SECTION STR
STARTING SYSTEM

CONTENTS

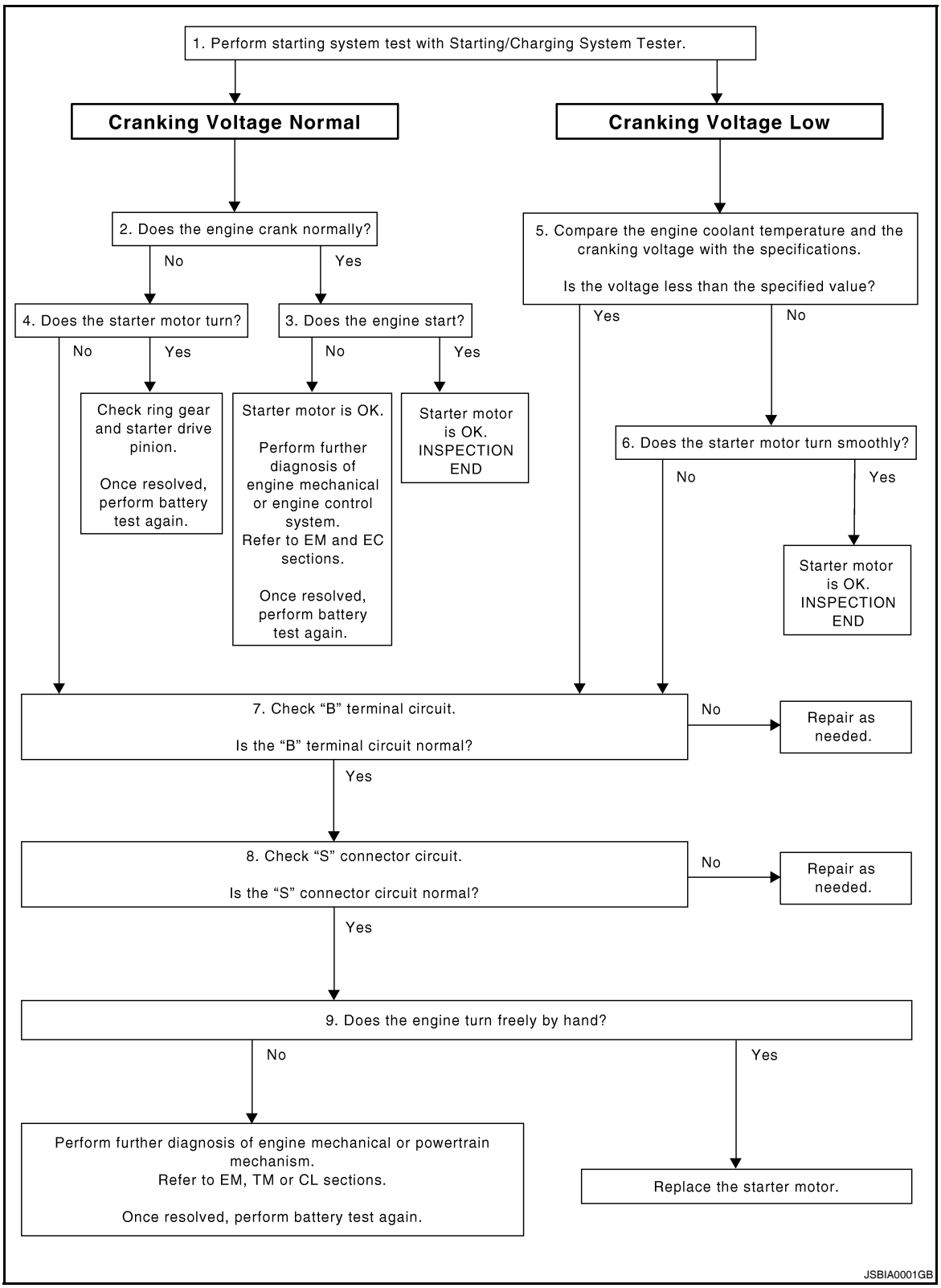
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000004205228

OVERALL SEQUENCE



DETAILED FLOW

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter motor and alternator test segments must be done as a set from start to finish.

1.DIAGNOSIS WITH STARTING/CHARGING SYSTEM TESTER

Perform the starting system test with Starting/Charging System Tester (J-44373). For details and operating instructions, refer to Technical Service Bulletin.

Test result

CRANKING VOLTAGE NORMAL>>GO TO 2
CRANKING VOLTAGE LOW>>GO TO 5
CHARGE BATTERY>>Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to Technical Service Bulletin.
REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to Technical Service Bulletin. If second test result is “REPLACE BATTERY”, then do so. Perform battery test again to confirm repair.

2.CRANKING CHECK

Check that the starter motor operates properly.

Does the engine crank normally?

YES >> GO TO 3
NO >> GO TO 4

3.ENGINE START CHECK

Check that the engine starts.

Does the engine start?

YES >> Starter motor is OK. Inspection end.
NO >> Perform further diagnosis of engine mechanical or engine control system. Refer to EM and EC sections. Once resolved, perform battery test again.

4.STARTER MOTOR ACTIVATION

Check that the starter motor operates.

Does the starter motor turn?

YES >> Check ring gear and starter motor drive pinion. Once resolved, perform battery test again.
NO >> GO TO 7

5.COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

Compare the engine coolant temperature and verify the cranking voltage is within specification.

Minimum Specification of Cranking Voltage Referencing Coolant Temperature

Engine coolant temperature [°C (°F)]	Voltage [V]
−30 to −20 (−22 to −4)	8.6
−19 to −10 (−2 to 14)	9.1
−9 to 0 (16 to 32)	9.5
More than 1 (More than 34)	9.9

Is the voltage less than the specified value?

YES >> GO TO 7
NO >> GO TO 6

6.STARTER OPERATION

Check the starter operation.

Does the starter motor turn smoothly?

YES >> Starter motor is OK. Inspection end.
NO >> GO TO 7

7.“B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to STR-8, "Diagnosis Procedure".

Is “B” terminal circuit normal?

YES >> GO TO 8
NO >> Repair as needed.

8. "S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to STR-9, "Diagnosis Procedure".

Is "S" connector circuit normal?

YES >> GO TO 9
NO >> Repair as needed.

9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

Does the engine turn freely by hand?

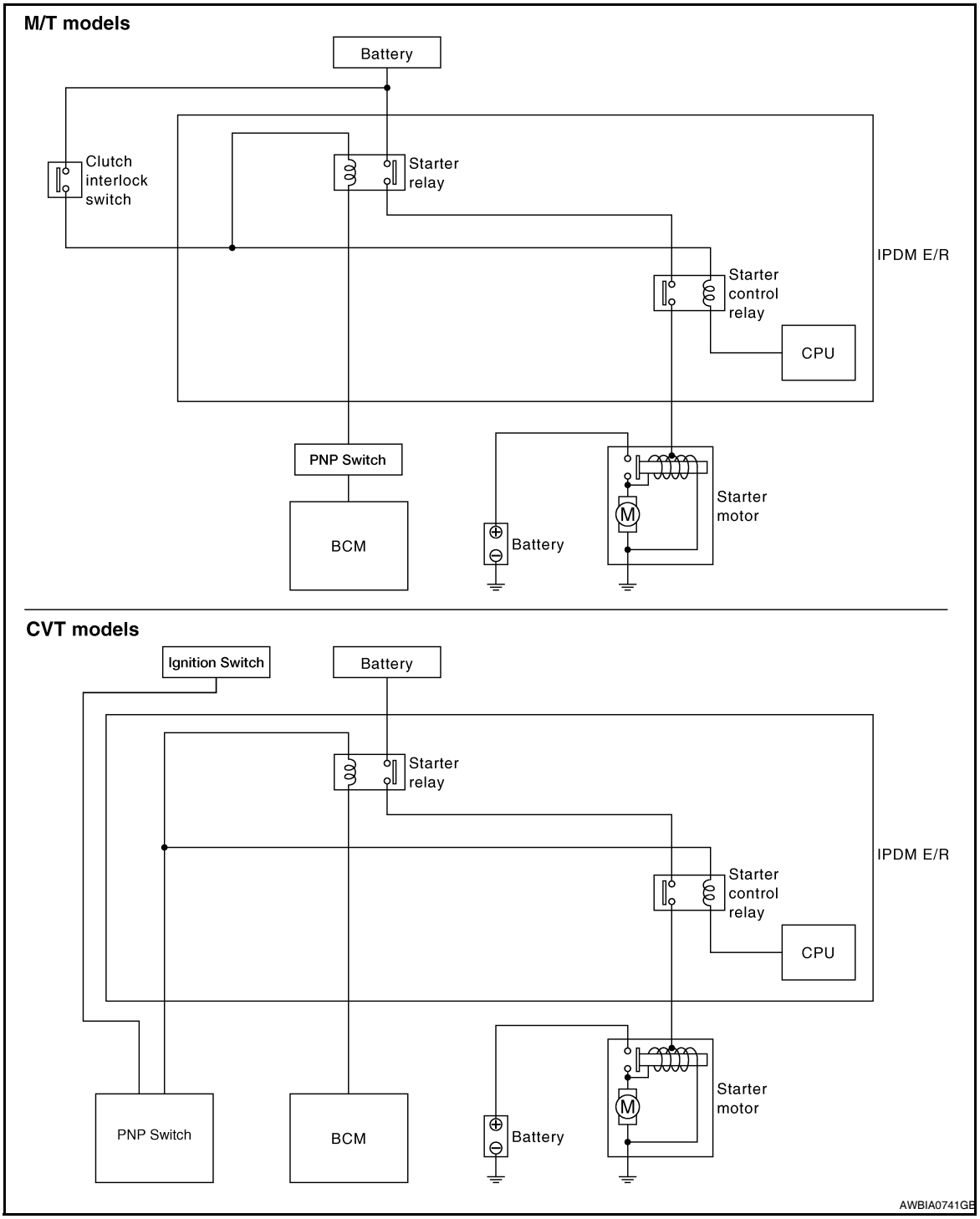
YES >> Replace starter motor.
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Refer to EM, TM or CL sections. Once resolved, perform battery test again. Refer to Technical Service Bulletin.

FUNCTION DIAGNOSIS

STARTING SYSTEM

System Diagram

INFOID:0000000004205229



System Description

INFOID:0000000004205230

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

Component Description

INFOID:0000000004205231

Component part	Description
PNP switch (CVT models)	PNP switch supplies power to the starter relay and starter control relay inside IPDM E/R when the selector lever is shifted to the P or N position.
Clutch interlock switch (M/T models)	The switch turns ON and electric power is supplied to the starter relay and starter control relay inside IPDM E/R when the clutch pedal is depressed.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R controls the starter control relay.
Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the “S” terminal is supplied with electric power.

COMPONENT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000004205232

The “B” terminal is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000004205233

CAUTION:

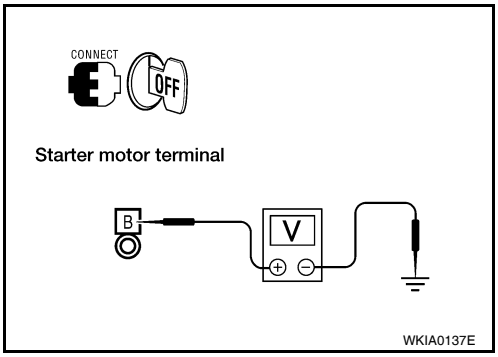
Perform diagnosis under the condition that the engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is depleted.**

1.CHECK TERMINAL B POWER SUPPLY VOLTAGE

1. Turn ignition switch OFF.
2. Make sure that starter motor connector F27 terminal B connection is clean and tight.
3. Check voltage between starter motor connector F27 terminal B and ground.

