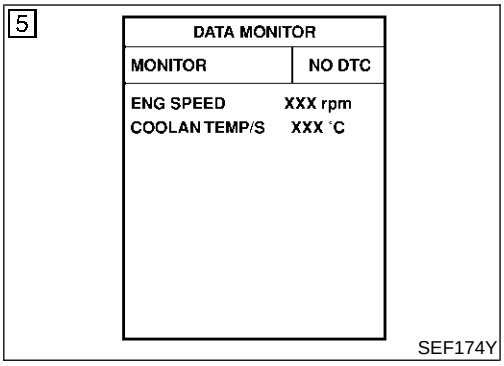
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine is running above 3,600 rpm.	OFF
	● Engine is running below 3,600 rpm after the following conditions are met. ● After warming up ● After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

On Board Diagnosis Logic

NHEC0836

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0037 0037 (Bank 1) P0057 0057 (Bank 2)	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heated oxygen sensor 2 heater
P0038 0038 (Bank 1) P0058 0058 (Bank 2)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heated oxygen sensor 2 heater



DTC Confirmation Procedure

NHEC0837

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 between 11.0V and 16V at idle.

WITH CONSULT-II

NHEC0837S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to the normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5) Let engine idle for 1 minute.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-182.

WITH GST

NHEC0837S02

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7) Let engine idle for 1 minute.
8) Select "MODE 3" with GST.
9) If DTC is detected, go to "Diagnostic Procedure", EC-182.

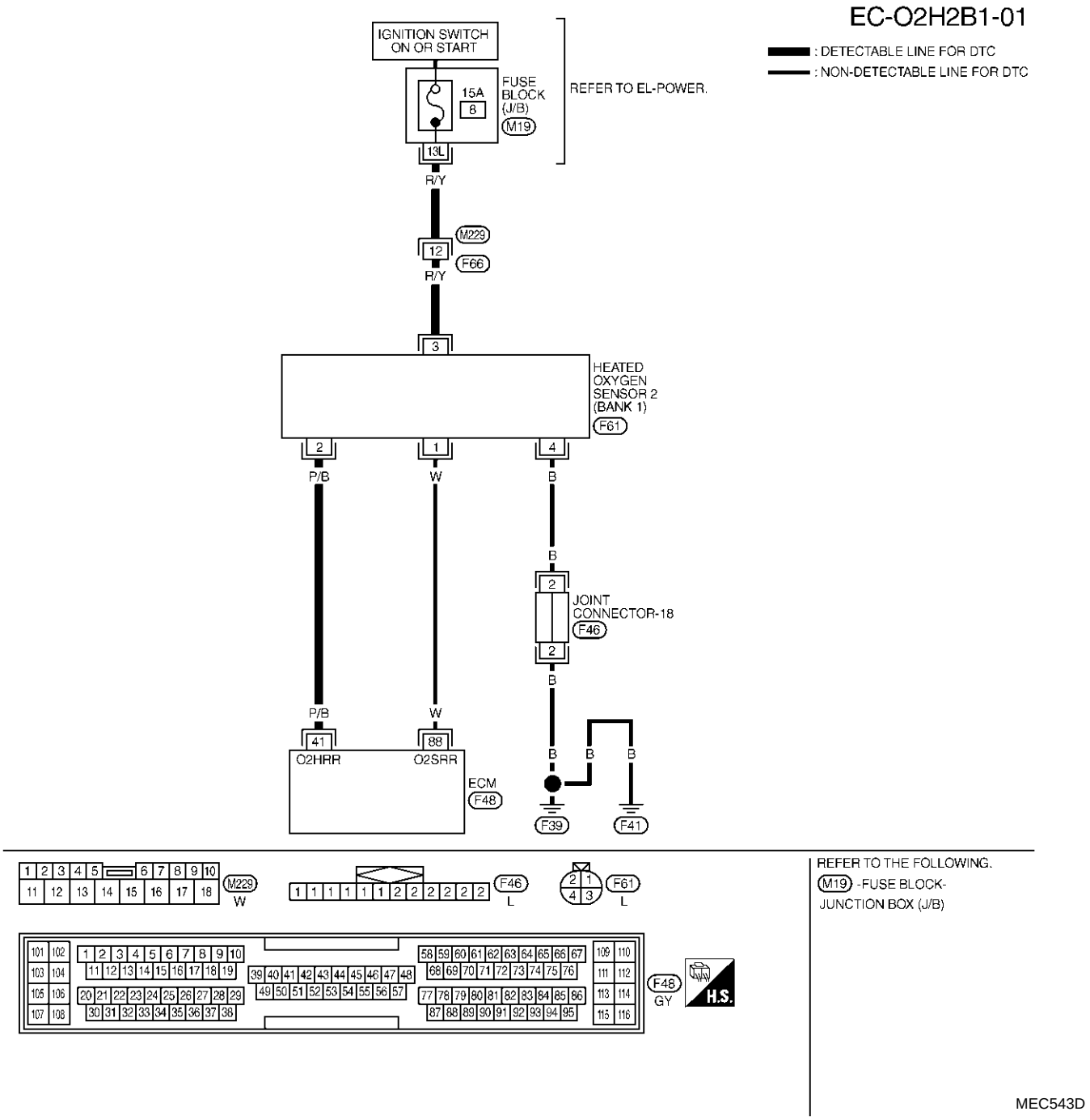
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

=NHEC0838

BANK 1

NHEC0838S01



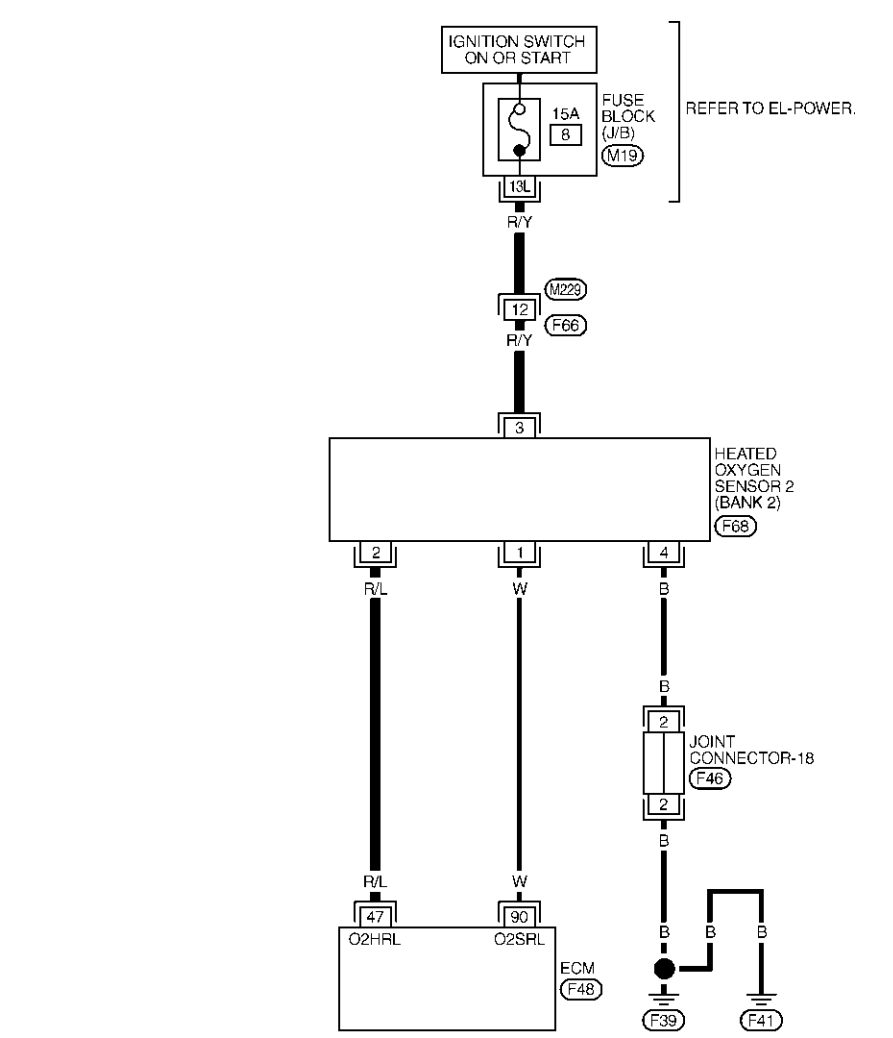
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

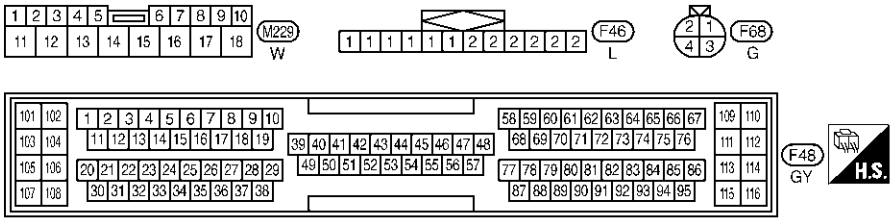
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
41	P/B	HEATED OXYGEN SENSOR 2 HEATER (BANK 1)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			• ENGINE SPEED: BELOW 3,600 RPM AFTER THE FOLLOWING CONDITIONS ARE MET • ENGINE: AFTER WARMING UP • KEEP ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - 1.0V

SEC659DC

BANK 2

NHEC0838S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC544D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
47	R/L	HEATED OXYGEN SENSOR 2 HEATER (BANK 1)	IGN ON	BATTERY VOLTAGE
			ENGINE RUNNING ABOVE 3,600 RPM	
			• ENGINE SPEED: BELOW 3,600 RPM AFTER THE FOLLOWING CONDITIONS ARE MET • ENGINE: AFTER WARMING UP • KEEP ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - 1.0V

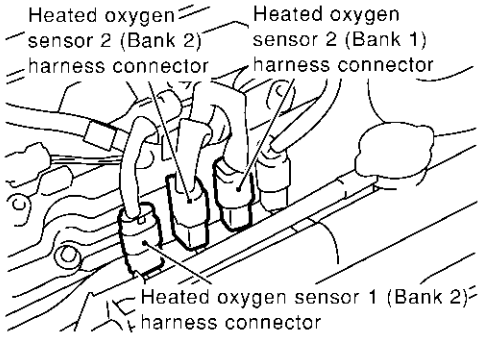
SEC660DC

Diagnostic Procedure

NHEC0839

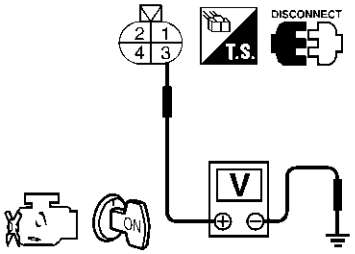
1	CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 2 harness connector.



SEC134D

3. Turn ignition switch “ON”.
4. Check voltage between HO2S2 terminal 3 and ground.



Voltage: Battery voltage

SEF314X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

	▶	Repair harness or connectors.

3	CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	41	2	Bank 1
P0057, P0058	47	2	Bank 2

MTBL1141

Continuity should exist.

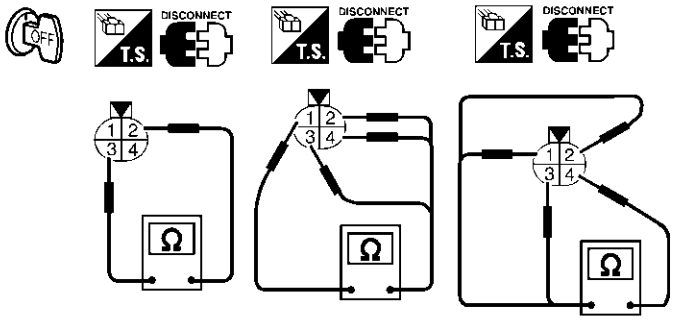
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the resistance between HO2S2 terminals as follows.



Terminal No.	Resistance
2 and 3	3.3 - 4.0Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist.)
4 and 1, 2, 3	

SEF315XE

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.**

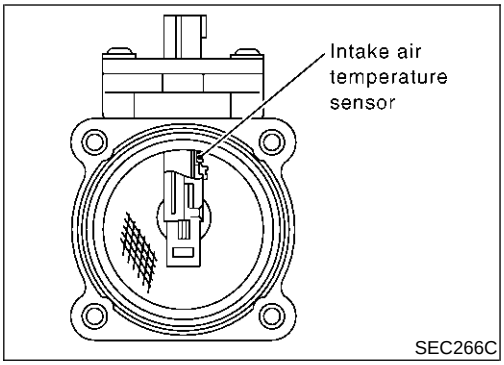
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**



Component Description

NHEC0840

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 film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film 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 film as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0841

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.1 - 1.5V
		2,500 rpm	1.7 - 2.4V
CAL/LD VALUE	ditto	Idle	10 - 35%
		2,500 rpm	10 - 35%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

NHEC1428

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition		Possible Cause
P0101 0101	Mass air flow sensor circuit range/ performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor

DTC Confirmation Procedure

NHEC0844

Perform “PROCEDURE MALFUNCTION A” first. If the 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 10 seconds before conducting the next test.

3

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

SEF174Y

PROCEDURE FOR MALFUNCTION A

NHEC0844S01

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

NHEC0844S0101

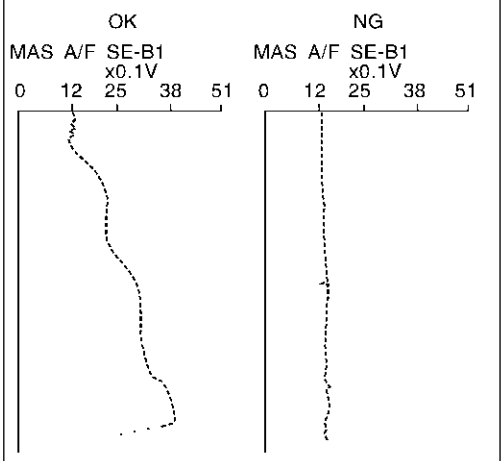
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and warm it up to normal operating temperature.
4) Run engine for at least 10 seconds at idle speed.
5) If DTC is detected, go to "Diagnostic Procedure", EC-188.

With GST

NHEC0844S0102

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

PROCEDURE FOR MALFUNCTION B

NHEC0844S02

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

NHEC0844S0201

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-188.**
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-188.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

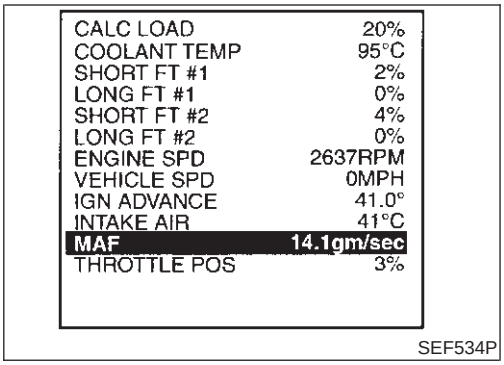
ENG SPEED	More than 2,000 rpm
THRTL SEN 1 THRTL SEN 2	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If DTC is detected, go to "Diagnostic Procedure", EC-188.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL SEN 1	XXX V
THRTL SEN 2	XXX V

PBIB0199E



Overall Function Check

NHEC0845

PROCEDURE FOR MALFUNCTION B

NHEC0845S01

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

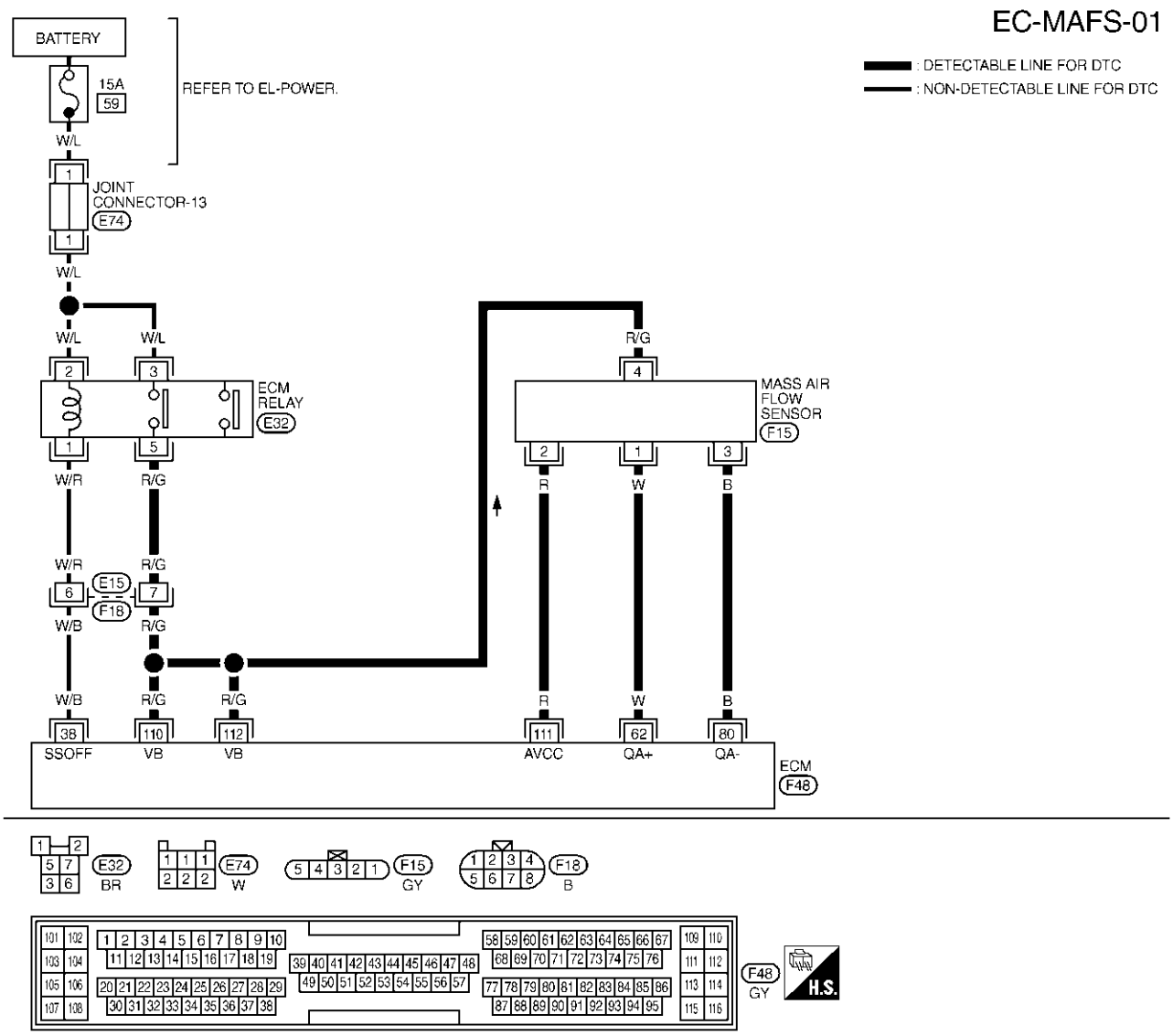
With GST

NHEC0845S0101

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-188.

Wiring Diagram

NHEC0846



MEC531D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.1 - 1.5V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.7 - 2.4V
80	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

SEF650XE

Diagnostic Procedure

NHEC0847

1	INSPECTION START

Which malfunction (A, B) is duplicated?

MALFUNCTION	Type
A	I
B	II

MTBL1142

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

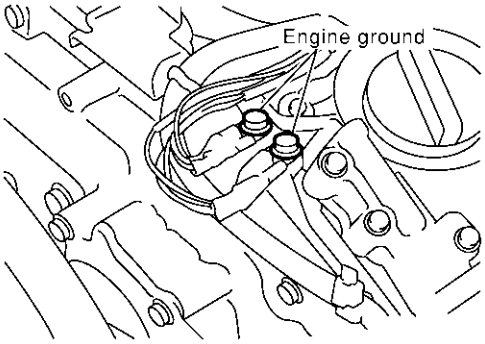
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

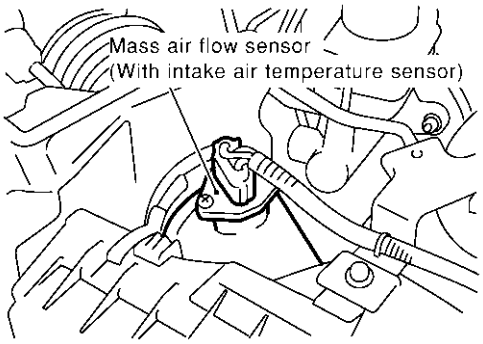


SEC047D

	▶	GO TO 4.

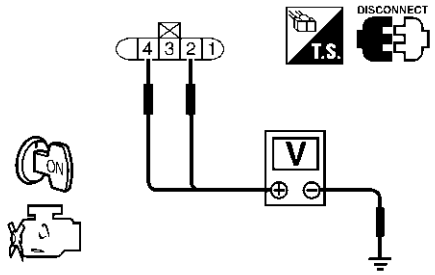
4	CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.



SEC055D

2. Turn ignition switch "ON".
3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.



Terminal	Voltage
2	Approximately 5
4	Battery voltage

SEF297X

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 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 MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80.
   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.

Diagnostic Procedure (Cont'd)

7	CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

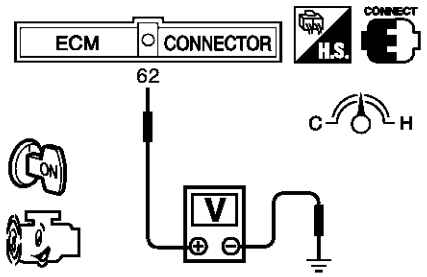
1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 62.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

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 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 62 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.4
Idle to about 4,000 rpm*	1.1 - 1.5 to Approx. 4.0

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

SEC103D

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again.
   Then repeat above check.

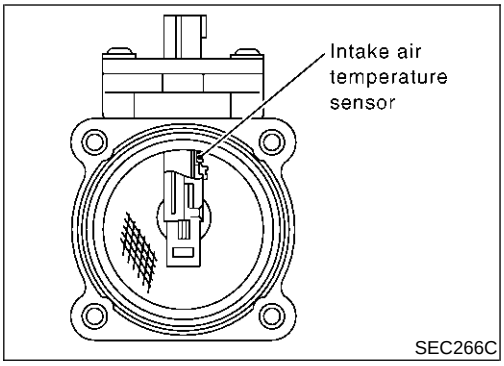
OK or NG

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

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**



Component Description

NHEC0746

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 film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film 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 film as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0747

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.1 - 1.5V
		2,500 rpm	1.7 - 2.4V
CAL/LD VALUE	ditto	Idle	10 - 35%
		2,500 rpm	10 - 35%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

NHEC1429

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

NHEC1429S01

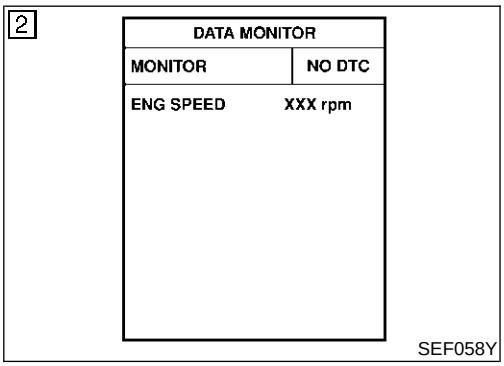
When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

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

NHEC1430

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.



PROCEDURE FOR DTC P0103

NHEC1430S01

With CONSULT-II

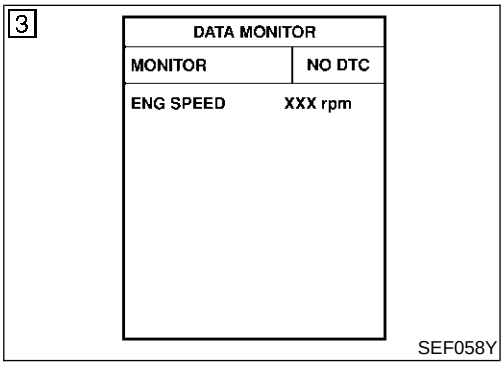
NHEC1430S0101

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-194.

With GST

NHEC1430S0102

Follow the procedure “With CONSULT-II” above.



PROCEDURE FOR DTC P0102

NHEC1430S02

With CONSULT-II

NHEC1430S0201

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-194.

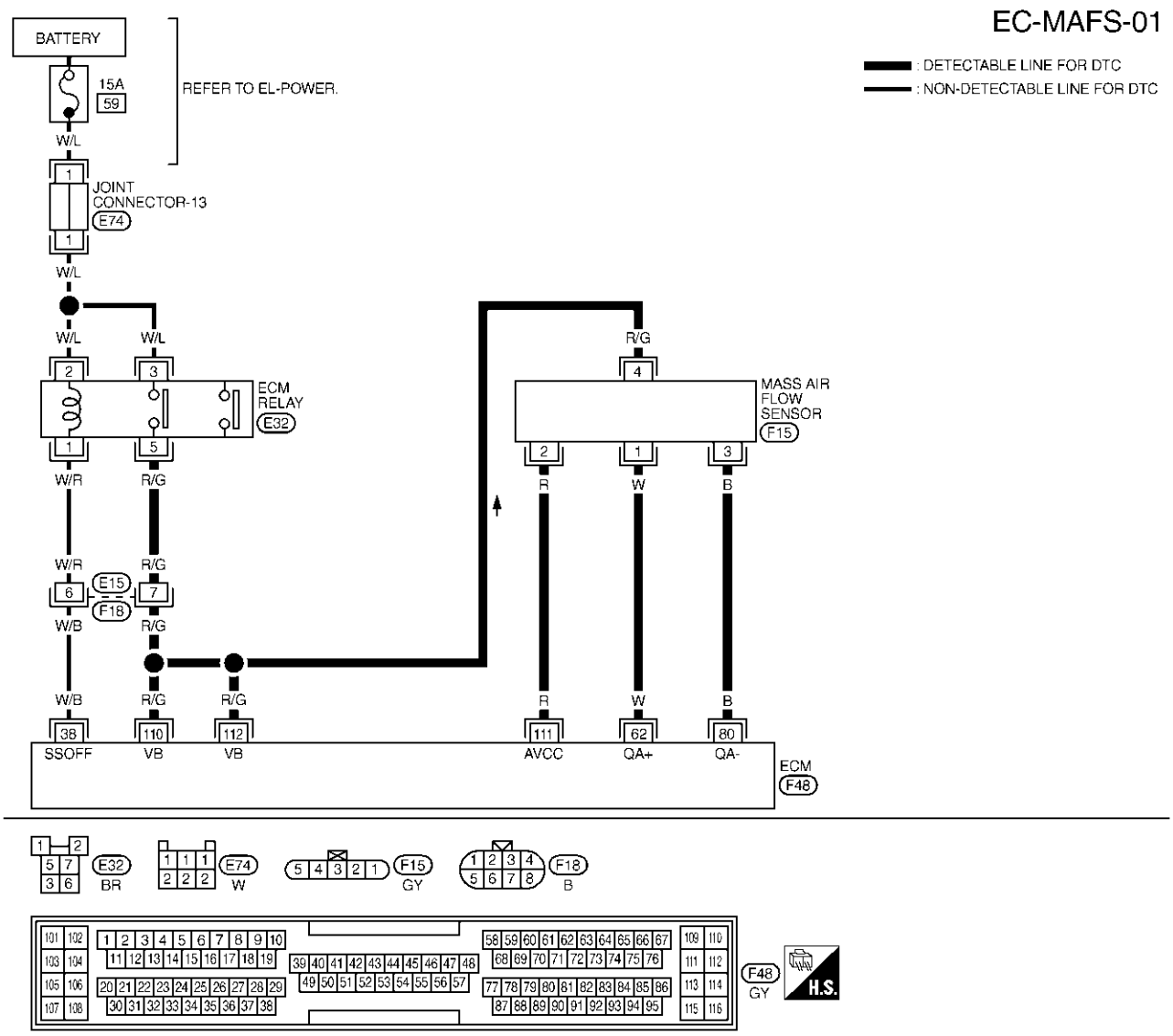
With GST

NHEC1430S0202

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC0753



MEC531D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.1 - 1.5V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.7 - 2.4V
80	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

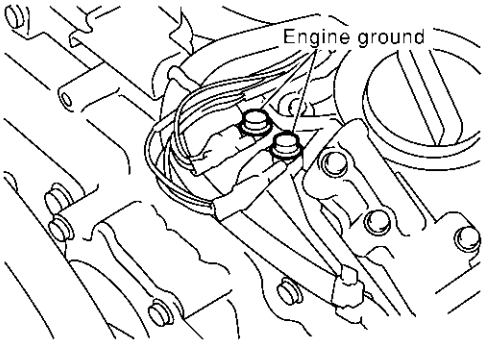
SEF650XE

Diagnostic Procedure

NHEC0754

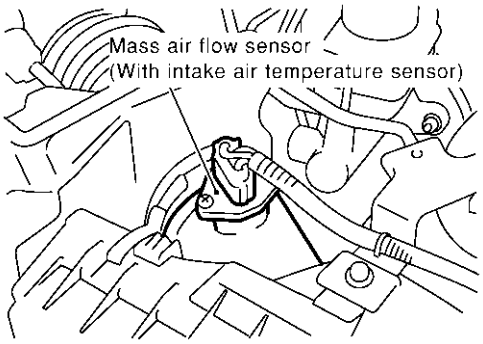
1	INSPECTION START
Which malfunction (P0102 or P0103) is duplicated?	
P0102 or P0103	
P0103 ▶	GO TO 3.
P0102 ▶	GO TO 2.

2	CHECK INTAKE SYSTEM
Check the following for connection. ● 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
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.	
 SEC047D	
▶	GO TO 4.

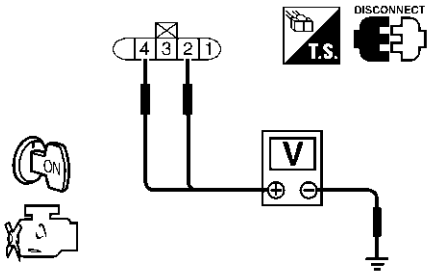
4	CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.



SEC055D

2. Turn ignition switch "ON".
3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.



Terminal	Voltage
2	Approximately 5
4	Battery voltage

SEF297X

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 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 MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

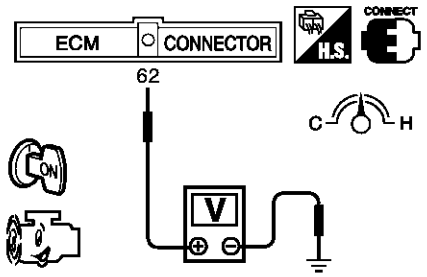
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

7	CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 62. Refer to Wiring Diagram. **Continuity should exist.** 2. 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 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 62 (Mass air flow sensor signal) and ground.		



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.4
Idle to about 4,000 rpm*	1.1 - 1.5 to Approx. 4.0

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

SEC103D

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

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

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

Component Description

NHEC0848

The absolute pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

On Board Diagnosis Logic

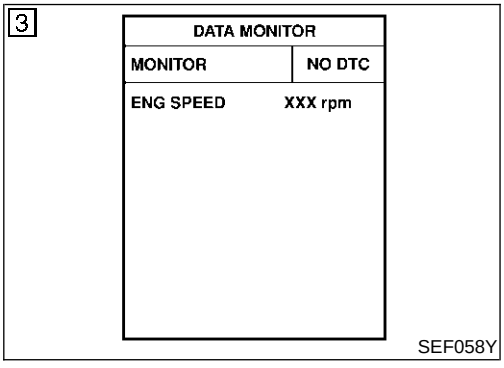
NHEC0849

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0107 0107	Absolute pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Absolute pressure sensor • ECM
P0108 0108	Absolute pressure sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

NHEC0850

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.



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-198.

With GST

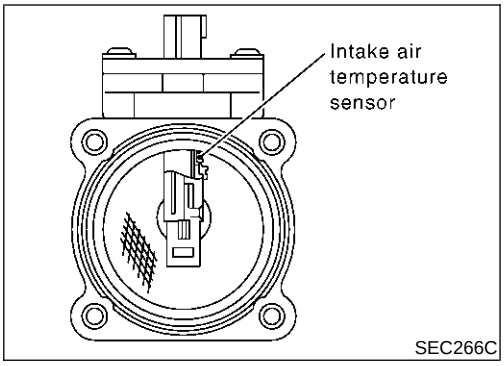
Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

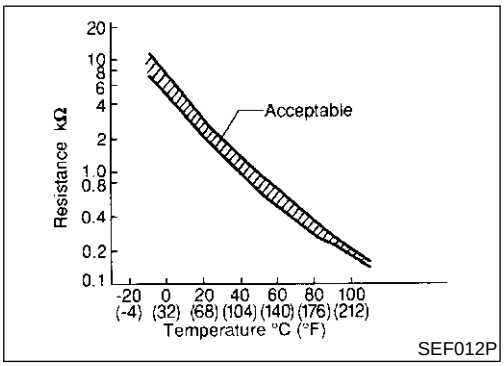
NHEC0851

1	INSPECTION START
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-197. 5. Is the 1st trip DTC P0107 or P0108 displayed again?	
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch “ERASE”. 4. **Perform “DTC Confirmation Procedure”.** See EC-197. 5. Is the 1st trip DTC P0107 or P0108 displayed again?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	**INSPECTION END**

2	REPLACE ECM
1. Replace ECM. 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to “IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-90. 3. Perform “Accelerator Pedal Released Position Learning”, EC-71. 4. Perform “Throttle Valve Closed Position Learning”, EC-71. 5. Perform “Idle Air Volume Learning”, EC-71.	
▶	**INSPECTION END**



SEC266C



SEF012P

Component Description

NHEC0852

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
25 (77)	3.32	1.9 - 2.1

*: These data are reference values and are measured between ECM terminal 66 (Intake air temperature sensor) and body 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

NHEC0853

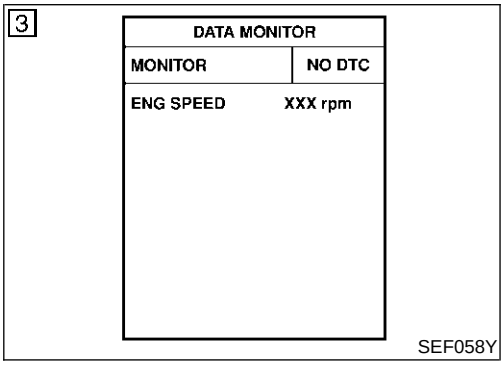
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

NHEC0854

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.



SEF058Y

WITH CONSULT-II

NHEC0854S01

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-201.

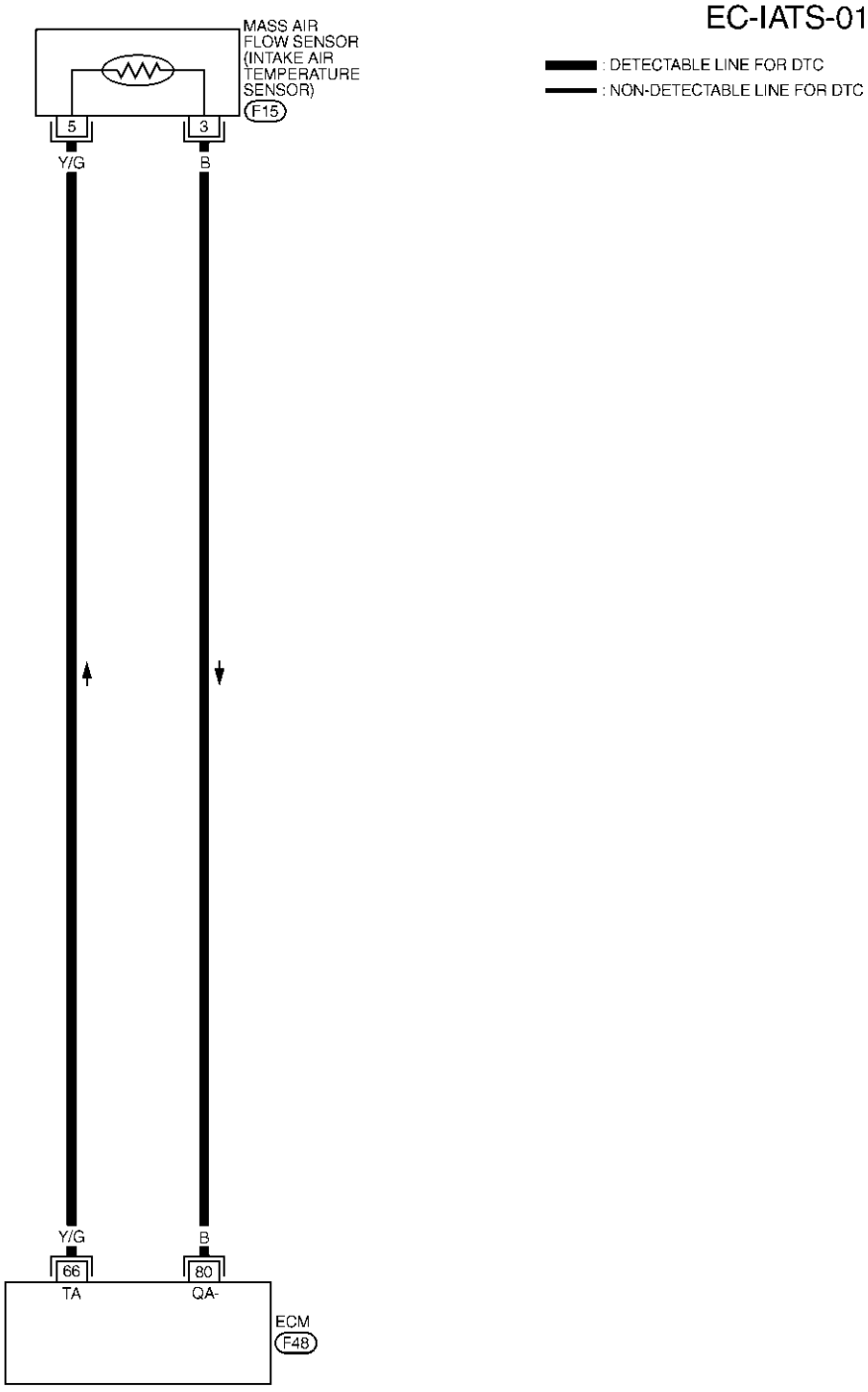
WITH GST

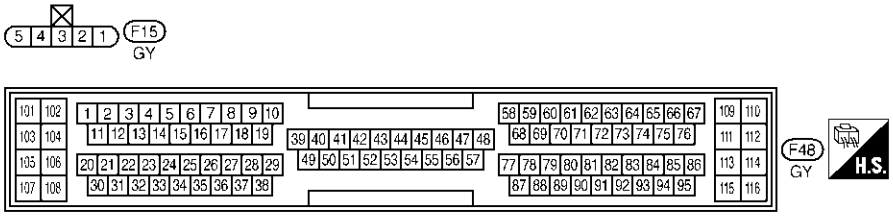
NHEC0854S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC0855





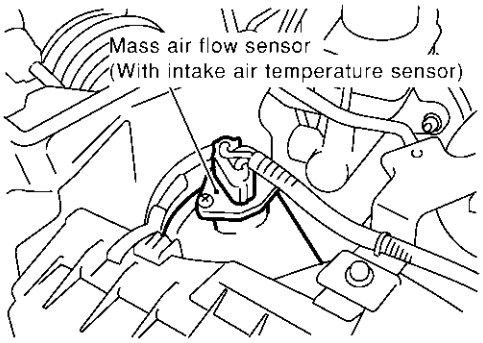
MEC532D

Diagnostic Procedure

NHEC0856

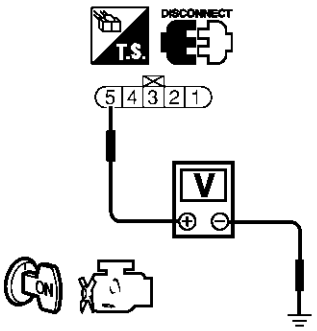
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect intake air temperature sensor harness connector.



SEC055D

3. Turn ignition switch “ON”.
4. Check voltage between terminal 5 and ground.



Voltage: Approximately 5V

SEC104D

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check 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

1. Turn ignition switch “OFF”.
2. Check harness continuity between sensor terminal 3 and engine 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 harness for open between ECM and intake air temperature sensor.

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

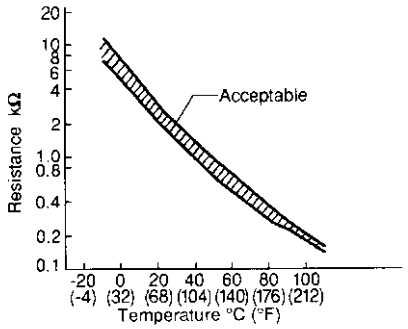
Diagnostic Procedure (Cont'd)

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 3 and 5 as shown in the figure.

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

MTBL1143

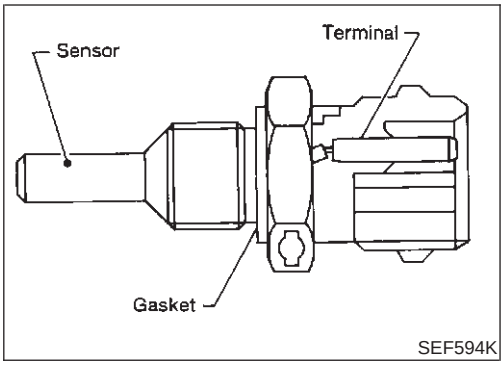


SEF012P

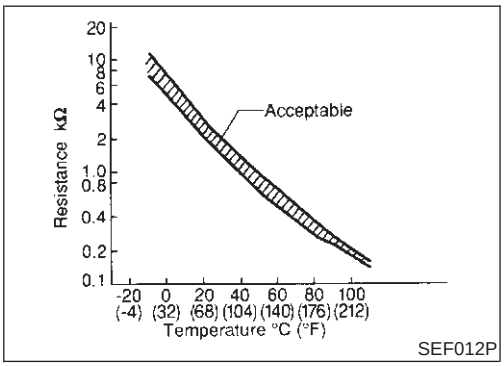
OK or NG

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

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



SEF594K



SEF012P

Component Description

NHEC0857

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 93 (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

NHEC1431

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

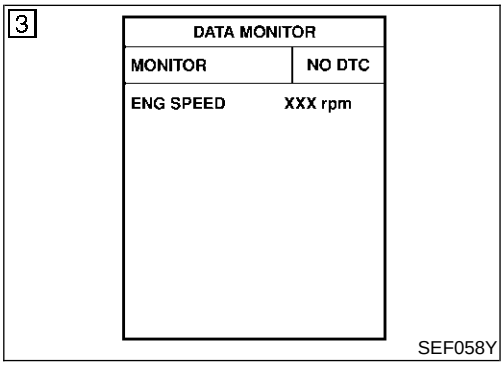
FAIL-SAFE MODE

NHEC1431S01

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

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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	



DTC Confirmation Procedure

NHEC1432

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.

WITH CONSULT-II

NHEC1432S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-206.

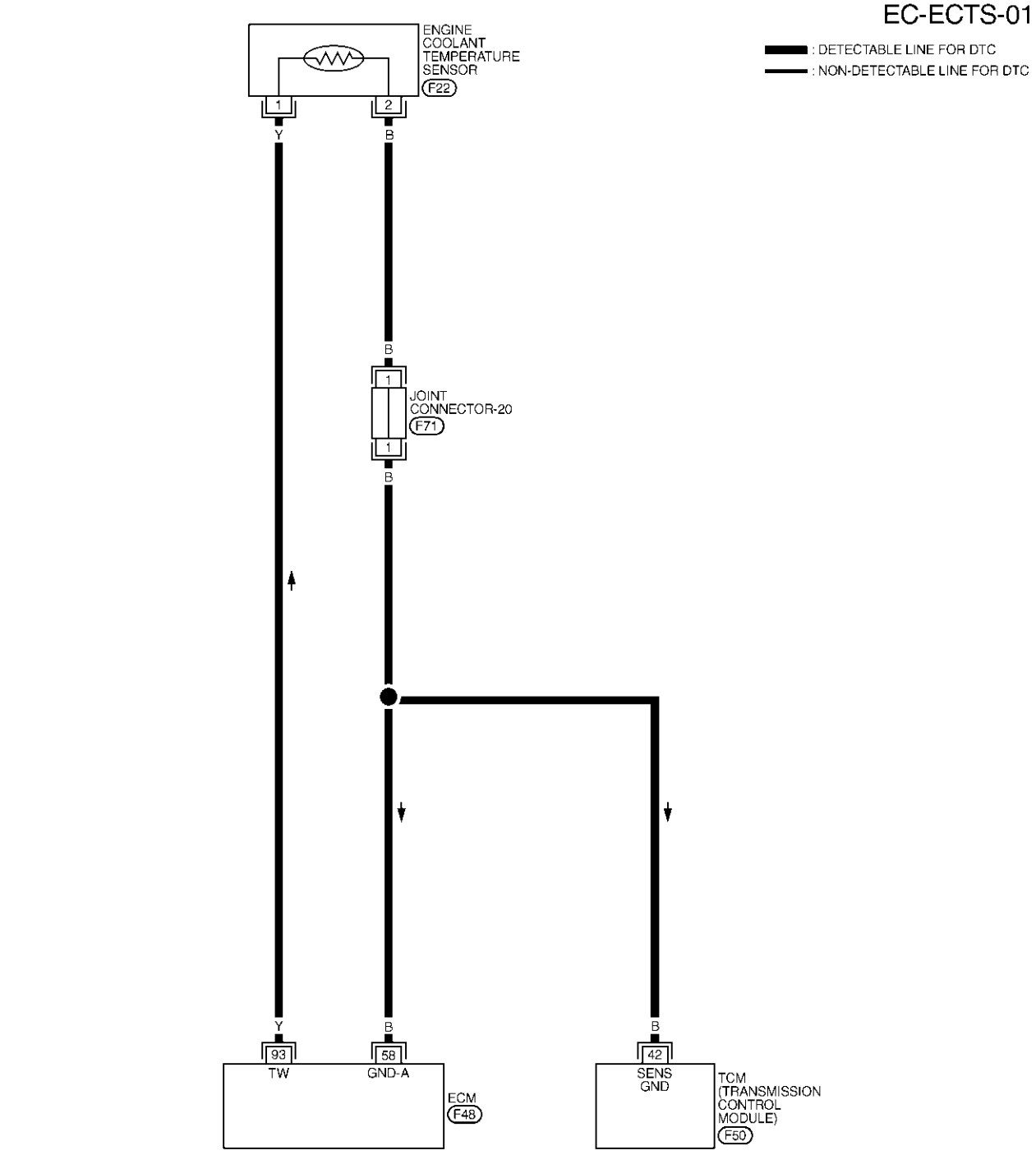
WITH GST

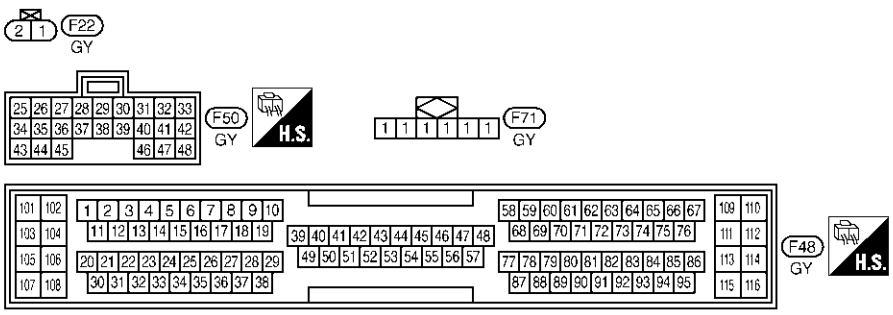
NHEC1432S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC0860





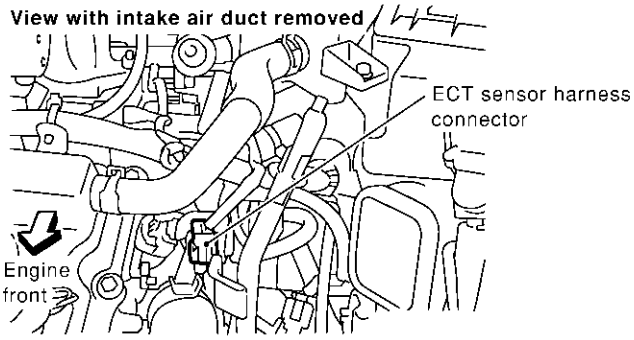
MEC349E

Diagnostic Procedure

NHEC0861

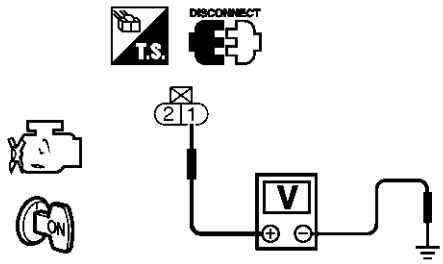
1	CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.



SEC105D

3. Turn ignition switch “ON”.
4. Check voltage between ECT sensor harness connector terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEC106D

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check harness for open or short between ECM and engine coolant temperature sensor.

	▶	Repair harness or connectors.

3	CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECT sensor terminal 2 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

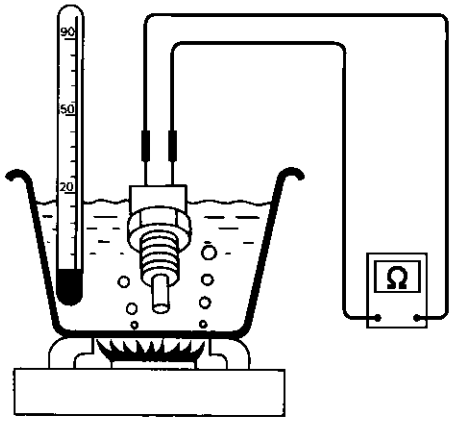
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-20 ● Harness for open between ECM and engine coolant temperature sensor ● Harness for open between TCM (Transmission Control Module) and engine coolant temperature sensor	
▶	Repair open circuit or short to power in harness or connectors.

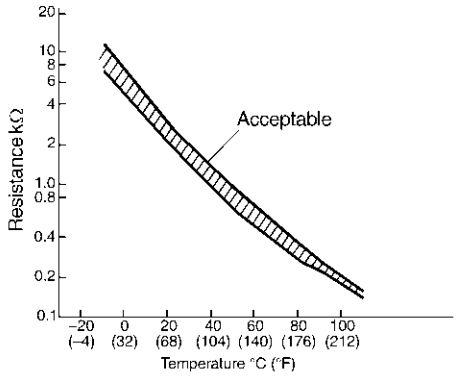
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 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

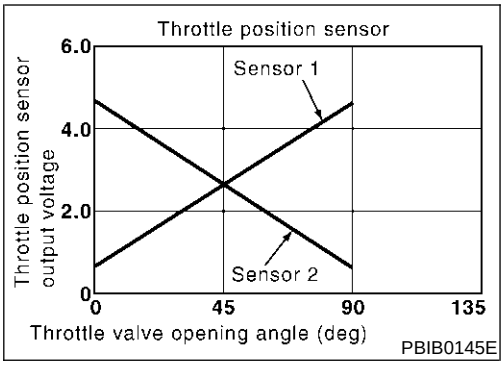


SEF304X

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-151.	
▶	**INSPECTION END**



Component Description

NHEC1333

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1334

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN2*	• Ignition switch: ON (Engine stopped) • Shift lever: D	Accelerator pedal: Released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

NHEC1455

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (The TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

NHEC1455S01

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

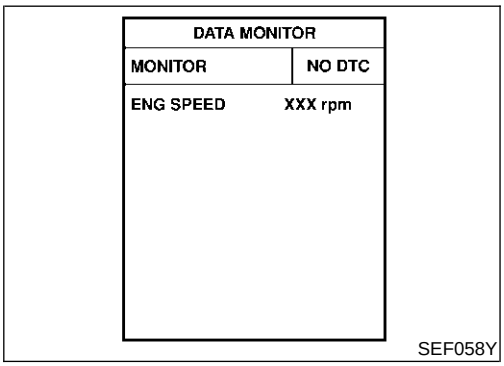
Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NHEC1456

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 10V 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 1 second.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-211.

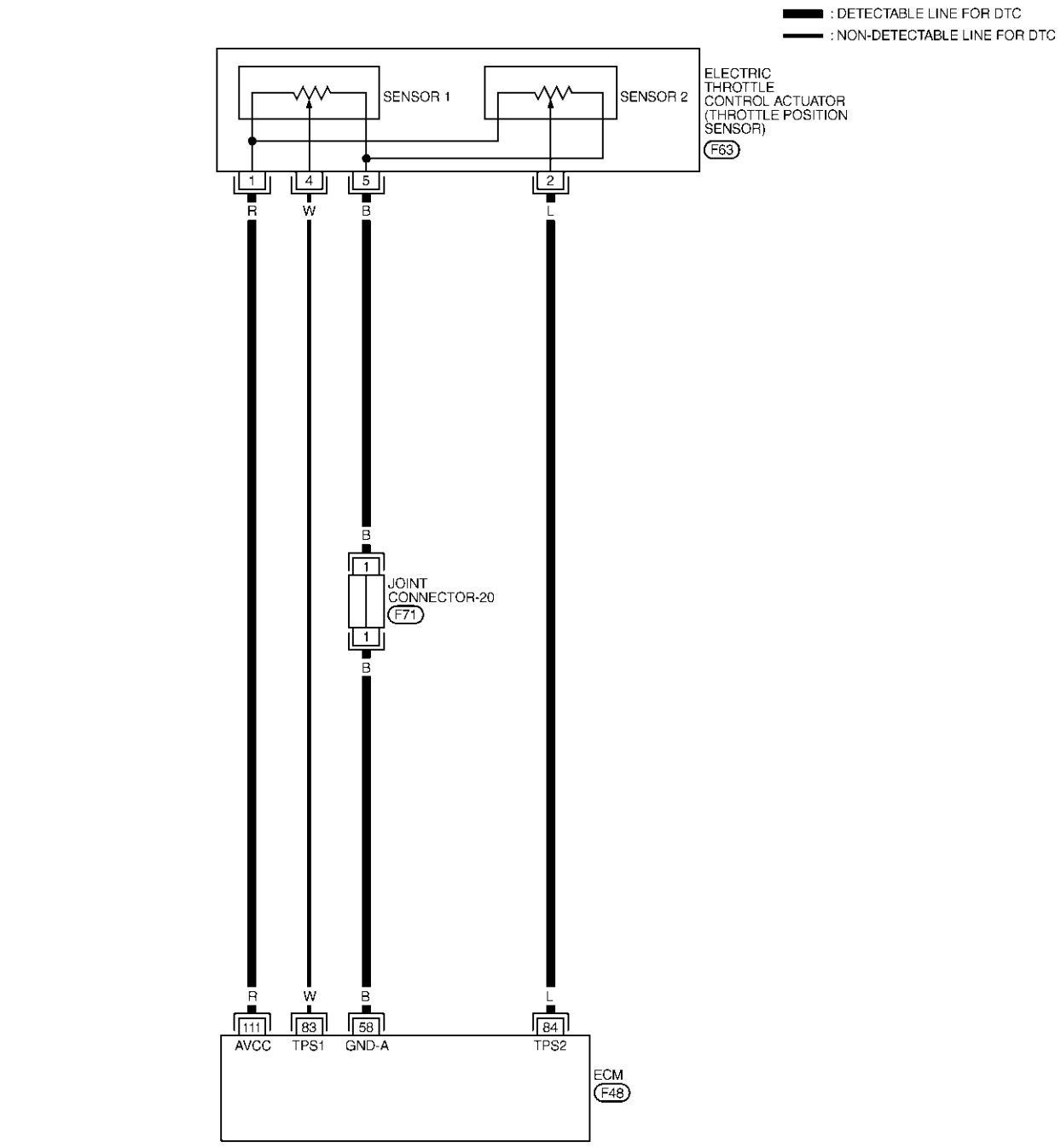
With GST

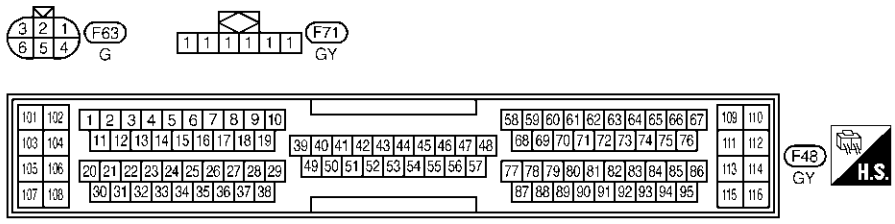
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC1337

EC-TPS2-01





MEC362E

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.

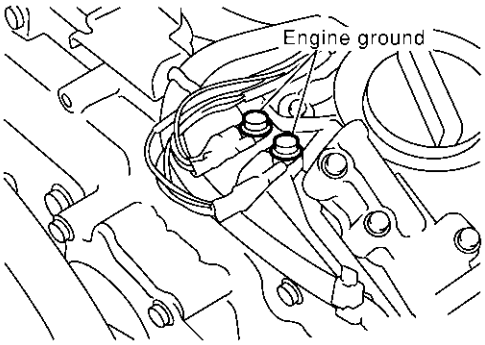
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
84	L	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	More than 0.36V
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1338

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



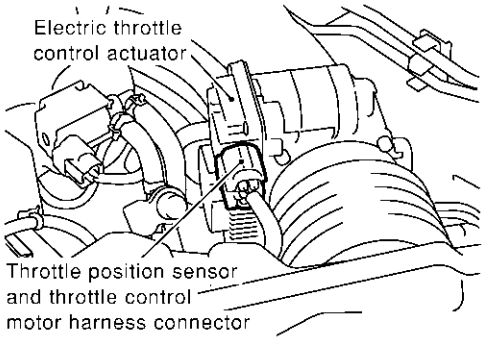
SEC047D

▶ GO TO 2.

Diagnostic Procedure (Cont'd)

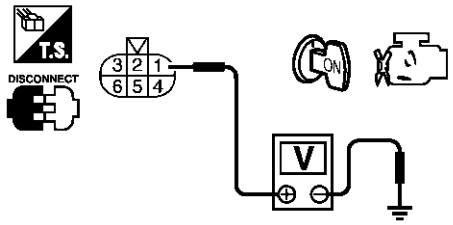
2	CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



SEC054D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

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 THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between electric throttle control actuator terminal 5 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-20
- Harness for open or short between electric throttle control actuator and ECM

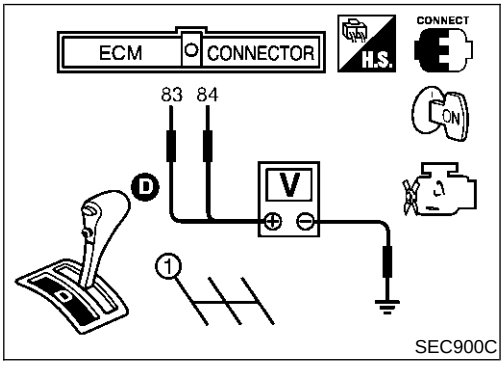
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 84 and electric throttle control actuator 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 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-213.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-71. 3. Perform "Idle Air Volume Learning", EC-71.	
▶	**INSPECTION END**

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Inspection

NHEC1339

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Turn ignition switch "ON".
4. Set selector lever to "D" position.
5. Check voltage between ECM terminals 83 (TP sensor 1), 84 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
84 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

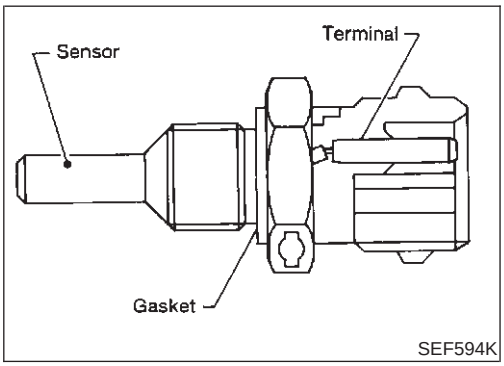
6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-71.
8. Perform "Idle Air Volume Learning", EC-71.

Description

NHEC0869

NOTE:

If DTC P0125 is displayed with P0117, P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-203.

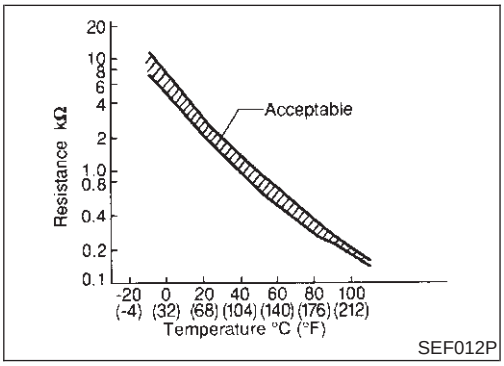


SEF594K

COMPONENT DESCRIPTION

NHEC0869S01

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.



SEF012P

<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 93 (Engine coolant temperature sensor) and ground.

CAUTION:

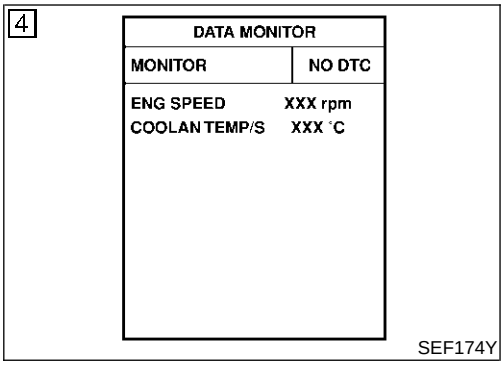
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NHEC0870

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	• 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.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor • Thermostat



DTC Confirmation Procedure

NHEC0871

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0871S01

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 DTC is detected, go to "Diagnostic Procedure", EC-215.

WITH GST

NHEC0871S02

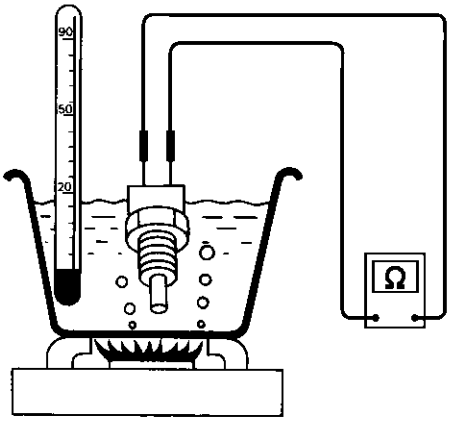
Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NHEC0872

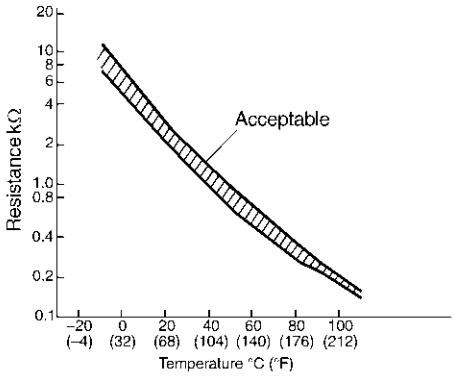
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

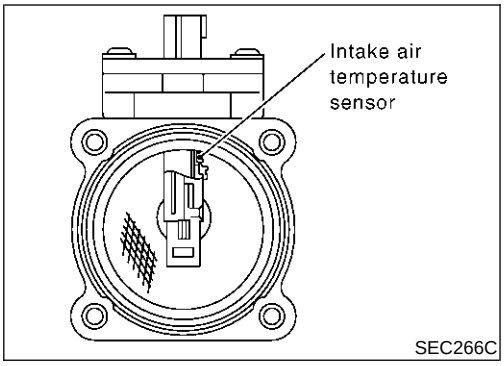
OK or NG

OK	▶	GO TO 2.
NG	▶	Replace engine coolant temperature sensor.

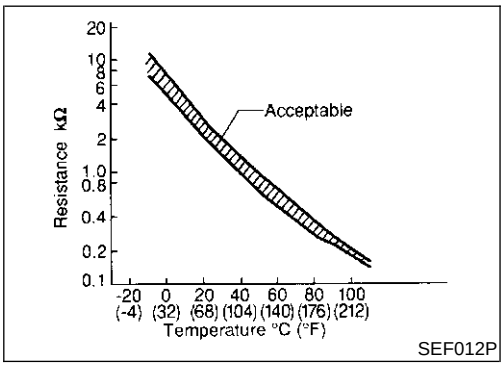
Diagnostic Procedure (Cont'd)

2	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 3.
NG	▶	Repair or replace thermostat. Refer to LC-18, "Thermostat".

3	CHECK INTERMITTENT INCIDENT	
• Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151. • Refer to Wiring Diagram, EC-205.		
	▶	**INSPECTION END**



SEC266C



SEF012P

Component Description

NHEC0767

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
25 (77)	3.32	1.9 - 2.1

*: These data are reference values and are measured between ECM terminal 66 (Intake air temperature sensor) and body 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

NHEC0768

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor

DTC Confirmation Procedure

NHEC0770

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.

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.

5

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

SEF176Y

Ⓔ WITH CONSULT-II

NHEC0770S03

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-218.

WITH GST

NHEC0770S04

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

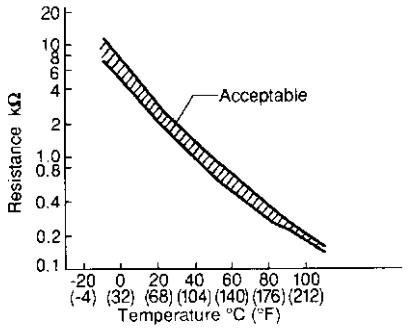
NHEC0772

1	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 3 and 5 as shown in the figure.

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

MTBL1143



SEF012P

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace intake air temperature sensor.

2	CHECK INTERMITTENT INCIDENT

- Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.
- Refer to wiring diagram, EC-200.

	▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC1289

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.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

NHEC1291

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:

- **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).**

WITH CONSULT-II

NHEC1291S01

1) Replace thermostat with new one. Refer to LC-18, "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.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-220.

WITH GST

NHEC1291S02

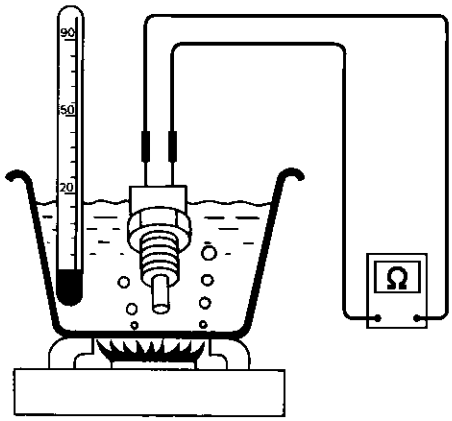
1) Follow the prodedure "WITH CONSULT-II" above.

Diagnostic Procedure

NHEC1292

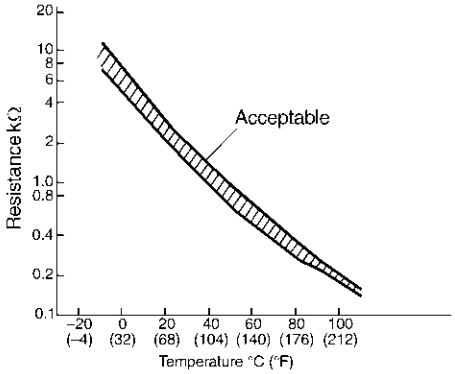
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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>

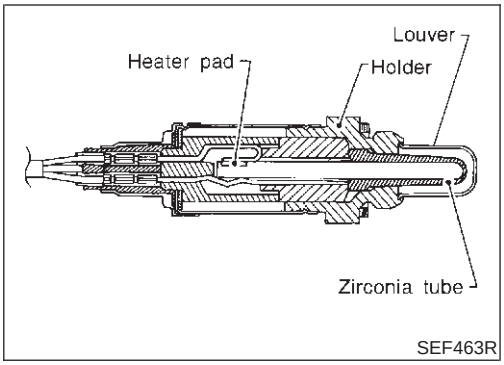
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

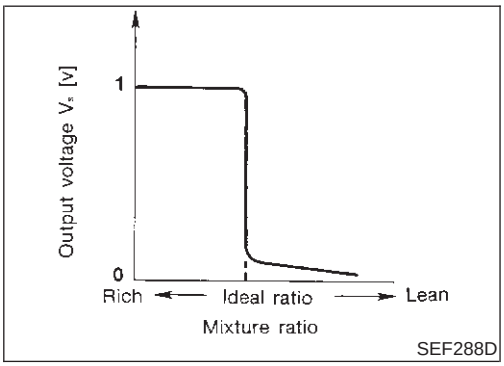
OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.



Component Description

NHEC0873

The heated oxygen sensor 1 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 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 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.

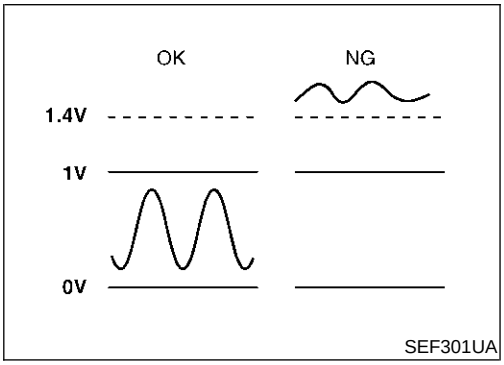


CONSULT-II Reference Value in Data Monitor Mode

NHEC0874

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

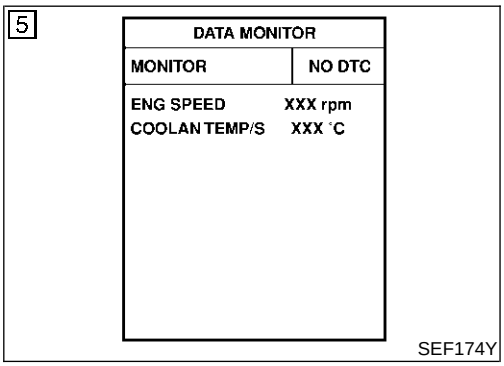


On Board Diagnosis Logic

NHEC0876

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0132 0132 (Bank 1) P0152 0152 (Bank 2)	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1



DTC Confirmation Procedure

NHEC0877

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.

WITH CONSULT-II

NHEC0877S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 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-225.

WITH GST

NHEC0877S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Restart engine and let it idle for 25 seconds.
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Restart engine and let it idle for 25 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-225.

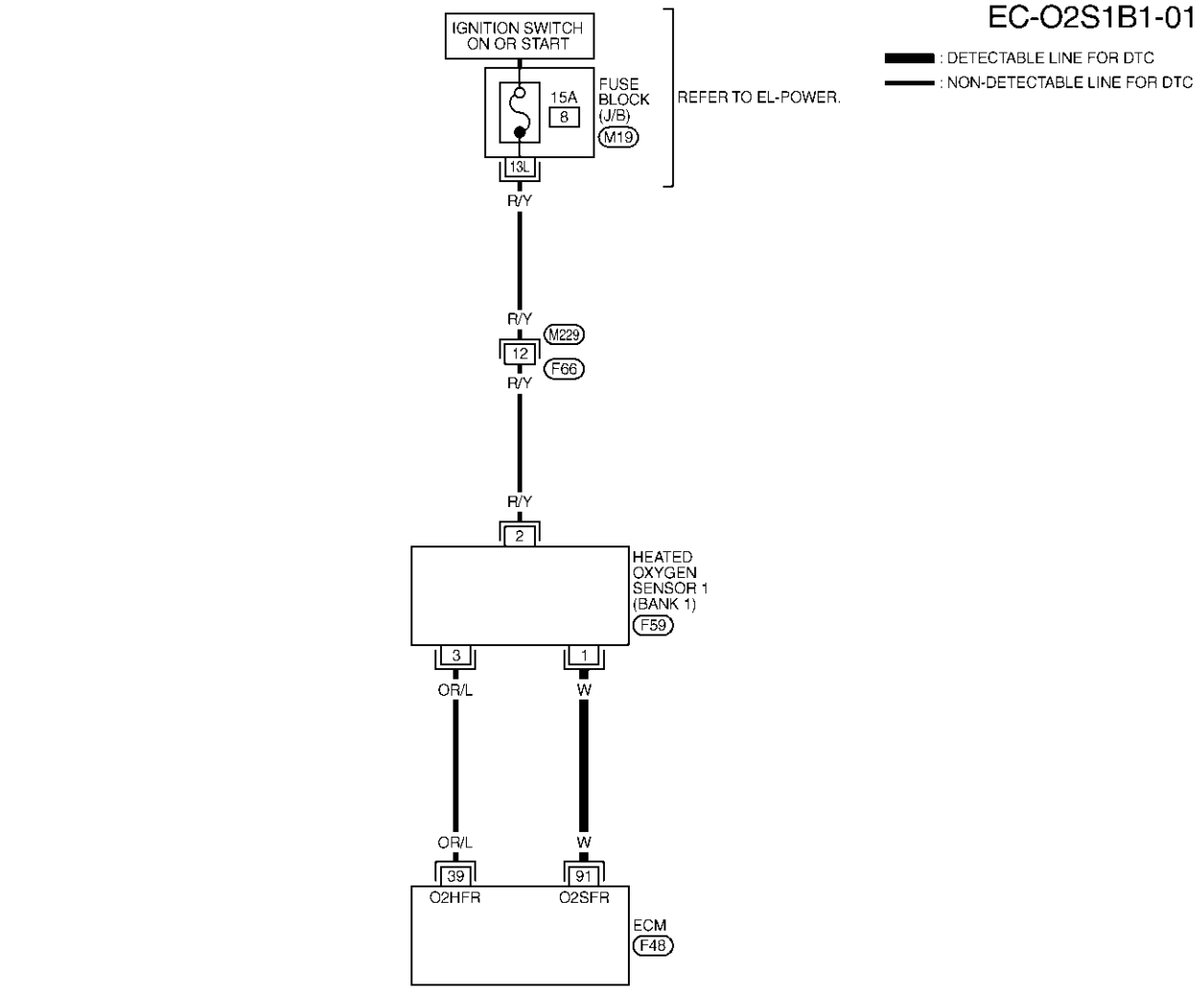
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NHEC0878

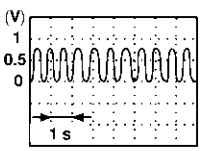
BANK 1

NHEC0878S01



MEC537D

ECM TERMINALS AND REFERENCE VALUE 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.

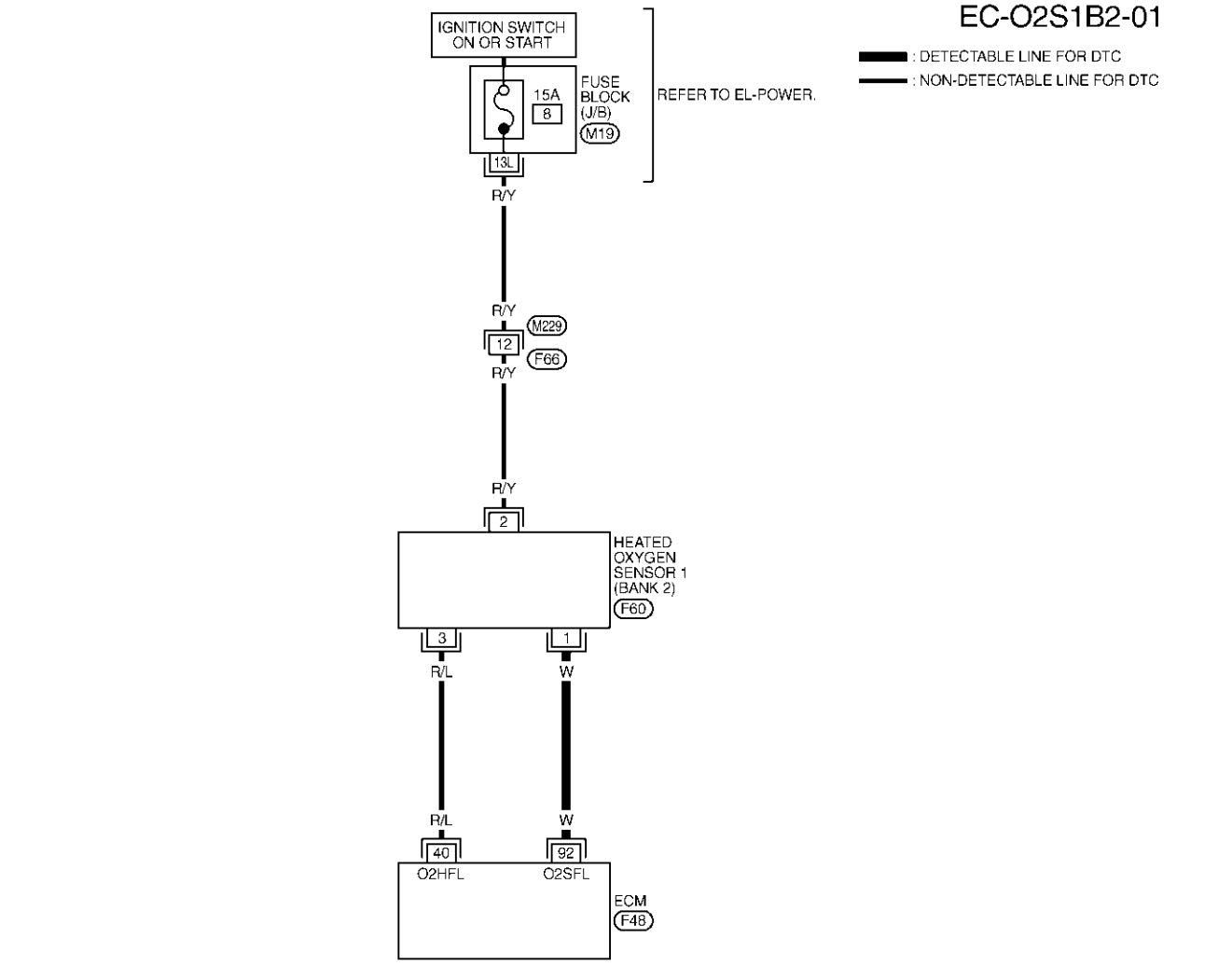
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
91	W	HEATED OXYGEN SENSOR 1 (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

SEC107D

Wiring Diagram (Cont'd)

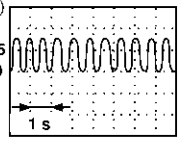
BANK 2

NHEC0878S02



MEC538D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
92	W	HEATED OXYGEN SENSOR 1 (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

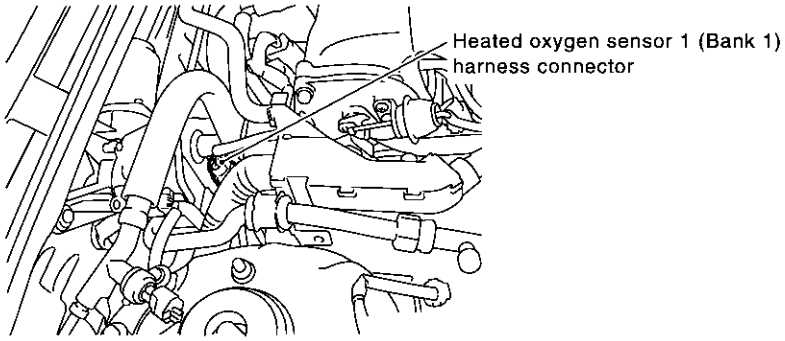
SEC108D

Diagnostic Procedure

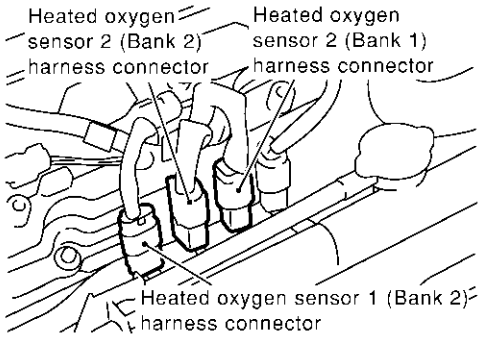
NHEC0879

1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.



SEC099D



SEC134D

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque:

40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 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	
P0132	91	1	Bank 1
P0152	92	1	Bank 2

MTBL1144

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	
P0132	91 or 1	Ground	Bank 1
P0152	92 or 1	Ground	Bank 2

MTBL1145

Continuity should not exist.

4. 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.

4	CHECK HO2S1 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 1 harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1

Ⓕ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 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				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

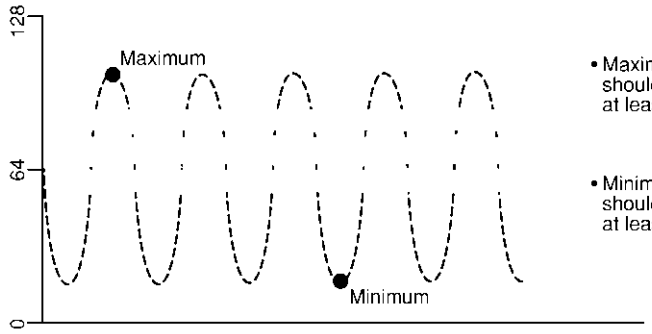
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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.**

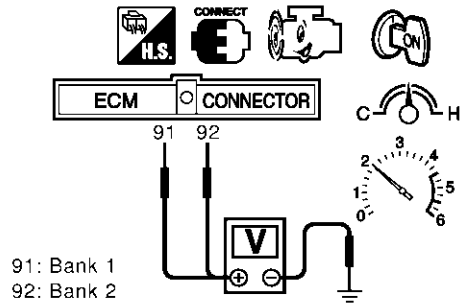
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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

SEC109D

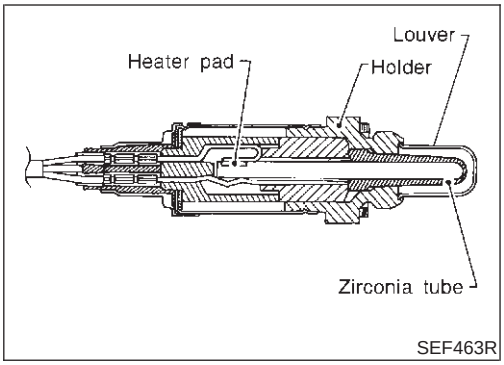
CAUTION:

- **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.

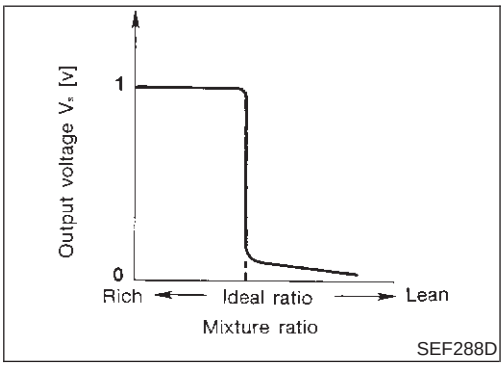
7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0880

The heated oxygen sensor 1 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 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 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.

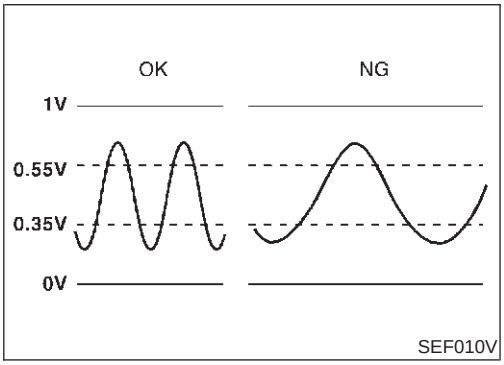


CONSULT-II Reference Value in Data Monitor Mode

NHEC0881

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NHEC0883

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 cycling time index] is inordinately long or not.

On Board Diagnosis Logic (Cont'd)

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0133 0133 (Bank 1) P0153 0153 (Bank 2)	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV valve • Mass air flow sensor

DTC Confirmation Procedure

NHEC0884

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 10 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) 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

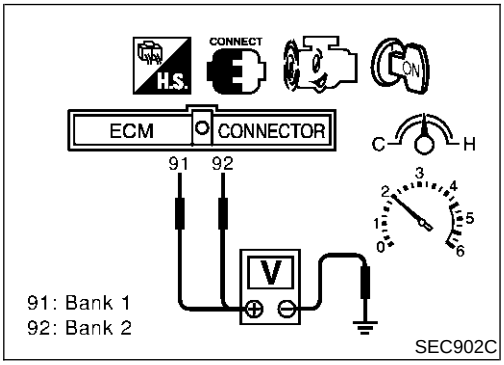
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133
COMPLETED

SEF658Y



SEC902C

WITH CONSULT-II

NHEC0884S01

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 minutes.

NOTE:
Never raise engine speed above 3,600 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	1,200 - 3,100 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.5 - 12 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-234.

Overall Function Check

NHEC0885

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

WITH GST

NHEC0885S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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

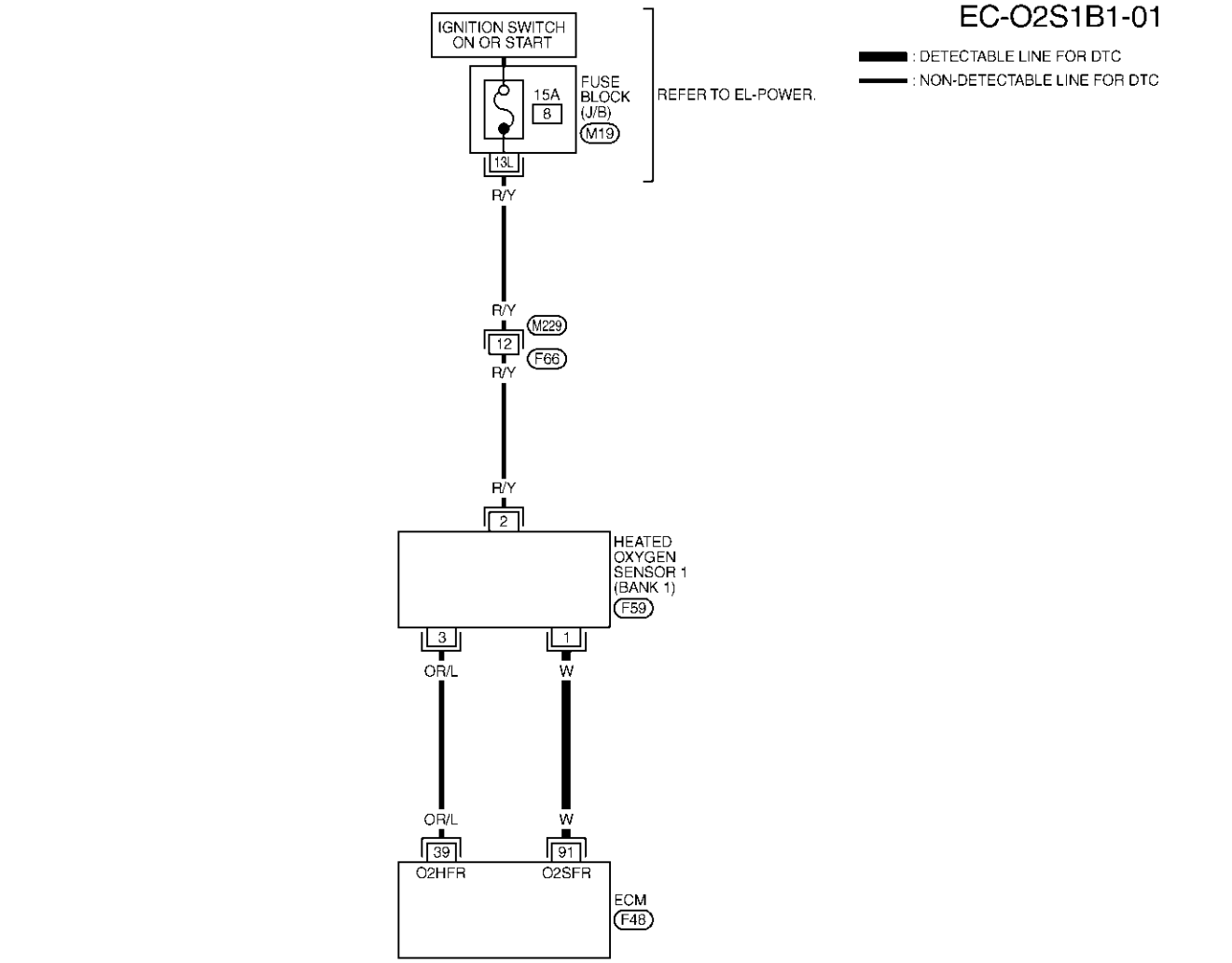
4) If NG, go to "Diagnostic Procedure", EC-234.

Wiring Diagram

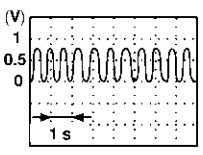
NHEC0886

BANK 1

NHEC0886S01



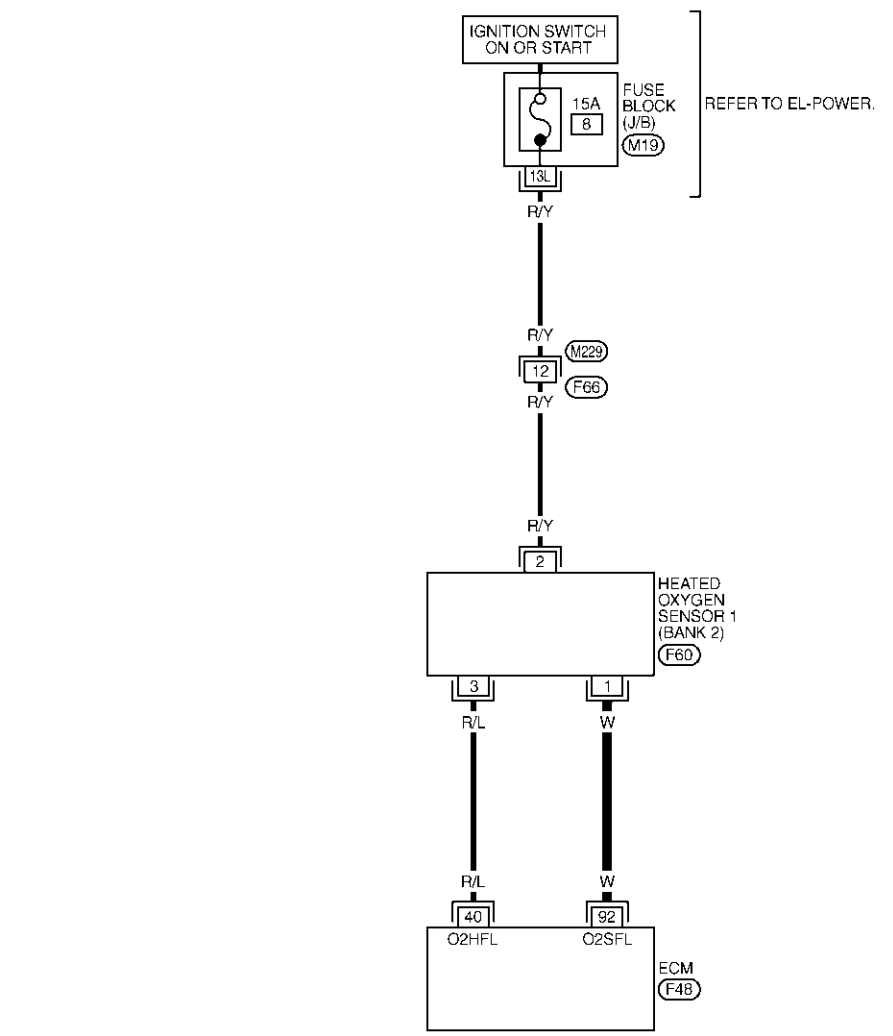
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

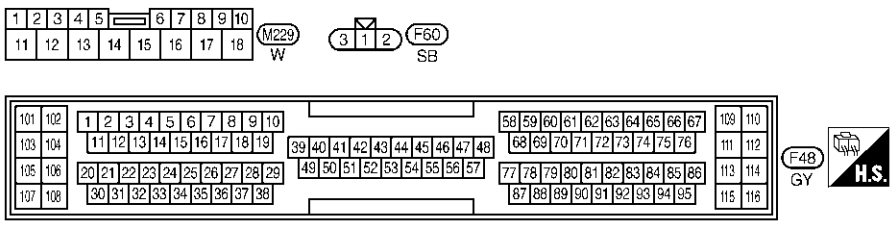
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
91	W	HEATED OXYGEN SENSOR 1 (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

SEC107D

BANK 2

NHEC0886S02

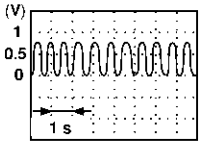




REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC538D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
92	W	HEATED OXYGEN SENSOR 1 (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

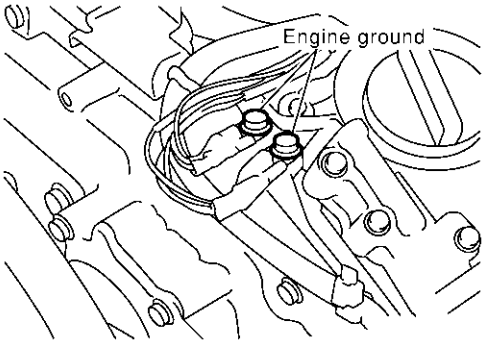
SEC108D

Diagnostic Procedure

NHEC0887

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEC047D

	▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

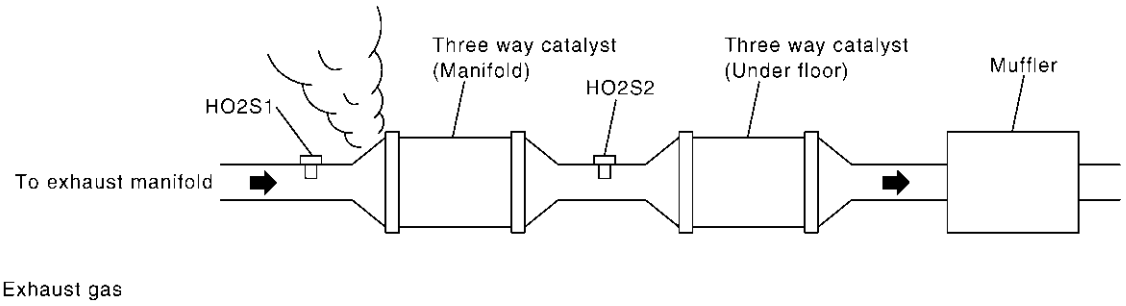
Tightening torque:

40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



SEC502D

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

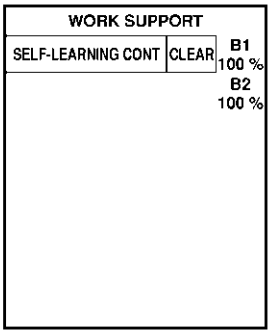
OK or NG

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".



SEF968Y

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?

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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-89.
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?

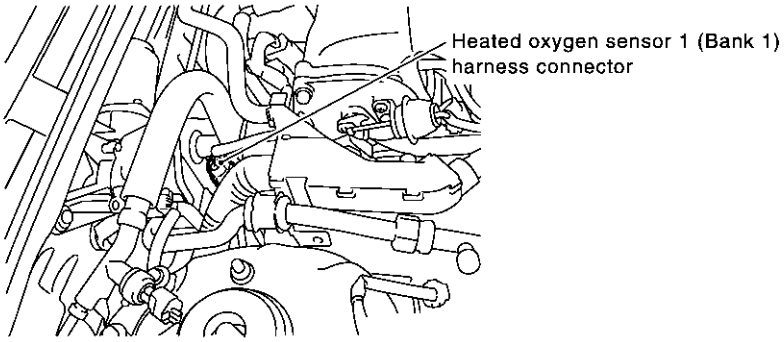
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-267, EC-275.
No	▶	GO TO 6.

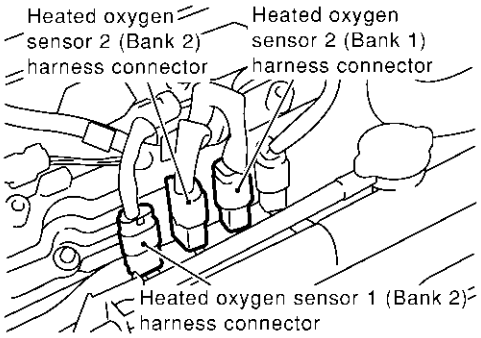
Diagnostic Procedure (Cont'd)

6	DISCONNECT HO2S1 HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Disconnect corresponding heated oxygen sensor 1 harness connector.



SEC099D



SEC134D

▶	GO TO 7.

7	CHECK HO2S1 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	
P0133	91	1	Bank 1
P0153	92	1	Bank 2

MTBL1146

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	
P0133	91 or 1	Ground	Bank 1
P0153	92 or 1	Ground	Bank 2

MTBL1147

Continuity should not exist.

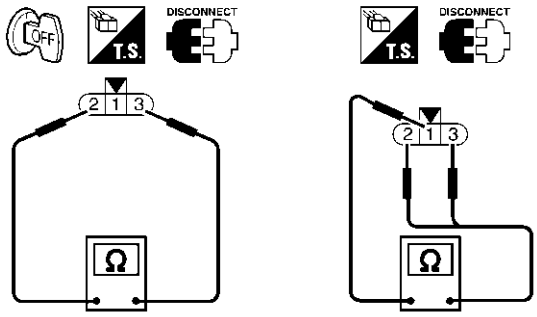
4. Also check harness for short to power.

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 HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
2 and 3	3.3 - 4.0Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310XA

CAUTION:

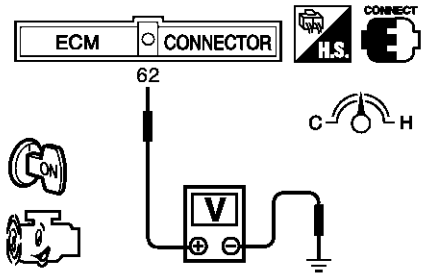
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12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

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

9	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 62 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.4
Idle to about 4,000 rpm*	1.1 - 1.5 to Approx. 4.0

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

SEC103D

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

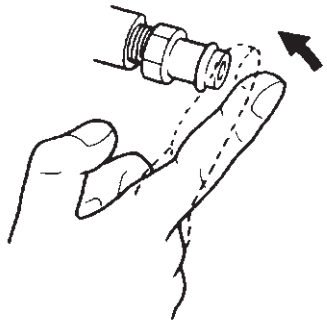
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

Diagnostic Procedure (Cont'd)

10	CHECK PCV VALVE

1. Install all removed parts.
2. Start engine and let it idle.
3. Remove PCV valve from rocker cover.
4. 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.



SEC137A

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace PCV valve.

11	CHECK HEATED OXYGEN SENSOR 1

Ⓕ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 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				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

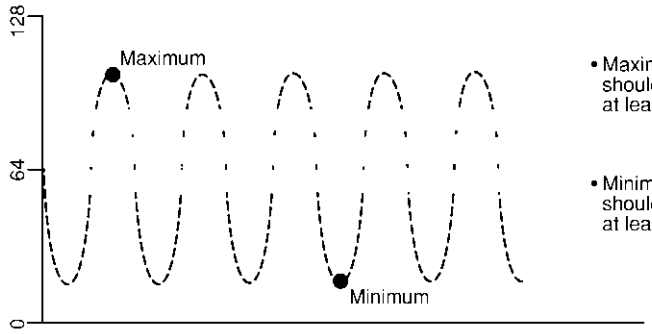
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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.**

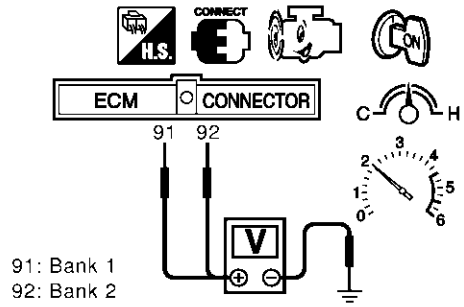
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

12	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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

SEC109D

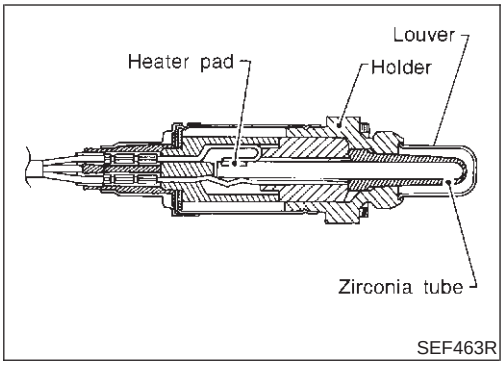
CAUTION:

- **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 13.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

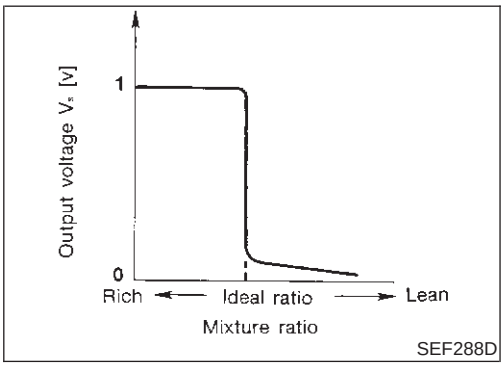
13	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0888

The heated oxygen sensor 1 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 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 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.

