SECTION SC
STARTING & CHARGING SYSTEM

CONTENTS

SERVICE INFORMATION

PRECAUTIONS

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

INFOID:0000000007403036

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 SRS 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 SRS 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.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000007403037

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, 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. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.

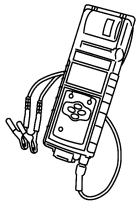
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT.

PREPARATION

Special Service Tool

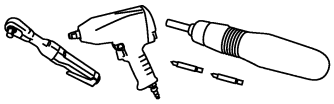
INFOID:0000000007403038

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
— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station  AWIIA1239ZZ	Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual
— (—) Model EXP-800 NI Battery and electrical diagnostic analyzer  JSMIA0806ZZ	Tests batteries and charging systems. For operating instructions, refer to diagnostic analyzer instruction manual

Commercial Service Tool

INFOID:0000000007403039

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts

BATTERY

How to Handle Battery

INFOID:0000000009318645

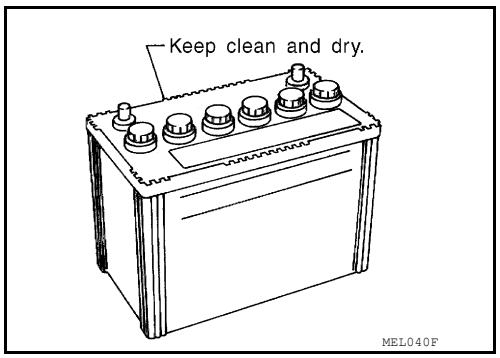
CAUTION:

- **If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.**
- **After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.**
- **Never add distilled water through the hole used to check specific gravity.**

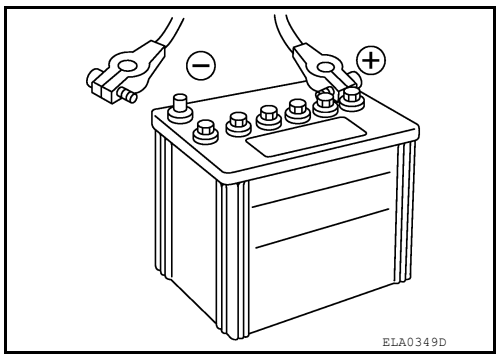
METHODS OF PREVENTING OVER-DISCHARGE

The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level.
  This also applies to batteries designated as “low maintenance” and “maintenance-free”.



- When the vehicle is not going to be used over a long period of time, disconnect the battery cable from the negative terminal. (If the vehicle has an extended storage switch, turn it off.)



Work Flow

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BATTERY DIAGNOSIS WITH EXP-800 NI OR GR8-1200 NI

To diagnose and confirm the condition of the battery, use the following special service tools:

- EXP-800 NI Battery and electrical diagnostic analyzer
- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

Refer to the applicable Instruction Manual for proper battery diagnosis procedures.

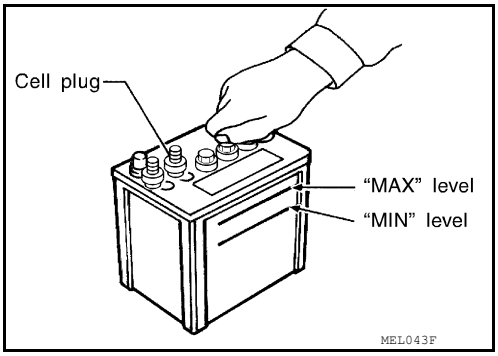
BATTERY DIAGNOSIS WITHOUT EXP-800 NI OR GR8-1200 NI

Checking Electrolyte Level

WARNING:

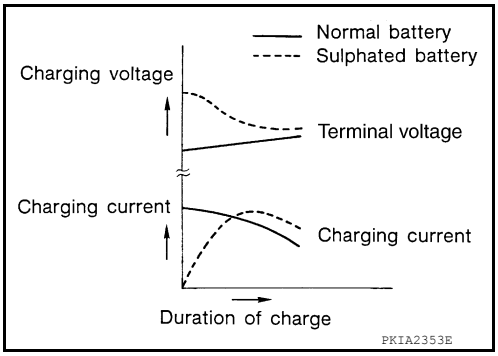
Never allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, never touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention. Failure to do this may cause personal injury or damage to clothing or the painted surfaces.

- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



SULFATION

- **A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulfation on the cell plates.**
- **To determine if a battery has been "sulfated", note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulfated batteries.**
- **A sulfated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.**



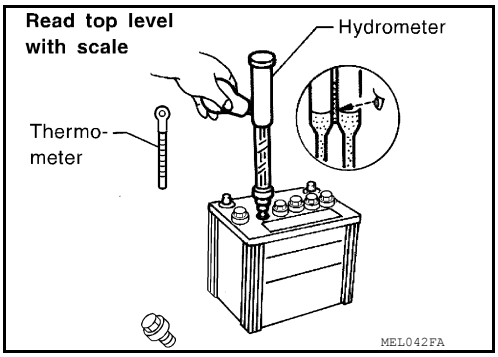
Specific Gravity Check

NOTE:

Check the charge condition of the battery.

Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

1. Read hydrometer and thermometer indications at eye level.
2. Use the chart below to correct your hydrometer reading according to electrolyte temperature.



Hydrometer Temperature Correction

Battery electrolyte temperature [°C (°F)]	Add to specific gravity reading
71 (160)	0.032
66 (150)	0.028
60 (140)	0.024
54 (130)	0.020
49 (120)	0.016
43 (110)	0.012
38 (100)	0.008
32 (90)	0.004
27 (80)	0
21 (70)	–0.004
16 (60)	–0.008
10 (50)	–0.012

Battery electrolyte temperature [°C (°F)]	Add to specific gravity reading
4 (40)	−0.016
−1 (30)	−0.020
−7 (20)	−0.024
−12 (10)	−0.028
−18 (0)	−0.032

Corrected specific gravity	Approximate charge condition
1.260 - 1.280	Fully charged
1.230 - 1.250	3/4 charged
1.200 - 1.220	1/2 charged
1.170 - 1.190	1/4 charged
1.140 - 1.160	Almost discharged
1.110 - 1.130	Completely discharged

Charging The Battery

CAUTION:

- **Never “quick charge” a fully discharged battery.**
- **Keep the battery away from open flame while it is being charged.**
- **When connecting the charger, connect the leads first, then turn on the charger. Never turn on the charger first, as this may cause a spark.**
- **If battery electrolyte temperature rises above 55 °C (131 °F), stop charging. Always charge battery at a temperature below 55 °C (131 °F).**

Charging Rates (Standard Charge)

Approximate charge condition	Charge current (A)	Charge time (h)
Fully charged	7	2
3/4 charged		2.5
1/2 charged		5
1/4 charged		7.5
Almost discharged		9
Completely discharged		10

Charging Rates (Quick Charge)

Approximate charge condition	Charge current (A)	Charge time (h)
Fully charged	—	—
3/4 charged	16	0.5
1/2 charged	33	
1/4 charged		
Almost discharged		
Completely discharged	—	—

NOTE:

The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

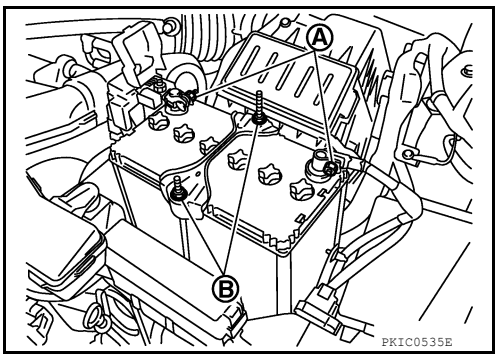
- If, after charging, the specific gravity of any two cells varies more than 0.050, the battery should be replaced.

Removal and Installation (MR20DE Battery)

INFOID:0000000007403042

REMOVAL MR20DE

1. Loosen battery terminal nuts (A), and disconnect both negative and positive battery terminals.
   CAUTION:
   Disconnect the battery negative terminal first.
2. Remove battery frame nuts (B) and battery frame.
3. Remove battery.