B - ground **Battery voltage**



Is there battery voltage present?

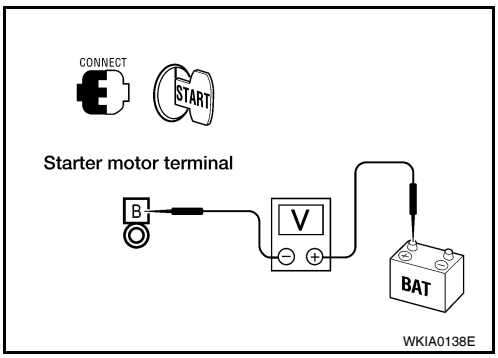
YES >> GO TO 2
NO >> Check harness between battery and starter motor for open circuit.

2.CHECK BATTERY CABLE (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
2. Check voltage between battery positive terminal and starter motor connector F27 terminal B while cranking the engine.

While cranking the engine

Terminal B - B+ terminal **Less than 0.5V**



Is the voltage drop less than 0.5V?

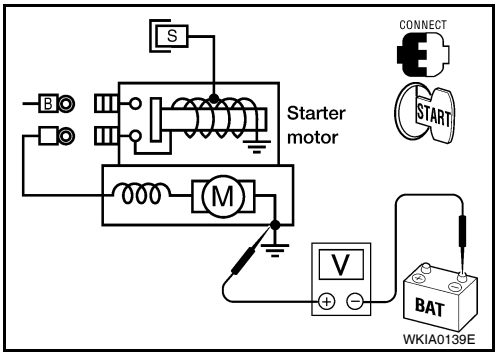
YES >> GO TO 3
NO >> Check harness between the battery and the starter motor for high resistance.

3.CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
2. Check voltage between starter motor case and battery negative terminal while cranking the engine.

While cranking the engine

Starter case - B- terminal **Less than 0.2V**



Is the voltage drop less than 0.2V?

YES >> Terminal B circuit is OK. Further inspection necessary. Refer to STR-3, "Work Flow".
NO >> Check the starter motor case to engine mounting for high resistance.

S CONNECTOR CIRCUIT

Description

INFOID:0000000004205234

The starter motor magnetic switch is supplied with power when the ignition switch is turned to the START position while the selector lever is in the P or N position (CVT models) or the clutch pedal is fully depressed (M/T models).

Diagnosis Procedure

INFOID:0000000004205235

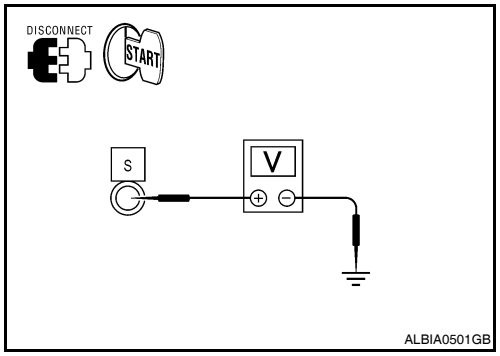
CAUTION:

Perform diagnosis under the condition that engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is released.**

1.CHECK "S" CONNECTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector F28.
3. Shift CVT selector lever to "P" or "N" position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
4. Check voltage between starter motor harness connector F28 terminal S and ground with the ignition in START.



With ignition switch in START

S - ground	**Battery voltage**

Is battery voltage present?

YES >> "S" circuit is OK. Further inspection necessary. Refer to STR-3, "Work Flow".
NO >> GO TO 2

2.CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check the following terminals and connectors for damage, bent pins and loose connections.

- IPDM E/R harness connector F10
- Starter motor harness connector F28

Is the inspection result normal?

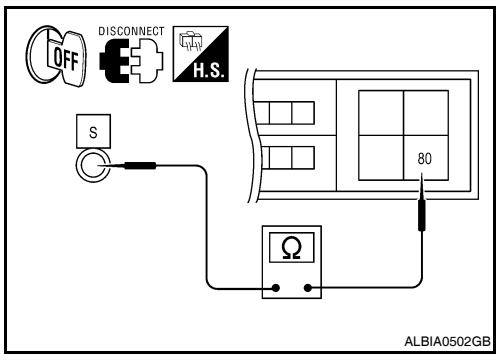
YES >> GO TO 3
NO >> Repair the terminal and connector.

3.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect the following harness connectors.

- IPDM E/R connector F10
- Starter motor connector F28

2. Check continuity between starter motor harness connector F28 terminal S and IPDM E/R harness connector F10 terminal 80.



S - 80	**Continuity exists**

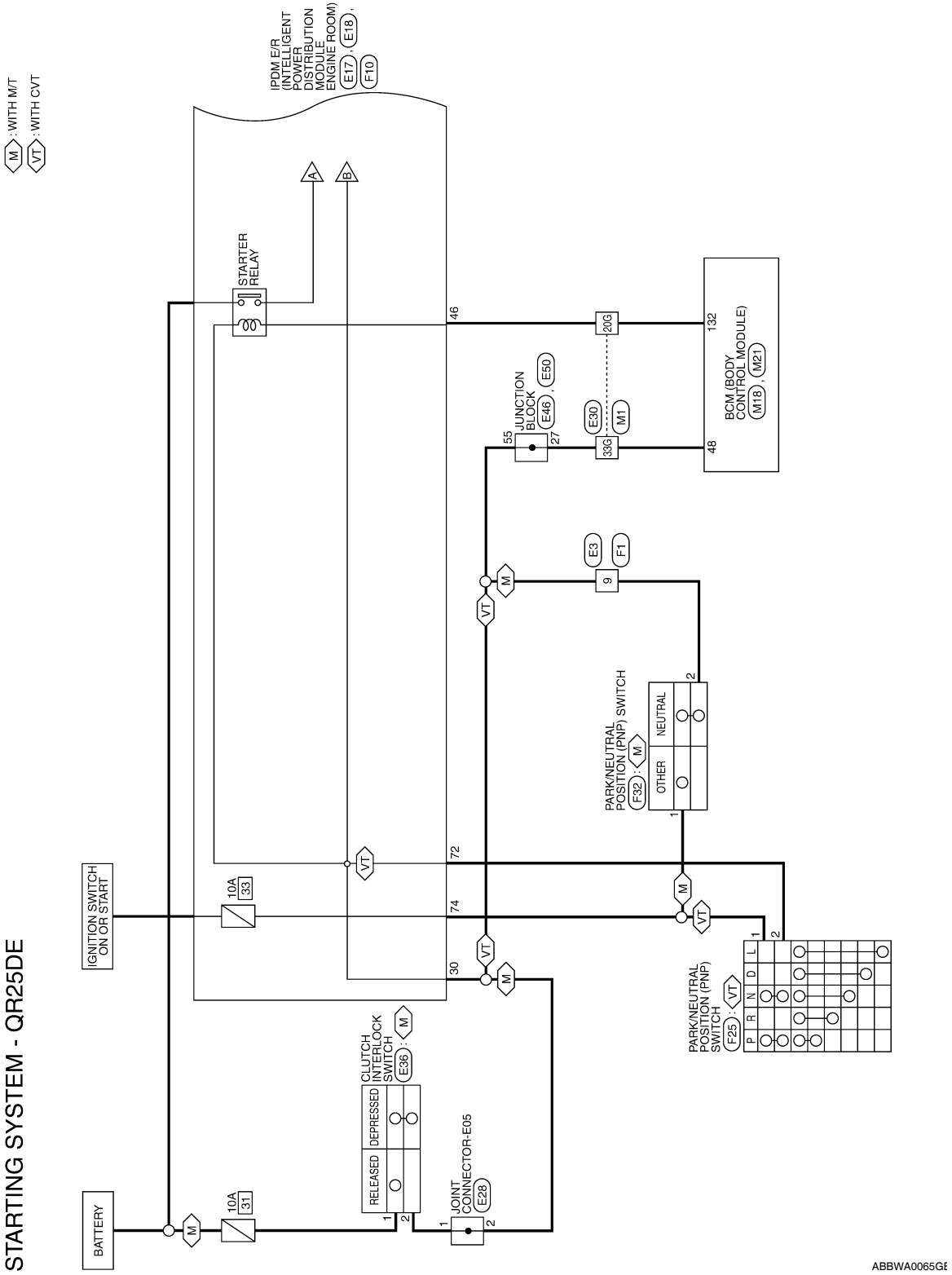
Is there proper continuity between the two pins?

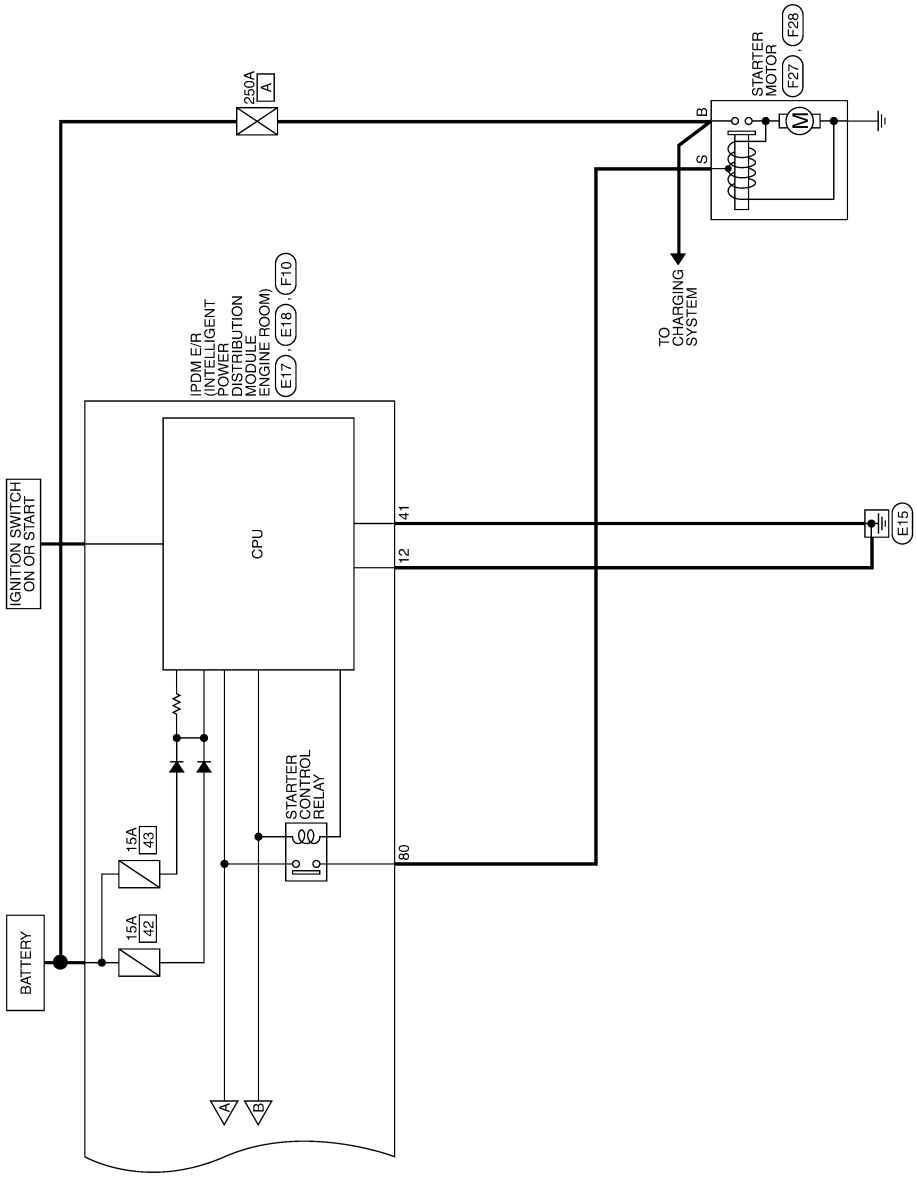
YES >> Further inspection necessary. Refer to STR-3, "Work Flow".
NO >> Repair the harness.