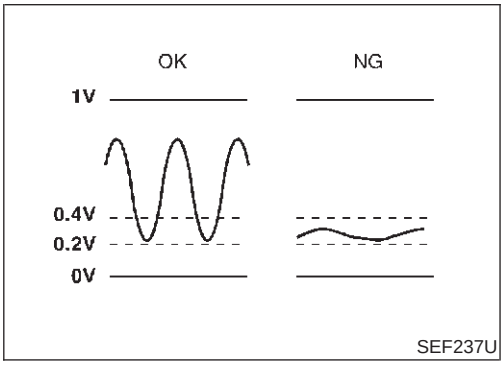


CONSULT-II Reference Value in Data Monitor Mode

NHEC0889

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



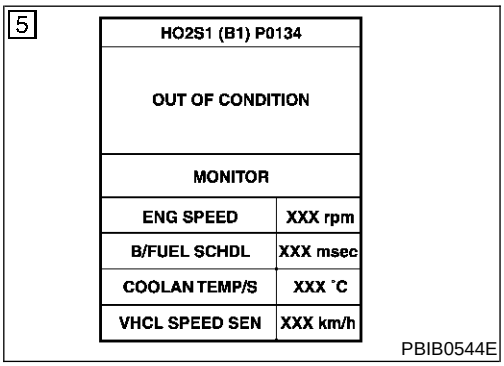
On Board Diagnosis Logic

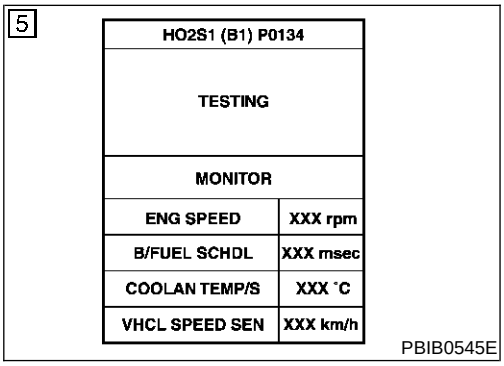
NHEC0891

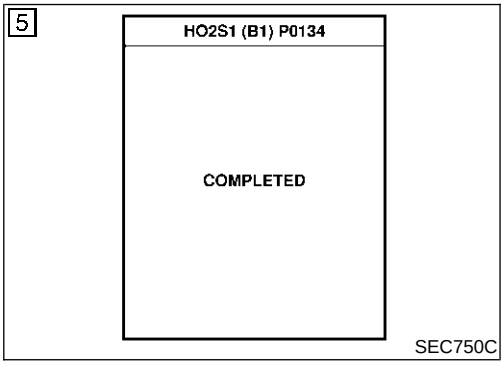
Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately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

On Board Diagnosis Logic (Cont'd)

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0134 0134 (Bank 1) P0154 0154 (Bank 2)	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1







DTC Confirmation Procedure

NHEC1433

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 10 seconds before conducting the next test.

TESTING CONDITION:

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

Ⓔ WITH CONSULT-II

NHEC1433S01

1) Start engine and warm it up to normal operating temperature.
2) Select "HO2S1 (B1)/(B2) P0134/P0154" of "HO2S1" 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 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.

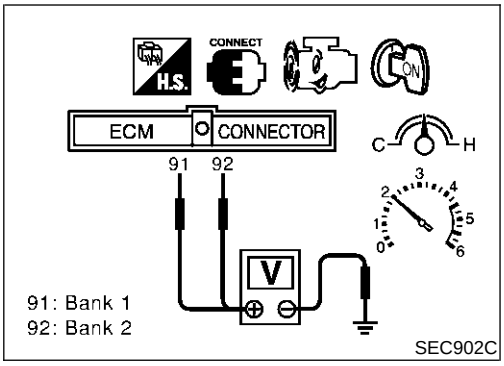
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 2,600 rpm
Vehicle speed	More than 70 km/h (43 MPH)
B/FUEL SCHDL	2 - 12 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-246.

During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

NHEC0893

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

WITH GST

NHEC0893S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.

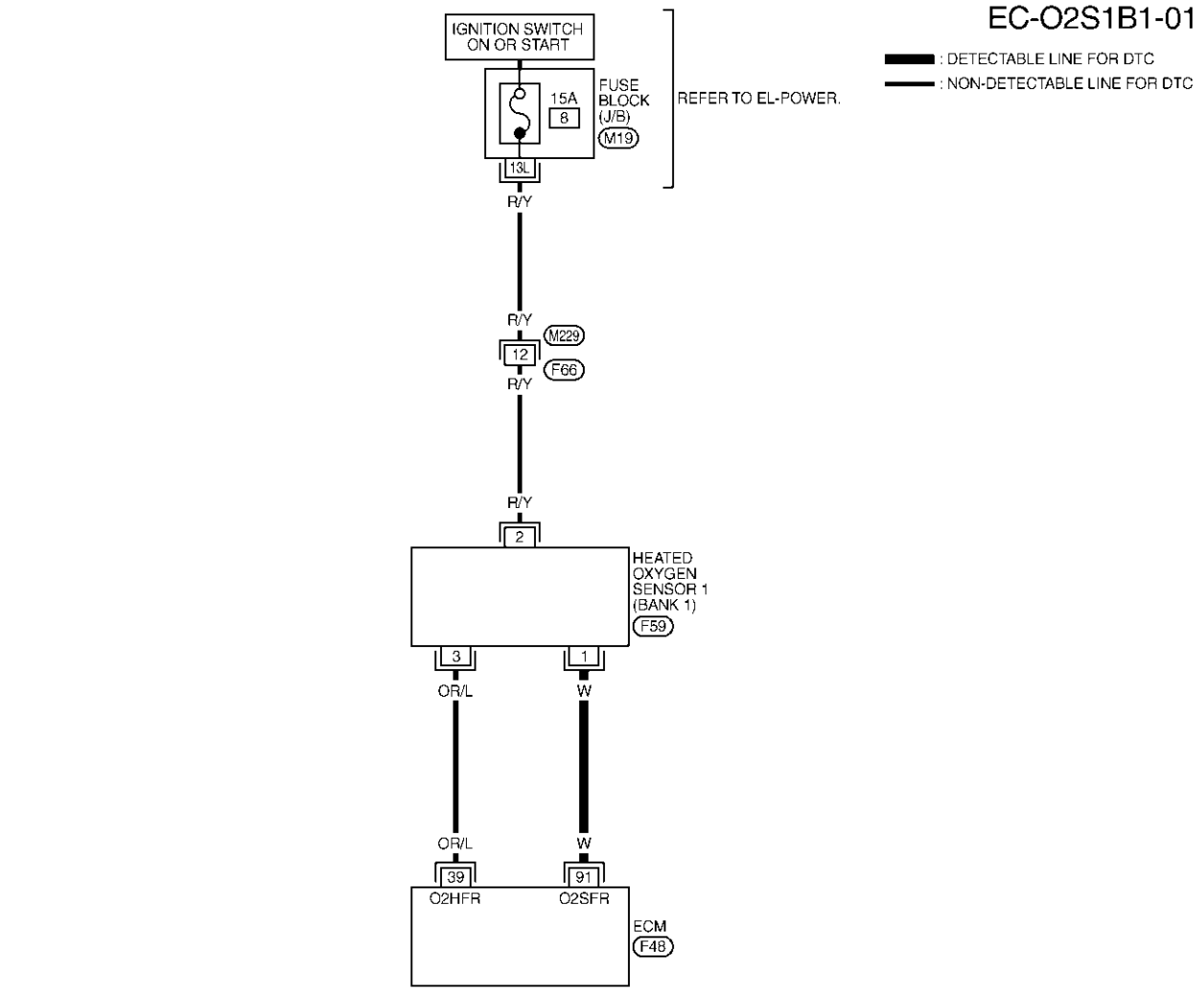
4) If NG, go to “Diagnostic Procedure”, EC-246.

Wiring Diagram

=NHEC0894

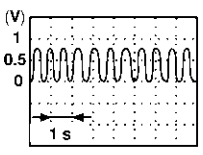
BANK 1

NHEC0894S01



MEC537D

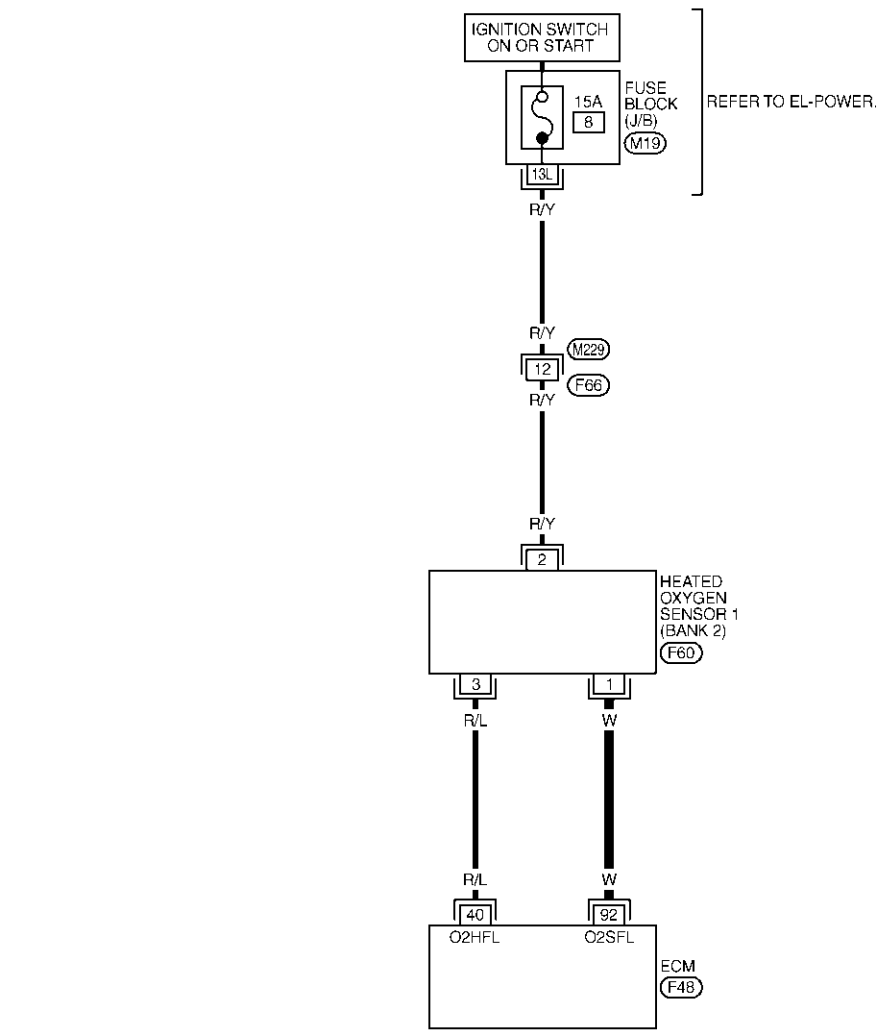
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

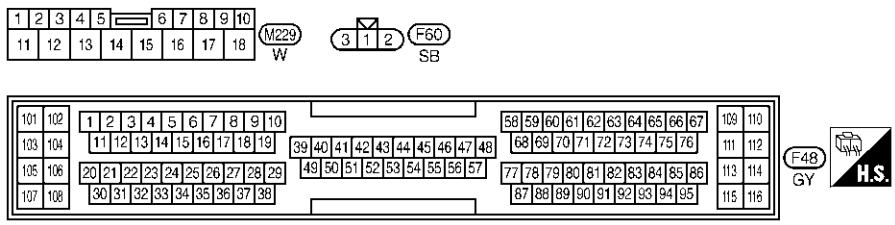
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
91	W	HEATED OXYGEN SENSOR 1 (BANK 1)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

SEC107D

BANK 2

NHEC0894S02

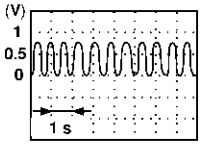




REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC538D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
92	W	HEATED OXYGEN SENSOR 1 (BANK 2)	ENGINE RUNNING AT 2,000 RPM AFTER WARMING UP TO NORMAL OPERATING TEMPERATURE	0 - APPROX. 1.0V 

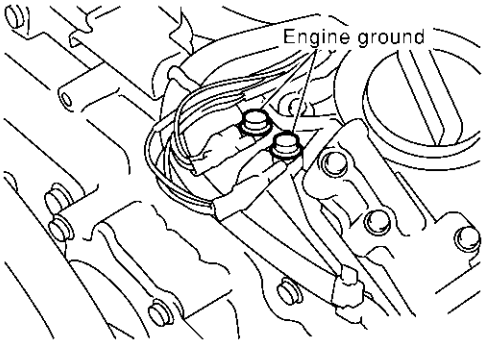
SEC108D

Diagnostic Procedure

NHEC0895

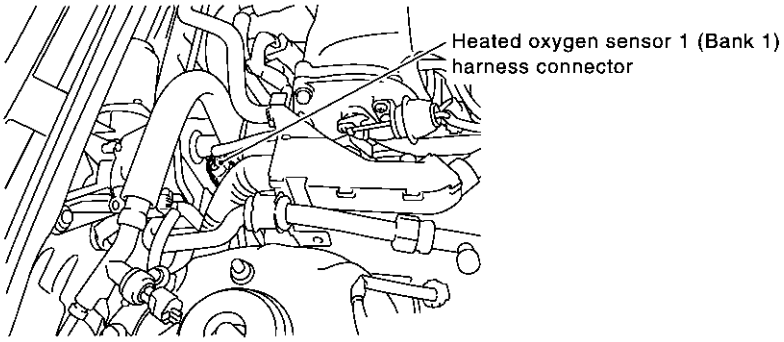
1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

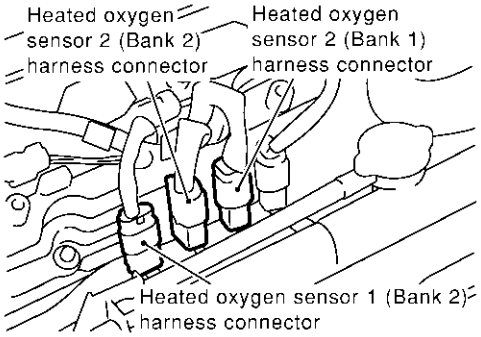


SEC047D

3. Disconnect corresponding heated oxygen sensor 1 harness connector.



SEC099D



SEC134D

▶	GO TO 2.

2	CHECK HO2S1 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	
P0134	91	1	Bank 1
P0154	92	1	Bank 2

MTBL1148

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	
P0134	91 or 1	Ground	Bank 1
P0154	92 or 1	Ground	Bank 2

MTBL1149

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.

3	CHECK HEATED OXYGEN SENSOR 1

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 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

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

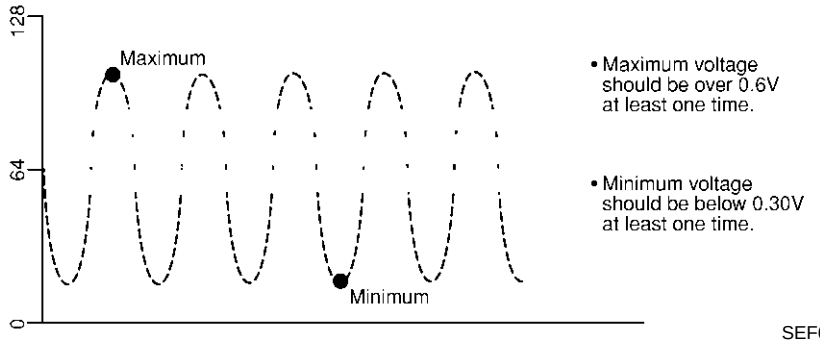
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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.**

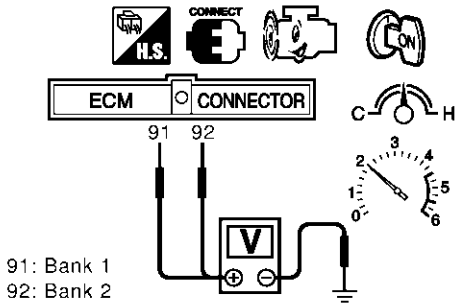
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

4	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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

SEC109D

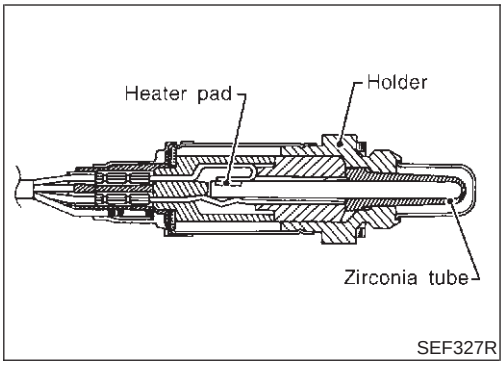
CAUTION:

- **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.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0896

The heated oxygen sensor 2, 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 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

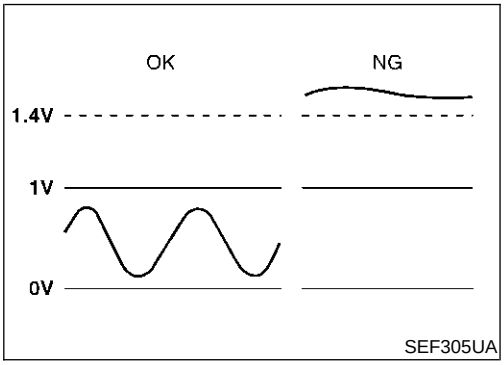
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0897

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Warm-up condition • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

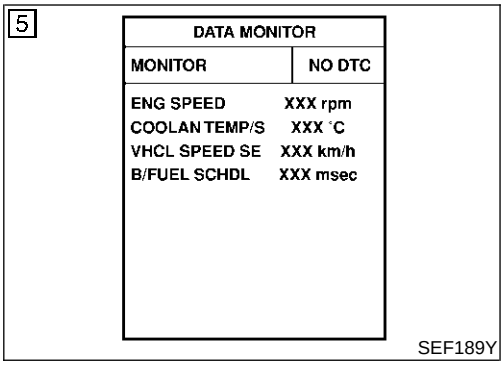


On Board Diagnosis Logic

NHEC0899

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0138 0138 (Bank 1) P0158 0158 (Bank 2)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2



DTC Confirmation Procedure

NHEC0900

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0900S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and warm it up to the normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5) Let engine idle for 1 minute.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-254.

WITH GST

NHEC0900S02

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7) Let engine idle for 1 minute.
8) Select "Mode 3" with GST.
9) If DTC is detected, go to EC-254, "Diagnostic Procedure".

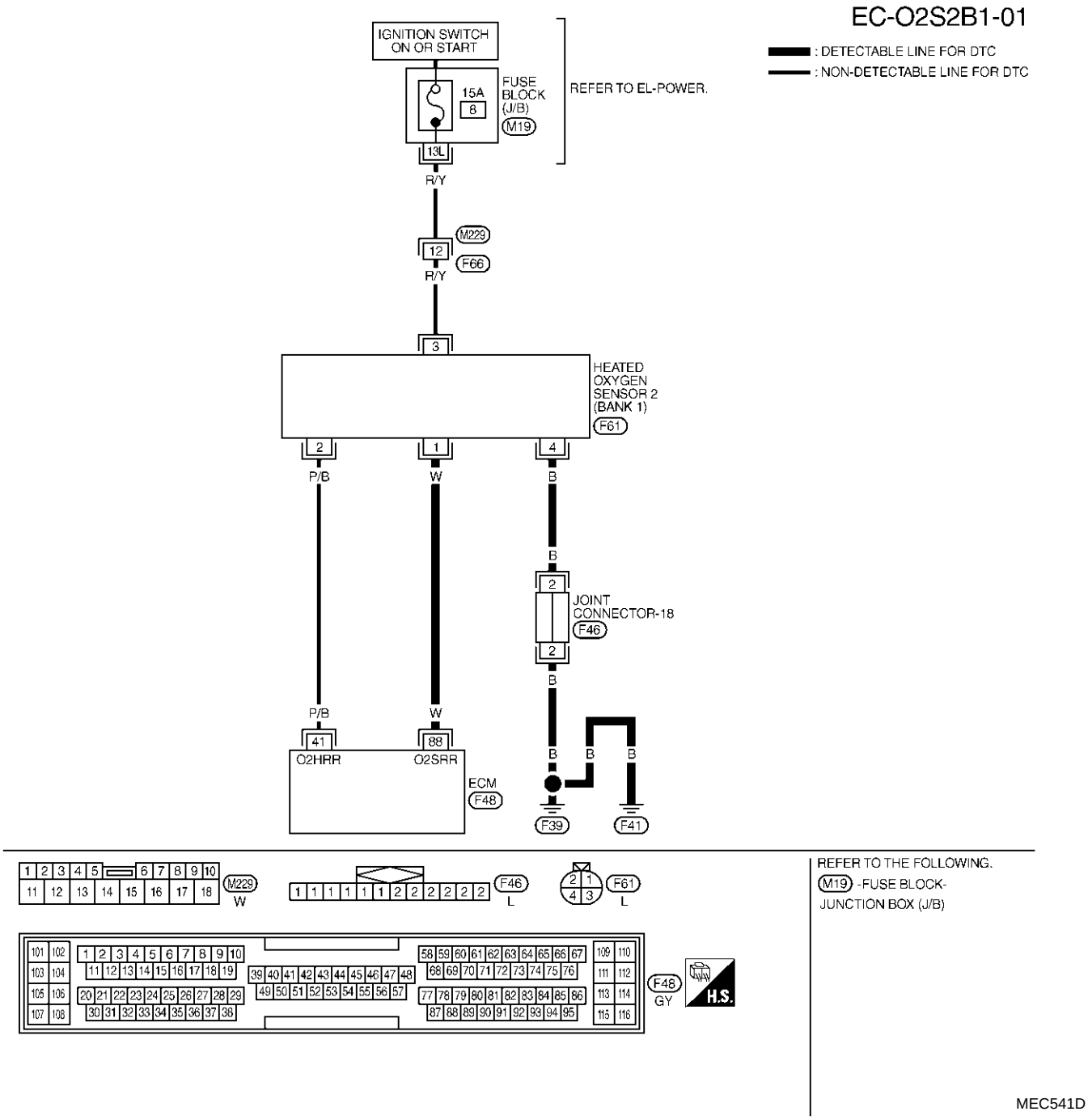
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

=NHEC0902

BANK 1

NHEC0902S01



MEC541D

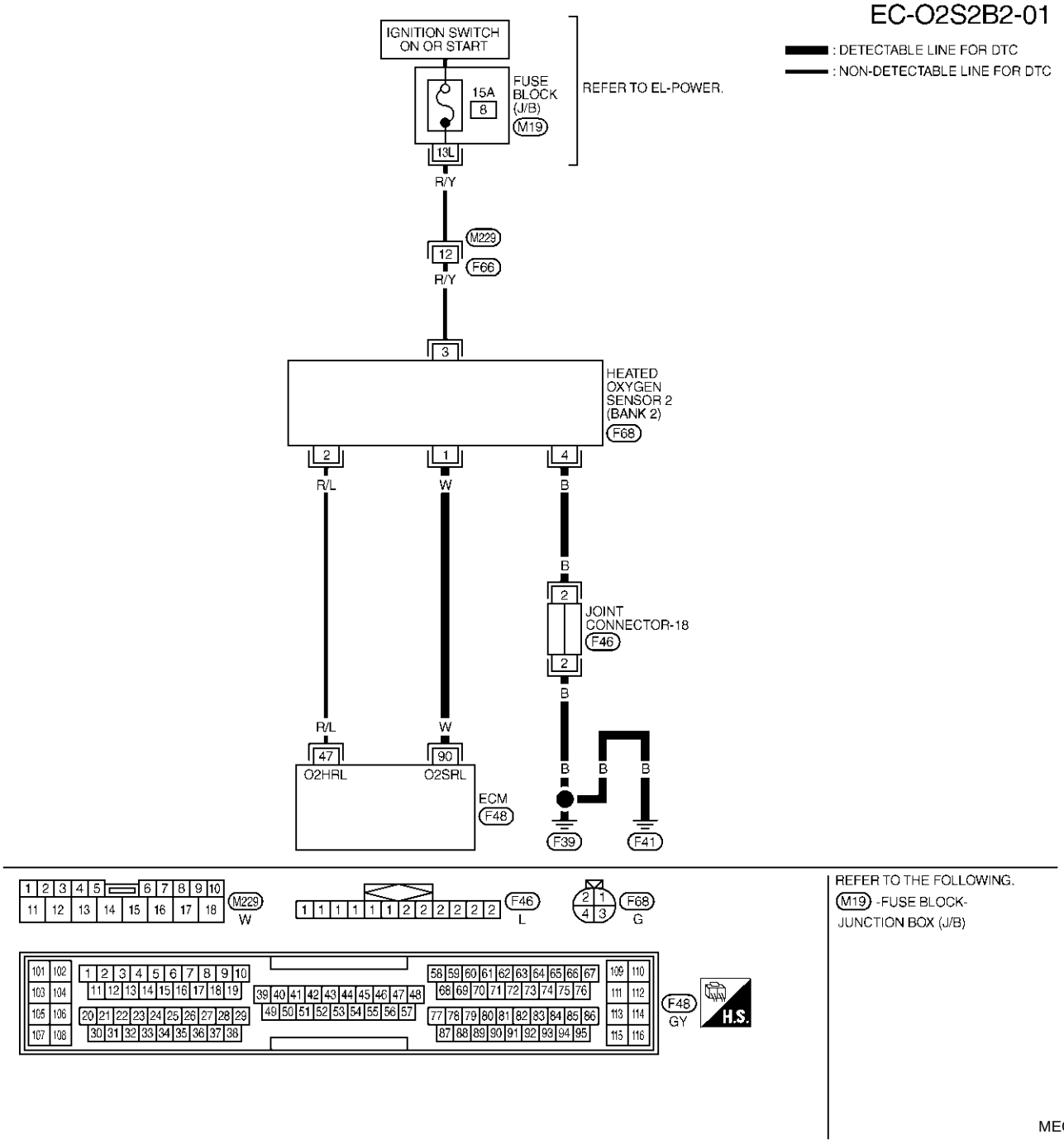
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
88	W	HEATED OXYGEN SENSOR 2 (BANK 1)	**[ENGINE IS RUNNING]** **• WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

SEC661DC

BANK 2

NHEC0902S02



MEC542D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
90	W	HEATED OXYGEN SENSOR 2 (BANK 2)	**[ENGINE IS RUNNING]** • **WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

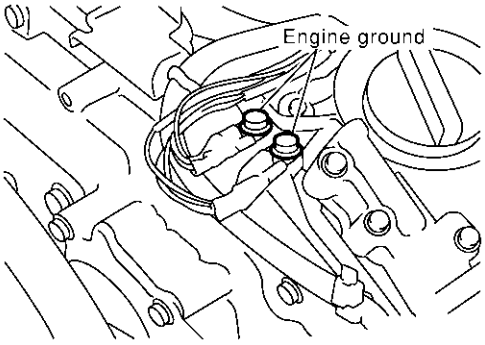
SEC662DC

Diagnostic Procedure

NHEC0903

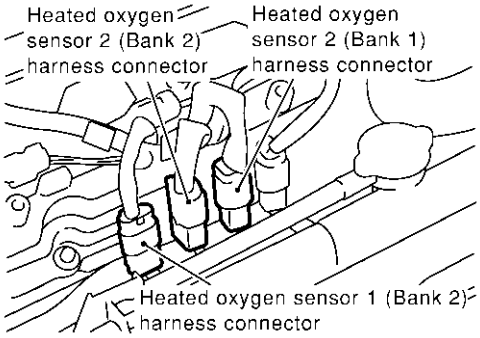
1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEC047D

3. Disconnect corresponding heated oxygen sensor 2 harness connector.



SEC134D

4. Disconnect ECM harness connector.

▶	GO TO 2.

2	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	88	1	Bank 1
P0158	90	1	Bank 2

MTBL1150

Continuity should exist.

2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0138	88 or 1	Ground	Bank 1
P0158	90 or 1	Ground	Bank 2

MTBL1151

Continuity should not exist.

3. Also check harness for short to power.

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 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. ● Joint connector-18 ● Harness for open and short between HO2S2 and engine ground		
	▶	Repair open circuit or short to power in harness or connectors.

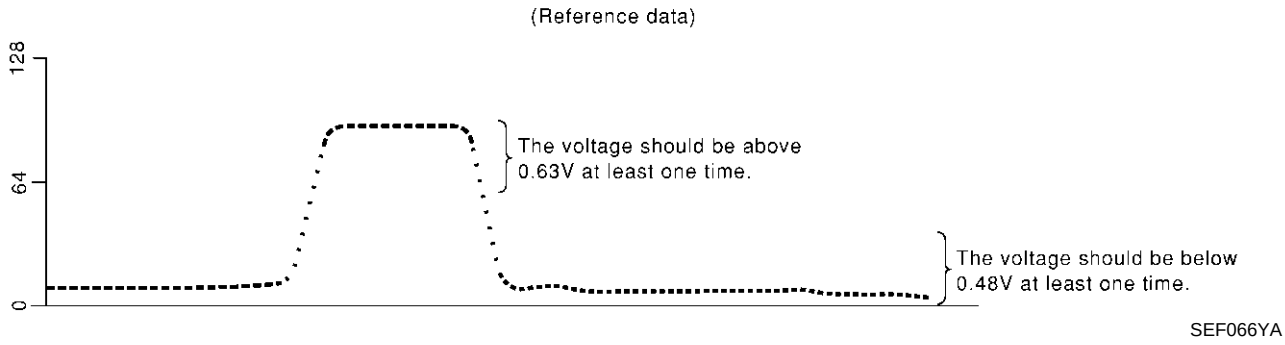
5	CHECK HO2S2 CONNECTORS FOR WATER	
Check heated oxygen sensor connector 2 and harness connector for water. **Water should not exist.**		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 2

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



SEF066YA

"HO2S2 (B1)/(B2)" should be above 0.63V 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.**
- **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.**

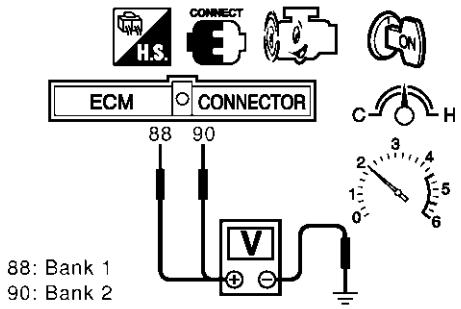
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK HEATED OXYGEN SENSOR 2-I

Ⓚ **Without CONSULT-II**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6. 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 0.63V at least once during this procedure.

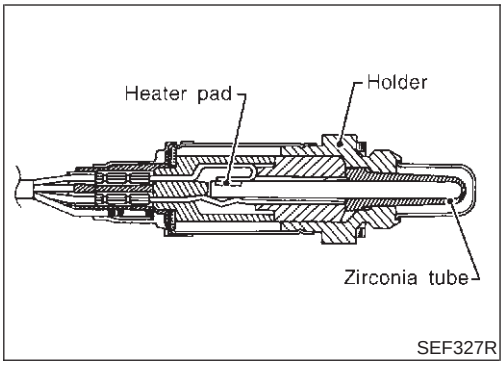
SEC114D

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK HEATED OXYGEN SENSOR 2-II	
Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 7; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF. **The voltage should go 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.** • **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	▶	Replace malfunctioning heated oxygen sensor 2.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



Component Description

NHEC0904

The heated oxygen sensor 2, 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 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

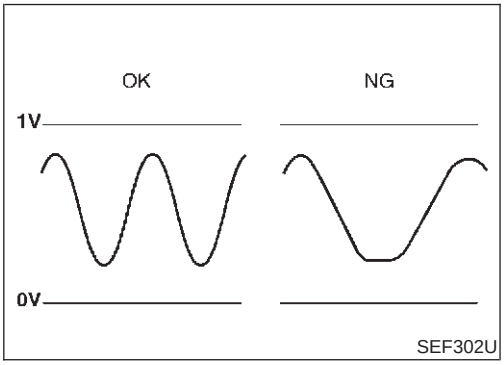
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0905

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Warm-up condition • After keeping engine between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

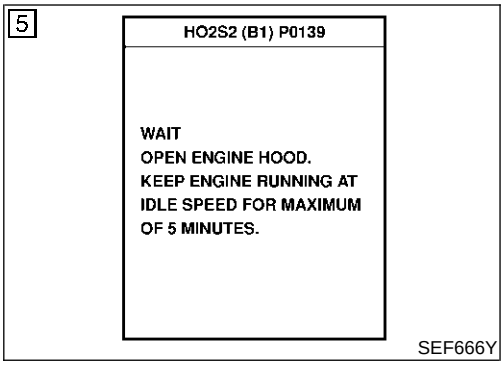


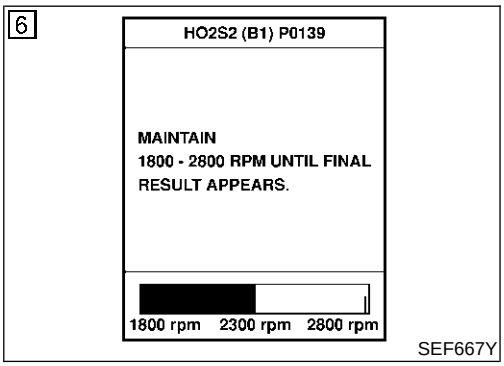
On Board Diagnosis Logic

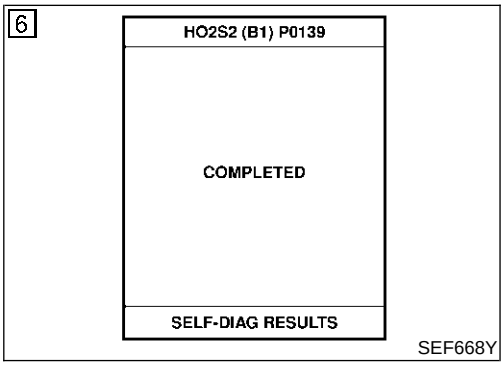
NHEC0907

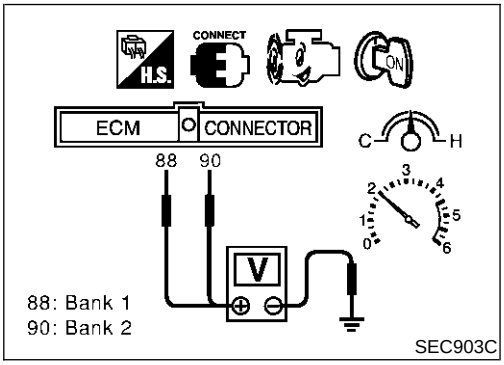
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0139 0139 (Bank 1) P0159 0159 (Bank 2)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NHEC0908

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.

Ⓔ WITH CONSULT-II

NHEC0908S01

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-263, "Diagnostic Procedure".
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
b) Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
d) When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NHEC0909

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

GST WITH GST

NHEC0909S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6) 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.
7) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH)

in "D" position with "OD" OFF.
The voltage should change at more than 0.06V for 1 second during this procedure.

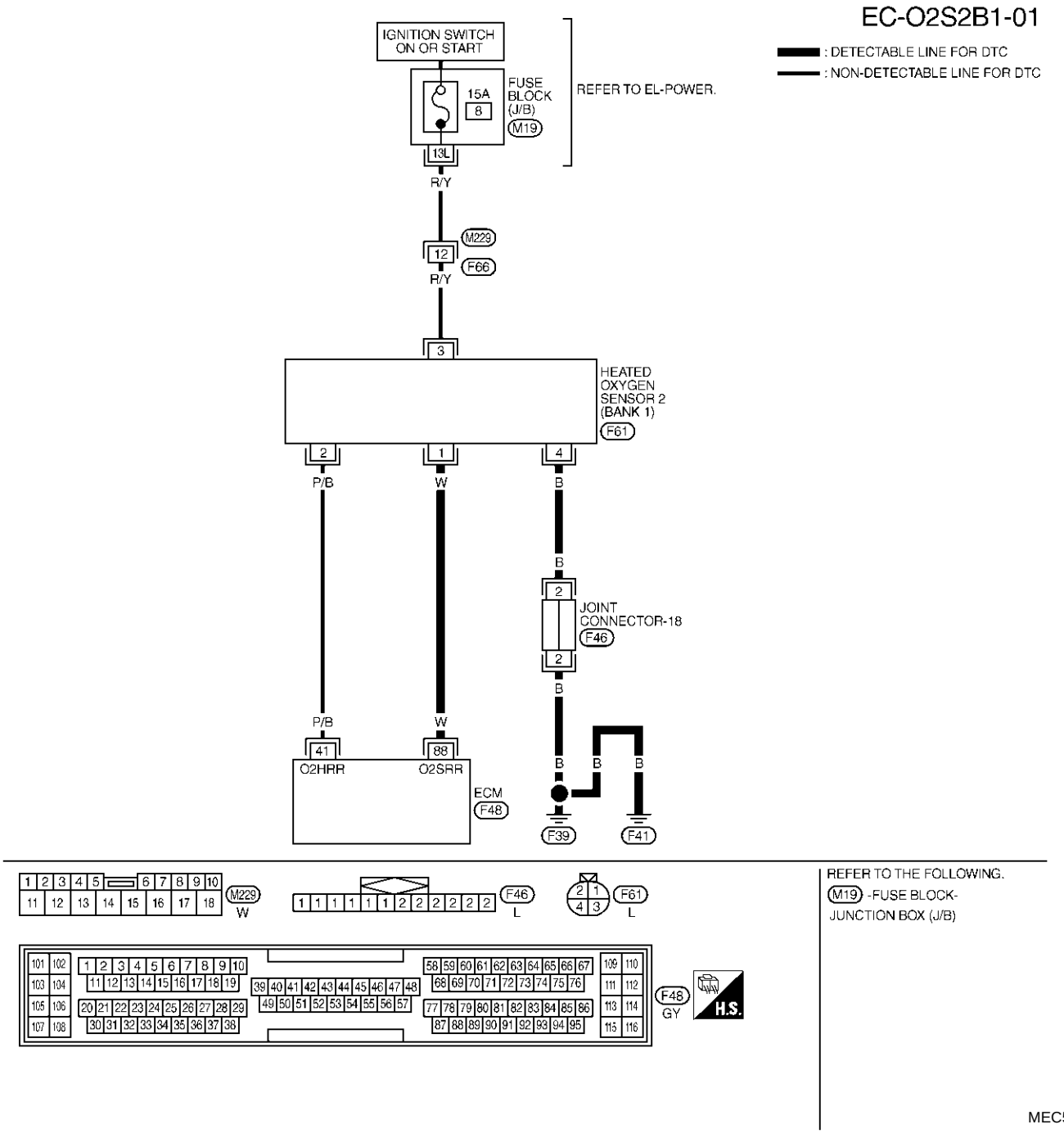
8) If NG, go to "Diagnostic Procedure", EC-263.

Wiring Diagram

=NHEC0910

BANK 1

NHEC0910S01



MEC541D

ECM TERMINALS AND REFERENCE VALUE 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.

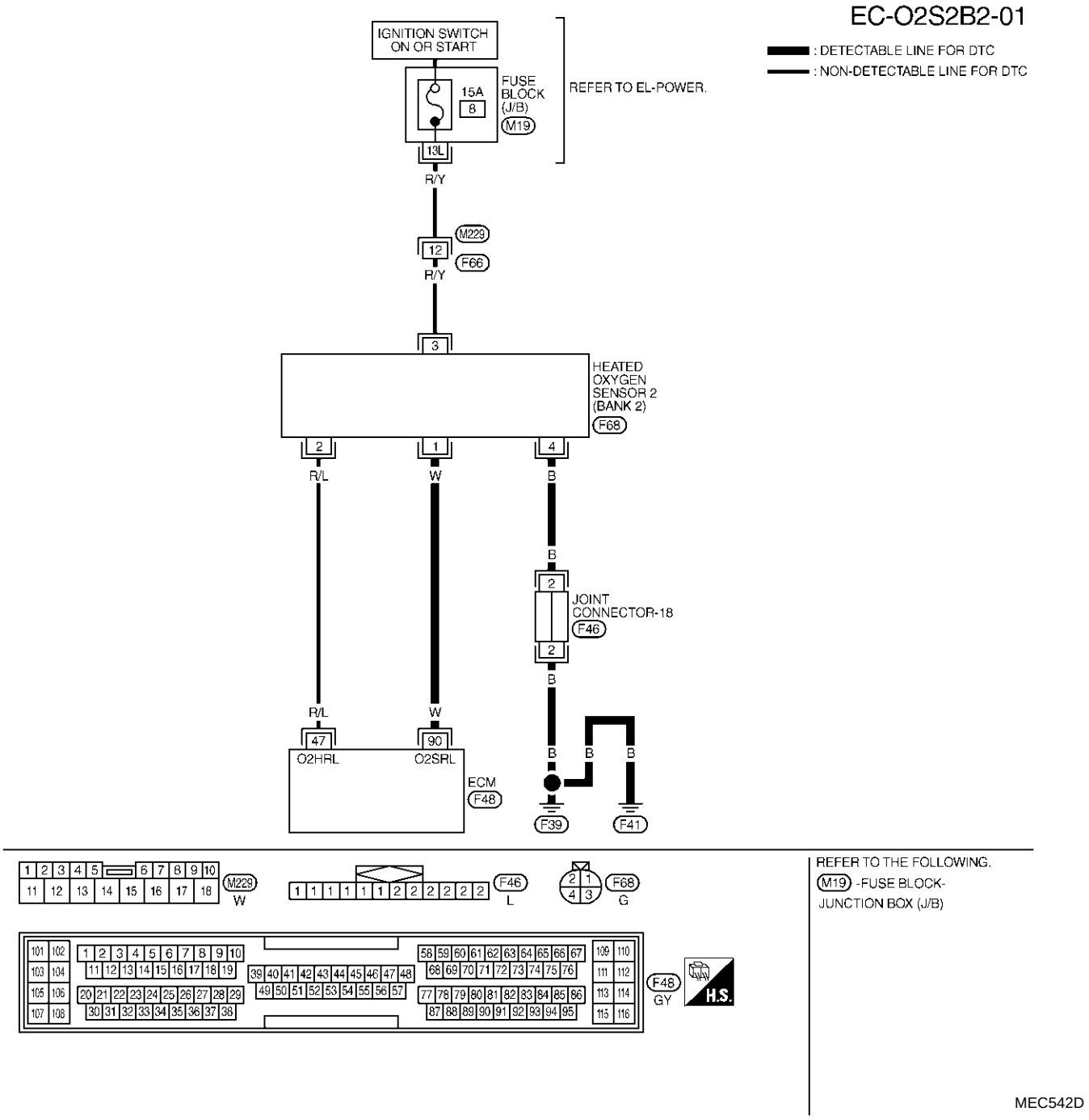
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
88	W	HEATED OXYGEN SENSOR 2 (BANK 1)	**[ENGINE IS RUNNING]** **• WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

SEC661DC

Wiring Diagram (Cont'd)

BANK 2

NHEC0910S02



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
90	W	HEATED OXYGEN SENSOR 2 (BANK 2)	**[ENGINE IS RUNNING]** • **WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

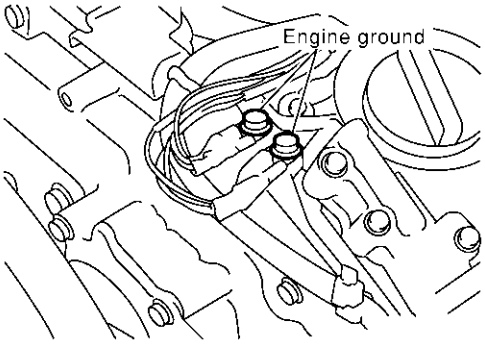
SEC662DC

Diagnostic Procedure

NHEC0911

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



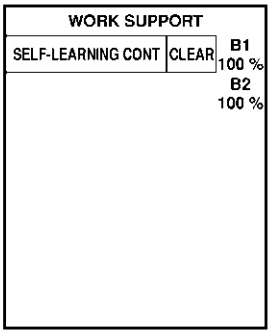
SEC047D

▶ GO TO 2.

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”.



SEF968Y

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?

Ⓚ **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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC No. P0102 is displayed.
6. Erase the DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-89.
7. Make sure DTC No. 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?

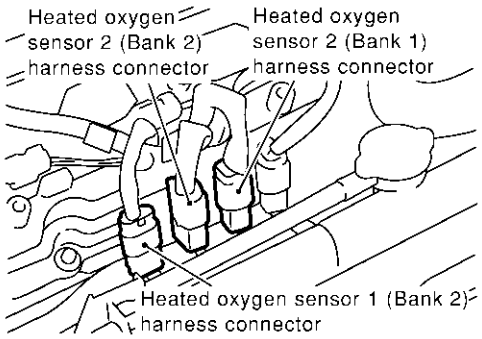
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-267, 275.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect corresponding heated oxygen sensor 2 harness connector.



SEC134D

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	88	1	Bank 1
P0159	90	1	Bank 2

MTBL1152

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0139	88 or 1	Ground	Bank 1
P0159	90 or 1	Ground	Bank 2

MTBL1153

Continuity should not exist.

6. 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.

4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 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.

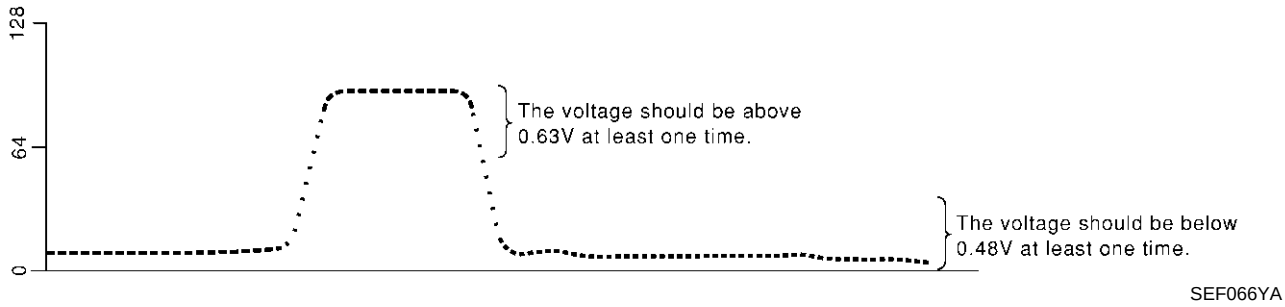
5	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-18 ● Harness for open and short between HO2S2 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066YA

"HO2S2 (B1)/(B2)" should be above 0.63V 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.**
- **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.**

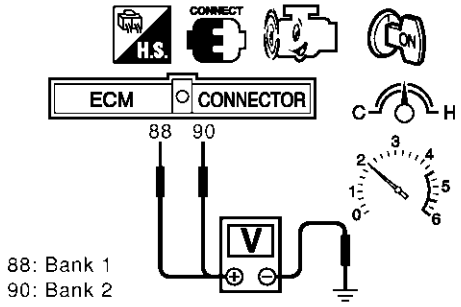
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed at between 3,500 to 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6. 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 0.63V at least once during this procedure.

SEC114D

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK HEATED OXYGEN SENSOR 2-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 7; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go 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.**
- **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	▶	Replace malfunctioning heated oxygen sensor 2.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**

On Board Diagnosis Logic

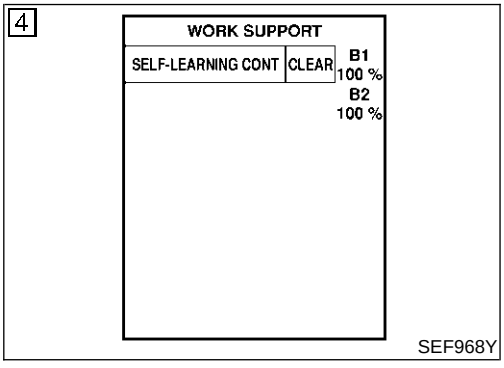
NHEC0912

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. 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).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0171 0171 (Bank 1) P0174 0174 (Bank 2)	Fuel injection system too lean	Fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection



DTC Confirmation Procedure

NHEC0913

NOTE:

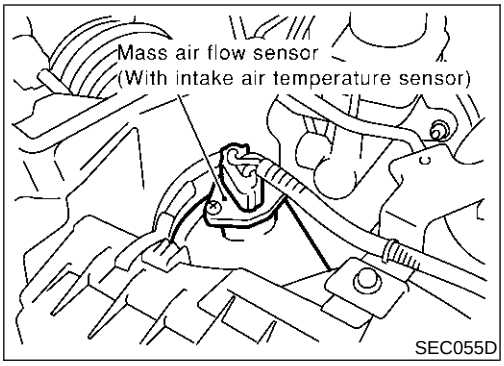
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

Ⓔ WITH CONSULT-II

NHEC0913S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 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-271.
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-271. If engine does not start, check exhaust and intake air leak visually.

DTC Confirmation Procedure (Cont'd)



WITH GST

NHEC0913S02

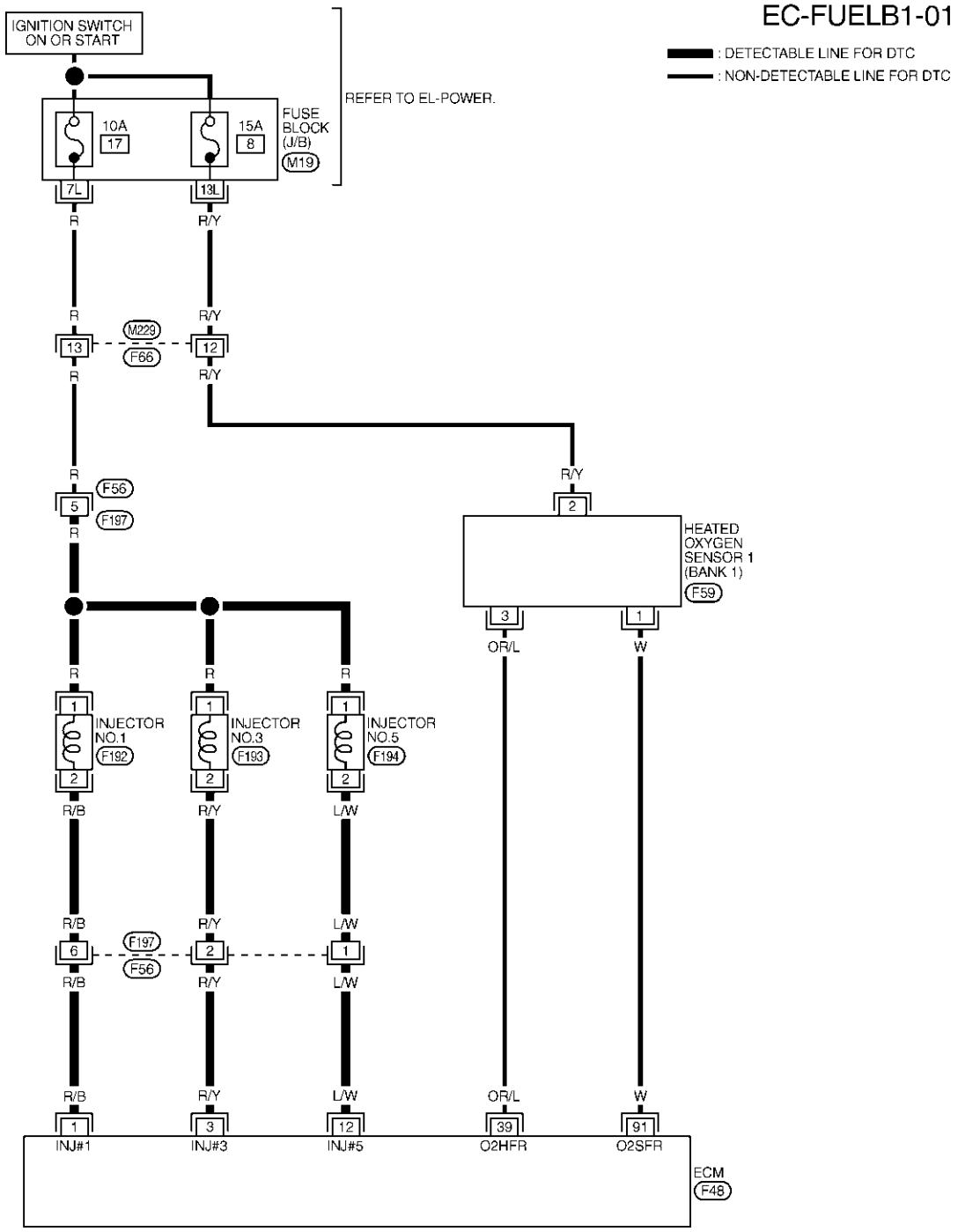
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure DTC P0102 is detected.
6) Select "MODE 4" with GST and erase the DTC P0102.
7) Start engine again and let it idle for at least 10 minutes.
8) Select "MODE 3" with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-271.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-271. If engine does not start, check exhaust and intake air leak visually.

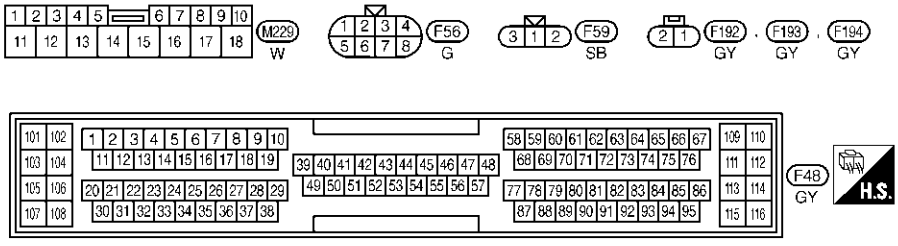
Wiring Diagram

NHEC0914

BANK 1

NHEC0914S01





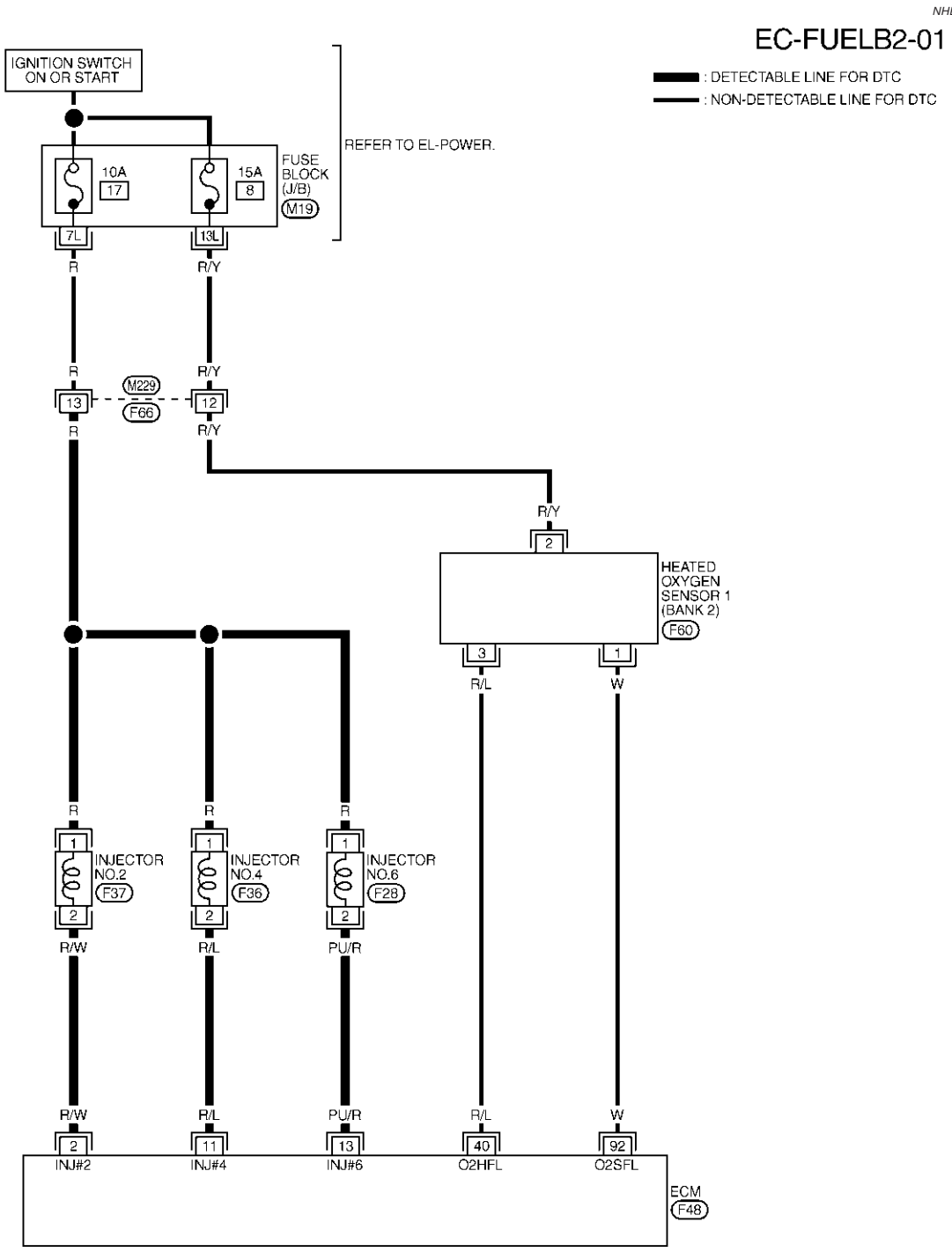
REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

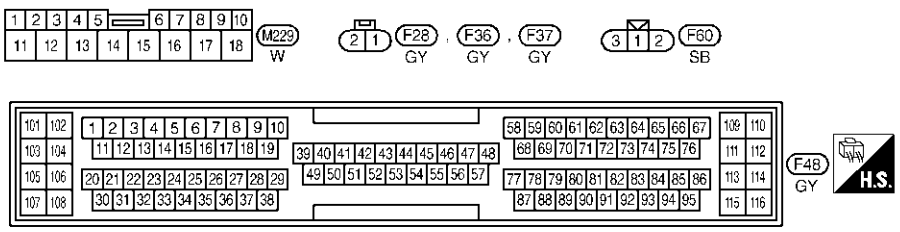
MEC545D

Wiring Diagram (Cont'd)

BANK 2

NHEC0914S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

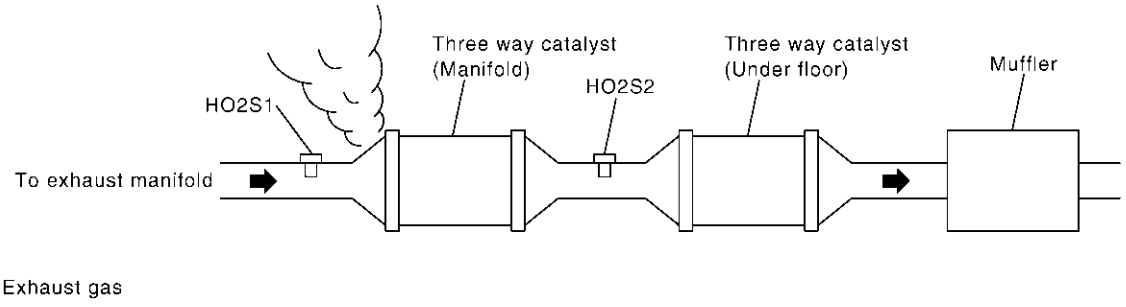
MEC546D

Diagnostic Procedure

NHEC0915

1	CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



SEC502D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	91	1	Bank 1
P0174	92	1	Bank 2

MTBL1154

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0171	91 or 1	Ground	Bank 1
P0174	92 or 1	Ground	Bank 2

MTBL1155

Continuity should not exist.

6. 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.

4	CHECK FUEL PRESSURE	
1. Release fuel pressure to zero. Refer to EC-56. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-56. **At idling:** **Approximately 350 kPa (3.57 kg/cm^2, 51 psi)** **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Follow the instruction of "Fuel Pressure Check", EC-56.

5	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm** **OK or NG**		
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-194.

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

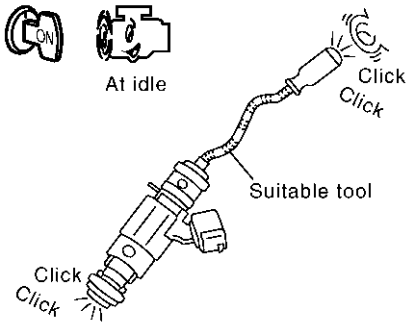
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V

SEC136D

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.



PBIB1725E

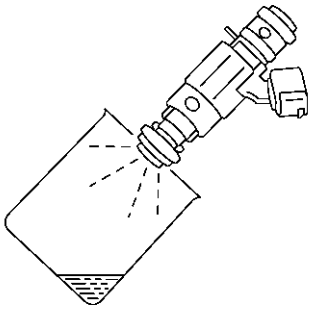
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-688.

7	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Disconnect all injector harness connectors.
4. Remove injector gallery assembly. Refer to EC-57.
   Keep fuel hose and all injectors connected to injector gallery.
5. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from injectors on bank 2.



PBIB1726E

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

On Board Diagnosis Logic

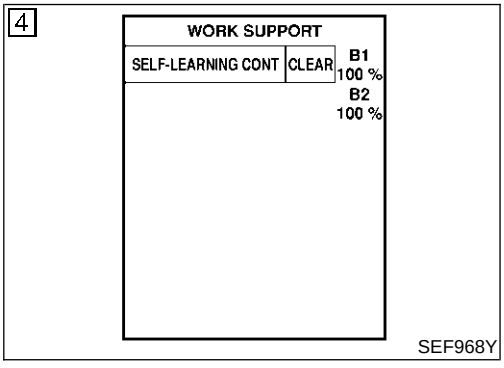
NHEC0916

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. 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	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0172 0172 (Bank 1) P0175 0175 (Bank 2)	Fuel injection system too rich	Fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor



DTC Confirmation Procedure

NHEC0917

NOTE:

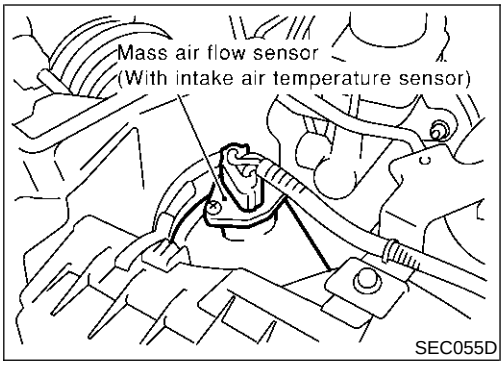
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

Ⓔ WITH CONSULT-II

NHEC0917S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 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-279.
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-279. If engine does not start, remove ignition plugs and check for fouling, etc.

DTC Confirmation Procedure (Cont'd)



WITH GST

NHEC0917S02

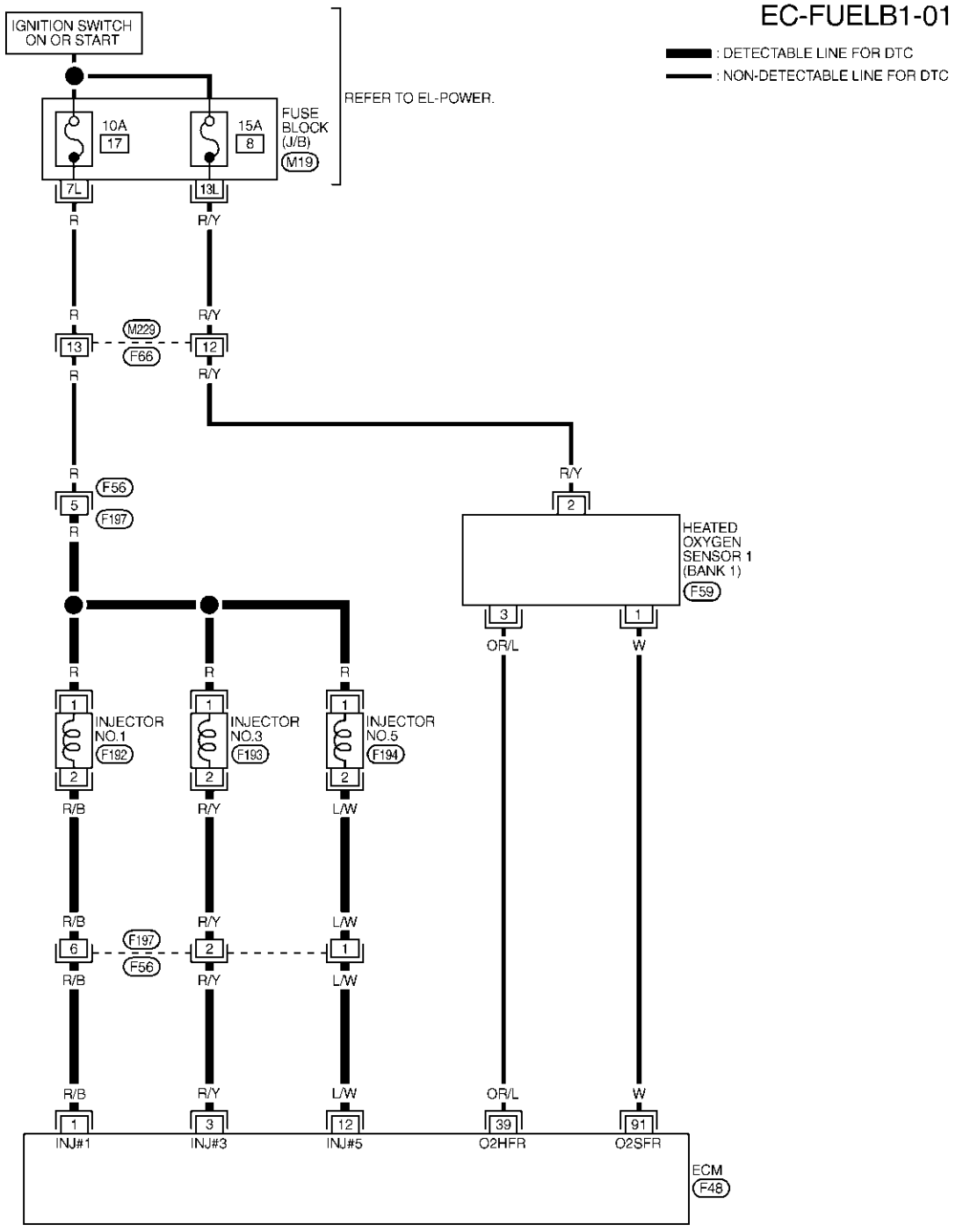
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 3" with GST. Make sure DTC P0102 is detected.
6) Select "MODE 4" with GST and erase the DTC P0102.
7) Start engine again and let it idle for at least 10 minutes.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-279.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
    If engine starts, go to "Diagnostic Procedure", EC-279. If engine does not start, remove ignition plugs and check for fouling, etc.

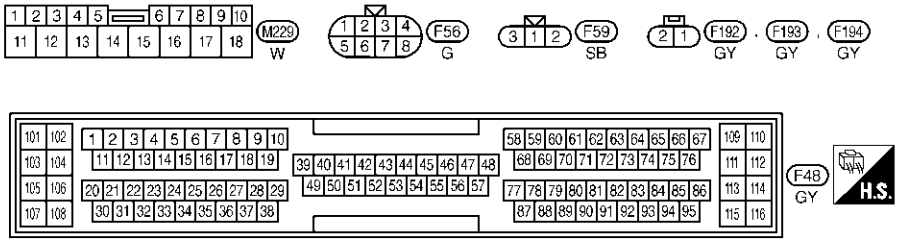
Wiring Diagram

NHEC0918

BANK 1

NHEC0918S01





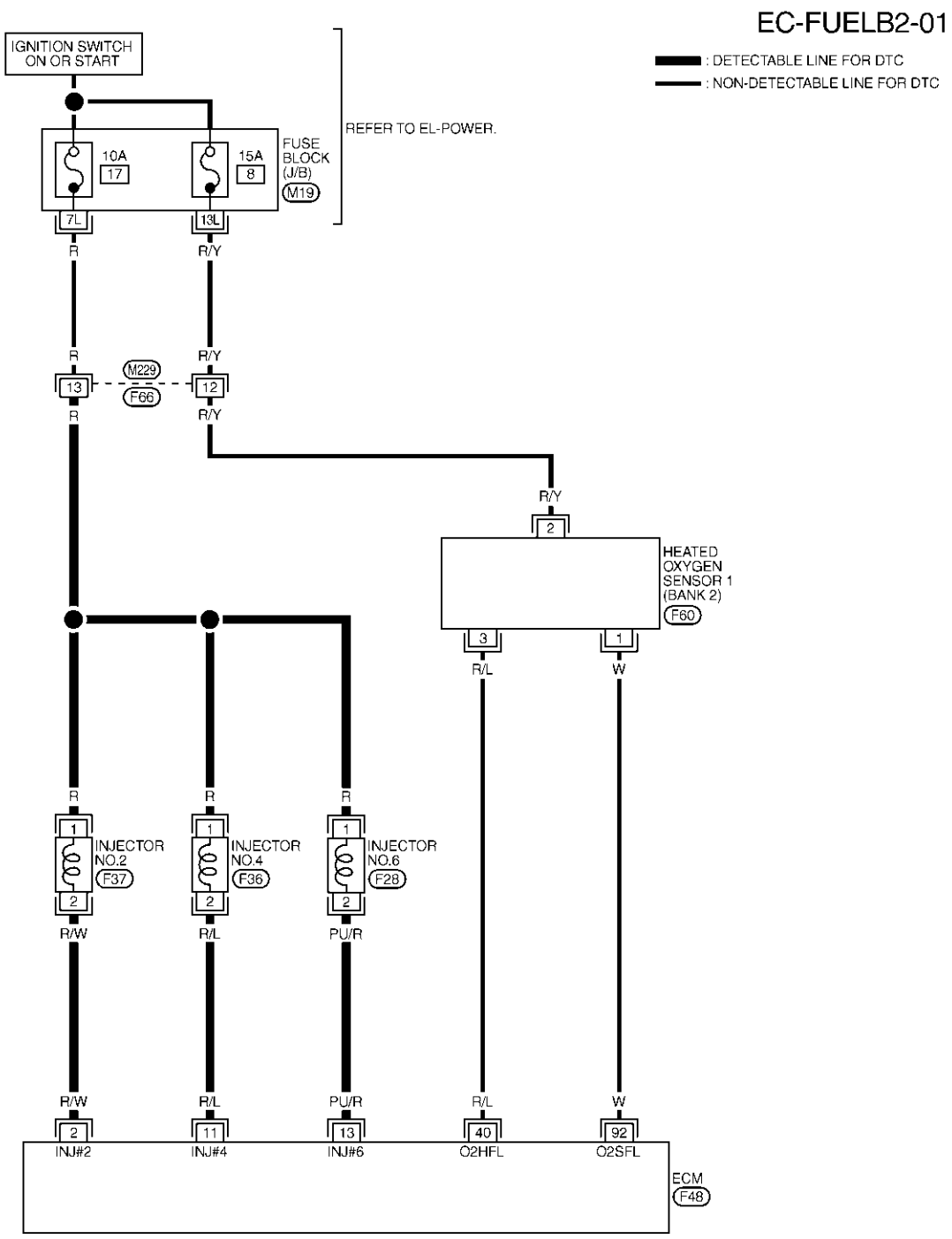
REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

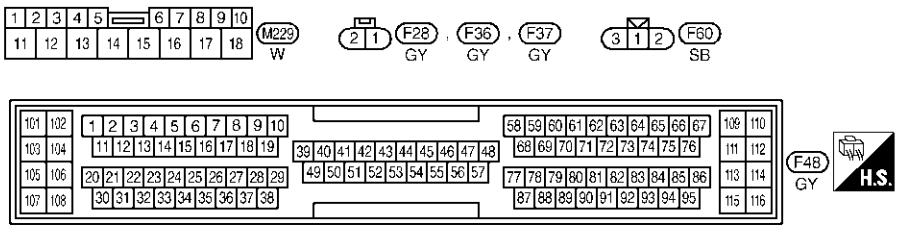
MEC545D

Wiring Diagram (Cont'd)

BANK 2

NHEC0918S02





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-JUNCTION BOX (J/B)

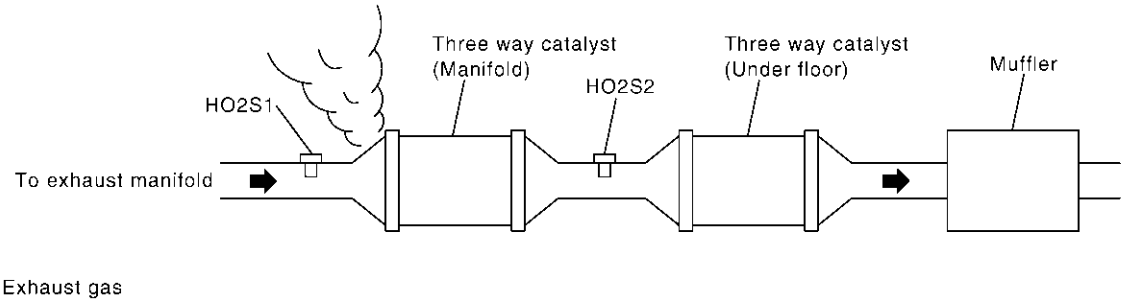
MEC546D

Diagnostic Procedure

NHEC0919

1	CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



SEC502D

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.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	91	1	Bank 1
P0175	92	1	Bank 2

MTBL1156

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0172	91 or 1	Ground	Bank 1
P0175	92 or 1	Ground	Bank 2

MTBL1157

Continuity should not exist.

6. 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.

4	CHECK FUEL PRESSURE	
1. Release fuel pressure to zero. Refer to EC-56. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-56. **At idling:** **Approximately 350 kPa (3.57 kg/cm^2, 51 psi)** **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Follow the instruction of "Fuel Pressure Check", EC-56.

5	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm** **OK or NG**		
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-194.

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

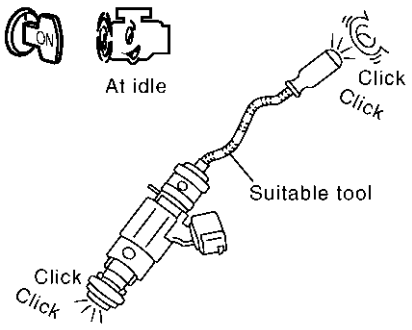
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V

SEC136D

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.



PBIB1725E

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-688.

7	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-57.
   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 all injector harness connectors.
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.

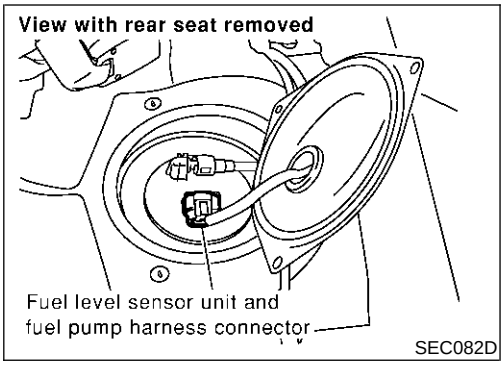
OK or NG

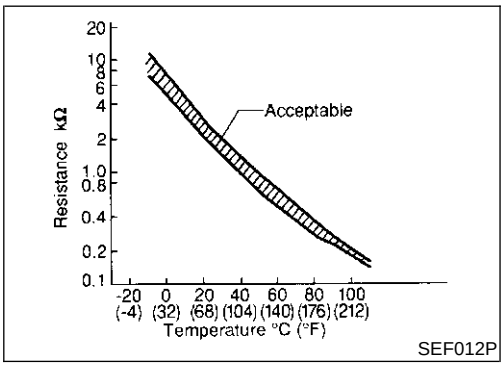
OK (Does not drip.)	▶	GO TO 8.
NG (Drips.)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**





Component Description

NHEC0773

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>

Fuel 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 75 (Fuel tank temperature sensor) and body 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

NHEC0774

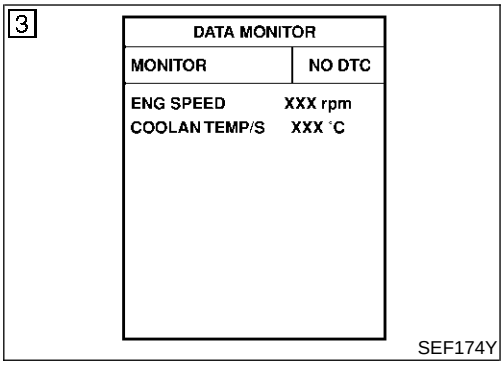
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0181 0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor

DTC Confirmation Procedure

NHEC0776

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.



WITH CONSULT-II

NHEC0776S01

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-283.
   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-283.

WITH GST

NHEC0776S02

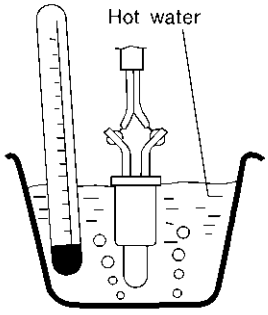
Follow the procedure "With CONSULT-II" above.

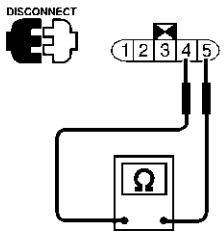
Diagnostic Procedure

NHEC0778

1	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

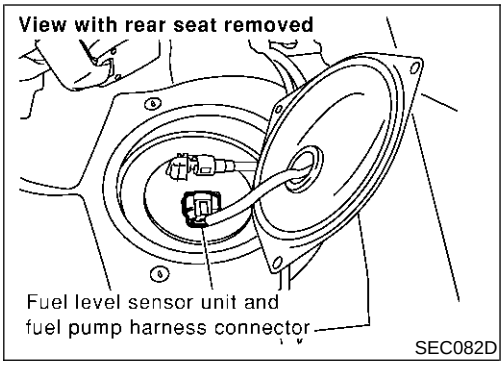
SEF587X

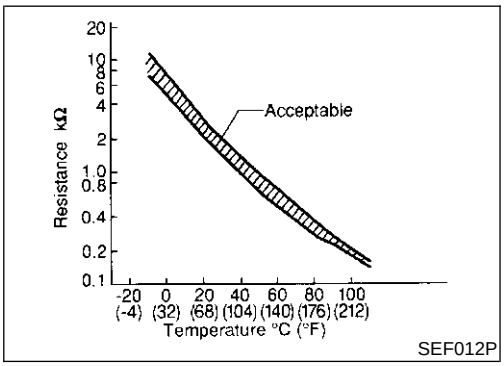
OK or NG

OK	▶	GO TO 2.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

2	CHECK INTERMITTENT INCIDENT
• Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151. • Refer to Wiring Diagram, EC-287.	
▶	**INSPECTION END**





Component Description

NHEC0920

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>

Fuel 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 75 (Fuel tank temperature sensor) and body 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

NHEC0921

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

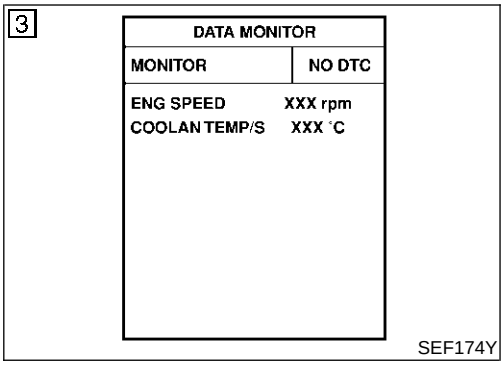
DTC Confirmation Procedure

NHEC0922

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.

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC0922S01

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-288.
   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-288.

WITH GST

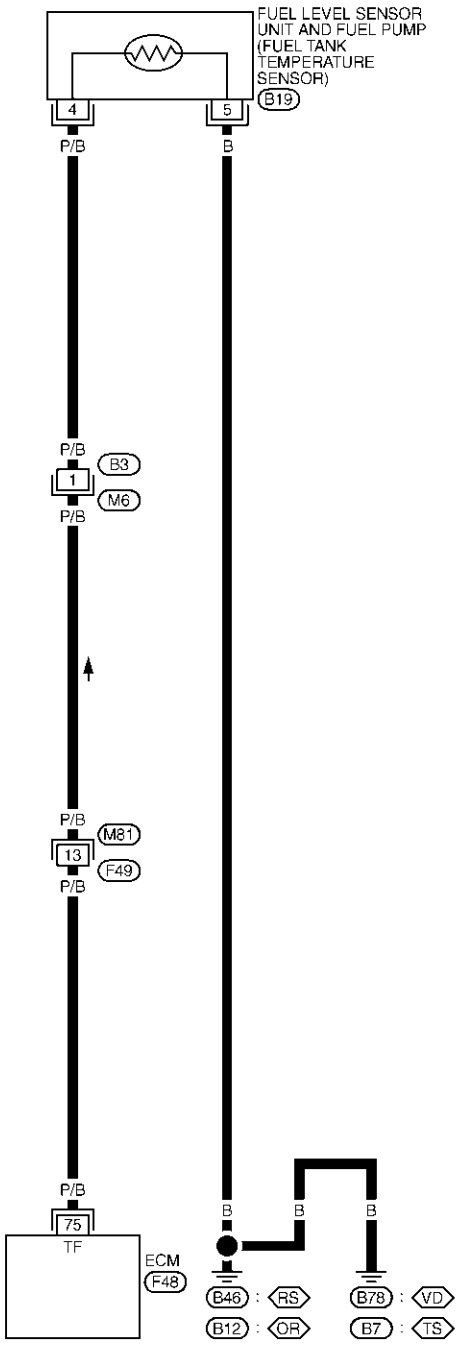
NHEC0922S02

Follow the procedure "With CONSULT-II" above.

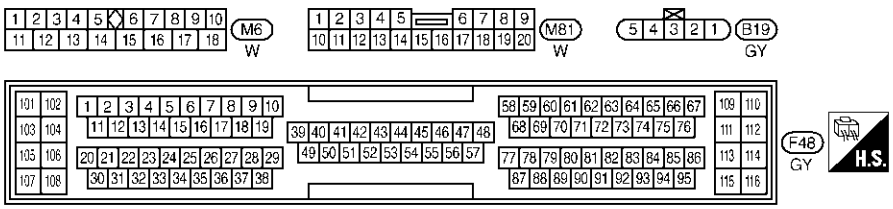
Wiring Diagram

NHEC0923

EC-FTTS-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
RS : WITH REAR SUNSHADE
OR : WITHOUT REAR SUNSHADE
VD : WITH VDC
TS : WITH TCS



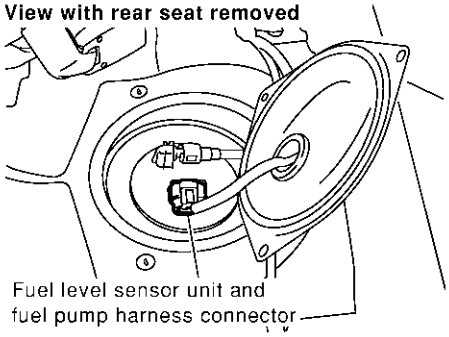
MEC350E

Diagnostic Procedure

NHEC0924

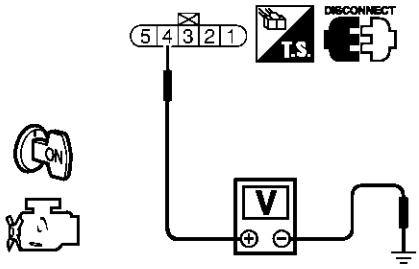
1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEC082D

3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit terminal 4 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEC116D

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M6
- Harness connectors M81, F49
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

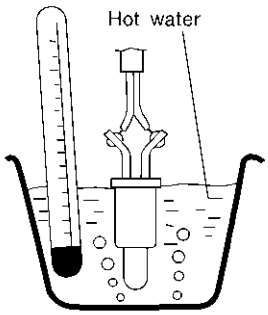
1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

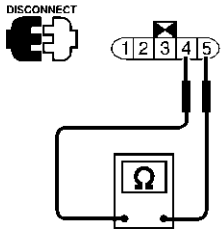
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

4	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 by heating with hot water or heat gun as shown in the figure.





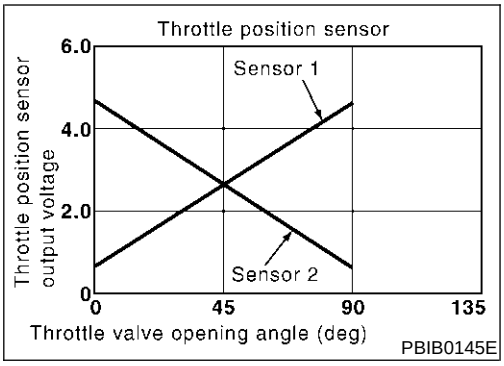
Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEF587X

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel level sensor unit.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC1372

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1373

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1	• Ignition switch: ON (Engine stopped) • Shift lever: D	Accelerator pedal: Released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

On Board Diagnosis Logic

NHEC1436

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (The TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

NHEC1436S01

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

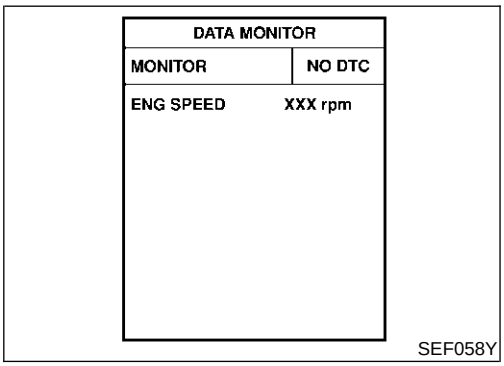
Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NHEC1437

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 10V 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 1 second.
4. If DTC is detected, go to “Diagnostic Procedure”, EC-293.

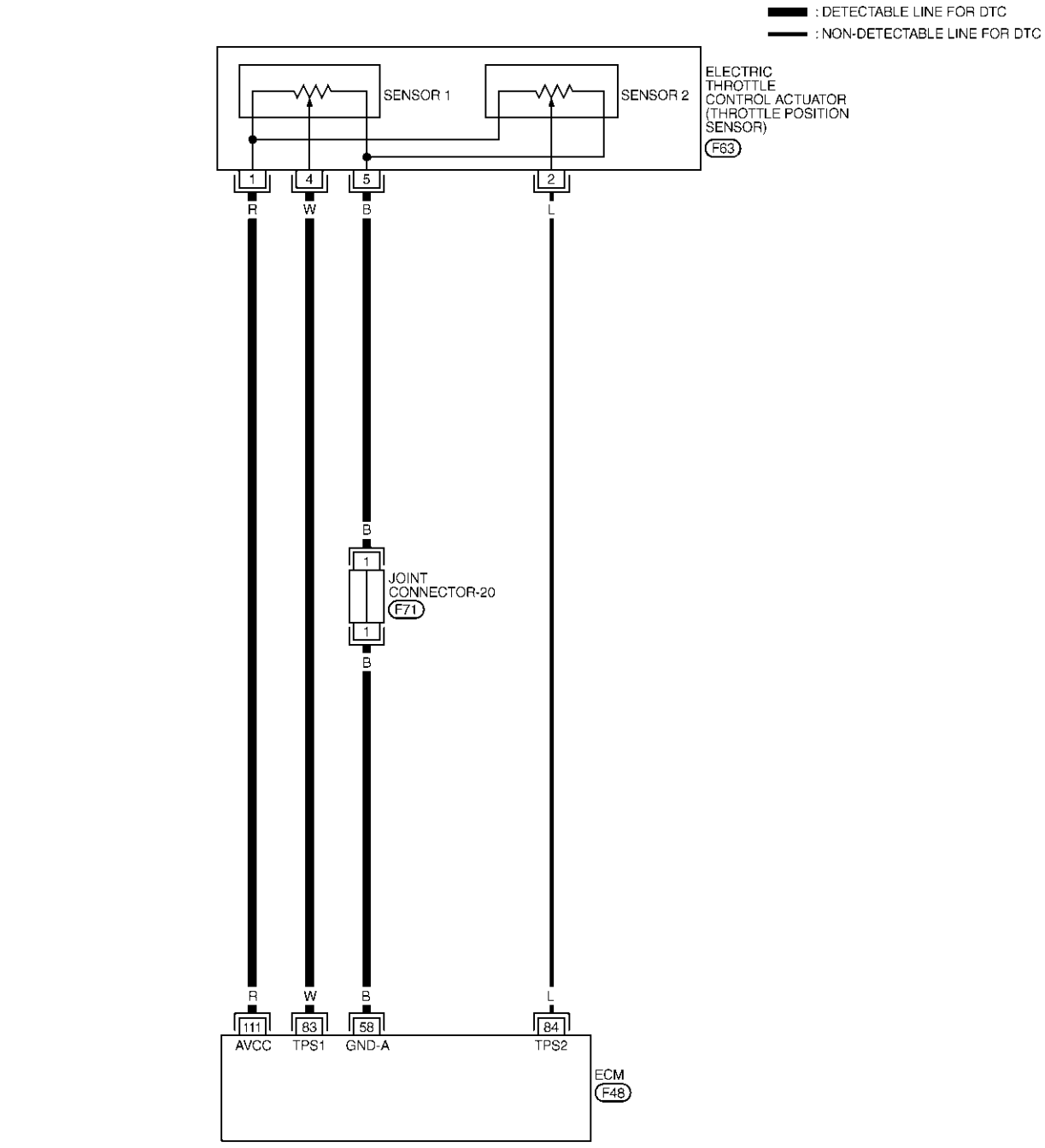
With GST

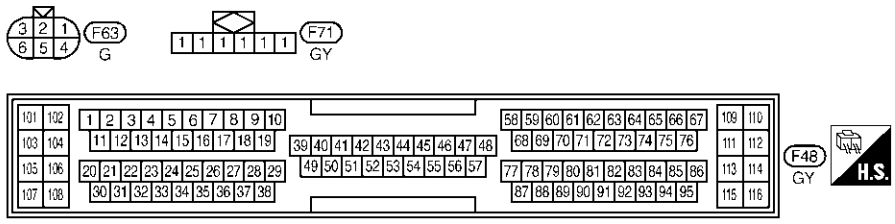
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1376

EC-TPS1-01





MEC352E

Wiring Diagram (Cont'd)

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.

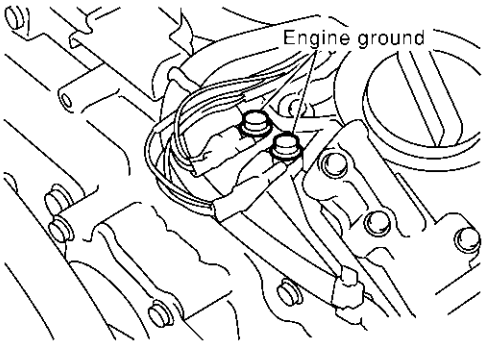
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Shift lever position is "D" ● Accelerator pedal released	More than 0.36V
			[Ignition switch "ON"] ● Shift lever position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
84	L	Throttle position sensor 2	**[Ignition switch "ON"]** ● Shift lever position is "D" ● Accelerator pedal released	Less than 4.75V
			[Ignition switch "ON"] ● Shift lever position is "D" ● Accelerator pedal fully depressed	More than 0.36V
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1377

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



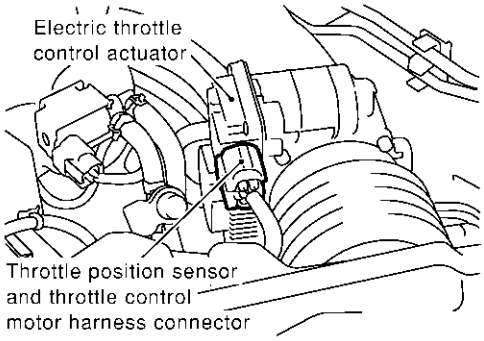
SEC047D

▶ GO TO 2.

Diagnostic Procedure (Cont'd)

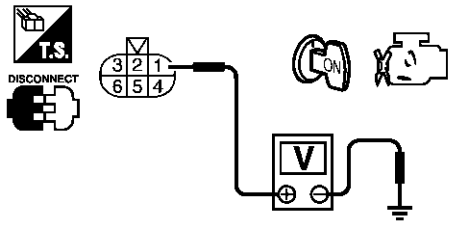
2	CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



SEC054D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

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 THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between electric throttle control actuator terminal 5 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-20
- Harness for open or short between electric throttle control actuator and ECM

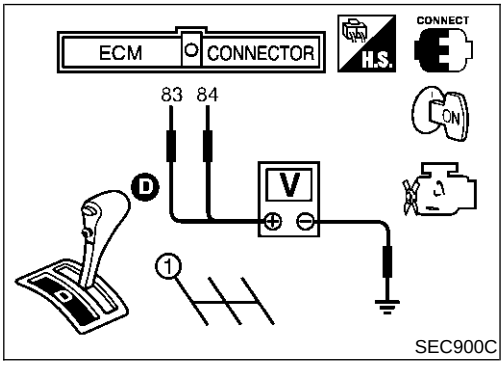
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 83 and electric throttle control actuator terminal 4. 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 ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-295.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-71. 3. Perform "Idle Air Volume Learning", EC-71.	
▶	**INSPECTION END**

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Inspection

NHEC1378

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Turn ignition switch "ON".
4. Set selector lever to "D" position.
5. Check voltage between ECM terminals 83 (TP sensor 1), 84 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
84 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-71.
8. Perform "Idle Air Volume Learning", EC-71.

On Board Diagnosis Logic

NHEC0929

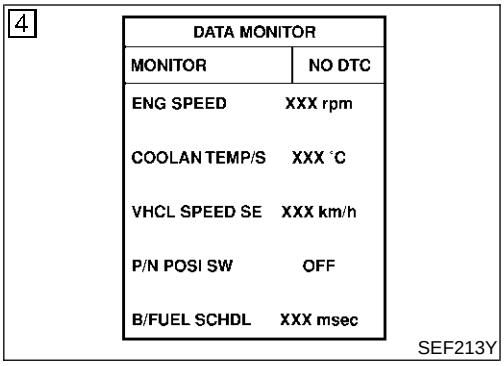
When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	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.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0300 0300	Multiple cylinder misfire detected	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.	• 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 • Incorrect PCV hose connection
P0301 0301	No. 1 cylinder misfire detected		
P0302 0302	No. 2 cylinder misfire detected		
P0303 0303	No. 3 cylinder misfire detected		
P0304 0304	No. 4 cylinder misfire detected		
P0305 0305	No. 5 cylinder misfire detected		
P0306 0306	No. 6 cylinder misfire detected		



DTC Confirmation Procedure

NHEC0930

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 10 seconds before conducting the next test.

WITH CONSULT-II

NHEC0930S01

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 10 seconds.
4) Restart engine and let it idle for about 15 minutes.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-298.

NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

1) Turn ignition switch OFF and wait at least 10 seconds.
2) Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ±400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ±10 km/h (5 MPH)
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).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

NHEC0930S02

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

=NHEC0931

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. 3. Check PCV hose connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
1. 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.

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 AIF SE-B1	XXX V

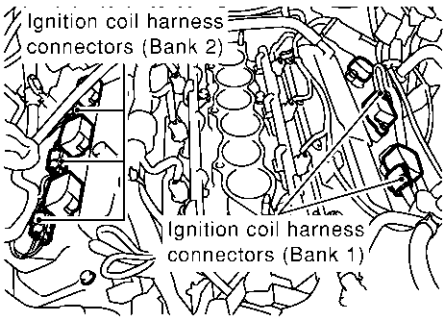
SEC136D

2. Is there any cylinder which does not produce a momentary engine speed drop?

Ⓚ **Without CONSULT-II**

When disconnecting each ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

View with intake manifold collector removed



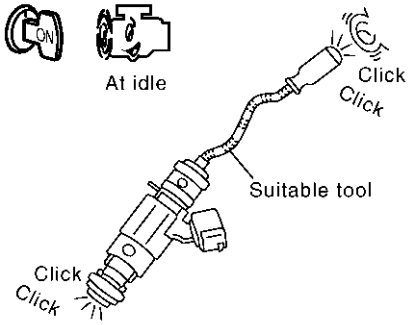
SEC120D

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	CHECK INJECTOR

Does each injector make an operating sound at idle?



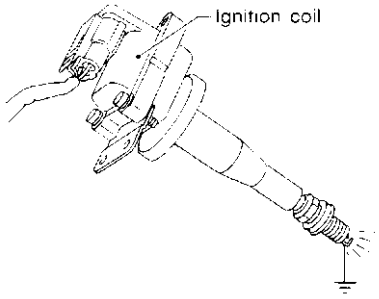
PBIB1725E

Yes or No

Yes	▶	GO TO 5.
No	▶	Check injector(s) and circuit(s). Refer to EC-688.

5	CHECK IGNITION SPARK

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.



SEF575Q

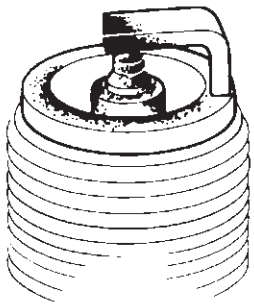
OK or NG

OK	▶	GO TO 6.
NG	▶	Check ignition coil, power transistor and their circuits. Refer to "IGNITION SIGNAL", EC-677.

Diagnostic Procedure (Cont'd)

6	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-17, "Changing Spark Plugs".

7	CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-13, "Measurement of Compression Pressure".

Standard:

1,275 kPa (13.0 kg/cm^2, 185 psi)/300 rpm

Minimum:

981 kPa (10.0 kg/cm^2, 142 psi)/300 rpm

Difference between each cylinder:

98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 8.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8	CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-56.
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-56.

At idle:

Approx. 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK	▶	GO TO 9.
NG	▶	Follow the instruction of "Fuel Pressure Check", EC-56.

9	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-119.

Items	Specifications
Ignition timing	15° ± 5° BTDC
Target idle speed	675 ± 50 rpm (in "P" or "N" position)

MTBL1556

OK or NG

OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	Follow the "Basic Inspection".

Diagnostic Procedure (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1

Ⓔ **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" more than 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				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

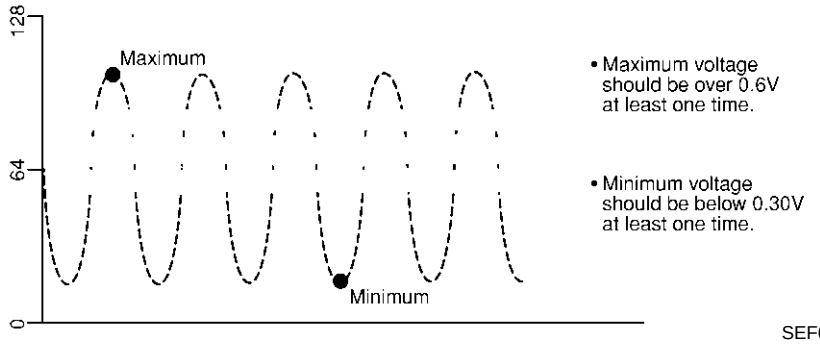
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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.**

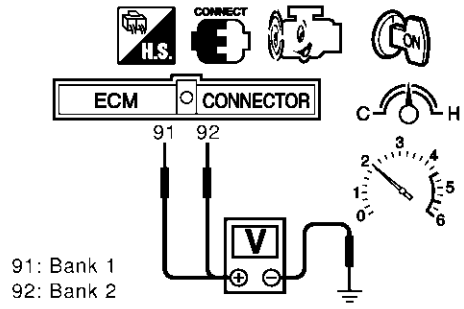
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

11	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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

SEC109D

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.

12	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in MODE 1 with GST.

2.0 - 6.0 g·m/sec: at idling
7.0 - 20.0 g·m/sec: at 2,500 rpm

OK or NG

OK	▶	GO TO 13.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-191.

13	CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in "Symptom Matrix Chart", EC-126.

OK or NG

OK	▶	GO TO 14.
NG	▶	Repair or replace.

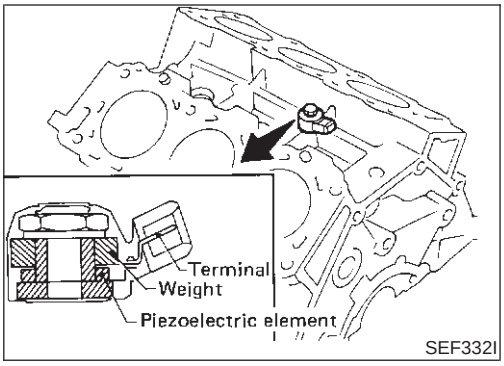
14	ERASE THE 1ST TRIP DTC

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-89.
Some tests may cause a 1st trip DTC to be set.

	▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0932

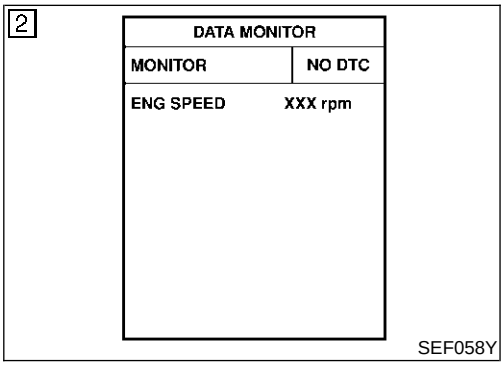
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

On Board Diagnosis Logic

NHEC0934

The MIL will not light for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	



DTC Confirmation Procedure

NHEC0935

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 10V at idle.

WITH CONSULT-II

NHEC0935S01

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 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-307.