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:
Connect the battery positive terminal first.

Battery frame nuts	**: 5.4 N·m (0.55 kg-m, 48 in-lb)**
Battery terminal nuts	**: 5.4 N·m (0.55 kg-m, 48 in-lb)**

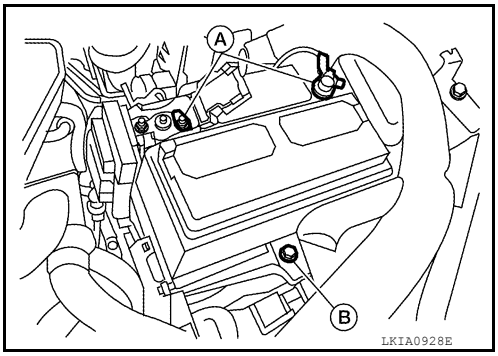
Reset electronic systems as necessary. Refer to SC-10, "Required Procedures After Battery Disconnection".

Removal and Installation (QR25DE Battery)

INFOID:0000000007403043

REMOVAL

1. Loosen battery terminal nuts (A), and disconnect both negative and positive battery terminals.
   CAUTION:
   Disconnect the battery negative terminal first.
2. Remove battery hold-down wedge bolt (B) and battery wedge bracket.
3. Remove battery.
4. Remove battery tray liner, if necessary.



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:
Connect the battery positive terminal first.

Battery wedge bracket bolt	**: 30 N·m (3.1 kg-m, 22 ft-lb)**
Battery terminal nuts	**: 5.4 N·m (0.55 kg-m, 48 in-lb)**

Reset electronic systems as necessary. Refer to SC-10, "Required Procedures After Battery Disconnection".

Exploded View (QR25DE Battery Tray)

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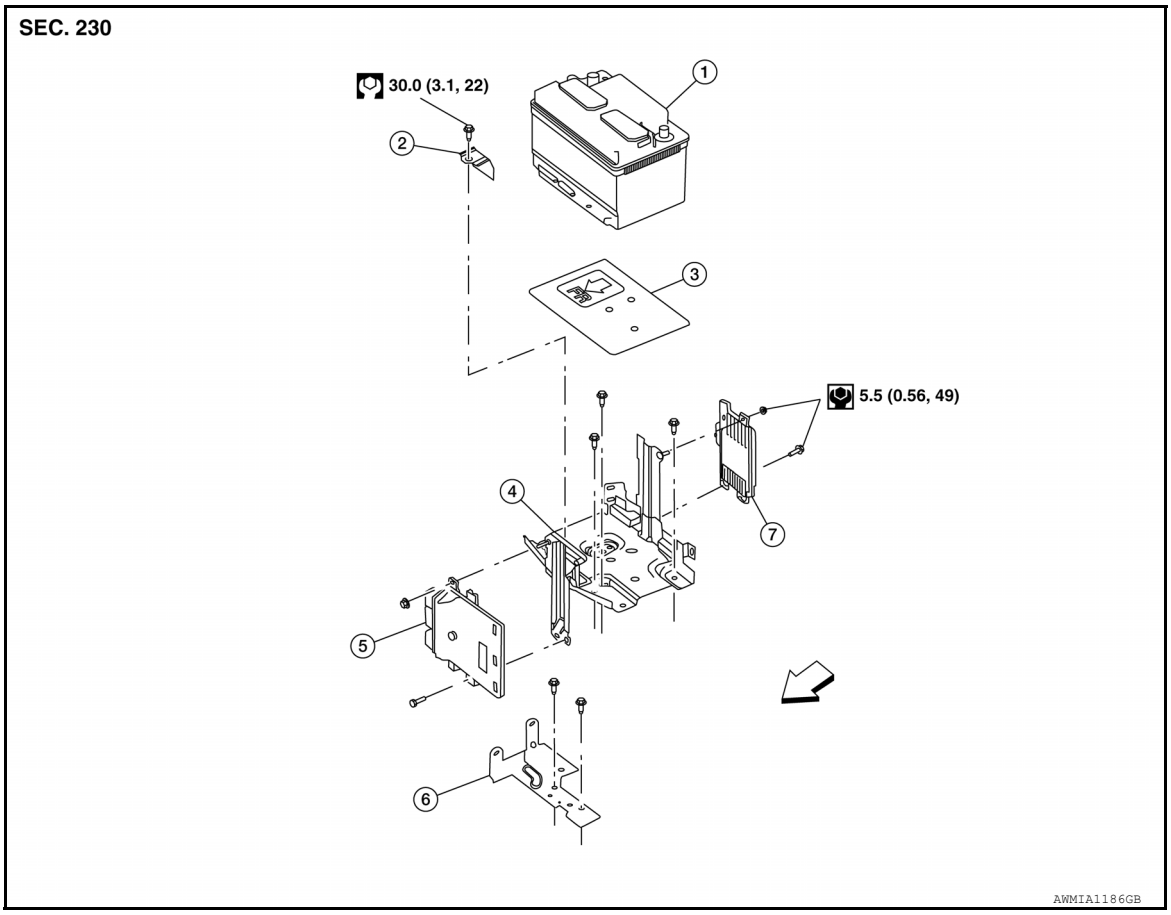