STARTING SYSTEM

Wiring Diagram - Coupe

INFOID:0000000004205236




STARTER MOTOR
F27
F28
250A
A
B
S
TO CHARGING SYSTEM
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E17
E18
F10
CPU
IGNITION SWITCH ON OR START
41
12
80
E15
STARTER CONTROL RELAY
15A
43
15A
42
BATTERY
A
B

AWBWA0024G

STARTING SYSTEM CONNECTORS - QR25DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

9G	8G	7G	6G	5G	4G	3G		1G
17G	16G	15G	14G	13G	12G	11G	10G	2G
	26G	25G	24G	23G	22G	21G	20G	
	34G	33G	32G	31G	30G	29G	28G	27G
	41G	40G	39G	38G	37G	36G	35G	
	50G	49G	48G	47G	46G	45G	44G	43G
	58G	57G	56G	55G				
	63G	62G	61G	60G	59G	54G	53G	52G
	72G	71G	70G	69G	68G	67G	66G	
	80G	79G	78G	77G	76G	75G	74G	73G
		83G		82G		81G		

Terminal No.	Color of Wire	Signal Name
20G	R	–
33G	R/G	–

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GREEN

H.S.

38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20
58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40

Terminal No.	Color of Wire	Signal Name
48	R/G	SHIFT_N/P

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39
46	45	44	43

Terminal No.	Color of Wire	Signal Name
41	B	GND (SIGNAL)
46	R	START_CONT

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

Terminal No.	Color of Wire	Signal Name
9	BR	–

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GRAY

H.S.

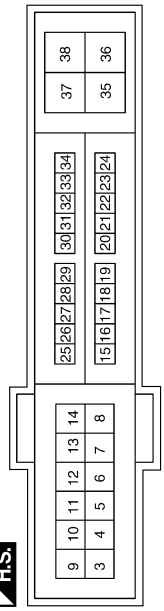
131	130	129	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
151	150	149	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132

Terminal No.	Color of Wire	Signal Name
132	R	ST_CONT_USM

ABBIA0188GB

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
12	B	GND (POWER)
30	R/B	CLUTCH I/L SW

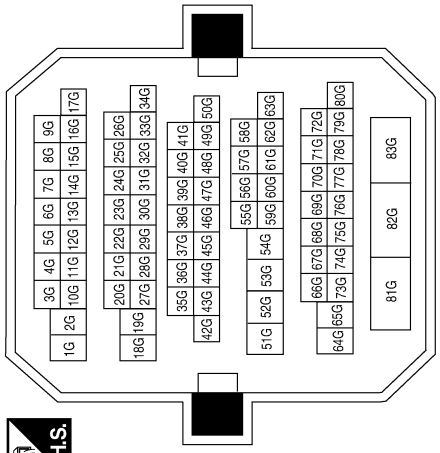
Connector No.	E28
Connector Name	JOINT CONNECTOR-E05
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	R	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
20G	BR	–
33G	BR	–

Connector No.	E36
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	R	–

ABBIA0189GB

Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

31	30	29	28		27	26	25
40	39	38	37	36	35	34	33	32

Terminal No.	Color of Wire	Signal Name
27	BR	–

Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

56	55

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
9	R/B	–

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

53	54	55	56	57	58		69	70	71	72	73		74	75	76	77	78		81	82
47	48	49	50	51	52		59	60	61	62	63		64	65	66	67	68		79	80

Terminal No.	Color of Wire	Signal Name
72	R/B	NPSW
74	Y	START_IG-EGI
80	B/W	STARTER_MOTOR

Connector No.	F25
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH QR25DE CVT)
Connector Color	BLACK

H.S.

8	4	3	7
2	6	5	1

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

ABBIA0190GB

Connector No.	F32
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH M/T)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

Connector No.	F28
Connector Name	STARTER MOTOR
Connector Color	–

Terminal No.	Color of Wire	Signal Name
S	B/W	START

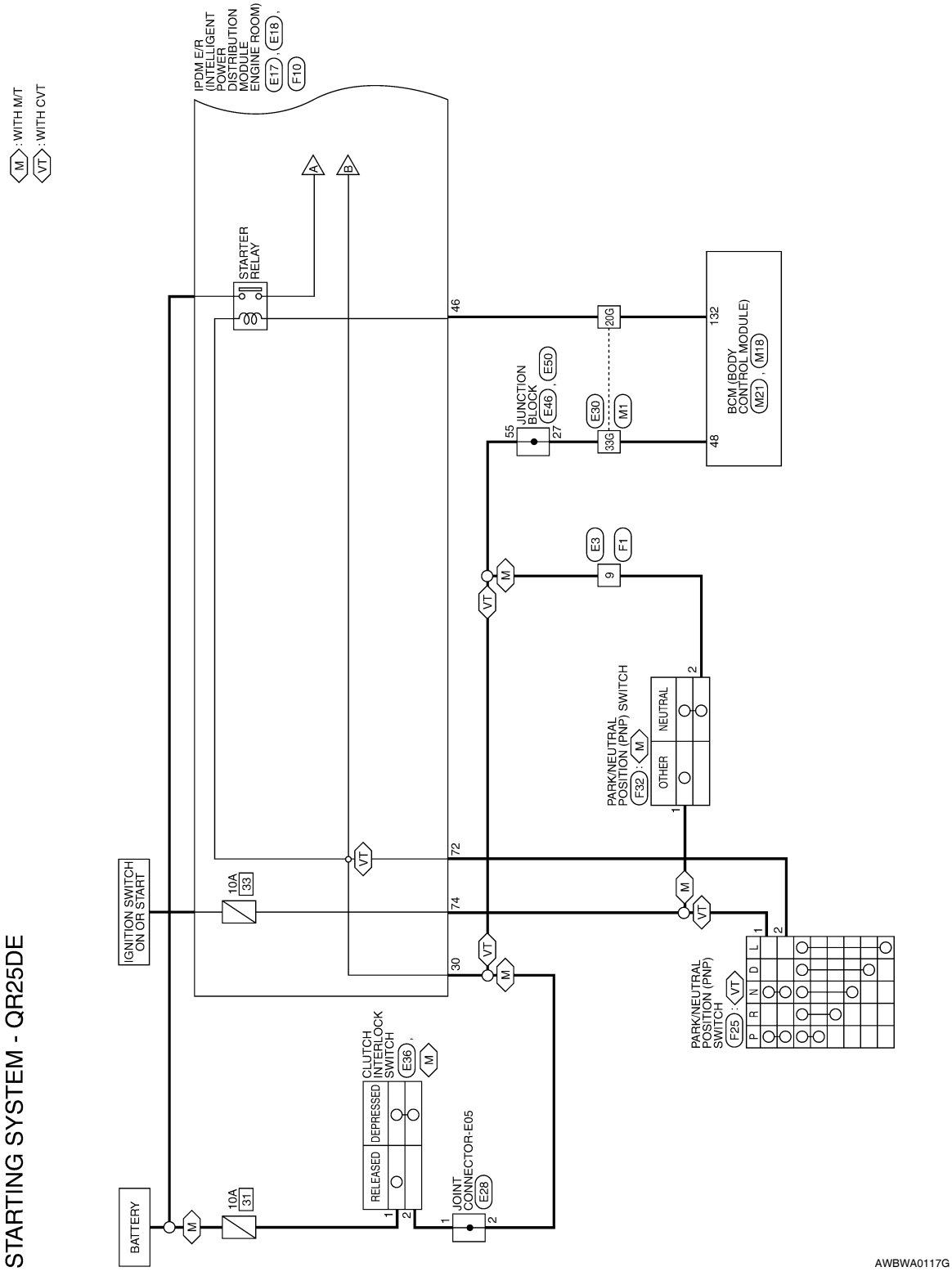
Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	–

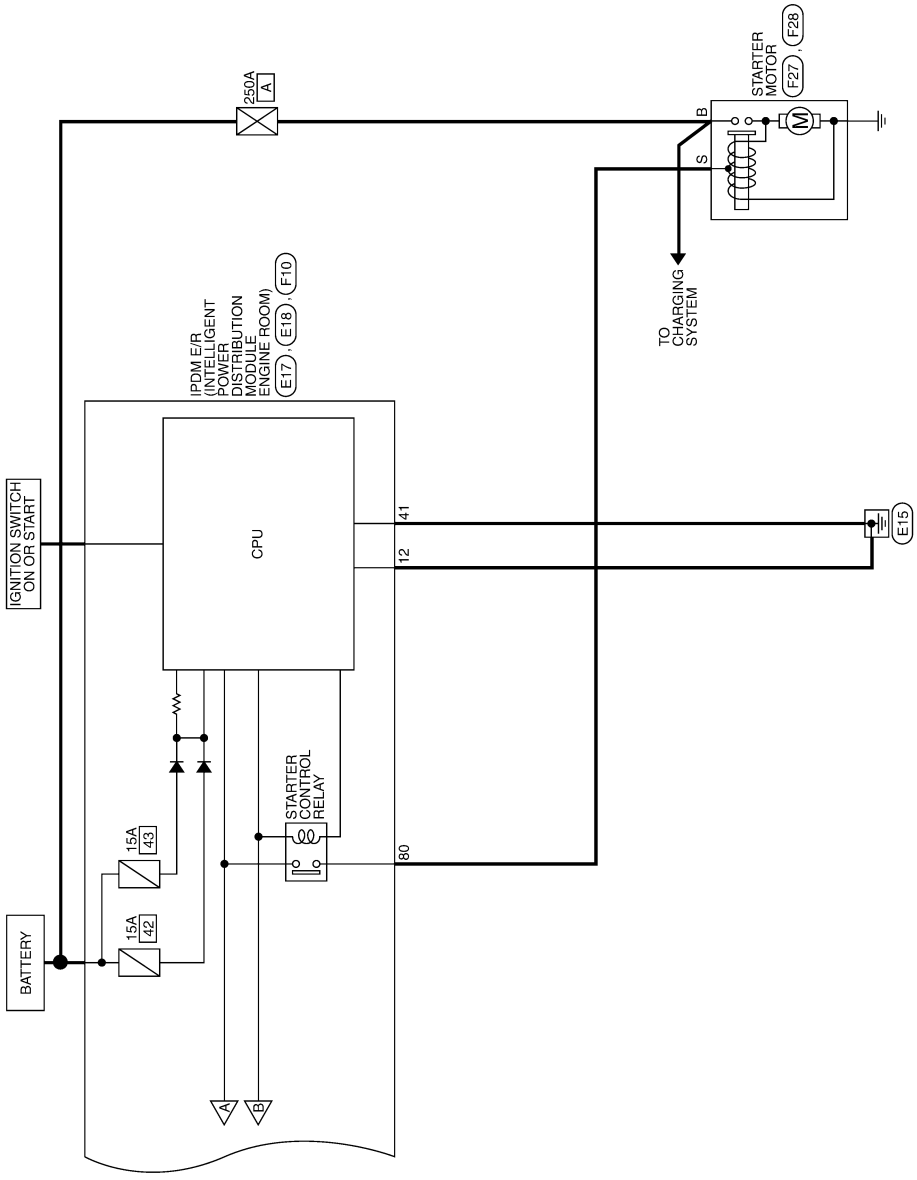
Terminal No.	Color of Wire	Signal Name
B	B/R	BATT