WITH GST

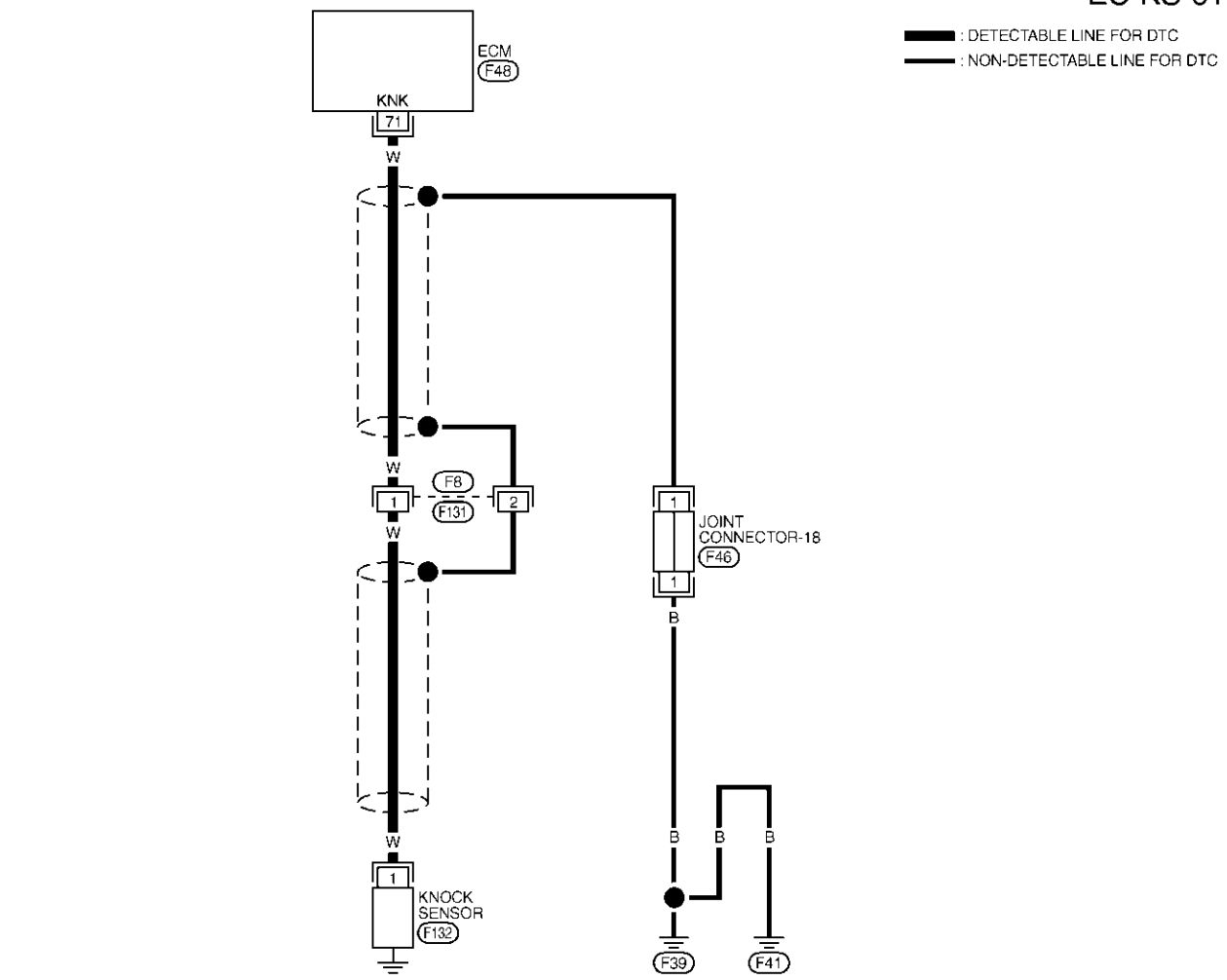
NHEC0935S03

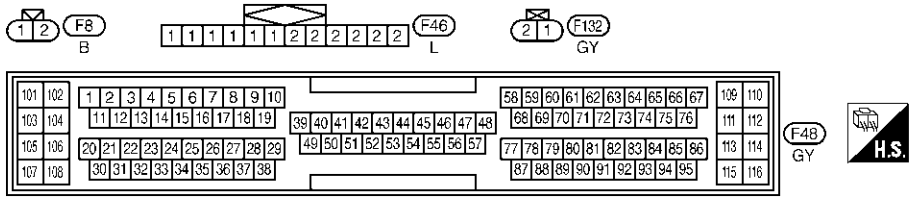
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC0936

EC-KS-01





MEC550D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
71	W	KNOCK SENSOR	ENGINE RUNNING AT IDLE SPEED	APPROX. 2.5V

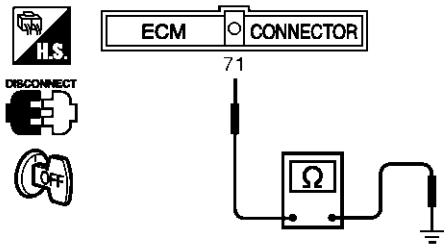
SEC117D

Diagnostic Procedure

NHEC0937

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 71 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)]

SEC118D

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 71 and knock sensor 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 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, F131
- 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.

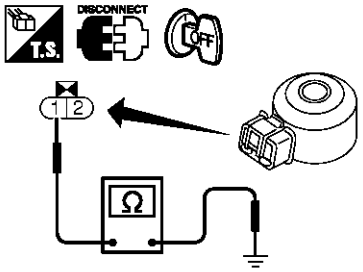
Diagnostic Procedure (Cont'd)

4	CHECK KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.



Resistance: 500 - 620 kΩ [at 25°C (77°F)]

SEC119D

CAUTION:

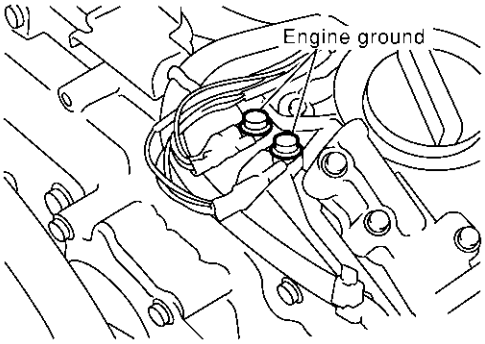
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.



SEC047D

	▶	GO TO 6.

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F8, F131.
2. Check harness continuity between harness connector F8 terminal 2 and engine ground.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

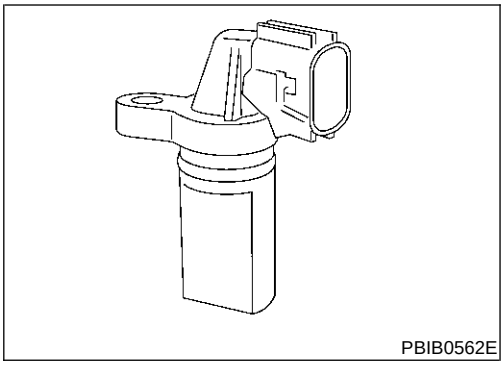
7	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, F131
- Joint connector-18
- Harness for open or short between harness connector F8 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-151.	
▶	**INSPECTION END**


PBIB0562E

Component Description

NHEC0938

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor 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.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0939

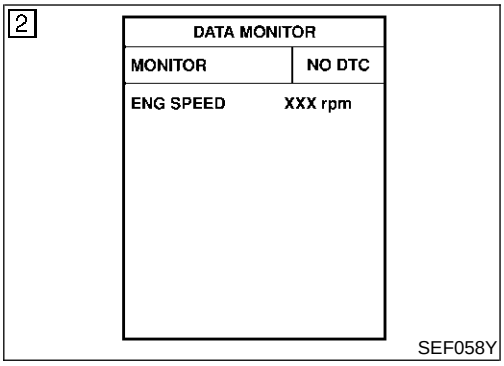
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

On Board Diagnosis Logic

NHEC0941

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0335 0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor signal is not in the normal pattern during engine running.	• Harness or connectors [The crankshaft position sensor (POS) circuit is open or shorted.] • Crankshaft position sensor (POS) • Signal plate



DTC Confirmation Procedure

=NHEC0942

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 10.5V with ignition switch “ON”.

With CONSULT-II

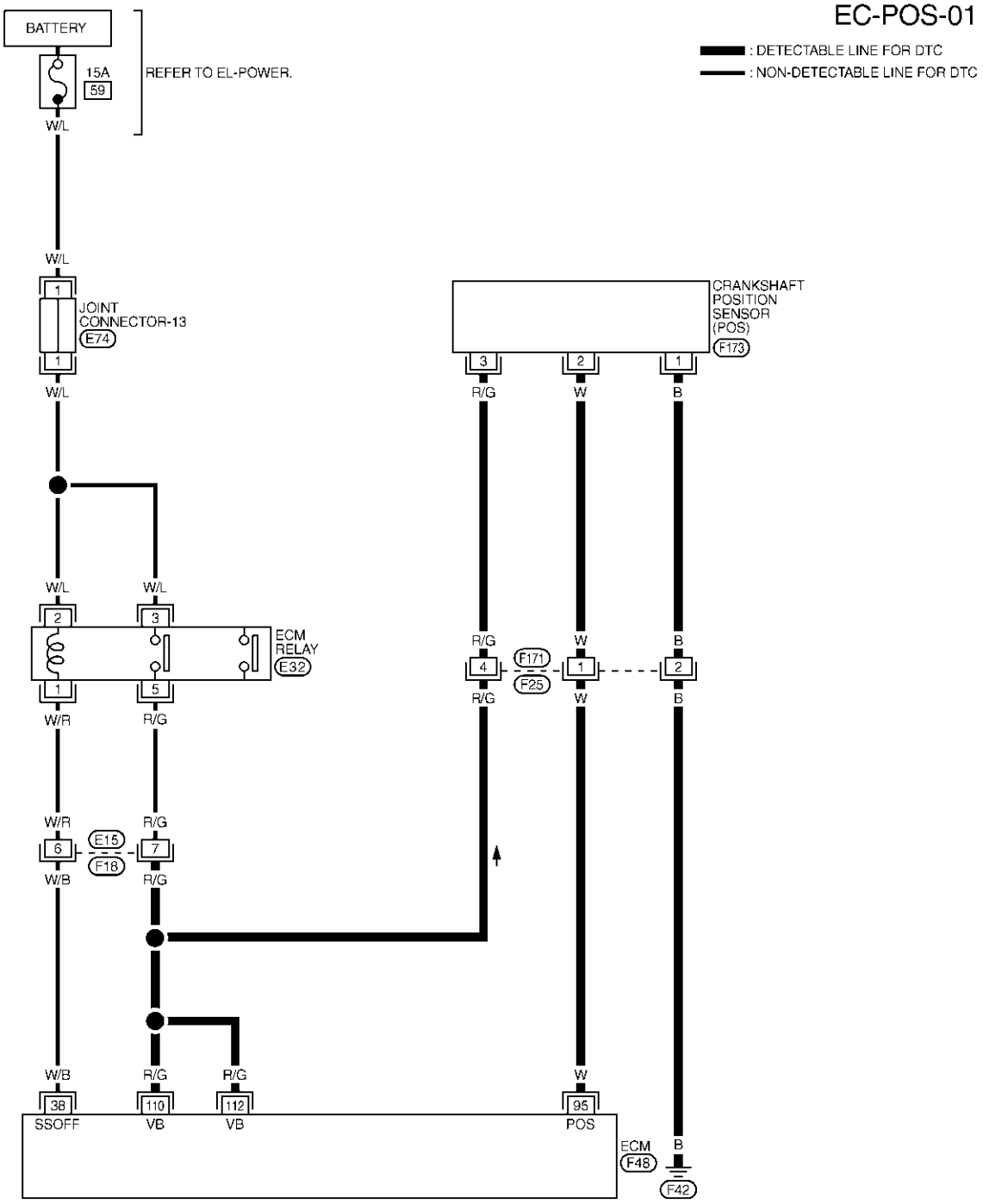
1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-313.
   If 1st trip DTC is not detected, go to next step.
4) Maintaining engine speed at more than 1,000 rpm for at least 5 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-313

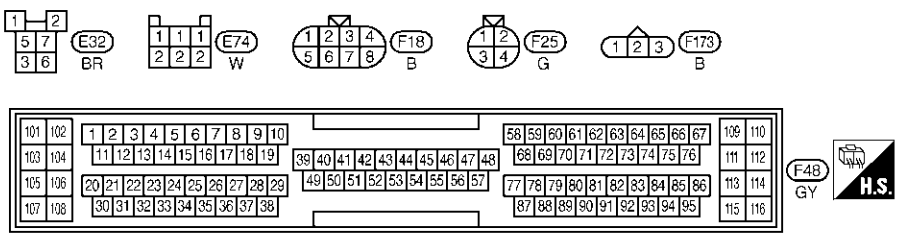
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC0943



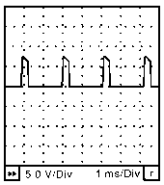
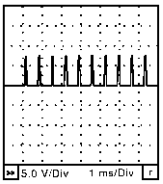


MEC551D

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

CAUTION:

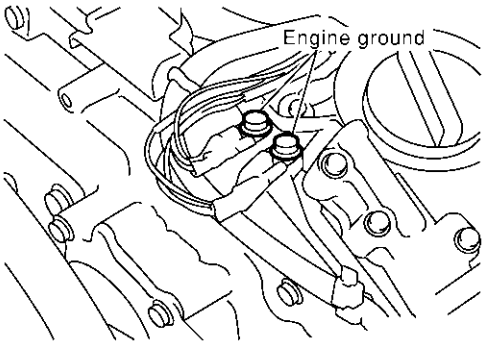
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
95	W	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 2.4V★  SEC035D
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V★  SEC036D

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

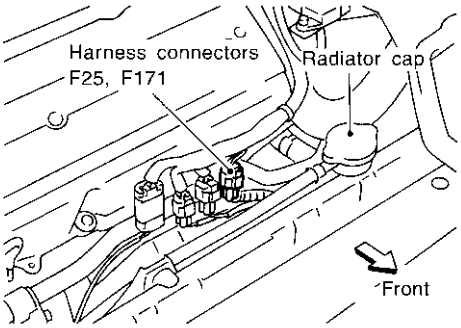
NHEC0944

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.  SEC047D	
▶	GO TO 2.

Diagnostic Procedure (Cont'd)

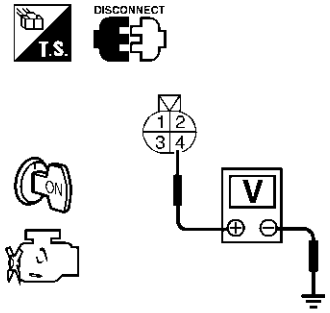
2	CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors F25, F171.



SEF511WB

2. Turn ignition switch "ON".
3. Check voltage between harness connector F25 terminal 4 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF323X

4. 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.
- Harness connectors F25, F171
- Harness connectors E15, F18
- Harness for open or short between ECM and harness connector F25
- Harness for open or short between ECM relay and harness connector F25

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

4	CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between harness connector F25 terminal 2 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.

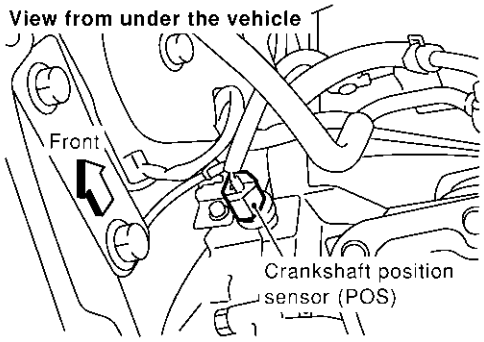
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F25, F171 ● Harness for open between harness connector F25 and ground	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 95 and harness connector F25 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. ● Harness connectors F25, F171 ● Harness for open or short between ECM and harness connector F25	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK CKP SENSOR (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKP sensor (POS) harness connector.



SEC137D

2. Check harness continuity between CKP sensor (POS) terminals and harness connector F171 terminals as follows.

CKP sensor (POS) terminal	Harness connector F171 terminal
1	2
2	1
3	4

MTBL1191

Continuity should exist.

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

OK or NG

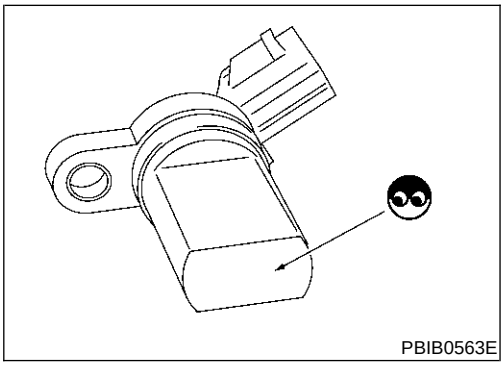
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

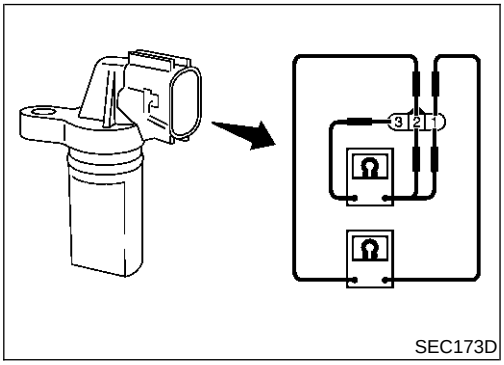
9	CHECK CRANKSHAFT POSITION SENSOR (POS)	
Refer to "Component Inspection", EC-316.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

10	CHECK GEAR TOOTH	
Visually check for chipping signal plate gear tooth.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the signal plate.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



PBIB0563E



SEC173D

Component Inspection

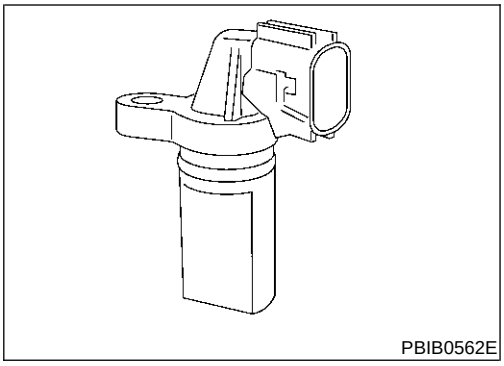
NHEC1415

CRANKSHAFT POSITION SENSOR (POS)

NHEC1415S01

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (−)	Except 0 or ∞
1 (+) - 3 (−)	
2 (+) - 3 (−)	


PBIB0562E

Component Description

NHEC0945

The camshaft position sensor (PHASE) senses the retraction with intake valve camshaft to identify a particular cylinder. The crankshaft position sensor (POS) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The sensor consists of a permanent magnet and Hall IC. When 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.

On Board Diagnosis Logic

NHEC0947

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0340 0340 (Bank 1) P0345 0345 (Bank 2)	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors [The camshaft position sensor (PHASE) circuit is open or shorted.] • Camshaft position sensor (PHASE) • Camshaft (Intake) • Starter motor (Refer to SC section.) • Starting system circuit (Refer to SC section.) • Dead (Weak) battery

DTC Confirmation Procedure

NHEC0948

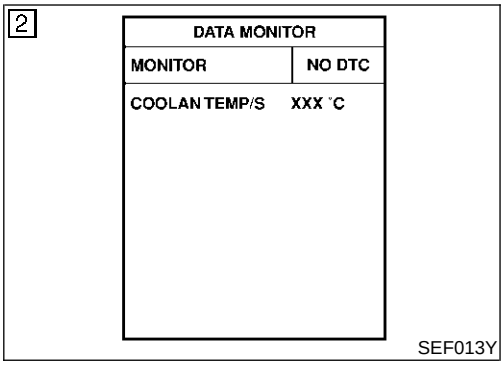
NOTE:

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 10.5V with ignition switch “ON”.

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC0948S03

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321. If 1st trip DTC is not detected, go to next step.
5) Maintaining engine speed at more than 1,000 rpm for at least 5 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321.

WITH GST

NHEC0948S04

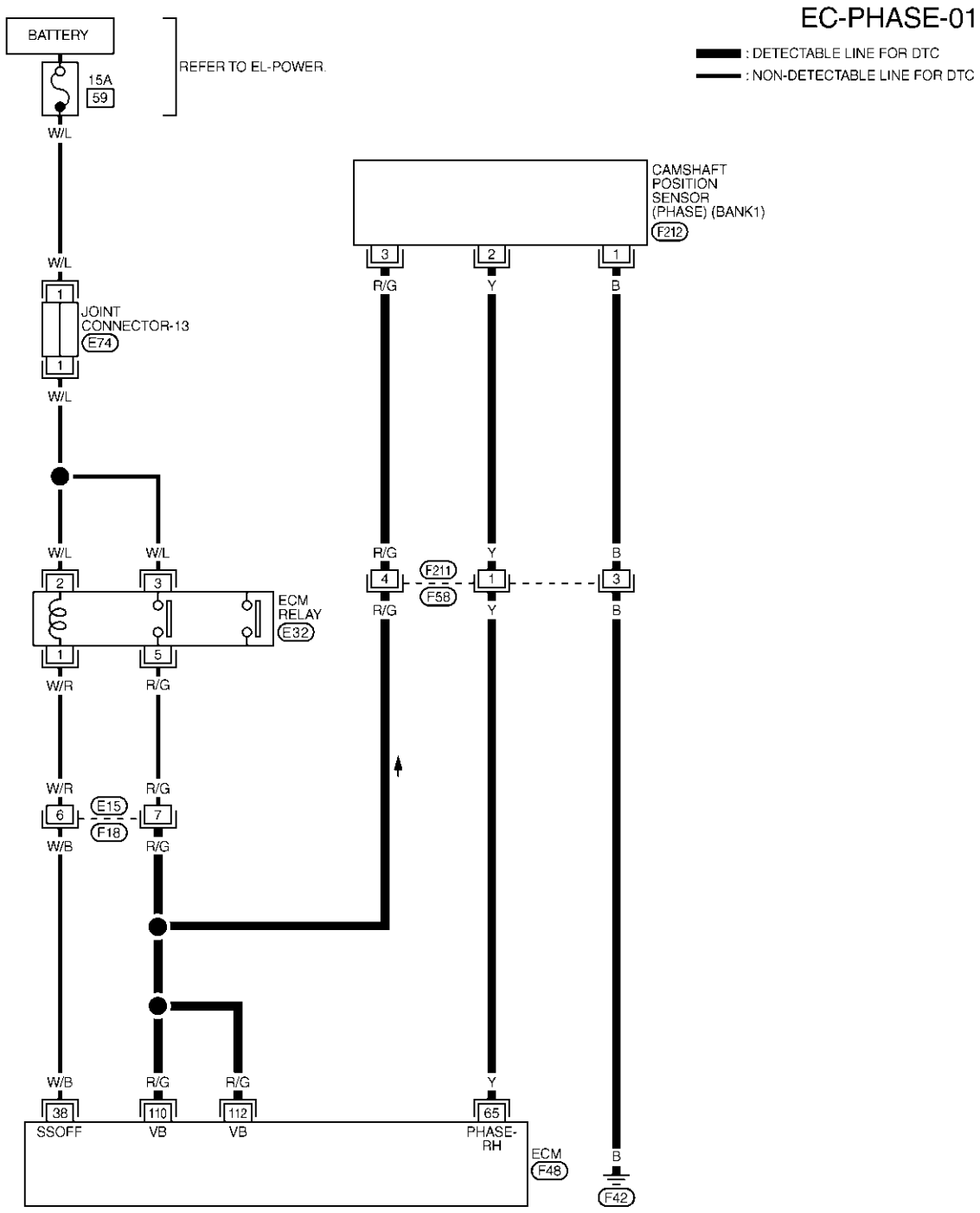
Follow the procedure "With CONSULT-II" above.

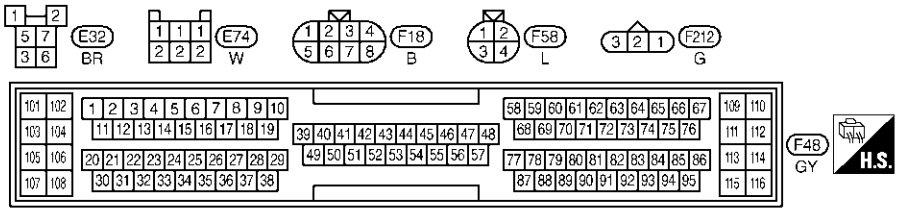
Wiring Diagram

NHEC0949

BANK 1

NHEC0949S01



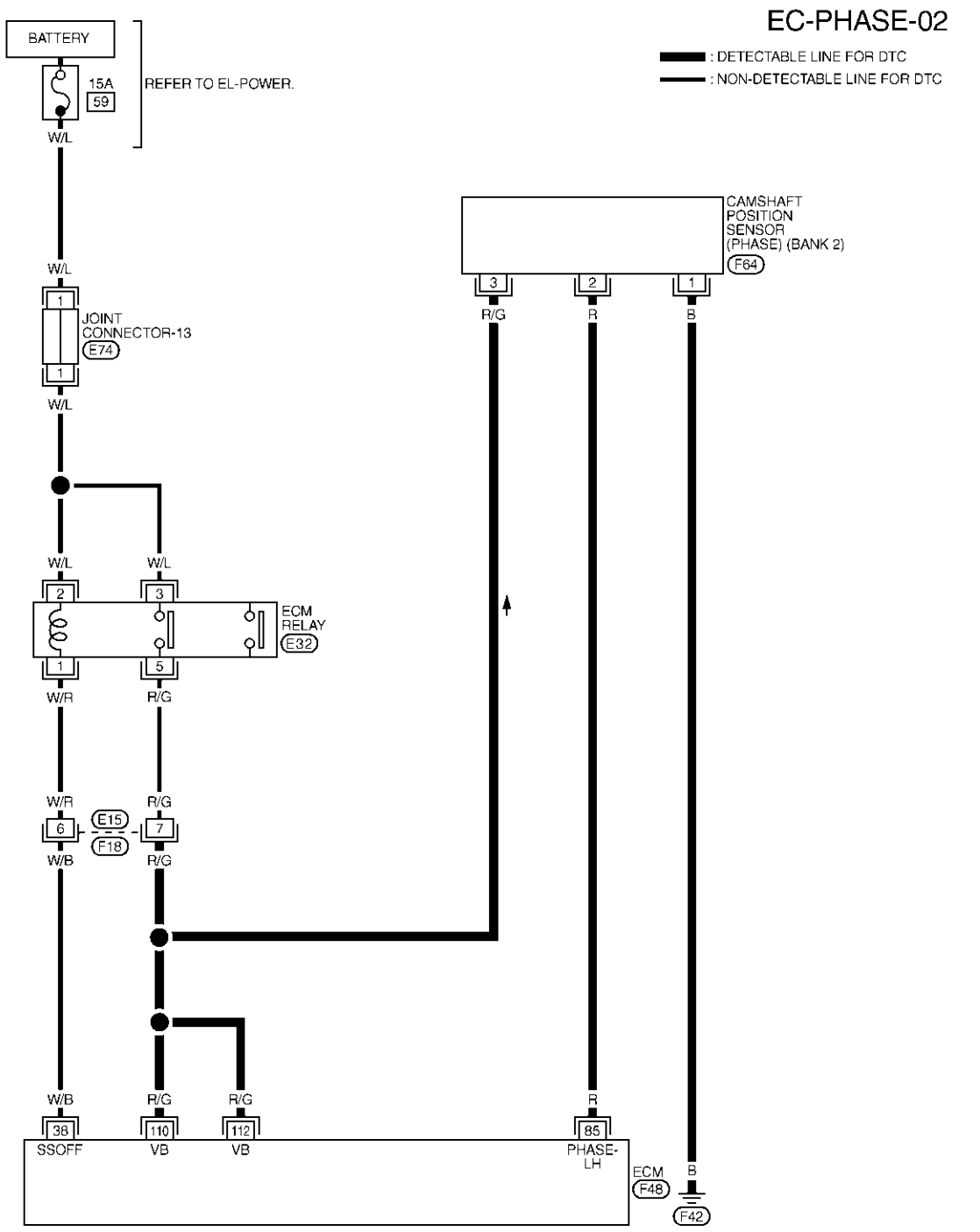


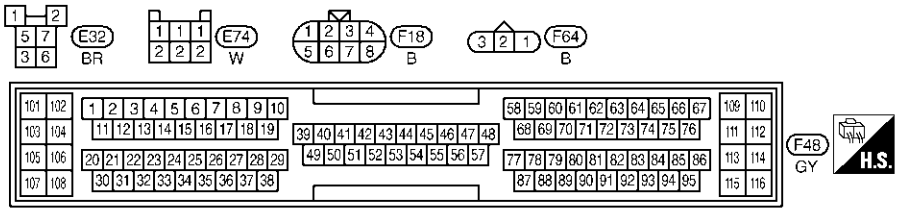
MEC573D

Wiring Diagram (Cont'd)

BANK 2

NHEC0949S02





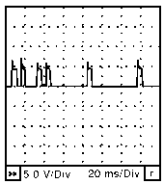
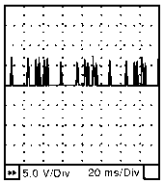
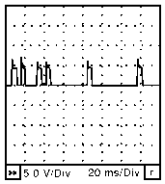
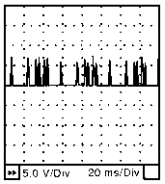
MEC574D

Wiring Diagram (Cont'd)

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)
65	Y	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  SEC033D
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  SEC034D
85	R	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  SEC033D
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  SEC034D

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

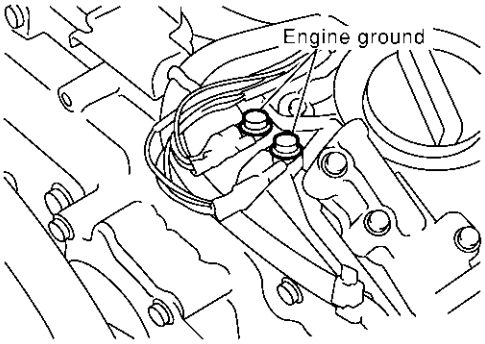
Diagnostic Procedure

NHEC0950

1	CHECK STARTING SYSTEM	
Turn ignition switch to "START" position. **Does the engine turn over?** **Does the starter motor operate?**		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to SC-10, "STARTING SYSTEM".)

2	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

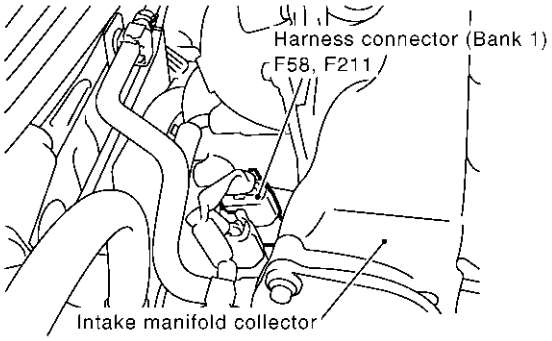


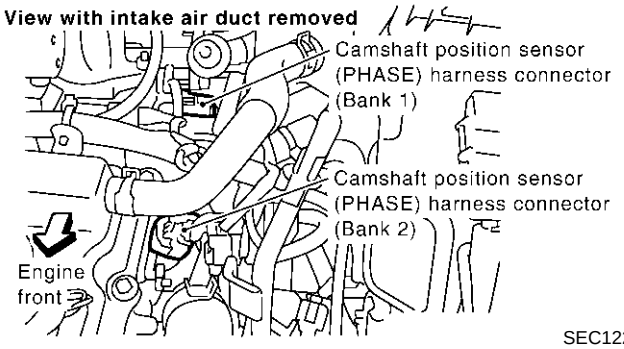
SEC047D

	▶	GO TO 3.

3	CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

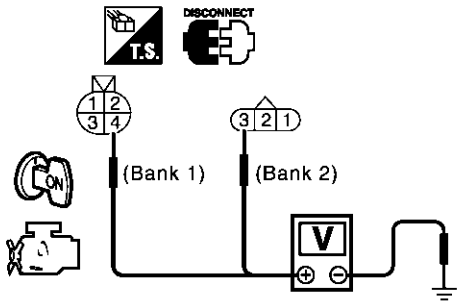
1. Disconnect CMP sensor (PHASE) harness connector (bank 2) or harness connectors F58, F211 (bank 1).





SEC122DB

2. Check voltage between CMP sensor (PHASE) harness connector (bank 2) terminal 3 or harness connector F70 (bank 1) terminal 4 and ground with CONSULT-II or tester.



SEC206D

Voltage: Battery voltage

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F58, F211 (bank 1) ● Harness connectors E15, F18 ● Harness for open or short between ECM and camshaft position sensor (PHASE) or harness connector F70 ● Harness for open or short between ECM relay and camshaft position sensor (PHASE) or harness connector F70	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between harness connector F58 terminal 3 and engine ground (bank 1). Refer to Wiring Diagram. 2. Check CMP sensor (PHASE) harness connector terminal 1 and engine ground (bank 2). Refer to Wiring Diagram. **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. ● Harness connectors F58, F211 (bank 1) ● Harness for open between camshaft position sensor (PHASE) or harness connector F70 and ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 65 and harness connector F58 terminal 1. 3. Check harness continuity between ECM terminal 85 and CMP sensor (PHASE) harness connector 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 (DTC P0340) ▶	GO TO 9.
OK (DTC P0345) ▶	GO TO 10.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F58, F211 (bank 1) ● Harness for open or short between ECM and camshaft position sensor (PHASE) or harness connector F58	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK CMP SENSOR (PHASE) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CMP sensor (PHASE) harness connector.
2. Check harness continuity between CMP sensor (PHASE) terminals and harness connector F231 terminals as follows.

CMP sensor (PHASE) terminal	Harness connector F231 terminal
1	3
2	1
3	4

MTBL1192

Continuity should exist.

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

OK or NG

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

10	CHECK CAMSHAFT POSITION SENSOR (PHASE)

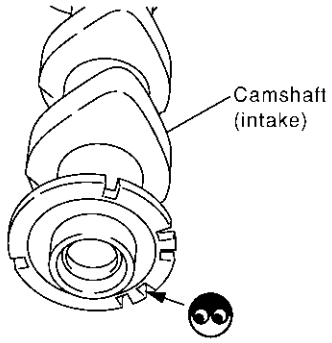
Refer to "Component Inspection", EC-325.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace camshaft position sensor (PHASE).

11	CHECK CAMSHAFT (INTAKE)

Visually check for chipped signal plate at camshaft rear.



SEC905C

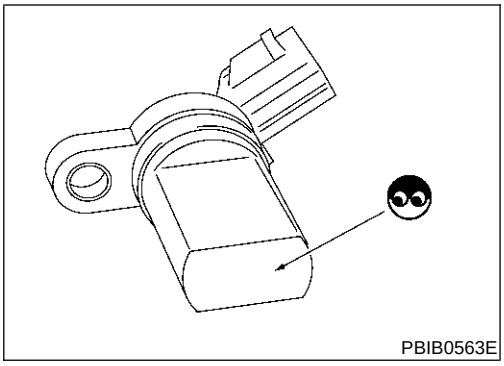
OK or NG

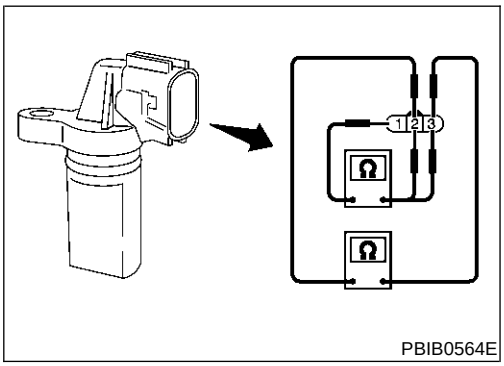
OK	▶	GO TO 12.
NG	▶	Replace camshaft.

12	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**


PBIB0563E



PBIB0564E

Component Inspection

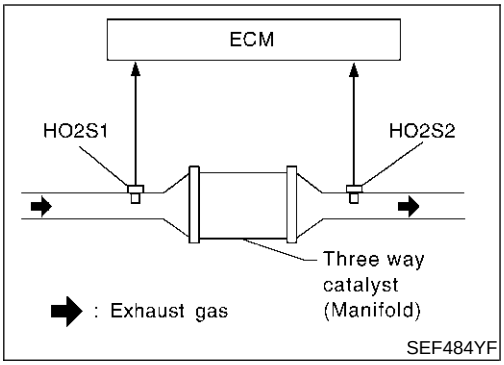
NHEC1416

CAMSHAFT POSITION SENSOR (PHASE)

NHEC1416S01

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown inthe figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (−)	Except 0 or ∞
1 (+) - 3 (−)	
2 (+) - 3 (−)	



SEF484YF

On Board Diagnosis Logic

NHEC1443

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0420 0420 (Bank 1) P0430 0430 (Bank 2)	Catalyst system efficiency below threshold	Three way catalyst (manifold) does not operate properly, three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (Manifold) • 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

SEC138D

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec

SEC139D

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NHEC0952

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.

Ⓔ WITH CONSULT-II

NHEC0952S01

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Open engine hood.
6) Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
7) Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely. If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 10.
8) Wait 5 seconds at idle.
9) Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes). If not “CMPLT”, perform the following.

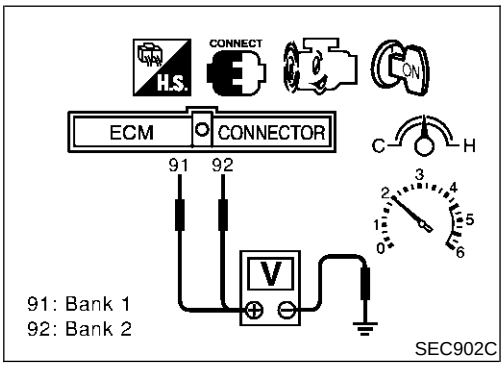
a) Turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle).
b) Turn ignition switch “ON” and select “COOLANTEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c) Start engine and warm it up while monitoring

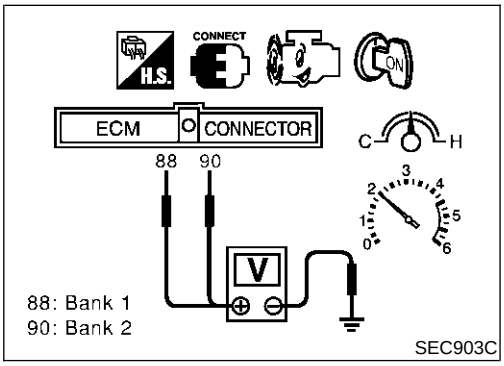
"COOLANTEMP/S" indication on CONSULT-II.

d) When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

10) Select "SELF-DIAG RESULTS" mode with CONSULT-II.

11) Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-328.





Overall Function Check

NHEC0953

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

NHEC0953S01

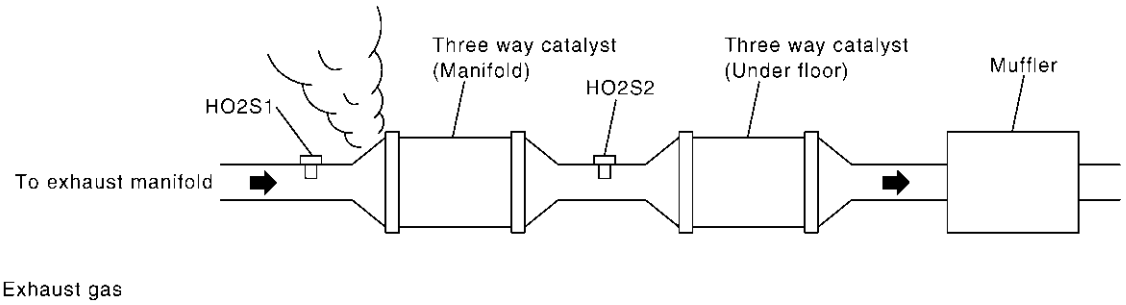
1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeters probes between ECM terminals 91 [heated oxygen sensor 1 bank 1 signal], 92 [heated oxygen sensor 1 bank 2 signal] and engine ground, and ECM terminals 88 [heated oxygen sensor 2 bank 1 signal], 90 [heated oxygen sensor 2 bank 2 signal] and engine ground.
6) Keep engine speed at 2,000 rpm constant under no load.
7) Make sure that the voltage switching frequency (high & low) between ECM terminals 88 and engine ground, or 90 and engine ground is very less than that of ECM terminals 91 and engine ground, or 91 and engine ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to "Diagnostic Procedure", EC-328.

NOTE:
If the voltage at terminal 92 or 91 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-229.)

Diagnostic Procedure

=NHEC0954

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK EXHAUST GAS LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust gas leak before the three way catalyst (manifold).		
 SEC502D		
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-119.		

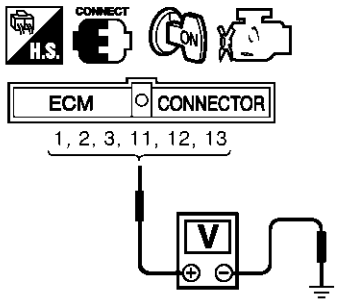
Items	Specifications
Ignition timing	15° ± 5° BTDC
Target idle speed	675 ± 50 rpm (in “P” or “N” position)

MTBL1556

OK or NG		
OK	▶	GO TO 5.
NG	▶	Follow the “Basic Inspection”.

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-689.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 1, 2, 3, 11, 12, 13 and ground with CONSULT-II or tester.



SEC395D

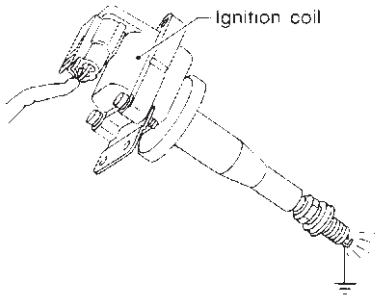
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-690.

6	CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Check ignition coil with power transistor and their circuit. Refer to EC-677.

7	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-57.
   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 8.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

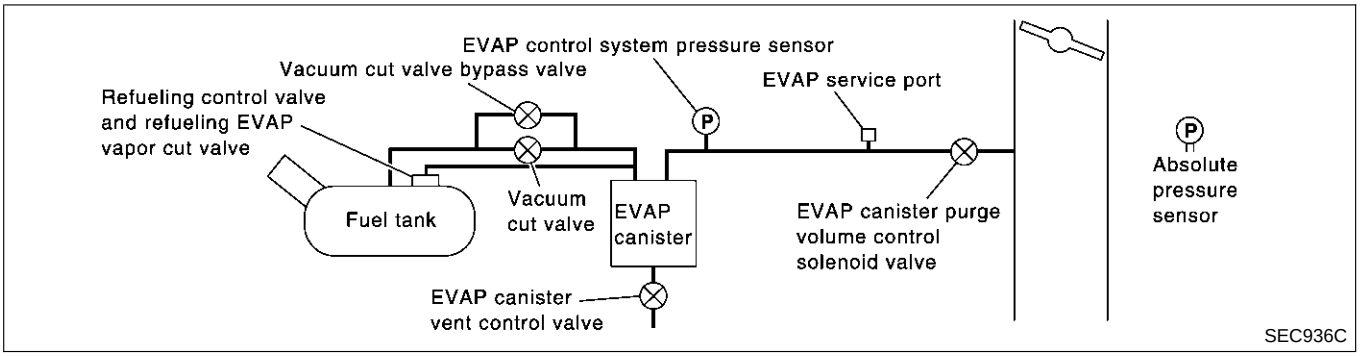
Diagnostic Procedure (Cont'd)

8	**CHECK INTERMITTENT INCIDENT**	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace three way catalyst (manifold).

System Description

NHEC0955

NOTE:
If DTC P0441 is displayed with P2122, P2123, P2127, P2128 or P2138, perform trouble diagnosis for other DTC.



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 to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NHEC0956

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.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0441 0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• 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 • EVAP canister purge volume control solenoid valve circuit • Blocked purge port • EVAP canister vent control valve

5

PURG FLOW P0441	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEC140D

6

PURG FLOW P0441	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEC141D

6

PURG FLOW P0441
COMPLETED

SEC759C

DTC Confirmation Procedure

NHEC0957

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 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

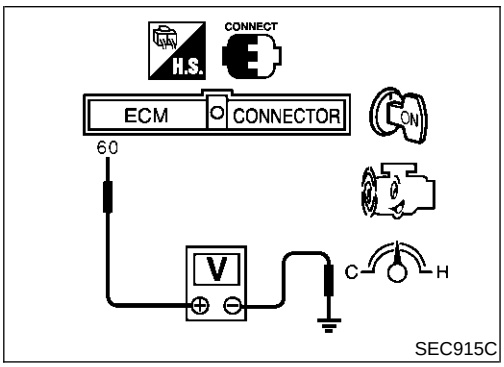
NHEC0957S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” 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 - 3,000 rpm
B/FUEL SCHDL	1.3 - 8.1 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-334.



SEC915C

Overall Function Check

NHEC0958

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a DTC might not be confirmed.

WITH GST

NHEC0958S01

1) Lift up drive wheels.
2) Start engine (TCS switch “OFF”) and warm it up to normal operating temperature.
3) Turn ignition switch “OFF”, wait at least 10 seconds.
4) Start engine and wait at least 70 seconds.

5) Set voltmeter probes to ECM terminals 60 (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
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-334.

Diagnostic Procedure

=NHEC0959

1	CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

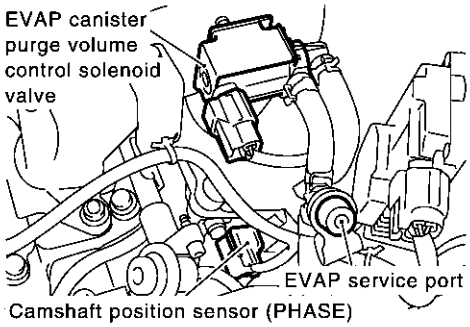
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

Ⓕ **With CONSULT-II**

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEC929C

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 and check vacuum existence.

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

SEC142D

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

MTBL1158

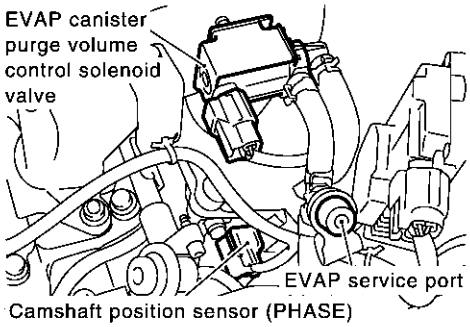
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

3	CHECK PURGE FLOW

Without CONSULT-II

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.



SEC929C

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

1. Turn ignition switch "OFF".
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-41.

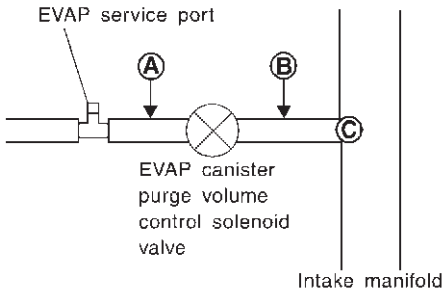
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

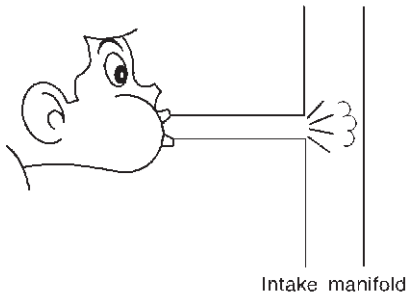
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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.

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

SEC142D

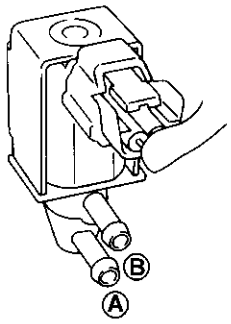
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	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.

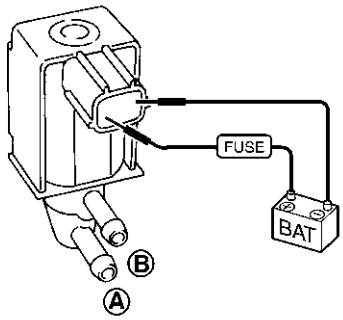


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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

SEF335X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

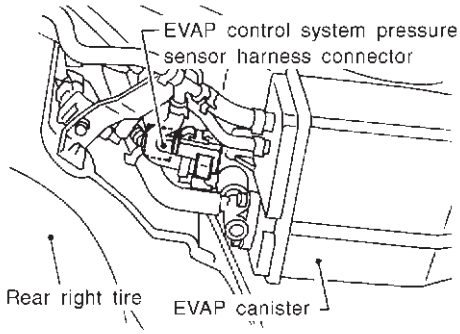
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF495R

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 P0452, EC-370 and P0453, EC-377.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

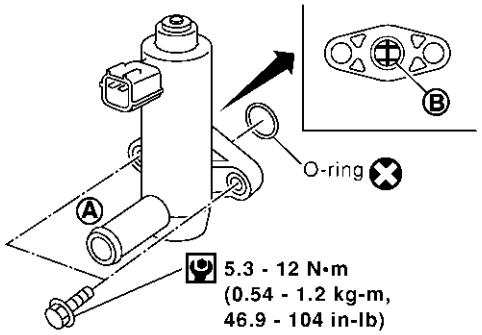
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean the rubber tube using an air blower.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

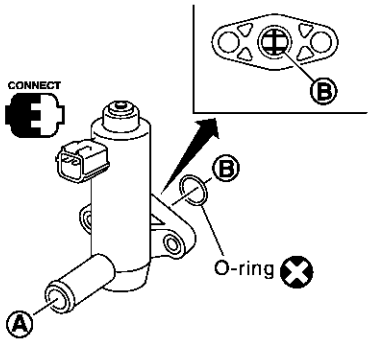
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



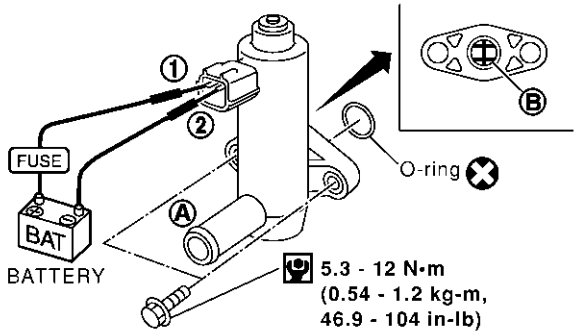
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-41.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace it.

Diagnostic Procedure (Cont'd)

16	**CLEAN EVAP PURGE LINE**
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 17.

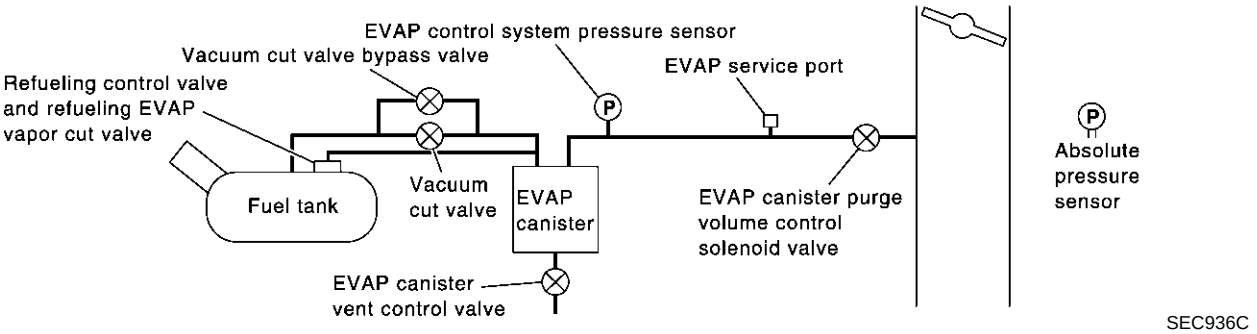
17	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0960

NOTE:
If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-559.)

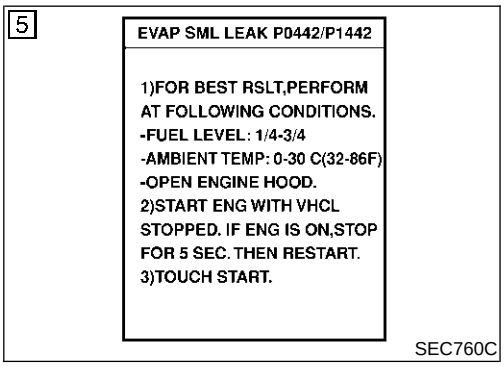
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.
The vacuum cut valve 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.

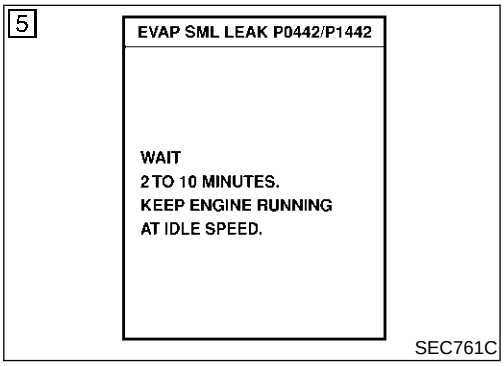


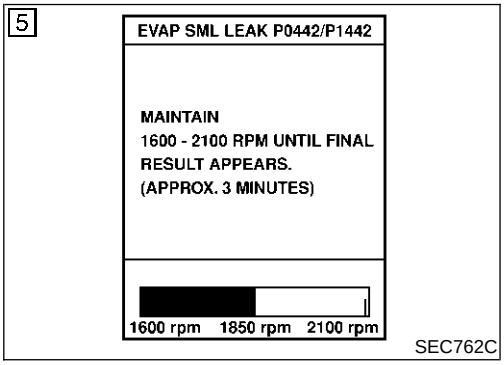
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel 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

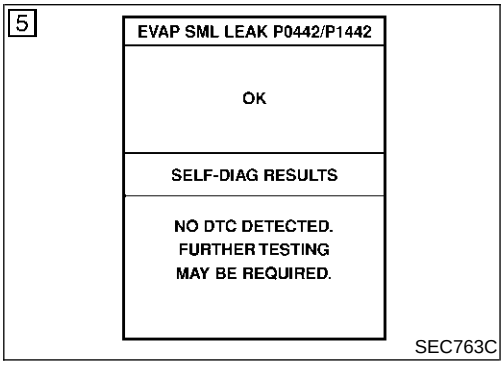
CAUTION:

- **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 Confirmation Procedure

NHEC1444

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first (see EC-559).**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 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 and 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).**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

NHEC1444S01

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 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 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5) Select "EVP SML LEAK P0442/P1442" 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-119.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-343.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NHEC1444S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-82 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-82.

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 10 seconds.
6) Start engine.
It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-82.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", EC-343.
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0441, EC-334.
- If P0441 and P0442 are not displayed on the screen, go to the following step.

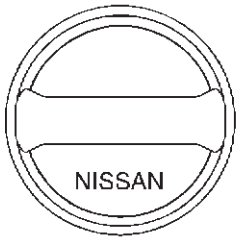
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NHEC0962

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

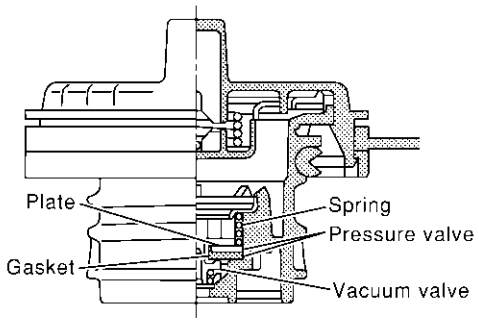
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

Diagnostic Procedure (Cont'd)

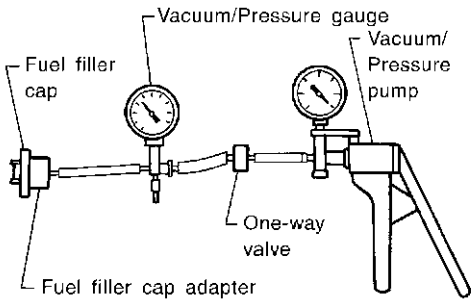
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

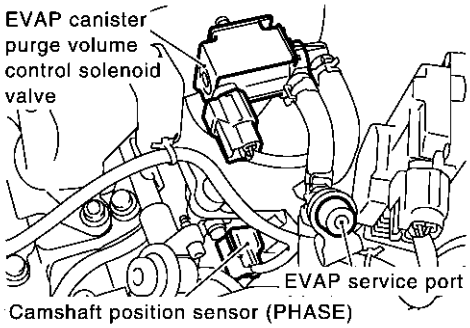
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

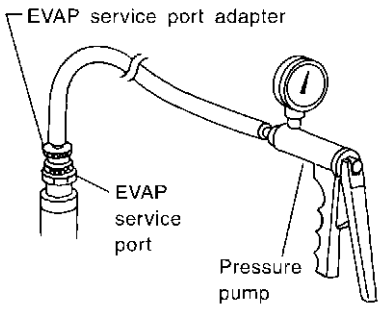
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEC929C



SEF916U

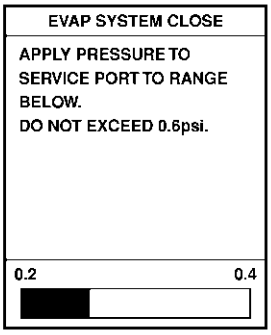
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

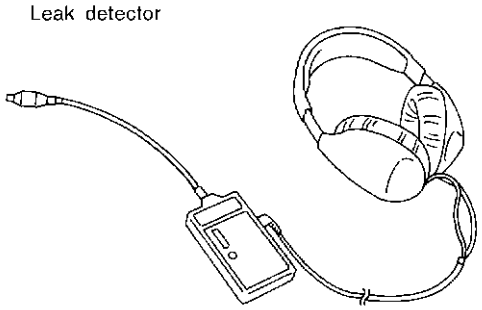
Ⓕ **With CONSULT-II**

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/cm^2, 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-41.



SEF200U

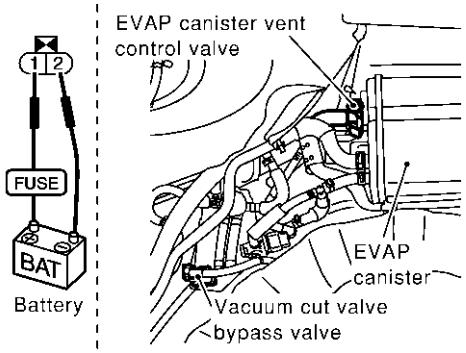
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

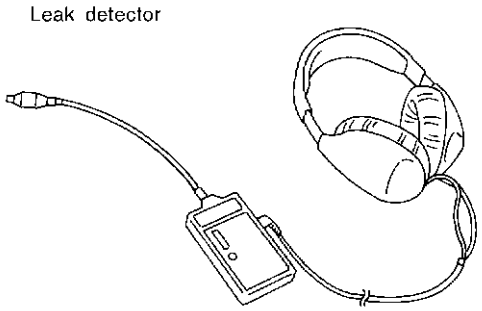
Without CONSULT-II

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.)



SEF254X

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/cm^2, 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-41.



SEF200U

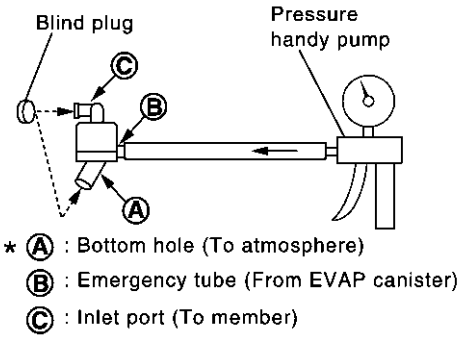
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	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.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- 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

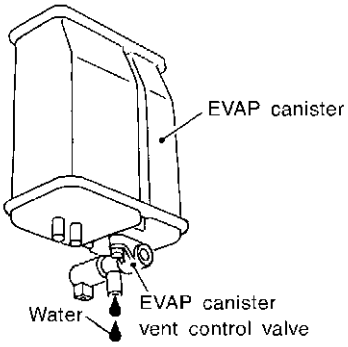
Refer to "DTC Confirmation Procedure", EC-559.

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

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

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. ● 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

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.

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

SEC142D

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

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.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-31.	
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

Ⓔ **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

SEC142D

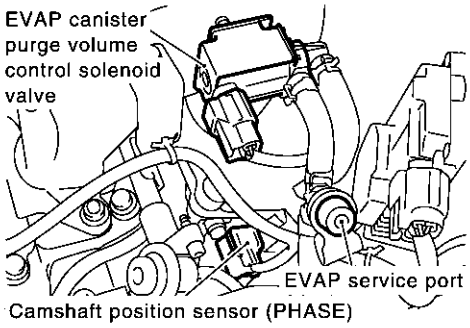
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

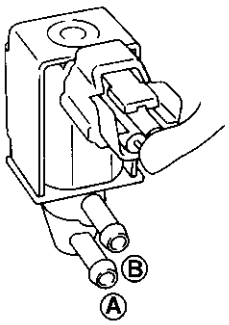
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C

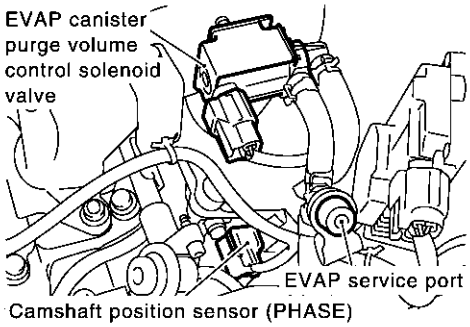


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

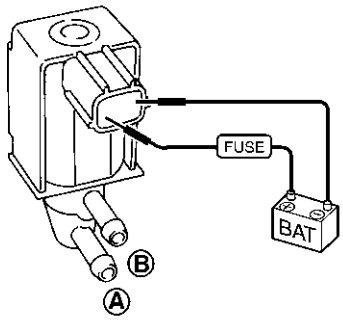
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

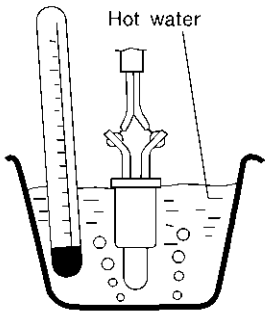
OK or NG

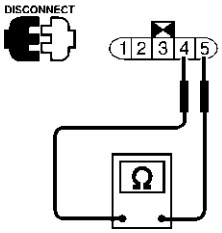
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

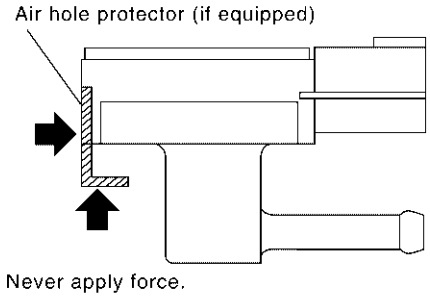
SEF587X

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

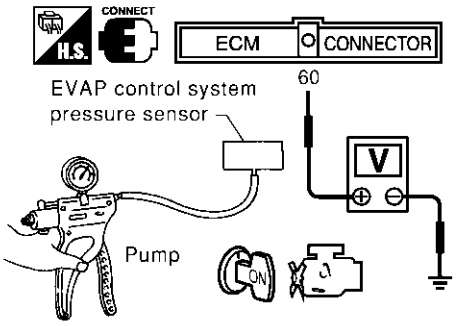
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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-37.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

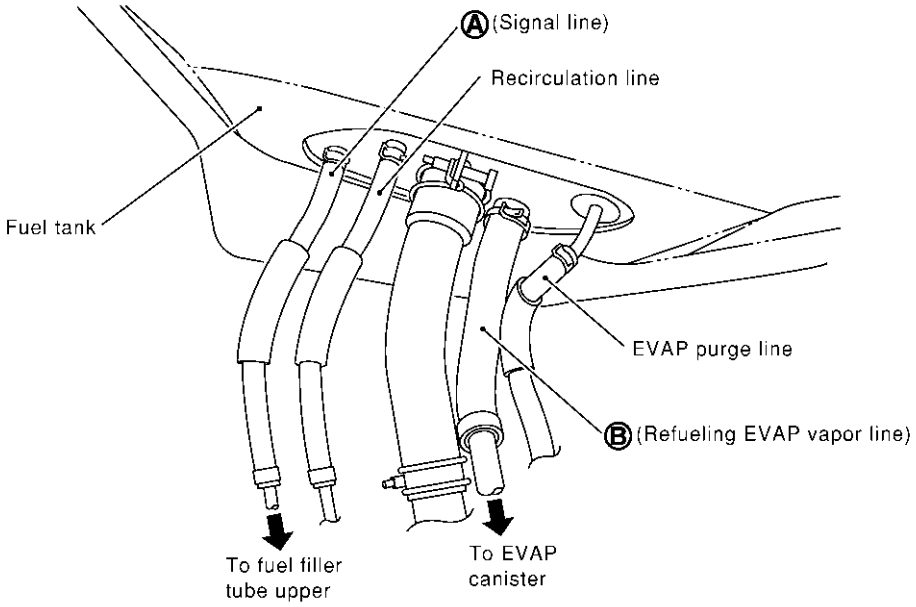
21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

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-43.	
OK or NG	
OK ▶	GO TO 23.
NG ▶	Repair or replace hoses and tubes.

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.

24 CHECK REFUELING CONTROL VALVE

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.



SEF830X

OK or NG

OK ▶	GO TO 25.
NG ▶	Replace refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

26	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

Description

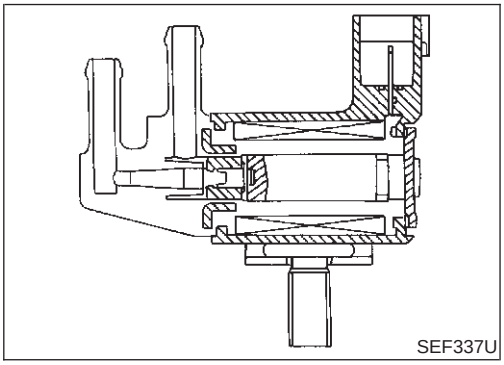
NHEC0963

SYSTEM DESCRIPTION

NHEC0963S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	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		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	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.


SEF337U

COMPONENT DESCRIPTION

NHEC0963S02

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

NHEC0964

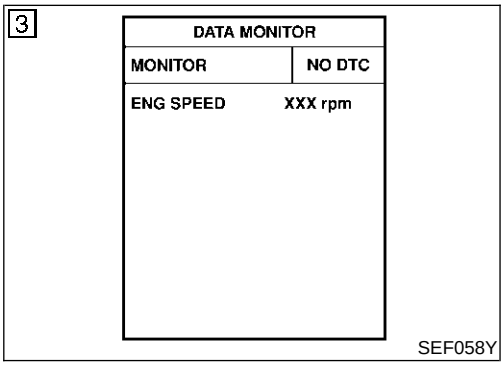
Specification data are reference values.

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	—

On Board Diagnosis Logic

NHEC0966

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve.	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve.	• Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NHEC0967

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 battery voltage is more than 11V at idle.

WITH CONSULT-II

NHEC0967S01

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-360.

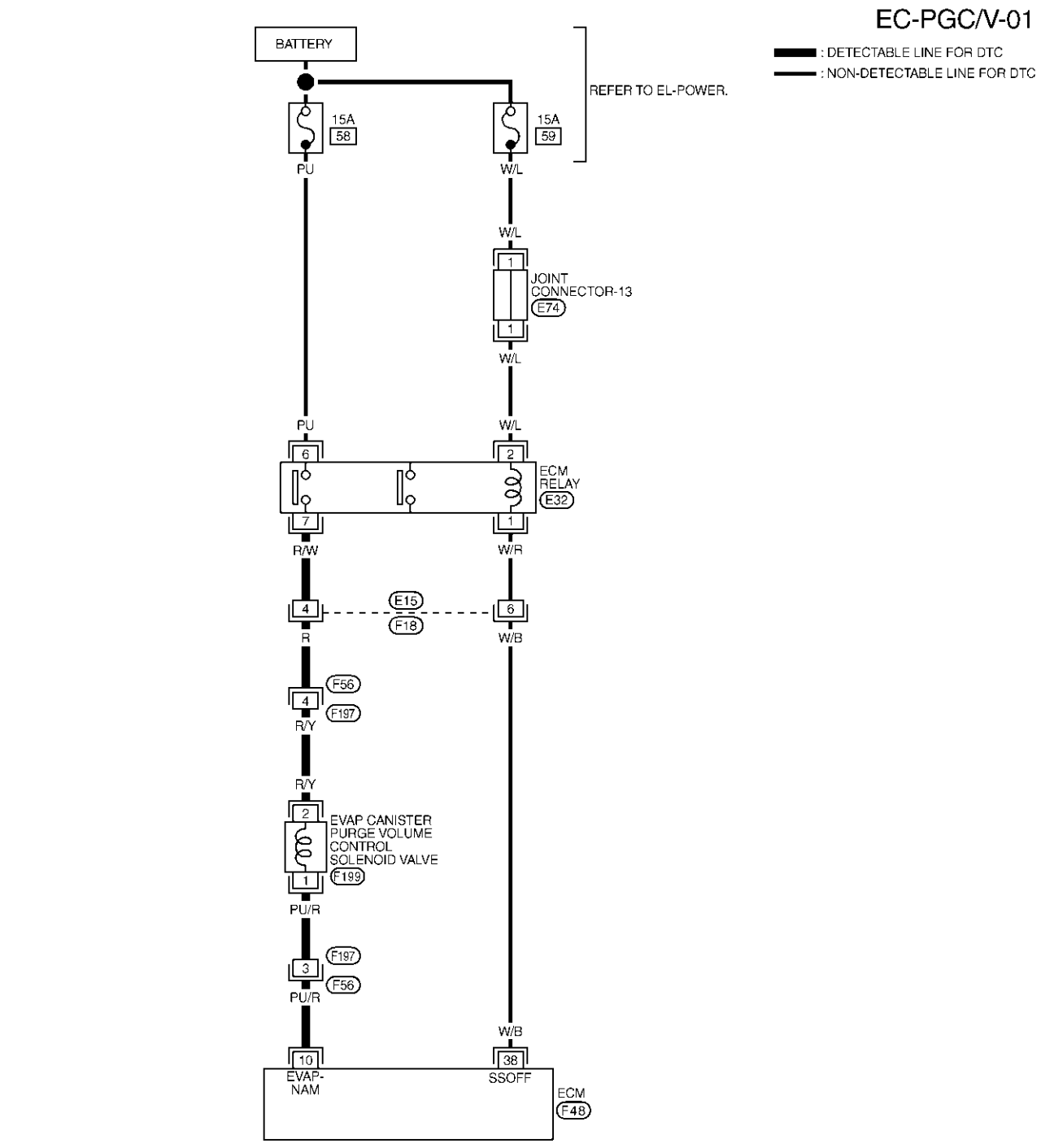
WITH GST

NHEC0967S02

Follow the proocedure "WITH CONSULT-II" above.

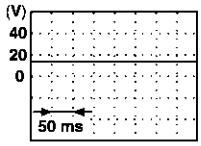
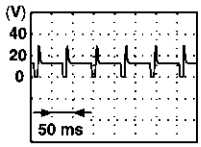
Wiring Diagram

NHEC0968



MEC552D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	PU/R	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE★ (11 - 14) 
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE★ (11 - 14) 

★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

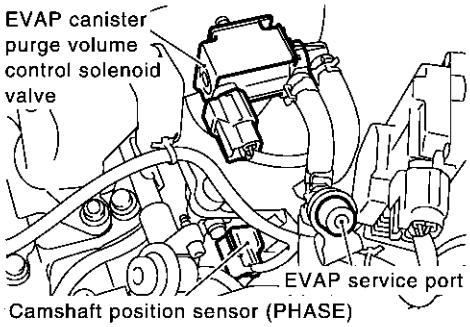
SEC219D

Diagnostic Procedure

NHEC0969

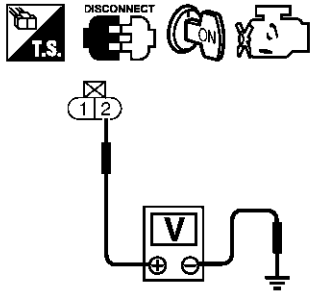
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEC929C

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT-II or tester.



SEC062D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness connectors F56, F197
- 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

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 10 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F197, F58
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓔ **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

SEC142D

OK or NG

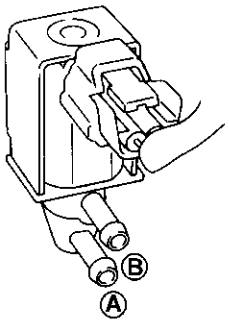
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	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.

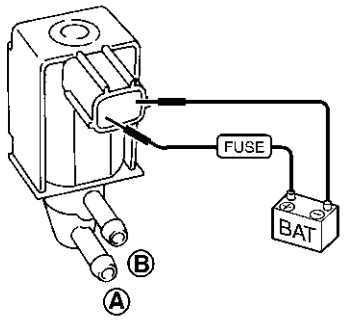


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Ⓚ **Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



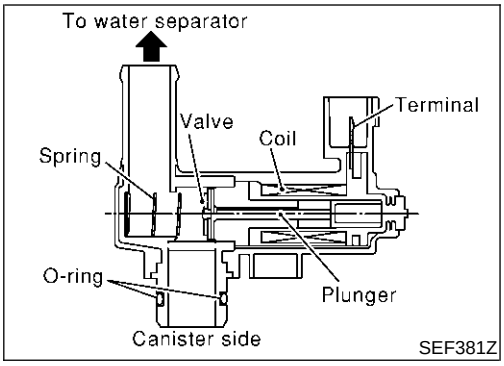
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

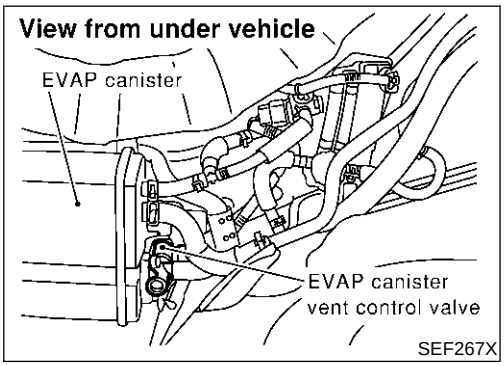
SEF335X

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-151.	
▶	**INSPECTION END**





Component Description

NHEC0970

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

NHEC0971

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC0973

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC Confirmation Procedure

NHEC0974

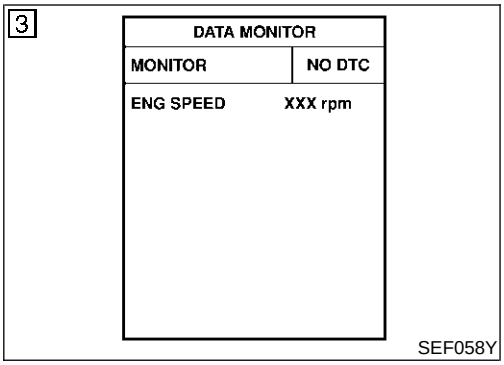
NOTE:

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 battery voltage is more than 11V at idle.

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC0974S01

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-366.

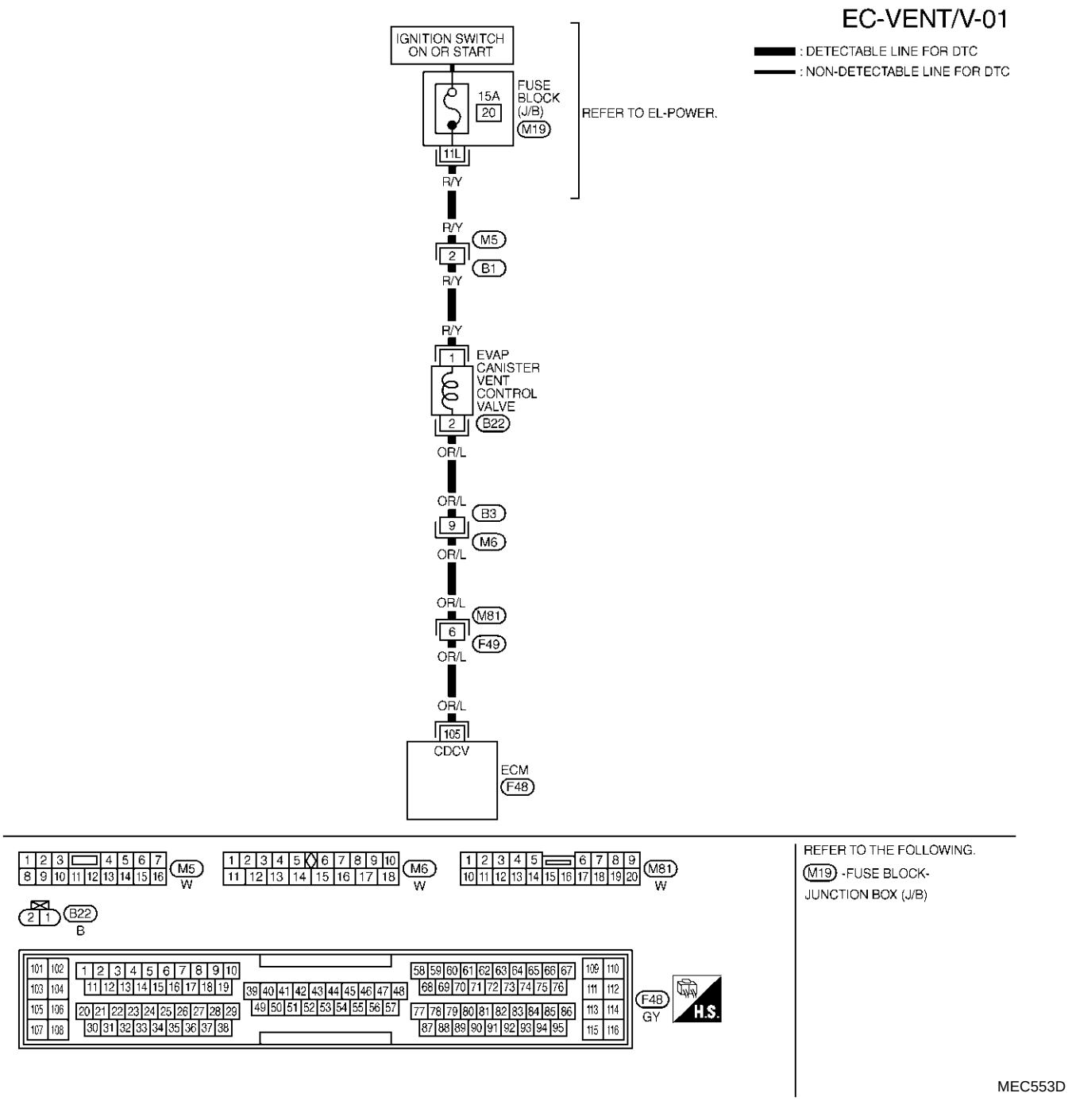
WITH GST

NHEC0974S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC0975



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
105	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

SEF668XC

Diagnostic Procedure

NHEC0976

1	INSPECTION START	
1. Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT	

Ⓔ **With CONSULT-II**

1. Turn ignition switch “OFF” and then turn “ON”.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

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

PBIB0151E

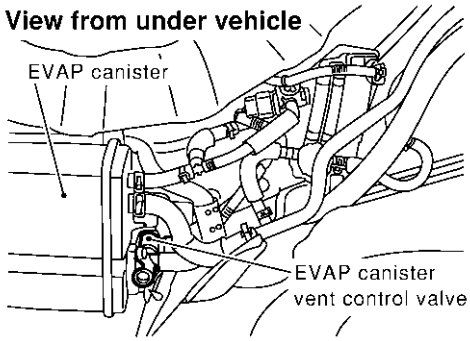
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

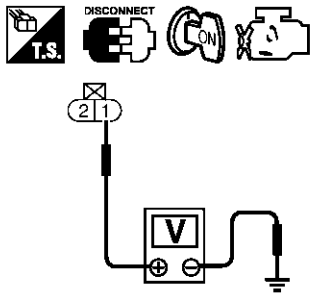
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF267X

3. Turn ignition switch "ON".
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.



SEC061D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M5, B1
- Fuse block (J/B) connector M19
- 15A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

	▶	Repair harness or connectors.

5	CHECK EVAP CANISTER VENT CONTROL 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 105 and EVAP canister vent control 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

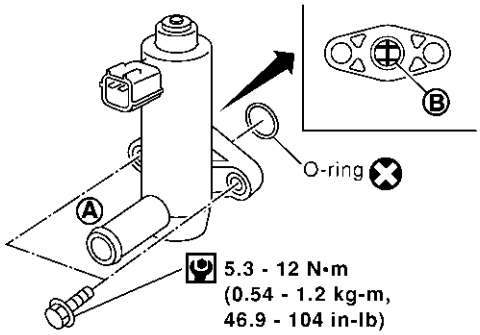
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M6 ● Harness connectors M81, F49 ● 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 RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Clean the rubber tube using an air blower.

8	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.	



SEF376Z

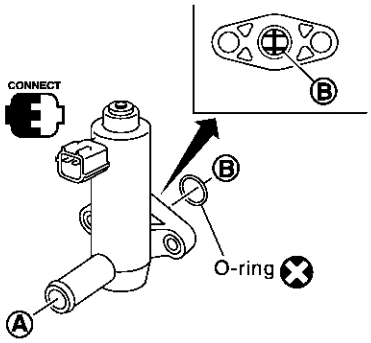
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



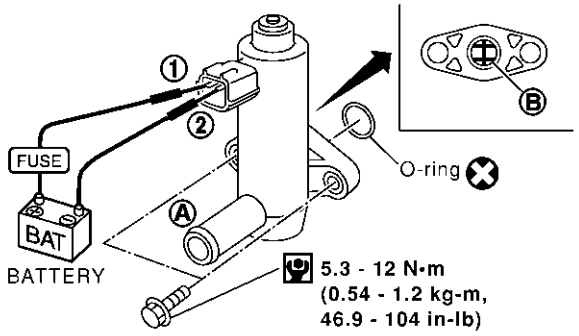
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

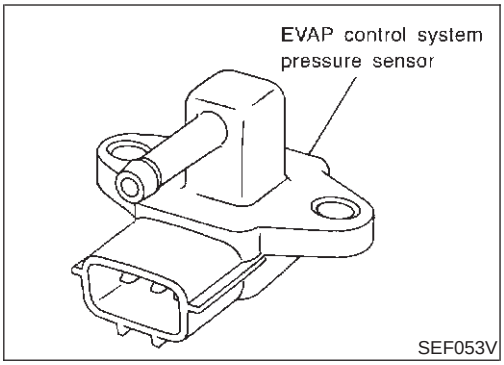
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

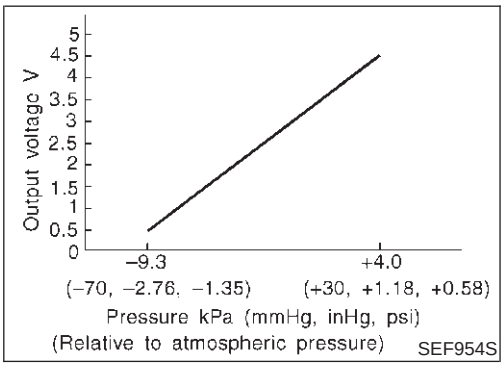
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**





Component Description

NHEC0779

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.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0780

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NHEC0782

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • EVAP control system pressure sensor

DTC Confirmation Procedure

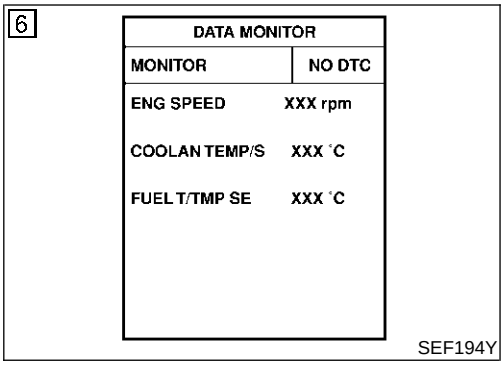
NHEC0784

NOTE:

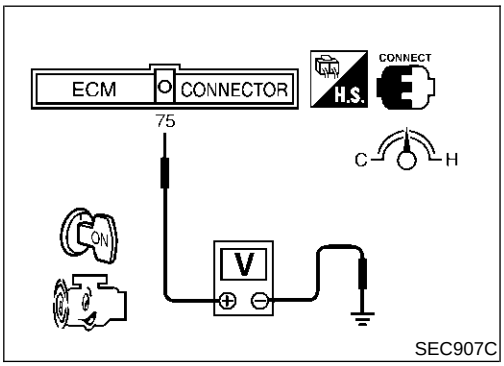
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.



SEF194Y



SEC907C

WITH CONSULT-II

NHEC0784S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "FUEL T/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-373.
   If 1st trip DTC is not detected, go to next step.
8) Stop engine and install EVAP service port adapter and pressure pump to EVAP service port securely.
9) Pressurize the EVAP line using pressure pump.
10) Confirm the pressure does not go up.
11) If pressure go up, go to "Diagnostic Procedure", EC-373.

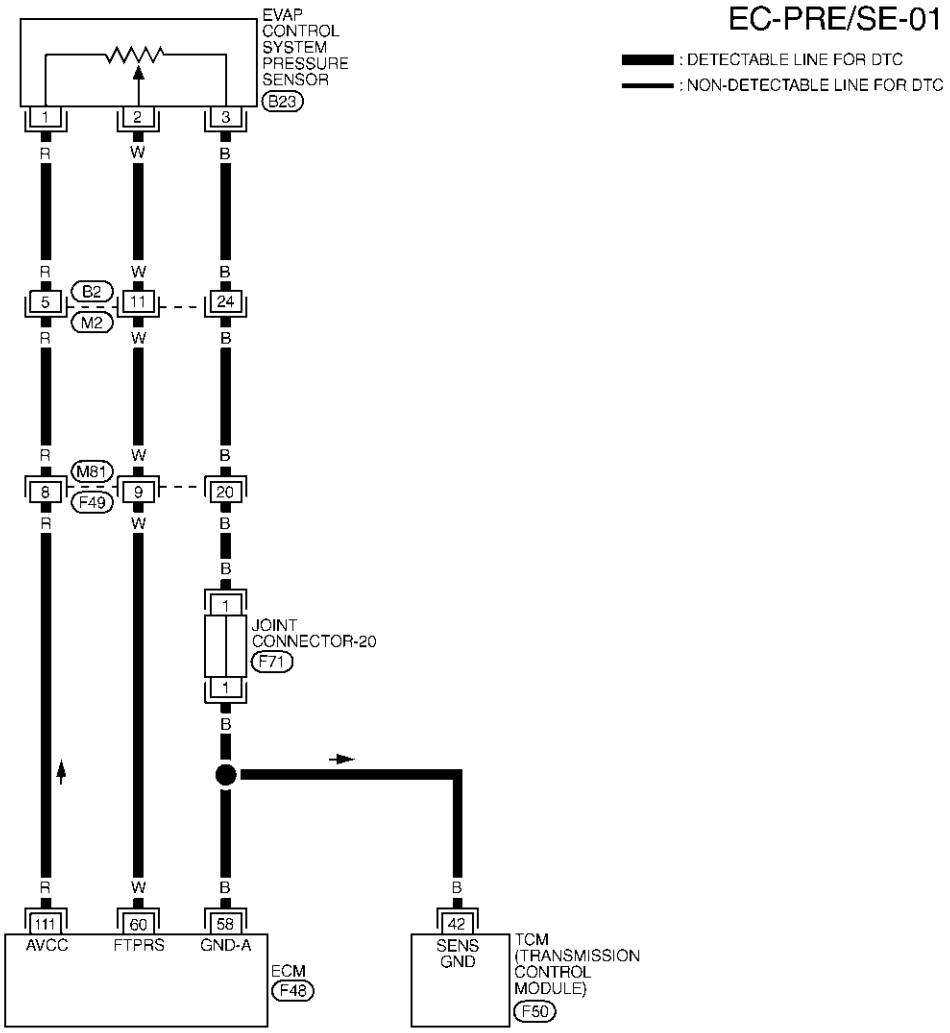
WITH GST

NHEC0784S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 75 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-373.

Wiring Diagram

NHEC0785



MEC355E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
60	W	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

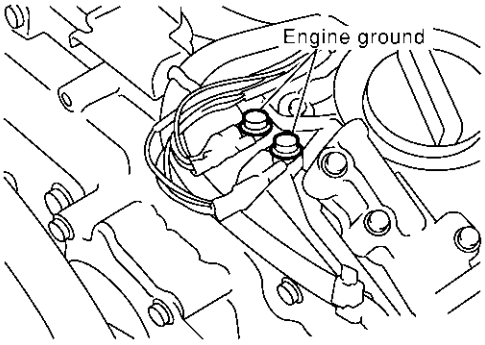
SEF623XE

Diagnostic Procedure

NHEC0786

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEC047D

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

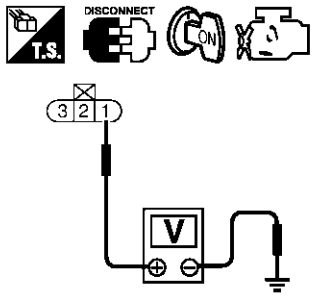
Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between EVAP control system pressure sensor terminal 1 and ground with CONSULT-II or tester.



SEC063D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B2, M2
- Harness connectors M81, F49
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 7.
NG ▶	GO TO 6.

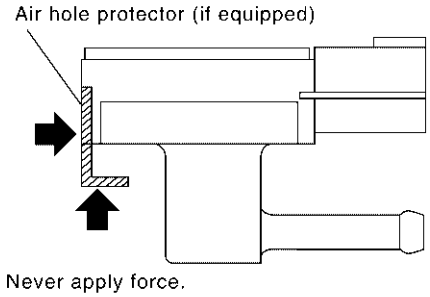
6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B2, M2 ● Harness connectors M81, F49 ● Joint connector-20 ● Harness for open between EVAP control system pressure sensor and ECM ● Harness for open between EVAP control system pressure sensor and TCM (Transmission Control Module)	
▶	Repair open circuit or short to power in harness or connectors.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 60 and EVAP control system pressure 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 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B2, M2 ● Harness connectors M81, F49 ● 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.

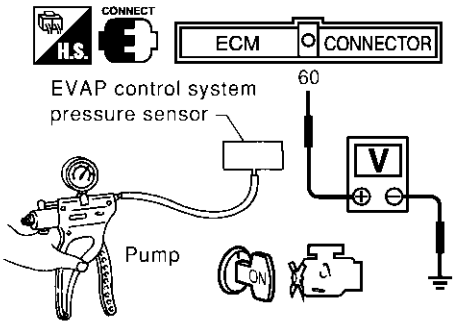
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

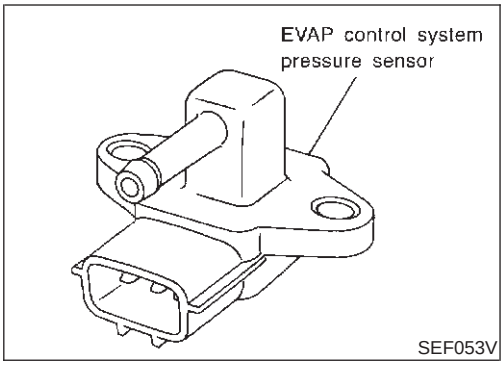
MTBL1159

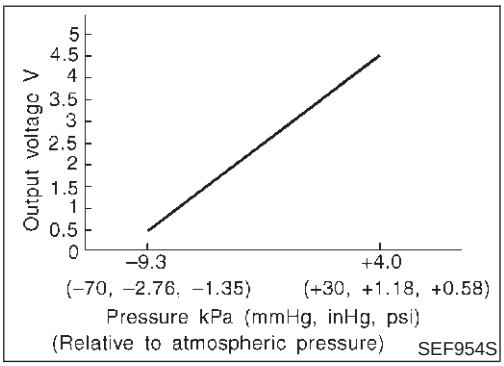
CAUTION:
Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**





Component Description

NHEC0977

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.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0978

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

On Board Diagnosis Logic

NHEC0980

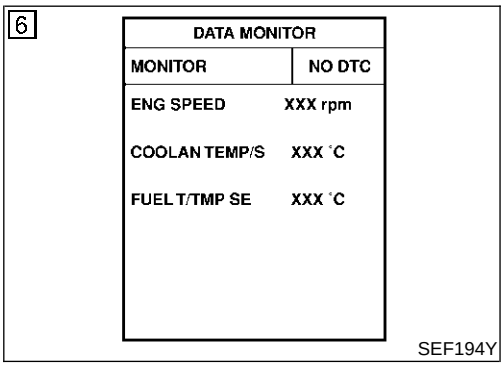
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister • Water separator • Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NHEC0981

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:
Always perform test at a temperature of 5°C (41°F) or more.

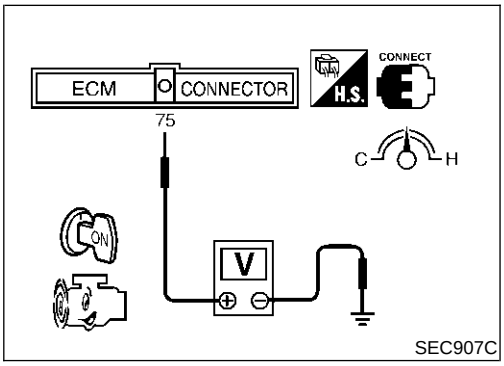


SEF194Y

Ⓔ WITH CONSULT-II

NHEC0981S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “FUEL T/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-379.



SEC907C

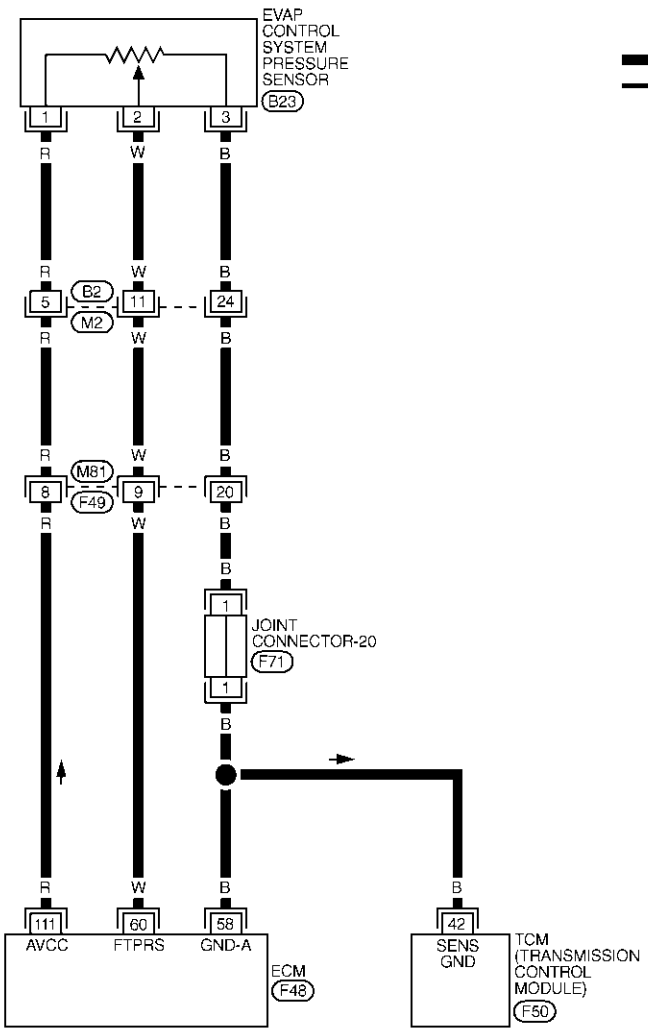
GST WITH GST

NHEC0981S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 75 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select “MODE 7” with GST.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-379.

Wiring Diagram

NHEC0982



MEC355E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
60	W	EVAP CONTROL SYSTEM PRESSURE SENSOR	IGN ON	APPROX. 3.4V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

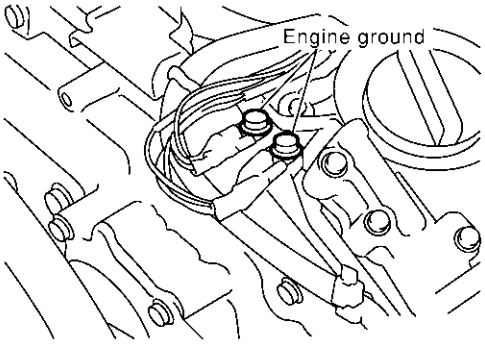
SEF623XE

Diagnostic Procedure

NHEC0983

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEC047D

	▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

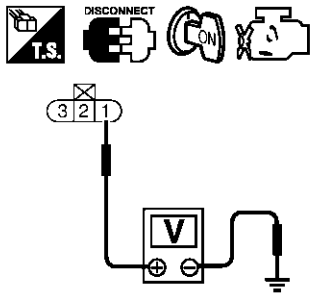
Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between EVAP control system pressure sensor terminal 1 and ground with CONSULT-II or tester.



SEC063D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B2, M2
- Harness connectors M81, F49
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Check harness continuity between EVAP control system pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram. **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. ● Harness connectors B2, M2 ● Harness connectors M81, F49 ● Joint connector-20 ● Harness for open between EVAP control system pressure sensor and ECM ● Harness for open between EVAP control system pressure sensor and TCM (Transmission Control Module)	
▶	Repair open circuit or short to power in harness or connectors.

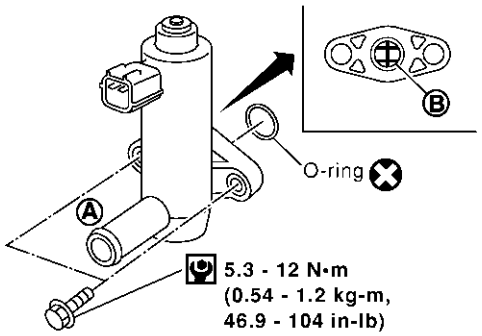
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 60 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B2, M2 ● Harness connectors M81, F49 ● 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.

9	CHECK RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging. **OK or NG**	
OK ▶	GO TO 10.
NG ▶	Clean the rubber tube using an air blower.

10	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

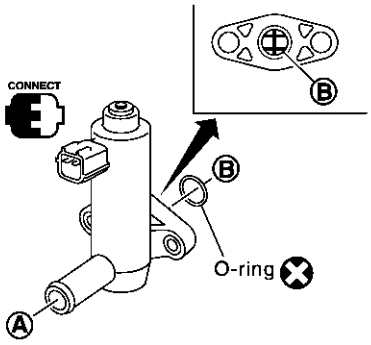
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	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 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



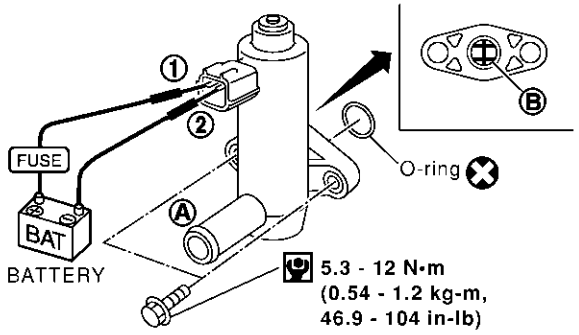
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Ⓚ **Without CONSULT-II**

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III

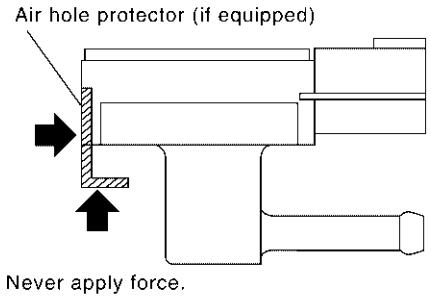
1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

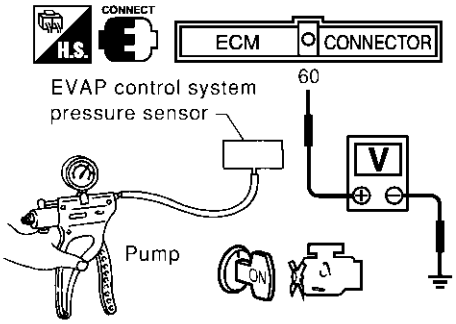
13	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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.

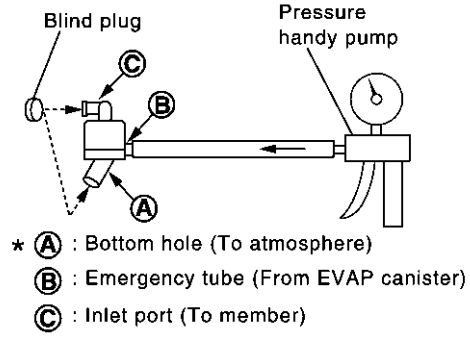
OK or NG

OK	▶	GO TO 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 rubber tube using an air blower, repair or replace rubber tube.

15	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.



PBIB1032E

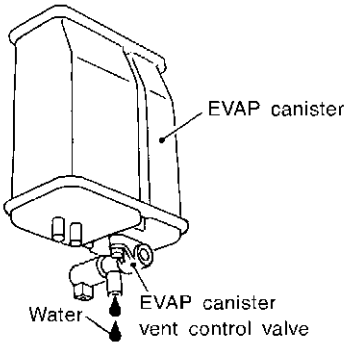
5. In case of NG in items 2 - 4, replace the parts.