1. Battery	2. Battery wedge bracket	3. Battery tray liner
4. Battery tray	5. ECM	6. ECM harness bracket
7. Transmission control module (TCM) (CVT models)	⇦ Vehicle front	

Removal and Installation (QR25DE Battery Tray)

INFOID:0000000007403045

REMOVAL

1. Remove battery and battery tray liner. Refer to SC-8, "Removal and Installation (QR25DE Battery)".
2. Disconnect ECM.
3. Disconnect TCM (CVT models).
4. Remove the battery tray bolts and battery tray.
5. Remove the ECM harness bracket, if necessary.
6. Remove the ECM, if necessary.
7. Remove the TCM (CVT models), if necessary.

INSTALLATION

Installation is in the reverse order of removal.
Reset electronic systems as necessary. Refer to SC-10, "Required Procedures After Battery Disconnection".

Required Procedures After Battery Disconnection

INFOID:0000000007403046

System	Item	Reference
Engine Control System	Idle Air Volume Learning	EC-100 (MR20DE for California) EC-660 (MR20DE except for California) EC-1206 (QR25DE)
Glasses, Window System & Mirrors	Power Window System Initialization	GW-51
Roof	Sunroof Memory Reset/Initialization	RF-11
Audio, Visual, Navigation & Telephone System	Audio (Radio Preset)	Refer to Owner's Manual.
	Navigation System	Refer to Owner's Manual.

STARTING SYSTEM

System Description

INFOID:0000000007403047

M/T Models with MR20DE

Power is supplied at all times
- through 225A fusible link [letter **a**, located in the fusible link box (battery) or
- to starter motor terminal B and
- through 40A fusible link (letter **m**, located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied
- from ignition switch terminal ST
- to IPDM E/R terminal 21.

With the ignition switch in the ON or START position, power is supplied
- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to the clutch interlock switch terminal 2.

With the clutch pedal depressed, power is supplied
- through the clutch interlock switch terminal 1
- to IPDM E/R terminal 35.

Ground is supplied at all times
- to IPDM E/R terminals 39 and 59
- through body grounds E9, E15 and E24.

If the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN communication lines, the IPDM E/R grounds the starter relay and power is supplied
- through terminal 19 of the IPDM E/R
- to terminal S of the starter motor.

The starter motor magnetic switch energizes closing the circuit between the battery and the starter motor. The starter motor is case ground through the cylinder block. With power and ground supplied, the starter motor operates.

M/T Models with QR25DE

Power is supplied at all times
- through fusible link box (battery)
- to starter motor terminal B and
- through 40A fusible link (letter **m**, located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied
- from ignition switch terminal ST
- to IPDM E/R terminal 21.

With the ignition switch in the ON or START position, power is supplied
- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to clutch interlock switch terminal 2.