ABBIA0191GB

Wiring Diagram - Sedan

INFOID:0000000004205237



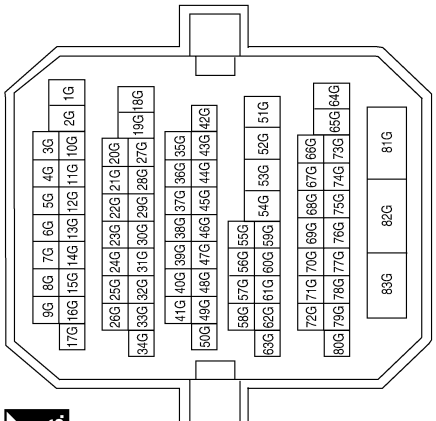

250A
A
STARTER MOTOR
F28
F27
B
S
TO CHARGING SYSTEM
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E17
E18
F10
IGNITION SWITCH ON OR START
CPU
41
12
E15
STARTER CONTROL RELAY
80
15A
43
15A
42
BATTERY
A
B

AWBWA0118G

STARTING SYSTEM CONNECTORS - QR25DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

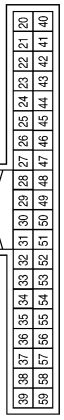
H.S.



Terminal No.	Color of Wire	Signal Name
20G	R	–
33G	R/G	–

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GREEN

H.S.



Terminal No.	Color of Wire	Signal Name
48	R/G	SHIFT_N/P

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
132	R	ST_CONT_USM

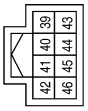
Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
9	BR	–

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

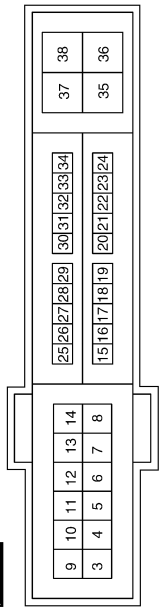


Terminal No.	Color of Wire	Signal Name
41	B	GND (SIGNAL)
46	R	START_CONT

ABBIA0177GB

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

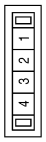
H.S.



Terminal No.	Color of Wire	Signal Name
12	B	GND (POWER)
30	R/B	CLUTCH I/L SW

Connector No.	E28
Connector Name	JOINT CONNECTOR-E05
Connector Color	WHITE

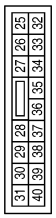
H.S.



Terminal No.	Color of Wire	Signal Name
1	R	–
2	R	–

Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
27	BR	–

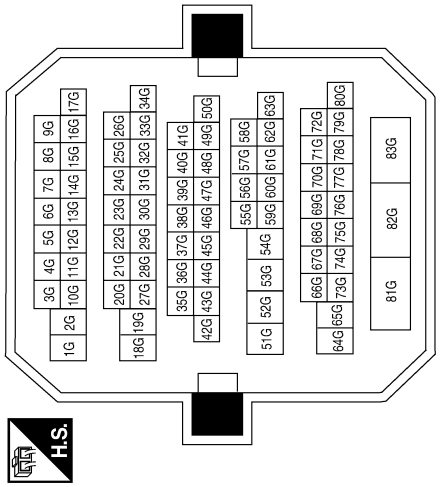
Connector No.	E36
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	R	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
20G	BR	–
33G	BR	–

ABBIA0178GB

Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
9	R/B	–

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
72	R/B	NPSW
74	Y	START_IG-EGI
80	B/W	STARTER_MOTOR

Connector No.	F25
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH CVT)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

ABBIA0179GB

Connector No.	F32
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

Connector No.	F28
Connector Name	STARTER MOTOR
Connector Color	—

H.S.

Terminal No.	Color of Wire	Signal Name
S	B/W	START

Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	—

H.S.

Terminal No.	Color of Wire	Signal Name
B	B/R	BATT

AWBIA0425GB

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000004205238

Symptom	Reference
No normal cranking	Refer to STR-3, "Work Flow".
Starter motor does not rotate	

PRECAUTION

PRECAUTIONS

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

INFOID:0000000004205239

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front 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. Information necessary to service the system safely is included in the SR and SB 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 must be performed by an authorized NISSAN/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 SR 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 harnesses or harness connectors.**

Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000004523259

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.
If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the battery disconnected or discharged, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

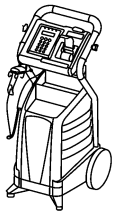
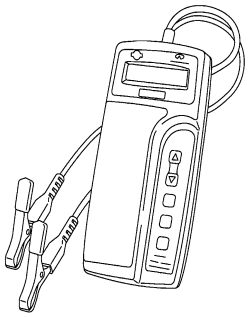
1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-III.

PREPARATION

PREPARATION

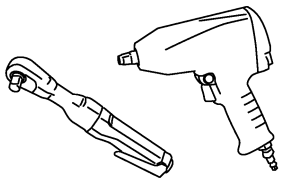
Special Service Tool

INFOID:0000000004205240

Tool number (Kent Moore No.) Tool name	Description
(J-48087) Battery Service Center  WKIA5280E	Tests Battery. For operating instructions, refer to Technical Service Bulletin and Battery Service Center User Guide.
(J-44373) Model 620 Starting/Charging system tester  SEL403X	Tests starting and charging systems. For operating instructions, refer to Technical Service Bulletin.

Commercial Service Tool

INFOID:0000000004205241

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

ON-VEHICLE REPAIR

STARTER MOTOR

Removal and Installation

INFOID:0000000004205242

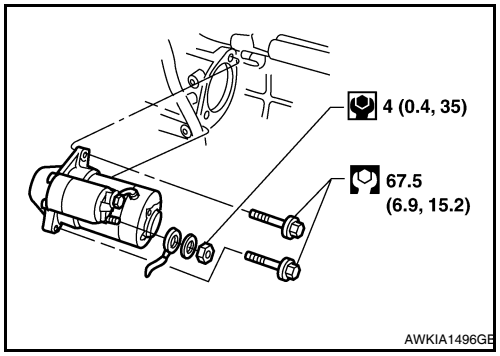
M/T MODELS

Removal

1. Disconnect the negative battery terminal.
2. Disconnect the starter motor harness connectors.
3. Remove the two starter motor bolts, using power tools.
4. Remove the starter motor.

Installation

Installation is in the reverse order of removal.



Removal and Installation

INFOID:0000000004205243

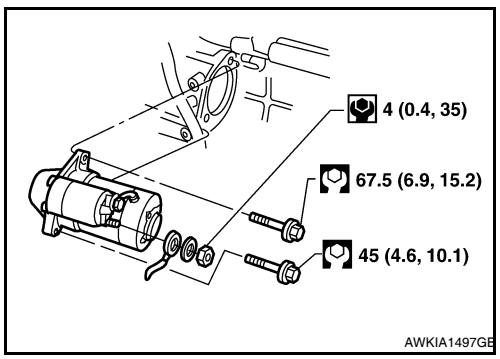
CVT Models

REMOVAL

1. Remove the battery and battery tray bracket. For Sedan Refer to PG-139, "Removal and Installation" For Coupe Refer to PG-68, "Removal and Installation"
2. Remove the air cleaner assembly ducts.
3. Disconnect the following:
   - ECM
   - TCM
4. Disconnect the starter motor harness connectors.
5. Remove the two starter motor bolts, using power tools.
6. Remove the starter motor.

INSTALLATION

Installation is in the reverse order of removal.

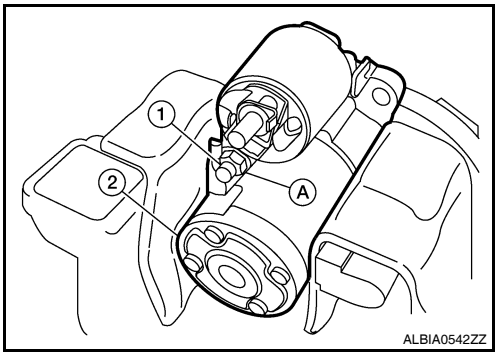


Disassembly and Assembly

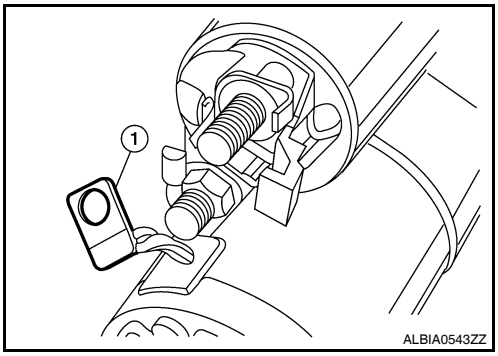
INFOID:0000000004507222

DISASSEMBLY

1. Set the starter motor assembly (2) onto a suitable tool using a soft cloth as shown.
2. Remove the terminal "M" nut (A) from terminal "M" (1).



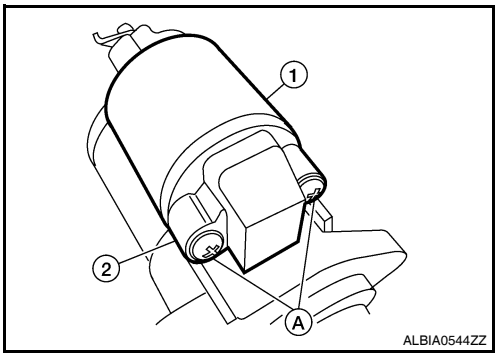
3. Disconnect terminal "M" connector (1).



4. Remove the two magnet switch assembly screws (A) and remove the magnet switch assembly (1).

CAUTION:

Magnet switch assembly (1) may pop out from starter motor assembly (2) while loosening magnet switch assembly screws.

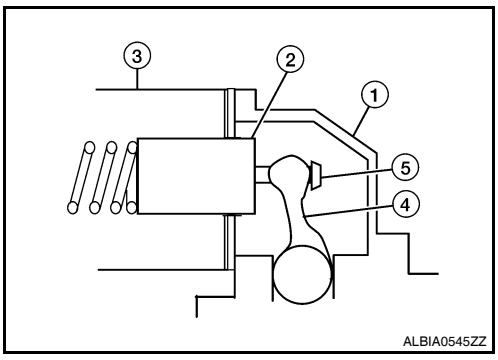


ASSEMBLY

1. Install magnet switch assembly (3) onto starter motor assembly (1).
   - Pull rod (5) of magnet switch assembly (3) should be engaged with shift lever (4) as shown.