NOTE:
Do not disassemble water separator.

OK or NG		
OK	▶	GO TO 16.
NG	▶	Replace water separator.

16	CHECK IF EVAP CANISTER SATURATED WITH WATER	

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No		
Yes	▶	GO TO 17.
No	▶	GO TO 19.

Diagnostic Procedure (Cont'd)

17	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	▶	GO TO 19.
NG	▶	GO TO 18.

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

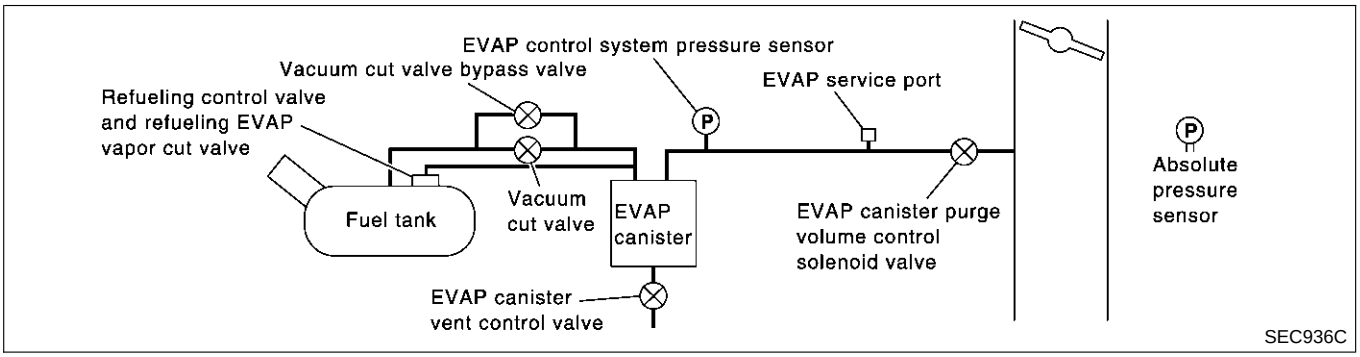
19	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC1475

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-559.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



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:

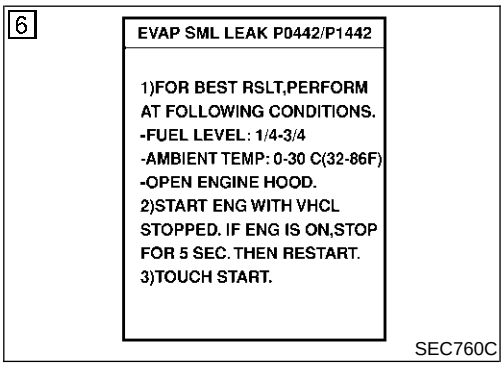
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

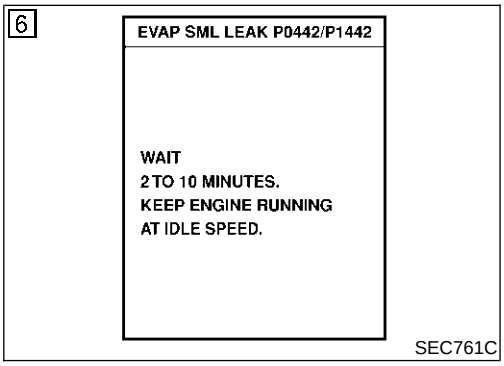
NHEC1476

- 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

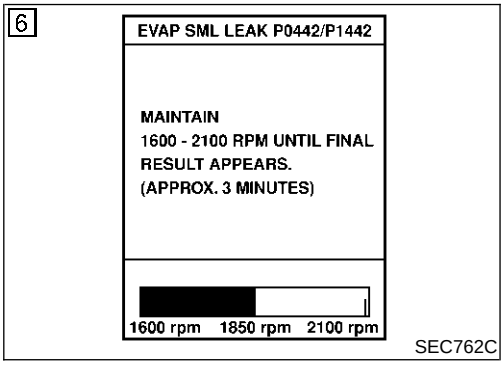
- Refueling control valve
- ORVR system leaks



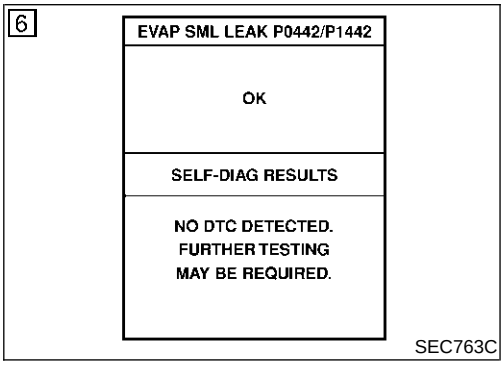
SEC760C



SEC761C



SEC762C



SEC763C

DTC Confirmation Procedure

NHEC1477

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-559.)**
- **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 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

WITH CONSULT-II

NHEC1477S01

1) Tighten fuel filler cap securely until ratcheting sound is heard.
2) Turn ignition switch "ON".
3) Turn ignition switch "OFF" and wait at least 10 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 P0442/P1442" 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-119.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-387.
   If P0442 is displayed, perform "Diagnostic Procedure" for DTC P0442.

WITH GST

NHEC1477S02

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-82 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-82.
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 10 seconds.
6) Start engine.
It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-82.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-387.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0442, EC-343.
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for DTC P0441, EC-334.
- If P0455, P0442 and P0441 are not displayed on the screen, go to the following step.

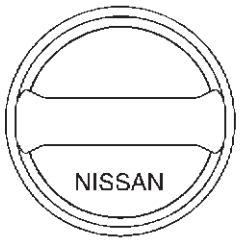
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NHEC1478

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

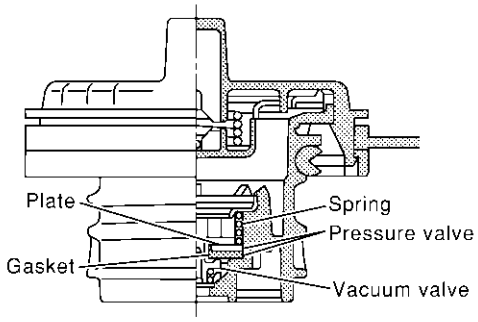
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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 ▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

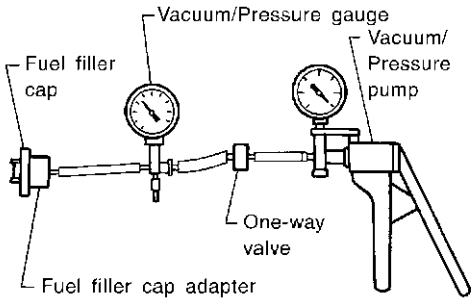
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap. **OK or NG**	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

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/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −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.

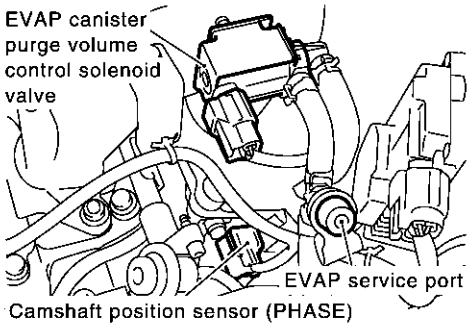
5	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-37.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 7.

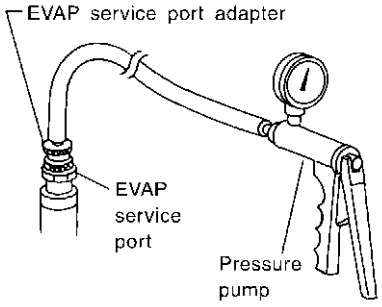
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-363.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEC929C



SEF916U

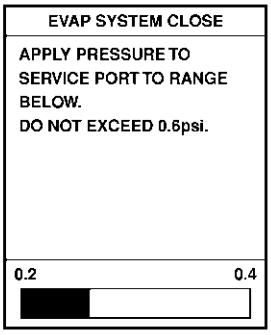
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.

9	CHECK FOR EVAP LEAK

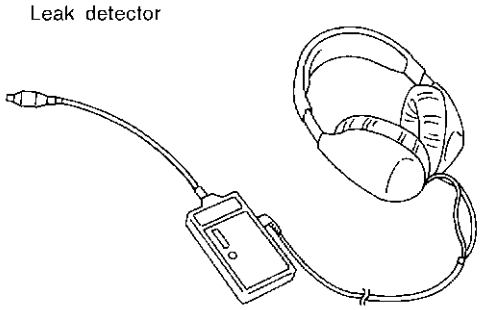
Ⓕ **With CONSULT-II**

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/cm^2, 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-41.



SEF200U

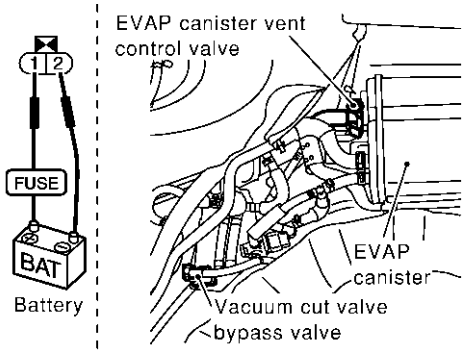
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

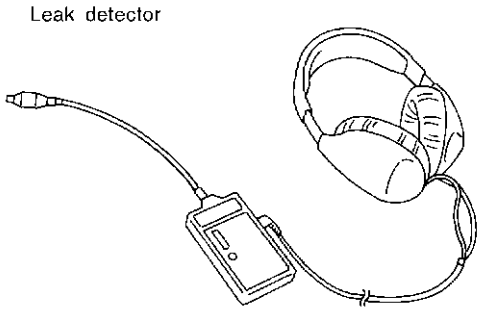
Without CONSULT-II

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.)



SEF254X

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/cm^2, 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-41.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓕ **With CONSULT-II**

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.

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

SEC142D

Vacuum should exist.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓚ **Without CONSULT-II**

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 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-31.

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

SEC142D

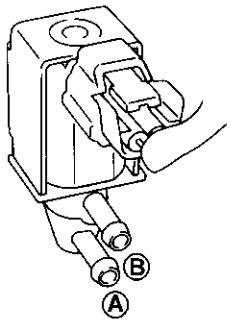
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	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.

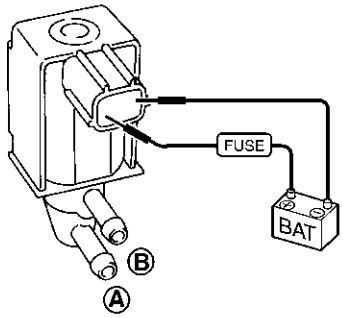


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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

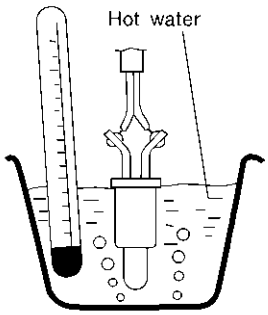
SEF335X

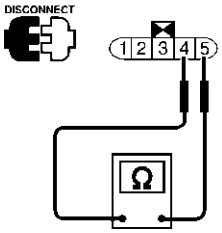
OK or NG

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 and fuel pump terminals 4 and 5 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

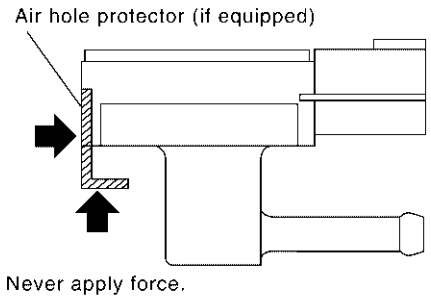
SEF587X

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel level sensor unit.

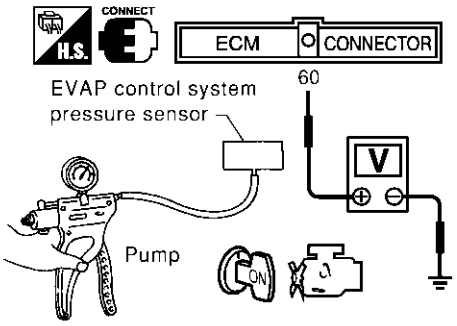
17	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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 18.
NG	▶	Replace EVAP control system pressure sensor.

18	CHECK REFUELING EVAP VAPOR LINE

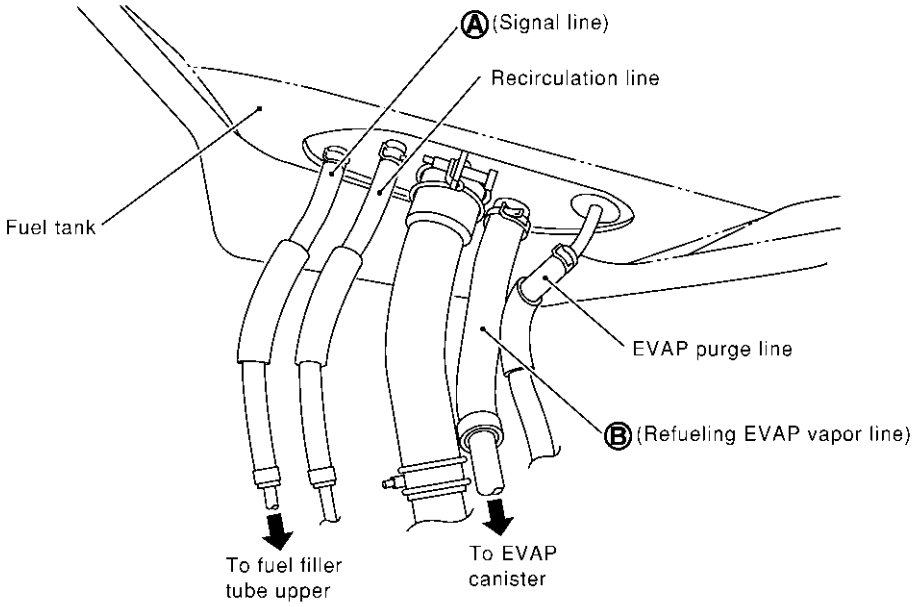
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-43.

OK or NG

OK	▶	GO TO 19.
NG	▶	Repair or replace hoses and tubes.

19	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 20.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

20	CHECK REFUELING CONTROL VALVE	
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 21.
NG	▶	Replace refueling control valve with fuel tank.

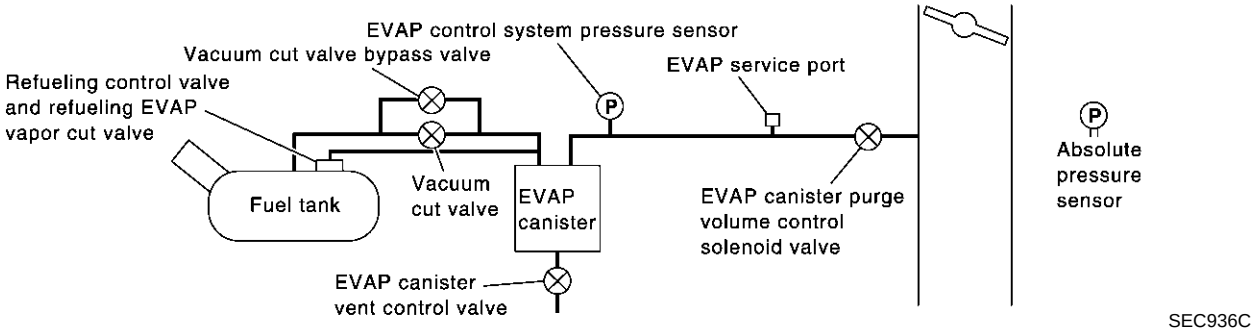


SEF830X

21	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC0987

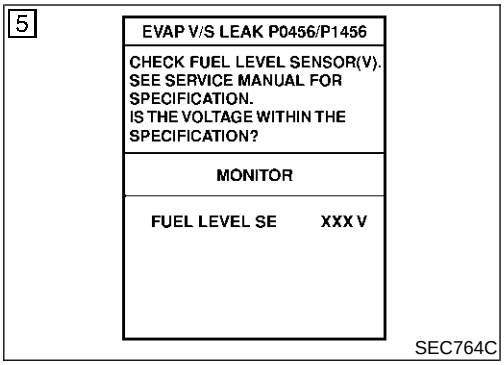


This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold same as a conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.

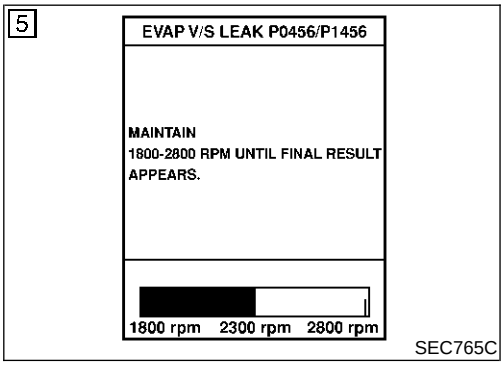
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler 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 saturated with water • EVAP control system pressure sensor • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

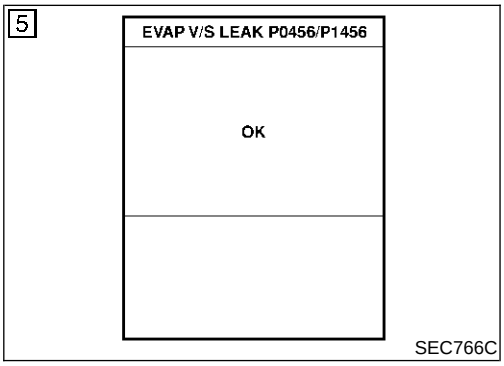
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEC764C



SEC765C



SEC766C

DTC Confirmation Procedure

NHEC0988

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P0456 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 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.**

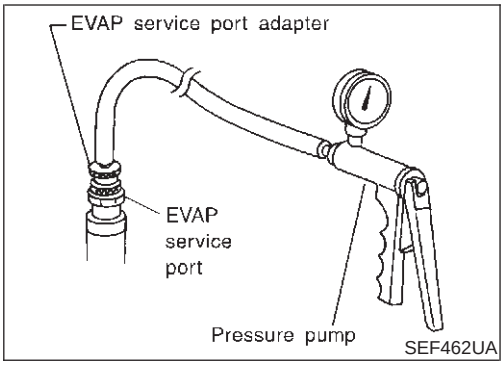
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

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 - 35°C (32 - 95°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 "EVP V/S LEAK P0456/P1456" 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-399.

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic Inspection", EC-119.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**



Overall Function Check

NHEC0989

WITH GST

NHEC0989S01

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 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/cm^2, 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-399.

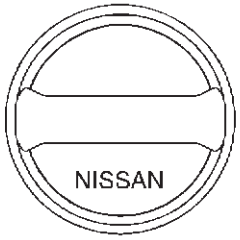
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NHEC0990

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.

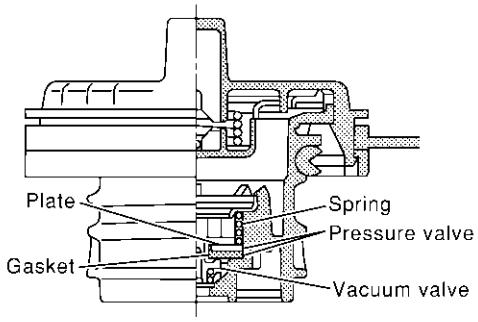
Diagnostic Procedure (Cont'd)

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 ▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

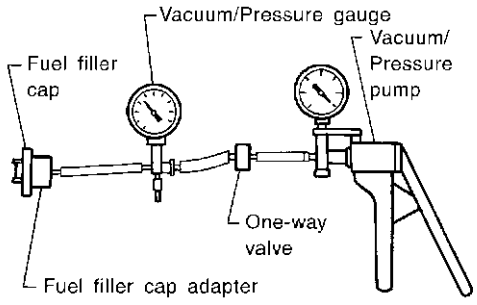
3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	GO TO 4.

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/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

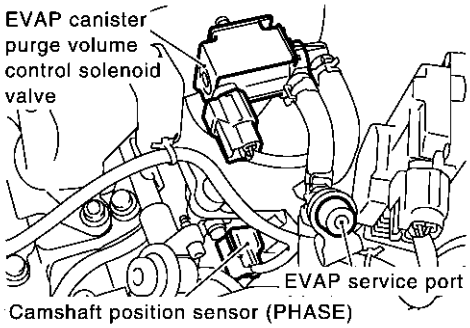
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

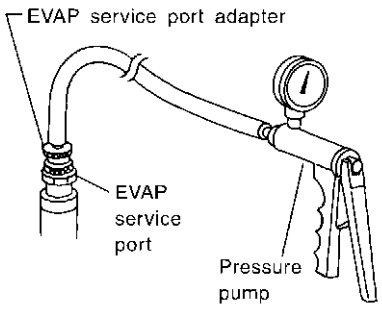
OK ▶	GO TO 5.
NG ▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEC929C



SEF916U

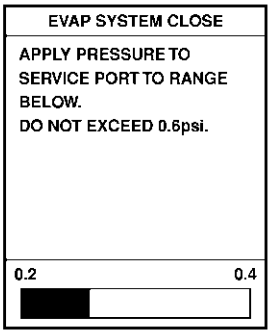
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

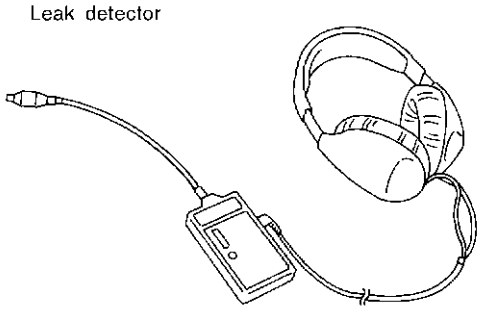
Ⓕ **With CONSULT-II**

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/cm^2, 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-41.



SEF200U

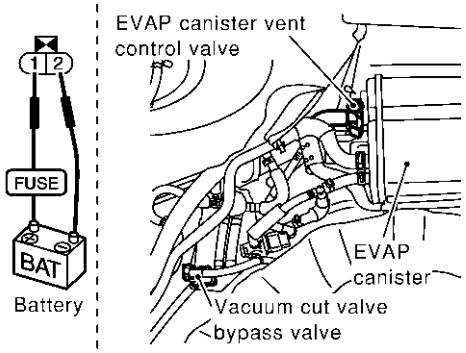
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

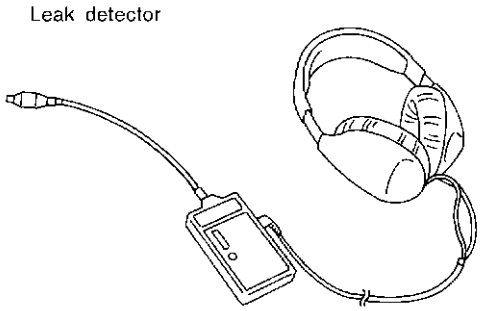
Without CONSULT-II

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.)



SEF254X

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/cm^2, 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-41.



SEF200U

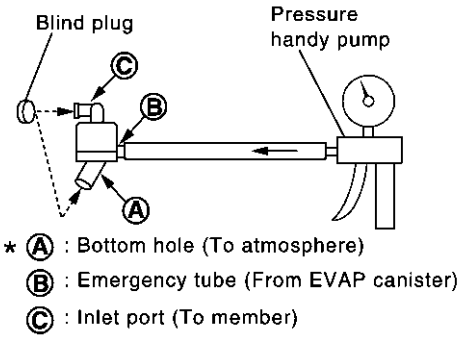
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	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.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
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

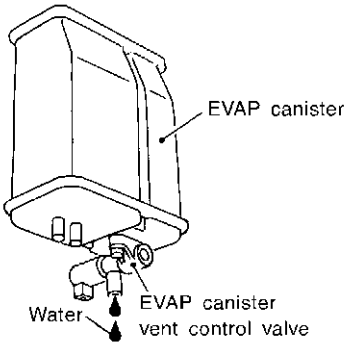
Refer to "DTC Confirmation Procedure", EC-559.

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

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

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. ● 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

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.

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

SEC142D

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

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.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-31.	
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

Ⓔ **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

SEC142D

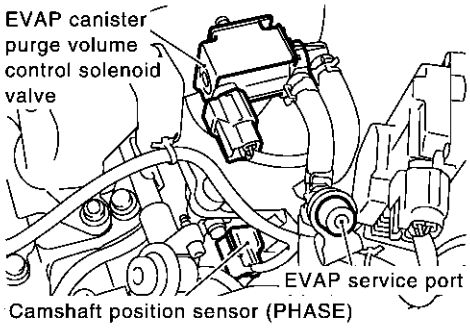
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

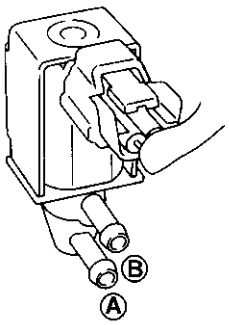
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C

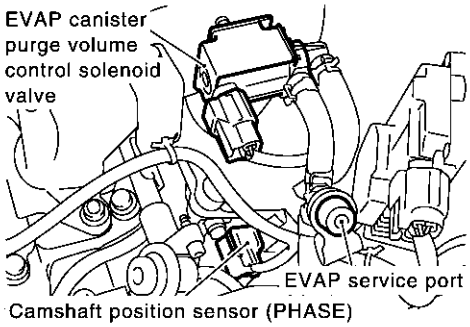


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

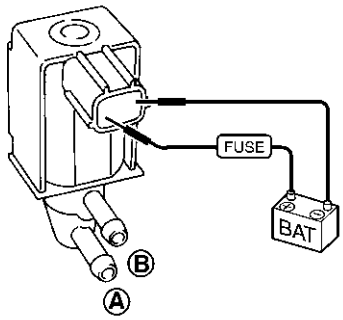
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

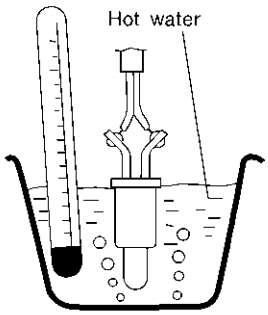
OK or NG

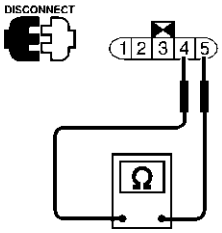
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

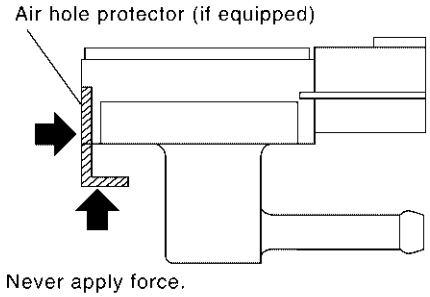
SEF587X

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

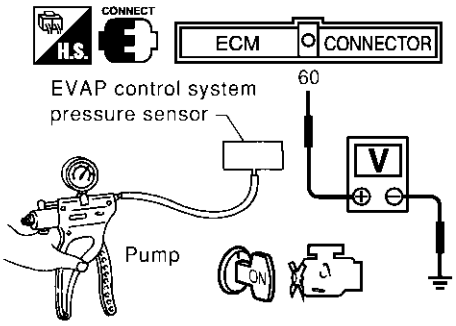
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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-37.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

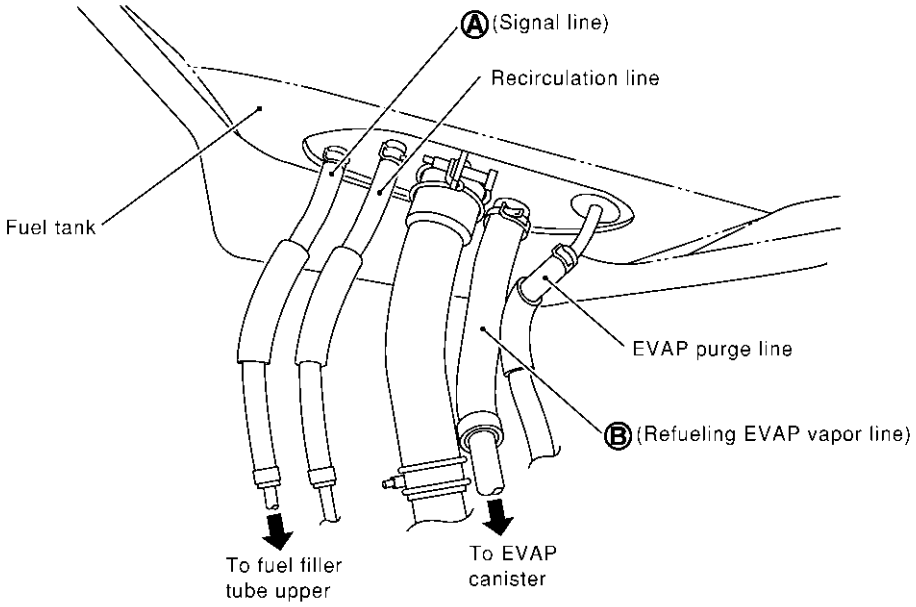
21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

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 "EVAPORATIVE EMISSION LINE DRAWING", EC-41.	
OK or NG	
OK ▶	GO TO 23.
NG ▶	Repair or replace hoses and tubes.

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.

24 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that 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.



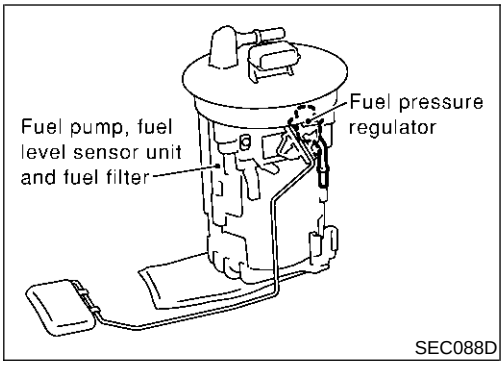
SEF830X

OK or NG

OK ▶	GO TO 25.
NG ▶	Replace or refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

26	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



Component Description

NHEC0991

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.

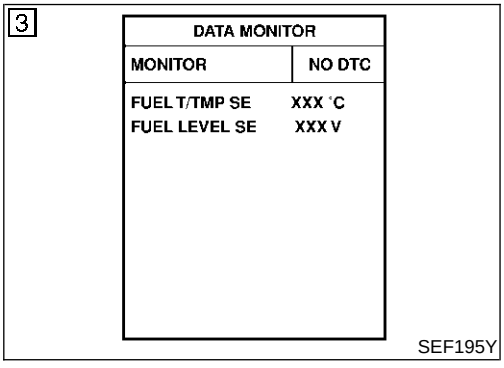
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NHEC0992

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.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) • Fuel level sensor



DTC Confirmation Procedure

NHEC0993

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.

WITH CONSULT-II

NHEC0993S01

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-414.

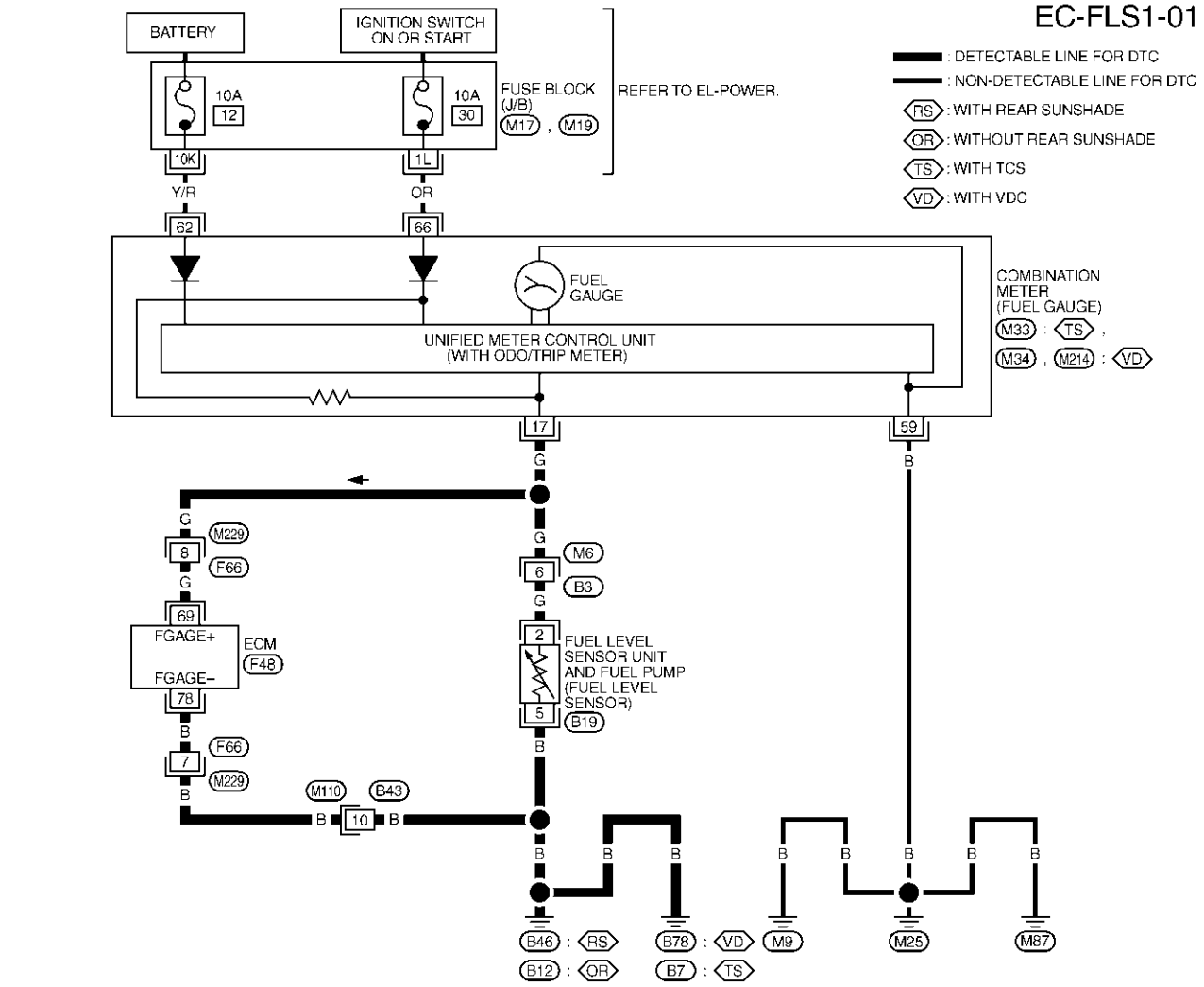
WITH GST

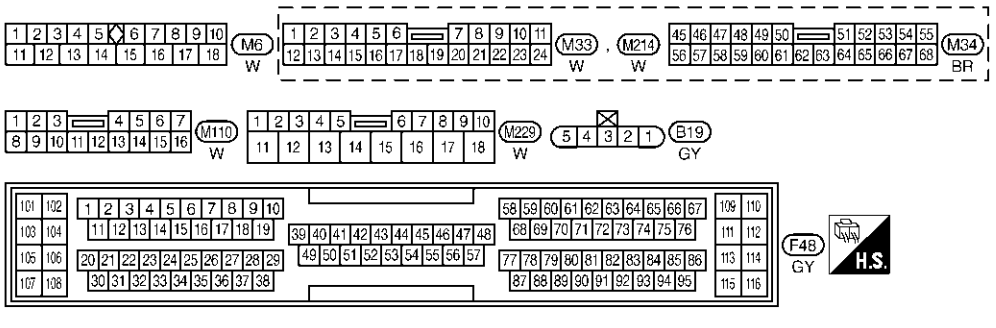
NHEC0993S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC0994





REFER TO THE FOLLOWING.
M17 , M19 - FUSE BLOCK - JUNCTION BOX (J/B)

MEC356E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
78	B	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V
69	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V OUTPUT VOLTAGE VARIES WITH FUEL LEVEL.

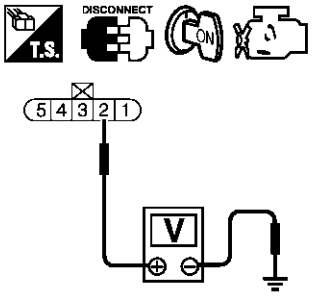
SEF711YB

Diagnostic Procedure

=NHEC0995

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or a tester.



SEC065D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M6, B3
- Harness for open or short between combination meter and fuel level sensor unit and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 5 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 69 and fuel level sensor unit and fuel pump terminal 2, ECM terminal 78 and fuel level sensor unit and fuel pump terminal 5. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

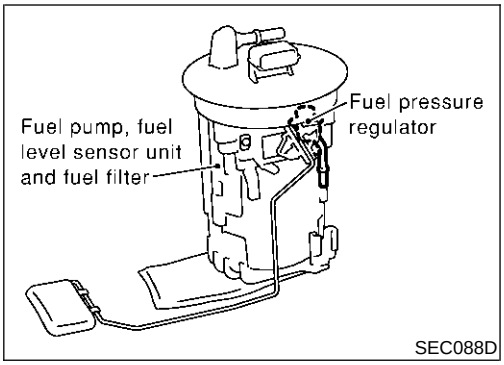
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● Harness connectors M6, B3 ● Harness for open or short between ECM and fuel level sensor unit and fuel pump	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-140, "Fuel Level Sensor Unit Check".	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace fuel level sensor unit and fuel pump.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

=NHEC0996

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.
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

NHEC0997

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.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0461 0461	Fuel level sensor circuit range/ performance	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.	• Harness or connectors (The level sensor circuit is open or shorted.) • Fuel level sensor

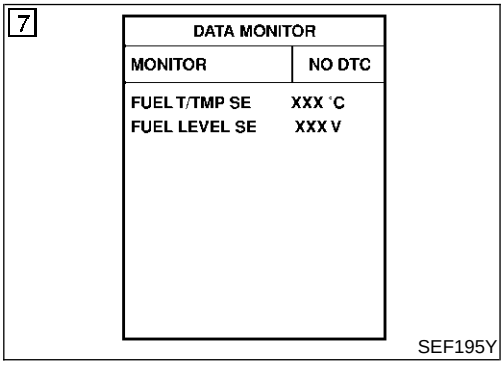
Overall Function Check

NHEC0998

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.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-4, “Fuel Tank”.

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.



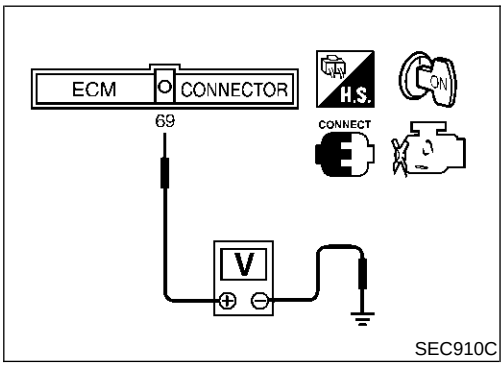
Ⓔ WITH CONSULT-II

NHEC0998S01

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” 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-140, "FUEL LEVEL SENSOR UNIT CHECK".

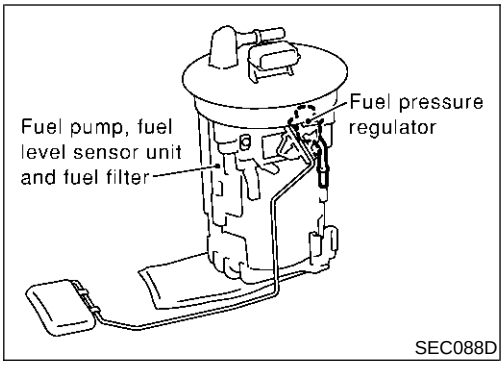


WITH GST

NHEC0998S02

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 69 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 69 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 69 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to EL-140, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

NHEC0999

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.

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

NHEC1000

ECM receives two signals from the fuel level sensor circuit.

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.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage is sent from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

DTC Confirmation Procedure

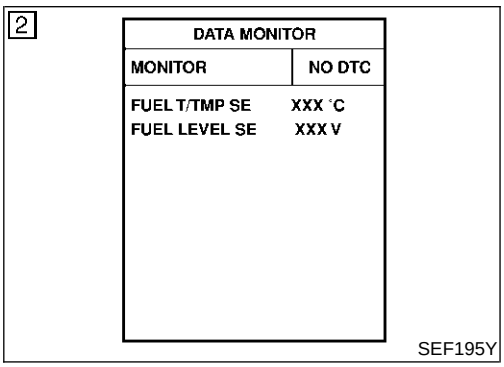
NHEC1001

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”.



WITH CONSULT-II

NHEC1001S01

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-420.

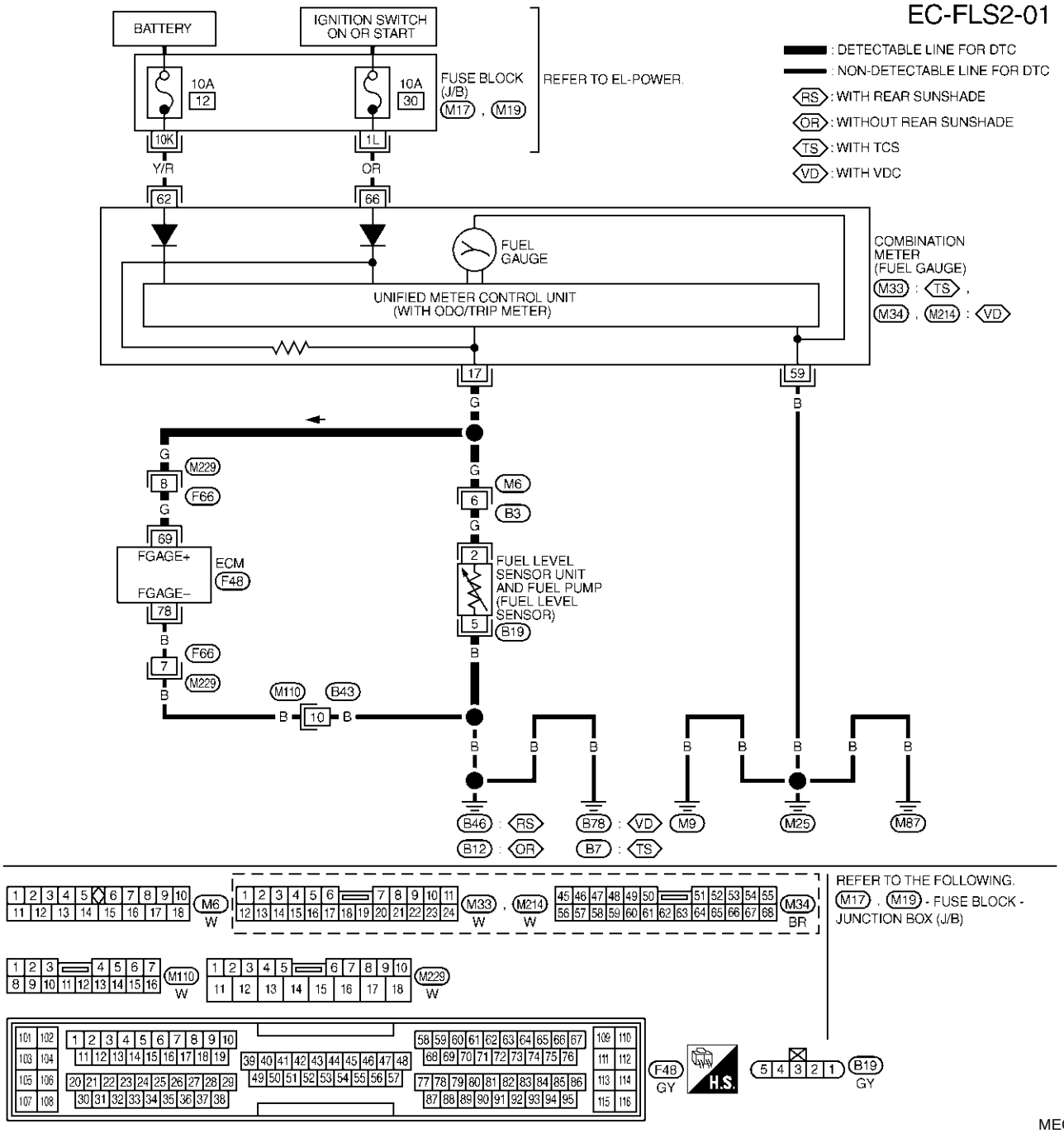
WITH GST

NHEC1001S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1002



MEC357E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
78	B	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V
69	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V OUTPUT VOLTAGE VARIES WITH FUEL LEVEL.

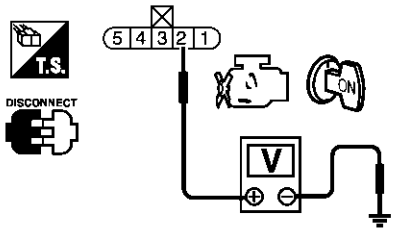
SEF711YB

Diagnostic Procedure

=NHEC1003

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or tester.



SEC220D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M6, B3
- 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

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 5 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 69 and fuel level sensor and fuel pump terminal 2. 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. ● Harness connectors F66, M229 ● Harness connectors M6, B3 ● Harness for open 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-140, "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-151.	
▶	**INSPECTION END**

Component Description

=NHEC1004

The vehicle speed sensor signal is sent from ABS actuator and electric unit or ABS/TCS control unit to combination meter. The combination meter then sends a signal to the ECM.

On Board Diagnosis Logic

NHEC1006

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor signal is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor signal circuit is open or shorted.) • ABS actuator and electric unit or ABS/TCS control unit • Combination meter

DTC Confirmation Procedure

NHEC1007

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 10 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.

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

NHEC1007S01

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-425.
   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.

ENG SPEED	More than 1,800 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 14.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-425.

Overall Function Check

NHEC1008

Use this procedure to check the overall function of the vehicle speed sensor signal circuit. During this check, a 1st trip DTC might not be confirmed.

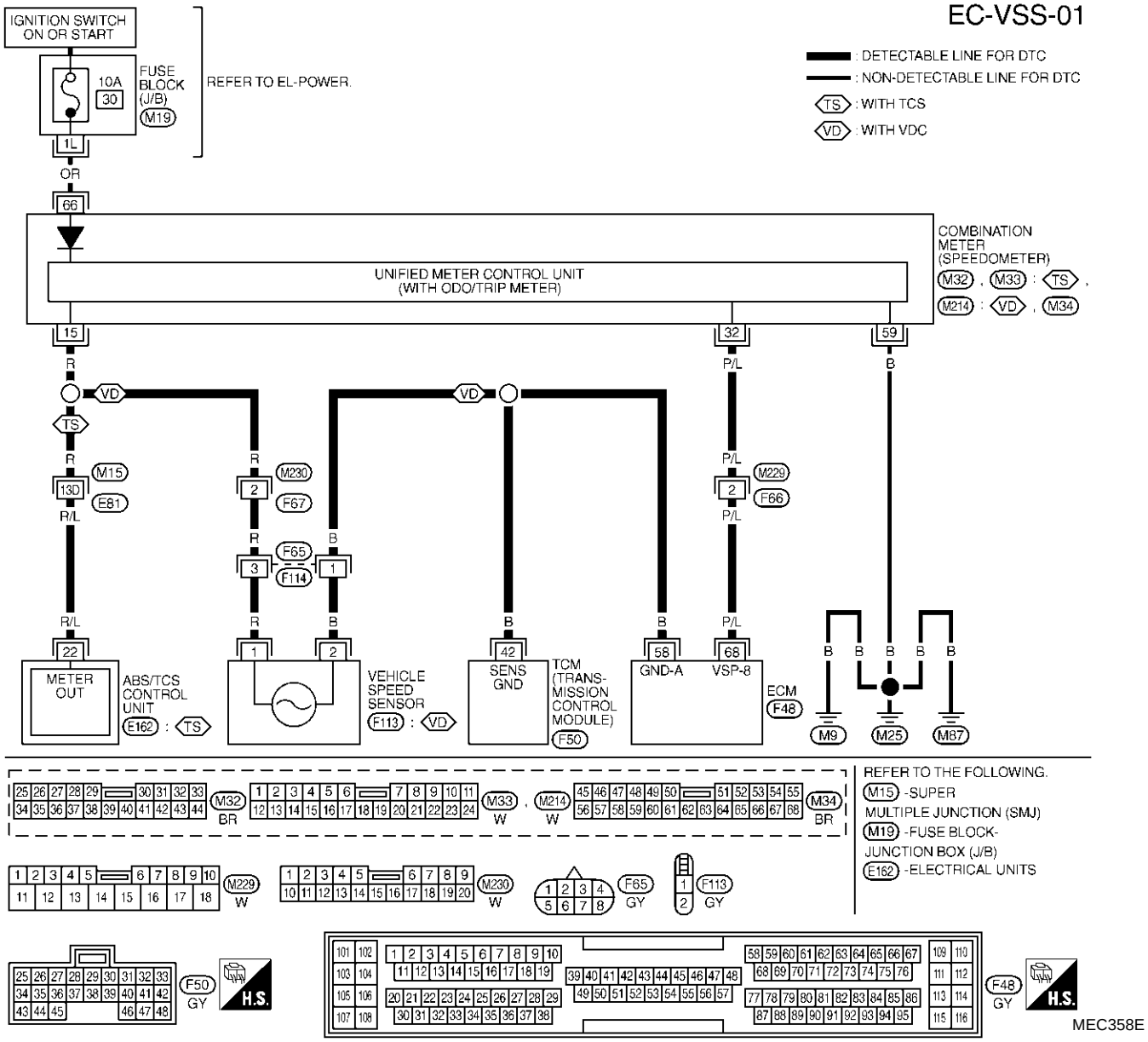
WITH GST

NHEC1008S01

1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor signal 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-425.

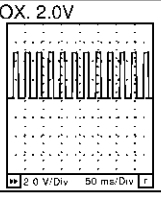
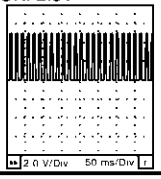
Wiring Diagram

=NHEC1009



MEC358E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
68	P/L	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 10 KM/H (6 MPH) IN 1ST GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.0V 
			VEHICLE DRIVING AT 30 KM/H (19 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.5V 

SEC045D

Diagnostic Procedure

NHEC1010

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 M32.
3. Check harness continuity between ECM terminal 68 and combination meter terminal 32.
   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

Check the following.
- Harness connectors M229, F66
- 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 COMBINATION METER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK COMBINATION METER CIRCUIT FOR OPEN AND SHORT

Check the following.
- Harness connectors M15, E81
- Harness connectors M230, F67
- Harness connectors F65, F114
- Harness for open or short between combination meter and vehicle speed sensor
- Harness for open or short between combination meter and ABS/TCS control unit
- Harness for open or short between vehicle speed sensor and ECM
- Harness for open or short between vehicle speed sensor and TCM (Transmission control module)

OK or NG

OK	▶	Check combination meter and vehicle speed sensor or ABS/TCS control unit. Refer to EL section.
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-151.

	▶	**INSPECTION END**

Description

NHEC0787

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadly. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

NHEC0790

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is not in the specified range.	● Electric throttle control actuator ● Intake air leak

DTC Confirmation Procedure

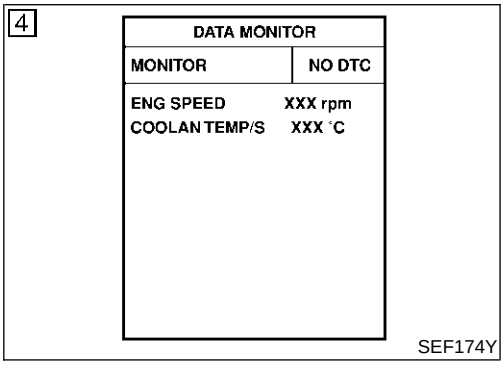
NHEC0792

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.
- **If the target idle speed is out of the specified value, perform “Idle Air Volume Learning” before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the “Service Data and Specifications (SDS)”, EC-730.**

TESTING CONDITION:

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



Ⓔ WITH CONSULT-II

NHEC0792S03

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Turn ignition switch “ON” again and select “DATA MONITOR” mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-427.

WITH GST

NHEC0792S04

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC0794

1	CHECK INTAKE AIR LEAK	
1. Start engine and let it idle. 2. Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	REPLACE ECM	
1. Stop engine. 2. Replace ECM. 3. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90. 4. Perform "Accelerator Pedal Released Position Learning", EC-71. 5. Perform "Throttle Valve Closed Position Learning", EC-71. 6. Perform "Idle Air Volume Learning", EC-71.		
	▶	**INSPECTION END**

Description

NHEC0795

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadly. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

NHEC0798

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is not in the specified range.	● Electric throttle control actuator ● Intake air leak

DTC Confirmation Procedure

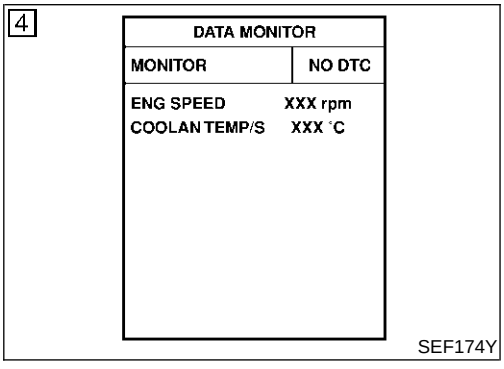
NHEC0800

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.
- **If the target idle speed is out of the specified value, perform “Idle Air Volume Learning” before conducting “DTC Confirmation Procedure”. For the target idle speed, refer to the “Service Data and Specifications (SDS)”, EC-730.**

TESTING CONDITION:

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



Ⓔ WITH CONSULT-II

NHEC0800S03

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Turn ignition switch “ON” again and select “DATA MONITOR” mode with CONSULT-II.
5) Start engine and run it for at least 1 minute at idle speed.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-429.

WITH GST

NHEC0800S04

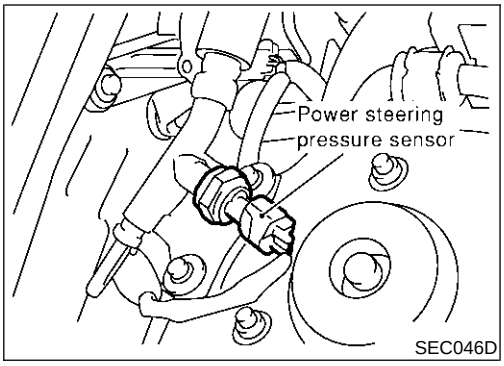
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC0802

1	CHECK INTAKE AIR LEAK	
1. Start engine and let it idle. 2. Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	REPLACE ECM	
1. Stop engine. 2. Replace ECM. 3. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90. 4. Perform "Accelerator Pedal Released Position Learning", EC-71. 5. Perform "Throttle Valve Closed Position Learning", EC-71. 6. Perform "Idle Air Volume Learning", EC-71.		
	▶	**INSPECTION END**



Component Description

NHEC1250

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1256

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is turned.	ON

On Board Diagnosis Logic

NHEC1251

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Power steering pressure sensor

DTC Confirmation Procedure

NHEC1252

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.

With CONSULT-II

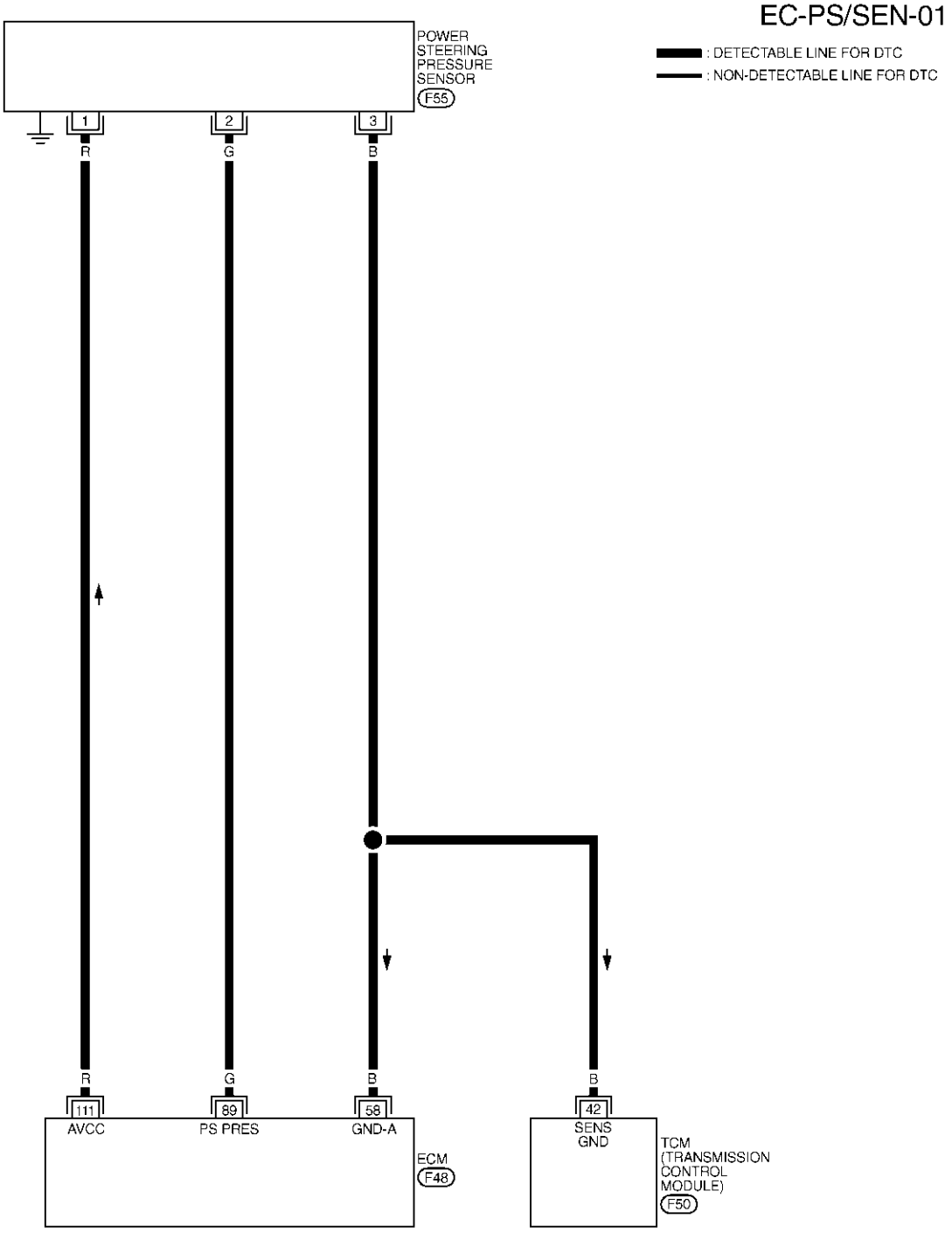
1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-432, “Diagnostic Procedure”.

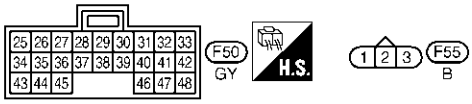
With GST

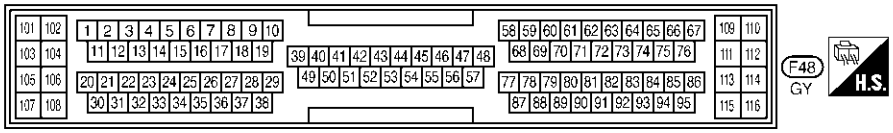
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1253







MEC568D

Wiring Diagram (Cont'd)

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

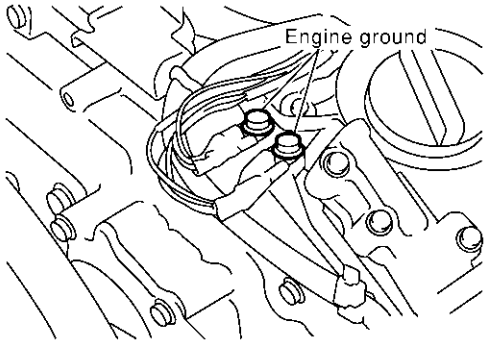
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
89	G	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
111	R	Sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1254

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

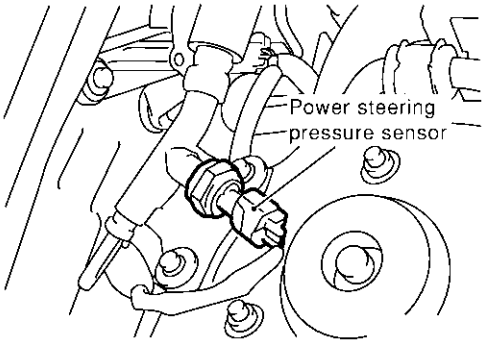


SEC047D

▶	GO TO 2.

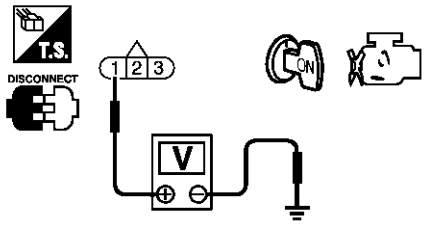
2	CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch "ON".



SEC046D

3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.



SEC048D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connectors.

3	CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between PSP sensor terminal 3 and engine 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 following.
- Harness for open or short between ECM and PSP sensor
- Harness for open or short between TCM (Transmission Control Module) and PSP sensor.

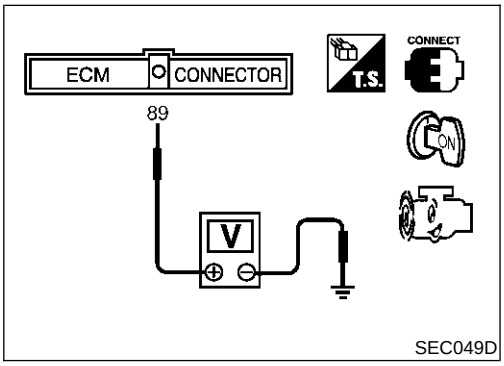
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 89 and PSP sensor terminal 2. **Continuity should exist.** 3. 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 PSP SENSOR	
Refer to "Component Inspection", EC-434.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace PSP sensor.

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



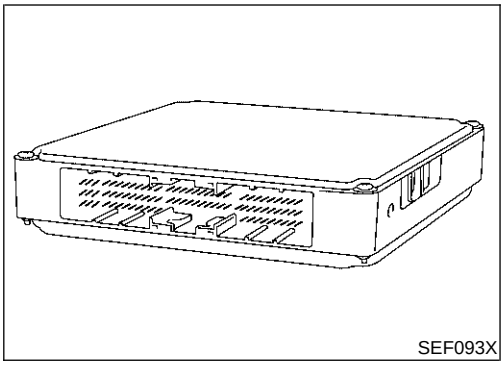
Component Inspection

NHEC1257

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 89 and ground under the following conditions.

Condition	Voltage
Steering wheel is turned fully.	Approximately 0.5 - 4.0V
Steering wheel is not turned.	Approximately 0.4 - 0.8V



SEF093X

Component Description

NHEC1032

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NHEC1033

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition		Possible Cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

Detected items	Engine operation condition in fail-safe mode
Malfunction A	• ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • ECM deactivates ASCD operation.

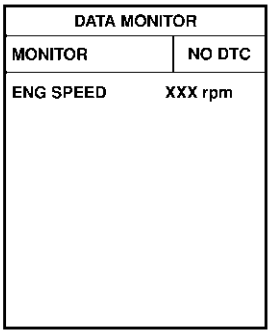
DTC Confirmation Procedure

NHEC1445

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no malfunction 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 10 seconds before conducting the next test.



SEF058Y

PROCEDURE FOR MALFUNCTION A

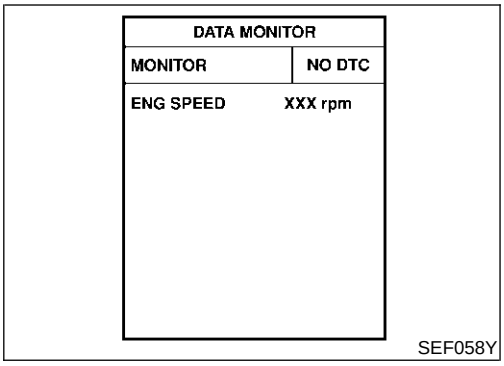
With CONSULT-II

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) If 1st trip DTC is detected, go to EC-436, "Diagnostic Procedure".

With GST

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)



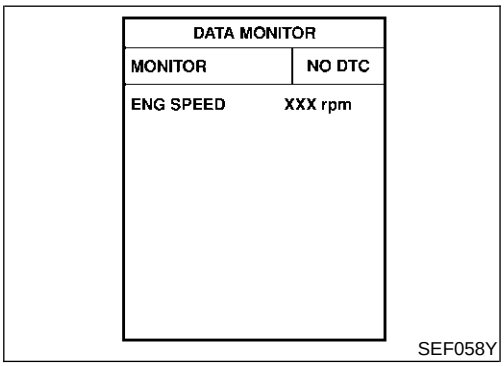
PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1) Turn ignition switch "ON" and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4) If 1st trip DTC is detected, go to EC-436, "Diagnostic Procedure".

With GST

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1) Turn ignition switch "ON" and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Turn ignition switch "OFF", wait at least 10 seconds, and then turn "ON".
4) Repeat step 3 procedure, 32 times.
5) If 1st trip DTC is detected, go to EC-436, "Diagnostic Procedure".

With GST

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC1035

1	INSPECTION START
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-435. 5. Is the 1st trip DTC P0605 displayed again?	
With GST 1. Turn ignition switch "ON". 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-435. 5. Is the 1st trip DTC P0605 displayed again?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	**INSPECTION END**

2	REPLACE ECM
1. Replace ECM. 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90. 3. Perform "Accelerator Pedal Released Position Learning", EC-71. 4. Perform "Throttle Valve Closed Position Learning", EC-71. 5. Perform "Idle Air Volume Learning", EC-71.	
▶	**INSPECTION END**

Component Description

NHEC1258

Malfunction Indicator Lamp (MIL) is located on the instrument panel. When the ignition switch is turned ON without engine running, MIL will light up. This is a bulb check. When the engine is started, MIL should go off. If MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnosis Logic

NHEC1259

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0650 0650	Malfunction indicator (MIL) control circuit	• An excessively high voltage is sent to ECM through the MIL circuit under the condition that calls for MIL light up. • An excessively low voltage is sent to ECM through the MIL circuit under the condition that calls for MIL not to light up.	• Harness or connectors (MIL circuit is open or shorted.) • MIL

FAIL-SAFE MODE

ECM enters fail-safe mode when both DTC P0650 and another DTC, which calls for MIL to light up, are detected at the same time.

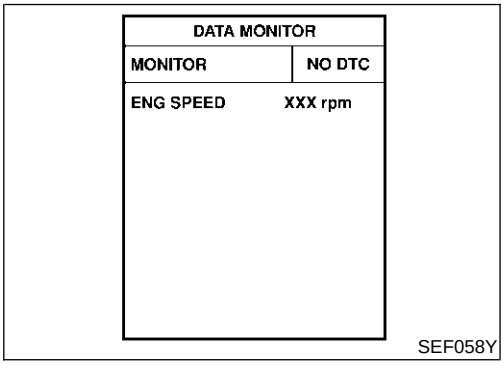
Detected items	Engine operating condition in fail-safe mode
MIL circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut.

DTC Confirmation Procedure

NHEC1260

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.



With CONSULT-II

1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-439.

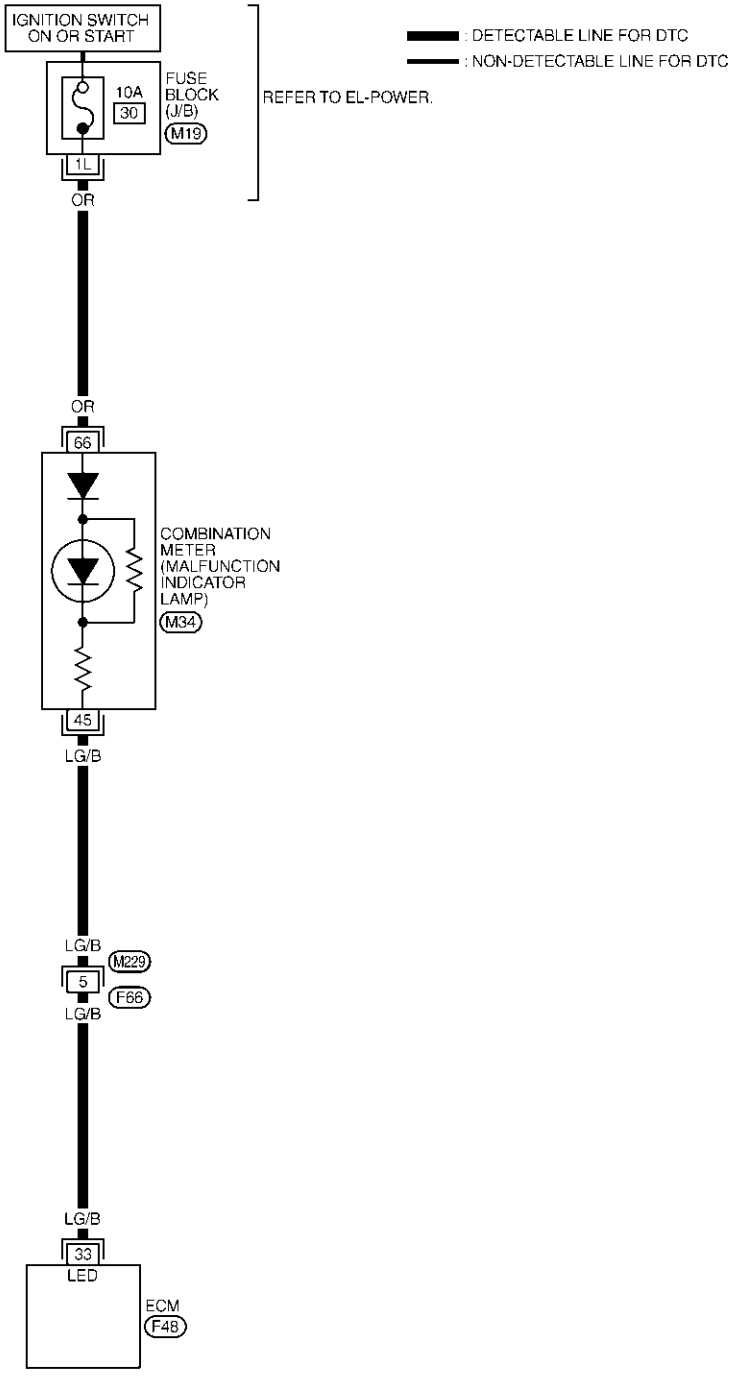
WITH GST

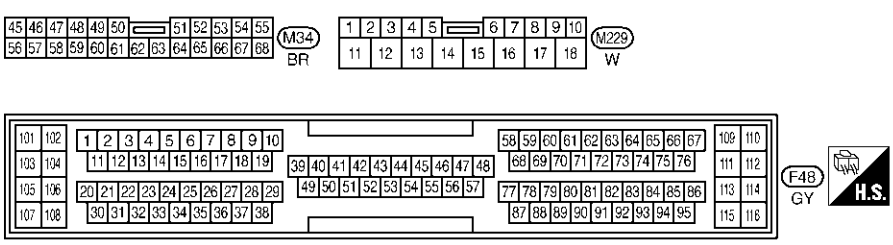
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1261

EC-MIL-01





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC572D

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

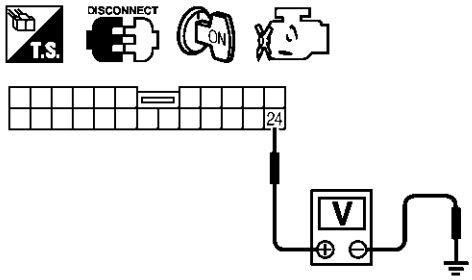
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG/B	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

NHEC1262

1 CHECK MIL POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect combination meter harness connector.
3. Turn ignition switch "ON".
4. Check voltage between combination meter terminal 24 and ground with CONSULT-II or tester.



SEC050D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector M19
- 10A fuse
- Harness for open or short between fuse block (J/B) and combination meter

▶ Repair harness or connectors.

3 CHECK MIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 33 and combination meter terminal 45. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

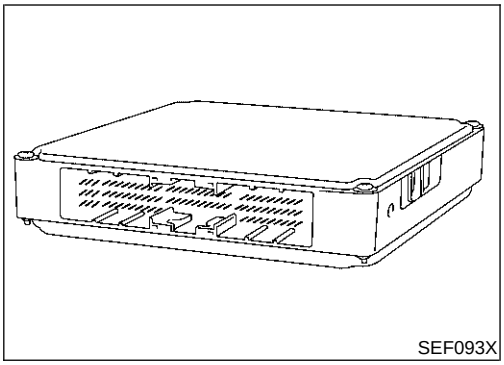
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● 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.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
OK or NG	
OK ▶	Replace combination meter. Refer to EL-125, "METERS AND GAUGES".
NG ▶	Repair or replace.


SEF093X

Component Description

NHEC1263

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

On Board Diagnosis Logic

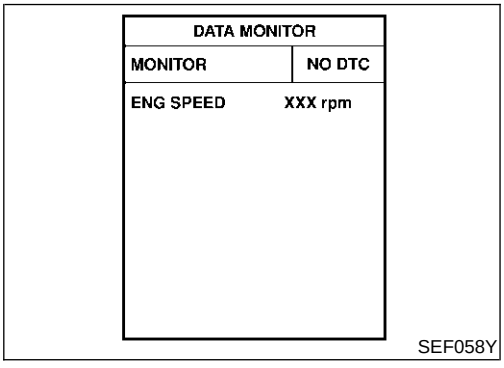
NHEC1264

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

NHEC1265

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.



SEF058Y

With CONSULT-II

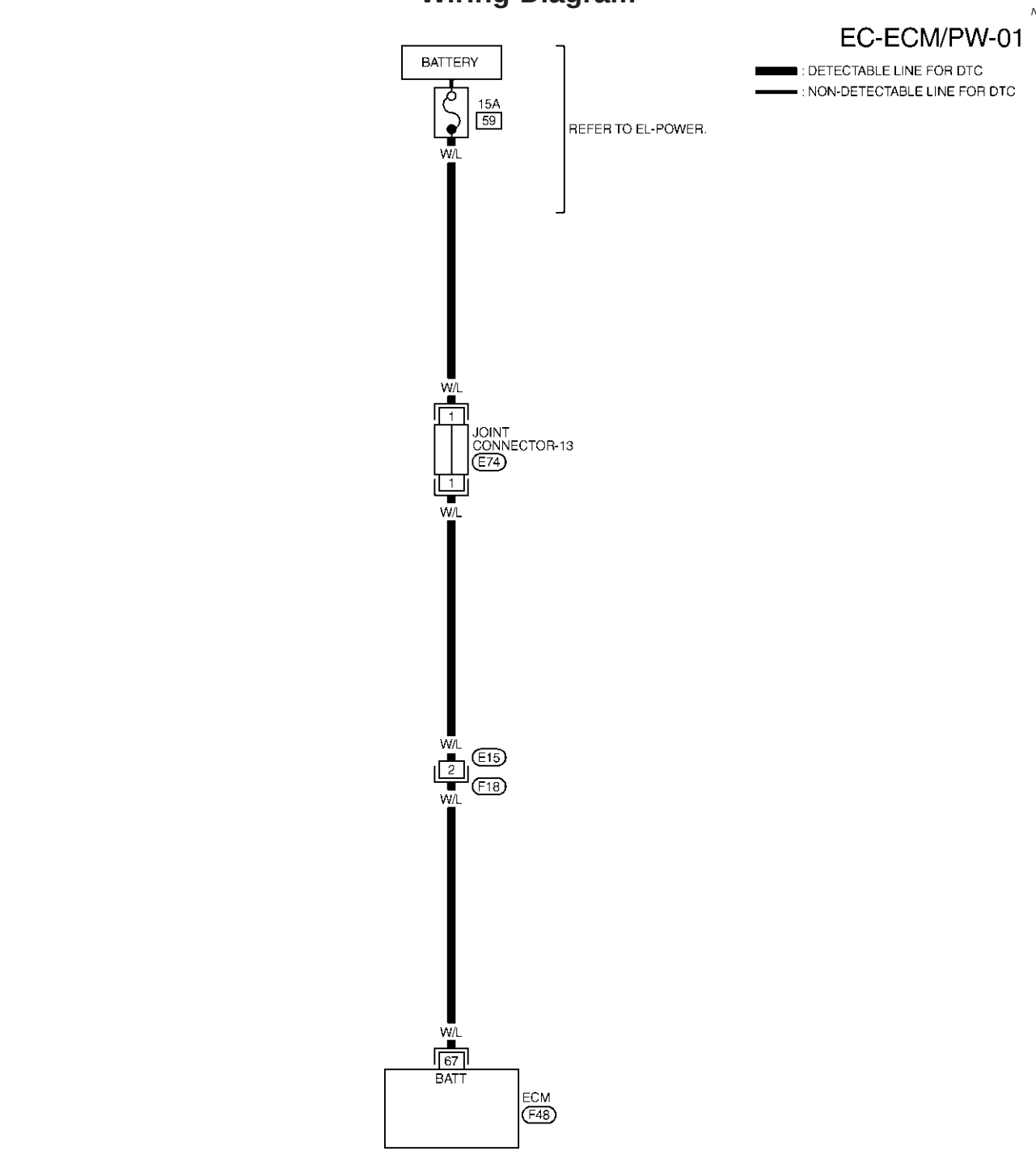
1. Turn ignition switch “ON” and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-443.

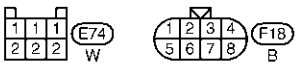
With GST

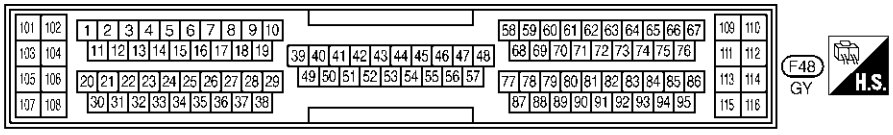
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1266







MEC703D

Wiring Diagram (Cont'd)

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

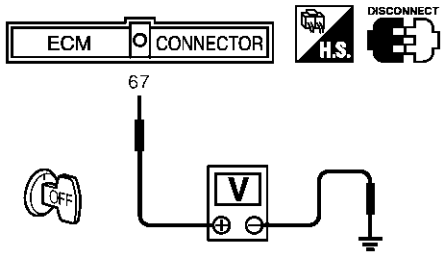
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	W/L	Power supply for ECM (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

NHEC1267

1	CHECK ECM POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.



SEC912C

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Joint connector-13
- 15A fuse
- Harness for open or short between ECM and fuse

	▶	Repair or replace harness or connectors.

3	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness or connectors.

4	PERFORM DTC CONFIRMATION PROCEDURE

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-441.
5. Is the 1st trip DTC P1065 displayed again?

With GST
1. Turn ignition switch "ON".
2. Select MODE 4 with GST.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
   See EC-441.
5. Is the 1st trip DTC P1065 displayed again?

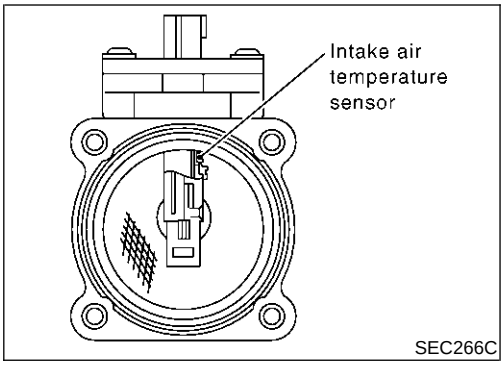
Yes or No

Yes	▶	GO TO 5.
No	▶	**INSPECTION END**

5	REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-90.
3. Perform "Accelerator Pedal Released Position Learning", EC-71.
4. Perform "Throttle Valve Closed Position Learning", EC-71.
5. Perform "Idle Air Volume Learning", EC-71.

	▶	**INSPECTION END**



Component Description

NHEC0803

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 film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film 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 film as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

NHEC0804

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.1 - 1.5V
		2,500 rpm	1.7 - 2.4V
CAL/LD VALUE	ditto	Idle	10 - 35%
		2,500 rpm	10 - 35%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

On Board Diagnosis Logic

NHEC1446

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1102 1102	Mass air flow sensor circuit range/ performance problem	A voltage from the sensor is constantly approx. 1.0V when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

NHEC1446S01

When the 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.

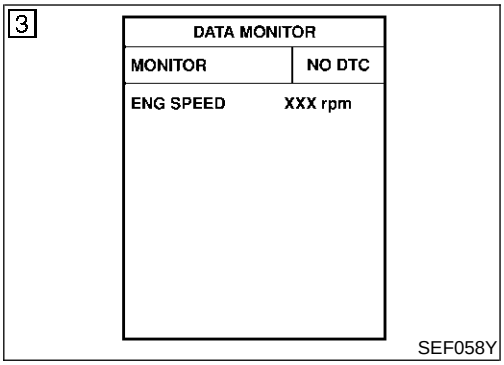
DTC Confirmation Procedure

NHEC1447

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.

DTC Confirmation Procedure (Cont'd)



WITH CONSULT-II

NHEC1447S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-448.

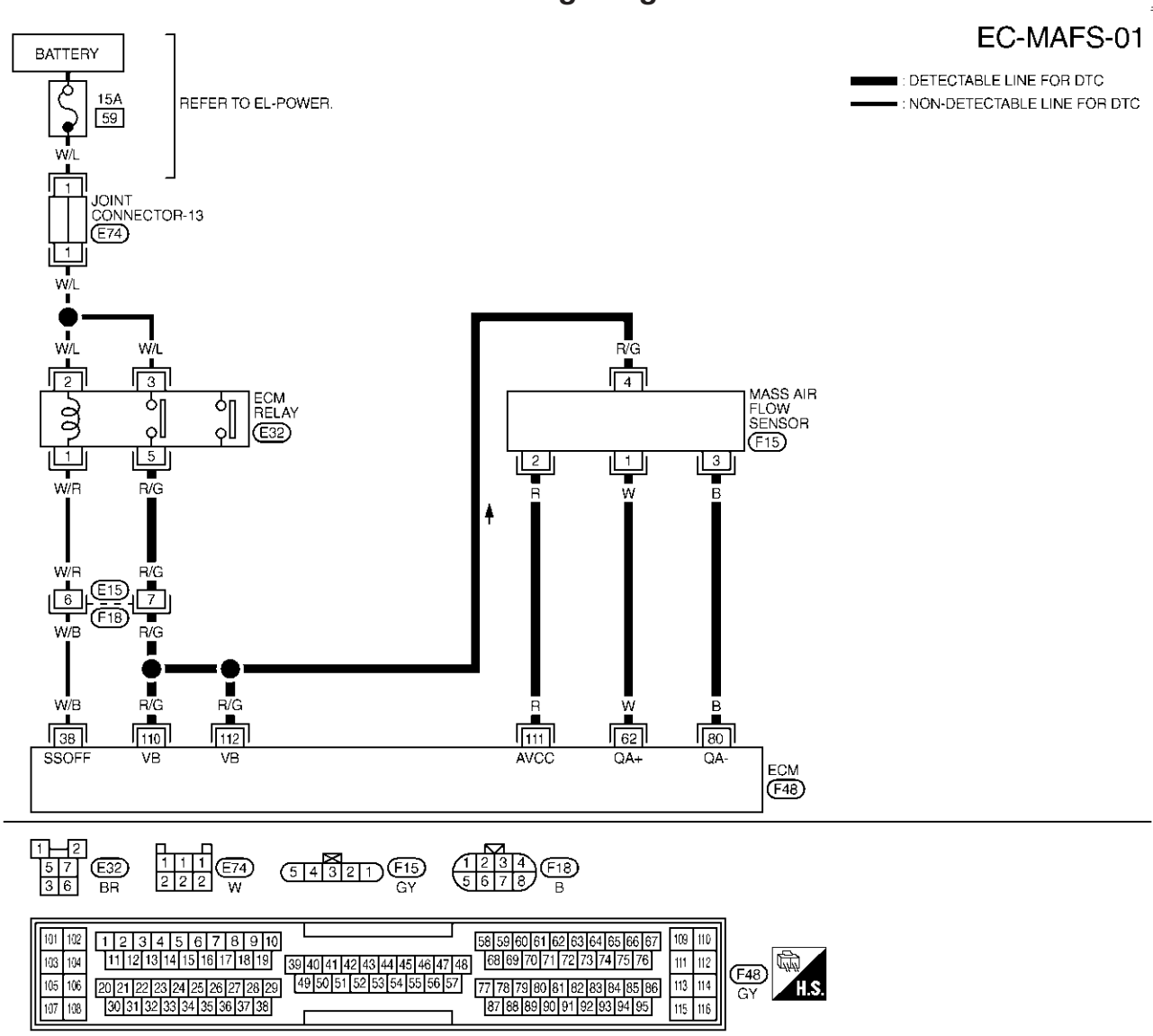
WITH GST

NHEC1447S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

=NHEC0810



MEC531D

ECM TERMINALS AND REFERENCE VALUE 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.

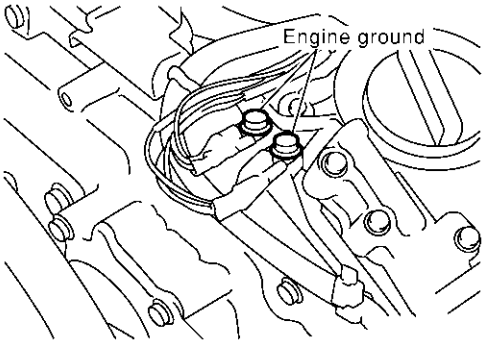
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
62	W	MASS AIR FLOW SENSOR	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	1.1 - 1.5V
			ENGINE RUNNING AT 2,500 RPM UNDER WARM-UP CONDITION	1.7 - 2.4V
80	B	MASS AIR FLOW SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	APPROX. 0V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

SEF650XE

Diagnostic Procedure

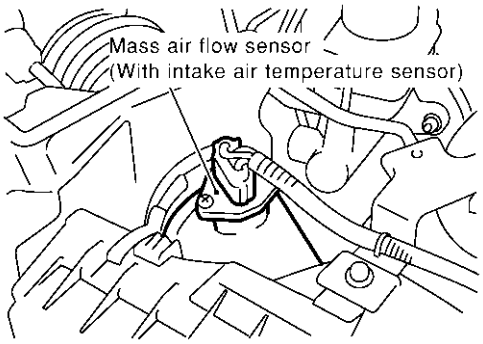
=NHEC0811

1	CHECK INTAKE SYSTEM	
Check the following for connection. ● Air duct ● Vacuum hoses		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Reconnect the parts.

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.		
 SEC047D		
	▶	GO TO 3.

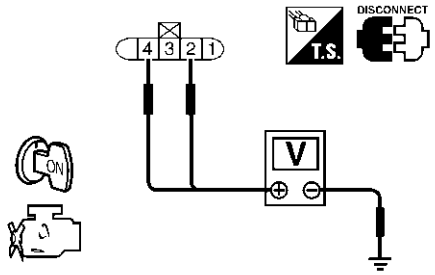
3	CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.



SEC055D

2. Turn ignition switch "ON".
3. Check voltage between MAF sensor terminals 2, 4 and ground with CONSULT-II or tester.



Terminal	Voltage
2	Approximately 5
4	Battery voltage

SEF297X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- 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.

5	CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 80.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

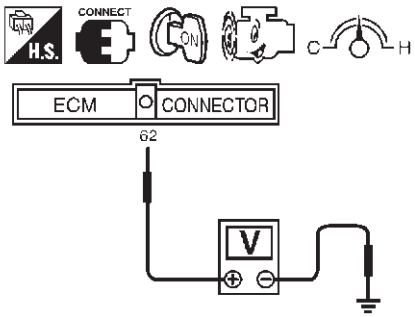
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

6	CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between MAF sensor terminal 1 and ECM terminal 62. Refer to Wiring Diagram. **Continuity should exist.** 2. 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.

7	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 62 (Mass air flow sensor signal) and ground.		



SEF391R

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.1 - 1.5
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.4
Idle to about 4,000 rpm*	1.1 - 1.5 to Approx. 4.0

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

MTBL1160

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace mass air flow sensor.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

Component Description

NHEC1298

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

NHEC1299

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE
When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

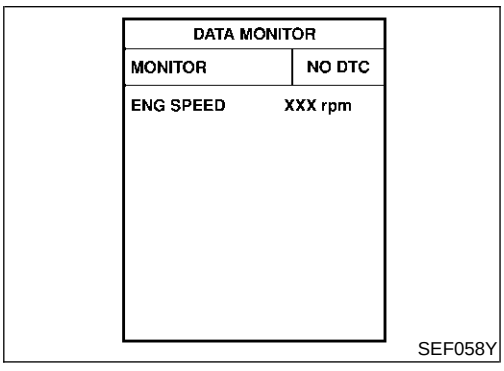
Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle control actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in “N” or “P” position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

NHEC1300

NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A AND B” first. If the DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION C”.**
  If there is no malfunction on “PROCEDURE FOR MALFUNCTION A AND B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



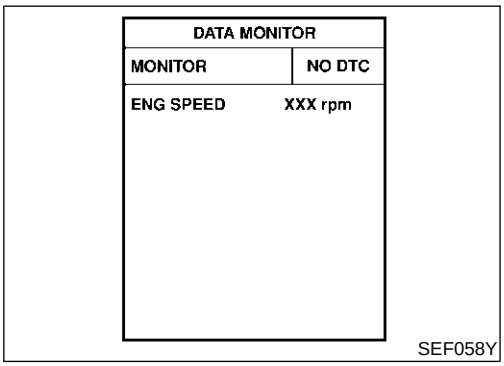
PROCEDURE FOR MALFUNCTION A AND B

Ⓔ With CONSULT-II

1) Turn ignition switch “ON” and wait at least 1 second.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Shift selector lever to “D” position and wait at least 3 seconds.
4) Turn ignition switch “OFF”, wait at least 10 seconds and then turn “ON”.
5) Turn ignition switch “ON” and wait at least 1 second.
6) Shift selector lever to “D” position and wait at least 3 seconds.
7) Turn ignition switch “OFF”, wait at least 10 seconds, and then turn “ON”.

8) If DTC is detected, go to "Diagnostic Procedure", EC-452.

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



PROCEDURE FOR MALFUNCTION C
With CONSULT-II
1) Turn ignition switch "ON" and wait at least 1 second.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Shift selector lever to "D" position and wait at least 3 seconds.
4) Shift selector lever to "N" or "P" position.
5) Start engine and let it idle for 3 seconds.
6) If DTC is detected, go to "Diagnostic Procedure", EC-452.

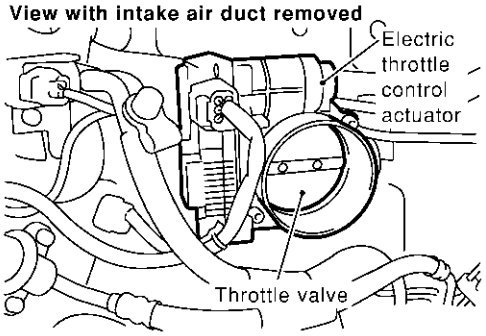
With GST
Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NHEC1413

1	CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.



OK or NG

OK	▶	GO TO 2.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

2	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Perform "Idle Air Volume Learning", EC-71.

	▶	**INSPECTION END**

Description

NHEC1301

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-451, 461.

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides the feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

NHEC1448

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted.) • Electric throttle control actuator

FAIL-SAFE MODE
When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

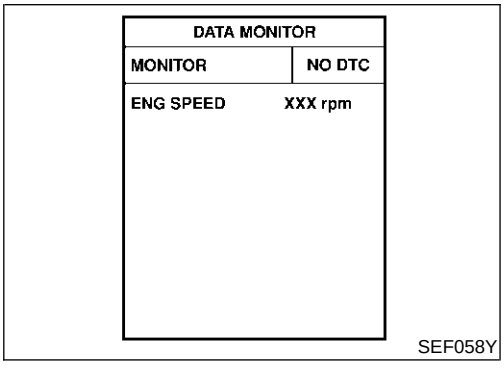
Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NHEC1449

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.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.



With CONSULT-II

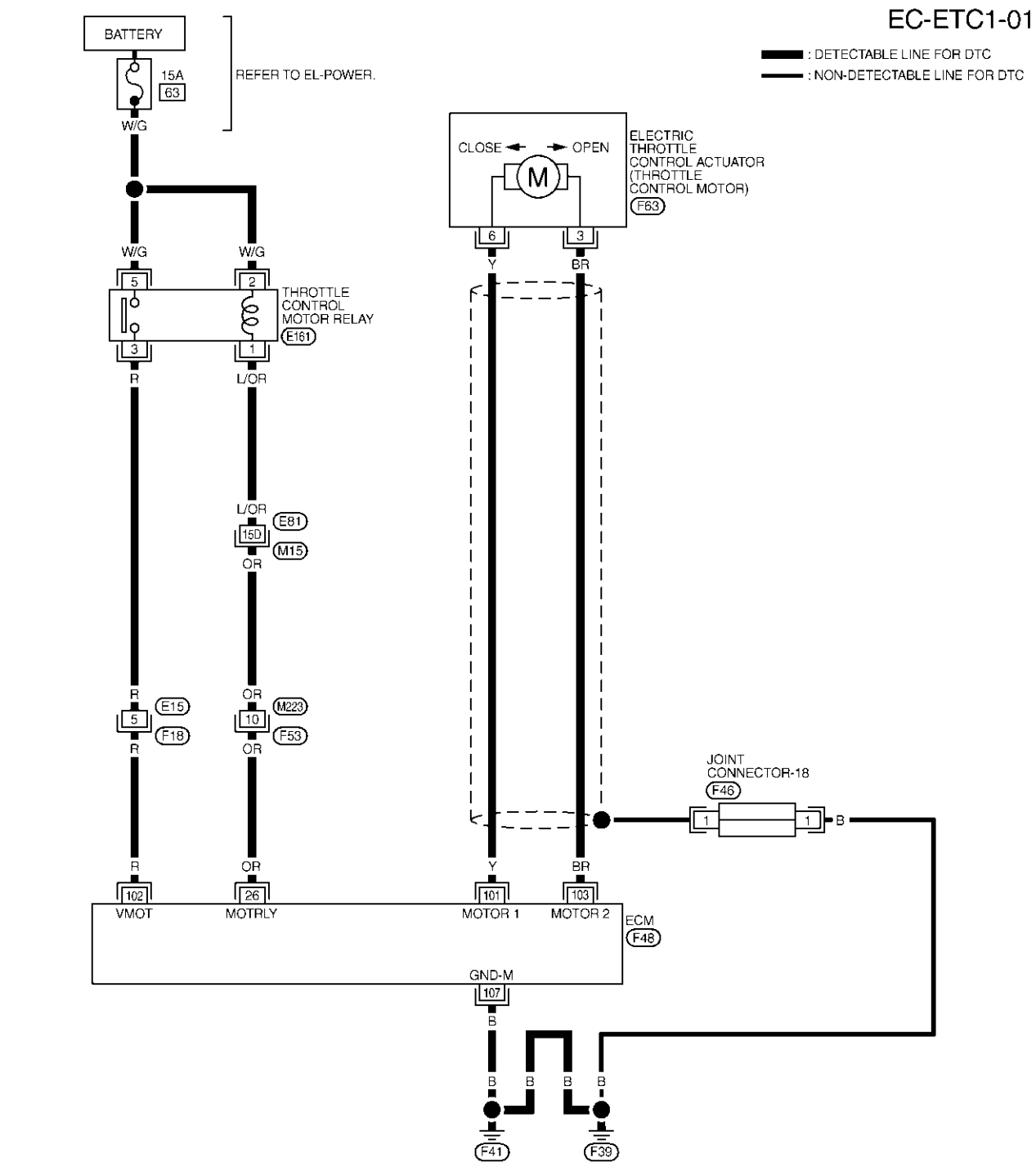
1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-456.

With GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC1304



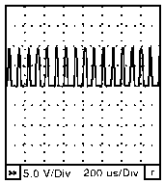
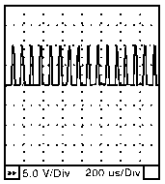
MEC359E

Wiring Diagram (Cont'd)

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)
26	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
101	Y	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is fully depressed	0 - 14V★  SEC037D
102	R	Throttle control motor relay power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
103	BR	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal is released	0 - 14V★  SEC038D
107	B	Throttle control motor ground	**[Engine is running]** ● Idle speed	Approximately 0V

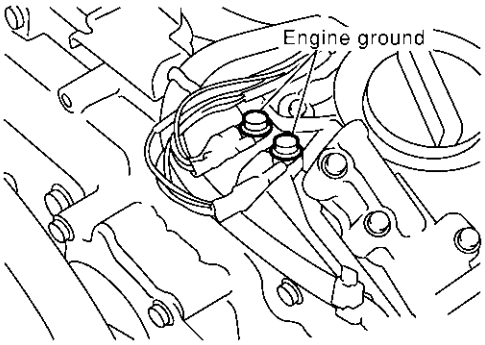
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

NHEC1305

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



SEC047D

▶ GO TO 2.

2	CHECK THROTTLE CONTROL MOTOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 107 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to power in harness or connectors.

3	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Reconnect harness connector disconnected.
2. Check voltage between ECM terminal 102 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11- 14V)

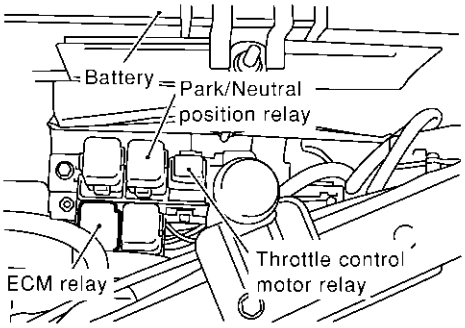
MTBL1168

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

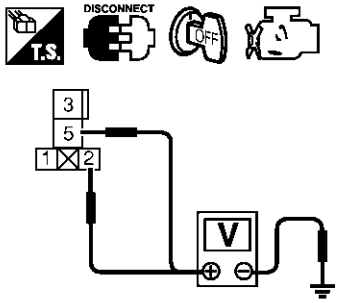
4	CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay.



SEC044D

3. Check voltage between throttle control motor relay terminals 2, 5 and ground with CONSULT-II or tester.



SEC091D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open and short between throttle control motor relay and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 102 and throttle control motor relay terminal 3. 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. ● Harness connector E15, F18 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between ECM terminal 26 and throttle control motor relay terminal 1. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

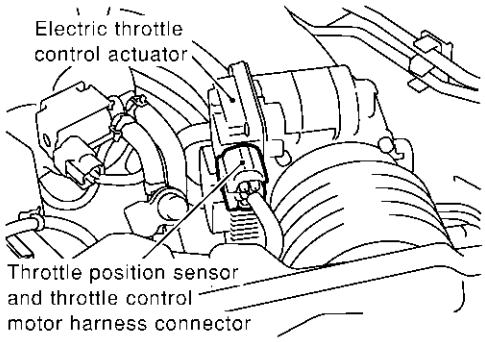
9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connector E81, M15 ● Harness connectors M223, F53 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK THROTTLE CONTROL MOTOR RELAY	
Refer to "Component Inspection", EC-460.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace throttle control motor relay.

11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

12 **CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT**

1. Turn ignition switch "OFF".
2. Disconnect electric throttle control actuator harness connector.



SEC054D

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
3	101	Should not exist
	103	Should exist
6	101	Should exist
	103	Should not exist

MTBL1169

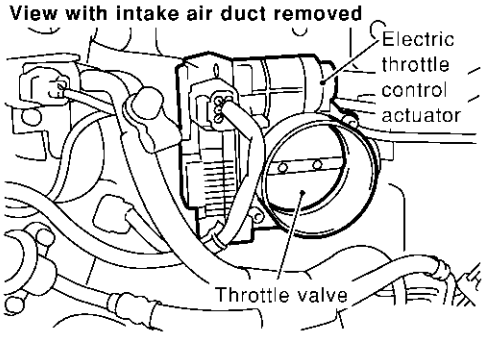
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair or replace.

13 **CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY**

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.



SEC083D

OK or NG

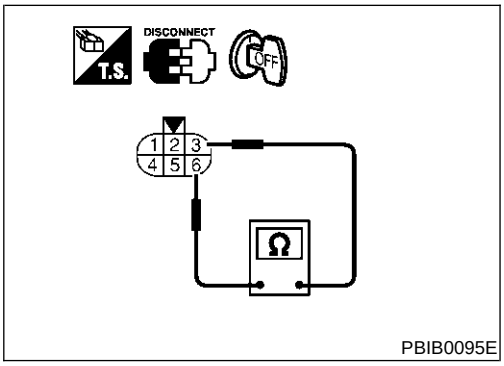
OK	▶	GO TO 14.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

Diagnostic Procedure (Cont'd)

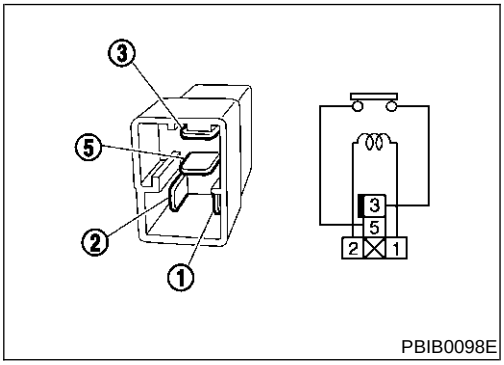
14	CHECK THROTTLE CONTROL MOTOR	
Refer to "Component Inspection", EC-460.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 16.