With the clutch pedal depressed, power is supplied
- through clutch interlock switch terminal 1
- to IPDM E/R terminal 35.

Ground is supplied at all times
- to IPDM E/R terminals 39 and 59
- through body grounds E9 and E15.

If the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN communication lines, the IPDM E/R grounds the starter relay and power is supplied
- through terminal 19 of the IPDM E/R
- to terminal S of the starter motor.

The starter motor magnetic switch energizes closing the circuit between the battery and the starter motor. The starter motor is case ground through the cylinder block. With power and ground supplied, the starter motor operates.

CVT Models with MR20DE

Power is supplied at all times
- through 225A fusible link [letter **a**, located in the fusible link box (battery)]
- to starter motor terminal B, and
- through 40A fusible link (letter **m**, located in the fuse and fusible link box)

• to ignition switch terminal B.
With the ignition switch in the START position, power is supplied
• from ignition switch terminal ST
• to IPDM E/R terminal 21.
With the ignition switch in the ON or START position, power is supplied
• through 10A fuse [No. 12, located in the fuse block (J/B)]
• to transmission range switch terminal 7.
With the shift selector in the P or N position, power is supplied
• through transmission range switch terminal 6
• to IPDM E/R terminal 35.
Ground is supplied at all times
• to IPDM E/R terminals 39 and 59
• through body grounds E9, E15 and E24.
If the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN communication lines, the IPDM E/R grounds the starter relay and power is supplied
• through terminal 19 of the IPDM E/R
• to terminal S of the starter motor.
The starter motor magnetic switch energizes closing the circuit between the battery and the starter motor. The starter motor is case ground through the cylinder block. With power and ground supplied, the starter motor operates.

CVT Models with QR25DE

Power is supplied at all times
• through fusible link box (battery)
• to starter motor terminal B, and
• through 40A fusible link (letter **m**, located in the fuse and fusible link box)
• to ignition switch terminal B.
With the ignition switch in the START position, power is supplied
• from ignition switch terminal ST
• to IPDM E/R terminal 21.
With the ignition switch in the ON or START position, power is supplied
• through 10A fuse [No. 12, located in the fuse block (J/B)]
• to transmission range switch terminal 7.
With the shift selector in the P or N position, power is supplied
• through transmission range switch terminal 6
• to IPDM E/R terminal 35.
Ground is supplied at all times
• to IPDM E/R terminals 39 and 59
• through body grounds E9 and E15.
If the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN communication lines, the IPDM E/R grounds the starter relay and power is supplied
• through terminal 19 of the IPDM E/R
• to terminal S of the starter motor.
The starter motor magnetic switch energizes closing the circuit between the battery and the starter motor. The starter motor is case ground through the cylinder block. With power and ground supplied, the starter motor operates.