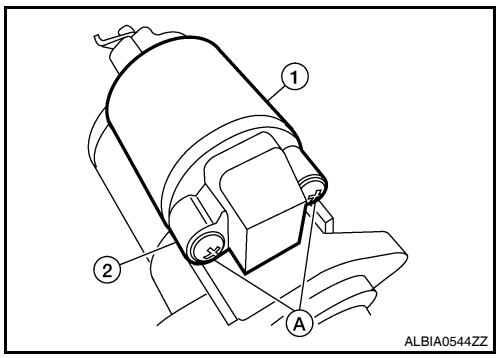
CAUTION:

- **Do not damage the sliding surface (2) of magnet switch assembly (3).**
- **Do not leave any dirt on the sliding surface (2) of the magnet switch assembly (3).**
- **Confirm the terminal location.**



2. Tighten the two magnet switch assembly screws (A) to specification.
   - Magnetic switch assembly (1)
   - Starter motor assembly (2)

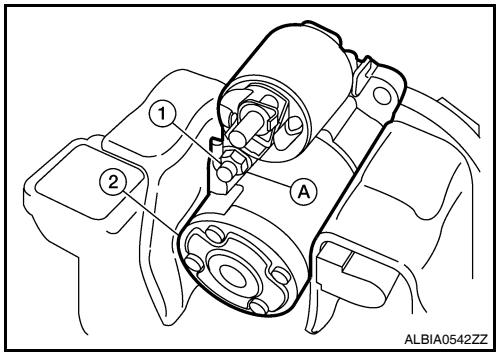
   Magnet switch assembly screws (A) : **5.9 N·m (0.6 kg-m, 8 lb-ft)**



3. Connect the terminal "M" connector and tighten terminal "M" nut (A) to specification.
   - Starter motor assembly (2)

   CAUTION:
   The connector for terminal "M" (1) may rotate easily while tightening terminal "M" nut (A). Hold the connector in place while tightening terminal "M" nut (A).

   Terminal "M" nut (A) : **10.8 N·m (1.1 kg-m, 15 ft-lb)**



SERVICE DATA AND SPECIFICATIONS (SDS)

STARTER MOTOR

Starter

INFOID:0000000004205244

Application		QR25DE	
		M/T model	CVT model
Manufacturer		Mitsubishi M000T22271ZC M000T22272ZC	Mitsubishi M000TA0172ZC M000TA0173ZC
Type		Reduction gear type	
System voltage		12V	
No-load	Terminal voltage	11V	
	Current	90A Max.	
	Revolution	2,000 rpm Min.	

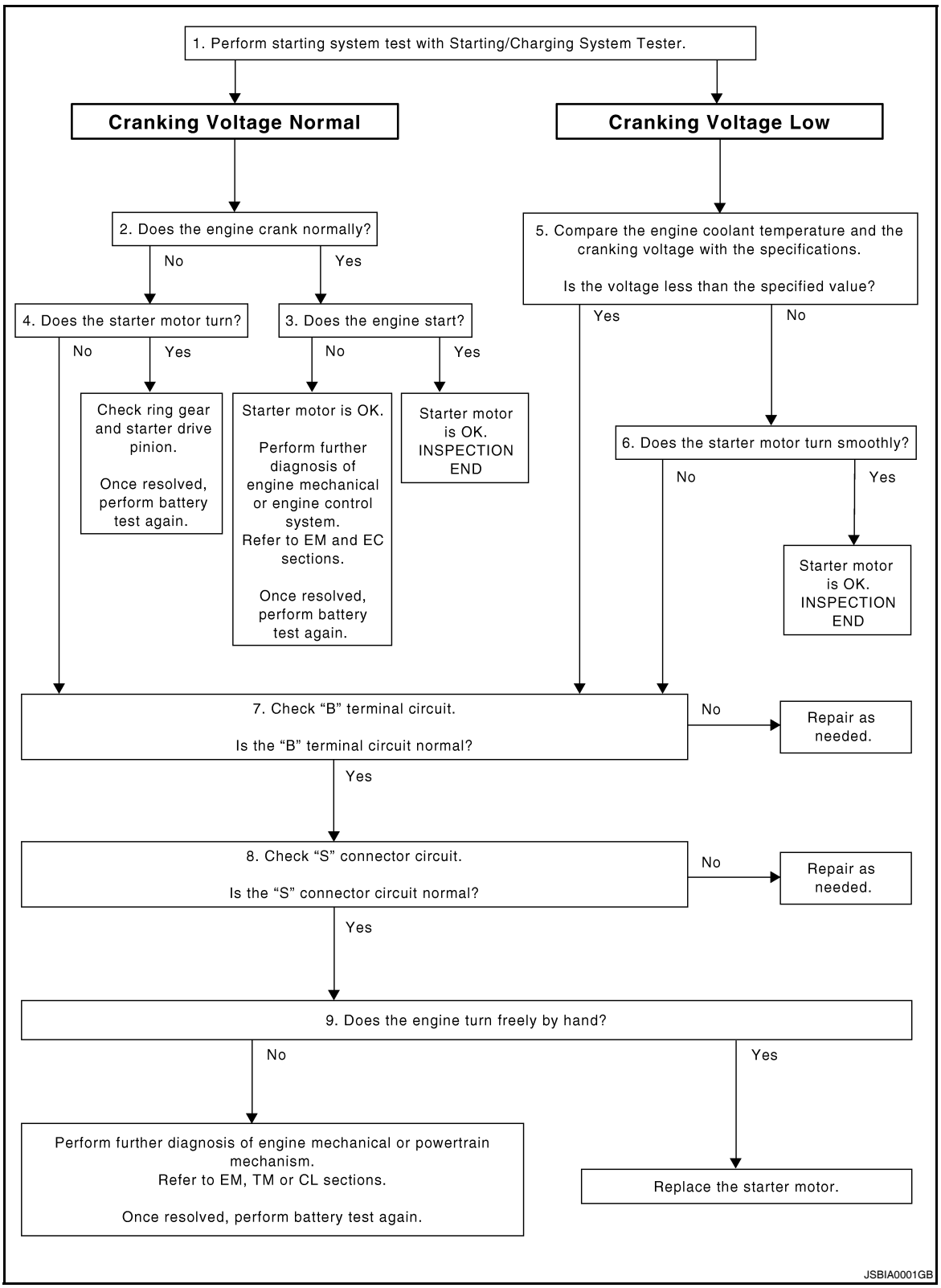
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000004205245

OVERALL SEQUENCE



DETAILED FLOW

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter motor and alternator test segments must be done as a set from start to finish.

1.DIAGNOSIS WITH STARTING/CHARGING SYSTEM TESTER

Perform the starting system test with Starting/Charging System Tester (J-44373). For details and operating instructions, refer to Technical Service Bulletin.

Test result

CRANKING VOLTAGE NORMAL>>GO TO 2
CRANKING VOLTAGE LOW>>GO TO 5
CHARGE BATTERY>>Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to Technical Service Bulletin.
REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to Technical Service Bulletin. If second test result is “REPLACE BATTERY”, then do so. Perform battery test again to confirm repair.

2.CRANKING CHECK

Check that the starter motor operates properly.

Does the engine crank normally?

YES >> GO TO 3
NO >> GO TO 4

3.ENGINE START CHECK

Check that the engine starts.

Does the engine start?

YES >> Starter motor is OK. Inspection end.
NO >> Perform further diagnosis of engine mechanical or engine control system. Refer to EM and EC sections. Once resolved, perform battery test again.

4.STARTER MOTOR ACTIVATION

Check that the starter motor operates.

Does the starter motor turn?

YES >> Check ring gear and starter motor drive pinion. Once resolved, perform battery test again.
NO >> GO TO 7

5.COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

Compare the engine coolant temperature and verify the cranking voltage is within specification.

Minimum Specification of Cranking Voltage Referencing Coolant Temperature

Engine coolant temperature [°C (°F)]	Voltage [V]
−30 to −20 (−22 to −4)	8.6
−19 to −10 (−2 to 14)	9.1
−9 to 0 (16 to 32)	9.5
More than 1 (More than 34)	9.9

Is the voltage less than the specified value?

YES >> GO TO 7
NO >> GO TO 6

6.STARTER OPERATION

Check the starter operation.

Does the starter motor turn smoothly?

YES >> Starter motor is OK. Inspection end.
NO >> GO TO 7

7.“B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to STR-34, "Diagnosis Procedure".

Is “B” terminal circuit normal?

YES >> GO TO 8
NO >> Repair as needed.

8. "S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to STR-35, "Diagnosis Procedure".

Is "S" connector circuit normal?

YES >> GO TO 9
NO >> Repair as needed.

9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

Does the engine turn freely by hand?

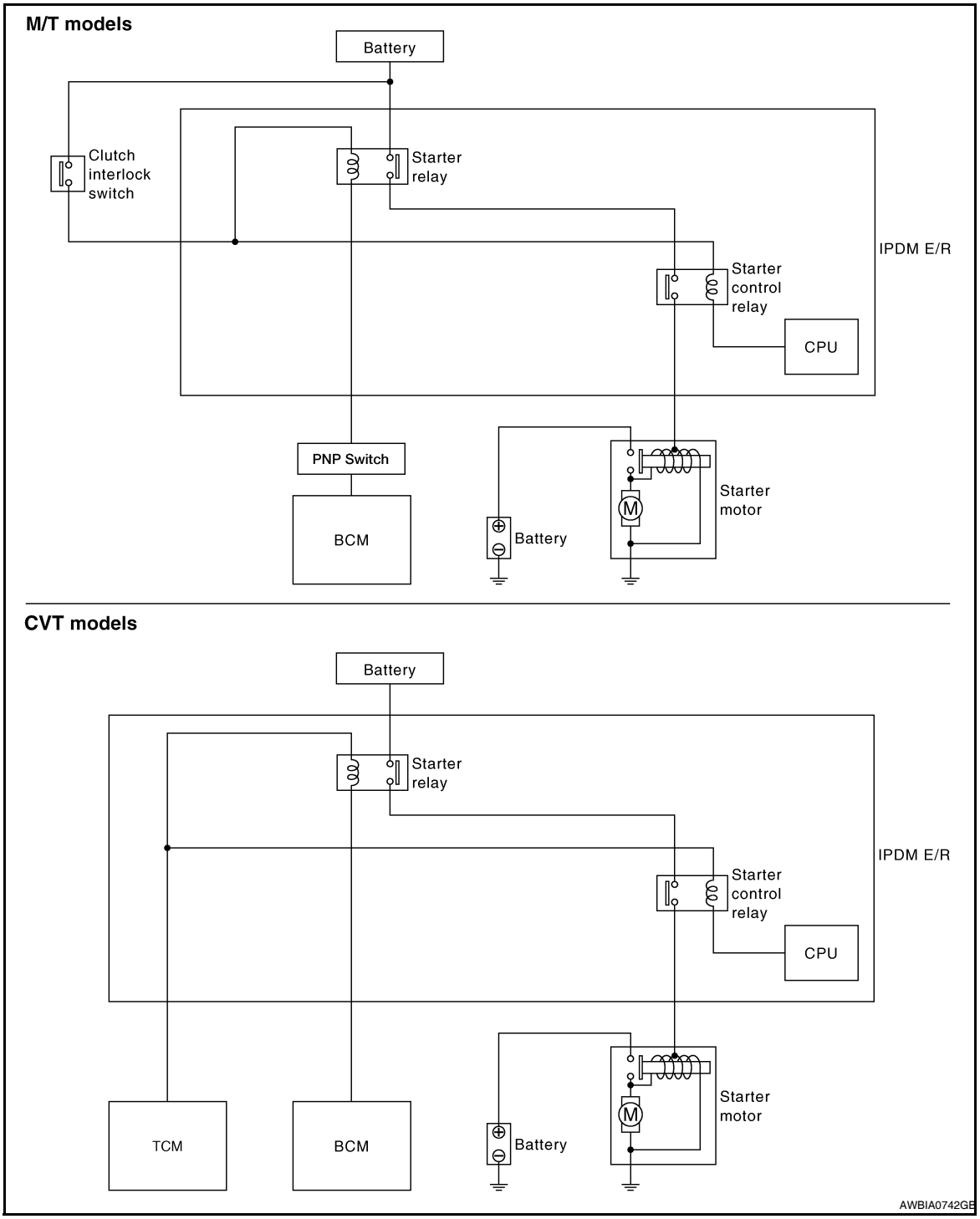
YES >> Replace starter motor.
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Refer to EM, TM or CL sections. Once resolved, perform battery test again. Refer to Technical Service Bulletin.