15	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or replace harness or connectors.

16	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-71. 3. Perform "Idle Air Volume Learning", EC-71.		
	▶	**INSPECTION END**



PBIB0095E



PBIB0098E

Component Inspection

NHEC1306

THROTTLE CONTROL MOTOR

NHEC1306S01

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

   Resistance: Approximately 1 - 15Ω [at 25°C (77°F)]
3. If NG, replace electric throttle control actuator and go to next step.
4. Perform "Throttle Valve Closed Position Learning", EC-71.
5. Perform "Idle Air Volume Learning", EC-71.

THROTTLE CONTROL MOTOR RELAY

NHEC1306S02

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.

Component Description

NHEC1307

Power supply for the Throttle Control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1319

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

NHEC1450

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1124 1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

NHEC1450S01

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

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NHEC1451

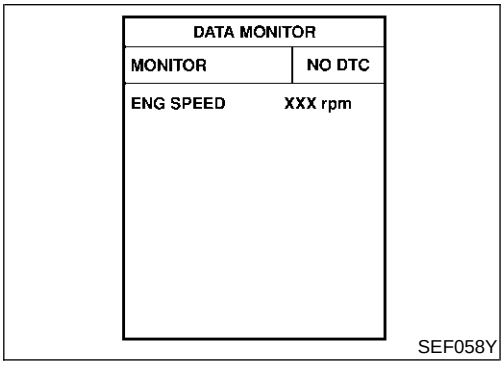
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.



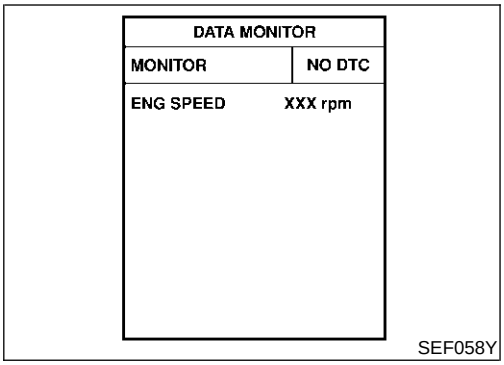
With CONSULT-II

1) Turn ignition switch “ON” and wait at least 1 second.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) If DTC is detected, go to “Diagnostic Procedure”, EC-464.

With GST

Follow the procedure “With CONSULT-II” above.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR DTC P1126

With CONSULT-II

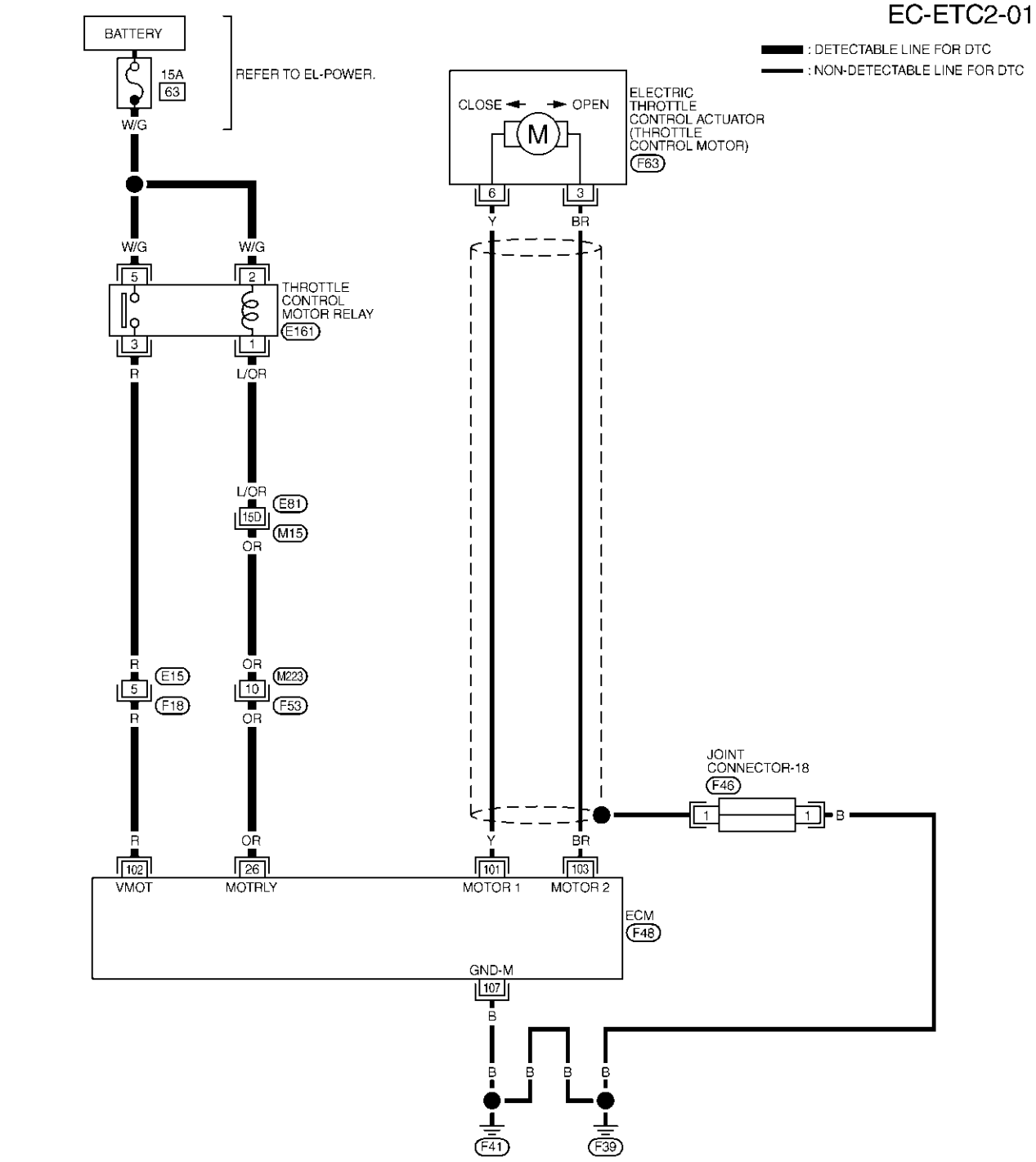
1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-464.

With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC1310



MEC360E

Wiring Diagram (Cont'd)

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.

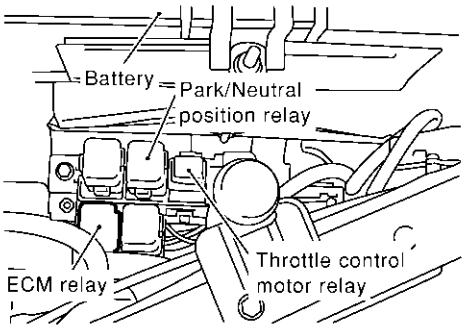
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	OR	Throttle control motor relay	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"]	0 - 1.0V
102	R	Throttle control motor relay power supply	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

NHEC1311

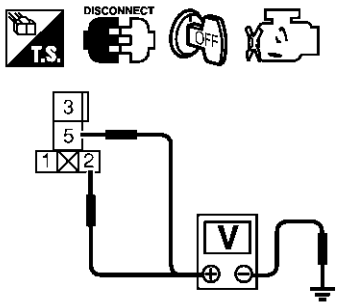
1 CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect throttle control motor relay.



SEC044D

3. Check voltage between throttle control motor relay terminals 2, 5 and ground with CONSULT-II or tester.



SEC091D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open and short between throttle control motor relay and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 102 and throttle control motor relay terminal 3. 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 5.
NG ▶	GO TO 4.

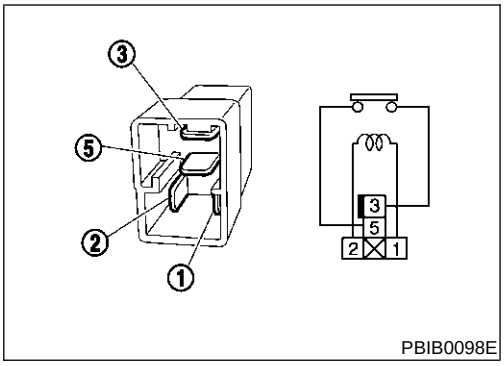
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connector E15, F18 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 26 and throttle control motor relay terminal 1. Refer to Wiring Diagram. **Continuity should exist.** 2. 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. ● Harness connector E81, M15 ● Harness connectors M223, F53 ● Harness for open and short between throttle control motor relay and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK THROTTLE CONTROL MOTOR RELAY
Refer to "Component Inspection", EC-466.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace throttle control motor relay.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



PBIB0098E

Component Inspection

NHEC1312

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.

Component Description

NHEC1313

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

NHEC1452

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1128 1128	Throttle control motor circuit short	ECM detects short both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

NHEC1452S01

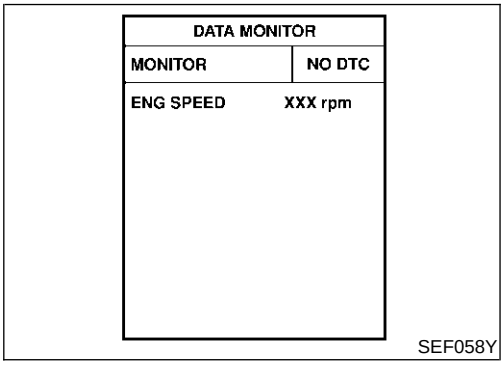
When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NHEC1453

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.



With CONSULT-II

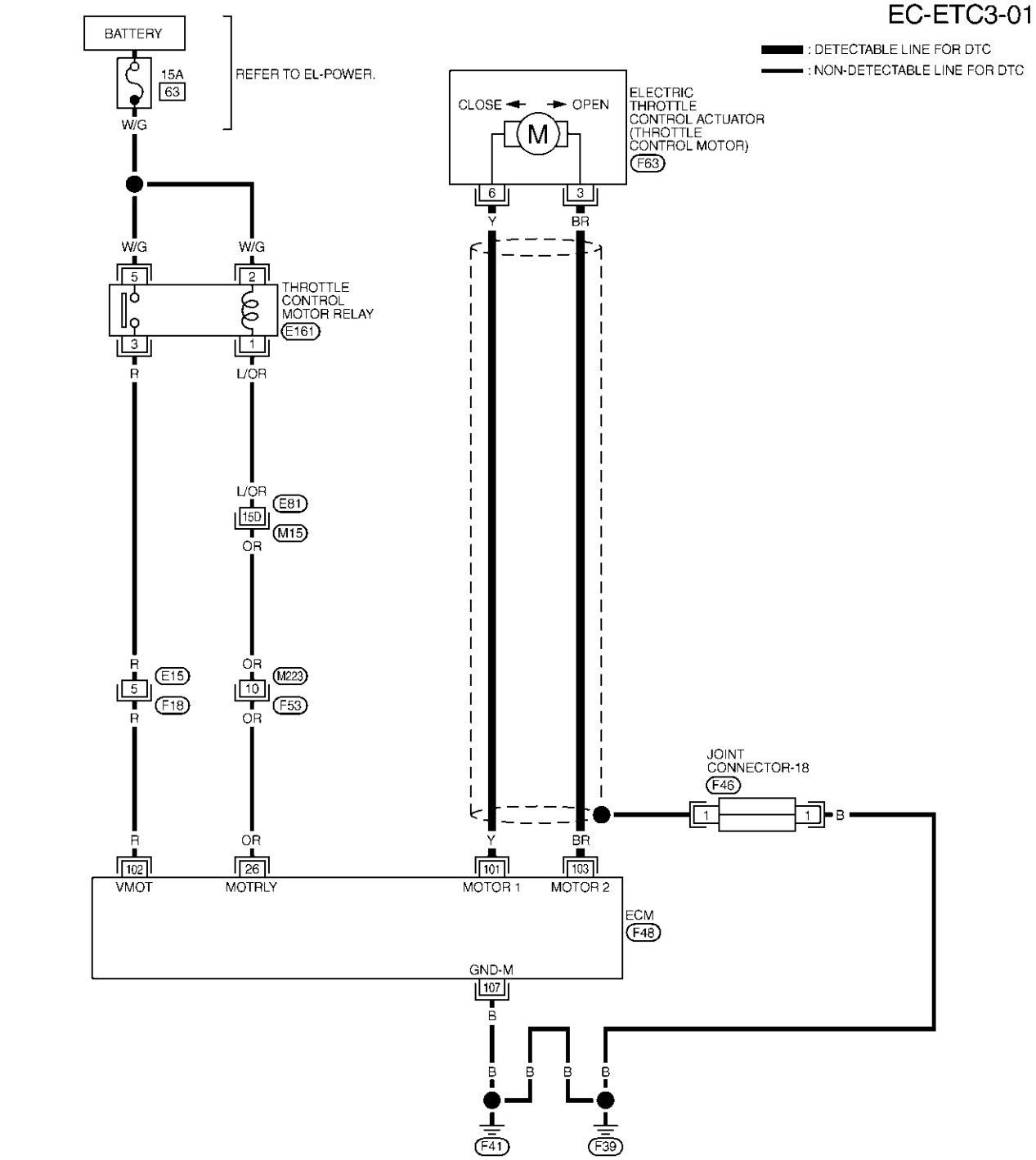
1) Turn ignition switch “ON” and wait at least 2 seconds.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-469.

With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

NHEC1316



REFER TO THE FOLLOWING.
(M15) -SUPER MULTIPLE JUNCTION (SMJ)

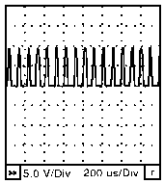
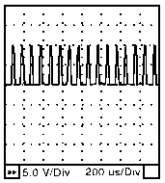
MEC361E

Wiring Diagram (Cont'd)

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)
101	Y	Throttle control motor (Open)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	0 - 14V★  SEC037D
103	BR	Throttle control motor (Close)	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal released	0 - 14V★  SEC038D

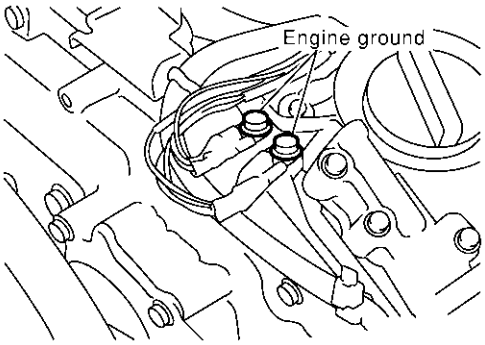
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

NHEC1317

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



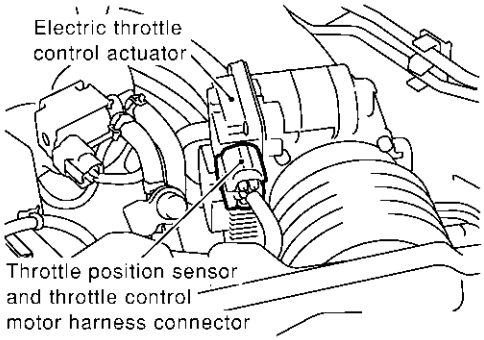
SEC047D

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch "OFF".
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.



SEC054D

Electric throttle control actuator terminal	ECM terminal	Continuity
3	101	Should not exist
	103	Should exist
6	101	Should exist
	103	Should not exist

MTBL1169

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

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK THROTTLE CONTROL MOTOR

Refer to "Component Inspection", EC-471.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

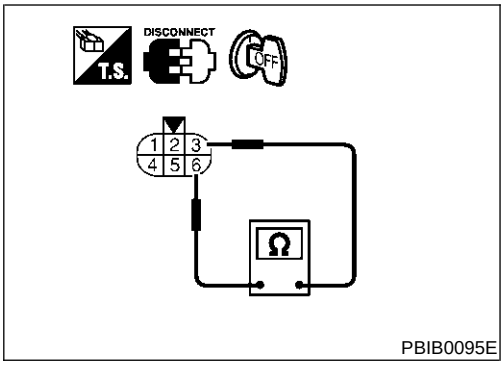
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Perform "Idle Air Volume Learning", EC-71.

	▶	**INSPECTION END**



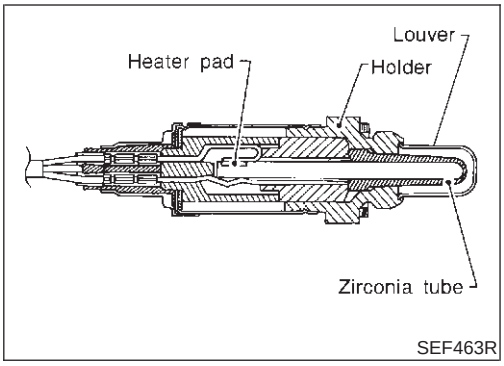
Component Inspection

NHEC1318

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

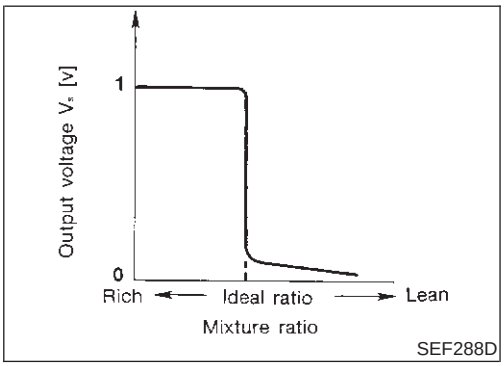
   Resistance: Approximately 1 - 15Ω [at 25°C (77°F)]
3. If NG, replace electric throttle control actuator and go to next step.
4. Perform “Throttle Valve Closed Position Learning”, EC-71.
5. Perform “Idle Air Volume Learning”, EC-71.



Component Description

NHEC1147

The heated oxygen sensor 1 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 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 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.

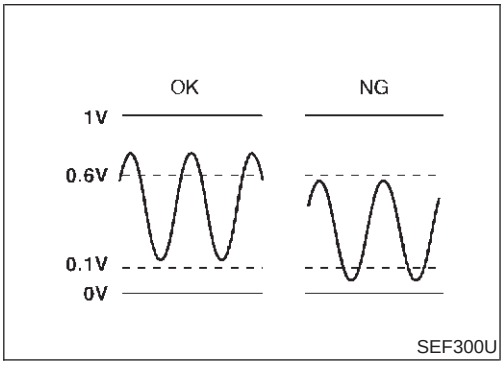


CONSULT-II Reference Value in Data Monitor Mode

NHEC1148

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



On Board Diagnosis Logic

NHEC1150

To judge the malfunction, the output from the heated oxygen sensor 1 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.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1143 1143 (Bank 1) P1163 1163 (Bank 2)	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Injectors • Intake air leaks

DTC Confirmation Procedure

NHEC1151

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 10 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.**

Ⓔ WITH CONSULT-II

NHEC1151S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P1143/P1163" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:

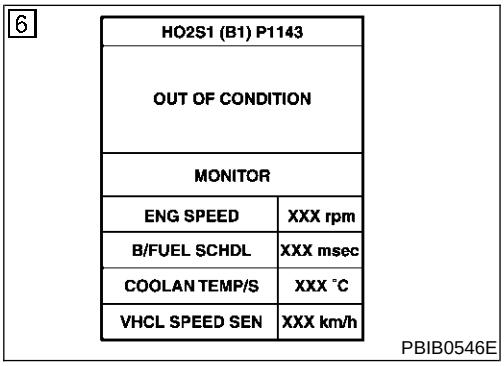
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

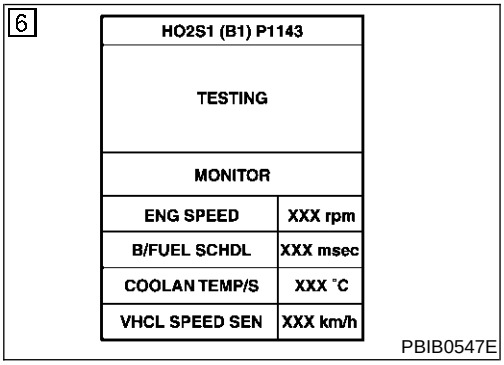
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

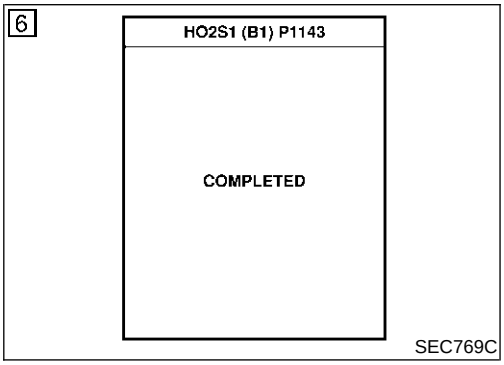
ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3 - 9 msec
Selector lever	Suitable position

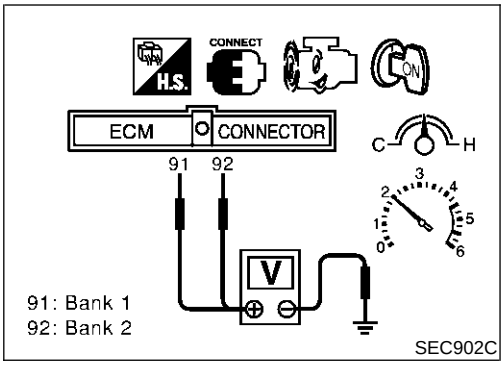
If "TESTING" is not displayed after 5 minutes, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-474.









Overall Function Check

NHEC1152

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

WITH GST

NHEC1152S01

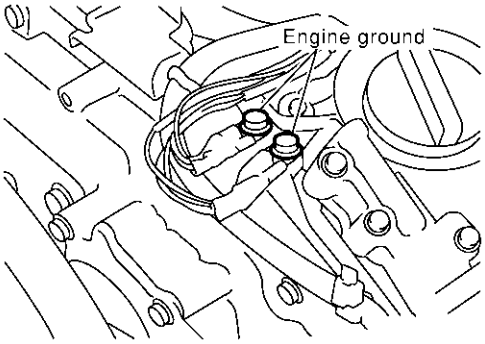
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 91 (bank 1 HO2S1 signal) or 92 (bank 2 HO2S1 signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is over 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-474.

Diagnostic Procedure

NHEC1153

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque:

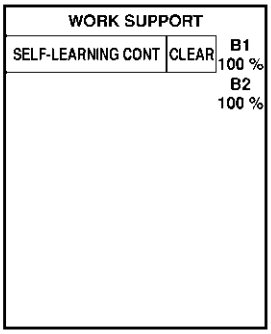
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	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".



SEF968Y

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?

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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-89.
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?

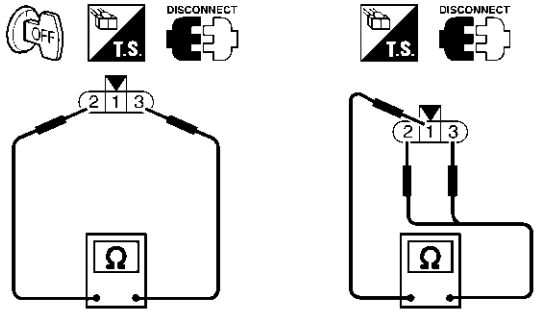
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-267.
No	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Stop engine.
2. Disconnect HO2S1 harness connector.
3. Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

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.

5	CHECK HEATED OXYGEN SENSOR 1

Ⓕ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 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				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

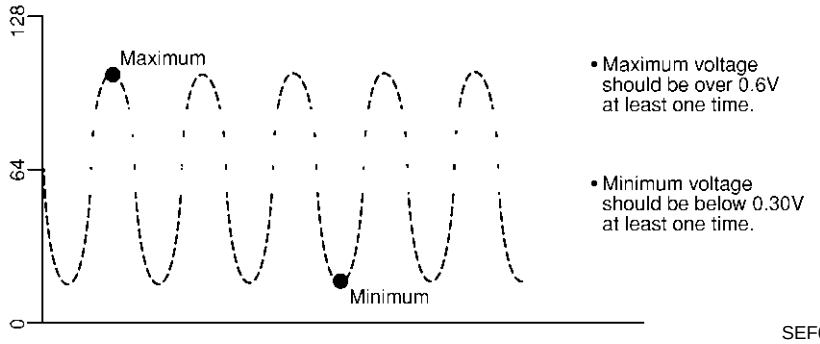
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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.

Diagnostic Procedure (Cont'd)

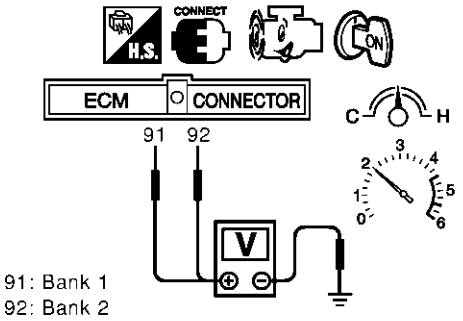
6	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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



SEC085D

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.**

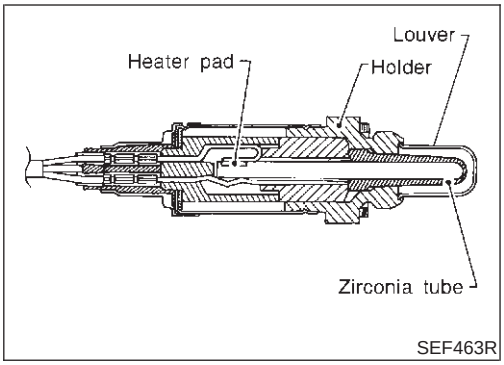
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.
For circuit, refer to "Wiring Diagram", EC-232.

▶ **INSPECTION END**

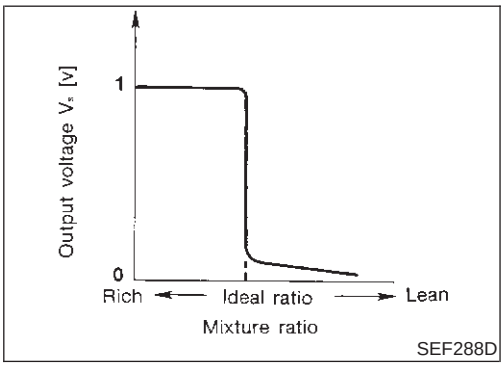


SEF463R

Component Description

NHEC1154

The heated oxygen sensor 1 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 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 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.



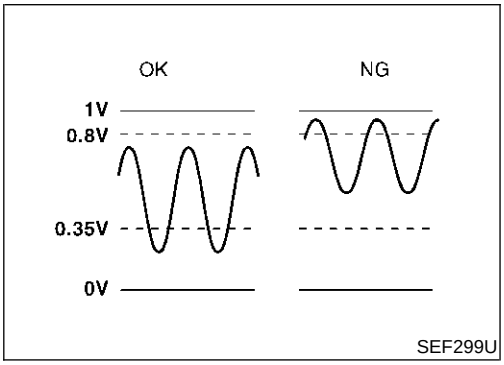
SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NHEC1155

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.



SEF299U

On Board Diagnosis Logic

NHEC1157

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

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1144 1144 (Bank 1) P1164 1164 (Bank 2)	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 • Fuel pressure • Injectors • Heated oxygen sensor 1 heater

DTC Confirmation Procedure

NHEC1158

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 10 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

NHEC1158S01

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) P1144/P1164" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:

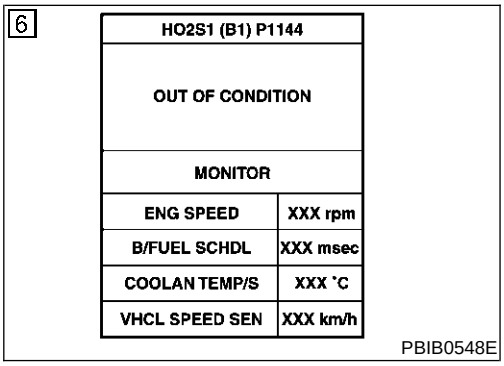
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

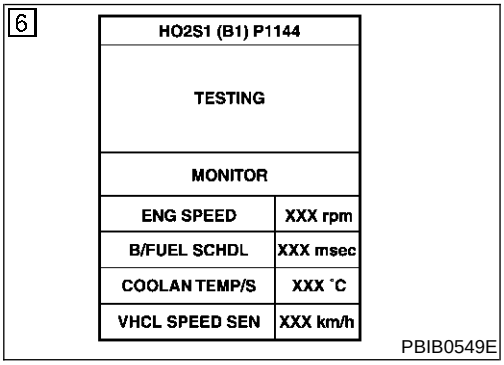
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

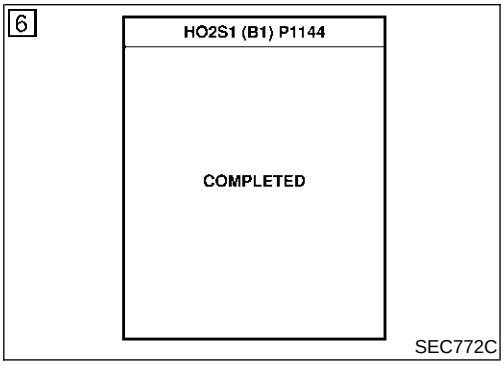
ENG SPEED	1,200 - 2,600 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3 - 9 msec
Selector lever	Suitable position

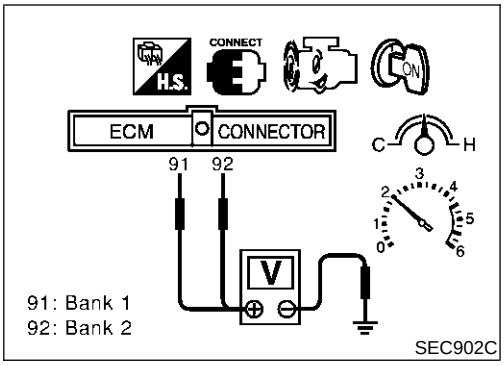
If "TESTING" is not displayed after 5 minutes, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-481.









Overall Function Check

NHEC1159

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

WITH GST

NHEC1159S01

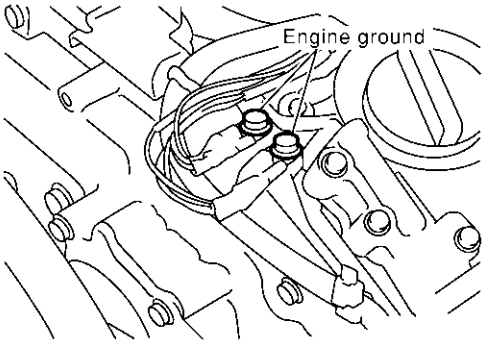
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 bank 2 signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 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-481.

Diagnostic Procedure

NHEC1160

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

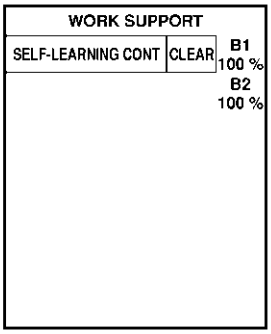
▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	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".



SEF968Y

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?

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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-89.
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-275.
No	▶	GO TO 4.

4	CHECK HO2S 1 CONNECTOR FOR WATER

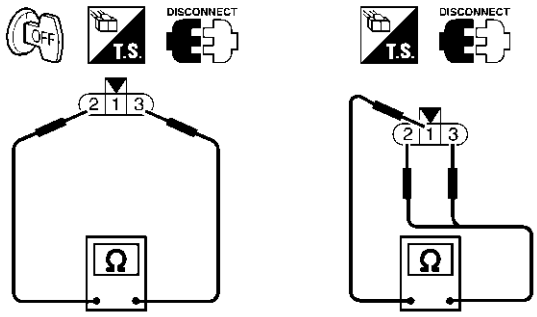
1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 1 and 3	∞Ω (Continuity should not exist.)

SEF310X

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 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK HEATED OXYGEN SENSOR 1

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
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
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 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				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L				

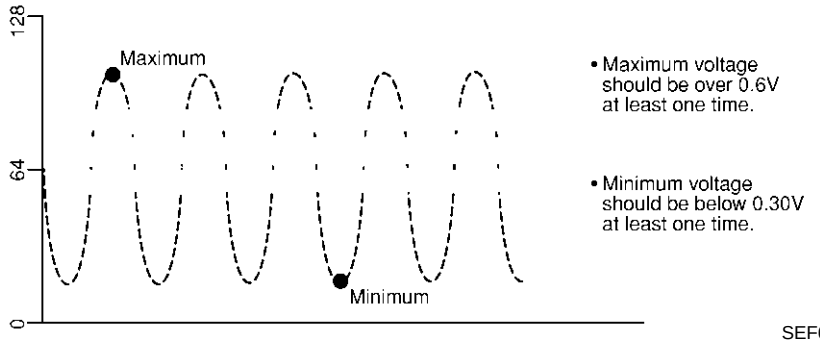
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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



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	▶	Replace malfunctioning heated oxygen sensor 1.

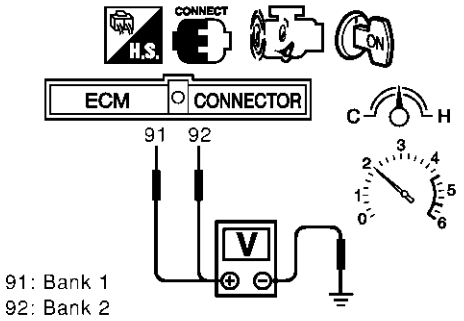
7	CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 91 (HO2S1 bank 1 signal) or 92 (HO2S1 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.
- 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.

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



SEC085D

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.**

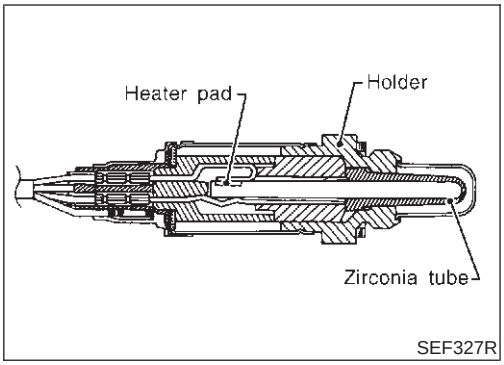
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.
For circuit, refer to "Wiring Diagram", EC-232.

▶ **INSPECTION END**



Component Description

NHEC1161

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

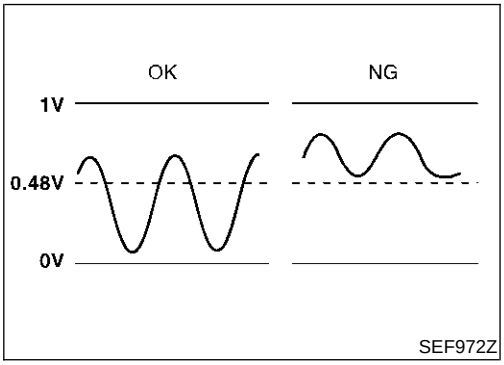
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1162

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Warm-up condition • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

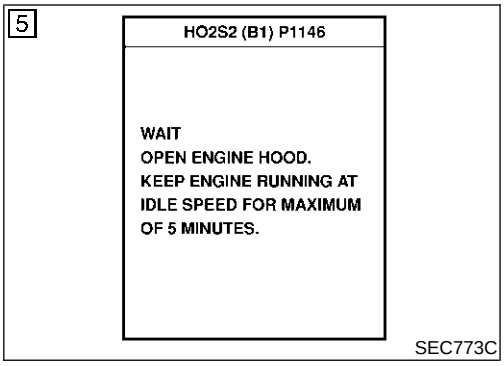


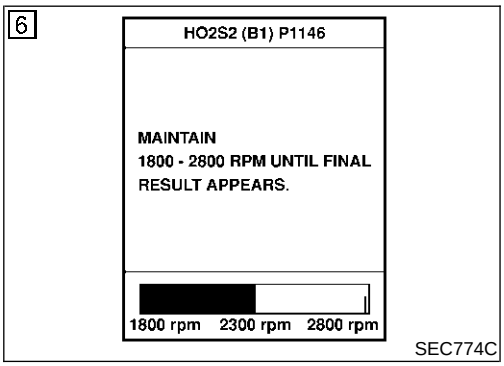
On Board Diagnosis Logic

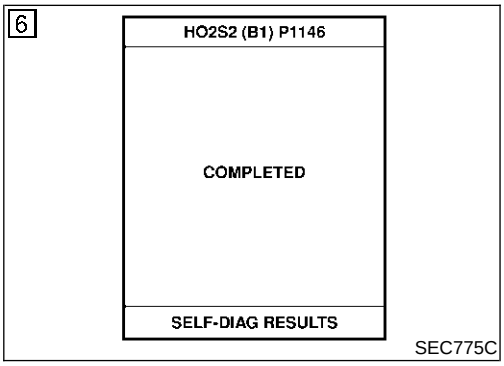
NHEC1164

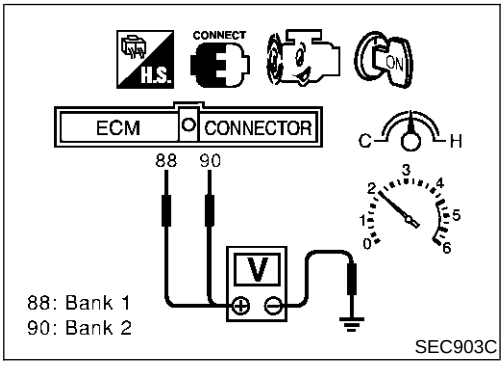
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1146 1146 (Bank 1) P1166 1166 (Bank 2)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Injectors









DTC Confirmation Procedure

NHEC1165

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:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

Ⓕ WITH CONSULT-II

NHEC1165S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Select "HO2S2 (B1) P1146" or "HO2S2 (B2) P1166" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-491, "Diagnostic Procedure".
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
b) Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
d) When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NHEC1166

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

GST WITH GST

NHEC1166S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6) 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 6, step 7 is not necessary.
7) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH)

in "D" position with "OD" OFF.
The voltage should be below 0.48V at least once during this procedure.

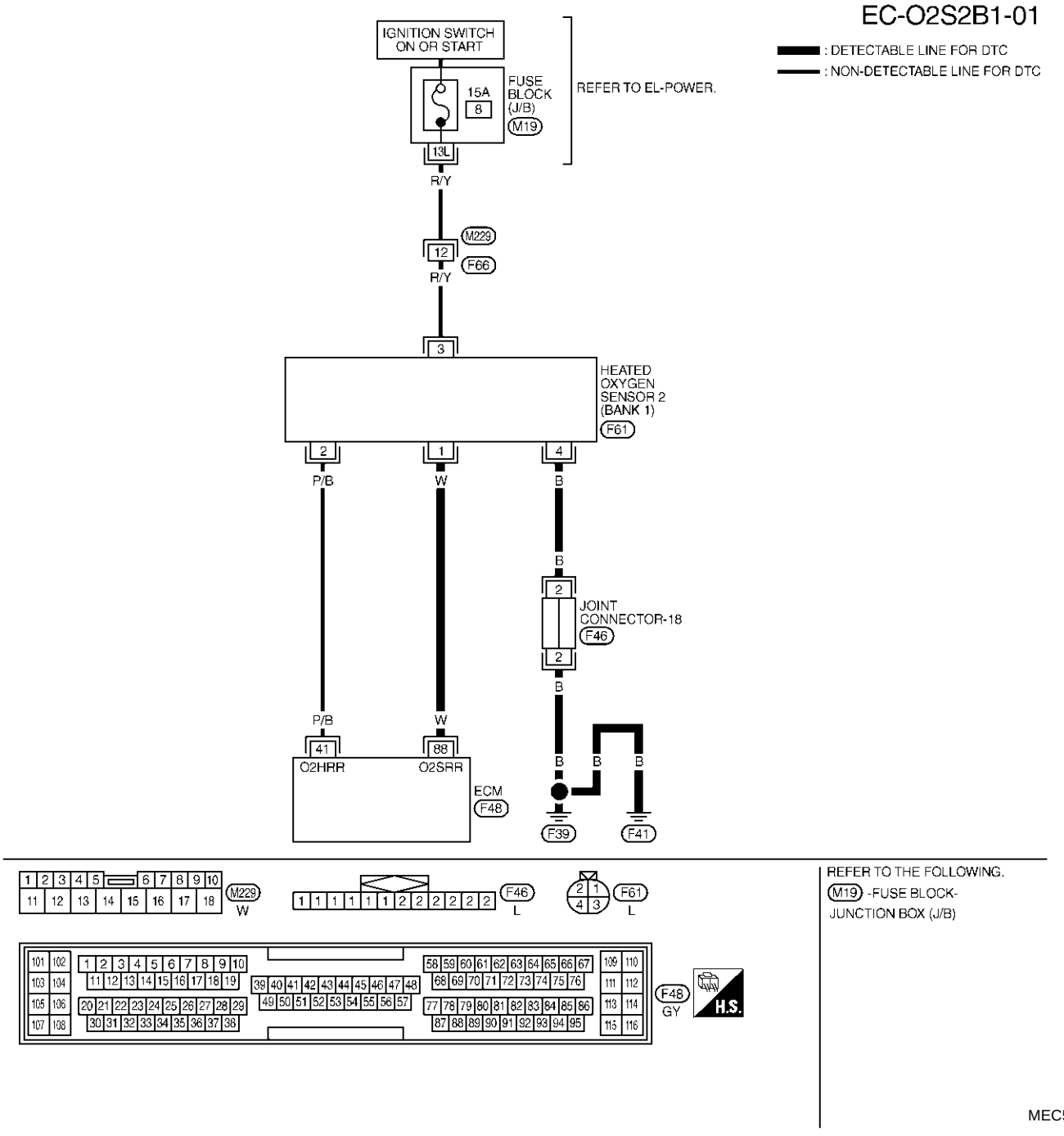
8) If NG, go to "Diagnostic Procedure", EC-491.

Wiring Diagram

=NHEC1167

BANK 1

NHEC1167S01



MEC541D

ECM TERMINALS AND REFERENCE VALUE 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.

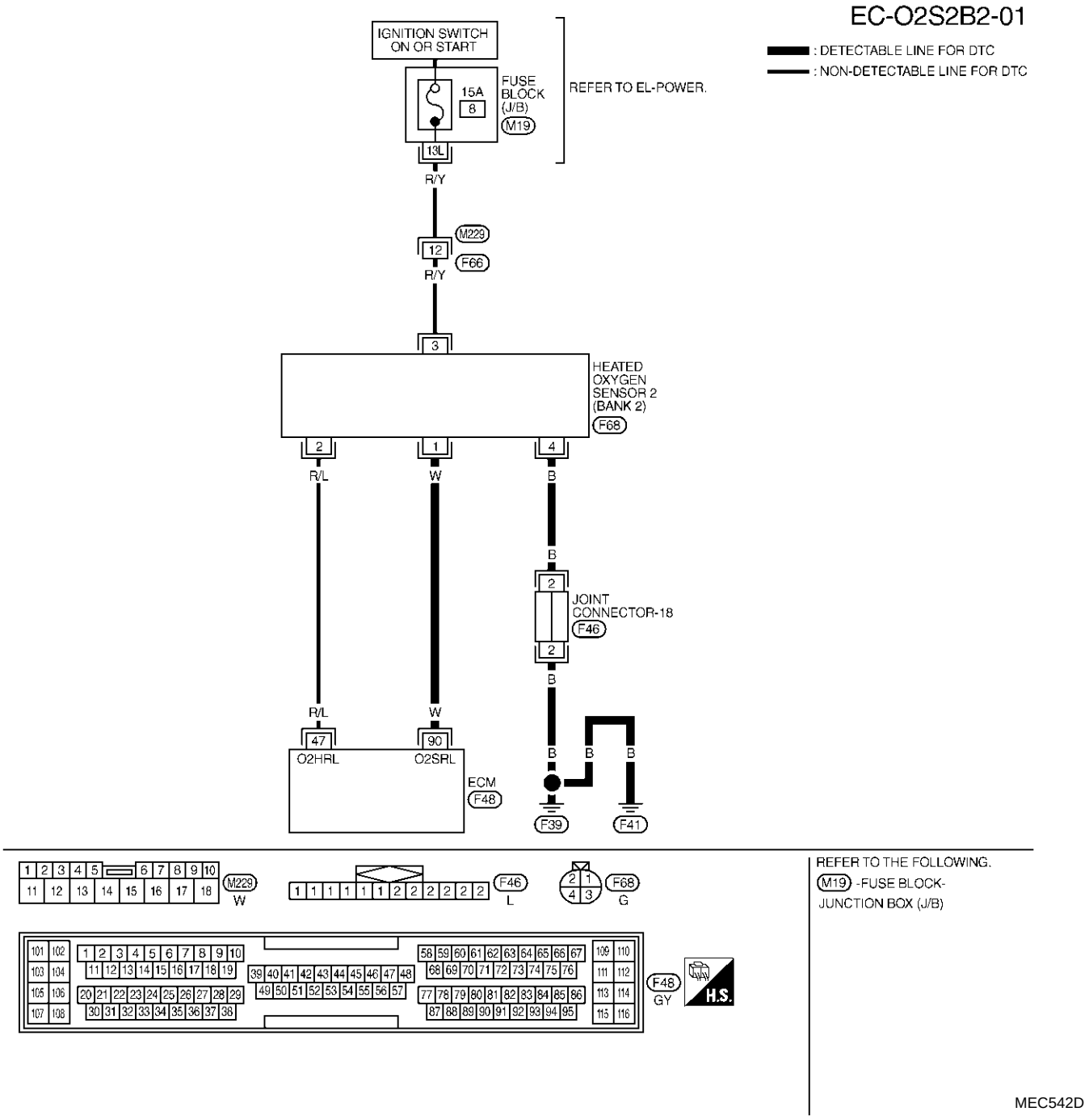
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
88	W	HEATED OXYGEN SENSOR 2 (BANK 1)	**[ENGINE IS RUNNING]** **• WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

SEC661DC

Wiring Diagram (Cont'd)

BANK 2

NHEC1167S02



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
90	W	HEATED OXYGEN SENSOR 2 (BANK 2)	**[ENGINE IS RUNNING]** • **WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

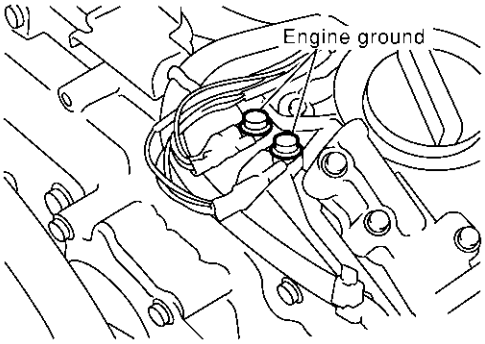
SEC662DC

Diagnostic Procedure

NHEC1168

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



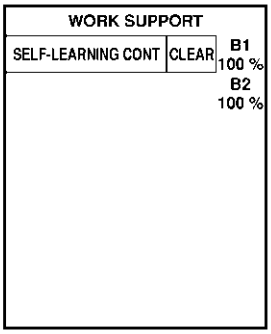
SEC047D

▶	GO TO 2.

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”.



SEF968Y

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?

Ⓚ **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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-89.
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?

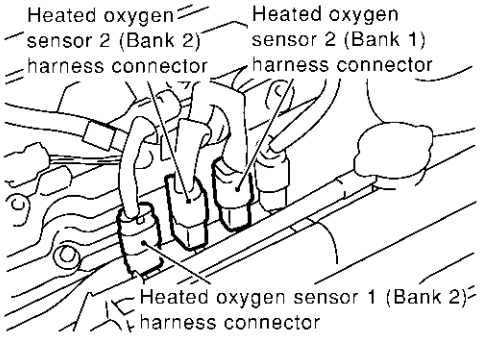
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-275.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect corresponding heated oxygen sensor 2 harness connector.



SEC134D

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	88	1	Bank 1
P1166	90	1	Bank 2

MTBL1161

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1146	88 or 1	Ground	Bank 1
P1166	90 or 1	Ground	Bank 2

MTBL1162

Continuity should not exist.

6. 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.

4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 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.

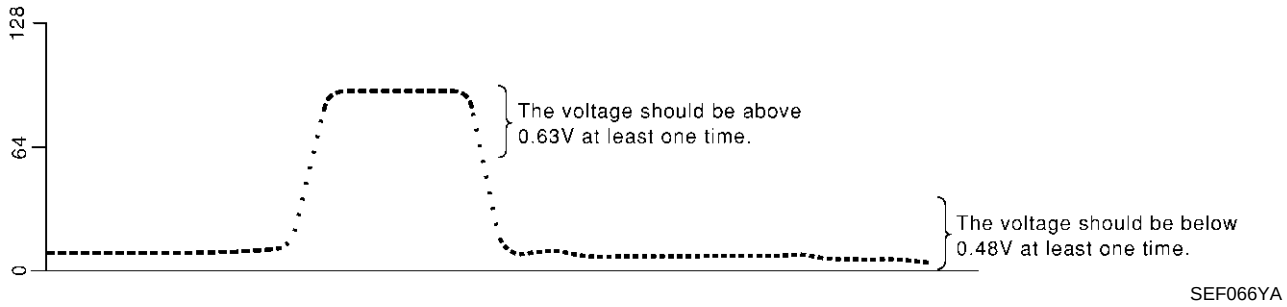
5	DETECT MALFUNCTIONING PART
Check the following. ● Joint connectors-18 ● Harness for open or short between heated oxygen sensor 2 and ground	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066YA

"HO2S2 (B1)/(B2)" should be above 0.63V 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.**
- **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.**

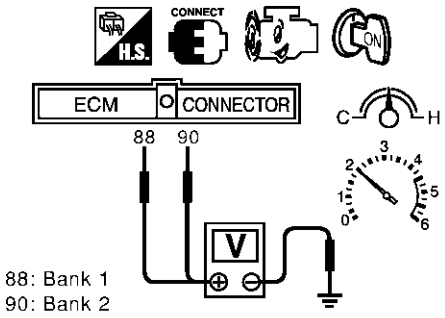
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6. Check the voltage when rewing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



SEC903C

The voltage should be above 0.63V at least once during this procedure.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK HEATED OXYGEN SENSOR 2-II

Without CONSULT-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 7; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go 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.**
- **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.**

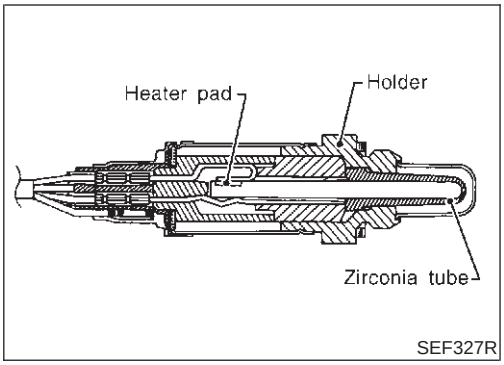
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

▶ **INSPECTION END**



Component Description

NHEC1169

The heated oxygen sensor 2, 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 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

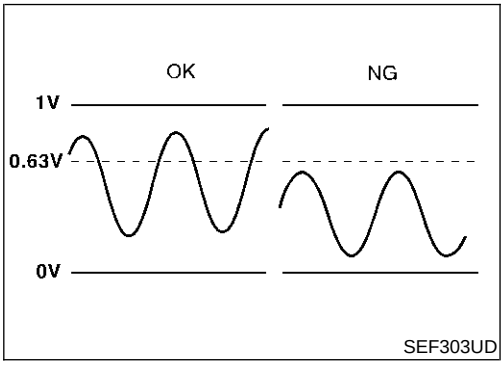
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1170

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Warm-up condition • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under lo load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

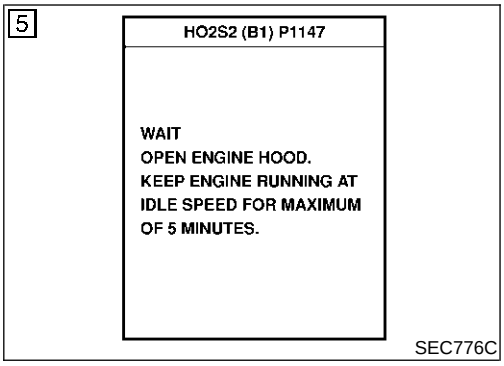


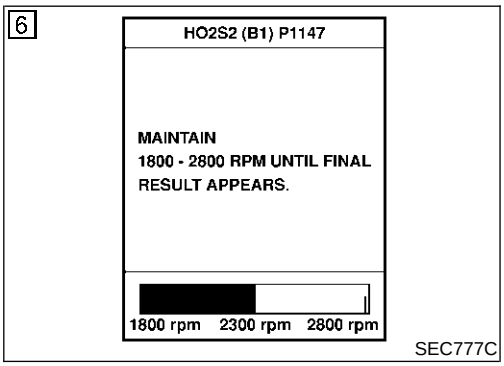
On Board Diagnosis Logic

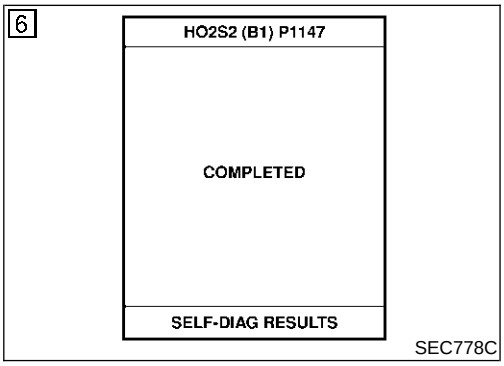
NHEC1172

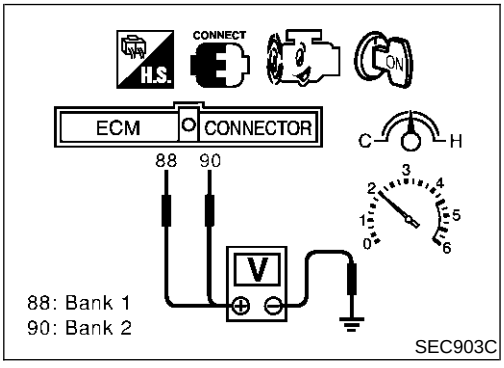
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1147 1147 (Bank 1) P1167 1167 (Bank 2)	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Injectors • Intake air leaks









DTC Confirmation Procedure

NHEC1173

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:

- **Open engine hood before conducting following procedure.**
- **For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).**

WITH CONSULT-II

NHEC1173S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Select "HO2S2 (B1) P1147" or "HO2S2 (B2) P1167" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Start engine and follow the instruction of CONSULT-II.
7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to EC-500, "Diagnostic Procedure".
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
b) Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c) Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
d) When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

Overall Function Check

NHEC1174

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

WITH GST

NHEC1174S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S2 bank 2 signal) and engine ground.
6) 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 0.63V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
7) Keep vehicle at idling for 10 minutes, then check the voltage.
   Or check the voltage when coasting from 80 km/h (50 MPH)

in "D" position with "OD" OFF.
The voltage should be above 0.63V at least once during this procedure.

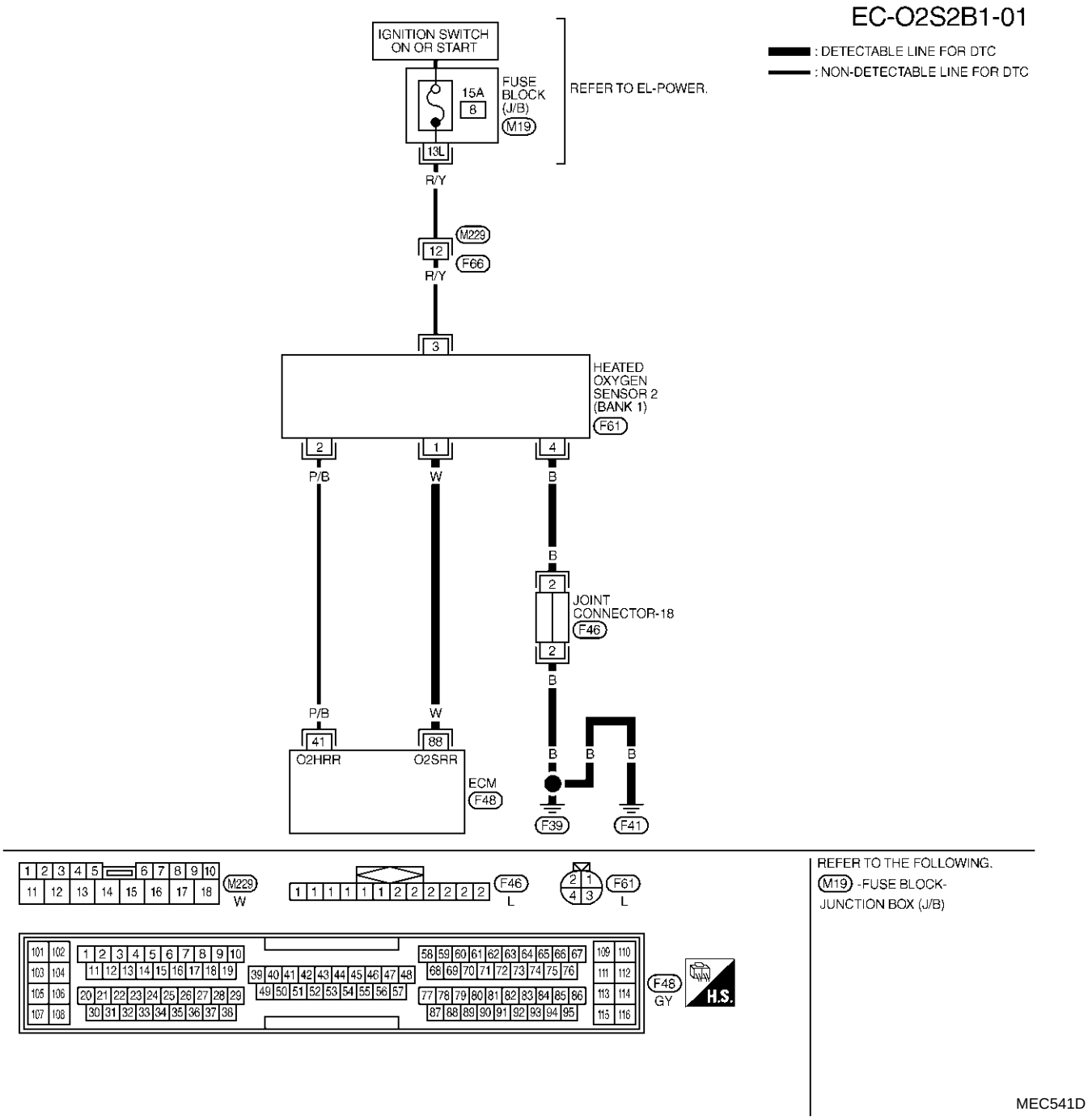
8) If NG, go to "Diagnostic Procedure", EC-500.

Wiring Diagram

=NHEC1175

BANK 1

NHEC1175S01



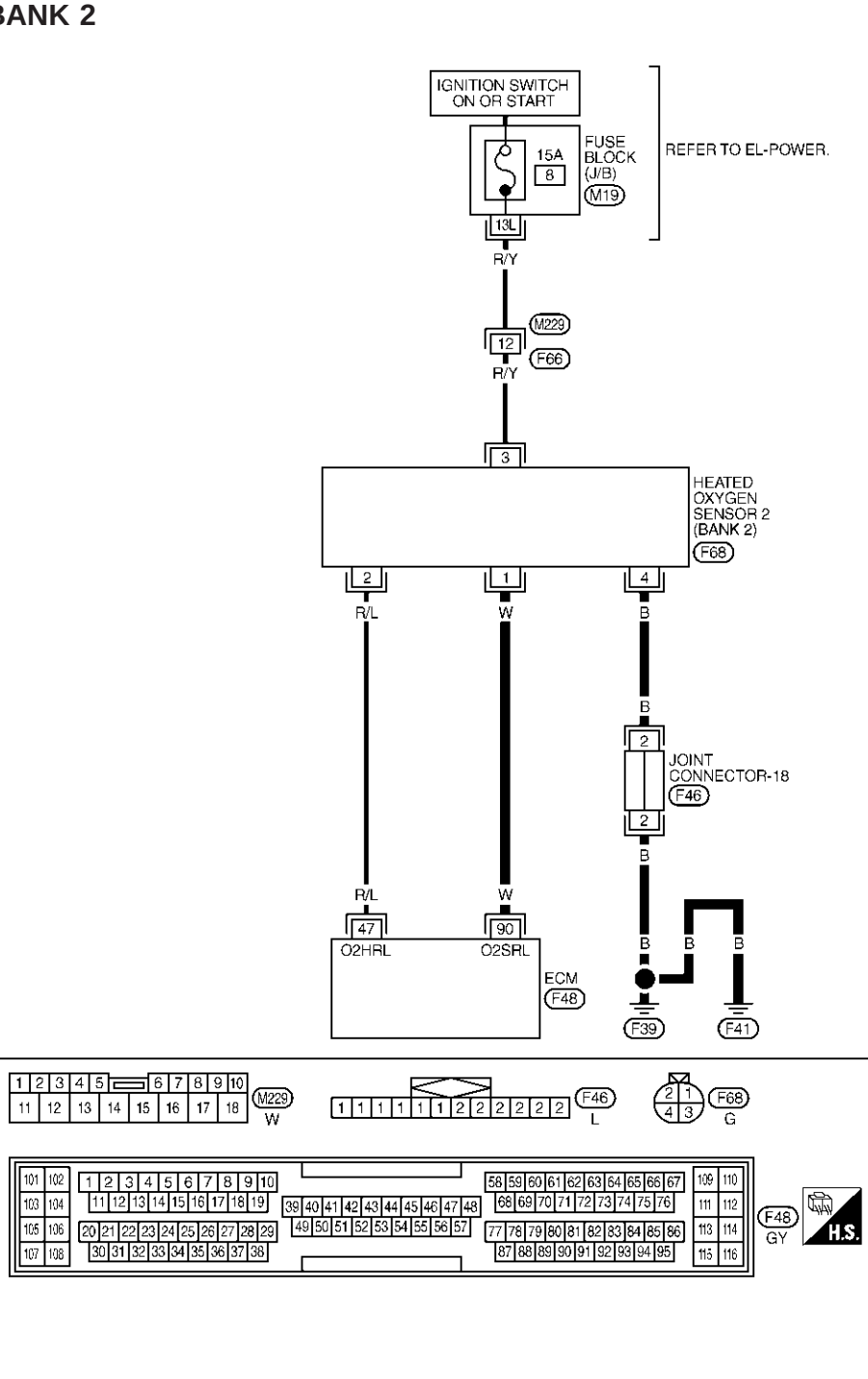
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
88	W	HEATED OXYGEN SENSOR 2 (BANK 1)	**[ENGINE IS RUNNING]** **• WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

SEC661DC

BANK 2

NHEC1175S02



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
90	W	HEATED OXYGEN SENSOR 2 (BANK 2)	**[ENGINE IS RUNNING]** • **WARM-UP CONDITION** • REVVING ENGINE FROM IDLE UP TO 3,000 RPM QUICKLY AFTER THE FOLLOWING CONDITIONS ARE MET. • AFTER KEEPING ENGINE SPEED BETWEEN 3,500 AND 4,000 RPM FOR 1 MINUTE AND AT IDLE FOR 1 MINUTE UNDER NO LOAD	0 - APPROX. 1.0V

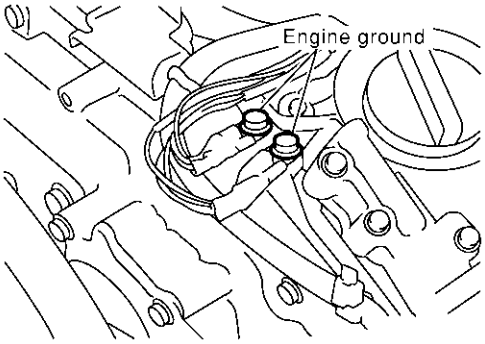
SEC662DC

Diagnostic Procedure

NHEC1176

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



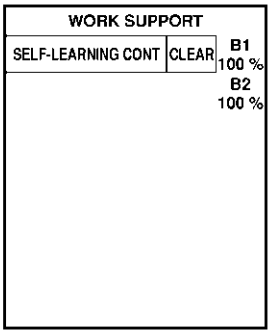
SEC047D

	▶	GO TO 2.

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”.



SEF968Y

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?

Ⓚ **Without CONSULT-II**

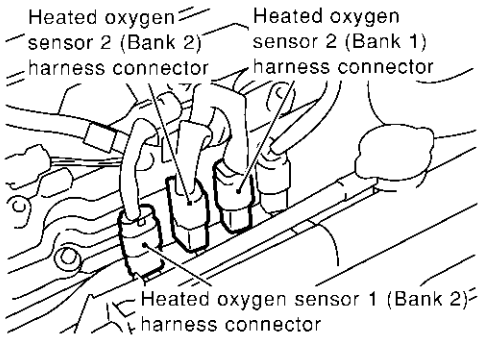
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-89.
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?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-267.
No	▶	GO TO 3.

3	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect corresponding heated oxygen sensor 2 harness connector.



SEC134D

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	88	1	Bank 1
P1167	90	1	Bank 2

MTBL1163

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1147	88 or 1	Ground	Bank 1
P1167	90 or 1	Ground	Bank 2

MTBL1164

Continuity should not exist.

6. 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.

4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 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.

Diagnostic Procedure (Cont'd)

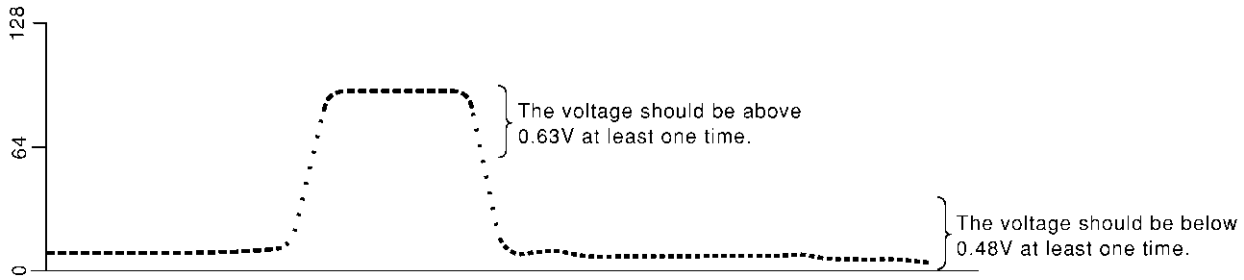
5	DETECT MALFUNCTIONING PART
Check the following. ● Joint connectors-18 ● Harness for open or short between heated oxygen sensor 2 and ground	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2

Ⓔ **With CONSULT-II**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
6. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF066YA

"HO2S2 (B1)/(B2)" should be above 0.63V 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.**
- **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.**

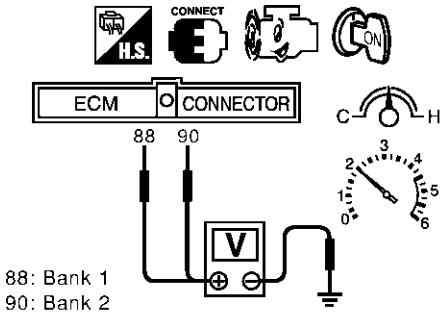
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "ON" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 88 (HO2S2 bank 1 signal) or 90 (HO2S bank 2 signal) and engine ground.
6. 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.)



SEC903C

The voltage should be above 0.63V at least once during this procedure.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK HEATED OXYGEN SENSOR 2-II

Without CONSULT-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 7; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

The voltage should go 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.**
- **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	▶	Replace malfunctioning heated oxygen sensor 2.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC1064

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1148 1148 (Bank 1) P1168 1168 (Bank 2)	Closed loop control	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition, the closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	• The heated oxygen sensor 1 circuit is open or shorted. • Heated oxygen sensor 1 • Heated oxygen sensor 1 heater

DTC Confirmation Procedure

NHEC1065

CAUTION:

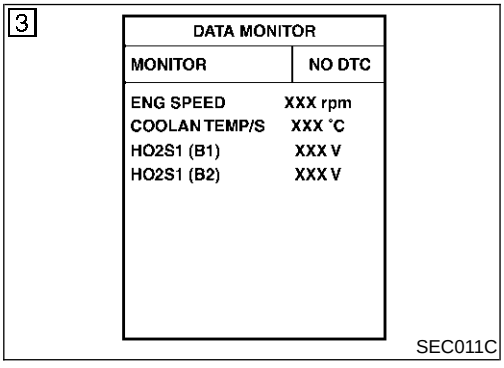
Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,600 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.**



Ⓔ WITH CONSULT-II

NHEC1065S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4) Let engine idle for one minute.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) 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.

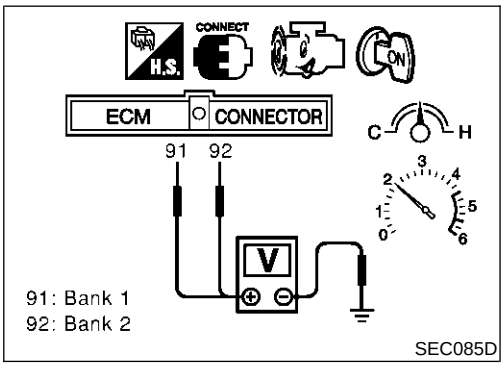
If the check result is NG, perform “Diagnosis Procedure”, EC-505.
If the check result is OK, perform the following step.

7) Let engine idle at least 5 minutes.
8) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.0 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, P0134 and/or P0154 may be displayed on CONSULT-II screen.

9) If DTC is detected, go to "Diagnostic Procedure", EC-505.



Overall Function Check

NHEC1066

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

NHEC1066S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeter probes between ECM terminal 91 [Heated oxygen sensor 1 bank 1 signal] or 92 [Heated oxygen sensor 1 bank 2 signal] and engine ground.
6) 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.

7) If NG, go to "Diagnostic Procedure", EC-505.

Diagnostic Procedure

NHEC1067

Perform trouble diagnosis for "DTC P0133, P0153", EC-229.

Description

NHEC1521

The malfunction information related to ABS/TCS or VDC/TCS/ABS is transferred through the CAN communication line from ABS/TCS control unit or VDC/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ABS/TCS control unit or VDC/TCS/ABS control unit but also for ECM after the ABS/TCS or VDC/TCS/ABS related repair.

On Board Diagnosis Logic

NHEC1522

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

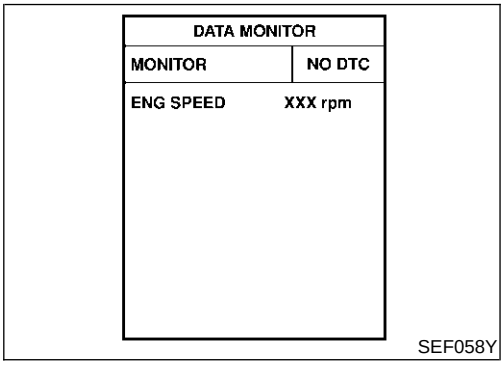
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	VDC/TCS/ABS control unit performance	ECM receives a malfunction information from ABS/TCS control unit or VDC/TCS/ABS control unit.	• ABS/TCS control unit • VDC/TCS/ABS control unit • TCS related parts • VDC related parts

DTC Confirmation Procedure

NHEC1523

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 let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-507.

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

NHEC1524

Go to BR-53 (With ABS/TCS models) or BR-101 (With VDC/TCS/ABS models), “TROUBLE DIAGNOSIS — INTRODUCTION”.

Description

NHEC1525

NOTE:
If DTC P1212 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to "DTC U1000, U1001 CAN COMMUNICATION LINE", EC-159.

This CAN communication line is used to control the smooth engine operation during the VDC, ABS or TCS operation. Pulse signals are exchanged between ECM and ABS/TCS control unit or VDC/TCS/ABS control unit.

Be sure to erase the malfunction information such as DTC not only in ABS/TCS control unit or VDC/TCS/ABS control unit but also ECM after the ABS/TCS or VDC/TCS/ABS related repair.

On Board Diagnosis Logic

NHEC1526

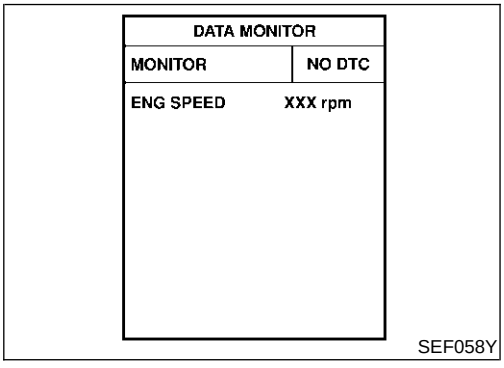
Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	VDC/TCS/ABS communication line	ECM cannot receive the information from ABS/TCS control unit or VDC/TCS/ABS control unit continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS/TCS control unit • VDC/TCS/ABS control unit • Dead (Weak) battery

DTC Confirmation Procedure

NHEC1527

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 let it idle for at least 10 seconds.
4. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-509.

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NHEC1528

1	CHECK ABS/TCS CONTROL UNIT OR VDC/TCS/ABS CONTROL UNIT FUNCTION
Refer to “TROUBLE DIAGNOSIS — INTRODUCTION”, BR-53 (With ABS/TCS models) or BR-101 (With VDC/TCS/ABS models).	
▶	**INSPECTION END**

System Description

NHEC1320

COOLING FAN CONTROL

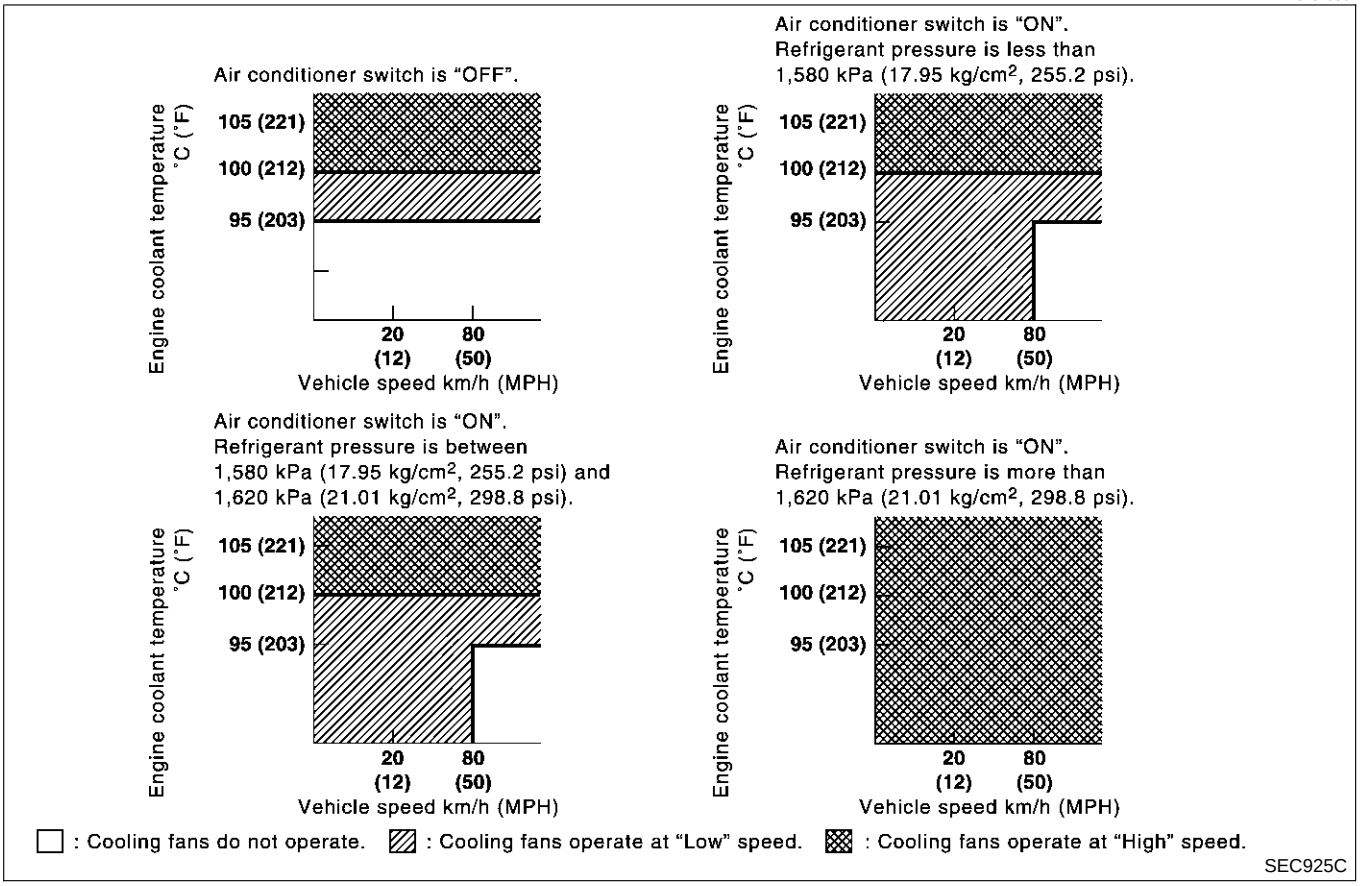
NHEC1320S01

Sensor	Input Signal to ECM	ECM function	Actuator
Wheel sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Refrigerant pressure sensor	Refrigerant pressure		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION

NHEC1320S02



SEC925C

CONSULT-II Reference Value in Data Monitor Mode

NHEC1321

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON

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

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	• After warming up engine, idle the engine. • 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 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

NHEC1454

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.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1217 1217	Engine over temperature	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant level is not within the specified range.	• 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-527.

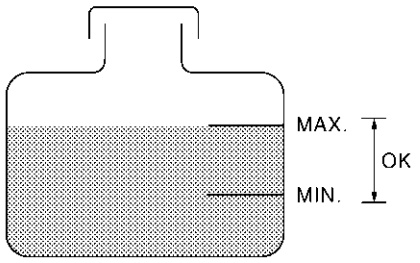
CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA-14, "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. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-freeze Coolant Mixture Ratio".

2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

1



SEF621W

4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

Overall Function Check

NHEC1324

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

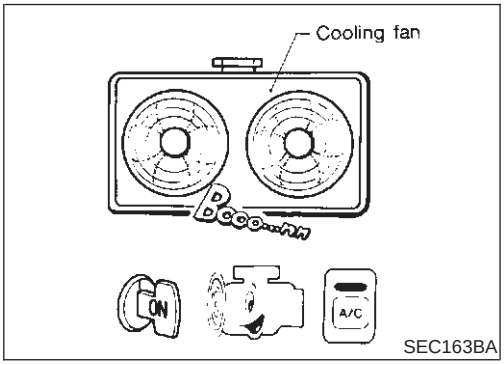
WARNING:

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.

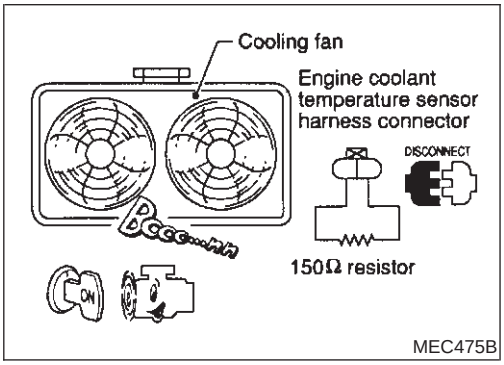
WITH CONSULT-II

NHEC1324S01

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-516.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-516.
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5) If the results are NG, go to “Diagnostic Procedure”, EC-516.



SEC163BA



MEC475B

WITH GST

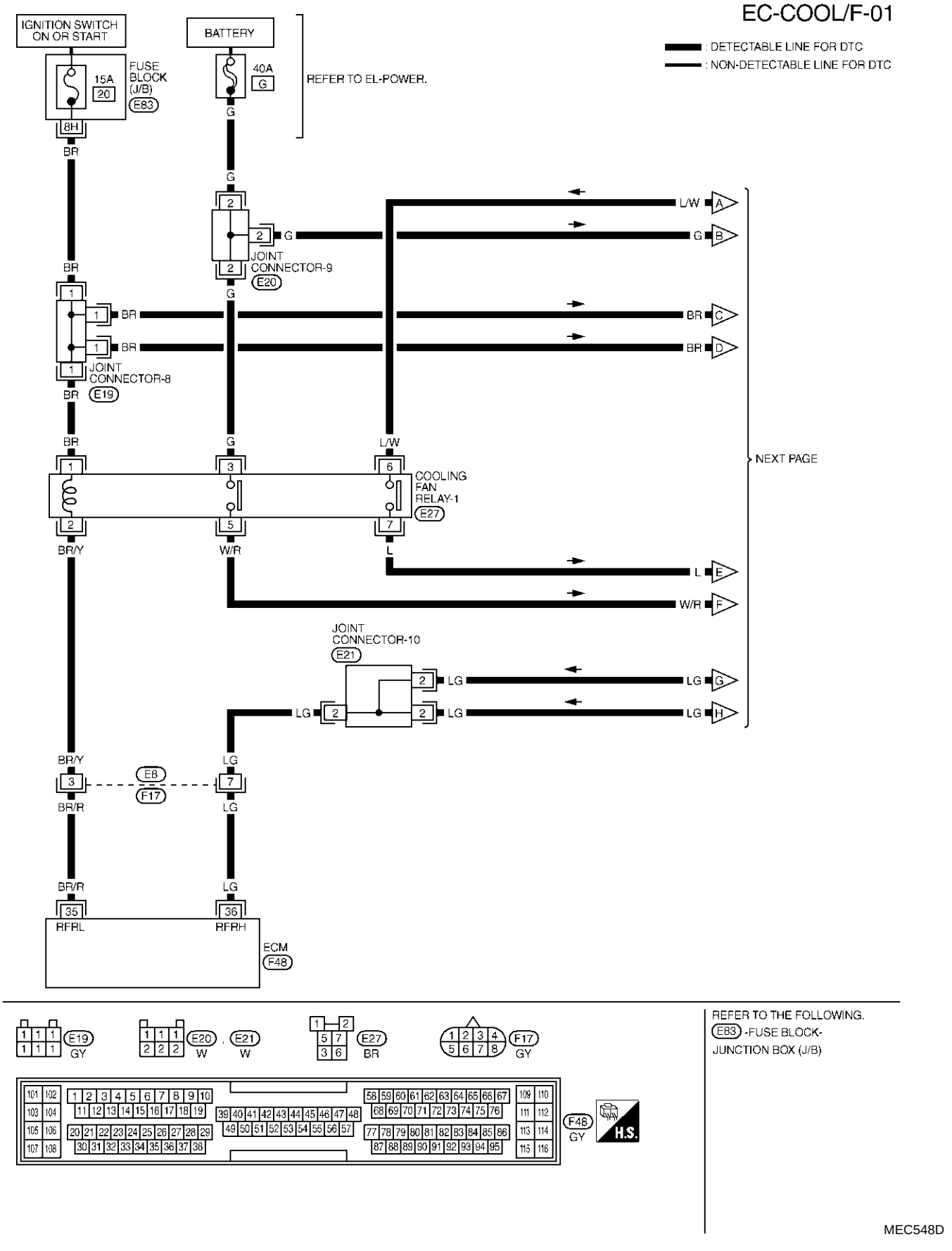
NHEC1324S03

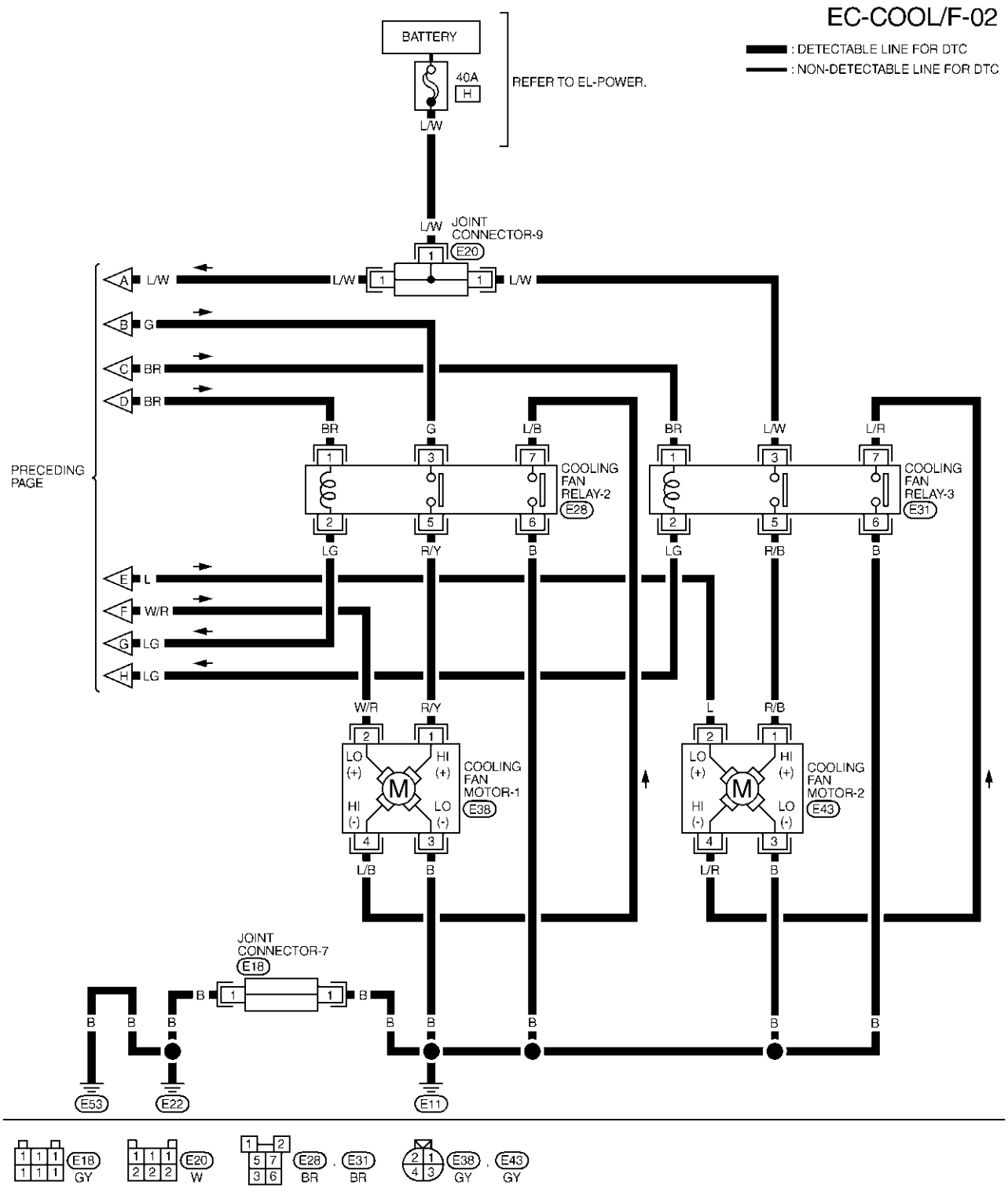
1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure”, EC-516.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-516.
3) Start engine.
Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch “ON”.
6) Turn blower fan switch “ON”.
7) Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
If NG, go to “Diagnostic Procedure”, EC-516.
If OK, go to the following step.
9) Turn ignition switch “OFF”.
10) Turn air conditioner switch and blower fan switch “OFF”.

11) Disconnect engine coolant temperature sensor harness connector.
12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.
14) If NG, go to "Diagnostic Procedure", EC-516.

Wiring Diagram

NHEC1325




EC-COOL/F-02
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
BATTERY
40A
H
REFER TO EL-POWER.
L/W
JOINT CONNECTOR-9
E20
PRECEDING PAGE
COOLING FAN RELAY-2
E28
COOLING FAN RELAY-3
E31
COOLING FAN MOTOR-1
E38
COOLING FAN MOTOR-2
E43
JOINT CONNECTOR-7
E18
E53
E22
E11
E18 GY
E20 W
E28 BR
E31 BR
E38 GY
E43 GY

MEC549D

Wiring Diagram (Cont'd)

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
36	LG	COOLING FAN RELAY (HIGH)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT HIGH SPEED	0 - 1.0V
35	BR/R	COOLING FAN RELAY (LOW)	ENGINE RUNNING WITH COOLING FAN NOT OPERATING	BATTERY VOLTAGE
			ENGINE RUNNING WITH COOLING FAN OPERATING AT LOW SPEED	0 - 1.0V

SEF630XC

Diagnostic Procedure

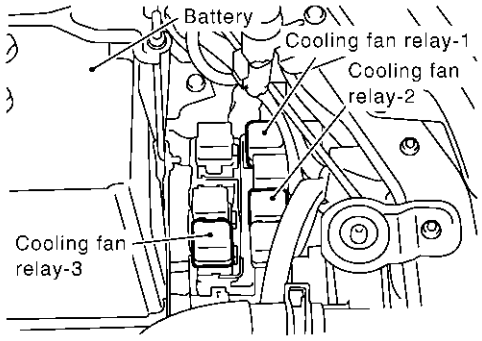
NHEC1326

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	

Ⓕ **With CONSULT-II**

1. Disconnect cooling fan relays-2 and -3.



SEC006C

2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF646X

4. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-522.)

3	CHECK COOLING FAN HIGH SPEED OPERATION	
Ⓕ **With CONSULT-II** 1. Turn ignition switch "OFF". 2. Reconnect cooling fan relays-2 and -3. 3. Turn ignition switch "ON". 4. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.		

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

5. Make sure that cooling fans-1 and -2 operate at high speed.

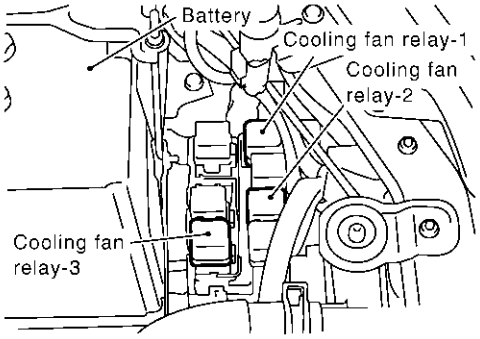
OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-525.)

4	CHECK COOLING FAN LOW SPEED OPERATION

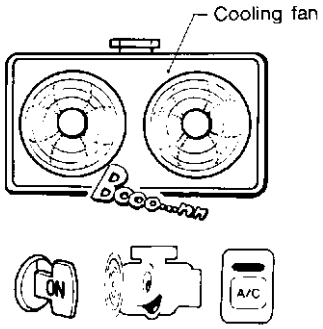
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



SEC006C

2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch "ON".
5. Turn blower fan switch "ON".
6. Make sure that cooling fans-1 and -2 operate at low speed.



SEC163BA

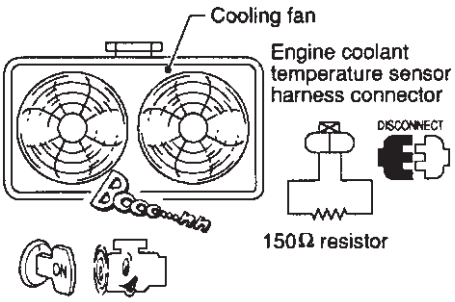
OK or NG

OK	▶	GO TO 5.
NG	▶	Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-522.)

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Turn air conditioner switch and blower fan switch "OFF".
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operate at high speed.



MEC475B

OK or NG

OK	▶	GO TO 6.
NG	▶	Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-525.)

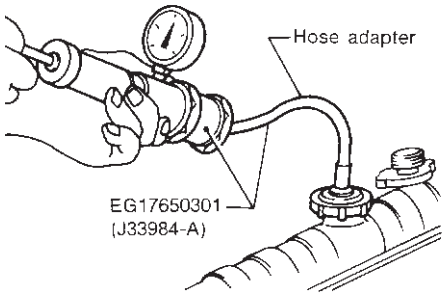
6	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.



SLC754A

Pressure should not drop.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following for leak.

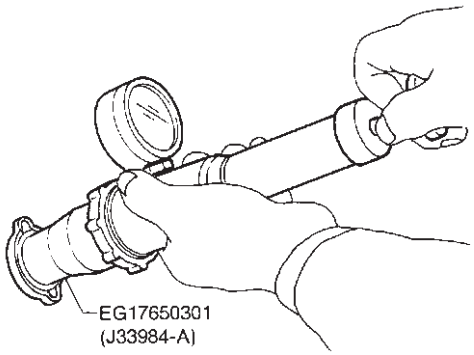
- Hose
- Radiator
- Water pump (Refer to LC-14, "Water Pump".)

	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

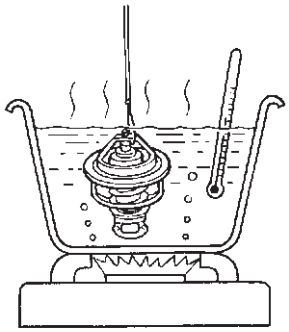
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace radiator cap.

9	CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
82°C (180°F) [standard]
Valve lift:
More than 8.6 mm/95°C (0.339 in/203°F)

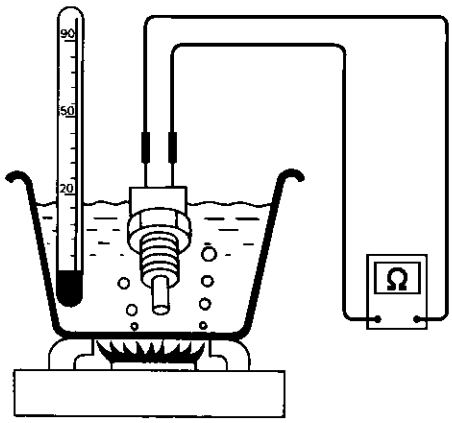
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-18, "Thermostat".

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace thermostat.

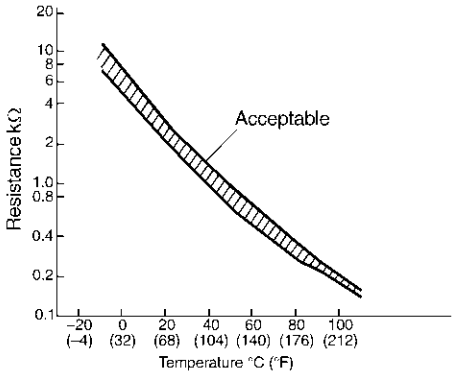
10	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace engine coolant temperature sensor.

11	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-527.	
▶	**INSPECTION END**

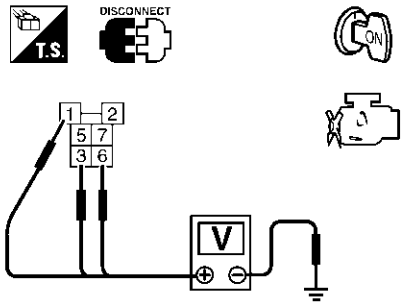
Diagnostic Procedure (Cont'd)

PROCEDURE A

=NHEC1326S01

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF590X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

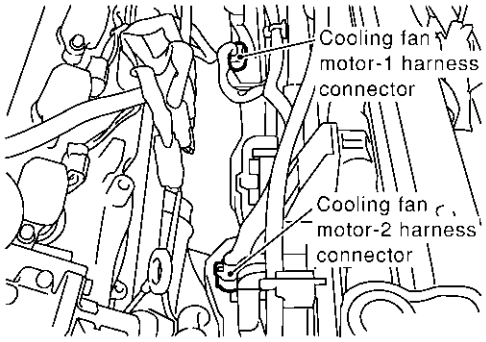
2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- 15A fuse
- 40A fusible links
- 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.

3	CHECK COOLING FAN MOTORS CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



SEC057D

3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 2, cooling fan motor-1 terminal 3 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 3 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
6. Also check harness for short to ground and 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.

4	CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 35 and cooling fan relay-1 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 6.
NG	▶	GO TO 5.

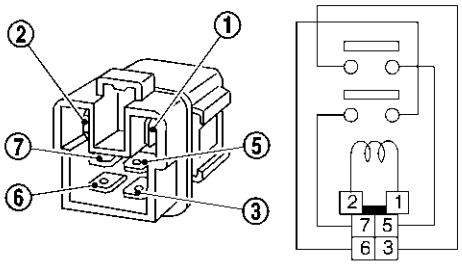
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F17
- 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.

6	CHECK COOLING FAN RELAY-1

Check continuity between cooling fan relay-1 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

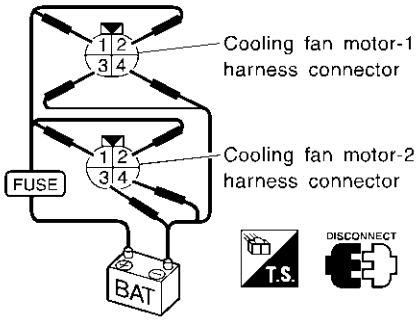
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relay.

7	CHECK COOLING FAN MOTORS-1 AND -2

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals (+)	Terminals (–)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

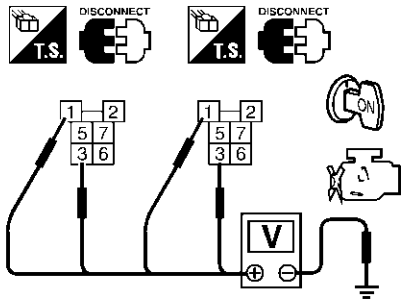
▶ **INSPECTION END**

PROCEDURE B

NHEC1326S02

1	CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF593X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-8
- Joint connector-9
- Harness for open or short between cooling fan relays-2 and -3 and joint connectors-8, -9

	▶	Repair harness or connectors.

3	CHECK COOLING FAN CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 1, cooling fan relay-2 terminal 7 and cooling fan motor-1 terminal 4, cooling fan relay-2 terminal 6 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 1, cooling fan relay-3 terminal 7 and cooling fan motor-2 terminal 4, cooling fan relay-3 terminal 6 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
6. Also check harness for short to ground and 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.

4	CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 36 and cooling fan relay-2 terminal 2, cooling fan relay-3 terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

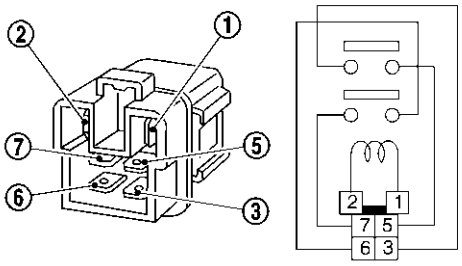
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E8, E17 ● Joint connector-10 ● Harness for open or short between cooling fan relays-2 and -3 and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK COOLING FAN RELAYS-2 AND -3

Check continuity between cooling fan relay-2, -3 terminals 3 and 5, 6 and 7 under the following conditions.



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

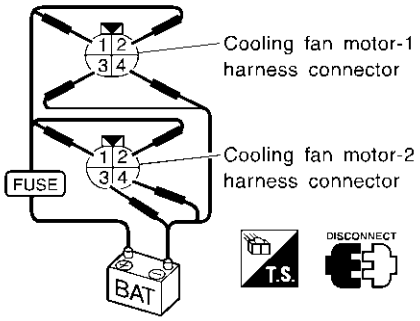
SEF591X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTORS

Supply battery voltage between the following terminals and check operation.



	Speed	Terminals (+)	Terminals (–)
Cooling fan motor-1	Low	2	3
	High	1 , 2	3 , 4
Cooling fan motor-2	Low	2	3
	High	1 , 2	3 , 4

SEF592X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motors.

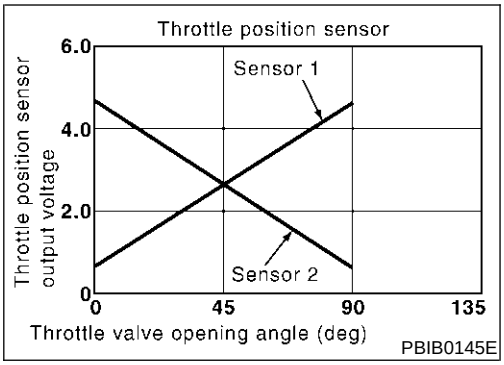
8	CHECK INTERMITTENT INCIDENT
1. Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NHEC1327

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See MA-11, “RECOMMENDED FLUIDS AND LUBRICANTS”.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-14, “Changing Engine Coolant”.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See LC-12, “System Check”.
ON*2	5	• Coolant leaks	• Visual	No leaks	See LC-12, “System Check”.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-18, “Thermostat” and LC-20, “Radiator”.
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-510).
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-14, “Changing Engine Coolant”.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See MA-13, “ENGINE MAINTENANCE”.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-50, “Inspection”.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-73, “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-25, “OVERHEATING CAUSE ANALYSIS”.



Component Description

NHEC1340

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

NHEC1342

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

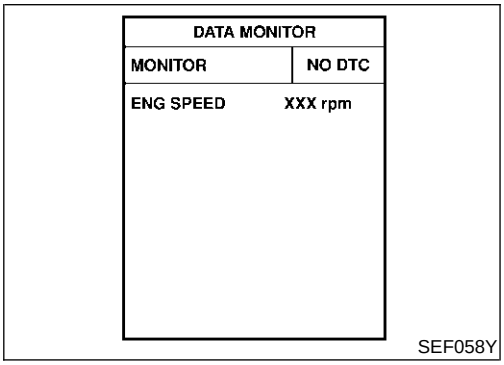
NHEC1343

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 10V at idle.