Wiring Diagram - START -

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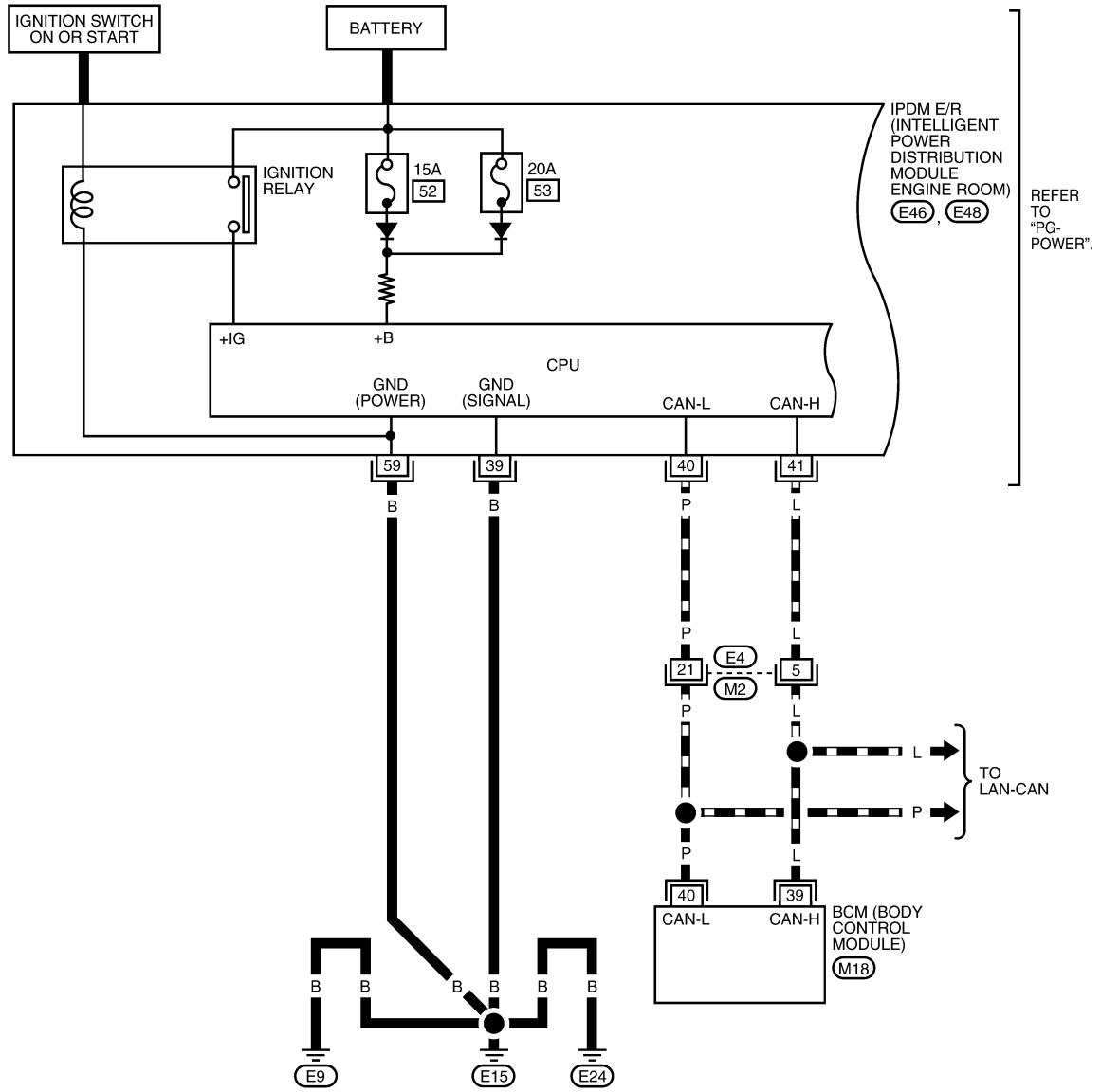
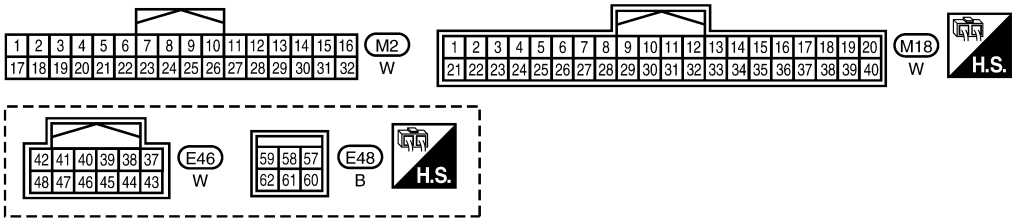
M/T Models - MR20DE