FUNCTION DIAGNOSIS

STARTING SYSTEM

System Diagram

INFOID:0000000004205246



System Description

INFOID:0000000004205247

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

Component Description

INFOID:0000000004205248

Component part	Description
TCM (CVT models)	TCM supplies power to the starter relay and starter control relay inside IPDM E/R when the selector lever is shifted to the P or N position.
Clutch interlock switch (M/T models)	The switch turns ON and electric power is supplied to the starter relay and starter control relay inside IPDM E/R when the clutch pedal is depressed.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R controls the starter control relay.
Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the “S” terminal is supplied with electric power.

COMPONENT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000004205249

The “B” terminal is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000004205250

CAUTION:

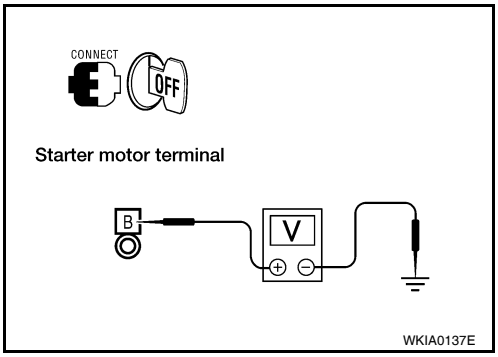
Perform diagnosis under the condition that the engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is depleted.**

1.CHECK TERMINAL B POWER SUPPLY VOLTAGE

1. Turn ignition switch OFF.
2. Make sure that starter motor connector F27 terminal B connection is clean and tight.
3. Check voltage between starter motor connector F27 terminal B and ground.

B - ground **Battery voltage**



Is there battery voltage present?

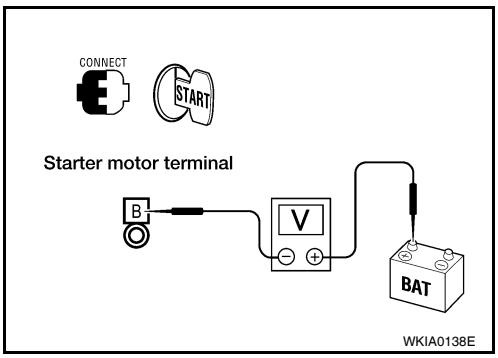
YES >> GO TO 2
NO >> Check harness between battery and starter motor for open circuit.

2.CHECK BATTERY CABLE (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
2. Check voltage between battery positive terminal and starter motor connector F27 terminal B while cranking the engine.

While cranking the engine

Terminal B - B+ terminal **Less than 0.5V**



Is the voltage drop less than 0.5V?

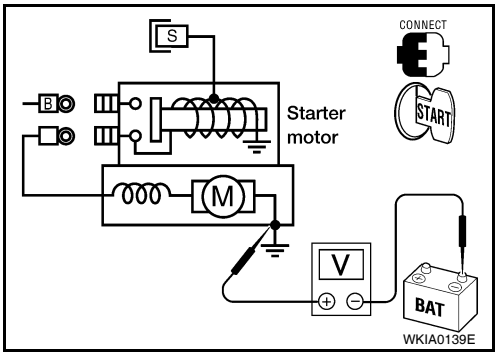
YES >> GO TO 3
NO >> Check harness between the battery and the starter motor for high resistance.

3.CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift CVT selector lever to “P” or “N” position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
2. Check voltage between starter motor case and battery negative terminal while cranking the engine.

While cranking the engine

Starter case - B- terminal **Less than 0.2V**



Is the voltage drop less than 0.2V?

YES >> Terminal B circuit is OK. Further inspection necessary. Refer to STR-29, "Work Flow".
NO >> Check the starter motor case to engine mounting for high resistance.

S CONNECTOR CIRCUIT

Description

INFOID:0000000004205251

The starter motor magnetic switch is supplied with power when the ignition switch is turned to the START position while the selector lever is in the P or N position (CVT models) or the clutch pedal is fully depressed (M/T models).

Diagnosis Procedure

INFOID:0000000004205252

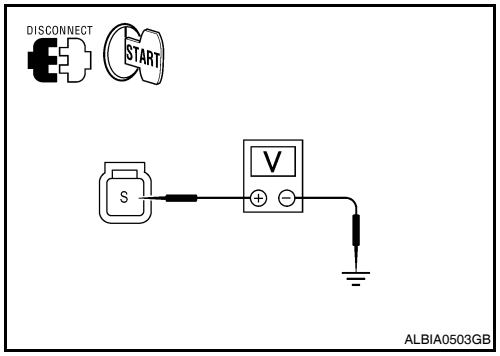
CAUTION:

Perform diagnosis under the condition that engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is released.**

1.CHECK "S" CONNECTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector F28.
3. Shift CVT selector lever to "P" or "N" position. (CVT models)
   Press and hold the clutch pedal fully with the control lever in neutral. (M/T models)
4. Check voltage between starter motor harness connector F28 terminal S and ground with the ignition in START.



With ignition switch in START

S - ground	**Battery voltage**

Is battery voltage present?

YES >> "S" circuit is OK. Further inspection necessary. Refer to STR-29, "Work Flow".
NO >> GO TO 2

2.CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check the following terminals and connectors for damage, bent pins and loose connections.

- IPDM E/R harness connector F10
- Starter motor harness connector F28

Is the inspection result normal?

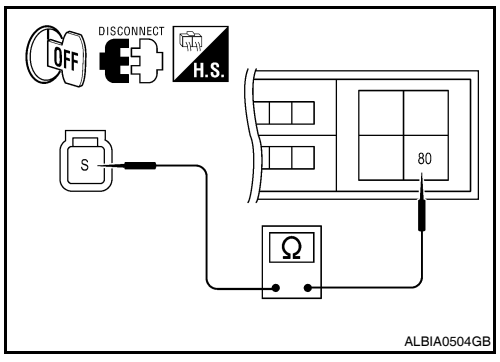
YES >> GO TO 3
NO >> Repair the terminal and connector.

3.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect the following harness connectors.

- IPDM E/R connector F10
- Starter motor connector F28

2. Check continuity between starter motor harness connector F28 terminal S and IPDM E/R harness connector F10 terminal 80.



S - 80	**Continuity exists**

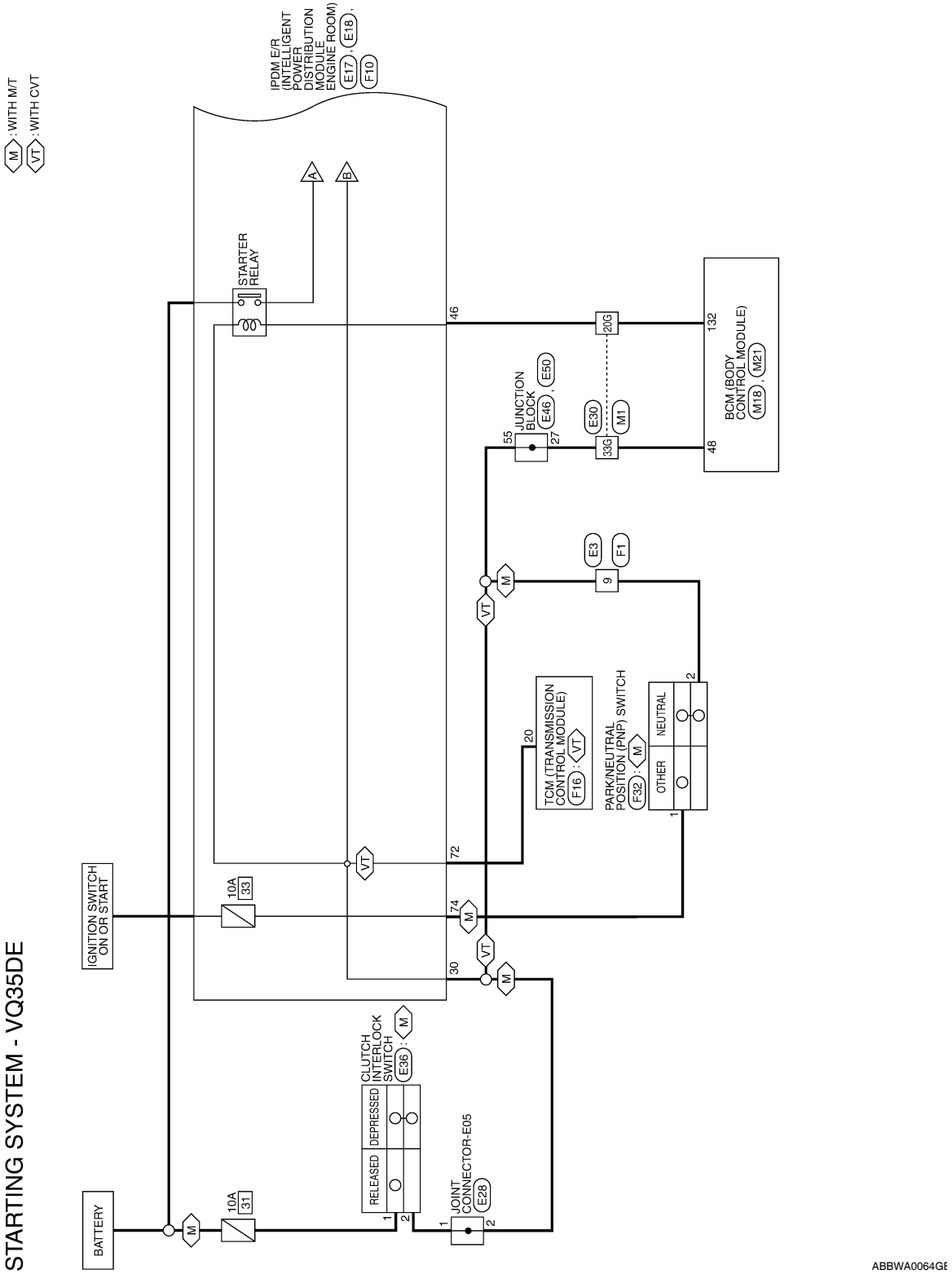
Is there proper continuity between the two pins?