With CONSULT-II

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Turn ignition switch “OFF”, wait at least 10 seconds.
4) Turn ignition switch “ON”.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-529.

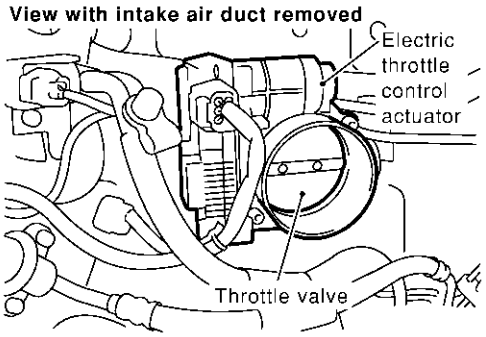
With GST
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC1345

1	CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch "OFF".
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



SEC083D

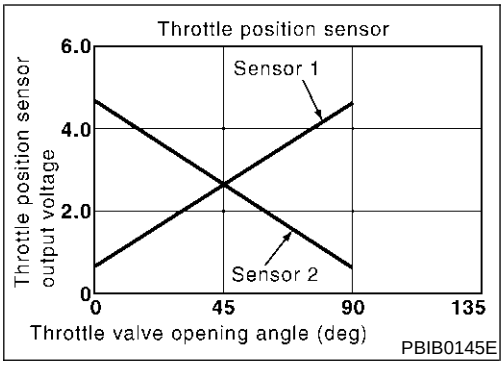
OK or NG

OK	▶	GO TO 2.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

2	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Perform "Idle Air Volume Learning", EC-71.

	▶	**INSPECTION END**



Component Description

NHEC1361

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

NHEC1362

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

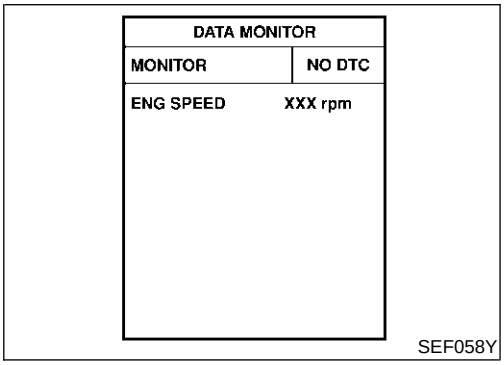
NHEC1363

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 10V at idle.



With CONSULT-II

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Turn ignition switch “OFF”, wait at least 10 seconds.
4) Turn ignition switch “ON”.
5) Repeat steps 3 and 4, 32 times.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-531.

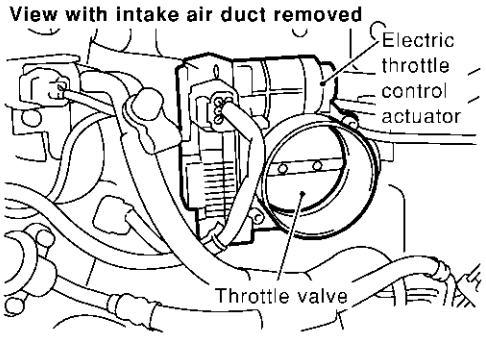
With GST
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NHEC1364

1	CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch "OFF".
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



SEC083D

OK or NG

OK	▶	GO TO 2.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

2	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Perform "Idle Air Volume Learning", EC-71.

	▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC1460

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (The TP sensor 1 and 2 circuit is shorted.) (APP sensor circuit is shorted.) (MAF sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Power steering pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 1) • MAF sensor • EVAP control system pressure sensor • Power steering pressure sensor • Refrigerant pressure sensor • ECM pin terminal

FAIL-SAFE MODE

NHEC1460S01

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

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

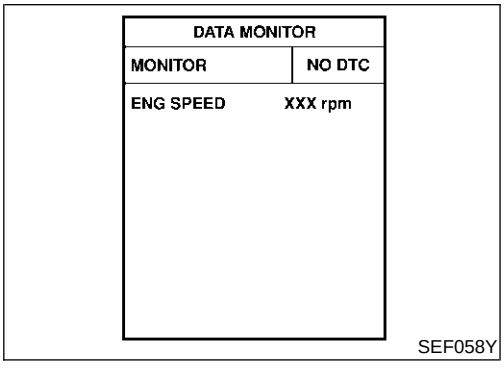
NHEC1461

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 10V 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 1 second.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-535.

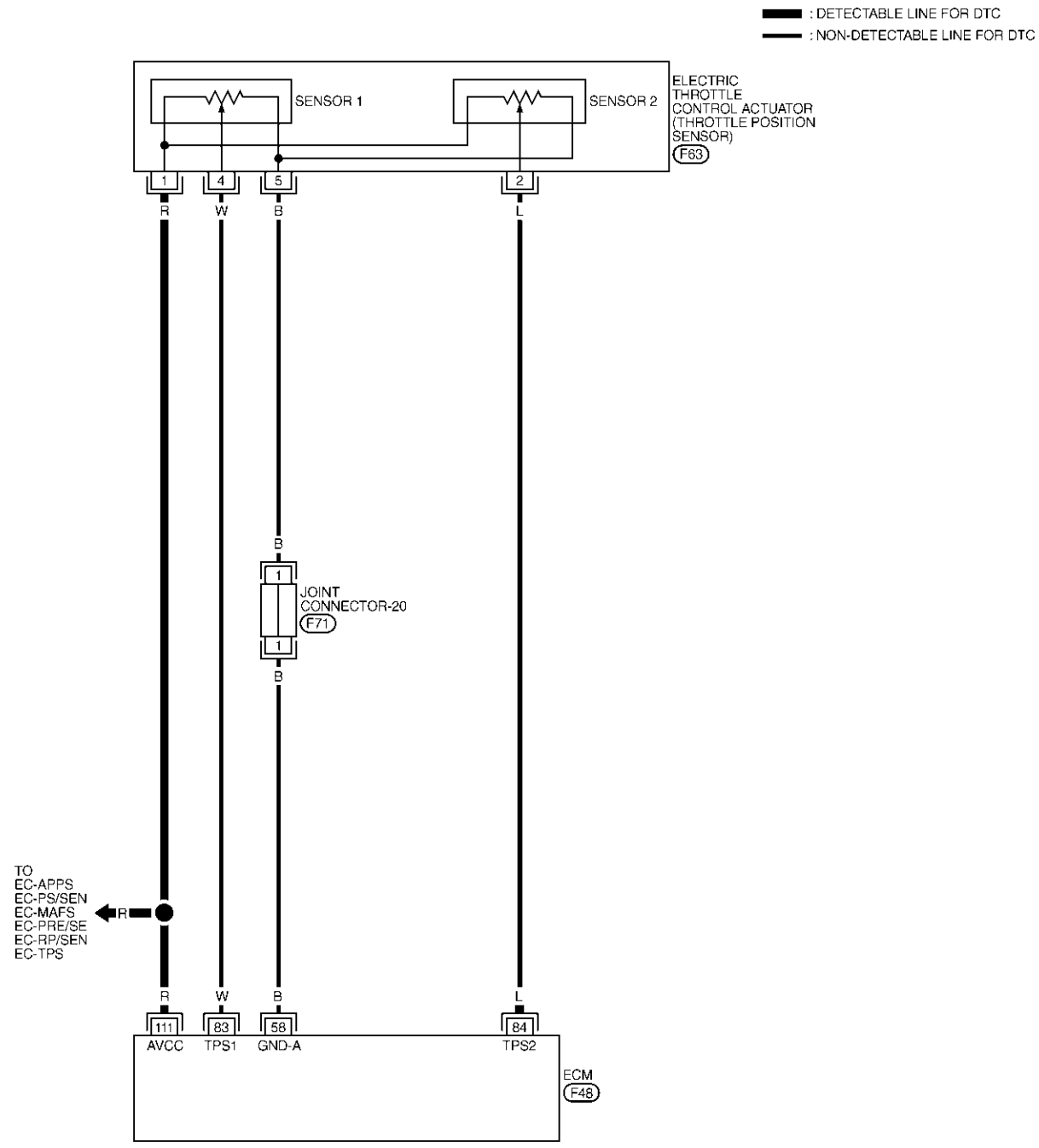
With GST

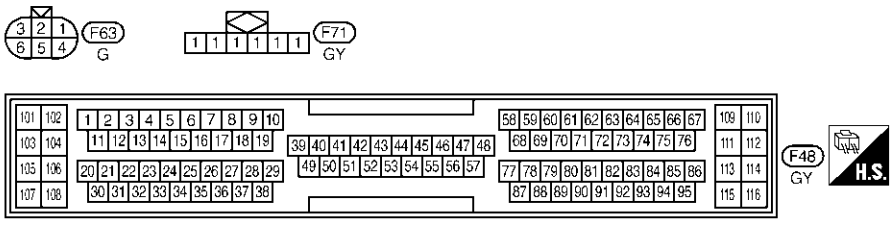
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC1358

EC-SEN/PW-01





MEC364E

Wiring Diagram (Cont'd)

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.

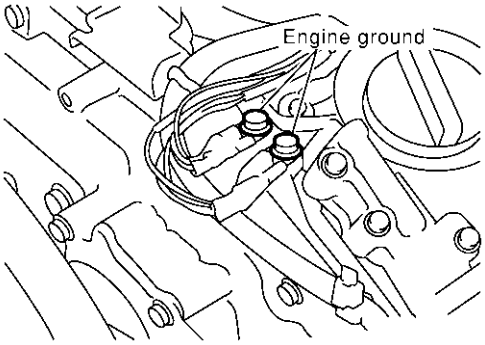
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	R	Sensor's power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1359

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



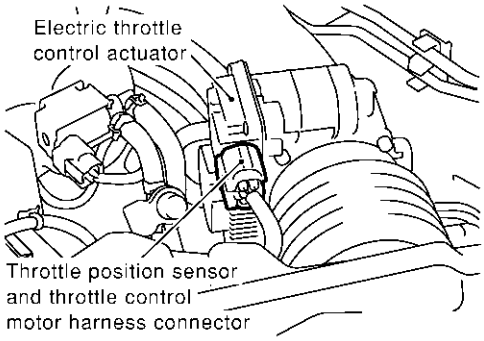
SEC047D

▶ GO TO 2.

Diagnostic Procedure (Cont'd)

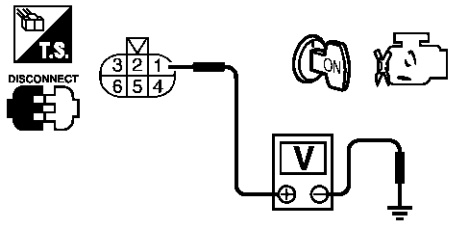
2	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



SEC054D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 3.

3	CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.

- Harness for short to power and short to ground, between the following terminals.
  ECM terminal 111 and electric throttle control actuator terminal 1. Refer to "Wiring Diagram", EC-534.
  ECM terminal 111 and APP sensor terminal 6. Refer to "Wiring Diagram", EC-645.
  ECM terminal 111 and MAF sensor terminal 2. Refer to "Wiring Diagram", EC-193.
  ECM terminal 111 and EVAP control system pressure sensor terminal 1. Refer to "Wiring Diagram", EC-372.
  ECM terminal 111 and power steering pressure sensor terminal 1. Refer to "Wiring Diagram", EC-431.
  ECM terminal 111 and refrigerant pressure sensor terminal 1. Refer to "Wiring Diagram", EC-710.
- ECM pin terminal

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair short to ground or short to power in harness or connectors.

4	CHECK COMPONENTS	
Check the following. ● Accelerator pedal position sensor (Refer to "Component Inspection", EC-667.) ● Mass air flow sensor (Refer to "Diagnostic Procedure", EC-188.) ● EVAP control system pressure sensor (Refer to "Diagnostic Procedure", EC-373.) ● Power steering pressure sensor (Refer to "Component Inspection", EC-434.) ● Refrigerant pressure sensor (Refer to "Diagnostic Procedure", EC-711.)		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning component.

5	CHECK THROTTLE POSITION SENSOR	
Refer to "Component Inspection", EC-661.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace electric throttle control actuator. 2. Perform "Throttle valve closed position learning", EC-71. 3. Perform "Idle air volume learning", EC-71.		
	▶	**INSPECTION END**

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**

Description

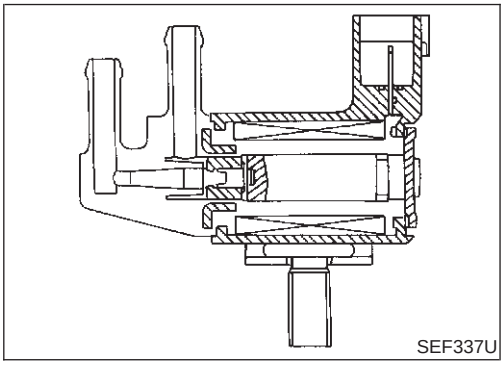
NHEC1089

SYSTEM DESCRIPTION

NHEC1089S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	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		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1	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.


SEF337U

COMPONENT DESCRIPTION

NHEC1089S02

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

NHEC1090

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	—

On Board Diagnosis Logic

NHEC1092

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1444 1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	• 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.)

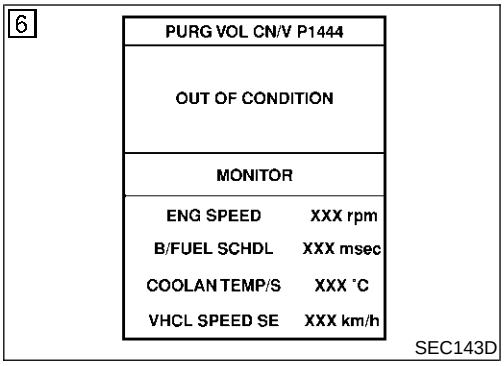
DTC Confirmation Procedure

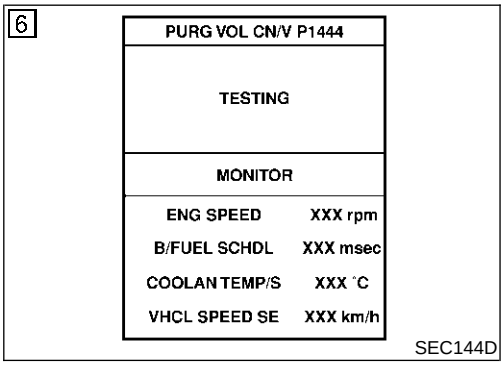
NHEC1093

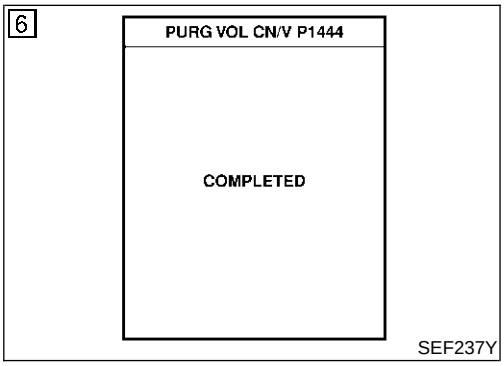
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

DTC Confirmation Procedure (Cont'd)







WITH CONSULT-II

NHEC1093S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 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-543.

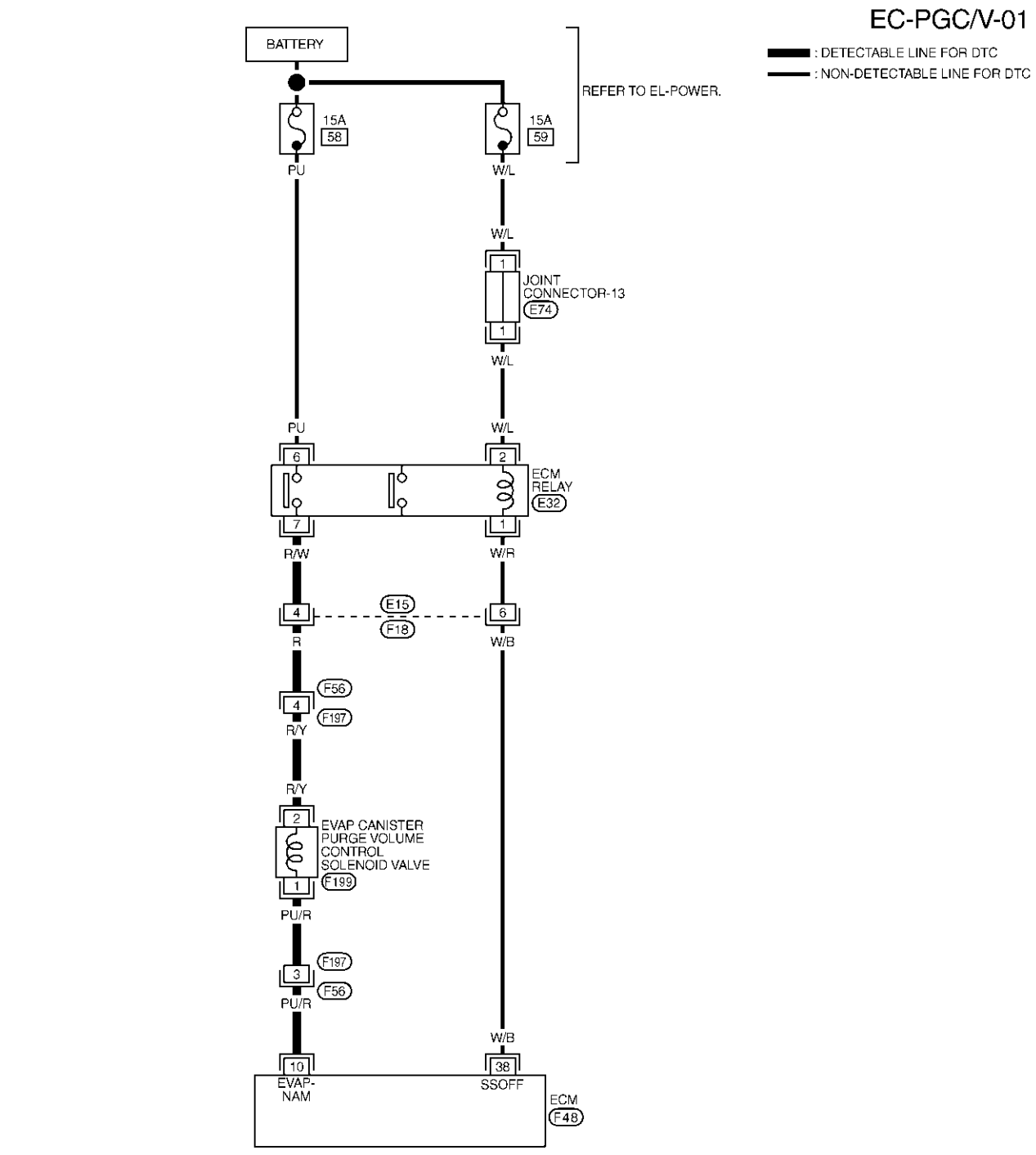
WITH GST

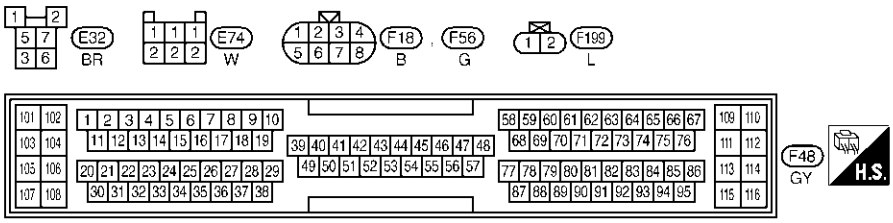
NHEC1093S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 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-543.

Wiring Diagram

NHEC1094

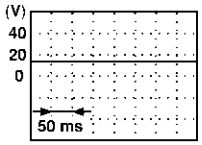
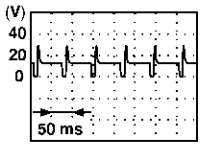




MEC552D

Wiring Diagram (Cont'd)

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	PU/R	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	ENGINE RUNNING AT IDLE SPEED	BATTERY VOLTAGE 
			ENGINE RUNNING AT 2,000 RPM (MORE THAN 100 SECONDS AFTER STARTING ENGINE)	BATTERY VOLTAGE 

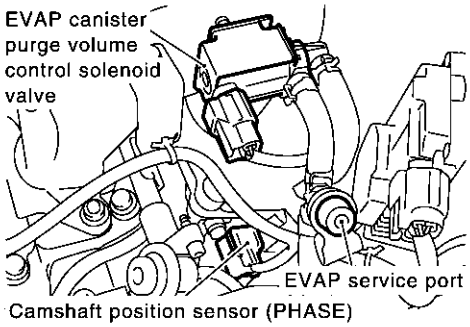
SEF800YB

Diagnostic Procedure

NHEC1095

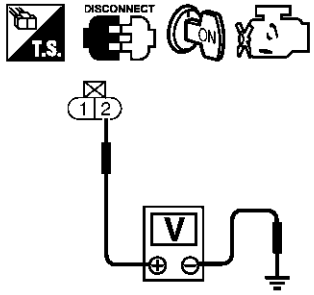
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEC929C

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and engine ground with CONSULT-II or tester.



SEC062D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness connectors F56, F197
- 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

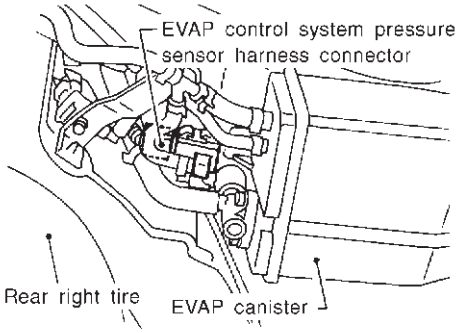
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 10 and EVAP canister purge volume control solenoid valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

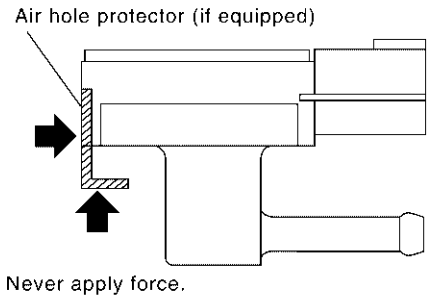
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F197, F56 ● Harness for open or short between ECM and EVAP canister purge volume control solenoid valve	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.  SEF495R **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. 2. Check connectors for water. **Water should not exist.** **OK or NG**	
OK ▶	GO TO 7.
NG ▶	Replace EVAP control system pressure sensor.

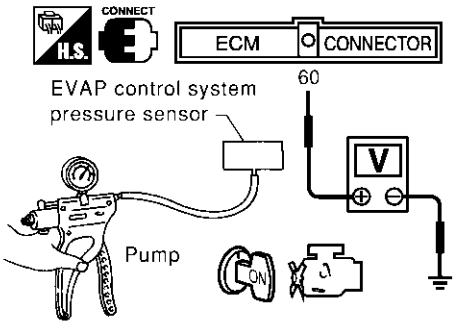
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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 (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect harness connectors disconnected.
3. Start engine.
4. 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

SEC142D

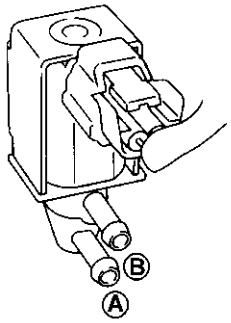
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	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.

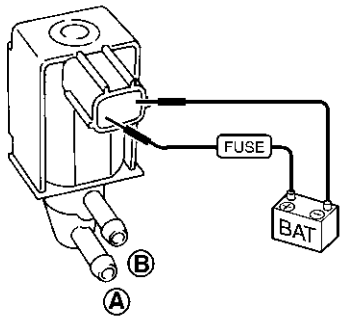


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

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

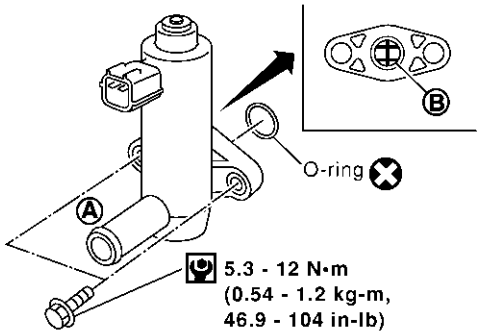
SEF335X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

10	CHECK RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging. **OK or NG**	
OK ▶	GO TO 11.
NG ▶	Clean the rubber tube using an air blower.

11	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.	



SEF376Z

OK or NG

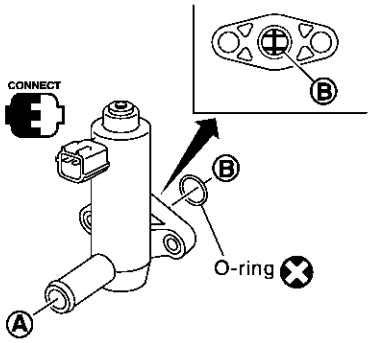
OK ▶	GO TO 12.
NG ▶	Replace EVAP canister vent control valve.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



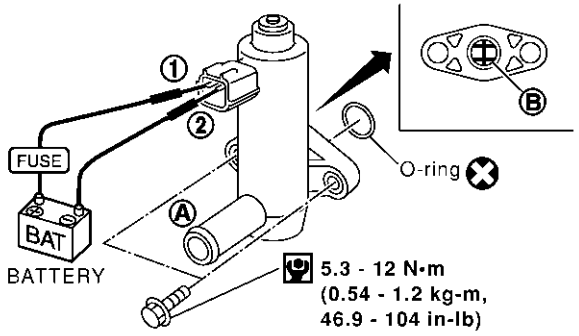
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-III

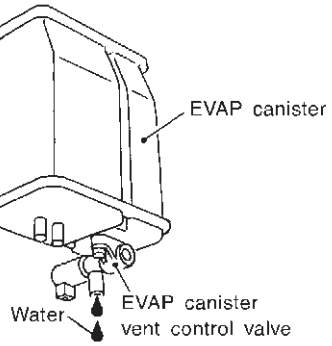
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 9 again.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

14	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 15.
No	▶	GO TO 18.

15	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	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

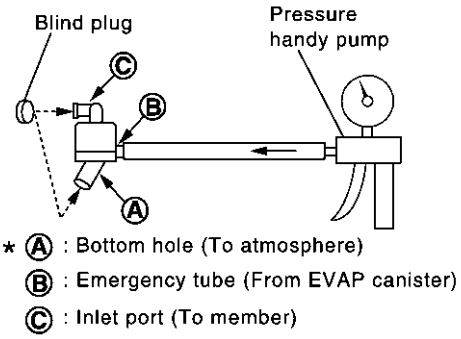
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separater for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

Diagnostic Procedure (Cont'd)

17	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.



PBIB1032E

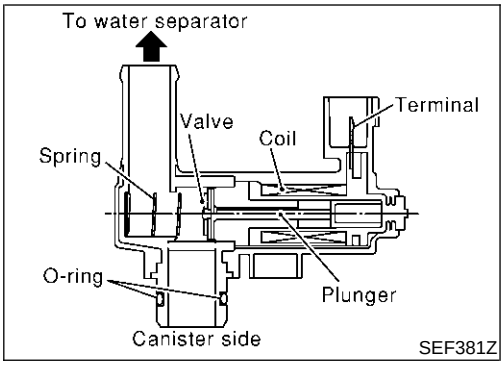
5. In case of NG in items 2 - 4, replace the parts.

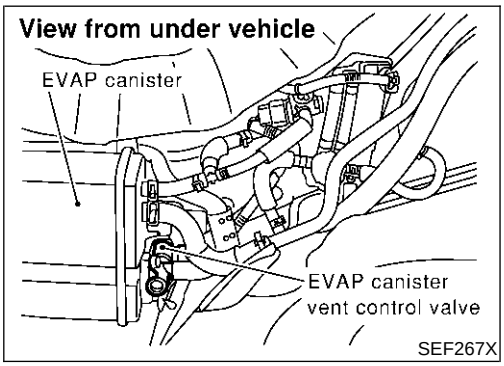
NOTE:
Do not disassemble water separator.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean or replace water separator.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**





Component Description

NHEC1096

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

NHEC1097

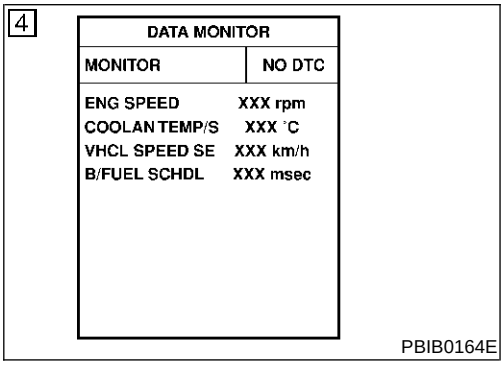
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC1099

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1446 1446	EVAP canister vent control valve closed	EVAP canister vent control valve remains closed under specified driving conditions.	• 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 Confirmation Procedure

NHEC1100

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 10 seconds before conducting the next test.

Ⓔ WITH CONSULT-II

NHEC1100S01

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-554.

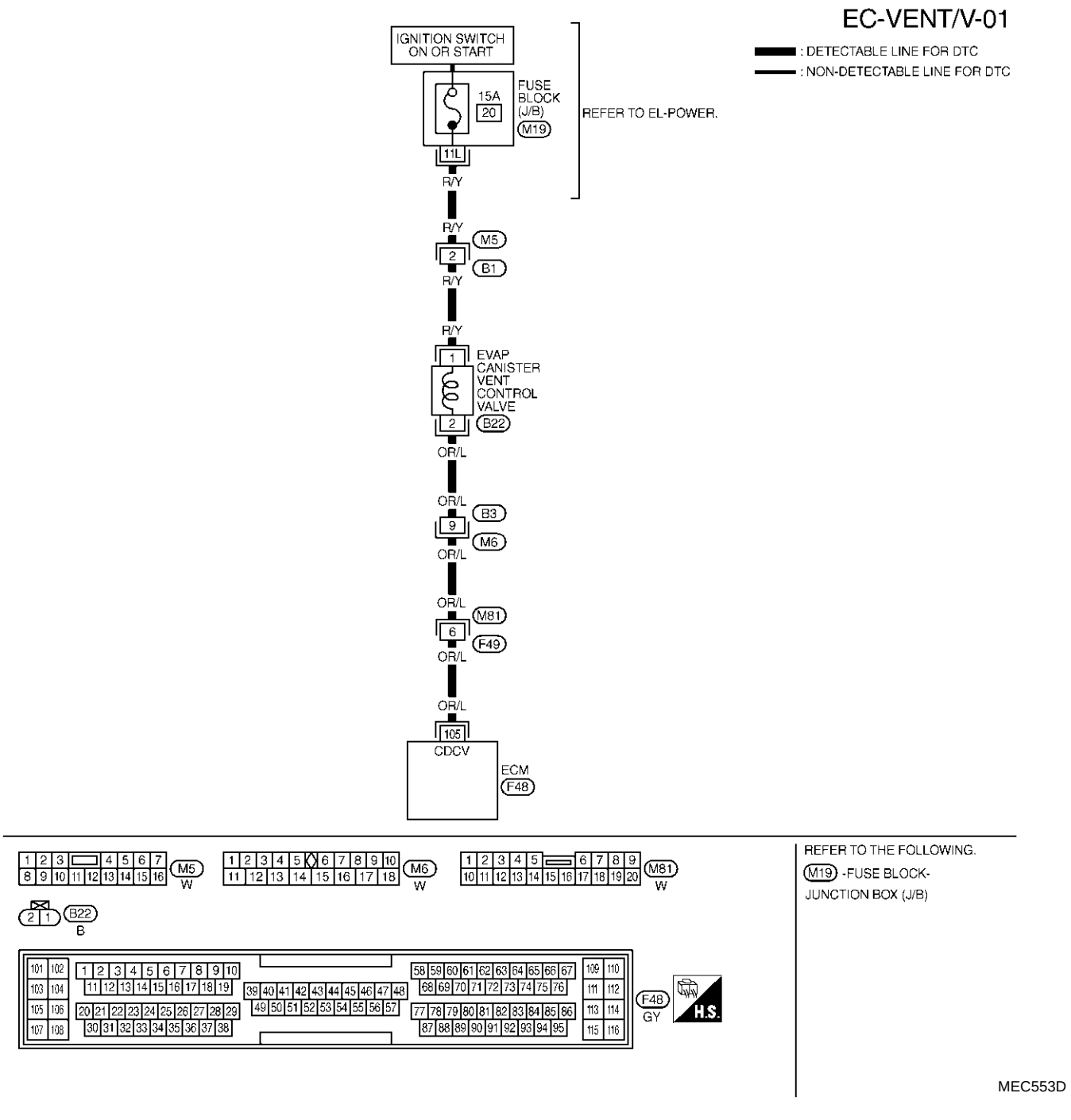
WITH GST

NHEC1100S02

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC1101



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
105	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

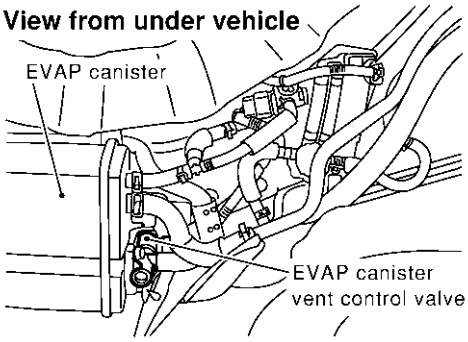
SEF668XC

Diagnostic Procedure

NHEC1102

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



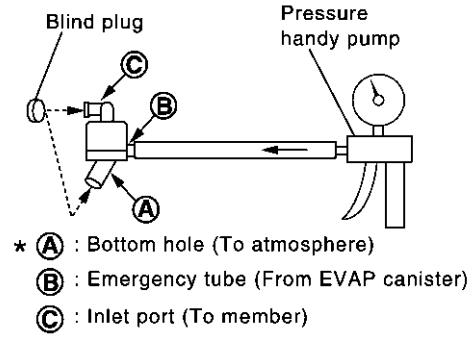
SEF267X

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	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.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

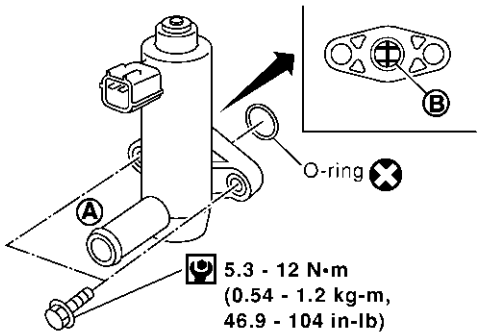
NOTE:
Do not disassemble water separator.

OK or NG

OK	▶	GO TO 3.
NG	▶	Clean or replace water separator.

3	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

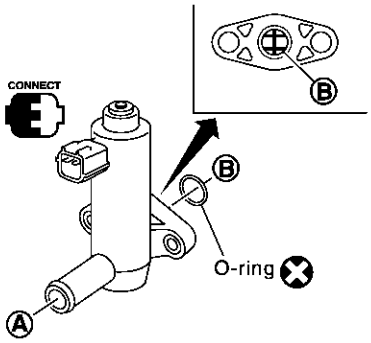
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-II

Ⓕ **With CONSULT-II**

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



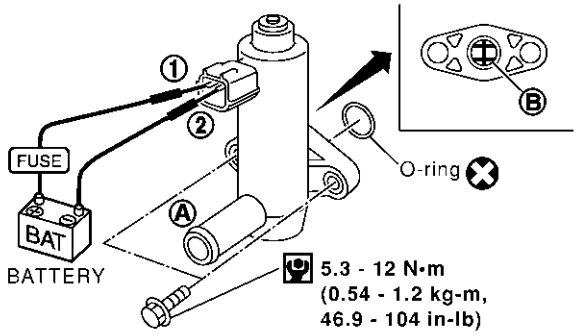
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Ⓚ **Without CONSULT-II**

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

Operation takes less than 1 second.

SEF378Z

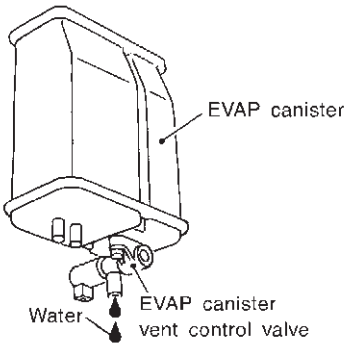
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the procedure 4 again. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Replace EVAP canister vent control valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.  SEF596U **Yes or No**		
Yes	▶	GO TO 7.
No	▶	GO TO 9.

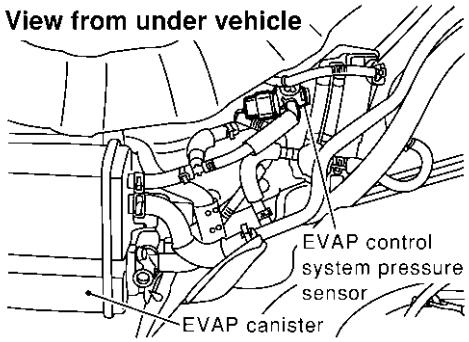
7	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

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

9	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 10.
NG	▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

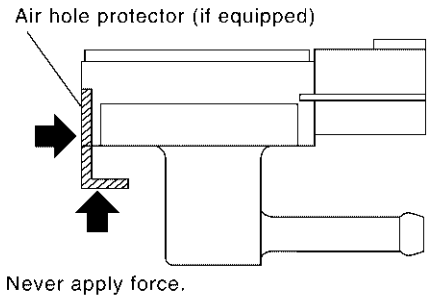
2. Check connectors for water.
Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

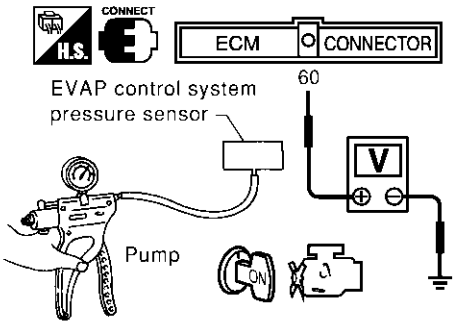
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

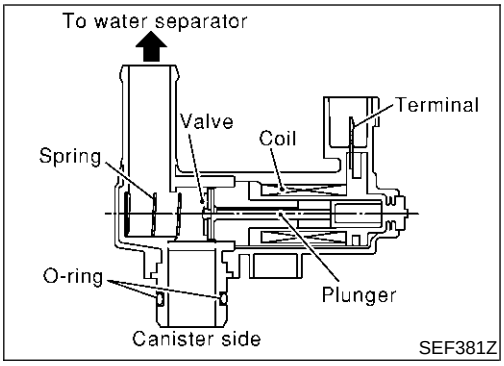
MTBL1159

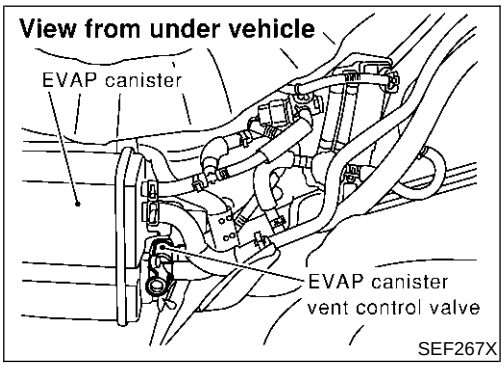
CAUTION:
Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**





Component Description

NHEC1103

NOTE:
If DTC P1448 is displayed with P0442, 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

NHEC1104

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC1106

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1448 1448	EVAP canister vent control valve open	EVAP canister vent control valve remains opened under specified driving conditions.	• 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

DTC Confirmation Procedure

NHEC1107

NOTE:
- **If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)

5

EVAP SML LEAK P0442/P1442

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.

SEC760C

5

EVAP SML LEAK P0442/P1442

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEC761C

5

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)

1600 rpm 1850 rpm 2100 rpm

SEC762C

6

EVAP SML LEAK P0442/P1442

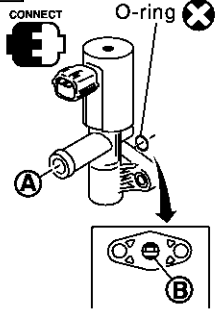
OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC763C

11



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

PBIB0153E

WITH CONSULT-II

NHEC1107S01

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).**
- **Open engine hood before conducting the following procedure.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 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 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

5) Select "EVP SML LEAK P0442/P1442" 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-119.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, go to the following step.

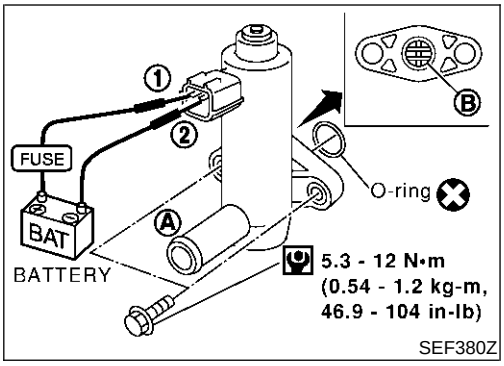
NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7) Stop engine and wait at least 10 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-563.
If the result is OK, go to "Diagnostic Procedure" for DTC P0442, EC-341.



Overall Function Check

NHEC1108

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.

WITH GST

NHEC1108S01

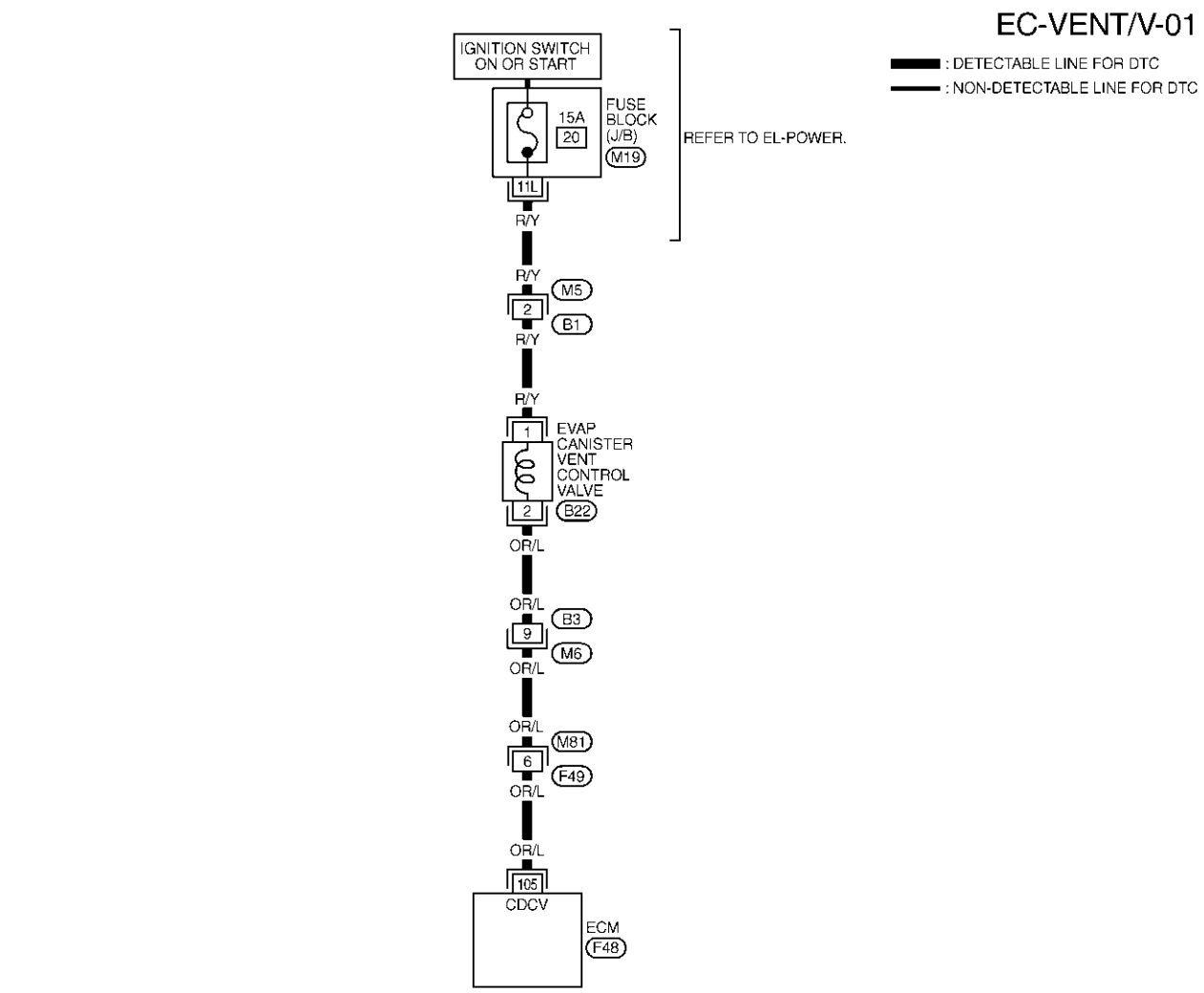
1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

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-563.
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-341.

Wiring Diagram

NHEC1109



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
105	OR/L	EVAP CANISTER VENT CONTROL VALVE	IGN ON	BATTERY VOLTAGE

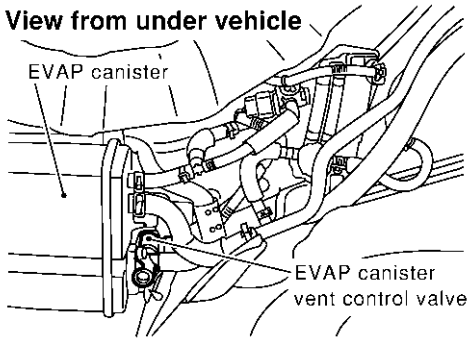
SEF668XC

Diagnostic Procedure

NHEC1110

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



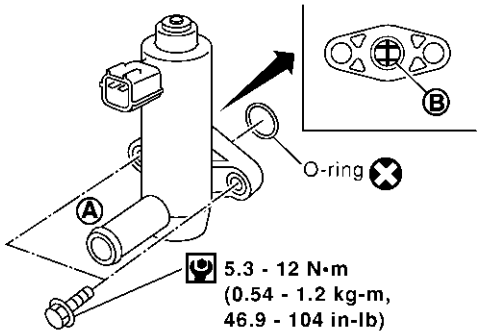
SEF267X

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

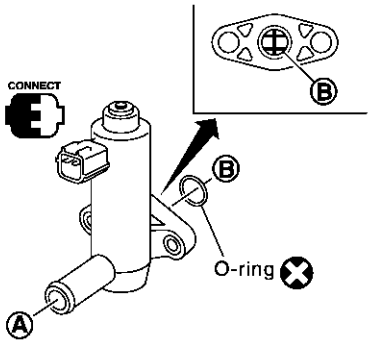
Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



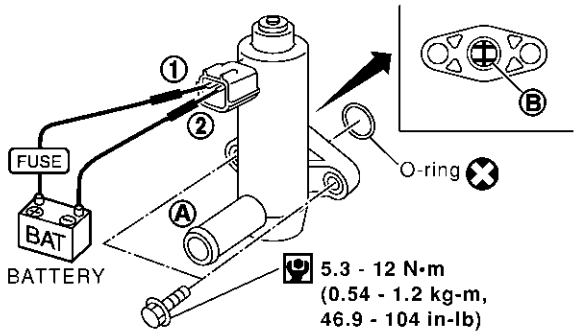
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III

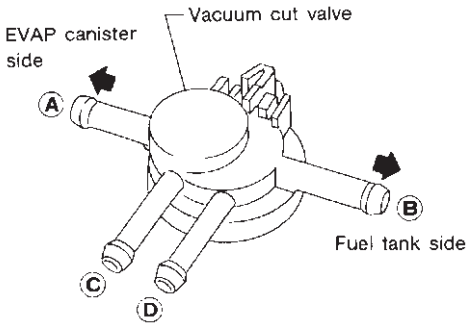
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

5	CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:



SEF379Q

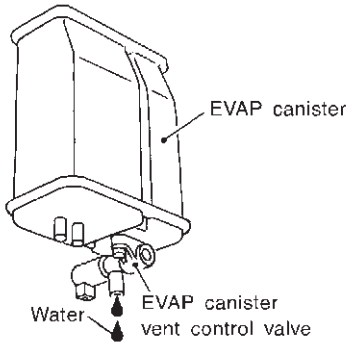
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace vacuum cut valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 9.

7	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).

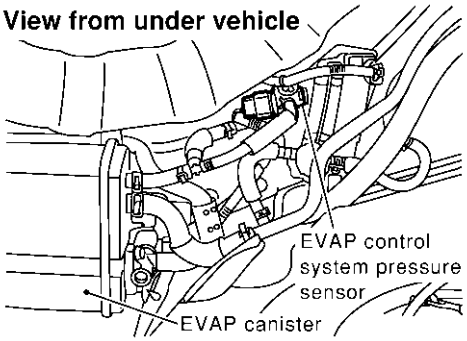
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

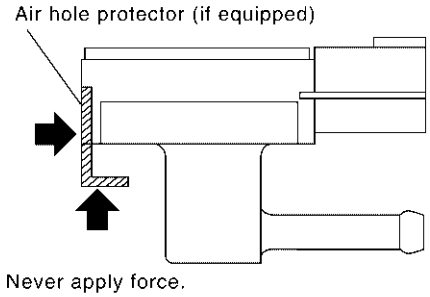
8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

9	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 10.
NG	▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
 SEF268X		
2. Check connectors for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

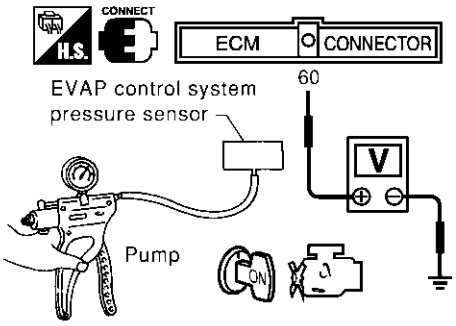
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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.

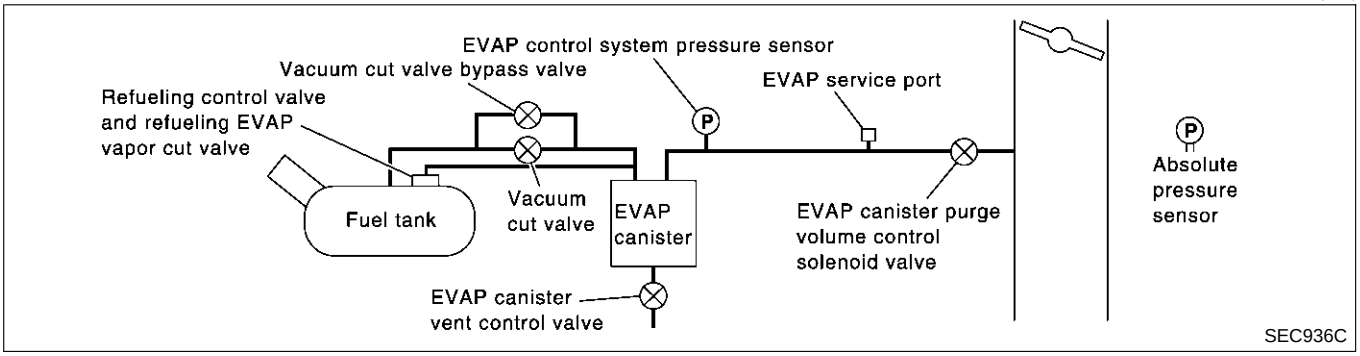
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NHEC1479

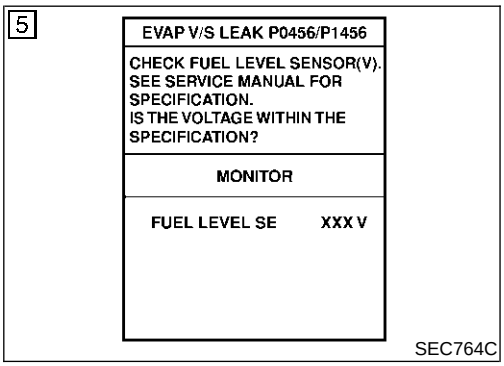


This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened 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 ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.
If ECM judges a leak which corresponds to a very small leak, the very small leak P1456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P1442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.

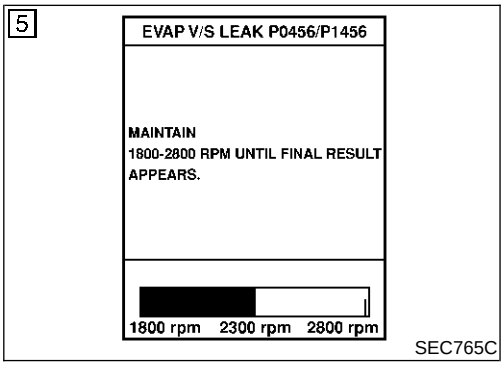
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1456 1456	Evaporative emission control system very small leak (positive pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler 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 • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister saturated with water • EVAP control system pressure sensor • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

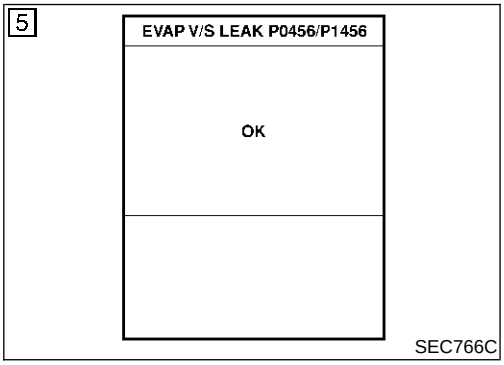
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEC764C



SEC765C



SEC766C

DTC Confirmation Procedure

NHEC1480

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P1456 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 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 conditions are 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.**

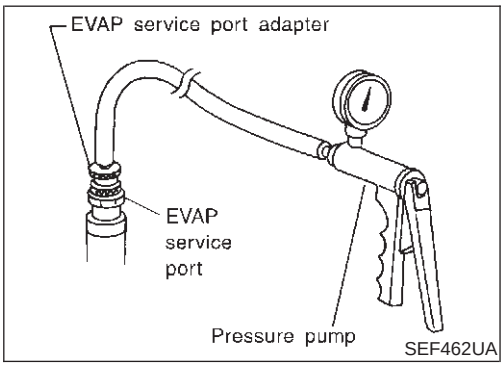
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

Ⓔ 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 - 35°C (32 - 95°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 10 seconds.
4) Turn ignition switch "ON".
5) Select "EVP V/S LEAK P0456/P1456" 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-571.

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic Inspection", EC-119.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**



Overall Function Check

NHEC1481

WITH GST

NHEC1481S01

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 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/cm^2, 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-571.
   If OK, go to next step.
8) Disconnect GST.
9) Start engine and warm it up to normal operating temperature.
10) Turn ignition switch "OFF" and wait at least 10 seconds.
11) Restart engine and let it idle for 90 seconds.
12) Keep engine speed at 2,000 rpm for 30 seconds.
13) Turn ignition switch "OFF".

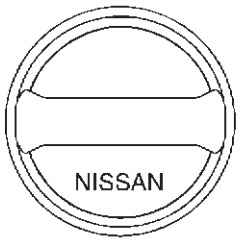
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NHEC1482

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	▶	1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. 2. Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

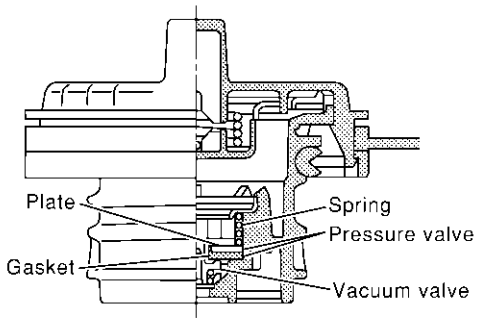
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

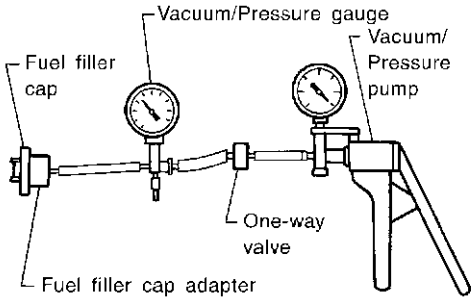
Diagnostic Procedure (Cont'd)

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/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

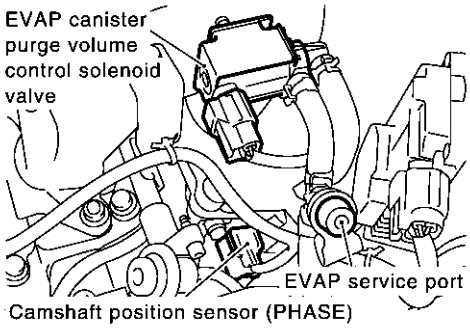
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

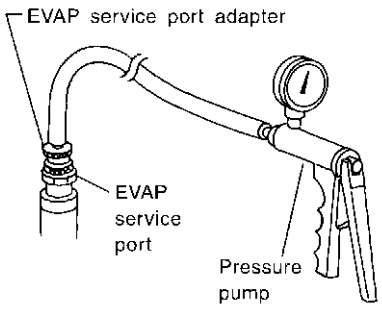
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEC929C



SEF916U

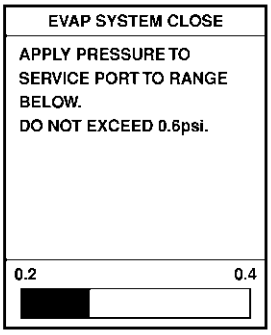
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

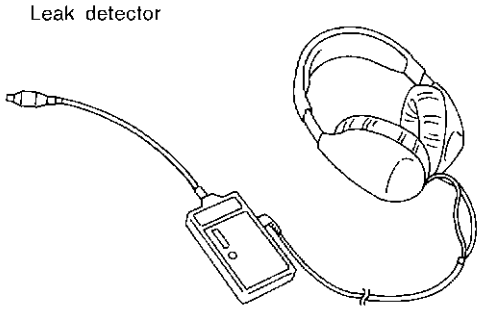
Ⓕ **With CONSULT-II**

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/cm^2, 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-41.



SEF200U

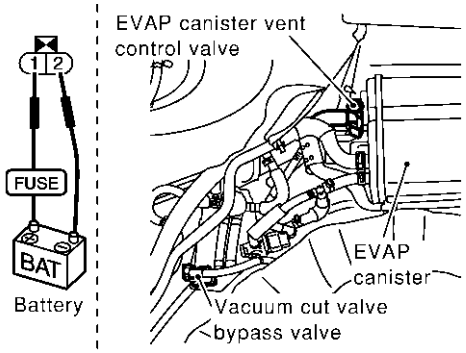
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

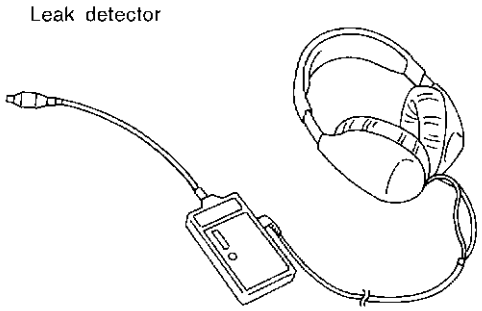
Without CONSULT-II

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.)



SEF254X

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/cm^2, 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-41.



SEF200U

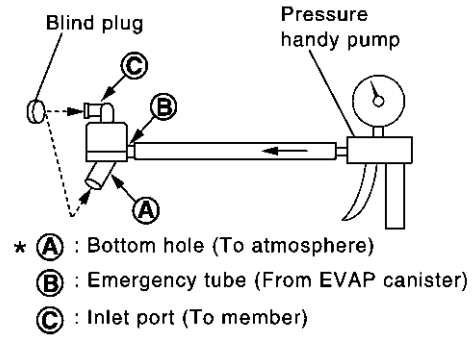
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

8	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.



PBIB1032E

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
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

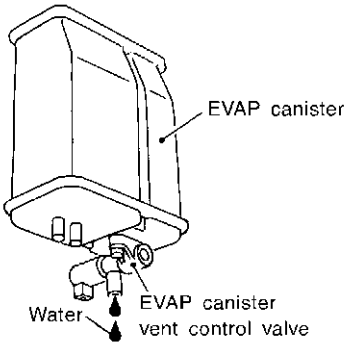
Refer to "DTC Confirmation Procedure", EC-559.

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

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

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. ● 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**

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.

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

SEC142D

Vacuum should exist.

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓚ **Without CONSULT-II**

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.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-31.	
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

Ⓔ **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

SEC142D

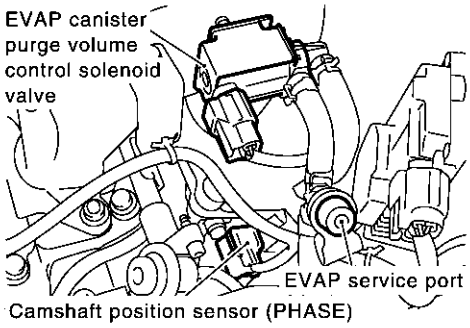
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

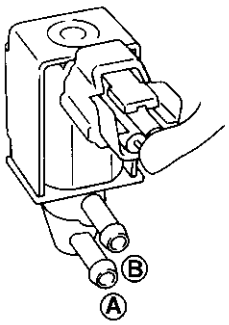
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C

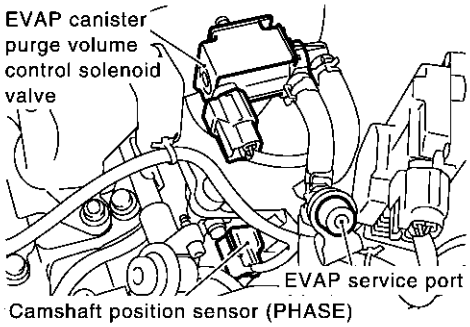


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

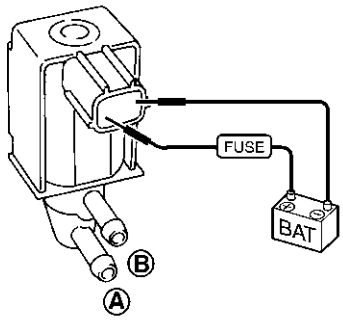
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEC929C



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

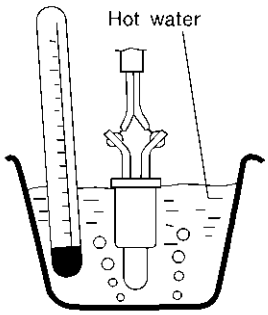
OK or NG

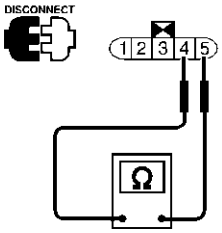
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

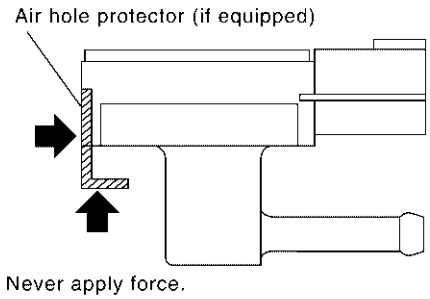
SEF587X

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

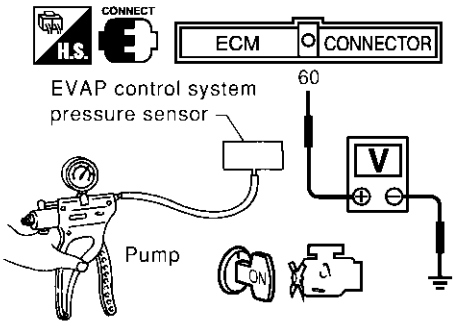
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 60 and ground.



SEC908C

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

MTBL1159

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-37.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

Diagnostic Procedure (Cont'd)

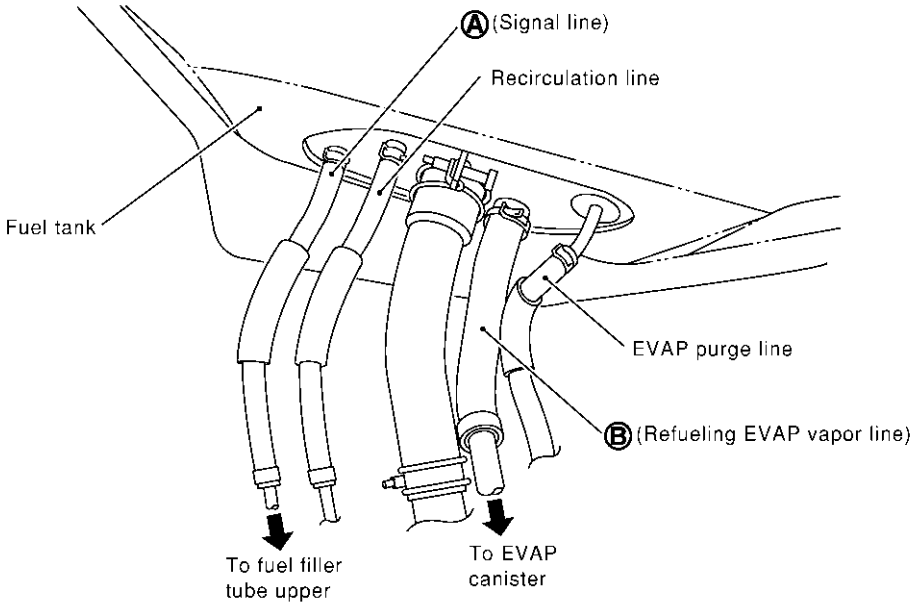
21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

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 "EVAPORATIVE EMISSION LINE DRAWING", EC-41.	
OK or NG	
OK ▶	GO TO 23.
NG ▶	Repair or replace hoses and tubes.

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.

24 CHECK REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check that 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.



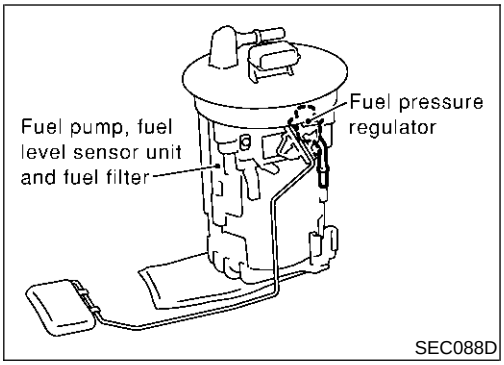
SEF830X

OK or NG

OK ▶	GO TO 25.
NG ▶	Replace or refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

26	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



Component Description

NHEC1111

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.

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

NHEC1112

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.

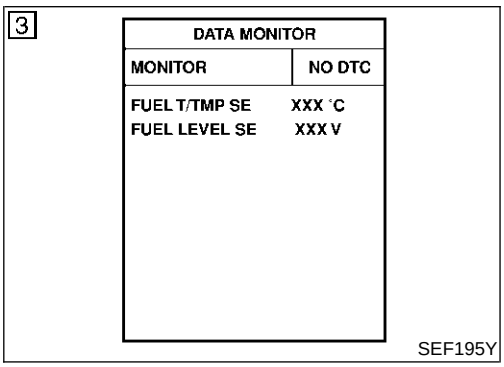
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1464 1464	Fuel level sensor circuit ground signal	A high voltage from the sensor is sent to ECM.	• Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NHEC1113

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.



WITH CONSULT-II

NHEC1113S01

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-586.

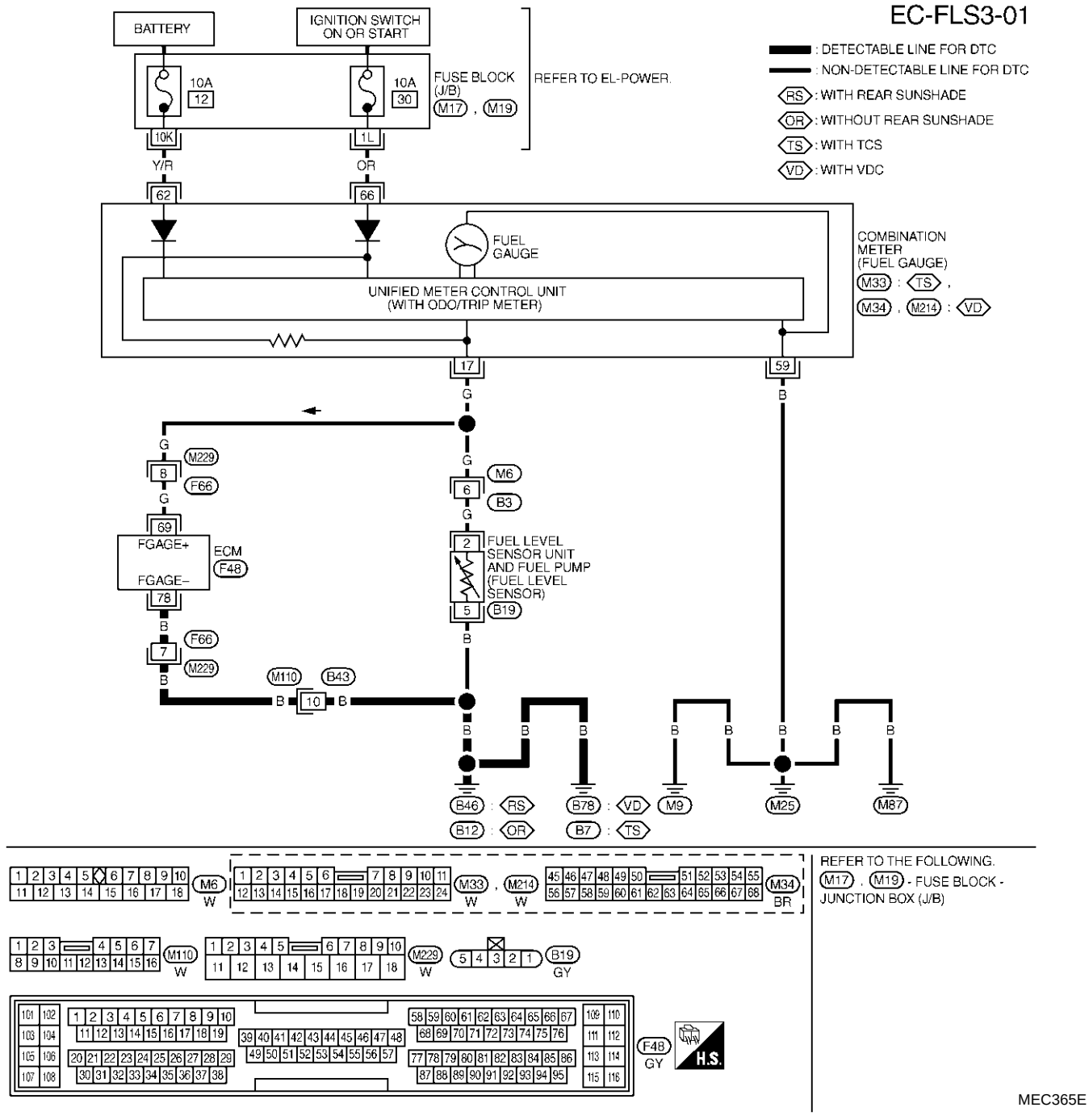
WITH GST

NHEC1113S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1114



MEC365E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
78	B	FUEL LEVEL SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED	APPROX. 0V
69	G	FUEL LEVEL SENSOR	IGN ON	APPROX. 0 - 4.8V OUTPUT VOLTAGE VARIES WITH FUEL LEVEL.

SEF711YB

Diagnostic Procedure

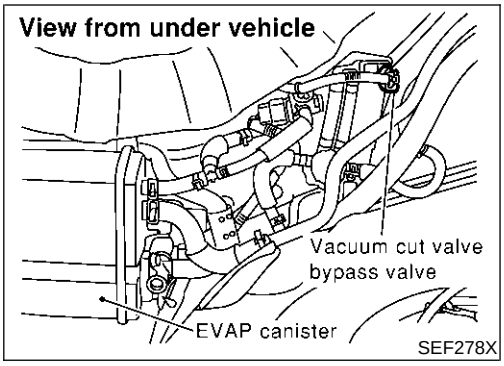
=NHEC1115

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 78 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. ● Harness connectors F66, M229 ● Harness connectors M6, B3 ● Harness for open between ECM and body ground		
	▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR	
Refer to EL-140, “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-151. **OK or NG**		
	▶	**INSPECTION END**



Description

=NHEC1116

COMPONENT DESCRIPTION

NHEC1116S01

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.

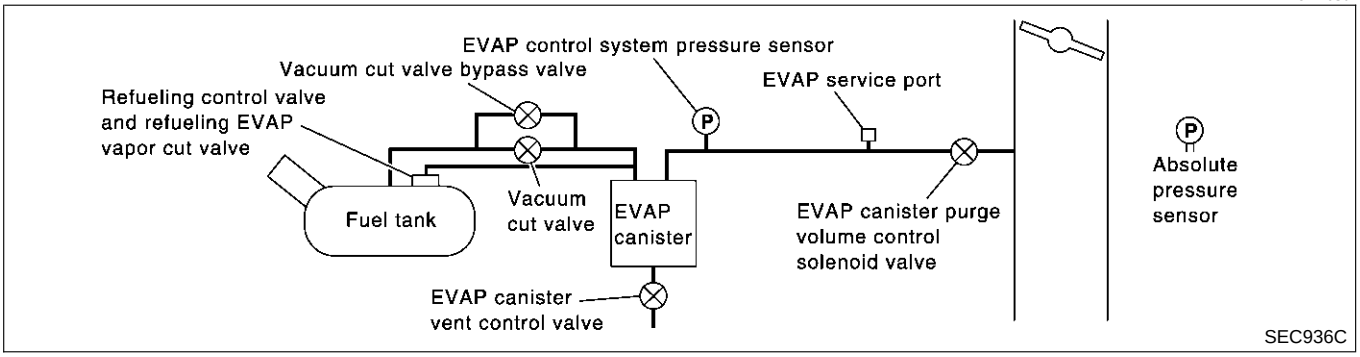
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NHEC1116S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC1117

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

NHEC1119

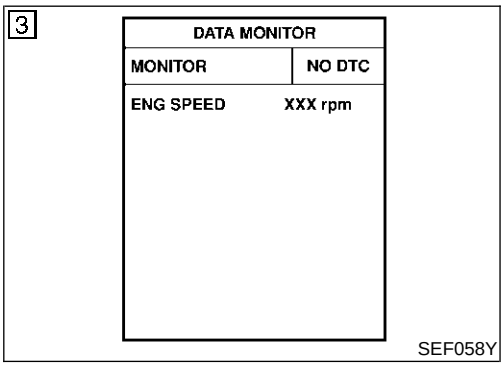
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1490 1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	• Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) • Vacuum cut valve bypass valve

DTC Confirmation Procedure

NHEC1120

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 idle speed.



WITH CONSULT-II

NHEC1120S01

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-590.

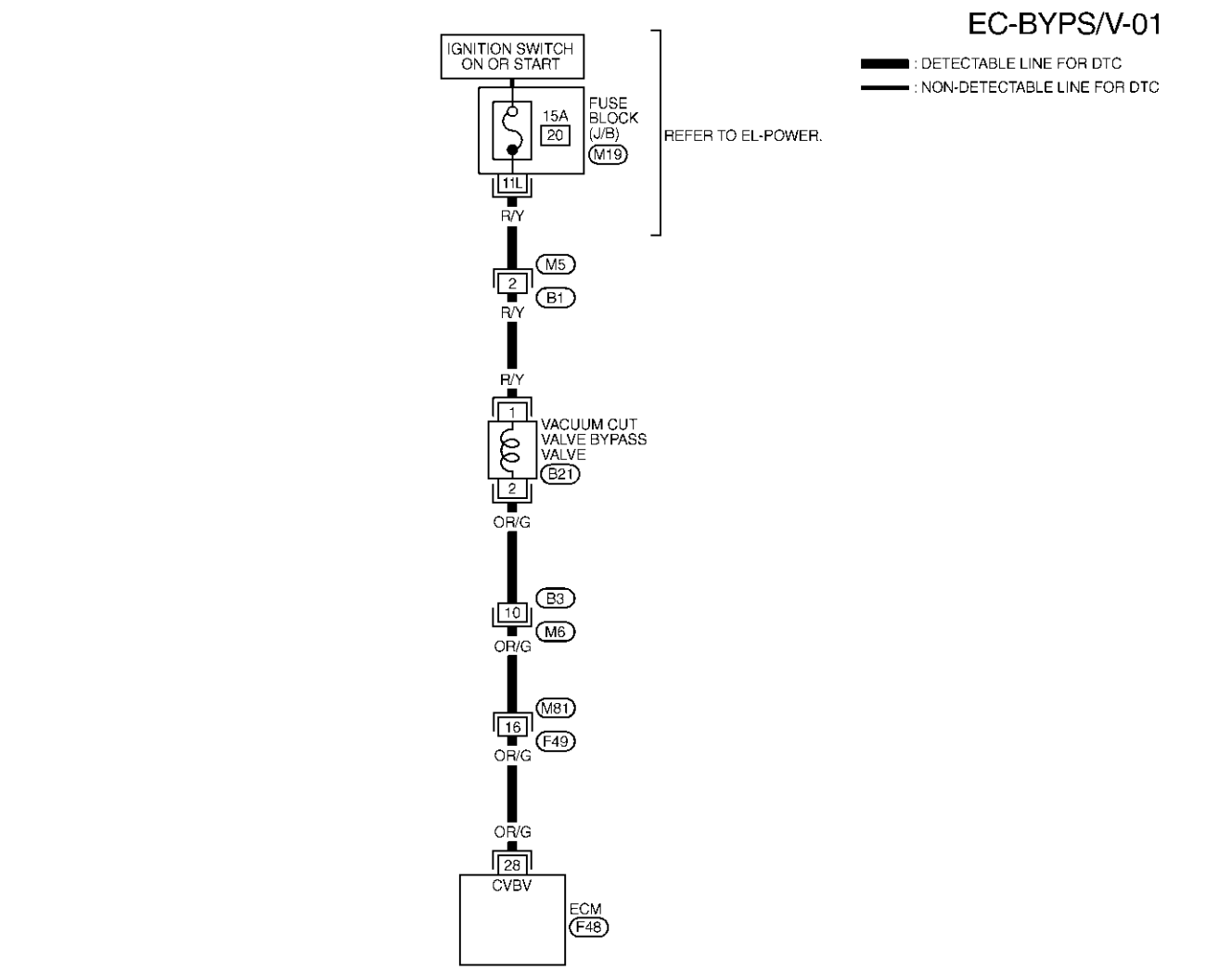
WITH GST

NHEC1120S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1121



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
28	OR/G	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF634XD

Diagnostic Procedure

NHEC1122

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

Ⓔ **With CONSULT-II**

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.

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

PBIB0157E

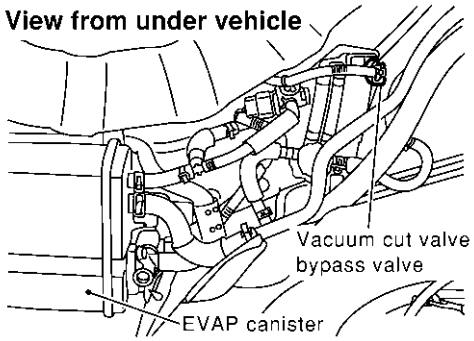
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

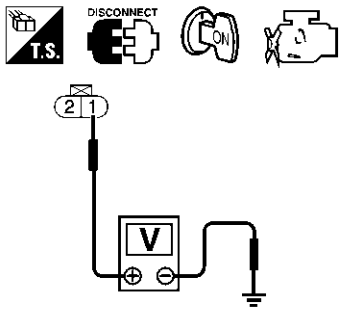
3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF278X

3. Turn ignition switch "ON".
4. Check voltage between vacuum cut valve bypass valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF356X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M5, B1
- Fuse block (J/B) connector M19
- 15A 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 28 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.

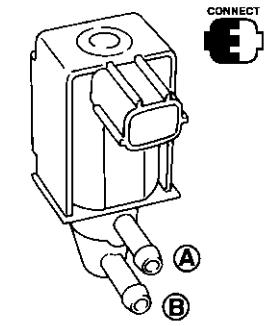
Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B3, M6 ● Harness connectors M81, F49 ● 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

Ⓔ **With CONSULT-II**

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
4. 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

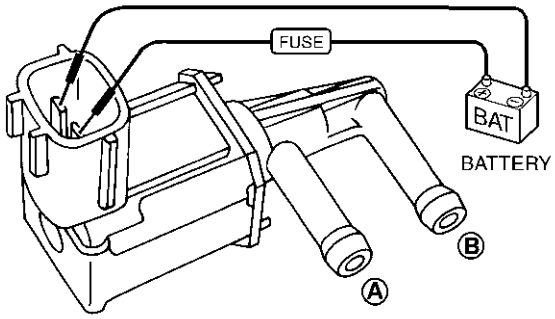
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEC156D

Ⓚ **Without CONSULT-II**

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	Yes
No supply	No

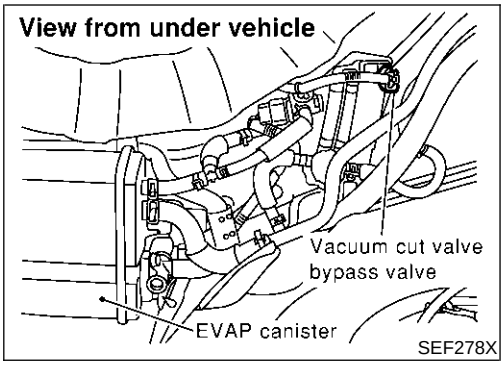
Operation takes less than 1 second.

SEF358X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Description

NHEC1123

COMPONENT DESCRIPTION

NHEC1123S01

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.

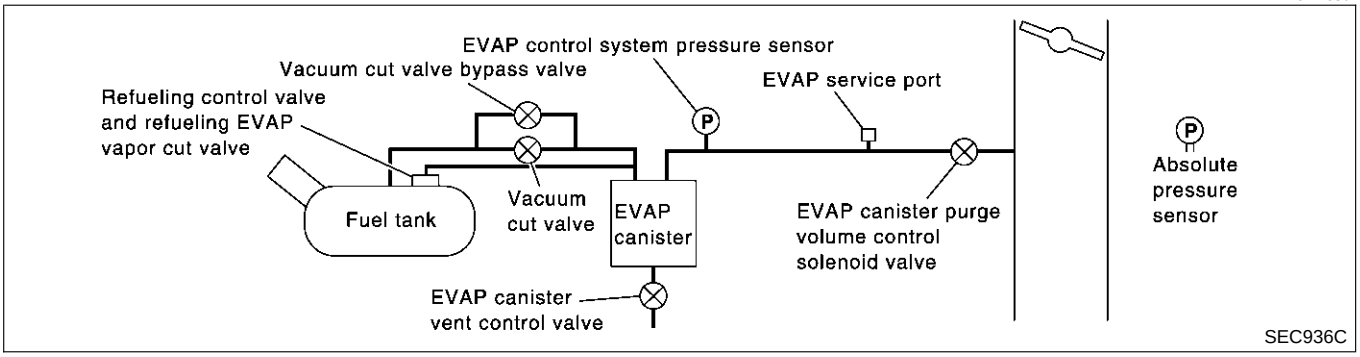
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NHEC1123S02



CONSULT-II Reference Value in Data Monitor Mode

NHEC1124

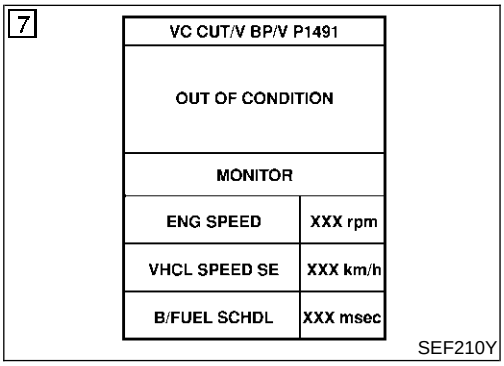
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

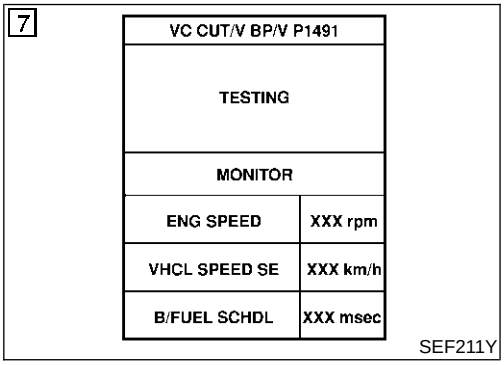
On Board Diagnosis Logic

NHEC1126

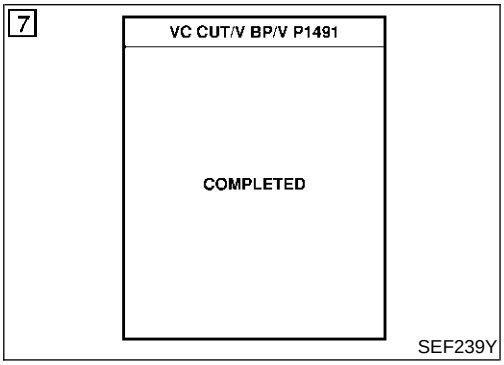
DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1491 1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor and circuit • EVAP 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



SEF210Y



SEF211Y



SEF239Y

DTC Confirmation Procedure

NHEC1127

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 10 seconds before conducting the next test.

TESTING CONDITION:

For best results, perform test at a temperature of 5 to 30°C (41 to 86°F).

Ⓔ WITH CONSULT-II

NHEC1127S01

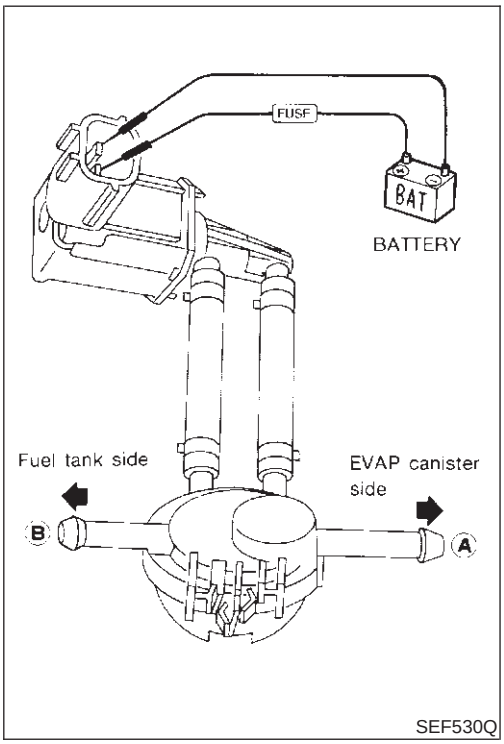
1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
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.)

ENG SPEED	Idle speed or more
Selector lever	Suitable position
Vehicle speed	35 - 120 km/h (22 - 75 MPH) or more
B/FUEL SCHDL	1.3 - 8.1 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-597.



Overall Function Check

NHEC1128

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.

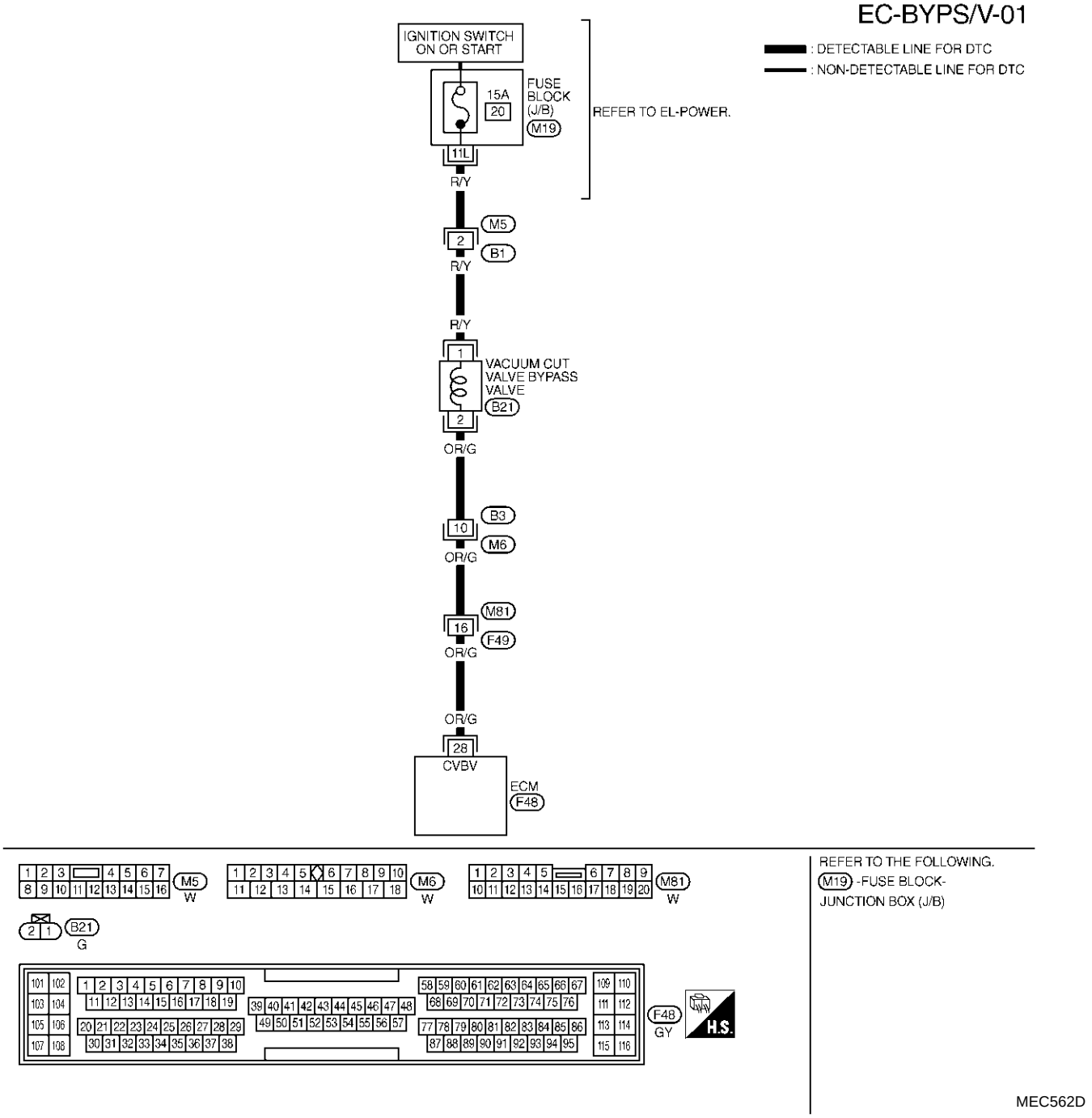
WITH GST

NHEC1128S01

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-597.

Wiring Diagram

NHEC1129



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
28	OR/G	VACUUM CUT VALVE BYPASS VALVE	IGN ON	BATTERY VOLTAGE

SEF634XD

Diagnostic Procedure

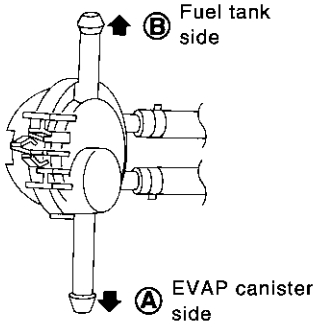
NHEC1130

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

Ⓔ **With CONSULT-II**

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.



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

SEC157D

OK or NG

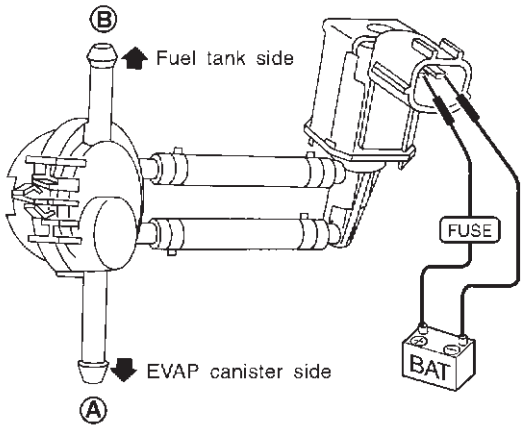
OK ▶	GO TO 4.
NG ▶	GO TO 5.

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

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.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 7.

4	CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP PURGE PORT

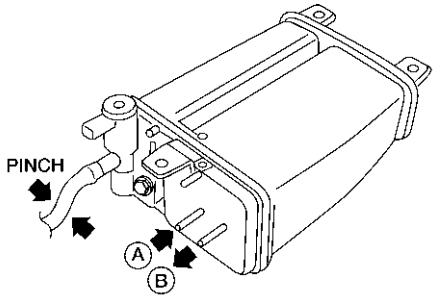
Check EVAP purge port of fuel tank for clogging.

OK or NG

OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

6	CHECK EVAP CANISTER

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



AEC630A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

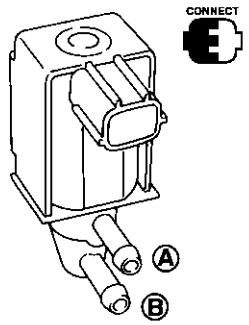
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

Diagnostic Procedure (Cont'd)

8	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

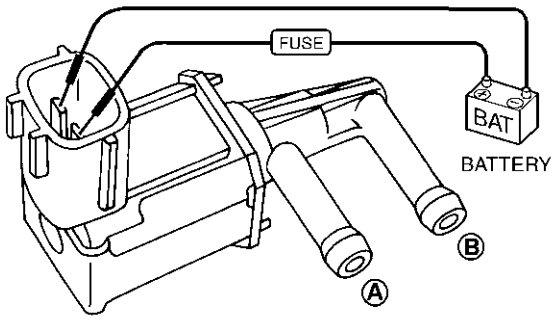
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEC156D

Without CONSULT-II

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	Yes
No supply	No

Operation takes less than 1 second.

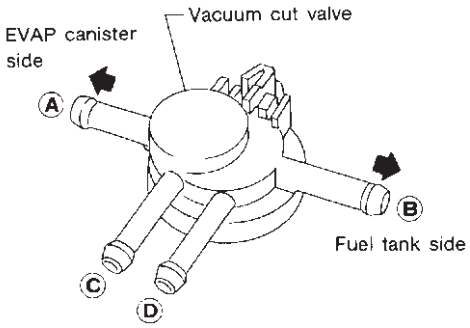
SEF358X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

9	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace vacuum cut valve.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

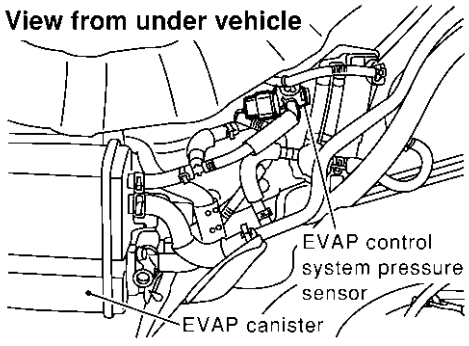
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF268X

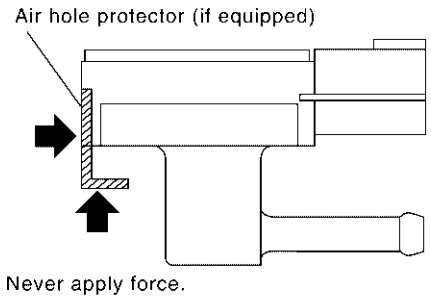
2. Check connectors for water.
Water should not exist.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

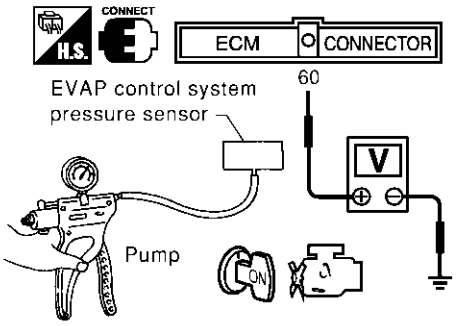
12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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.



SEC908C

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

MTBL1159

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 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE FOR CLOGGING

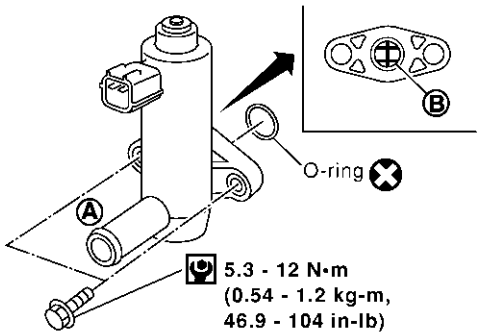
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 14.
NG	▶	Clean the rubber tube using an air blower.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

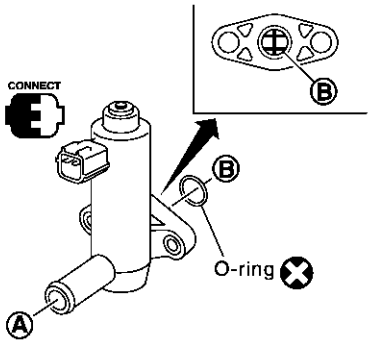
OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-II

Ⓕ **With CONSULT-II**

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/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



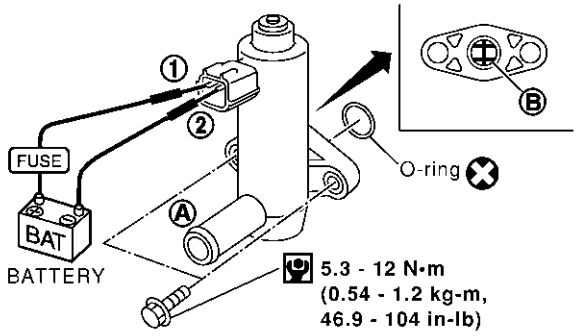
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Ⓚ **Without CONSULT-II**

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

Operation takes less than 1 second.

SEF378Z

Make sure new O-ring is installed properly.

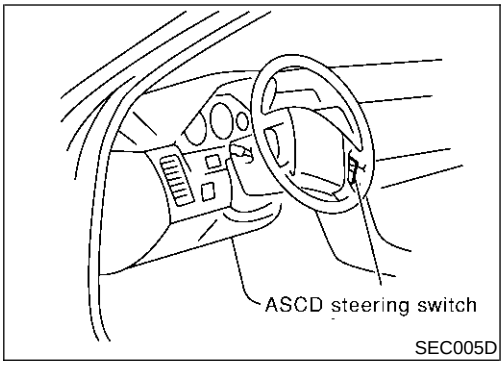
OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

Diagnostic Procedure (Cont'd)

16	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the Test No. 15 again.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister vent control valve.

17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



Component Description

NHEC1208

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1209

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	• Ignition switch: ON	• CRUISE switch: Pressed	ON
		• CRUISE switch: Released	OFF
CANCEL SW	• Ignition switch: ON	• CANCEL switch: Pressed	ON
		• CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	• ACCEL RES switch: Pressed	ON
		• ACCEL RES switch: Released	OFF
SET SW	• Ignition switch: ON	• COAST/SET switch: Pressed	ON
		• COAST/SET switch: Released	OFF

On Board Diagnosis Procedure

NHEC1462

This self-diagnosis has the one trip detection logic. The MIL will not light up for this self-diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-435.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible cause
P1564 1564	ASCD steering switch	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The ASCD steering switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

NHEC1463

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.

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press “CRUISE” switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press “ACCEL/RES” switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press “COAST/SET” switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press “CANCEL” switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-609.

With GST

Follow the procedure “With CONSULT-II” above.