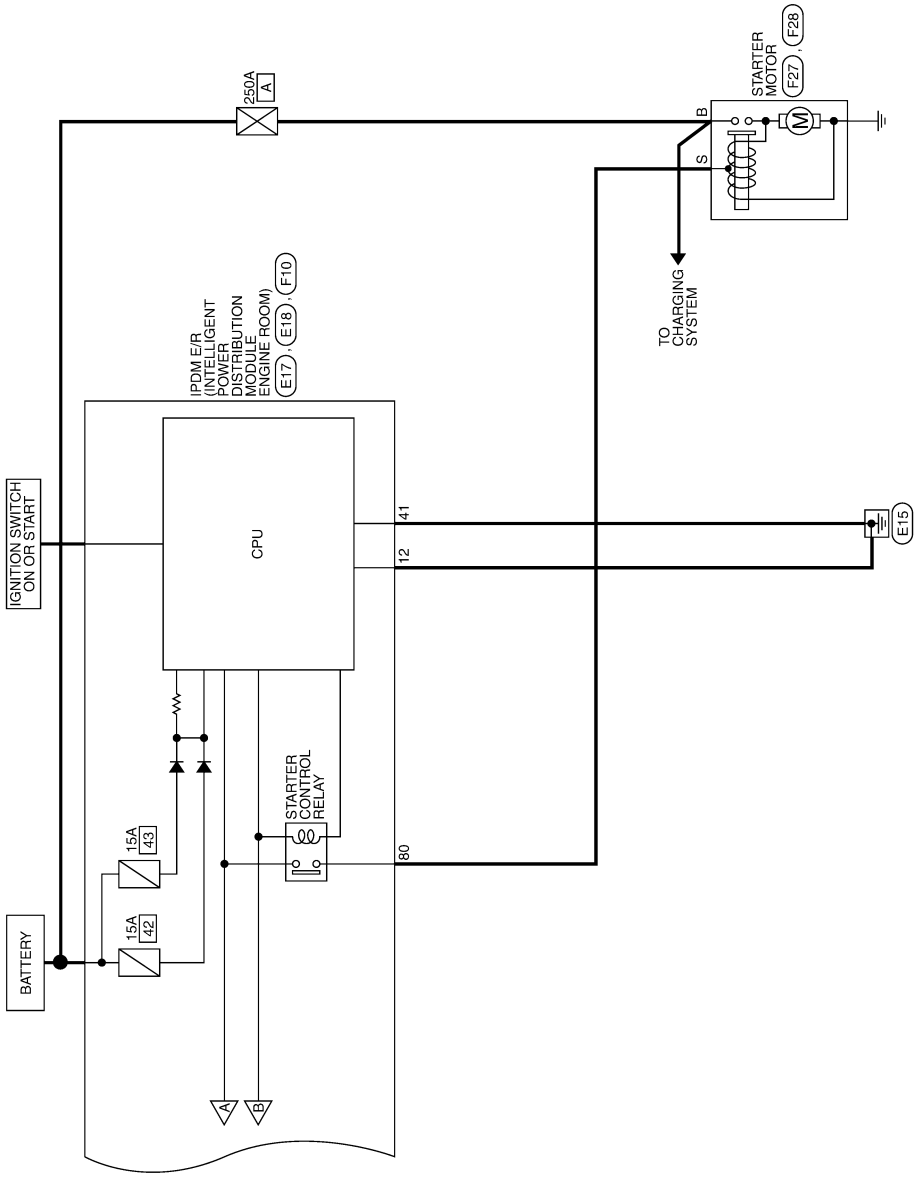
YES >> Further inspection necessary. Refer to STR-29, "Work Flow".
NO >> Repair the harness.

STARTING SYSTEM

Wiring Diagram - Coupe

INFOID:0000000004205253



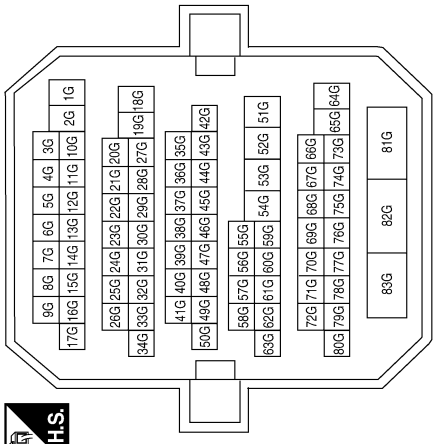

250A
A
STARTER MOTOR
F28
F27
B
S
TO CHARGING SYSTEM
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E17
E18
F10
CPU
IGNITION SWITCH ON OR START
41
12
E15
STARTER CONTROL RELAY
80
15A
43
15A
42
BATTERY
A
B

AWBWA0024G

STARTING SYSTEM CONNECTORS - VQ35DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
20G	R	–
33G	R/G	–

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GREEN

H.S.

38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20
39	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40

Terminal No.	Color of Wire	Signal Name
48	R/G	SHIFT_N/P

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
132	R	ST_CONT_USM

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

Terminal No.	Color of Wire	Signal Name
9	BR	–

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39
46	45	44	43

Terminal No.	Color of Wire	Signal Name
41	B	GND (SIGNAL)
46	R	START_CONT

ABBIA0184GB

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
12	B	GND (POWER)
30	R/B	CLUTCH I/L SW

Connector No.	E28
Connector Name	JOINT CONNECTOR-E05
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	R	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
20G	BR	–
33G	BR	–

Connector No.	E36
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	R	–

ABBIA0185GB

Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

31	30	29	28		27	26	25
40	39	38	37	36	35	34	33	32

Terminal No.	Color of Wire	Signal Name
27	BR	–

Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

56	55

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
9	R/B	–

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

53	54	55	56	57	58		69	70	71	72	73		74	75	76	77	78		81	82
47	48	49	50	51	52		59	60	61	62	63		64	65	66	67	68		79	80

Terminal No.	Color of Wire	Signal Name
72	R/B	NPSW
74	Y	START_IG-EGI
80	B/W	STARTER_MOTOR

Connector No.	F16
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	BLACK

H.S.

31	32	33	34	35	36	37	38	39	40	47	48
21	22	23	24	25	26	27	28	29	30	45	46
11	12	13	14	15	16	17	18	19	20	43	44
1	2	3	4	5	6	7	8	9	10	41	42

Terminal No.	Color of Wire	Signal Name
20	R/B	ST RLY

ABBIA0186GB

Connector No.	F32
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

Connector No.	F28
Connector Name	STARTER MOTOR
Connector Color	—

H.S.

Terminal No.	Color of Wire	Signal Name
S	B/W	START

Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	—

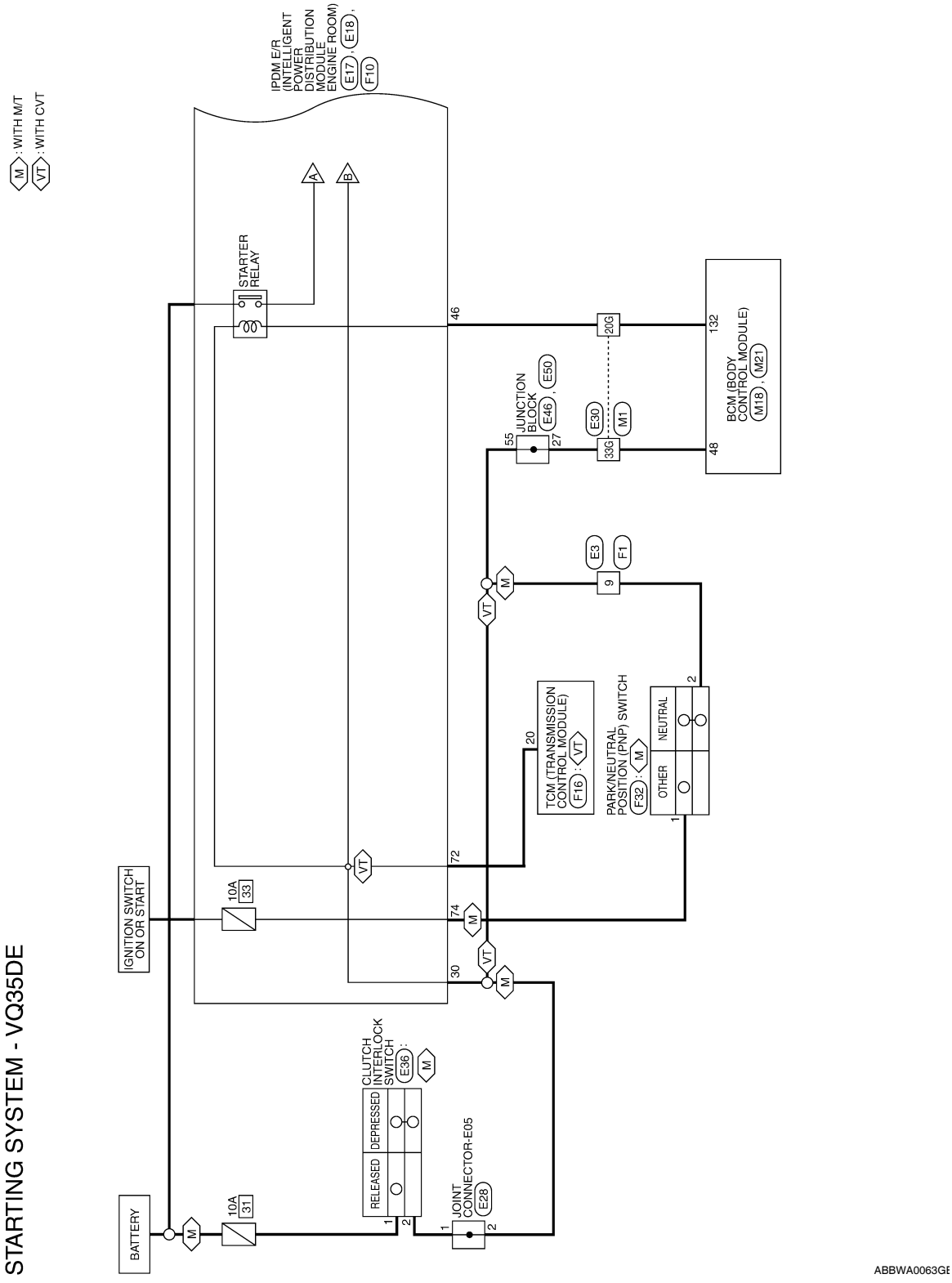
H.S.