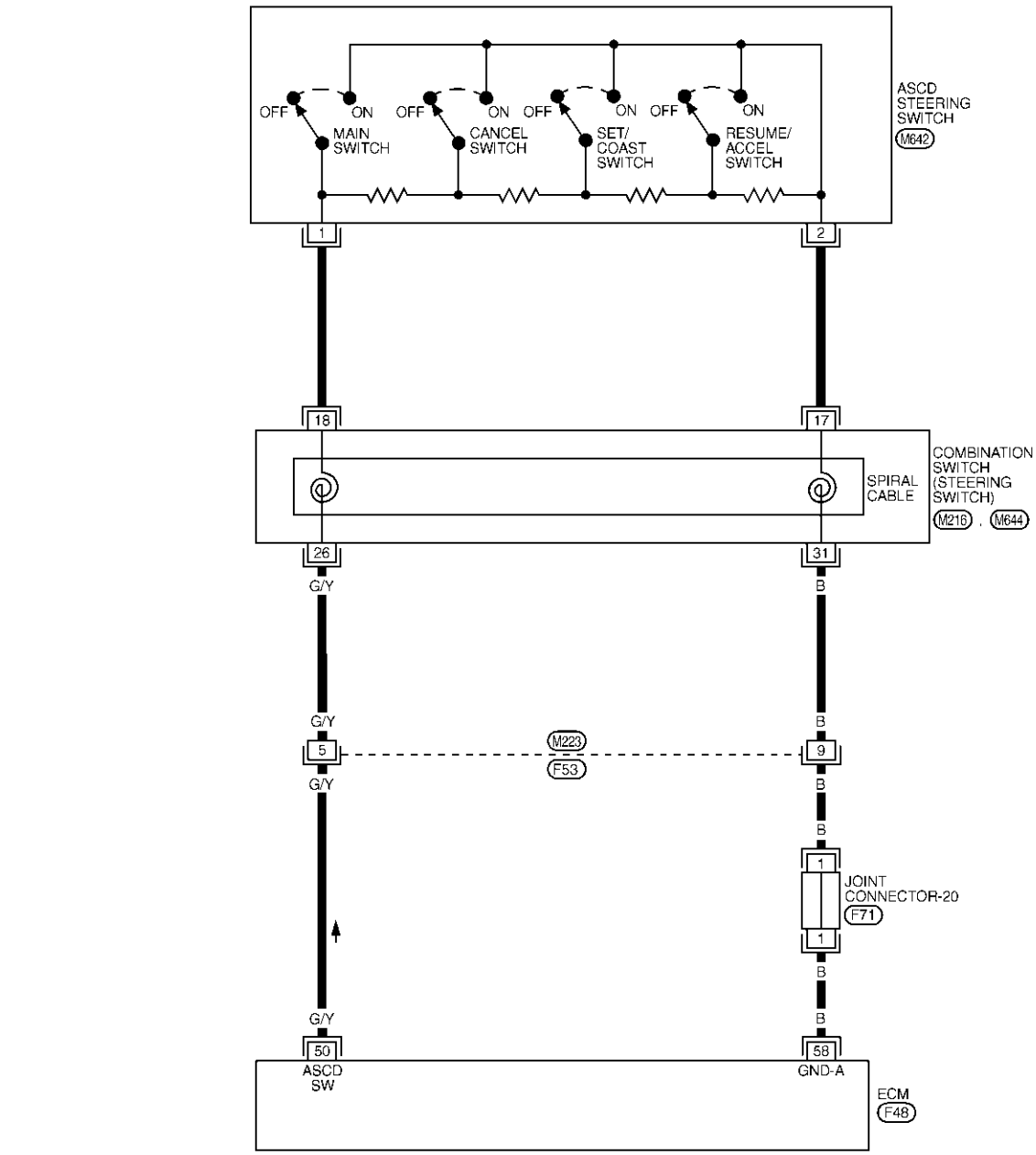
Wiring Diagram

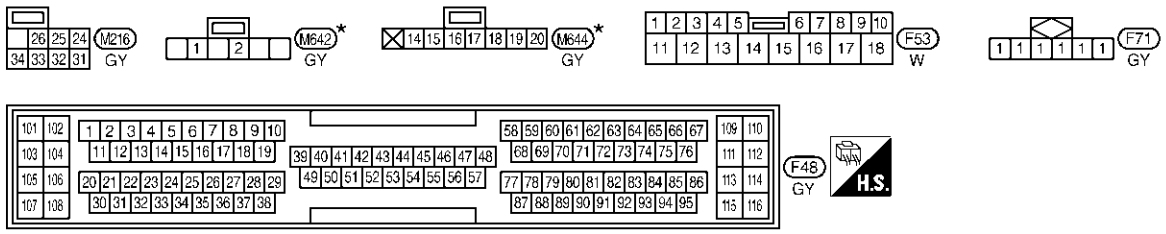
NHEC1464

EC-ASC/SW-01

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC





★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", EL SECTION.

MEC366E

Wiring Diagram (Cont'd)

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	G/Y	ASCD steering switch	**[Ignition switch "ON"]** ● ASCD steering switch is "OFF".	Approximately 4.0V
			[Ignition switch "ON"] ● CRUISE switch: Pressed	Approximately 0V
			[Ignition switch "ON"] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch "ON"] ● COAST/SET switch: Pressed	Approximately 2V
			[Ignition switch "ON"] ● ACCEL/RES switch: Pressed	Approximately 3V
58	B	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

NHEC1465

1 **CHECK ASCD STEERING SWITCH CIRCUIT**

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
MAIN SW	OFF
CANCEL SW	OFF
RESUME/ACC SW	OFF
SET SW	OFF

SEC006D

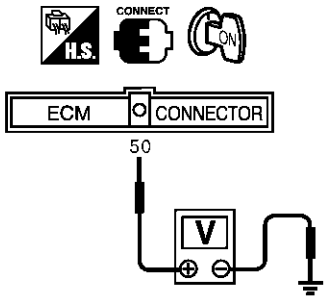
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
CRUISE	MAIN SW	Pressed	ON
		Released	OFF
COAST/SET	SET SW	Pressed	ON
		Released	OFF
ACCEL/RES	RESUME/ACC SW	Pressed	ON
		Released	OFF
CANCEL	CANCEL SW	Pressed	ON
		Released	OFF

MTBL1193

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 50 and ground with pressing each button.



SEC007D

Switch	Condition	Voltage [V]
CRUISE SW	Pressed	Approx. 0.5
	Released	Approx. 4.0
COAST/SET SW	Pressed	Approx. 2.0
	Released	Approx. 4.0
ACCEL/RES SW	Pressed	Approx. 3.0
	Released	Approx. 4.0
CANCEL SW	Pressed	Approx. 1.0
	Released	Approx. 4.0

MTBL1133

Refer to Wiring Diagram.

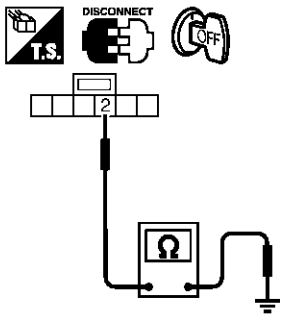
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ASCD steering harness connector.
3. Check harness continuity between switch terminal 2 and ground. Refer to Wiring Diagram.



SEC198D

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M223, F53
- Joint connector-20
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

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

4	CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 50 and ASCD steering switch 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 6.
NG	▶	GO TO 5.

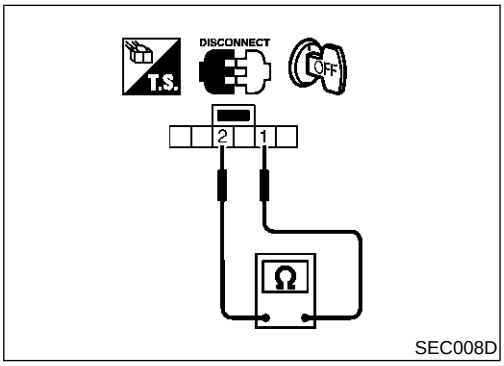
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M223, F53
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

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

6	CHECK ASCD STEERING SWITCH	
Refer to "Component Inspection", EC-611.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace ASCD steering switch.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



SEC008D

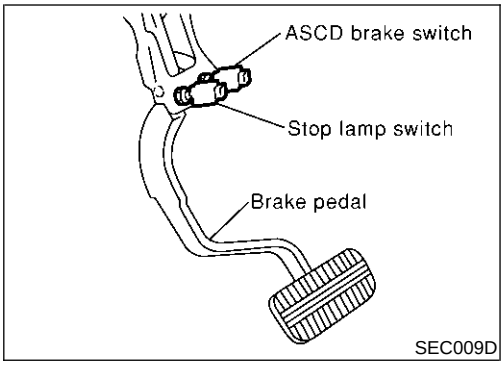
Component Inspection

NHEC1215

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between terminals 1 and 2 by pushing each switch.

Switch	Condition	Resistance [Ω]
CRUISE SW	Pressed	Approx. 0
	Released	Approx. 4,000
COAST/SET SW	Pressed	Approx. 660
	Released	Approx. 4,000
ACCEL/RES SW	Pressed	Approx. 1,480
	Released	Approx. 4,000
CANCEL SW	Pressed	Approx. 250
	Released	Approx. 4,000



Component Description

NHEC1466

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON.
ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1217

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	• Ignition switch: ON • Shift lever: Except “N” and “P” position	• Brake pedal: Released	ON
		• Brake pedal: Depressed	OFF
BRAKE SW 2 (Stop lamp switch)	• Ignition switch: ON	• Brake pedal: Released	OFF
		• Brake pedal: Depressed	ON

On Board Diagnosis Procedure

NHEC1467

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-435.**
- **If DTC P1572 is displayed with DTC P1805, first perform the trouble diagnosis for DTC P1805. Refer to EC-637.**

DTC	Trouble diagnosis name	DTC Detecting Condition	Possible cause
P1572 1572	ASCD brake switch	• When the vehicle speed is above 30 km/h (19 MPH), ON signal from the stop lamp switch and ASCD brake switch are sent to the ECM at the same time. • ASCD brake switch signal is not sent to ECM for an extremely long time while driving vehicle.	• Harness or connectors (The stop lamp switch circuit is open or shorted.) • Harness or connectors (The ASCD brake switch circuit is open or shorted.) • ASCD brake switch • Stop lamp switch • Harness or connectors (The ASCD brake switch or stop lamp switch circuit is open or shorted.) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • ECM

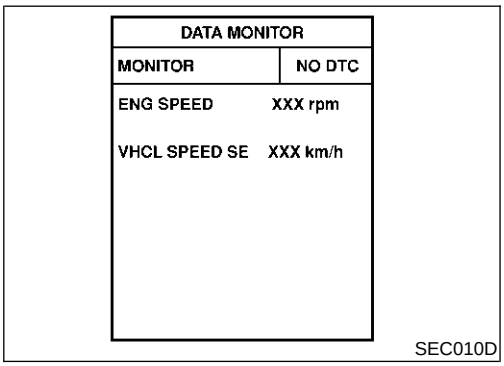
DTC Confirmation Procedure

NHEC1468

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 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 3 and 4 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) Start engine (TCS switch "OFF").
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-616.
If 1st rip DTC is not detected, go to the following step.

4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-616.

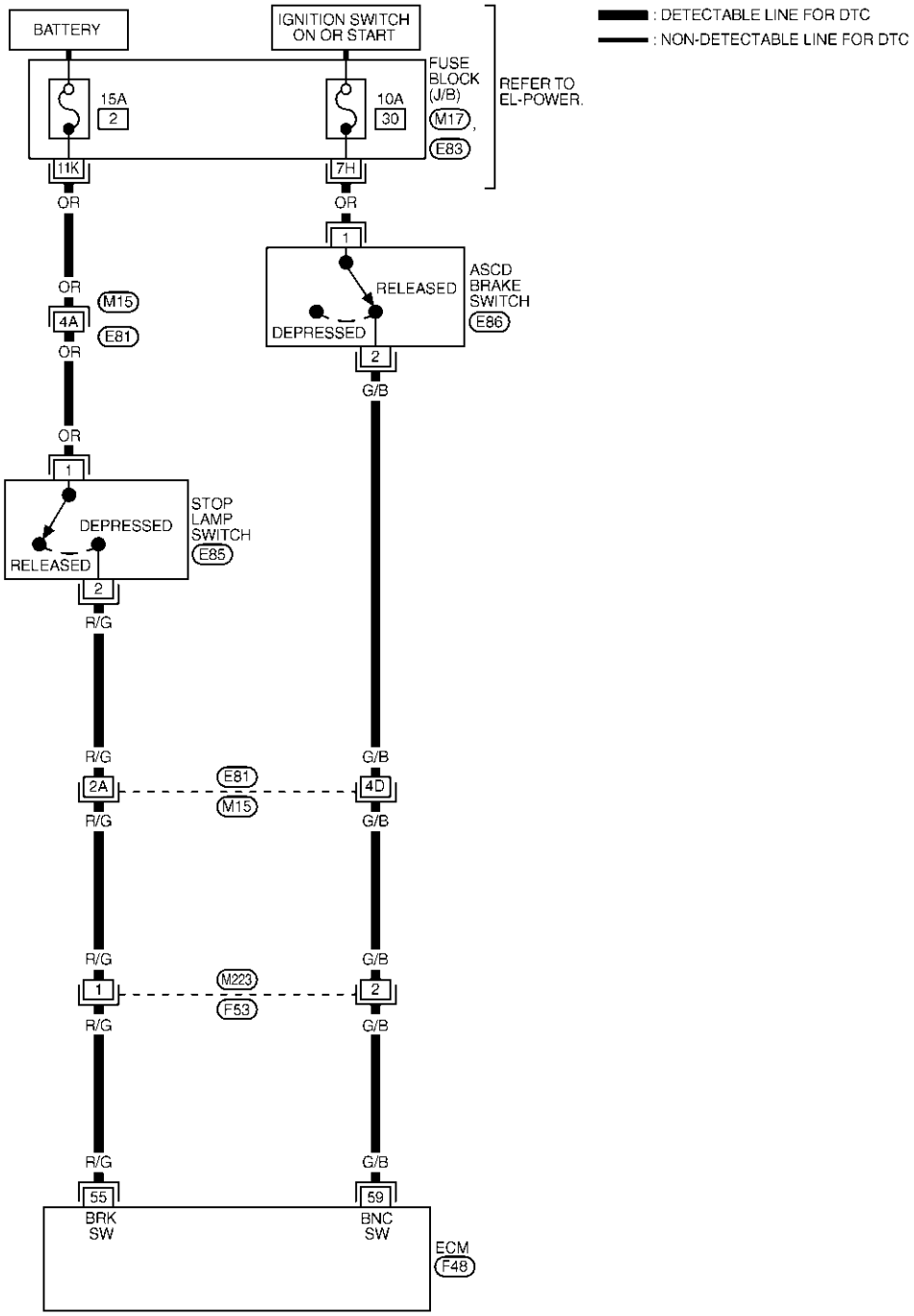
With GST

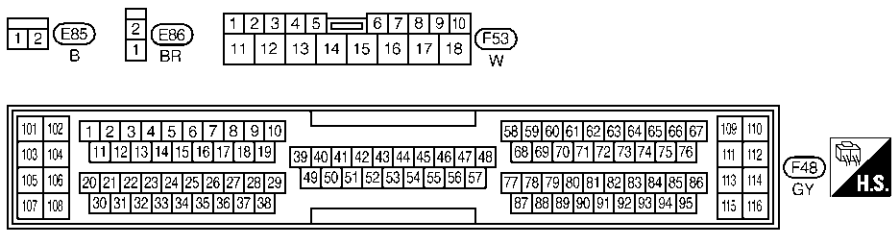
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC1221

EC-ASC/BS-01





REFER TO THE FOLLOWING.
M15 -SUPER MULTIPLE JUNCTION (SMJ)
M17 , E83
-FUSE BLOCK-
JUNCTION BOX (J/B)

MEC367E

Wiring Diagram (Cont'd)

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)
55	R/G	Stop lamp switch	**[Ignition switch "ON"]** ● Brake pedal is released	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal is depressed	BATTERY VOLTAGE (11 - 14V)
59	G/B	ASCD brake switch	**[Ignition switch "ON"]** ● Brake pedal is released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Brake pedal is depressed	Approximately 0V

Diagnostic Procedure

NHEC1222

1	CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check the indication of “BRAKE SW1” under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW1	OFF

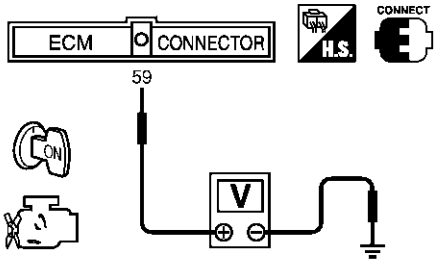
SEC011D

CONDITION	INDICATION
When brake pedal is depressed.	OFF
When brake pedal is released.	ON

MTBL1557

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 59 and ground under the following conditions.



SEC012D

CONDITION	VOLTAGE
When brake pedal is depressed.	Approximately 0V
When brake pedal is released.	Battery voltage

MTBL1558

Refer to Wiring Diagram.

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK OVERALL FUNCTION-II

Ⓕ **With CONSULT-II**

See "BRAKE SW2" indication in "DATA MONITOR" mode.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW2	OFF

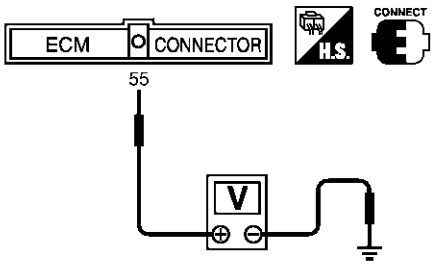
SEC013D

CONDITION	INDICATION
When brake pedal is depressed.	ON
When brake pedal is released.	OFF

MTBL1336

Ⓚ **Without CONSULT-II**

Check voltage between ECM terminal 55 and ground under the following conditions.



SEC014D

CONDITION	VOLTAGE
When brake pedal is depressed.	Battery voltage
When brake pedal is released.	Approximately 0V

MTBL1337

Refer to Wiring Diagram.

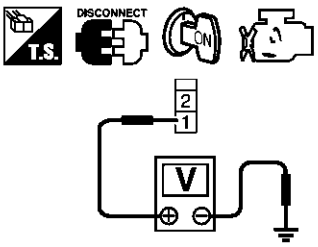
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

3	CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.



PBIB0857E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E83
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5	CHECK ASCD BRAKE SWITCH INPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and ASCD brake switch terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for open to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 6.

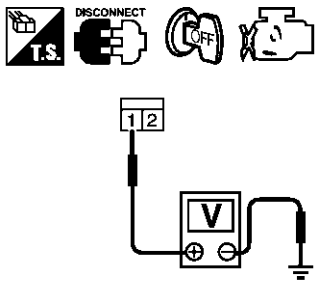
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E81, M15
- Harness connectors M223, F53
- Harness for open and short between ECM and ASCD brake switch

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

7	CHECK ASCD BRAKE SWITCH	
Refer to "Component Inspection", EC-621.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace ASCD brake switch.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors E81, M15 ● Harness connectors M223, F53 ● Harness for open and short between ASCD clutch switch and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

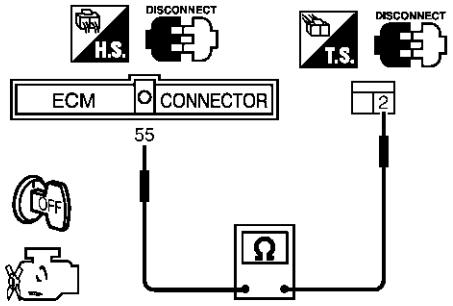
9	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect stop lamp switch harness connector. 3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.		
 PBIB0117E		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 12.
NG	▶	GO TO 11.

10	DETECT MALFUNCTIONING PART	
Check the following. ● Fuse block (J/B) connector M17 ● 15A fuse ● Harness connectors M15, E81 ● Harness for open or short between stop lamp switch and fuse		
	▶	Repair open circuit or short to ground in harness or connectors.

Diagnostic Procedure (Cont'd)

11	CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 55.



SEC216D

Continuity should exist

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

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M15, E81
- Harness connectors M162, F55
- Harness for open or short between stop lamp switch and ECM

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

13	CHECK STOP LAMP SWITCH

Refer to "Component Inspection", EC-621.

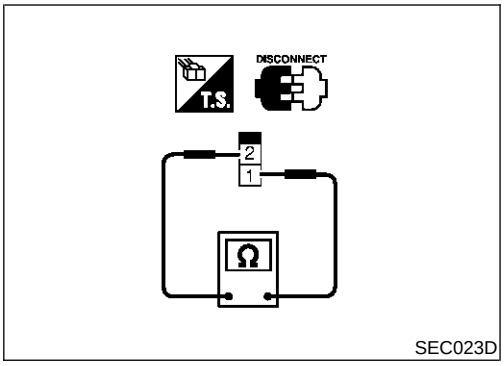
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace stop lamp switch.

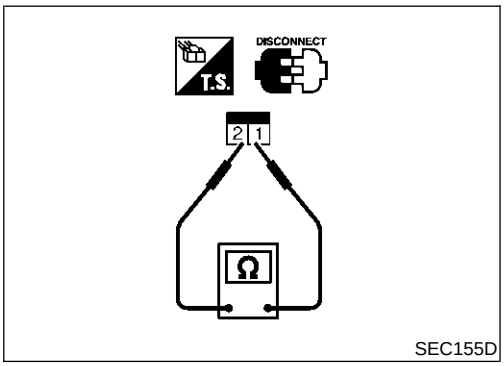
14	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

	▶	**INSPECTION END**



SEC023D



SEC155D

Component Inspection

NHEC1223

ASCD BRAKE SWITCH AND STOP LAMP SWITCH

Condition	Continuity	
	ASCD brake switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

Check each switch after adjusting brake pedal — refer to BR section.

Component Description

NHEC1469

ECM receives vehicle speed signals via two different lines, and detects vehicle speed for ASCD control.
Vehicle speed signals are input from combination meter and TCM separately.
Signal from TCM is sent via CAN communication line.
Refer to EC-54 for ASCD functions.

On Board Diagnosis Procedure

NHEC1470

The MIL will not light up for this self-diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001, refer to EC-159.**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-422.**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-435.**

DTC	Trouble diagnosis name	DTC Detecting Condition	Possible cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference values between two vehicle speed signals if they are out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) • Harness or connectors (The combination meter circuit is open or shorted.) • Combination meter • Vehicle speed sensor • TCM • ECM

DTC Confirmation Procedure

NHEC1471

CAUTION:

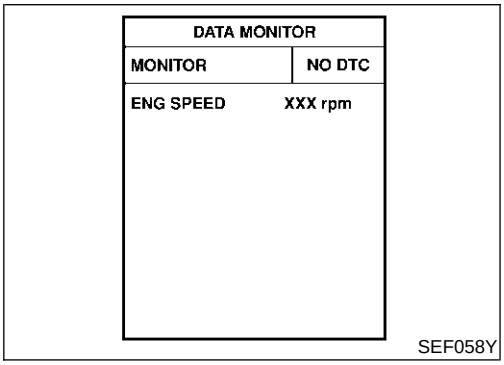
Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 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

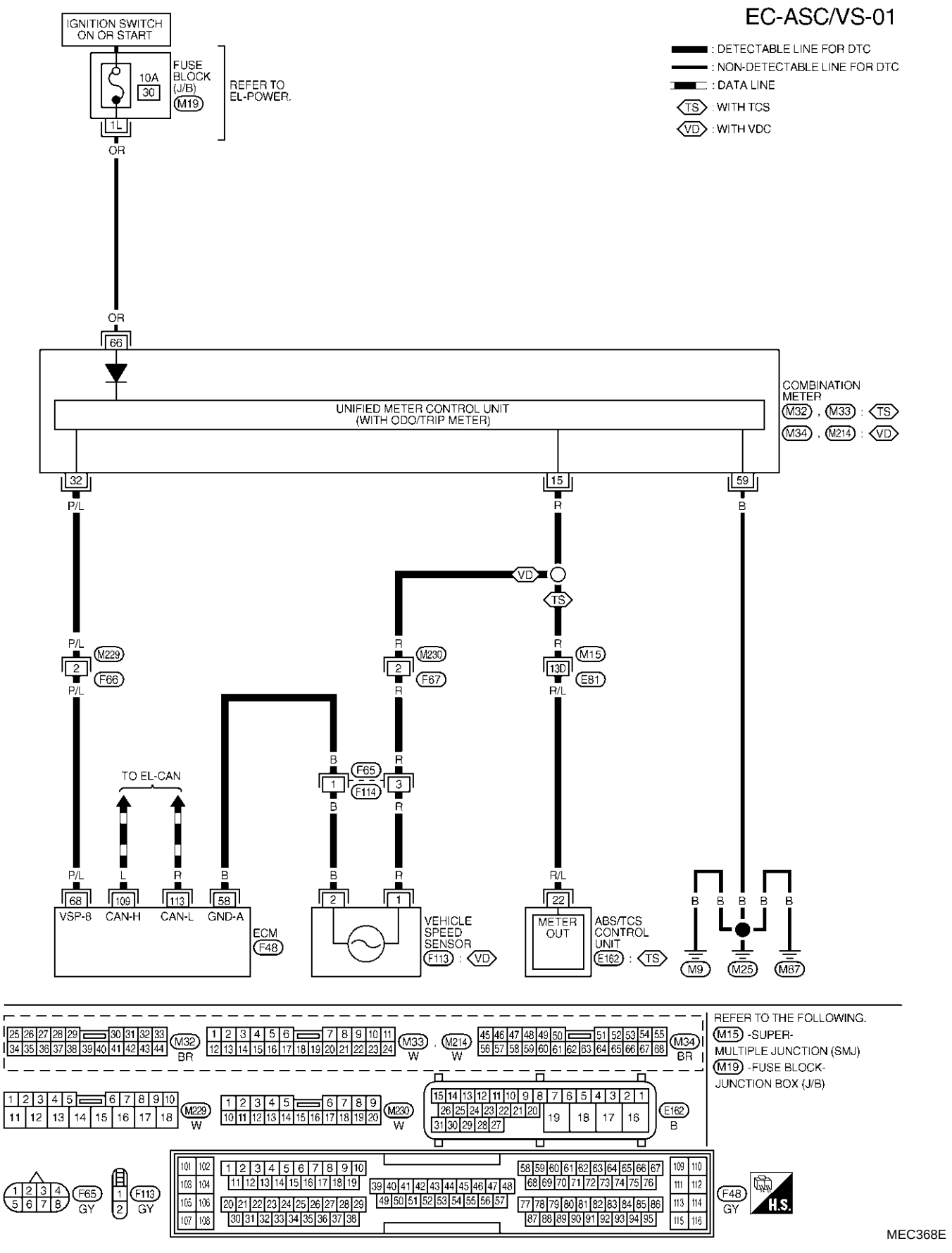
1) Start engine (TCS switch “OFF”).
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Drive the vehicle at more than 40 km/h (25 MPH).
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-625.

With GST

Follow the procedure "With CONSULT-II" above.

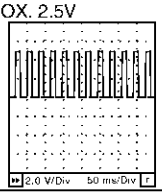
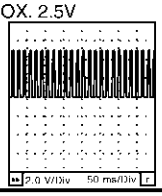
Wiring Diagram

NHEC1229



MEC368E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
68	P/L	VEHICLE SPEED SENSOR	VEHICLE DRIVING AT 10 KM/H (6 MPH) IN 1ST GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.5V 
			VEHICLE DRIVING AT 30 KM/H (19 MPH) IN 2ND GEAR POSITION UNDER LIFTED UP CONDITION	APPROX. 2.5V 

SEC045DB

Diagnostic Procedure

NHEC1230

1	CHECK TCM FUNCTION	
Check malfunction of the AT system with CONSULT-II or "O/D OFF" indicator. Refer to AT-5.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check AT system. Refer to AT-5.

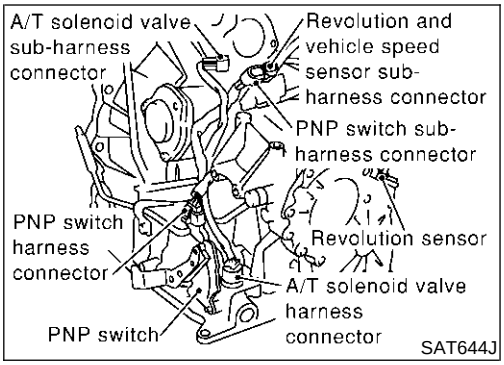
2	CHECK SPEEDOMETER OPERATION	
Check if speedometer operates normally.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check speedometer and vehicle speed sensor circuit. Refer to EL-125.

3	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 68 and combination meter terminal 32 with CONSULT-II or tester. 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	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F66, M229 ● Harness for open or short between combination meter and ECM	
▶	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-151.	
▶	**INSPECTION END**



Component Description

NHEC1134

When the gear position is “P” or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
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

NHEC1135

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

On Board Diagnosis Logic

NHEC1137

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1706 1706	Park/Neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

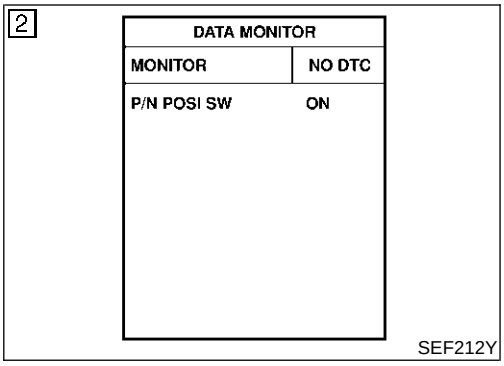
DTC Confirmation Procedure

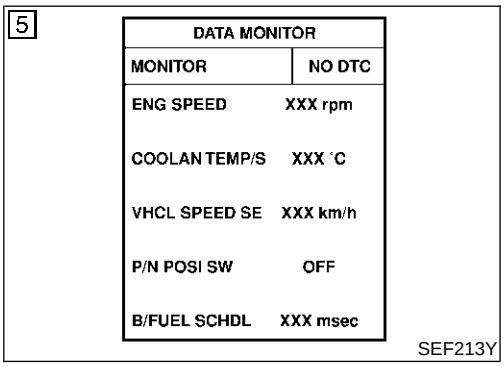
NHEC1138

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 10 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)





WITH CONSULT-II

=NHEC1138S01

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.

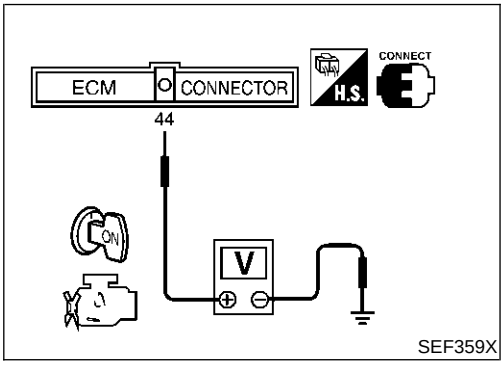
Position (Selector lever)	Known-good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-630.
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	More than 1,400 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More than 2 msec
VHCL SPEED SE	More than 65 km/h (40 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-630.



Overall Function Check

NHEC1139

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.

WITH GST

NHEC1139S01

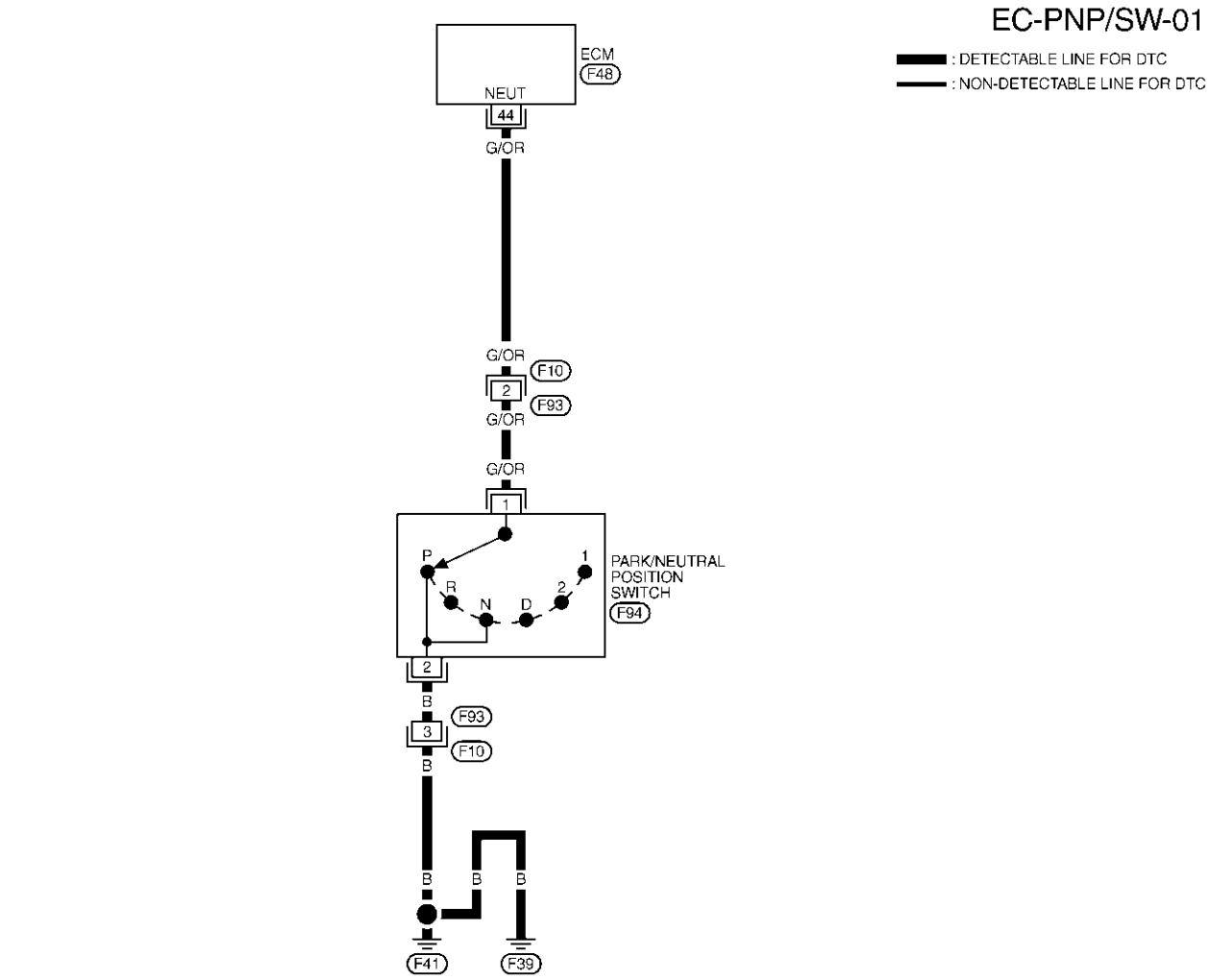
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal 44 and body ground under the following conditions.

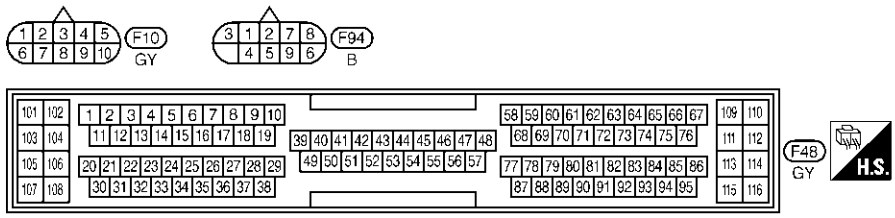
Condition (Gear position)	Voltage V (Known-good data)
"P" and "N" position	Approx. 0
Except the above position	Battery voltage

3) If NG, go to "Diagnostic Procedure", EC-630.

Wiring Diagram

NHEC1140





MEC369E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
44	G/OR	PARK/NEUTRAL POSITION (PNP) SWITCH	IGN ON WITH GEAR POSITION "N" OR "P"	APPROX. 0V
			IGN ON WITHOUT THE ABOVE GEAR POSITION	BATTERY VOLTAGE

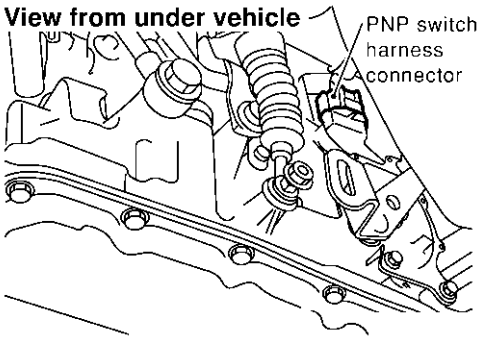
SEF635XG

Diagnostic Procedure

NHEC1141

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect park/neutral position (PNP) switch harness connector.



SEF279X

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.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F93, F10
- Check 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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 44 and PNP switch 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F10, F93
- 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.

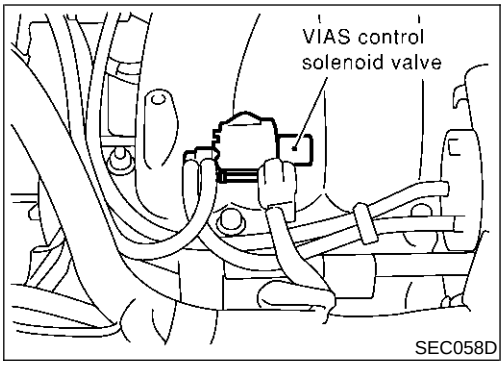
5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-112, “Diagnostic Procedure”.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC1400

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1404

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	• Engine: After warming up	1,800 - 3,600 rpm	ON
		Except above condition	OFF

On Board Diagnosis Logic

NHEC1472

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1800 1800	VIAS control solenoid valve circuit open	An improper voltage signal is sent to ECM through VIAS control solenoid valve.	• Harness connectors (The solenoid valve circuit is open or shorted.) • VIAS control solenoid valve

DTC Confirmation Procedure

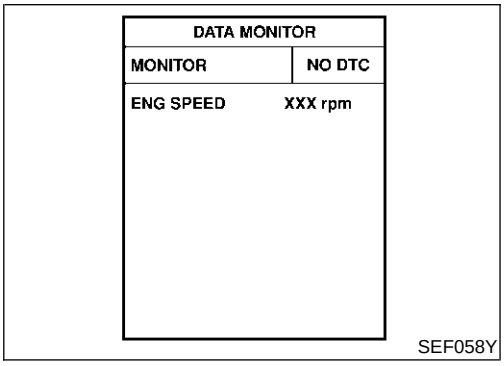
NHEC1473

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 battery voltage is more than 11V at idle.



WITH CONSULT-II

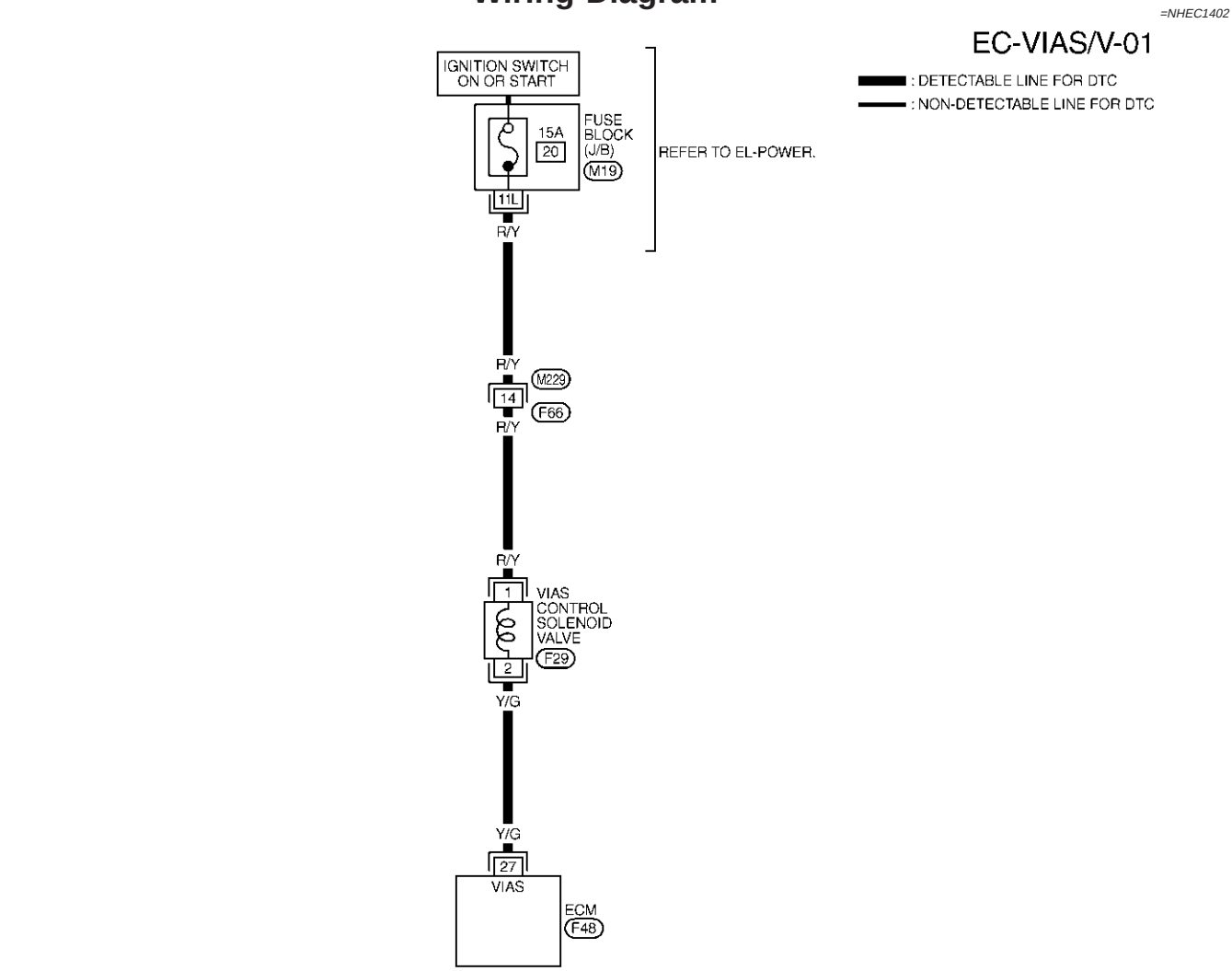
1. Turn ignition switch “ON”.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it for 10 seconds.
4. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-635.

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

=NHEC1402



ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
27	Y/G	VIAS CONTROL SOLENOID VALVE	ENGINE RUNNING BETWEEN 1,800 AND 3,600 RPM	0 - 1.0V
			EXCEPT ABOVE CONDITION	BATTERY VOLTAGE

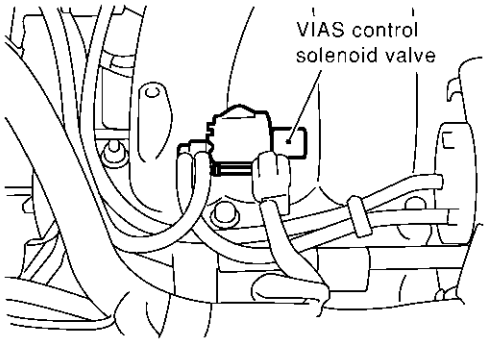
SEF636XC

Diagnostic Procedure

NHEC1403

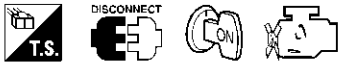
1	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

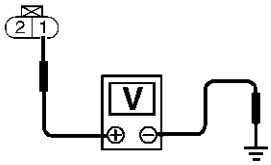
1. Turn ignition switch “OFF”.
2. Disconnect VIAS control solenoid valve harness connector.



SEC058D

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Fuse block (J/B) connector M19
- 15A fuse
- Harness continuity between fuse and VIAS control solenoid valve

	▶	Repair harness or connectors.

3	CHECK VIAS CONTROL SOLENOID 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 27 and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

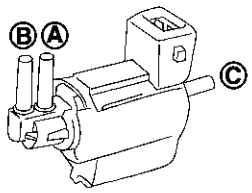
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connector disconnected.
2. Turn ignition switch ON.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VIAS SOL VALVE	ON
MONITOR	
ENG SPEED	XXX rpm

PBIB0177E

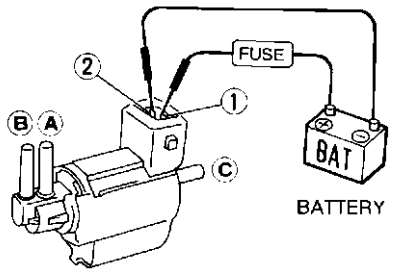
Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

MTBL1301

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



MEC488B

Condition VIAS SOL VALVE	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

Operation takes less than 1 second.

MTBL1302

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace VIAS control solenoid valve.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

Description

NHEC1278

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1279

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

NHEC1280

The MIL will not light up for this self-diagnosis.

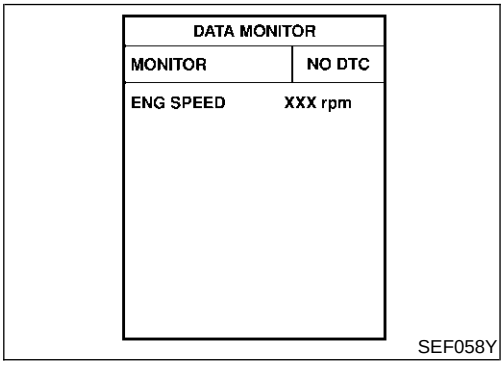
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

NHEC1280S01

When the malfunction is detected, the ECM enters fail-safe mode.

Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to small range. Therefore, acceleration will be poor.	
Condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration



DTC Confirmation Procedure

NHEC1281

WITH CONSULT-II

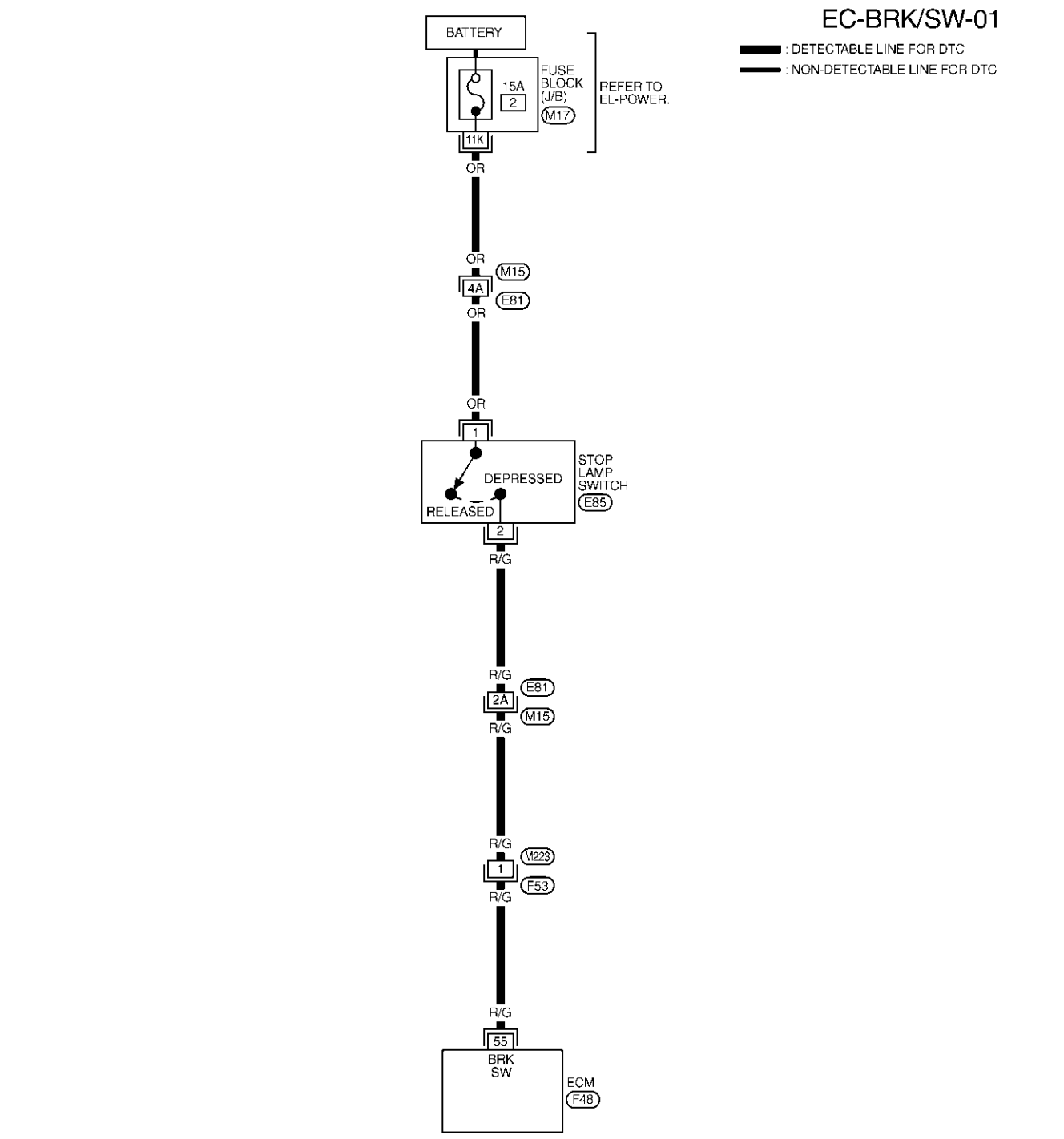
1. Turn ignition switch “ON”.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-639.

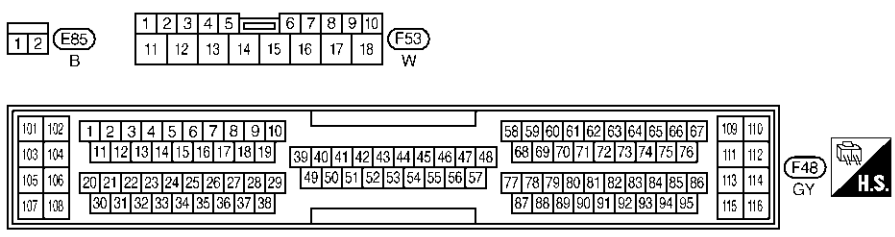
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1282





REFER TO THE FOLLOWING.
M15 -SUPER MULTIPLE JUNCTION (SMJ)
M17 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC370E

Wiring Diagram (Cont'd)

Specification data are reference values and are measured between each terminal and body 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)
55	R/G	Stop lamp switch	**[Engine is running]** ● Brake pedal released	Approximately 0V
			[Engine is running] ● Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

NHEC1283

1	CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch "OFF".
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

MTBL1138

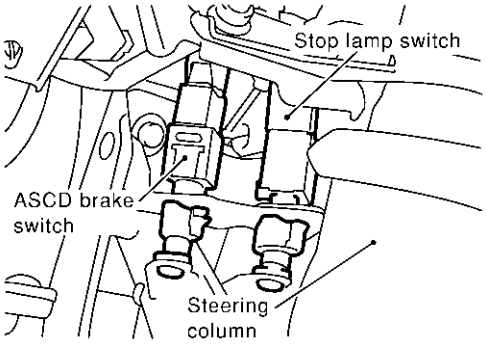
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

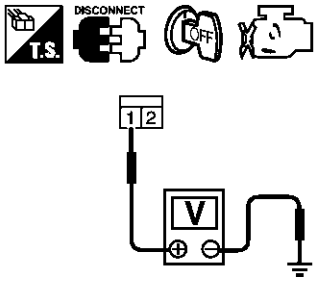
2	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



SEC053D

2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



SEC051D

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

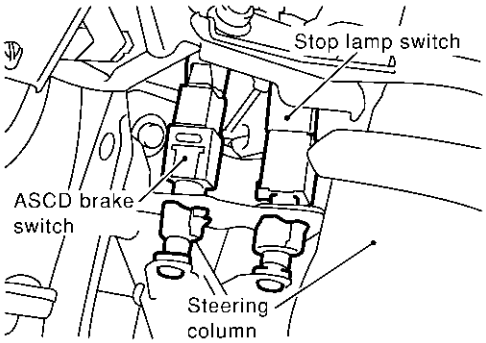
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M15, E81
- 15A fuse
- Fuse block (J/B) connector M17
- Harness for open and short between stop lamp switch and battery

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

4	CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Disconnect stop lamp switch harness connector.



SEC053D

4. Check harness continuity between ECM terminal 55 and stop lamp switch terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
5. 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.
- Harness connectors E81, M15
- Harness connectors M223, F53
- Harness for open or short between ECM and stop lamp switch

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

6	CHECK STOP LAMP SWITCH

Refer to "Component Inspection", EC-642.

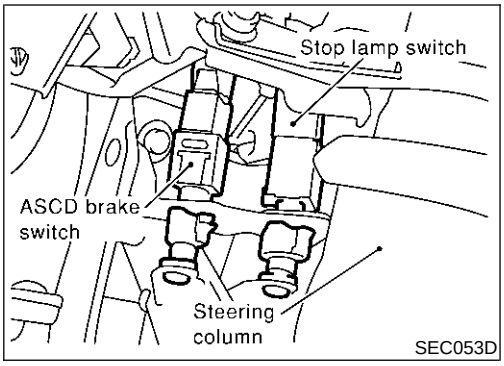
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace stop lamp switch.

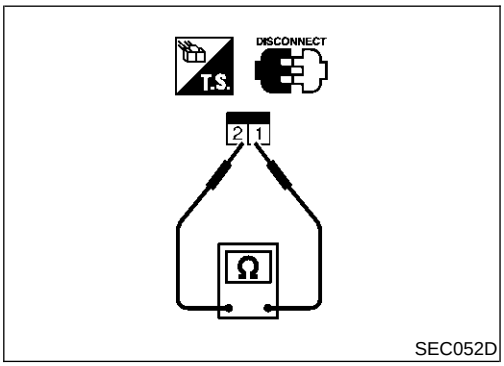
7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

	▶	**INSPECTION END**



SEC053D



SEC052D

Component Inspection

=NHEC1284

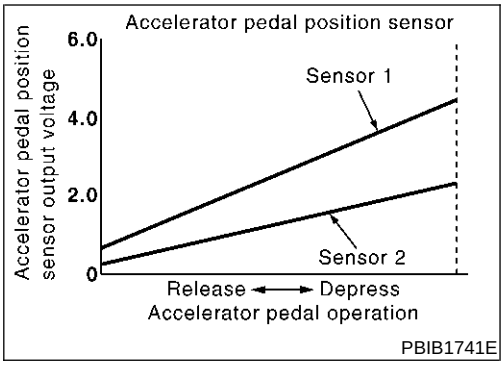
STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.

2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal released	Should not exist.
Brake pedal depressed	Should exist.

3. If NG, replace stop lamp switch.



Component Description

NHEC1386

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1387

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) Shift lever: “D”	Accelerator pedal: Released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 3.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) Shift lever: “D”	Accelerator pedal: Released	0.15 - 0.97V
		Accelerator pedal: Fully depressed	More than 3.5V
CLSD THL POS	• Ignition switch: ON (engine stopped) Shift lever: “D”	Accelerator pedal: Released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

NHEC1440

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (The APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

On Board Diagnosis Logic (Cont'd)

FAIL-SAFE MODE

=NHEC1440S01

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

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

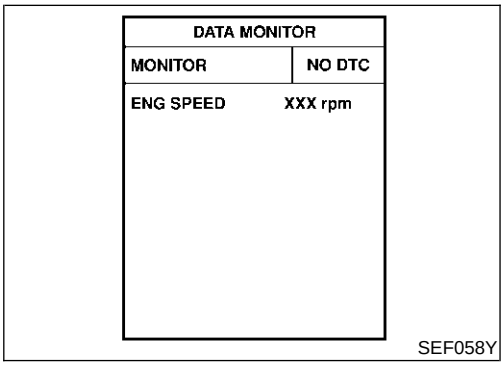
NHEC1441

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 10V at idle.



SEF058Y

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to "Diagnostic Procedure", EC-646.

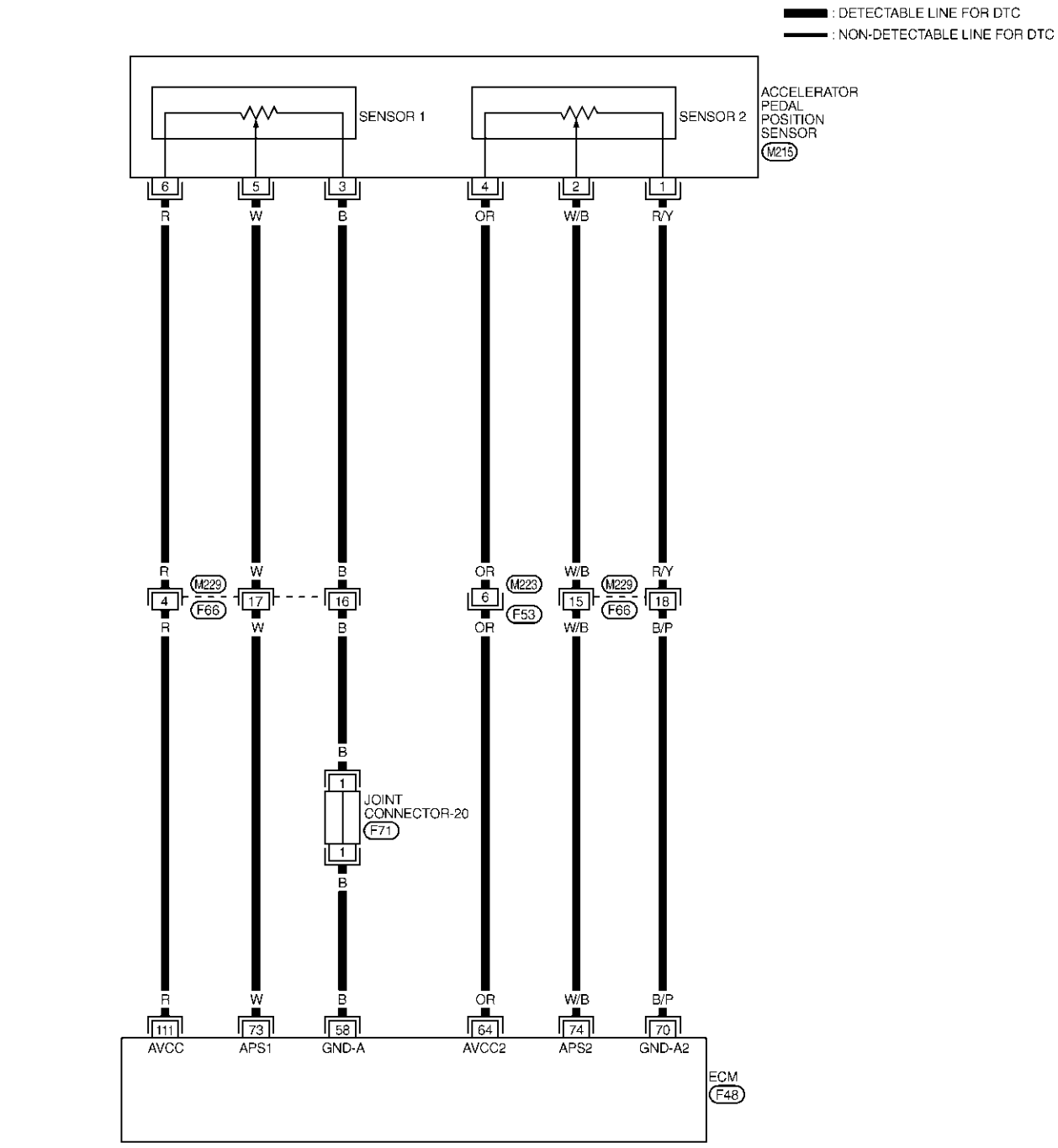
With GST

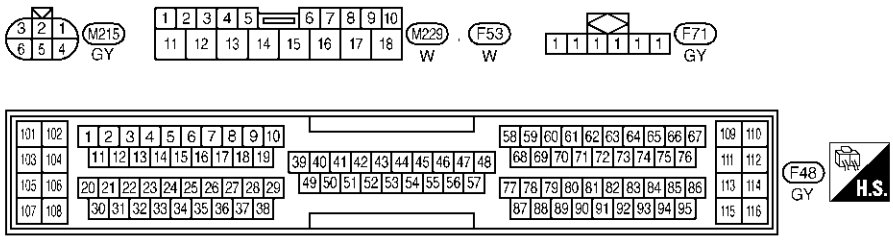
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC1390

EC-APPS3-01





MEC353E

Wiring Diagram (Cont'd)

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.

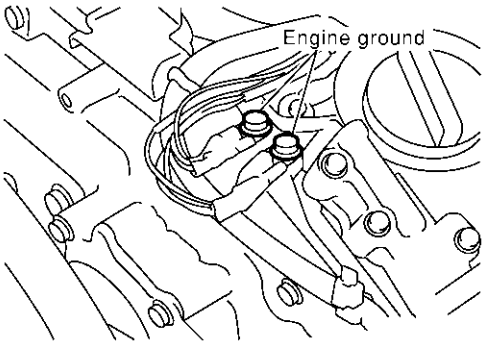
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	OR	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
70	B/P	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V
73	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.41 - 0.71V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 3.7V
74	W/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.08 - 0.48V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 1.8V
111	R	Sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1391

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

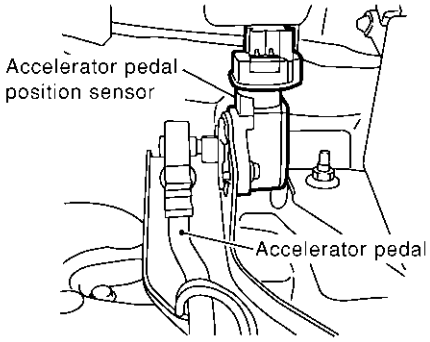


SEC047D

▶ GO TO 2.

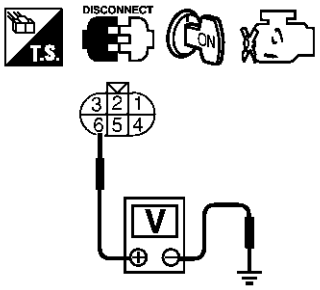
2	CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".



SEC081D

3. Check voltage between APP sensor terminals 6 and ground with CONSULT-II or tester.



SEC093D

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Harness for open or short between ECM and accelerator pedal position sensor

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

4	CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between APP sensor terminal 3 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.

Diagnostic Procedure (Cont'd)

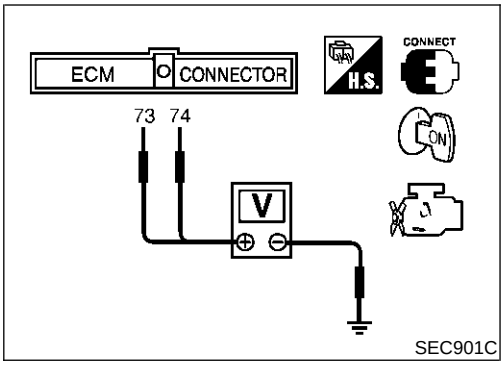
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● Joint connector-20 ● Harness for open or short between ECM and accelerator pedal position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 73 and APP sensor terminal 5. 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. ● Harness connectors M229, F66 ● Harness for open or short between ECM and accelerator pedal position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK APP SENSOR
Refer to "Component Inspection", EC-649.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace accelerator pedal assembly.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Inspection

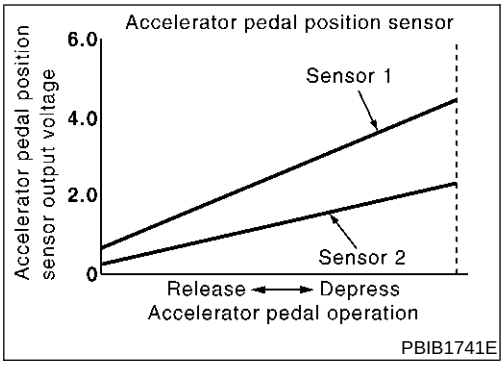
=NHEC1442

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Check voltage between ECM terminals 73 (APP sensor 1 signal), 74 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
73 (Accelerator pedal position sensor 1)	Released	0.41 - 0.71V
	Fully depressed	More than 3.7V
74 (Accelerator pedal position sensor 2)	Released	0.08 - 0.48V
	Fully depressed	More than 1.8V

4. If NG, replace accelerator pedal assembly.
5. Perform “Accelerator Pedal Released Position Learning”, EC-71.
6. Perform “Throttle Valve Closed Position Learning”, EC-71.
7. Perform “Idle Air Volume Learning”, EC-71.



Component Description

NHEC1347

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1348

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 3.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	0.15 - 0.97V
		Accelerator pedal: Fully depressed	More than 3.5V
CLSD THL POS	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

NHEC1457

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (The APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

=NHEC1457S01

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

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

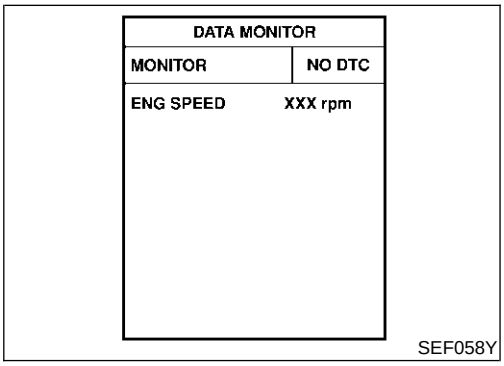
NHEC1458

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 10V 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 1 second.
4) If DTC is detected, go to "Diagnostic Procedure", EC-653.

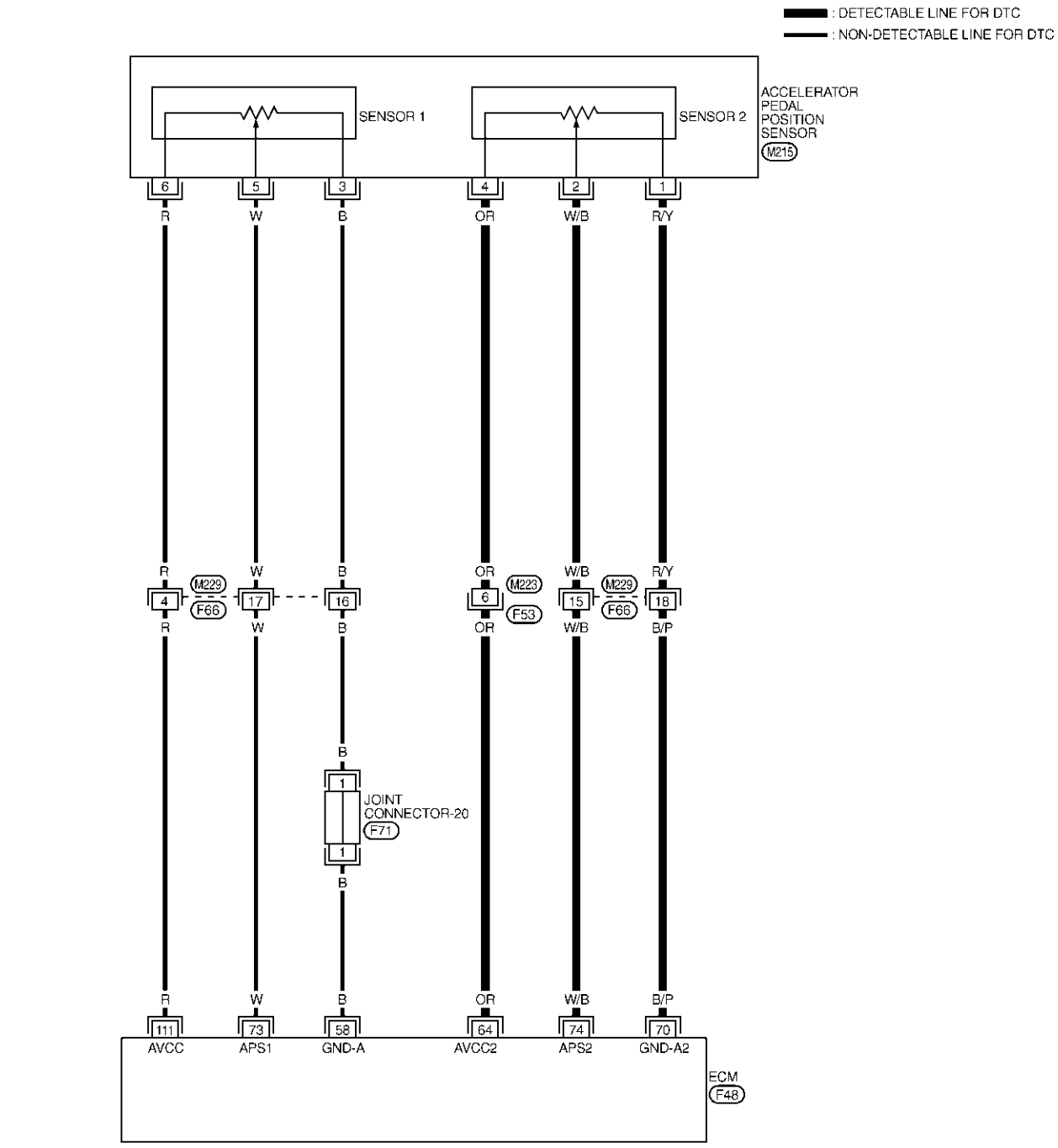
With GST

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NHEC1351

EC-APPS2-01



MEC363E

Wiring Diagram (Cont'd)

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.

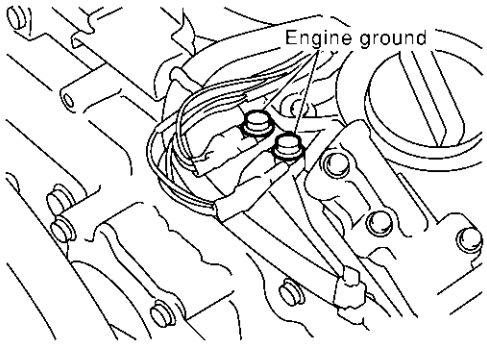
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	OR	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
70	B/P	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V
73	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.41 - 0.71V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 3.7V
74	W/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.08 - 0.48V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 1.8V
111	R	Sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1352

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



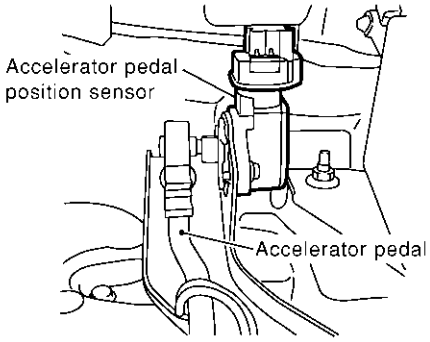
SEC047D

▶ GO TO 2.

Diagnostic Procedure (Cont'd)

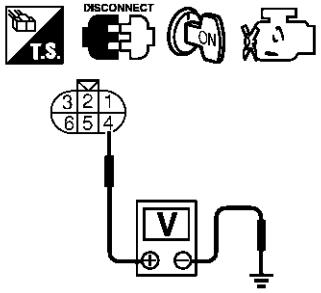
2	CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".



SEC081D

3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.



SEC094D

Voltage: Approximately 2.5V

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M223, F53
- Harness for open or short between ECM and accelerator pedal position sensor

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

4	CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between APP 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

Check the following.
- Harness connectors M229, F66
- Harness for open or short between ECM and accelerator pedal position sensor

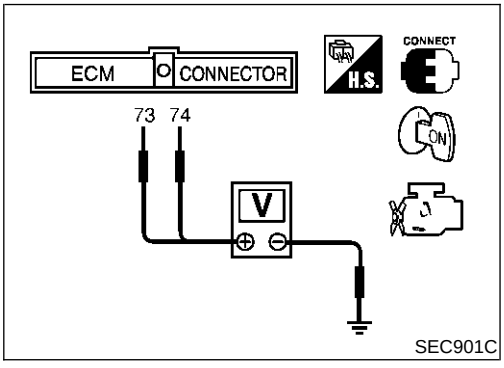
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 74 and APP 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 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● Harness for open or short between ECM and accelerator pedal position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK APP SENSOR
Refer to "Component Inspection", EC-655. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Replace accelerator pedal assembly.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Inspection

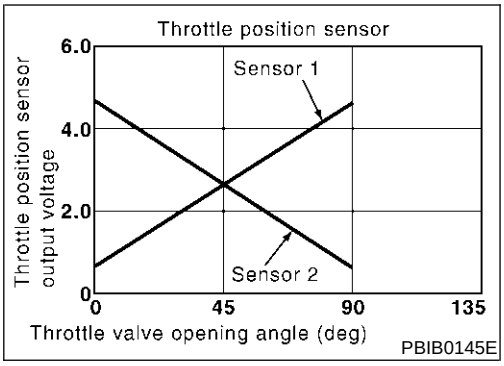
NHEC1459

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminals 73 (APP sensor 1 signal), 74 (APP sensor 2 signal) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
73 (Accelerator pedal position sensor 1)	Released	0.41 - 0.71V
	Fully depressed	More than 3.7V
74 (Accelerator pedal position sensor 2)	Released	0.08 - 0.48V
	Fully depressed	More than 1.8V

4. If NG, replace accelerator pedal assembly.
5. Perform "Accelerator Pedal Released Position Learning", EC-71.
6. Perform "Throttle Valve Closed Position Learning", EC-71.
7. Perform "Idle Air Volume Learning", EC-71.



Component Description

NHEC1365

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle vale movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve form these signal and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1366

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	• Ignition switch: ON (Engine stopped) • Shift lever: D	Accelerator pedal: Released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

NHEC1434

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2135 2135	Throttle position sensor circuit range/ performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

NHEC1434S01

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

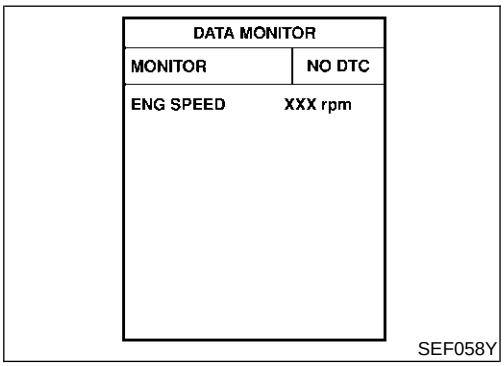
Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

NHEC1435

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 10V 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 1 second.
4. If DTC is detected, go to “Diagnostic Procedure”, EC-659.

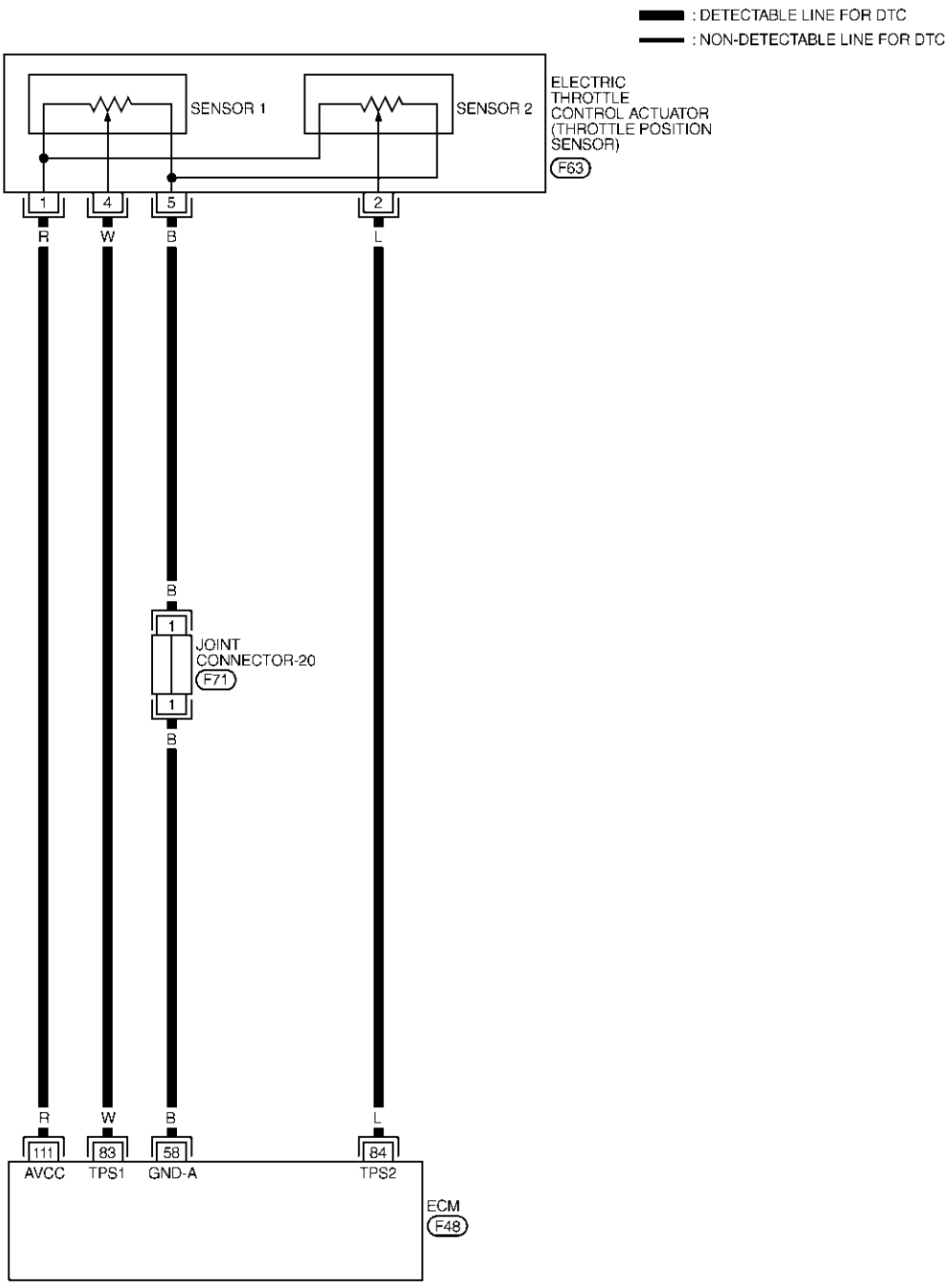
With GST

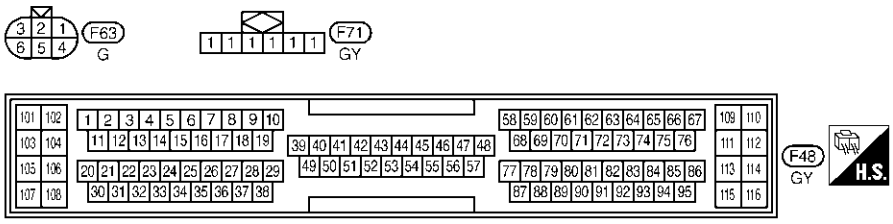
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NHEC1369

EC-TPS3-01





MEC351E

Wiring Diagram (Cont'd)

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.

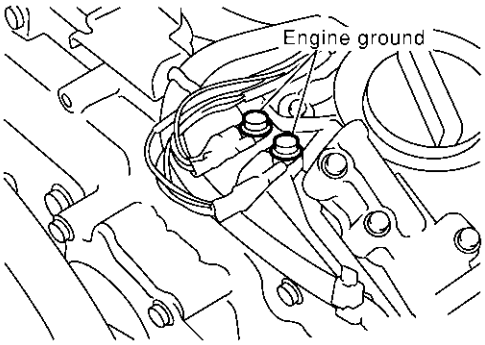
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	W	Throttle position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal released	More than 0.36V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	Less than 4.75V
84	L	Throttle position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal released	Less than 4.75V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever position is "D" ● Accelerator pedal fully depressed	More than 0.36V
111	R	Sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1370

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



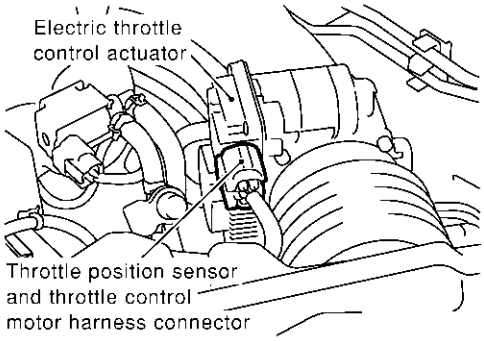
SEC047D

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

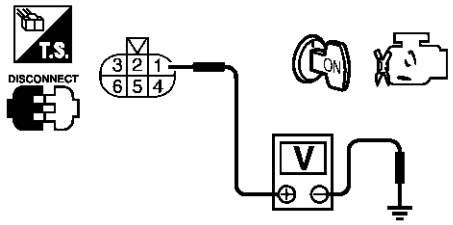
2	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch "ON".



SEC054D

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.



PBIB0082E

Voltage: Approximately 5V

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 THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between electric throttle control actuator terminal 5 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 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-20
- Harness for open or short between electric throttle control actuator and ECM

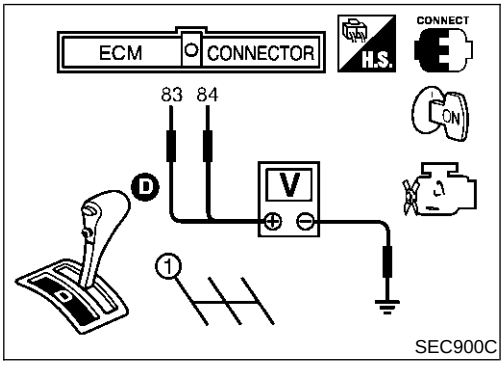
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 83 and electric throttle control actuator terminal 4, ECM terminal 84 and electric throttle control actuator 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 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK THROTTLE POSITION SENSOR
Refer to "Component Inspection", EC-661.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
1. Replace the electric throttle control actuator. 2. Perform "Throttle Valve Closed Position Learning", EC-71. 3. Perform "Idle Air Volume Learning", EC-71.	
▶	**INSPECTION END**

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



SEC900C

Component Inspection

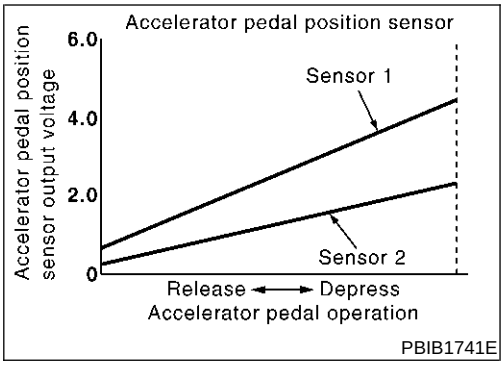
NHEC1371

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform "Throttle Valve Closed Position Learning", EC-71.
3. Turn ignition switch "ON".
4. Set selector lever to "D" position.
5. Check voltage between ECM terminals 83 (TP sensor 1), 84 (TP sensor 2) and engine ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Throttle position sensor 1)	Released	More than 0.36V
	Fully depressed	Less than 4.75V
84 (Throttle position sensor 2)	Released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform "Throttle Valve Closed Position Learning", EC-71.
8. Perform "Idle Air Volume Learning", EC-71.



Component Description

NHEC1379

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1380

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	0.41 - 0.71V
		Accelerator pedal: Fully depressed	More than 3.7V
ACCEL SEN2*	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	0.15 - 0.97V
		Accelerator pedal: Fully depressed	More than 3.5V
CLSD THL POS	• Ignition switch: ON (engine stopped) • Shift lever: “D”	Accelerator pedal: Released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

NHEC1438

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor 1 and 2

FAIL-SAFE MODE

=NHEC1438S01

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

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

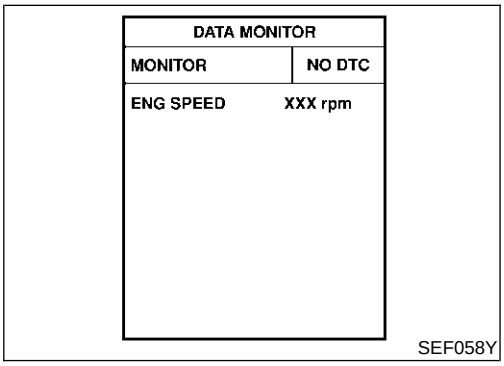
NHEC1439

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 10V 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 1 second.
4. If DTC is detected, go to "Diagnostic Procedure", EC-665.

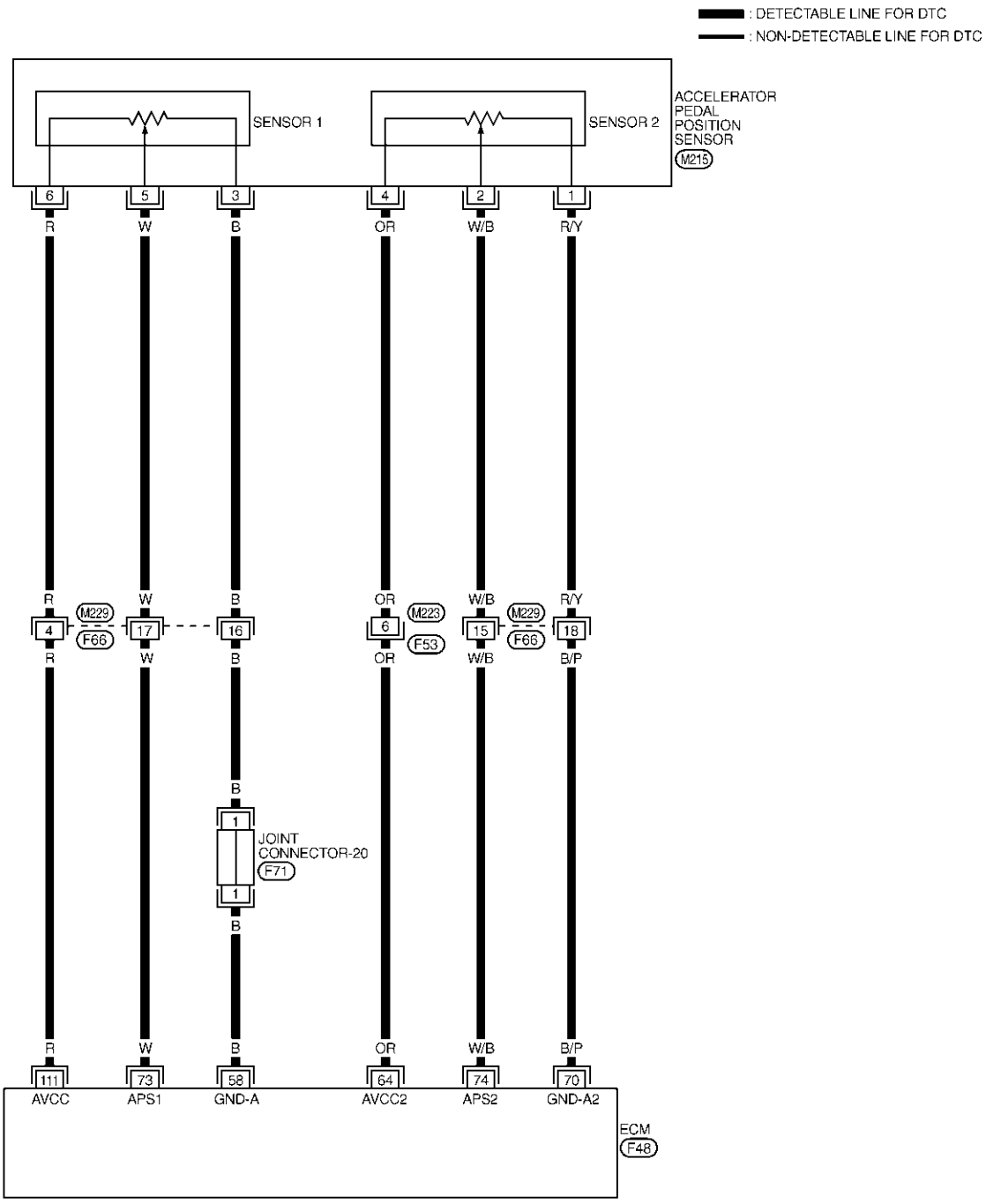
With GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NHEC1383

EC-APPS3-01



MEC353E

Wiring Diagram (Cont'd)

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.

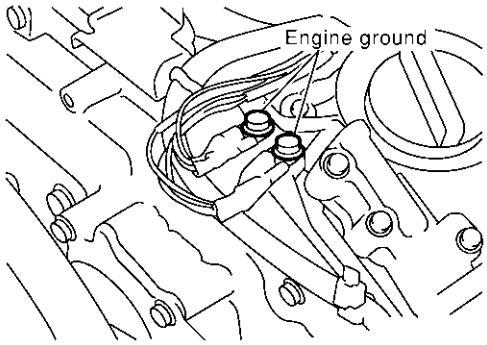
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
64	OR	Accelerator pedal position sensor 2 power supply	**[Ignition switch "ON"]**	Approximately 2.5V
70	B/P	Accelerator pedal position sensor 2 ground	**[Ignition switch "ON"]**	Approximately 0V
73	W	Accelerator pedal position sensor 1	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.41 - 0.71V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 3.7V
74	W/B	Accelerator pedal position sensor 2	**[Ignition switch "ON"]** ● Engine stopped ● Shift lever: "D" ● Accelerator pedal released	0.08 - 0.48V
			[Ignition switch "ON"] ● Engine stopped ● Shift lever: "D" ● Accelerator pedal fully depressed	More than 1.8V
111	R	Sensor power supply	**[Ignition switch "ON"]**	Approximately 5V

Diagnostic Procedure

NHEC1384

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.



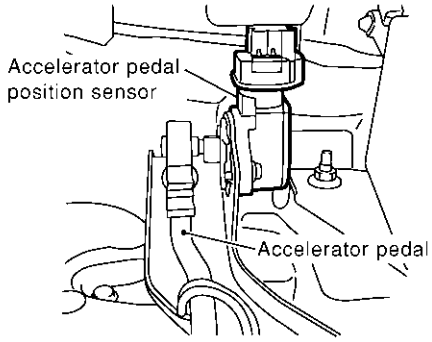
SEC047D

▶ GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch "ON".

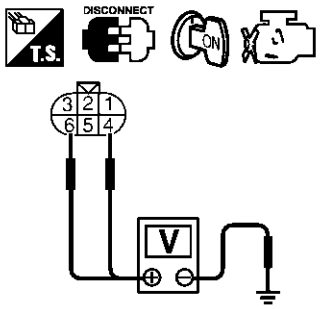


SEC081D

3. Check voltage between APP sensor terminals 4, 6 and ground with CONSULT-II or tester.

APP sensor terminal	Voltage (V)
4	Approximately 2.5
6	Approximately 5

MTBL1167



SEC092D

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Harness connectors M223, F53
- Harness for open or short between ECM and accelerator pedal position sensor

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

4	CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between APP sensor terminals 1, 3 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.

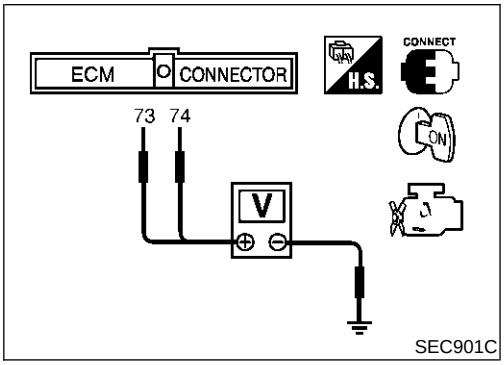
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● Joint connector-20 ● Harness for open or short between ECM and accelerator pedal position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 73 and APP sensor terminal 5, ECM terminal 74 and APP 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 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M229, F66 ● Harness for open or short between ECM and accelerator pedal position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK APP SENSOR
Refer to "Component Inspection", EC-667.	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace accelerator pedal assembly.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Inspection

NHEC1385

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminals 73 (APP sensor 1 signal), 74 (APP sensor 2 signal) and engine ground under the following conditions.

Component Inspection (Cont'd)

Terminal	Accelerator pedal	Voltage
73 (Accelerator pedal position sensor 1)	Released	0.41 - 0.71V
	Fully depressed	More than 3.7V
74 (Accelerator pedal position sensor 2)	Released	0.08 - 0.48V
	Fully depressed	More than 1.8V

4. If NG, replace accelerator pedal assembly.
5. Perform "Accelerator Pedal Released Position Learning", EC-71.
6. Perform "Throttle Valve Closed Position Learning", EC-71.
7. Perform "Idle Air Volume Learning", EC-71.

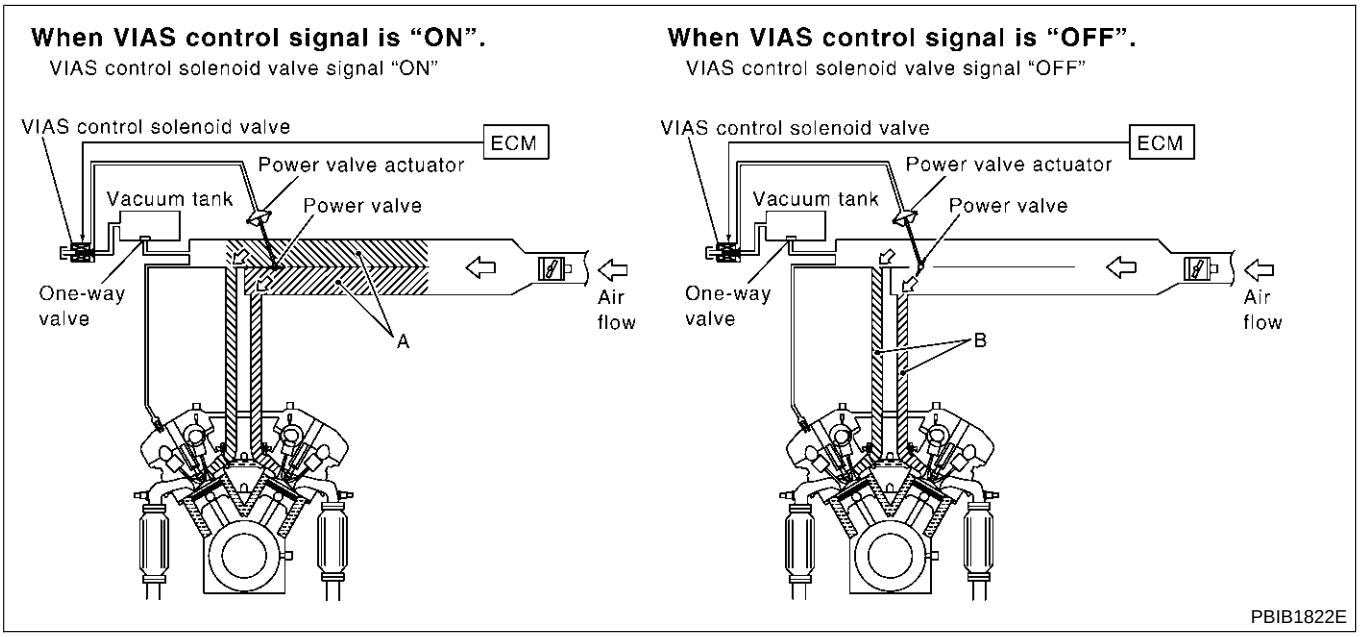
Description

NHEC0596

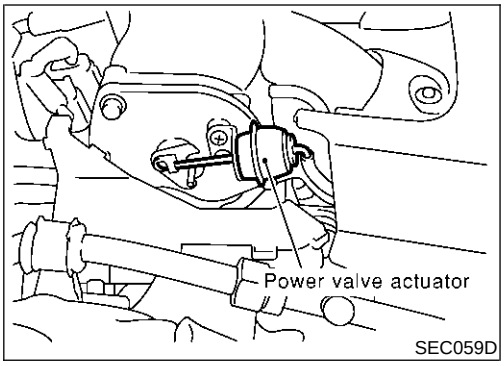
SYSTEM DESCRIPTION

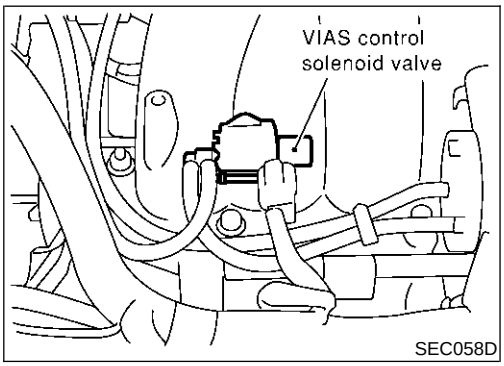
NHEC0596S01

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		



When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.
Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.
When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.
Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.





COMPONENT DESCRIPTION

NHEC0596S02

Power Valve

NHEC0596S0201

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

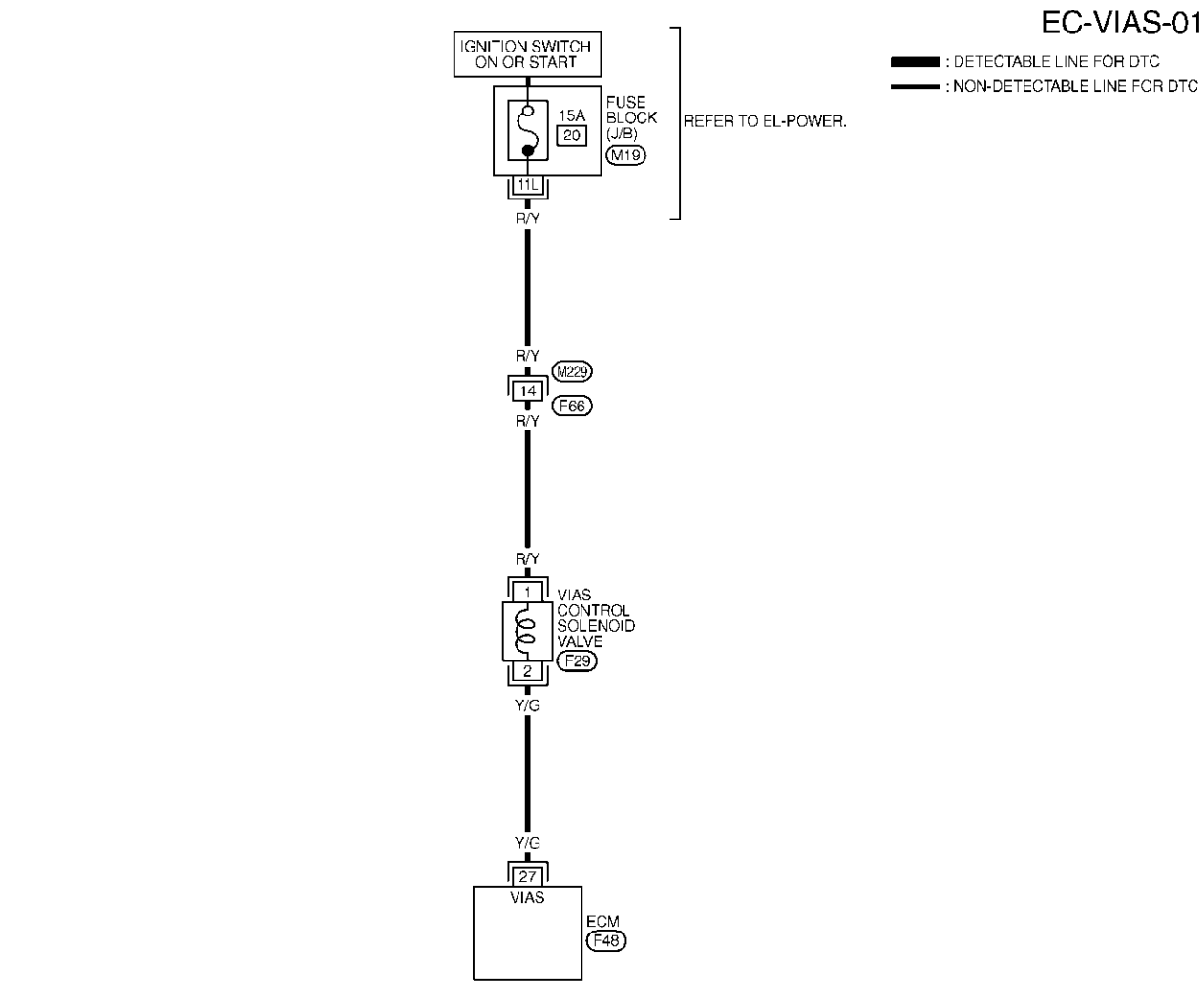
VIAS Control Solenoid Valve

NHEC0596S0202

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

Wiring Diagram

NHEC0597



MEC897D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
27	Y/G	VIAS CONTROL SOLENOID VALVE	ENGINE RUNNING BETWEEN 1,800 AND 3,600 RPM	0 - 1.0V
			EXCEPT ABOVE CONDITION	BATTERY VOLTAGE

SEF636XC

Diagnostic Procedure

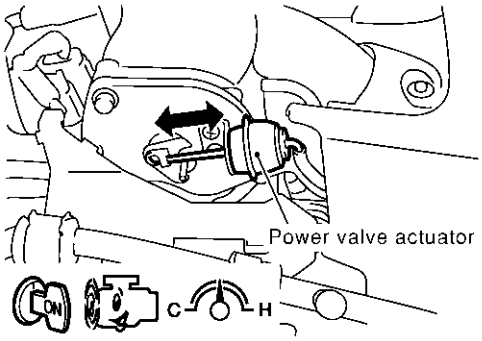
NHEC0598

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.

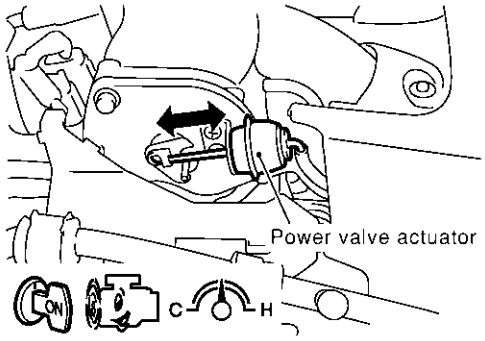
ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm



SEC128D

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



SEC060D

OK or NG

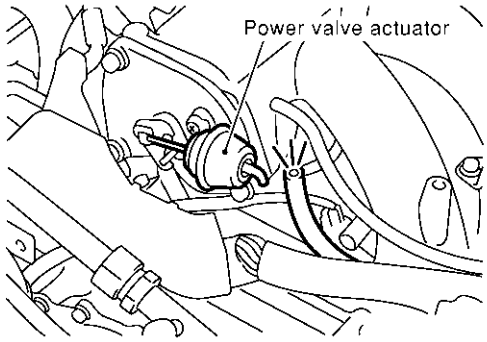
OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2 **CHECK VACUUM EXISTENCE**

Ⓕ **With CONSULT-II**

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
4. Turn VIAS control solenoid valve "ON" and "OFF", and check for the existence of vacuum under the following conditions.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm



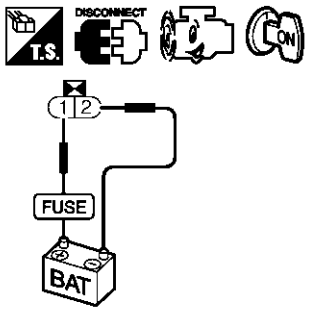
SEC129D

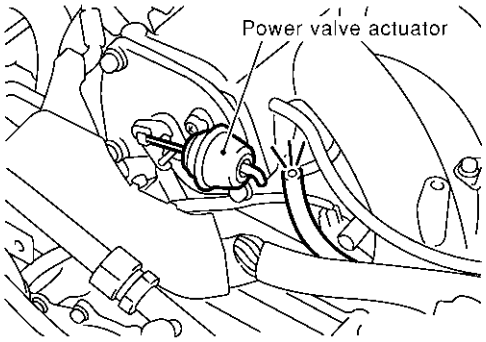
VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

MTBL1174

Ⓚ **Without CONSULT-II**

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check for the existence of vacuum under the following conditions.





SEC130D

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

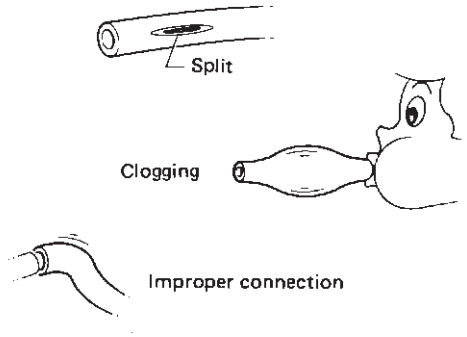
MTBL1175

OK or NG

OK	▶	Repair or replace power valve actuator.
NG	▶	GO TO 3.

3	CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, disconnection or improper connection.



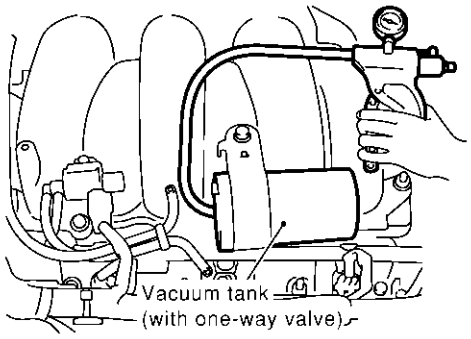
SEF109L

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace vacuum hose.

4	CHECK VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to port (at the center) of vacuum tank.
3. Apply vacuum and make sure that vacuum exists at another port.



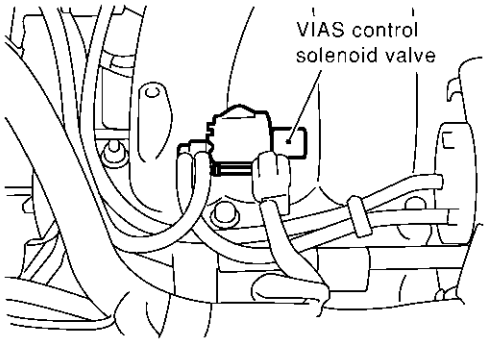
SEC131D

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace vacuum tank.

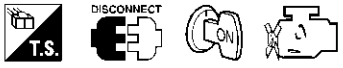
5	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

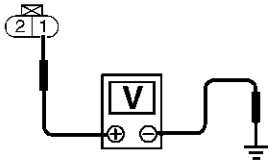
1. Stop engine.
2. Disconnect VIAS control solenoid valve harness connector.



SEC058D

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Fuse block (J/B) connector M19
- 15A fuse
- Harness continuity between fuse and VIAS control solenoid valve

	▶	Repair harness or connectors.

7	CHECK VIAS CONTROL SOLENOID 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 27 and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

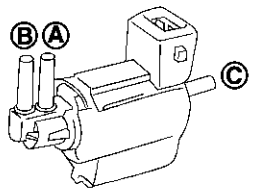
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect disconnected harness connector.
2. Turn ignition switch ON.
3. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VIAS SOL VALVE	ON
MONITOR	
ENG SPEED	XXX rpm

PBIB0177E

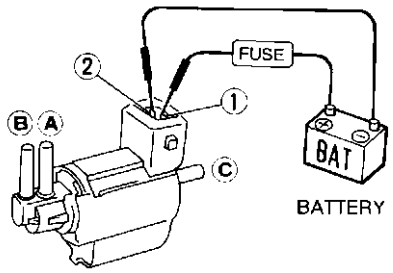
Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

MTBL1301

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



MEC488B

Condition VIAS SOL VALVE	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

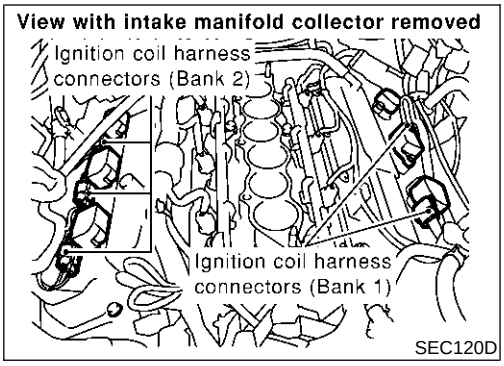
Operation takes less than 1 second.

MTBL1302

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace VIAS control solenoid valve.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0817

IGNITION COIL & POWER TRANSISTOR

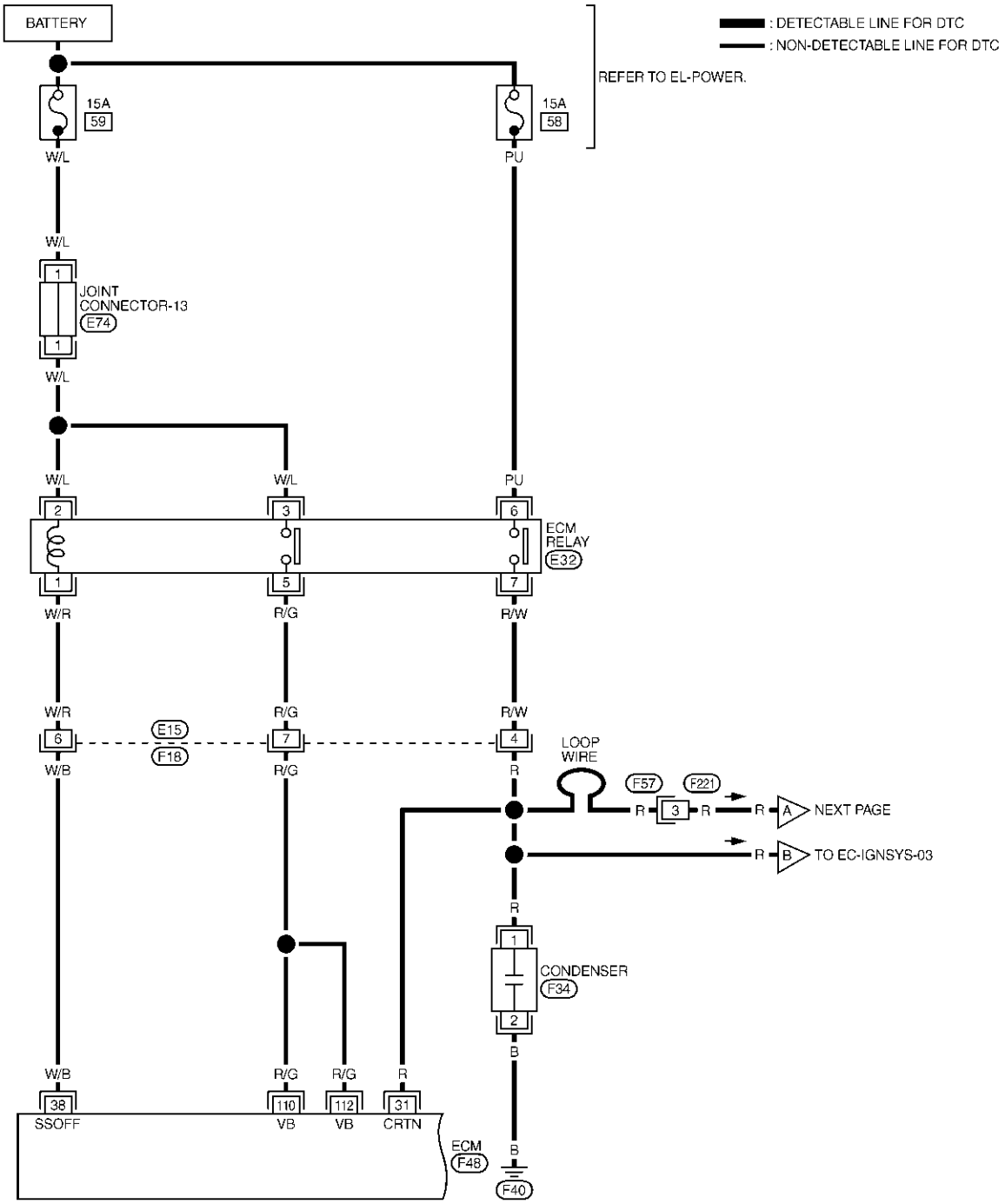
NHEC0817S01

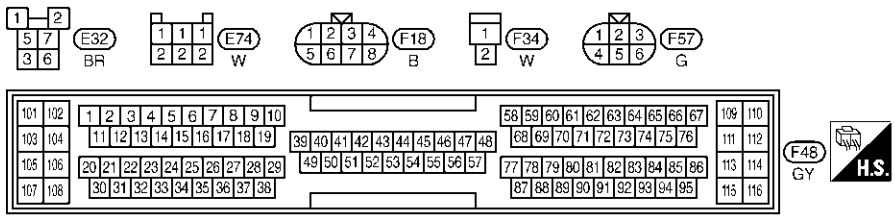
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

Wiring Diagram

NHEC0819

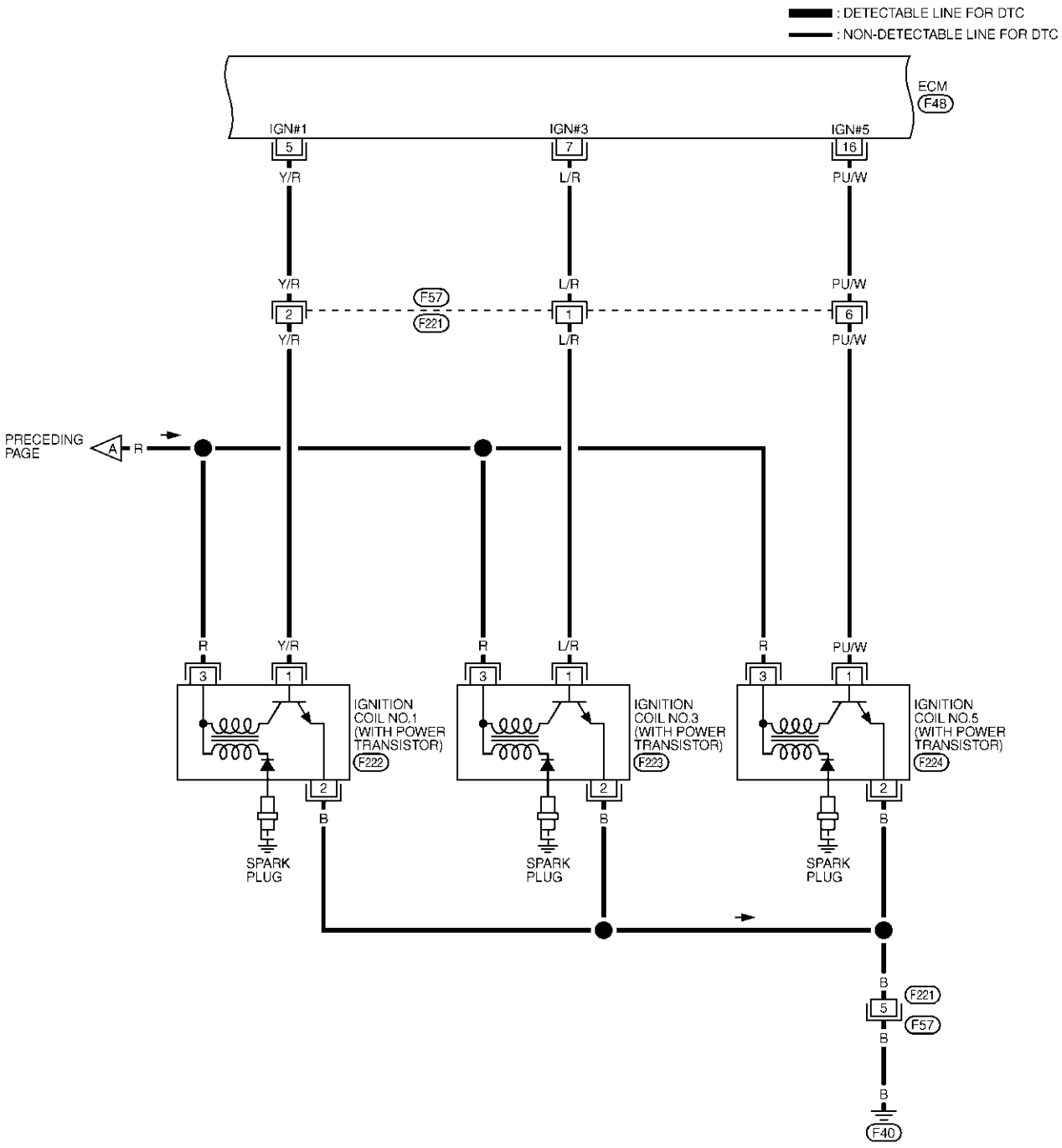
EC-IGNSYS-01





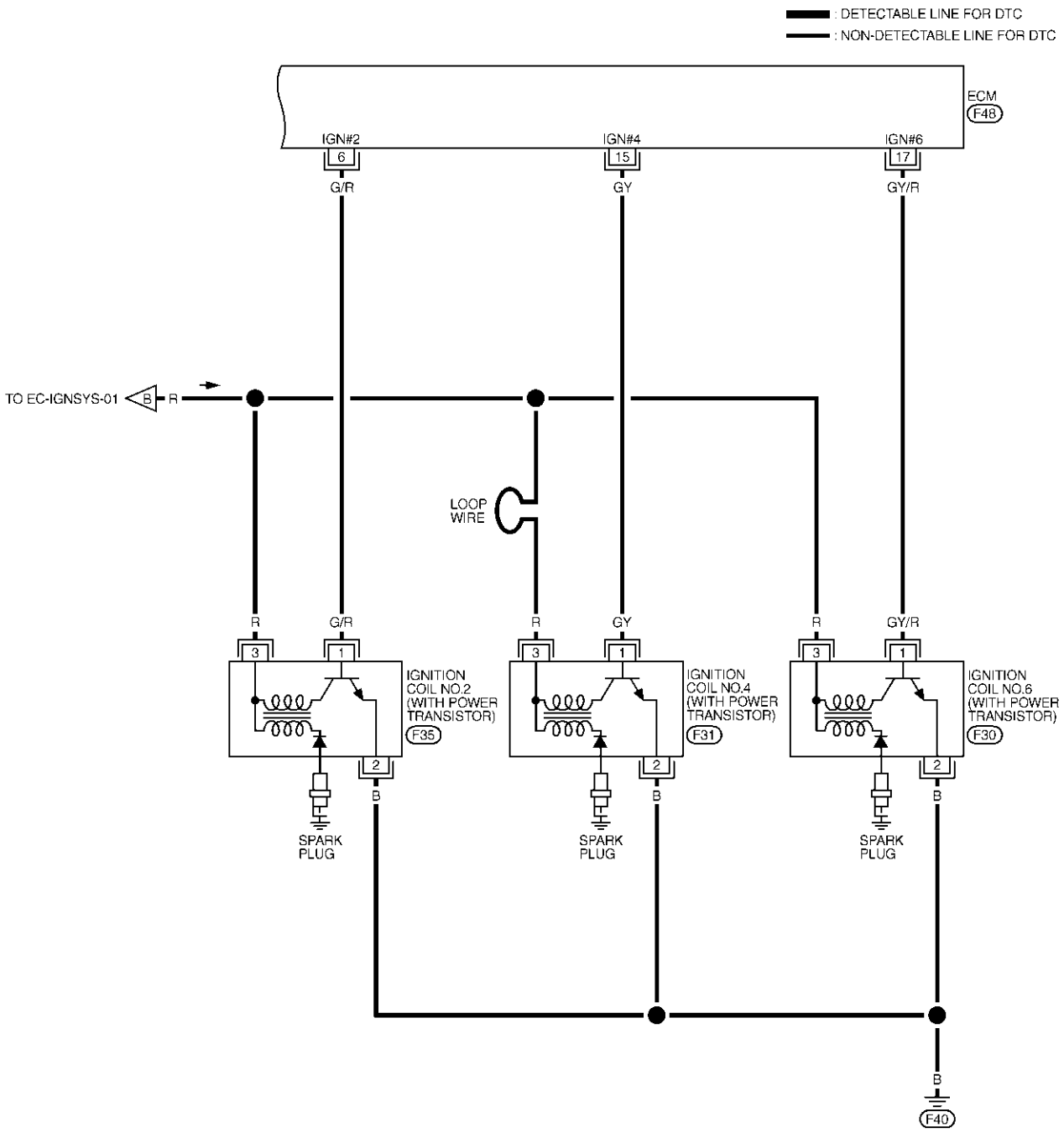
MEC558D

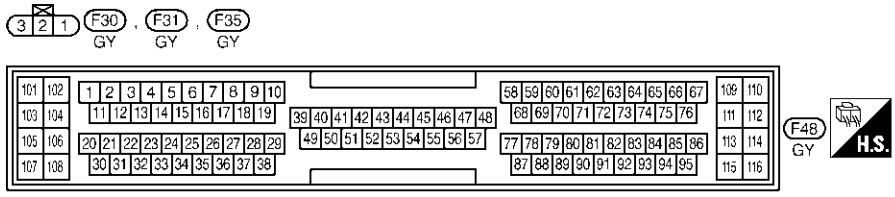
EC-IGNSYS-02



MEC559D

EC-IGNSYS-03



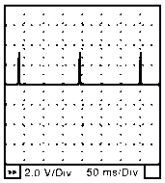
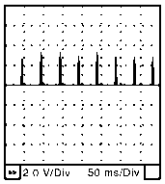


MEC560D

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)
5 6 7 15 16 17	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.2V★  SEC986C
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEC987C

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

NHEC0820

1	CHECK ENGINE 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.

Diagnostic Procedure (Cont'd)

2	CHECK OVERALL FUNCTION

Ⓕ **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.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 14.

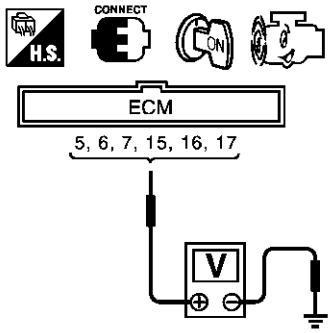
3	CHECK OVERALL FUNCTION

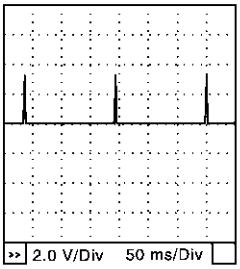
Ⓚ **Without CONSULT-II**

1. Let engine idle.
2. Read the voltage signal between ECM terminals 5, 6, 7, 15, 16, 17 and ground with oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

   NOTE:

   The pulse cycle changes depending on rpm at idle.





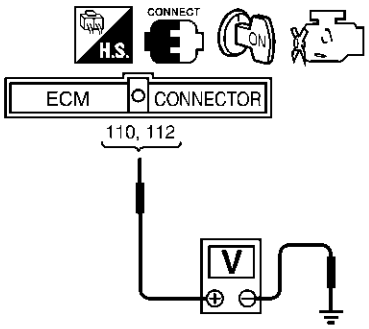
SEC159D

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 14.

4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



Voltage: Battery voltage

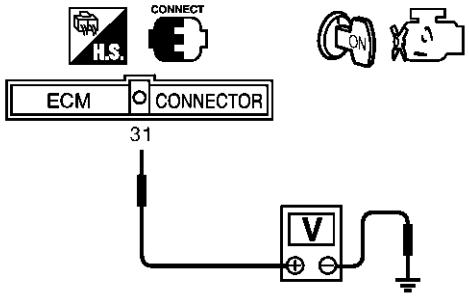
SEF366X

OK or NG

OK	▶	GO TO 5.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-152.

5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Check voltage between ECM terminal 31 and ground with CONSULT-II or tester.



SEC914C

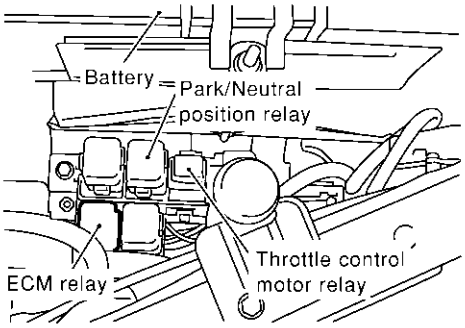
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 6.

6	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



SEC044D

3. Check harness continuity between ECM relay terminal 31 and ECM relay terminal 7. 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 8.
NG	▶	GO TO 7.

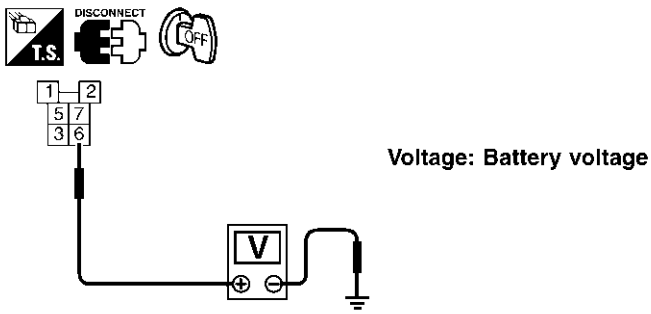
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E15, F18
- Harness for open or short between ECM and ECM relay

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

8	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF368X

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

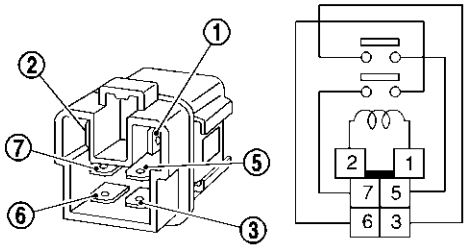
9	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse
- Harness for open and short between ECM relay and fuse

	▶	Repair or replace harness or connectors.

10	CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.



Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace ECM relay.

11	CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect condenser harness connector.
3. Check harness continuity between ECM terminal 31 and condenser terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check for short to ground and short to power.

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

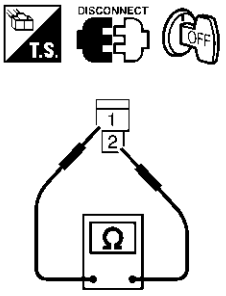
1. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair open circuit or short to power in harness or connectors.

13	CHECK CONDENSER

Check resistance between condenser terminals 1 and 2.



Resistance: Above 1MΩ at 25°C (77°F)

SEF369X

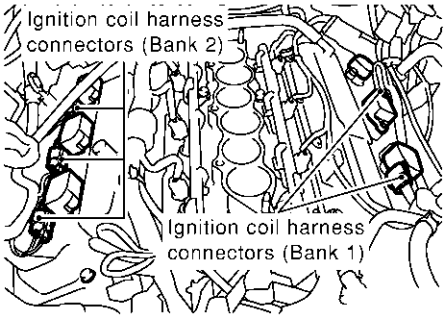
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace condenser.

14	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

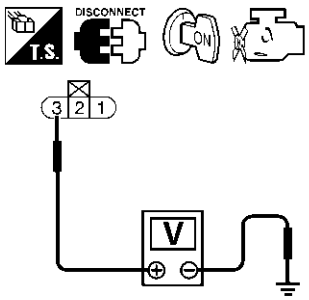
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.

View with intake manifold collector removed



SEC120D

4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF370X

OK or NG

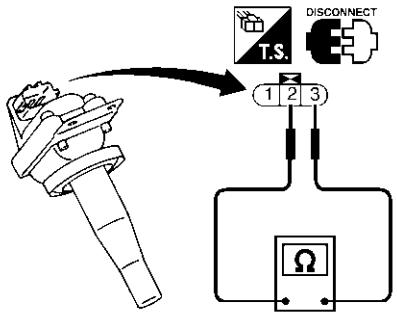
OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F57, F221 ● Harness for open and short between ignition coil and harness connector F18	
▶	Repair or replace harness or connectors.

16	CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**		
OK	▶	GO TO 17.
NG	▶	Repair open circuit or short to power in harness or connectors.

17	CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminals 5, 6, 7, 15, 16, 17 and ignition coil 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 18.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

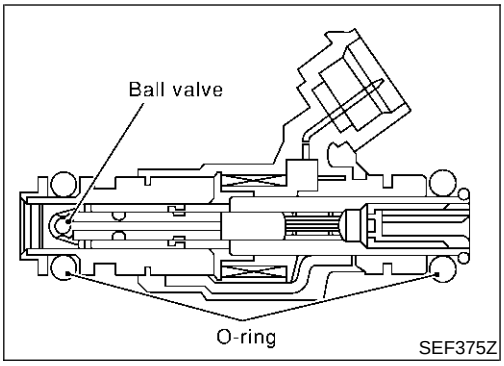
18	CHECK IGNITION COIL WITH POWER TRANSISTOR	
Check resistance between ignition coil terminals 2 and 3.		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace ignition coil with power transistor.



Terminals	Resistance	Result
2 and 3	Not 0Ω	OK
	0Ω	NG

SEF371X

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC0383

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

NHEC0384

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	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
B/FUEL SCHDL	ditto	Idle	2.3 - 2.9 msec
		2,000 rpm	2.3 - 2.9 msec

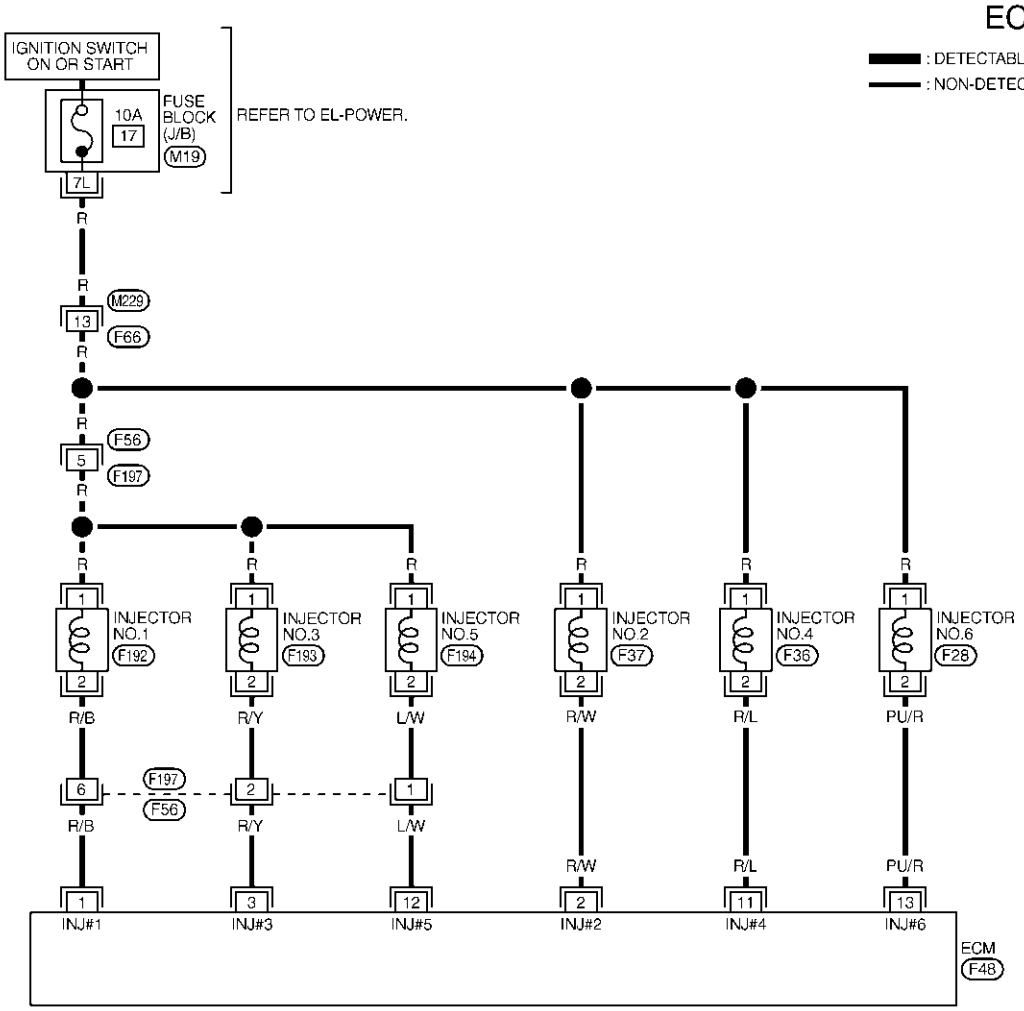
Wiring Diagram

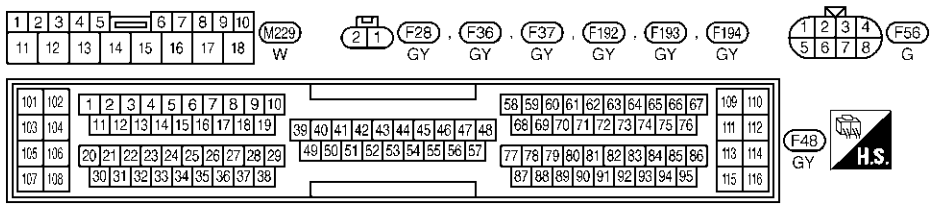
NHEC0386

EC-INJECT-01

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M19 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC564D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/B	INJECTOR NO. 1	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION **NOTE:** **THE PULSE CYCLE CHANGES DEPENDING ON RPM AT IDLE.**	BATTERY VOLTAGE
2	R/W	INJECTOR NO. 2		
3	R/Y	INJECTOR NO. 3		
11	R/L	INJECTOR NO. 4		
12	L/W	INJECTOR NO. 5		
13	PU/R	INJECTOR NO. 6		(V) 15 10 0 100 ms

SEF796YD

Diagnostic Procedure

NHEC0387

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

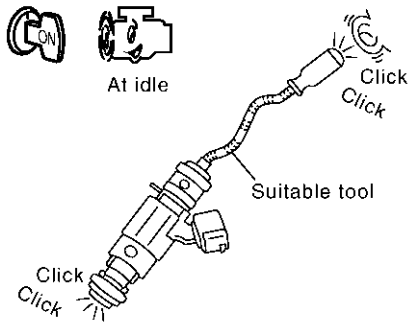
Ⓔ **With CONSULT-II**
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

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.



PBIB1725E

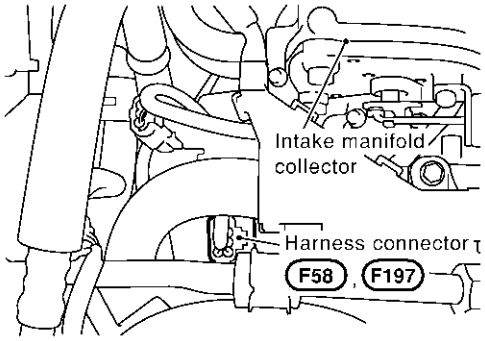
Clicking noise should be heard.

OK or NG

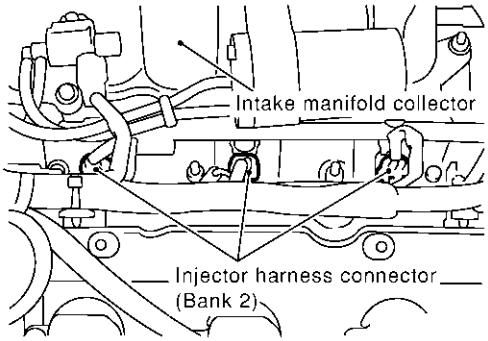
OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

3	CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect injector harness connectors (bank 2) and harness connectors F58, F197 (bank 1).

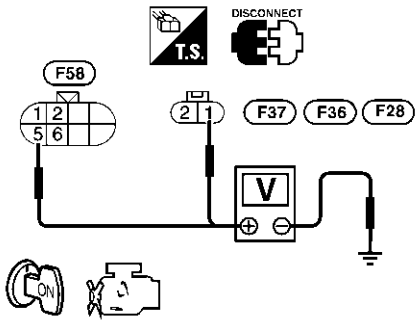


SEC086D



SEC087D

3. Turn ignition switch "ON".
4. Check voltage between injector terminal 1 and ground, harness connector F58 terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF897XA

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M229, F66
- Harness connectors F56, F197
- Fuse block (J/B) connector M19
- 10A fuse
- Harness for open or short between injector and fuse
- Harness for open or short between harness connector F58 and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 2, 11, 13, harness connector F58 terminals 6, 2, 1 and ECM terminals 1, 3, 12. 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.
- Harness connectors F56, F197
- Harness for open or short between harness connector F58 and ECM
- Harness for open or short between ECM and injector

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

7	CHECK SUB-HARNESS CIRCUIT FOR OPEN AND SHORT (BANK 1)

1. Remove intake manifold collector.
2. Disconnect injector harness connectors (Bank 1).
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Harness connector F197	Injector F192, F193, F194
5	1
6, 2, 1	2

MTBL1173

Continuity should exist.

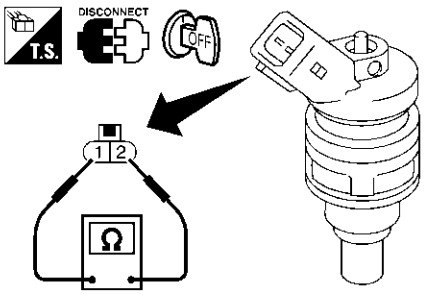
4. Also check harness for short to ground and short to power.

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 INJECTOR

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



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XA

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injector.

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

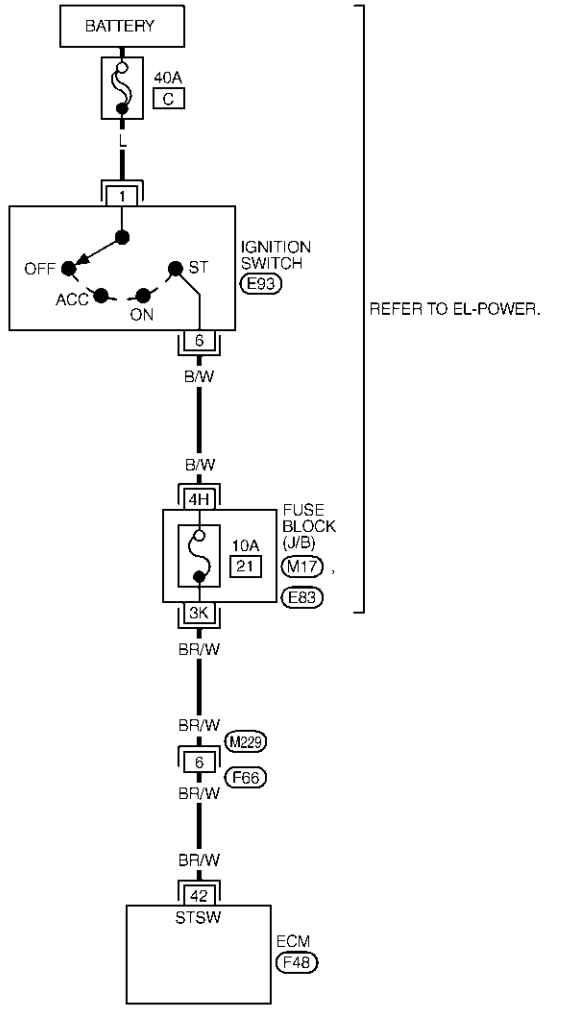
NHEC0388

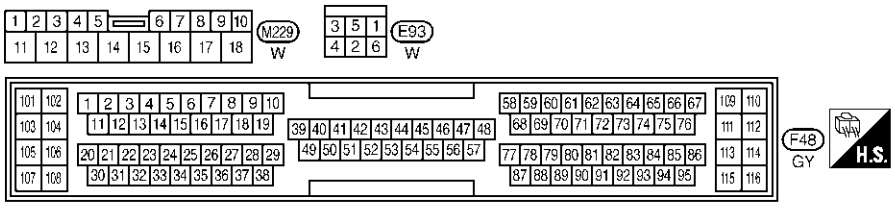
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

=NHEC0390





REFER TO THE FOLLOWING.
M17 , E83 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC565D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	BR/W	START SIGNAL	IGN ON	APPROX 0V
			IGN START	9 - 12V

SEF638XB

Diagnostic Procedure

NHEC0391

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.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF
CLSD THL POS	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF072Y

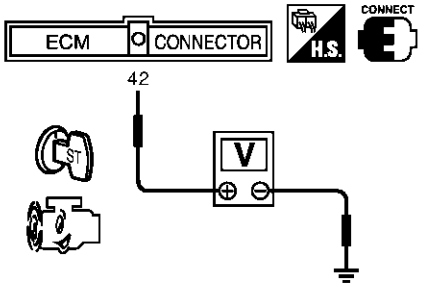
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Ⓧ **Without CONSULT-II**

Check voltage between ECM terminal 42 and ground under the following conditions.



Condition	Voltage
Ignition switch “START”	9 - 12V
Other positions	Approximately 0V

SEF362XA

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

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 SC-10, "STARTING SYSTEM".

5	CHECK FUSE
1. Turn ignition switch "OFF". 2. Disconnect 10A fuse. 3. Check if 10A fuse is OK.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace 10A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Disconnect ignition switch harness connector. 3. Check harness continuity between ECM terminal 42 and ignition switch terminal 6. 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 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F66, M229 ● Fuse block (J/B) connectors M17, E83 ● Harness for open or short between ignition switch and ECM	
▶	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-151.	
▶	**INSPECTION END**

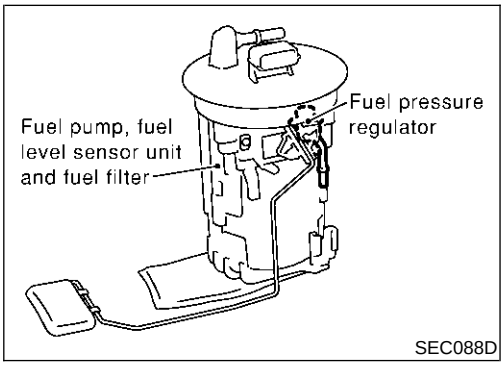
System Description

NHEC0392

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	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 (PHASE), 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 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.



Component Description

NHEC0393

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

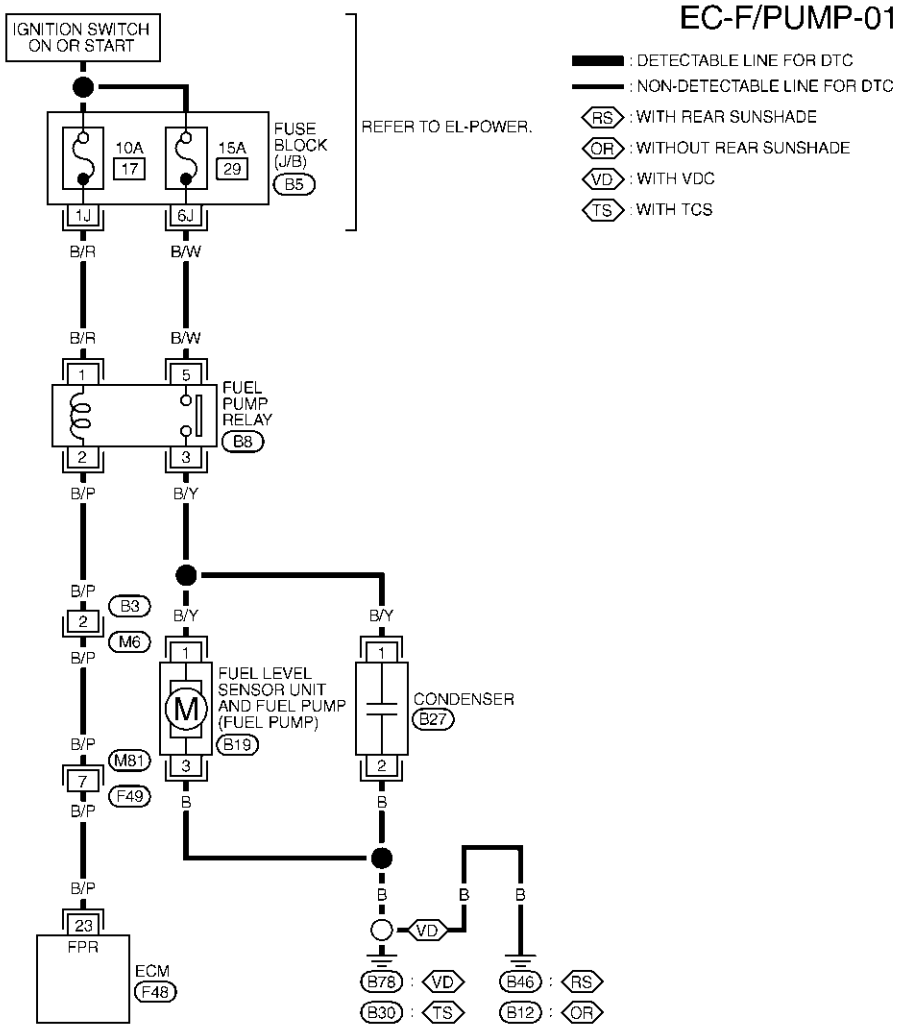
NHEC0394

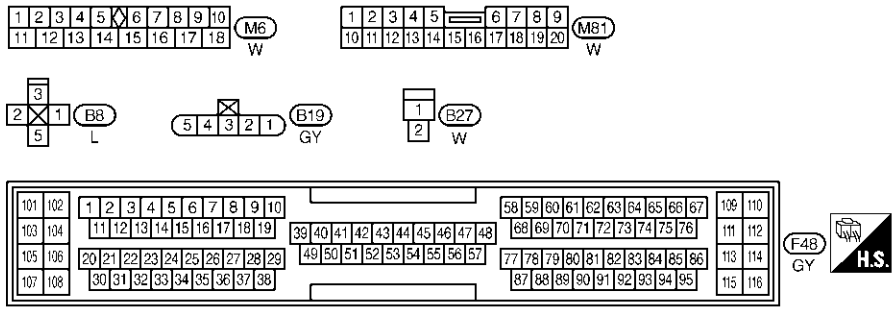
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 1 second.) ● Engine running and cranking	ON
	Except as shown above	OFF

Wiring Diagram

NHEC0396





REFER TO THE FOLLOWING.
B5 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC371E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
23	B/P	FUEL PUMP RELAY	FOR 1 SECOND AFTER IGN ON	0 - 1.5V
			ENGINE RUNNING	
			MORE THAN 1 SECOND AFTER IGN ON	BATTERY VOLTAGE (11 - 14V)

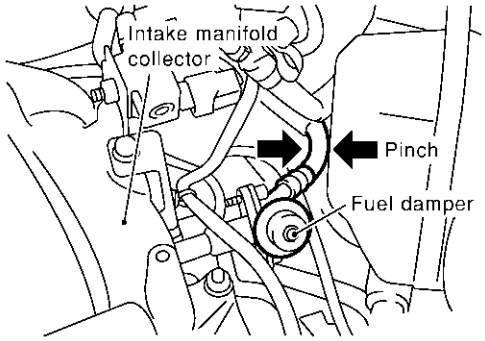
SEF639XC

Diagnostic Procedure

NHEC0397

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with two fingers.



SEC089D

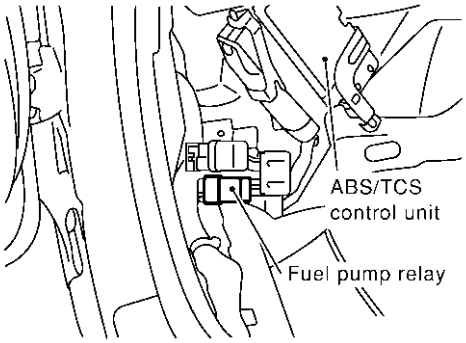
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

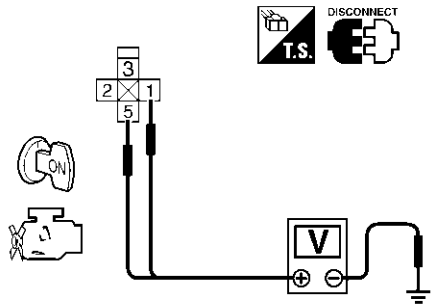
2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay.



SEF284X

3. Turn ignition switch “ON”.
4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF898X

OK or NG

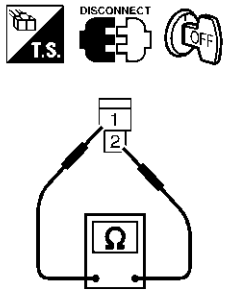
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Fuse block (J/B) connector B5 ● 10A fuse ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect condenser harness connector. 3. Check harness continuity between fuel pump relay terminal 3 and condenser terminal 1, condenser terminal 2 and body ground. 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. ● Harness for open or short between fuel pump relay and condenser ● Harness for open or short between condenser and body ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK CONDENSER
1. Turn ignition switch "OFF". 2. Disconnect condenser harness connector. 3. Check resistance between condenser terminals 1 and 2.	



SEF124Y

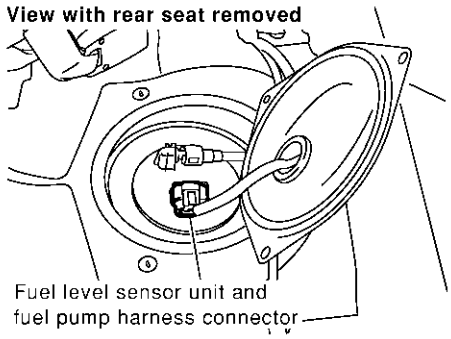
Resistance: Above 1 MΩ at 25°C (77°F)

OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace condenser.

Diagnostic Procedure (Cont'd)

7	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEC082D

3. Check harness continuity between fuel pump terminal 3 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 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between fuel pump relay and fuel pump
- Harness for open or short between fuel pump and body ground

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

9	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and fuel pump relay 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 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B3, M6
- Harness connectors M81, F49
- 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.

11	CHECK FUEL PUMP RELAY

With CONSULT-II

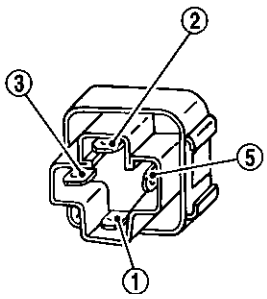
1. Reconnect fuel pump relay, fuel level sensor unit and fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

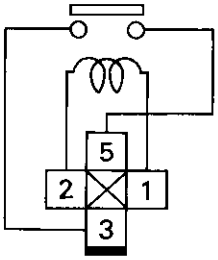
ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5 under the following conditions.





Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

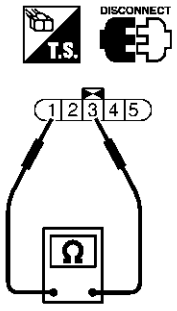
SEF608X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace fuel pump relay.

12	CHECK FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 3.



SEC918C

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace fuel pump.

Diagnostic Procedure (Cont'd)

13	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**

System Description

NHEC1328

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Engine mount control	Electronic controlled engine mount
Wheel sensor	Vehicle speed		

The ECM controls the engine mount operation corresponding to the engine speed and the vehicle speed. The control system has 2-step control [soft/hard].

Vehicle condition	Engine mount control
Idle (with vehicle stopped)	Soft
Driving	Hard

CONSULT-II Reference Value in Data Monitor Mode

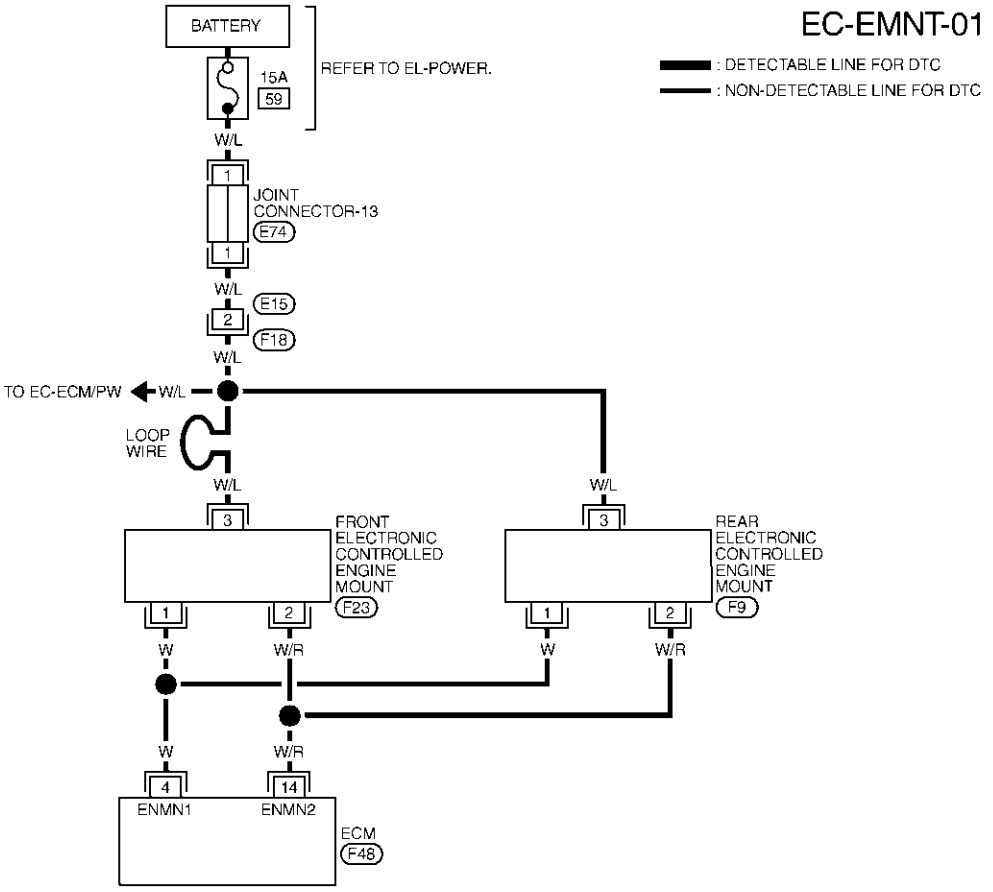
NHEC1329

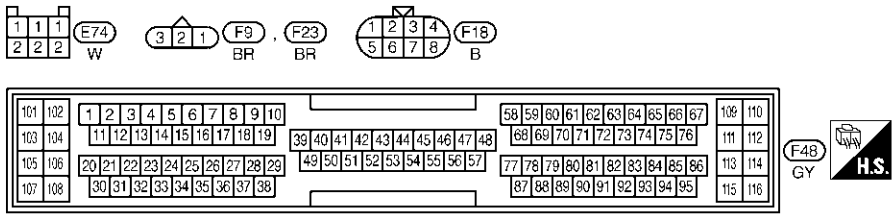
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ENGINE MOUNT	• Engine: Running	Idle (With vehicle stopped)	“IDLE”
		Except above conditions	“TRVL”

Wiring Diagram

NHEC1330





MEC372E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	W	ELECTRONIC CONTROLLED ENGINE MOUNT-1	ENGINE RUNNING AT IDLE SPEED (WITH VEHICLE STOPPED)	0 - 1.0V
			EXCEPT ABOVE	BATTERY VOLTAGE
14	W/R	ELECTRONIC CONTROLLED ENGINE MOUNT-2	ENGINE RUNNING AT IDLE SPEED (WITH VEHICLE STOPPED)	BATTERY VOLTAGE
			EXCEPT ABOVE	0 - 1.0V

SEF640XD

Diagnostic Procedure

NHEC1331

1	CHECK THE OVERALL FUNCTION

With CONSULT-II

1. After warming up engine, run it at idle speed.
2. Shift selector lever to “D” range while depressing the brake pedal and pulling the parking brake control lever.
3. Perform “ENGINE MOUNTING” in “ACTIVE TEST” mode with CONSULT-II and check that the body vibration changes according to switching the condition (With vehicle stopped).

ACTIVE TEST	
ENGINE MOUNTING	IDLE
MONITOR	
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEC237C

Without CONSULT-II

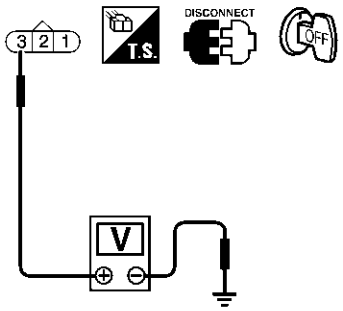
1. After warming up engine, run it at idle speed.
2. Shift selector lever to “D” range while depressing the brake pedal and pulling the parking brake control lever.
3. Disconnect front or rear electronic controlled engine mount harness connector when engine speed is more than 1,000 rpm.
4. When returning engine speed to idle speed, check that the body vibration increases, compared with the condition of the above step 2 (With vehicle stopped).

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect front or rear electronic controlled engine mount harness connector.
3. Check voltage between electronic controlled engine mount terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF899X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

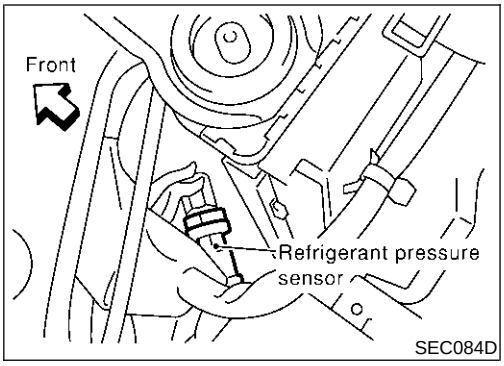
Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E15, F18 ● 15A fuse ● Joint connector-13 ● Harness for open or short between electronic controlled engine mount and battery	
▶	Repair harness or connectors.

4	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 4 and electronic controlled engine mount terminal 1, ECM terminal 14 and electronic controlled engine mount 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 5.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

5	CHECK ELECTRONIC CONTROLLED ENGINE MOUNT	
Visually check front and rear electronic controlled engine mount.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace front or rear engine mount assembly.

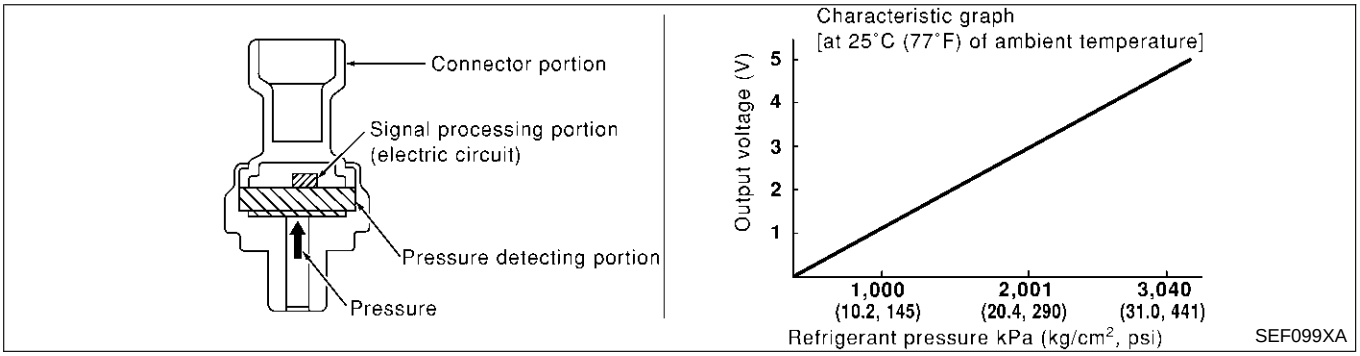
6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.		
	▶	**INSPECTION END**



Description

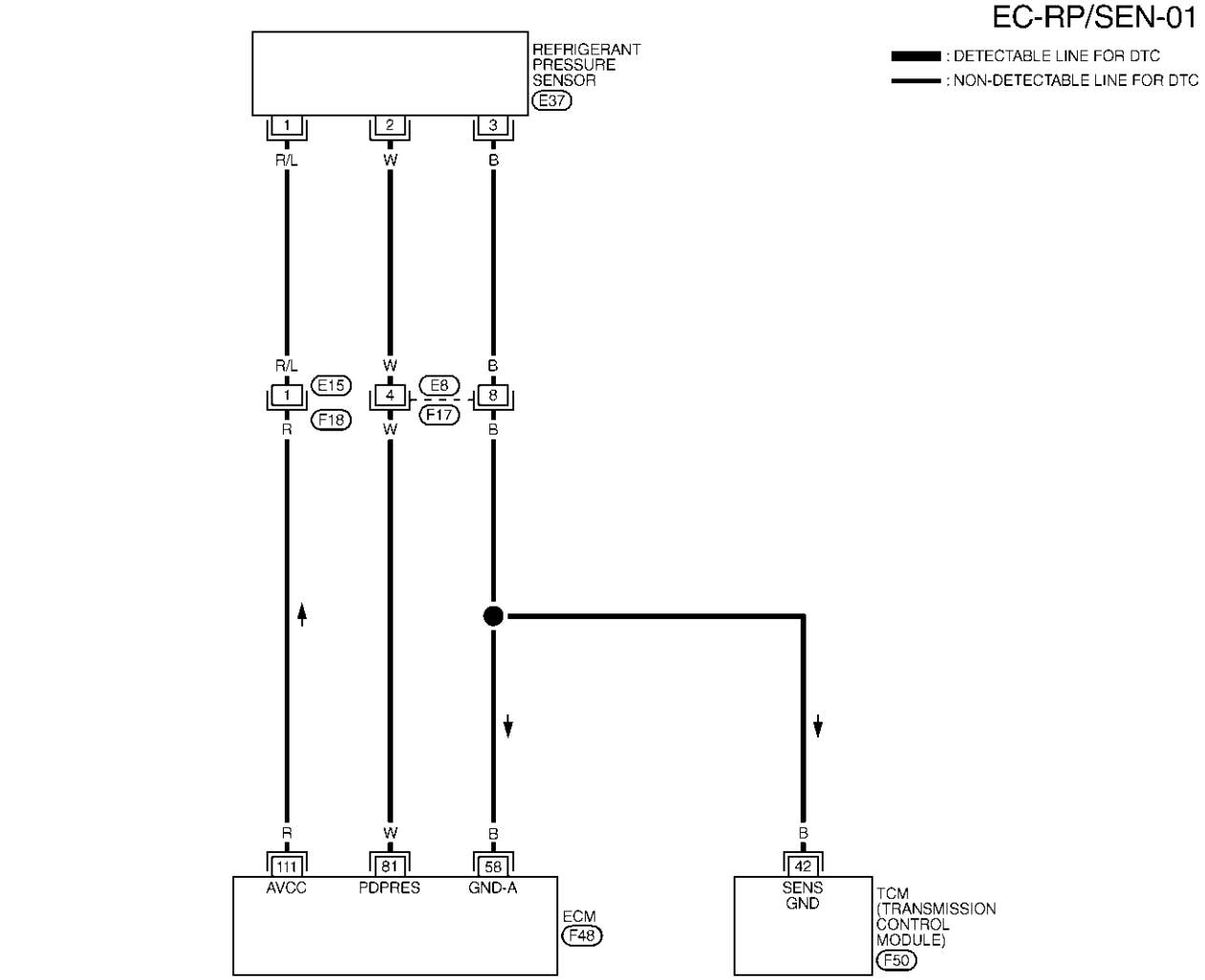
NHEC0636

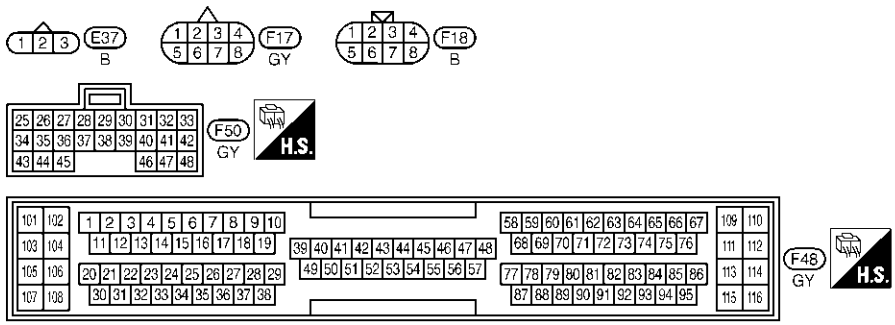
The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Wiring Diagram

NHEC0637





MEC569D

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
58	B	SENSOR GROUND	ENGINE RUNNING AT IDLE SPEED UNDER WARM-UP CONDITION	0V
81	W	REFRIGERANT PRESSURE SENSOR	ENGINE RUNNING UNDER WARM-UP CONDITION WITH A/C SWITCH AND BLOWER SWITH ON	1.0 - 4.0V
111	R	SENSOR POWER SUPPLY	IGN ON	APPROX. 5V

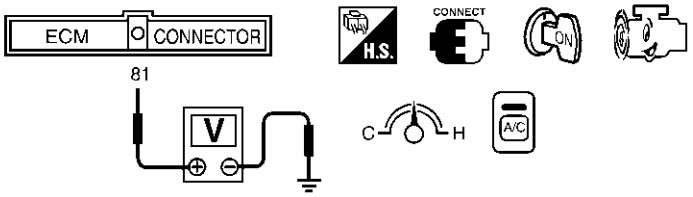
SEF643XE

Diagnostic Procedure

NHEC0638

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch “ON”.
3. Check voltage between ECM terminal 81 and ground with CONSULT-II or tester.



Voltage: 1 - 4V

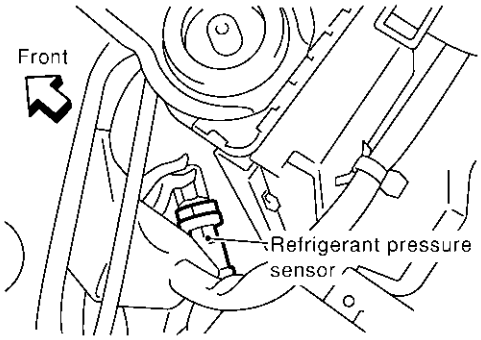
SEF617XA

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

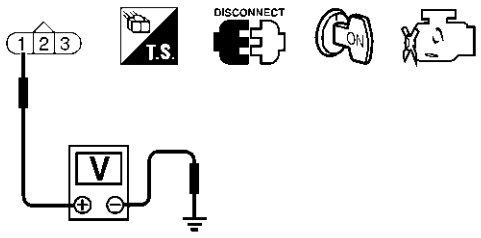
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



SEC084D

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF618X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E15, F18 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair harness or connectors.

4	CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between refrigerant pressure sensor terminal 3 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.

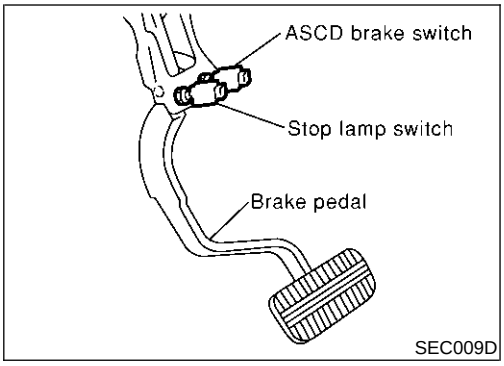
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E8, F17 ● Harness for open between ECM and refrigerant pressure sensor ● Harness for open between TCM (Transmission control module) and refrigerant pressure sensor	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 81 and refrigerant pressure 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 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E8, F17 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK REFRIGERANT PRESSURE SENSOR	
Refer to HA-14, "Refrigerant pressure sensor".		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace refrigerant pressure sensor.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.	
▶	**INSPECTION END**



Component Description

NHEC1232

When depressing the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON.
ECM detects the state of the brake pedal by this two kinds of input (ON/OFF signal).
Refer to EC-54 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1233

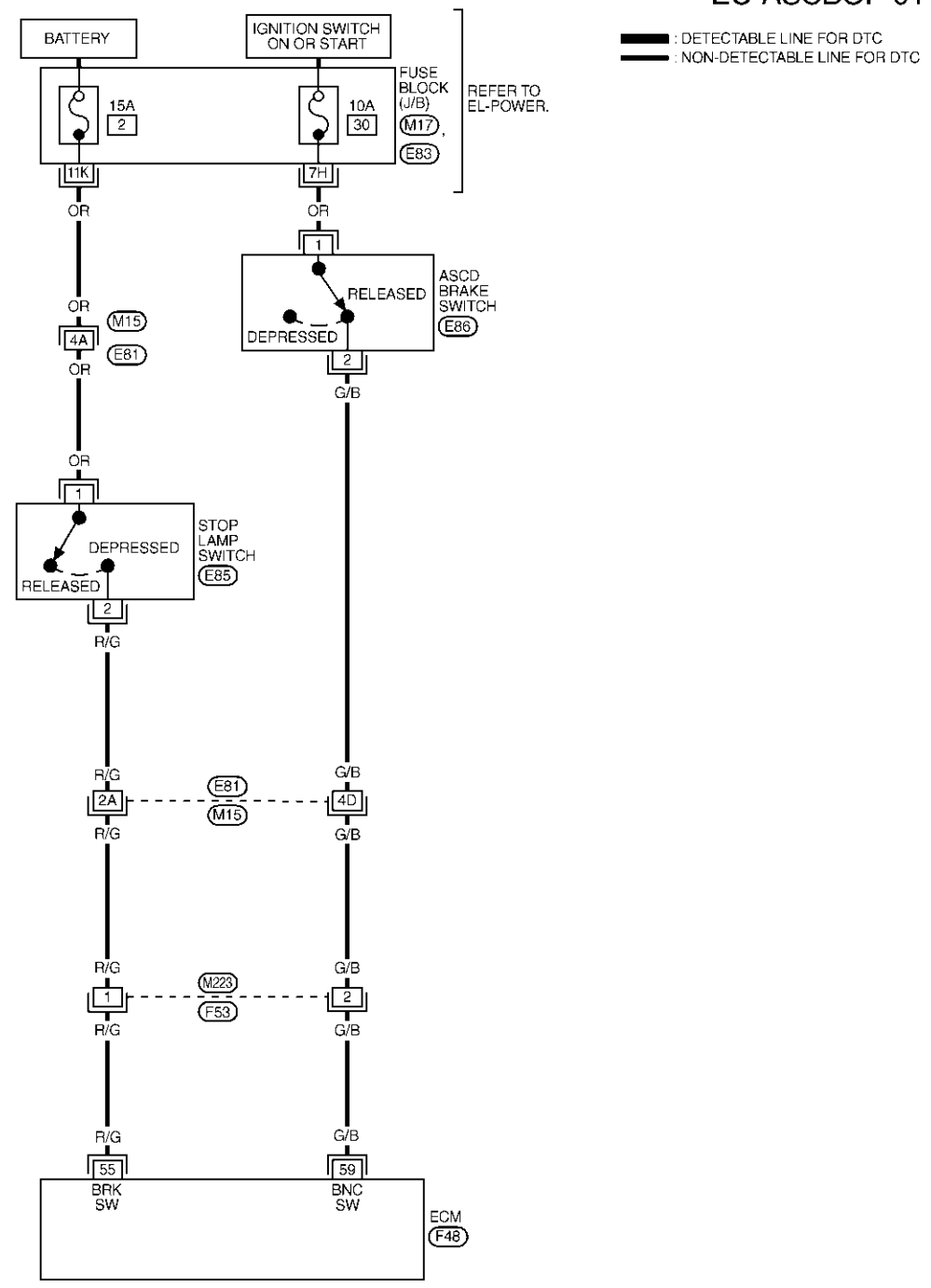
CONSULT-II Reference Value in Data Monitor Mode Specification data are reference values.

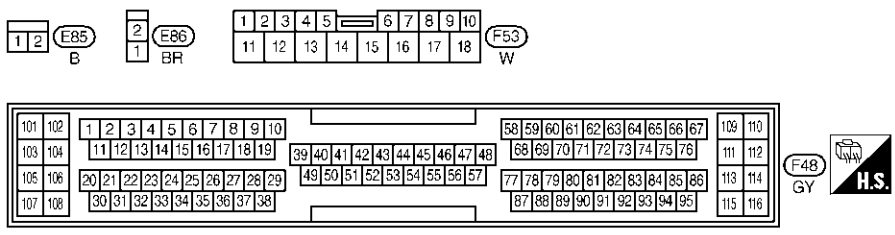
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW 1 (ASCD brake switch)	● Ignition switch: ON ● Shift lever: Except “N” and “P” position	● Brake pedal released	ON
		● Brake pedal depressed	OFF
BRAKE SW 2 (Stop lamp switch)	● Ignition switch: ON	● Brake pedal released	OFF
		● Brake pedal depressed	ON

Wiring Diagram

NHEC1237

EC-ASCBOF-01





REFER TO THE FOLLOWING.
M15 -SUPER MULTIPLE JUNCTION (SMJ)
M17 , E83
-FUSE BLOCK-
JUNCTION BOX (J/B)

MEC373E

Wiring Diagram (Cont'd)

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)
55	R/G	Stop lamp switch	**[Ignition switch "ON"]** ● Brake pedal is fully released	Approximately 0V
			[Ignition switch "ON"] ● Brake pedal is depressed	BATTERY VOLTAGE (11 - 14V)
59	G/B	ASCD brake switch	**[Ignition switch "ON"]** ● Brake pedal is released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Brake pedal is depressed	Approximately 0V

Diagnostic Procedure

NHEC1238

1	CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check the indication of “BRAKE SW1” under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW1	OFF

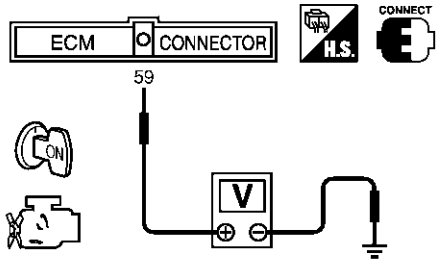
SEC011D

CONDITION	INDICATION
When brake pedal is depressed.	OFF
When brake pedal is released.	ON

MTBL1557

Without CONSULT-II

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 59 and ground under the following conditions.



SEC012D

CONDITION	VOLTAGE
When brake pedal is depressed.	Approximately 0V
When brake pedal is released.	Battery voltage

MTBL1558

Refer to Wiring Diagram.

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK OVERALL FUNCTION-II

Ⓕ **With CONSULT-II**

See "BRAKE SW2" indication in "DATA MONITOR" mode.

DATA MONITOR	
MONITOR	NO DTC
BRAKE SW2	OFF

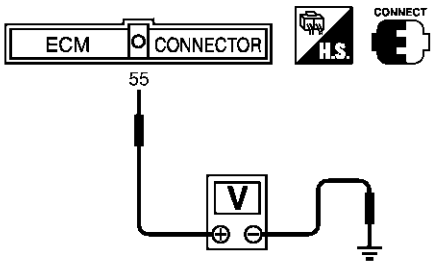
SEC013D

CONDITION	INDICATION
When brake pedal is depressed.	ON
When brake pedal is released.	OFF

MTBL1336

Ⓚ **Without CONSULT-II**

Check voltage between ECM terminal 55 and ground under the following conditions.



SEC014D

CONDITION	VOLTAGE
When brake pedal is depressed.	Battery voltage
When brake pedal is released.	Approximately 0V

MTBL1337

Refer to Wiring Diagram.

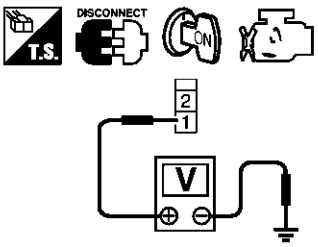
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

3	CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.



PBIB0857E

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E83
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

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

5	CHECK ASCD BRAKE SWITCH INPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and ASCD brake switch terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for open to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

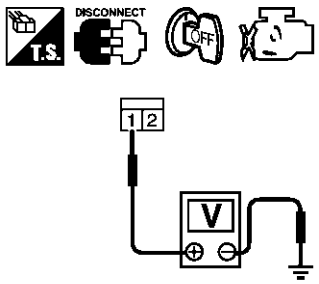
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E81, M15
- Harness connectors M223, F53
- Harness for open and short between ECM and ASCD brake switch

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

7	CHECK ASCD BRAKE SWITCH	
Refer to "Component Inspection", EC-621.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace ASCD brake switch.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors E81, M15 ● Harness connectors M223, F53 ● Harness for open and short between ASCD clutch switch and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

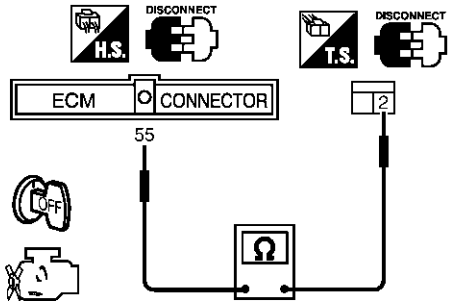
9	CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect stop lamp switch harness connector. 3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.		
 PBIB0117E		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART	
Check the following. ● Fuse block (J/B) connector M17 ● 15A fuse ● Harness connectors M15, E81 ● Harness for open or short between stop lamp switch and fuse		
	▶	Repair open circuit or short to ground in harness or connectors.

Diagnostic Procedure (Cont'd)

11	CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 55.



SEC216D

Continuity should exist

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

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 14.

12	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M15, E81
- Harness connectors M223, F53
- Harness for open or short between stop lamp switch and ECM

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

13	CHECK STOP LAMP SWITCH

Refer to "Component Inspection", EC-621.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace stop lamp switch.

14	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

	▶	**INSPECTION END**

Component Description

NHEC1240

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE indicator illuminates when CRUISE switch on steering switch is turned ON to indicate that ASCD system is ready for operation.

SET indicator illuminates when following conditions are met. CRUISE indicator illuminates, and SET switch on steering switch is turned ON while vehicle speed is within range of ASCD setting. SET indicator remains lit during ASCD control. Refer to EC-54 for ASCD functions.

CONSULT-II Reference Value in Data Monitor Mode

NHEC1474

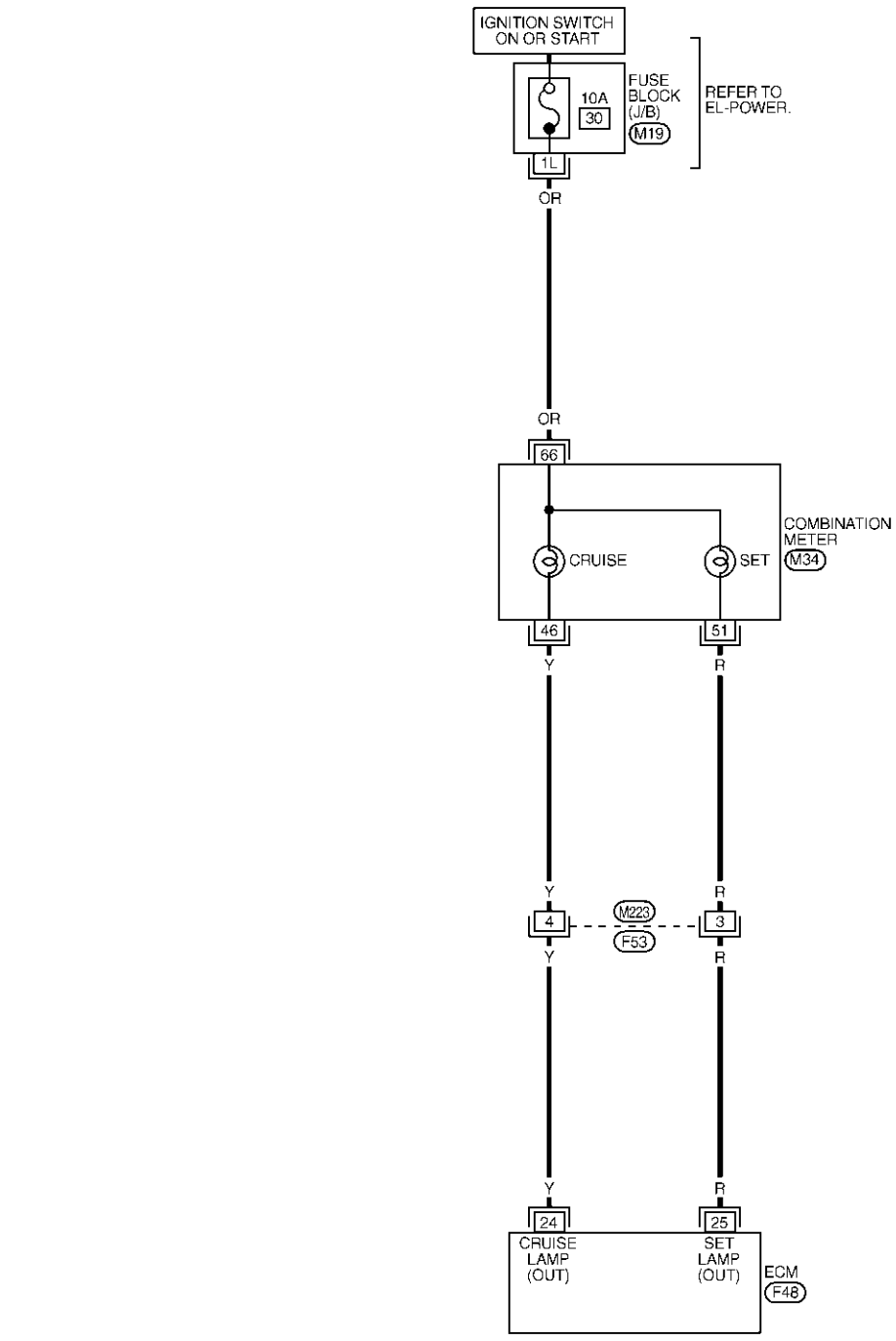
Specification data are reference values.

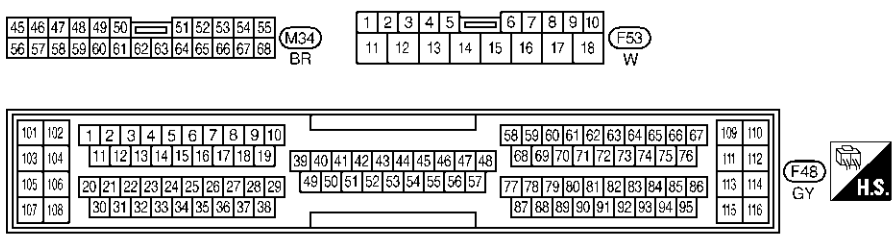
MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• CRUISE switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• CRUISE switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• COAST/SET switch: Pressed	ON
		• COAST/SET switch: Released	OFF

Wiring Diagram

NHEC1242

EC-ASCIND-01





REFER TO THE FOLLOWING.
(M19) -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC899D

Diagnostic Procedure

NHEC1243

1	CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	Ignition switch : ON	CRUISE switch pressed	ON
		CRUISE switch released	OFF
SET LAMP	When vehicle speed is between 40 km/h (25 MPH) to 144 km/h (89 MPH), and CRUISE switch is ON.	COAST/SET switch pressed	ON
		COAST/SET switch released	OFF

MTBL1260

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK COMBINATION METER OPERATION

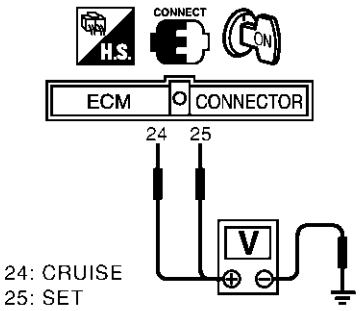
Check that combination meter operates normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check combination meter circuit. Refer to EL-129.

3	CHECK INDICATOR CIRCUIT

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminals 24, 25 and ground with CONSULT-II or tester.



SEC028D

Battery voltage should exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F53, M223
- Harness for open or short between combination meter and ECM

	▶	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-151.

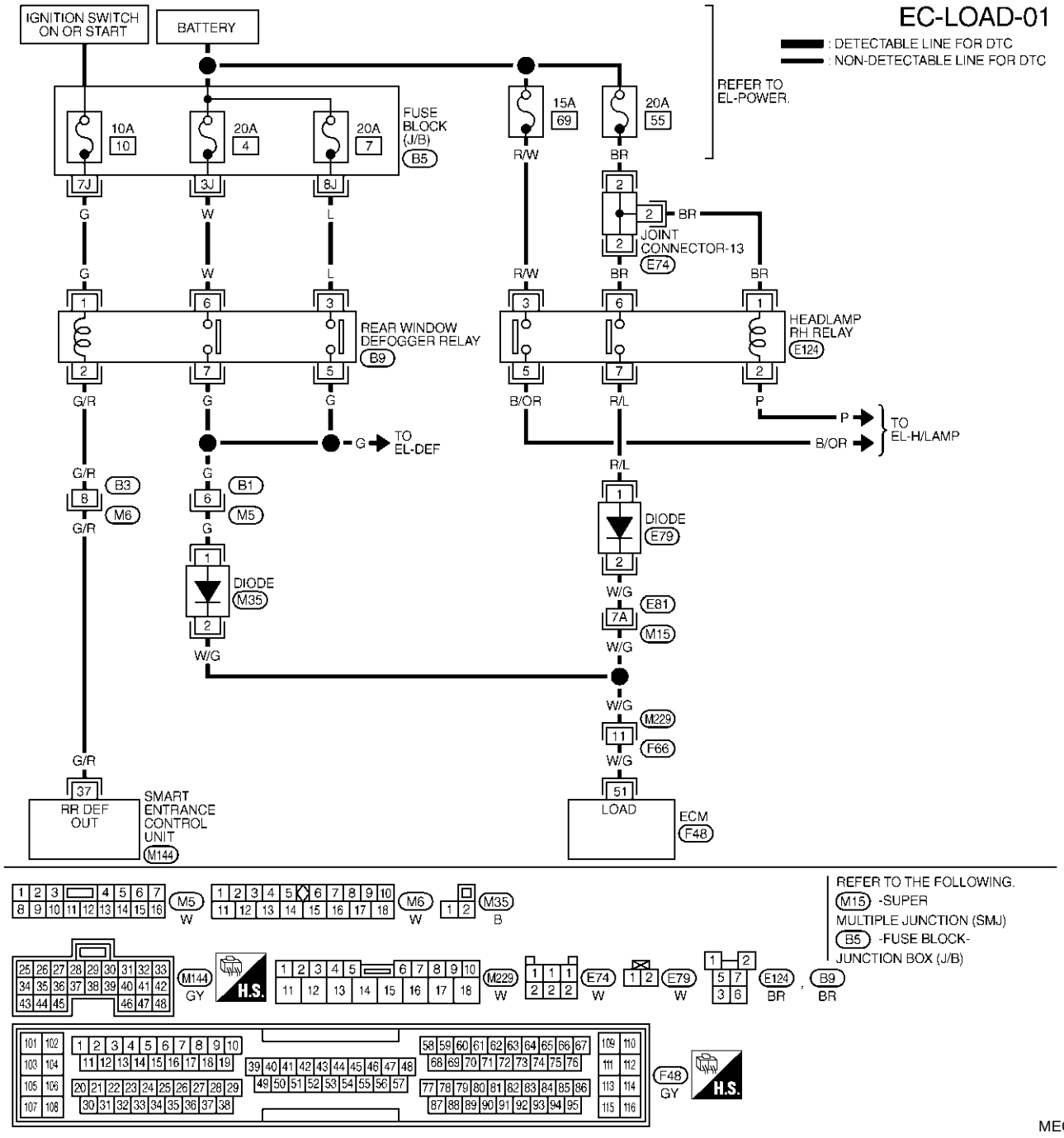
	▶	**INSPECTION END**

Wiring Diagram

NHEC0604

FOR USA

NHEC0604S03



MEC374E

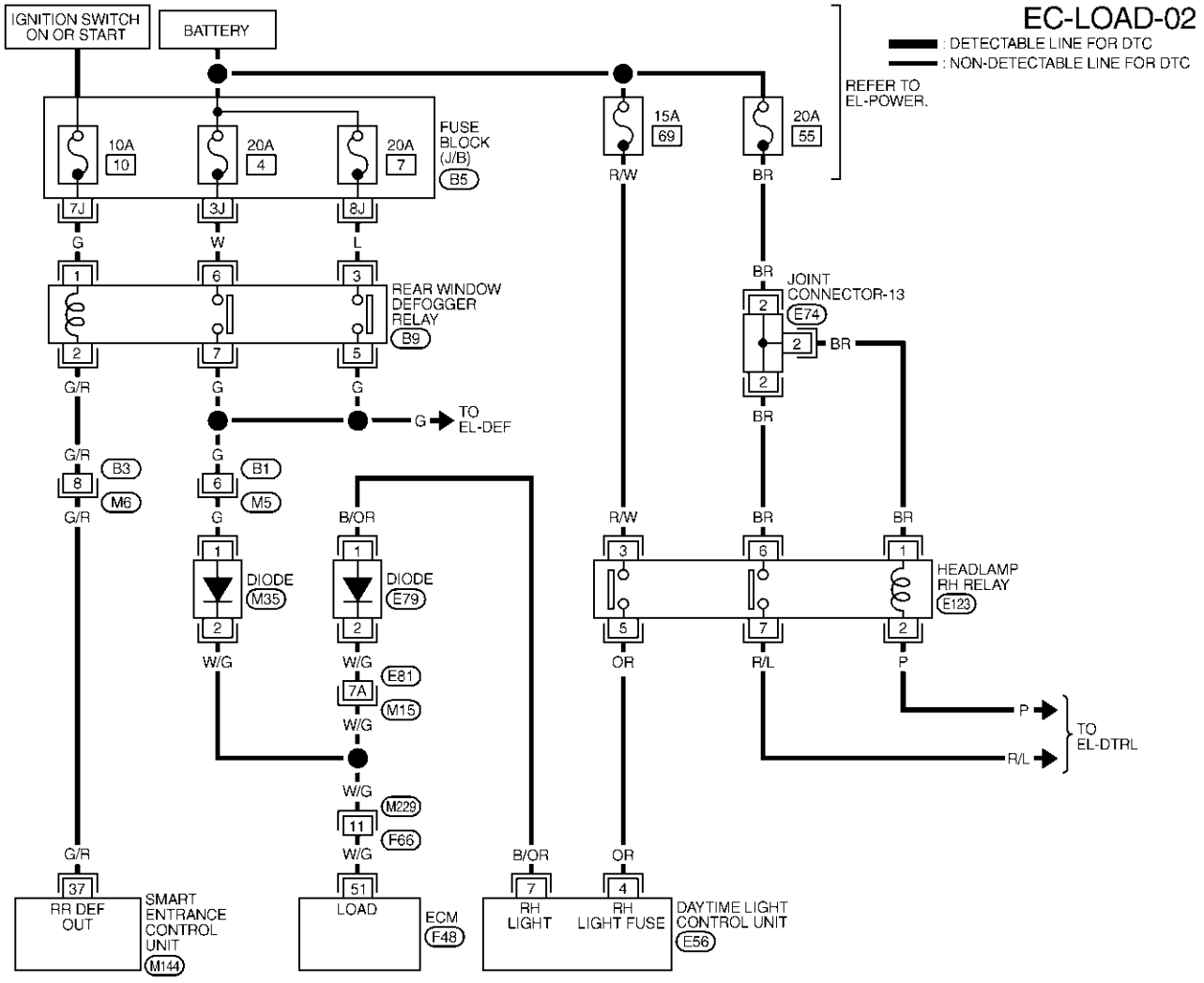
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND.
CAUTION:
DO NOT USE ECM GROUND TERMINALS WHEN MEASURING INPUT/OUTPUT VOLTAGE. DOING SO MAY RESULT IN DAMAGE TO THE ECM'S TRANSISTOR. USE A GROUND OTHER THAN ECM TERMINALS, SUCH AS THE GROUND.

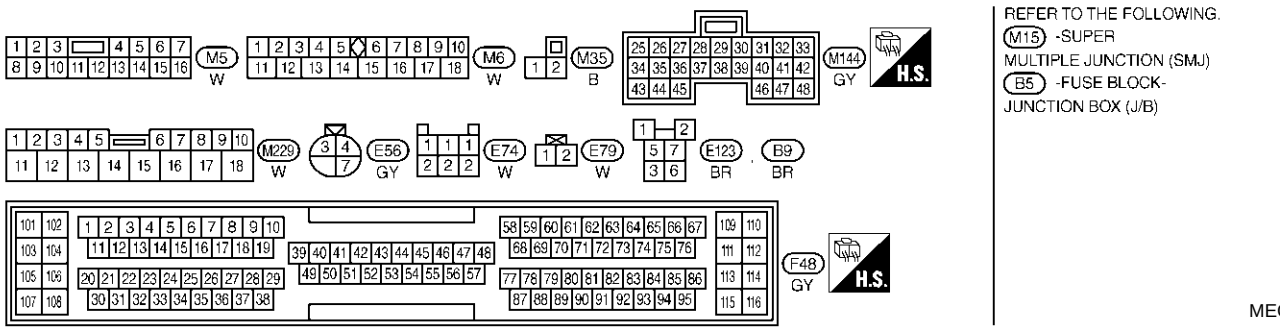
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
51	W/G	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 1ST POSITION	BATTERY VOLTAGE
			IGN ON UNDER EXCEPT ABOVE CONDITION	0V

SEF642XC

FOR CANADA

NHEC0604S04





REFER TO THE FOLLOWING.
M15 -SUPER MULTIPLE JUNCTION (SMJ)
B5 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC375E

ECM TERMINALS AND REFERENCE VALUE 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	WIRE COLOR	ITEM	CONDITION	DATA (DC)
51	W/G	ELECTRICAL LOAD SIGNAL	IGN ON WITH REAR WINDOW DEFOGGER SWITCH ON OR LIGHTING SWITCH ON AT 1ST POSITION	BATTERY VOLTAGE
			IGN ON UNDER EXCEPT ABOVE CONDITION	0V

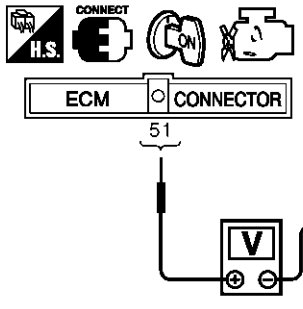
SEF642XC

Diagnostic Procedure

NHEC0605

1	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 51 and ground under the following conditions.



SEC090D

Condition	Voltage
Rear window defogger switch “ON”	BATTERY VOLTAGE
Rear window defogger switch “OFF”	0V

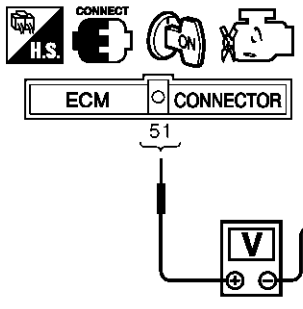
MTBL1165

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check voltage between ECM terminal 51 and ground under the following conditions.



SEC090D

Condition	Voltage
Lighting switch “ON” at 1st position	BATTERY VOLTAGE
Lighting switch “OFF”	0V

MTBL1166

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

3	CHECK REAR WINDOW DEFOGGER FUNCTION

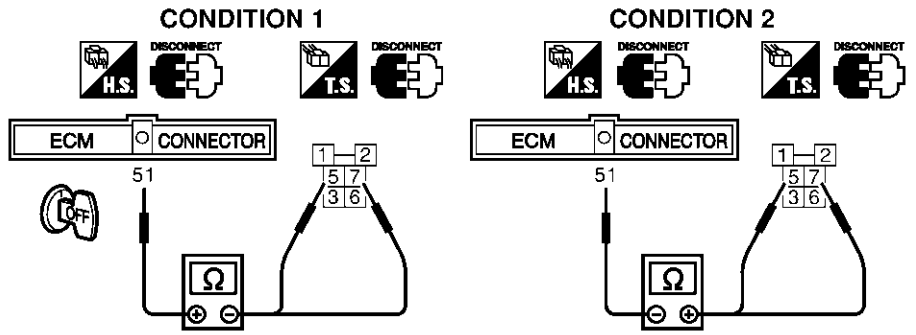
1. Start engine.
2. Turn "ON" the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes	▶	GO TO 4.
No	▶	Refer to EL-184, "Rear Window Defogger".

4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 51 and rear window defogger relay terminal 5 and 7.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEC125D

5. 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.
- Harness connectors B1, M5
- Harness connectors M229, F66
- Diode M35
- Harness for open and short between ECM and rear window defogger relay

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

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

	▶	**INSPECTION END**

7	CHECK HEADLAMP FUNCTION

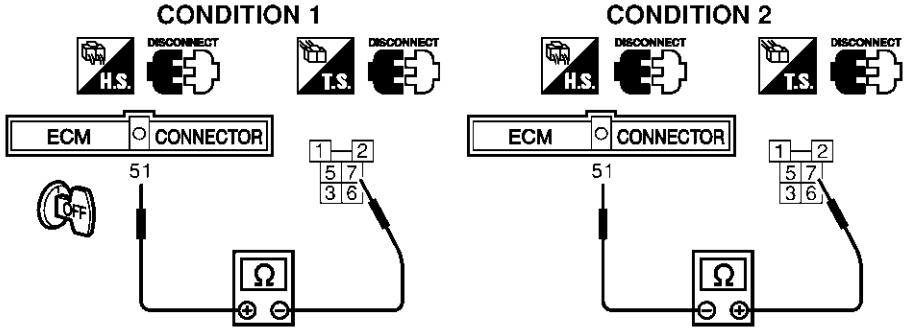
1. Start engine.
2. Turn the lighting switch "ON" at 1st position with high beam.
3. Check that headlamps are illuminated.

OK or NG

OK	▶	GO TO 8.
NG	▶	Refer to EL-38, "HEADLAMP (FOR USA)" or "EL-52, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

8	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

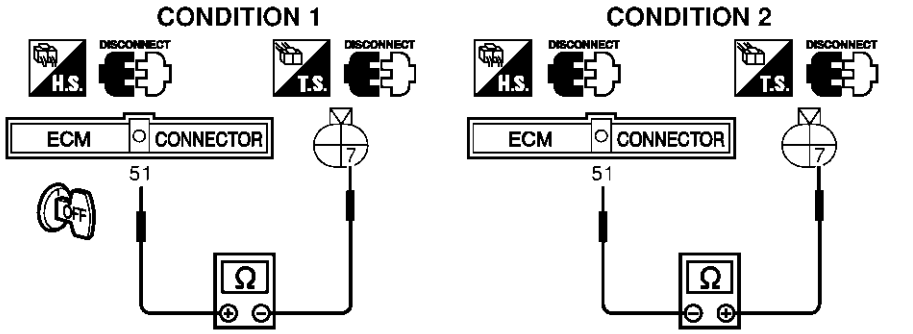
1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect headlamp RH relay (Models for USA), daytime light control unit harness connector (Models for Canada).
4. Check harness continuity between ECM terminal 51 and headlamp LH relay terminal 7 under the following conditions. (Models for USA)



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEC126D

5. Check harness continuity between ECM terminal 51 and daytime light control unit terminal 7 under the following conditions.(Model for Canada)



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEC127D

6. 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.
- Harness connectors E81, M15
- Harness connectors M229, F66
- Diode E79
- Harness for open and short between ECM and headlamp RH relay or daytime light control unit

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

10	CHECK INTERMITTENT INCIDENT

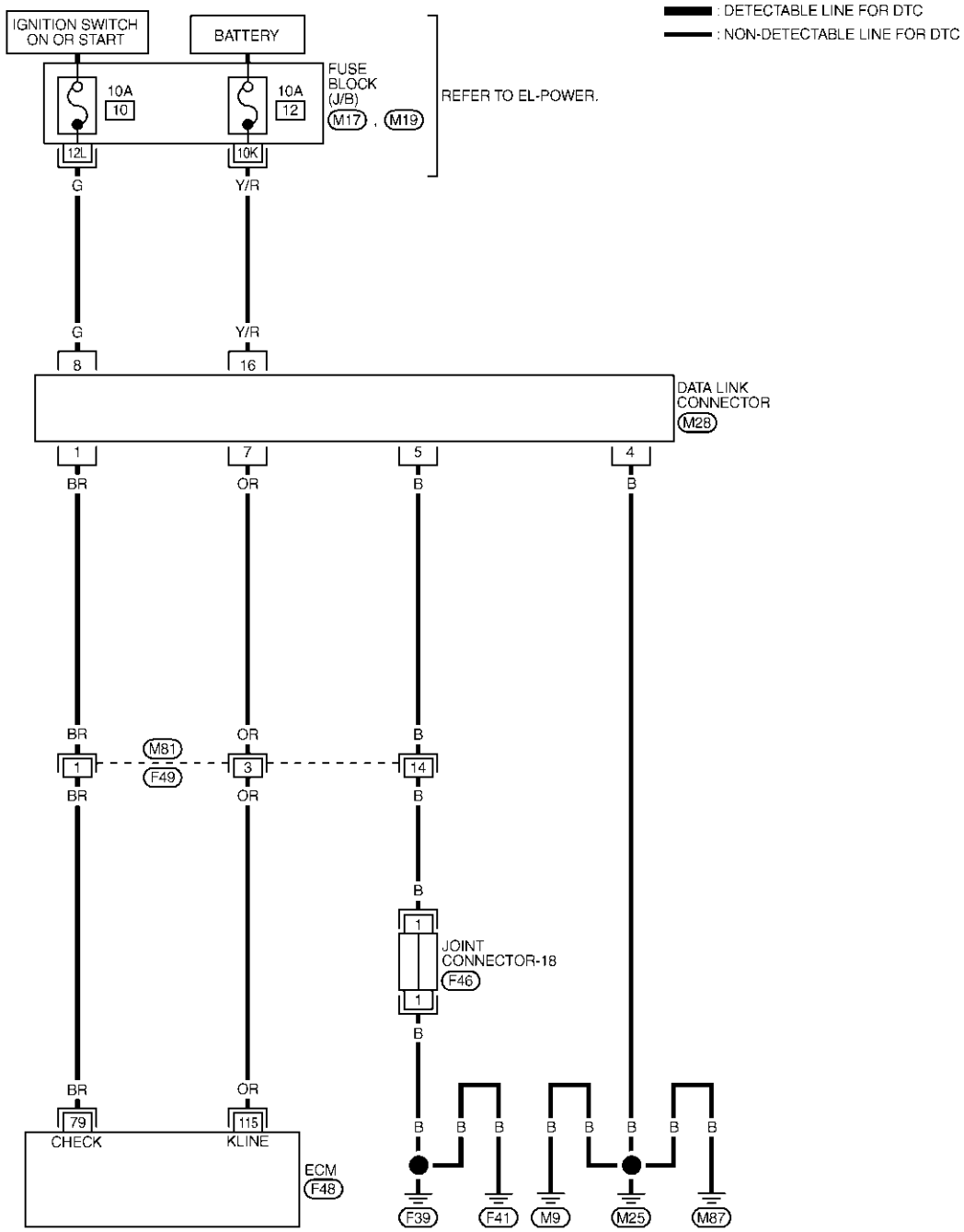
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-151.

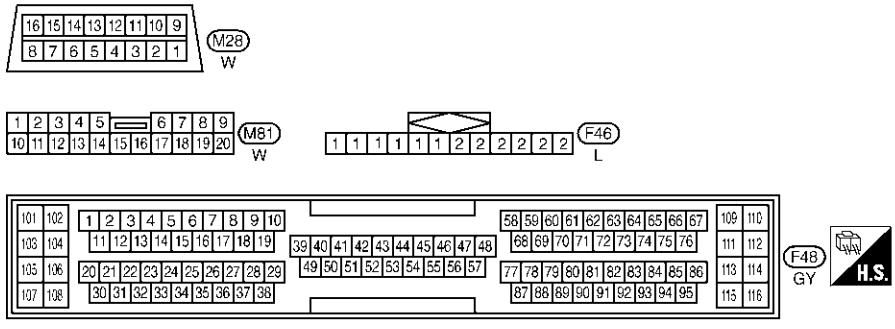
	▶	**INSPECTION END**

Wiring Diagram

NHEC0407

EC-DLC-01





REFER TO THE FOLLOWING.
M17 , M19 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC376E

Fuel Pressure Regulator

NHEC0408

Fuel pressure at idling kPa (kg/cm^2, psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

NHEC0409

Target idle speed*1	No-load*2 (in “P” or N” position)	A/T: 675±50 rpm
Air conditioner: ON	In “P” or N” position	825 rpm or more
Ignition timing*1	In “P” or N” position	15°±5° BTDC

*1: Throttle position sensor harness connector connected

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NHEC0411

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.1 - 1.5*V
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NHEC0412

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

NHEC0414

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Fuel Pump

NHEC0415

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

Injector

NHEC0417

Resistance [at 20°C (68°F)]	13.5 - 17.5Ω

Calculated Load Value

NHEC0420

	Calculated load value % (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Intake Air Temperature Sensor

NHEC0421

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

Heated Oxygen Sensor 2 Heater

NHEC0422

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Fuel Tank Temperature Sensor

NHEC0424

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Throttle Control Motor

NHEC1332

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Crankshaft Position Sensor (POS)

NHEC1414

Refer to “Component Inspection”, EC-316.

Camshaft Position Sensor (PHASE)

NHEC0639

Refer to “Component Inspection”, EC-325.

NOTES