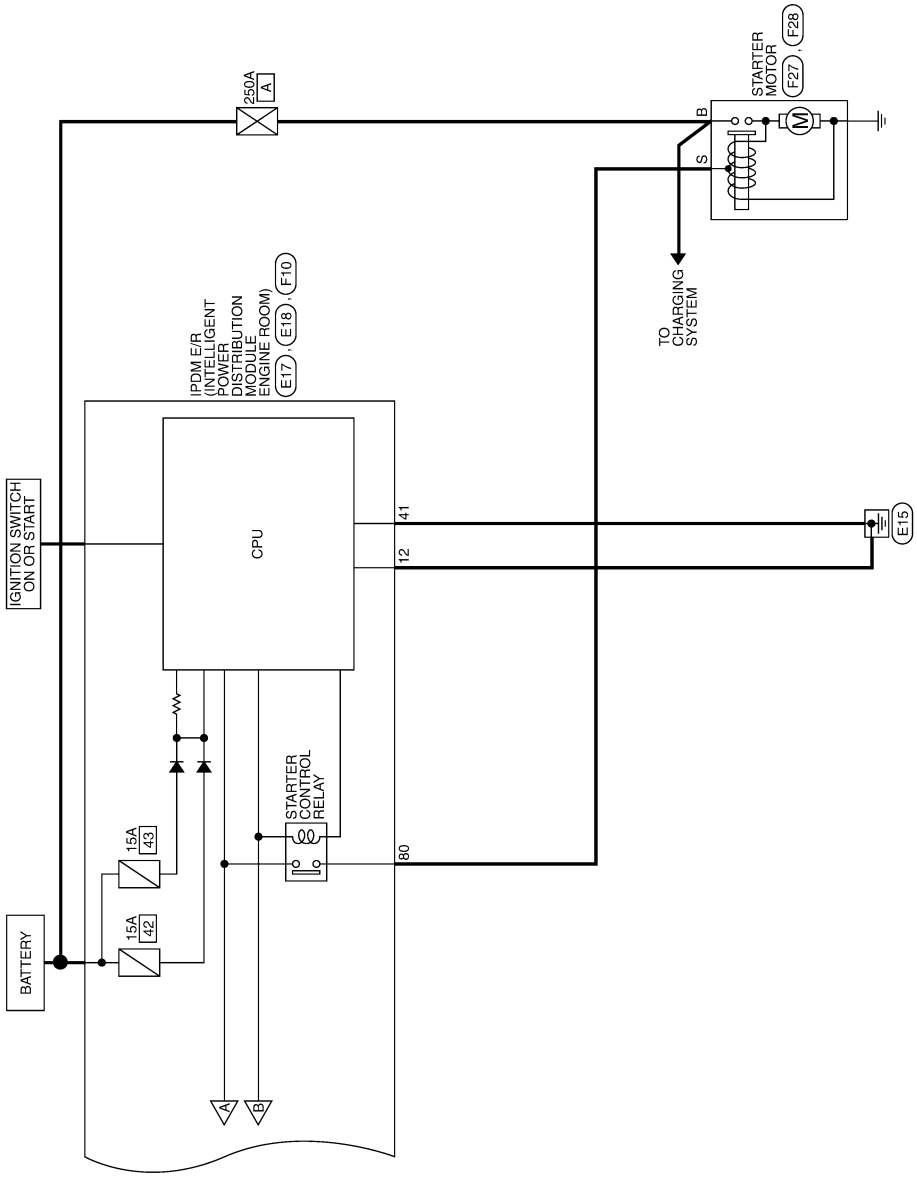
Terminal No.	Color of Wire	Signal Name
B	B/R	BATT

ABBIA0187GB

Wiring Diagram - Sedan

INFOID:0000000004205254




250A
A
STARTER MOTOR
F28
F27
B
S
M
TO CHARGING SYSTEM
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E17
E18
F10
IGNITION SWITCH ON OR START
CPU
41
12
E15
STARTER CONTROL RELAY
80
15A
43
15A
42
BATTERY
A
B

AWBWA0116G

STARTING SYSTEM CONNECTORS - VQ35DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

9G	8G	7G	6G	5G	4G	3G		1G
17G	16G	15G	14G	13G	12G	11G	10G	2G
	26G	25G	24G	23G	22G	21G	20G	19G	18G
	34G	33G	32G	31G	30G	29G	28G	27G	
	41G	40G	39G	38G	37G	36G	35G		
50G	49G	48G	47G	46G	45G	44G	43G	42G	
	58G	57G	56G	55G					
63G	62G	61G	60G	59G	54G	53G	52G	51G	
	72G	71G	70G	69G	68G	67G	66G		
80G	79G	78G	77G	76G	75G	74G	73G	65G	64G
				83G	82G		81G		

Terminal No.	Color of Wire	Signal Name
20G	R	–
33G	R/G	–

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GREEN

H.S.

39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20
59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40

Terminal No.	Color of Wire	Signal Name
48	R/G	SHIFT_N/P

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GRAY

H.S.

131	130	129	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
151	150	149	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132

Terminal No.	Color of Wire	Signal Name
132	R	ST_CONT_USM

Connector No.	E3
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3			4	5	6	7
8	9	10	11	12	13	14	15	16

Terminal No.	Color of Wire	Signal Name
9	BR	–

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

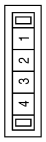
42	41	40	39
46	45	44	43

Terminal No.	Color of Wire	Signal Name
41	B	GND (SIGNAL)
46	R	START_CONT

ABBIA0180GB

Connector No.	E28
Connector Name	JOINT CONNECTOR-E05
Connector Color	WHITE

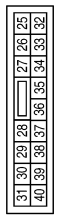
H.S.



Terminal No.	Color of Wire	Signal Name
1	R	–
2	R	–

Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

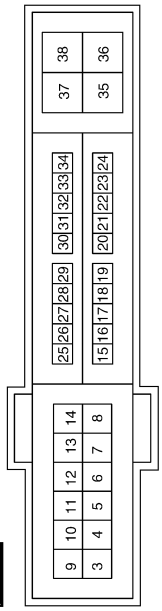
H.S.



Terminal No.	Color of Wire	Signal Name
27	BR	–

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
12	B	GND (POWER)
30	R/B	CLUTCH I/L SW

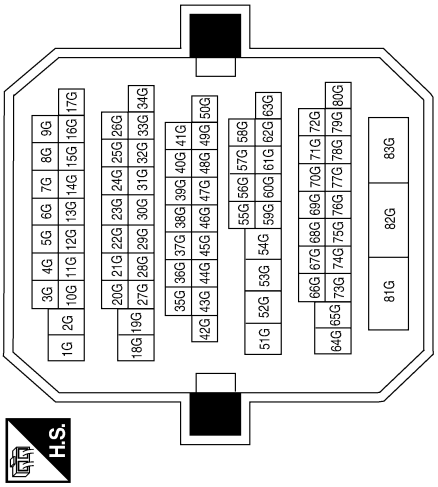
Connector No.	E36
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	R	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
20G	BR	–
33G	BR	–

ABBIA0181GB

Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

56	55

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
9	R/B	–

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

53	54	55	56	57	58
47	48	49	50	51	52

69	70	71	72	73		74	75	76	77	78
59	60	61	62	63		64	65	66	67	68

81	82
79	80

Terminal No.	Color of Wire	Signal Name
72	R/B	NPSW
74	Y	START_IG-EGI
80	B/W	STARTER_MOTOR

Connector No.	F16
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	BLACK

H.S.

31	32	33	34	35	36	37	38	39	40	47	48
21	22	23	24	25	26	27	28	29	30	45	46
11	12	13	14	15	16	17	18	19	20	43	44
1	2	3	4	5	6	7	8	9	10	41	42

Terminal No.	Color of Wire	Signal Name
20	R/B	ST_RLY

ABBIA0182GB

Connector No.	F32
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R/B	–

Connector No.	F28
Connector Name	STARTER MOTOR
Connector Color	—

H.S.

Terminal No.	Color of Wire	Signal Name
S	B/W	START

Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	—

H.S.

Terminal No.	Color of Wire	Signal Name
B	B/R	BATT

AWBIA0422GB

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000004205255

Symptom	Reference
No normal cranking	Refer to STR-29, "Work Flow".
Starter motor does not rotate	

PRECAUTION

PRECAUTIONS

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

INFOID:0000000004205256

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front 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. Information necessary to service the system safely is included in the SR and SB 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 must be performed by an authorized NISSAN/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 SR 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 harnesses or harness connectors.**

Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000004523260

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.
If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the battery disconnected or discharged, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

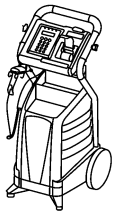
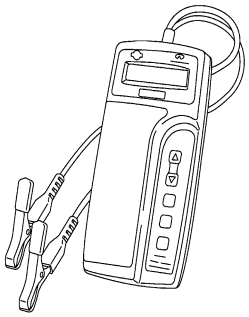
1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-III.

PREPARATION

PREPARATION

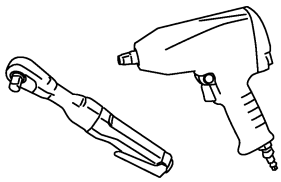
Special Service Tool

INFOID:0000000004205257

Tool number (Kent Moore No.) Tool name	Description
(J-48087) Battery Service Center  WKIA5280E	Tests Battery. For operating instructions, refer to Technical Service Bulletin and Battery Service Center User Guide.
(J-44373) Model 620 Starting/Charging system tester  SEL403X	Tests starting and charging systems. For operating instructions, refer to Technical Service Bulletin.

Commercial Service Tool

INFOID:0000000004205258

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

ON-VEHICLE REPAIR

STARTER MOTOR

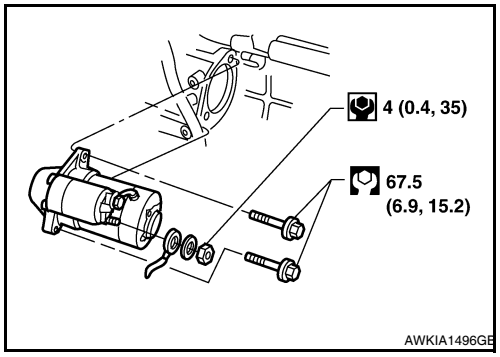
Removal and Installation

INFOID:0000000004205259

M/T Models

REMOVAL

1. Disconnect the negative battery terminal.
2. Disconnect the starter motor harness connectors.
3. Remove the two starter motor bolts, using power tools.
4. Remove the starter motor.



INSTALLATION

1. Installation is in the reverse order of removal.

Removal and Installation

INFOID:0000000004205260

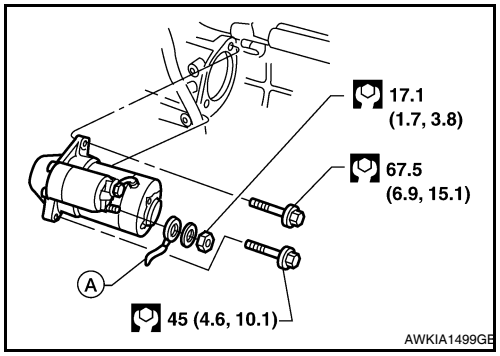
CVT Models

REMOVAL

1. Disconnect the negative and positive battery terminal.
2. Remove the air cleaner assembly and air ducts.
3. Disconnect the following:
   - ECM
   - TCM
4. Remove the battery tray. For Sedan Refer PG-139, "Removal and Installation". For Coupe Refer to PG-68, "Removal and Installation"
5. Disconnect the starter motor harness connectors.
6. Remove the two starter motor bolts, using power tools.
7. Remove the starter motor.

INSTALLATION

Installation is in the reverse order of removal.



SERVICE DATA AND SPECIFICATIONS (SDS)

STARTER MOTOR

Starter

INFOID:0000000004205261

Application		VQ35DE	
		M/T model	CVT model
Manufacturer		Mitsubishi M000T88782ZC	Mitsubishi M000TA0072ZC
Type		Reduction gear type	
System voltage		12V	
No-load	Terminal voltage	11V	
	Current	90A Max.	
	Revolution	2,800 rpm Min.	