SC-START-01





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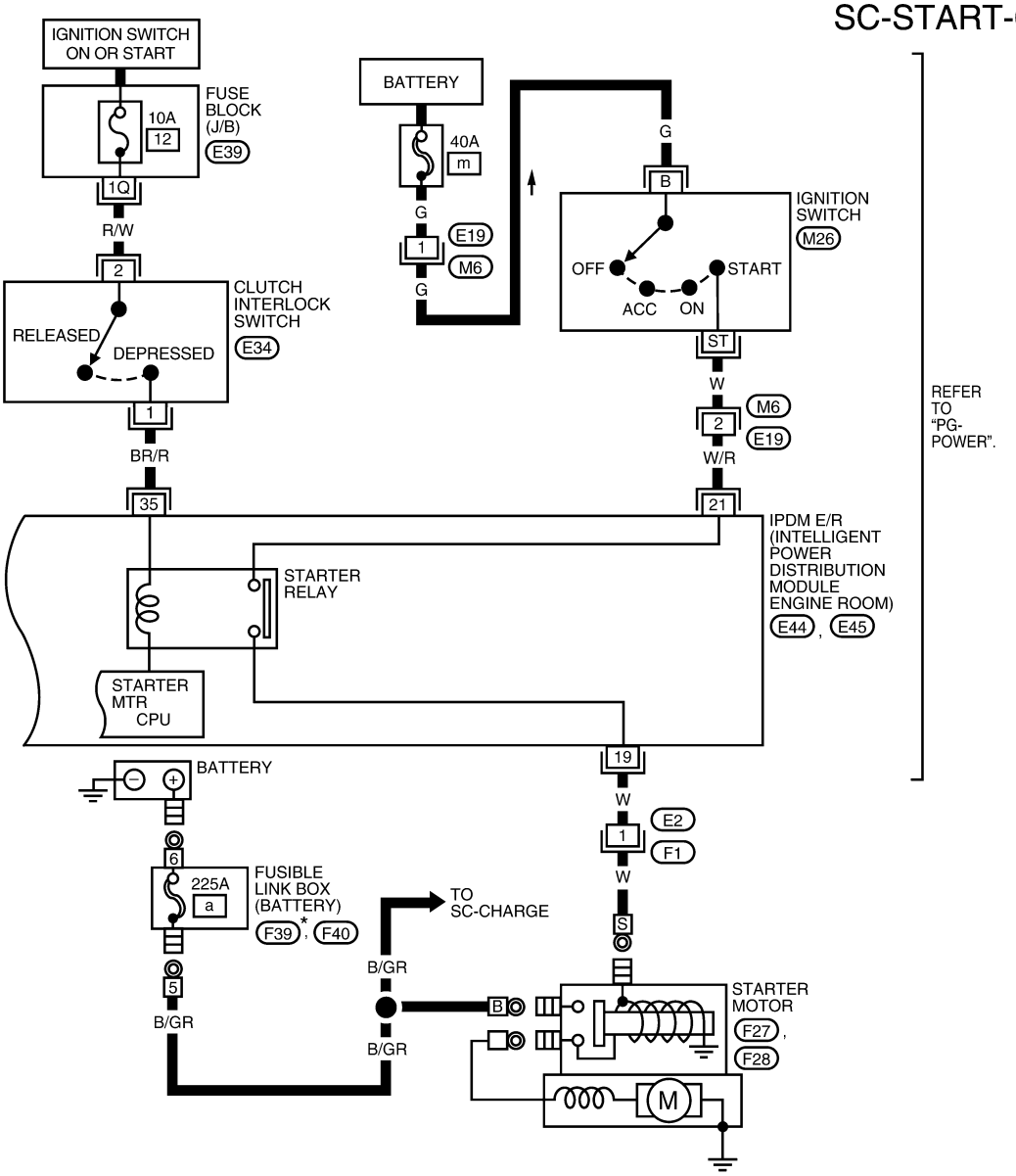
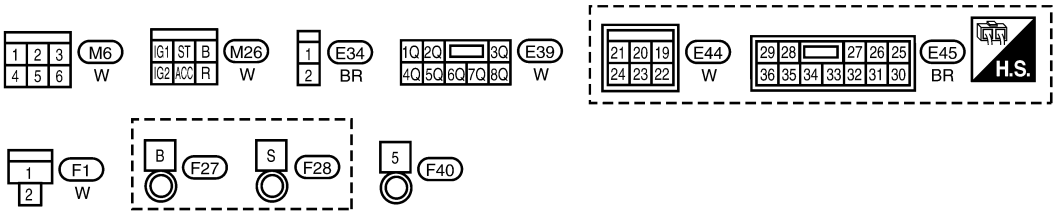
SC-START-02

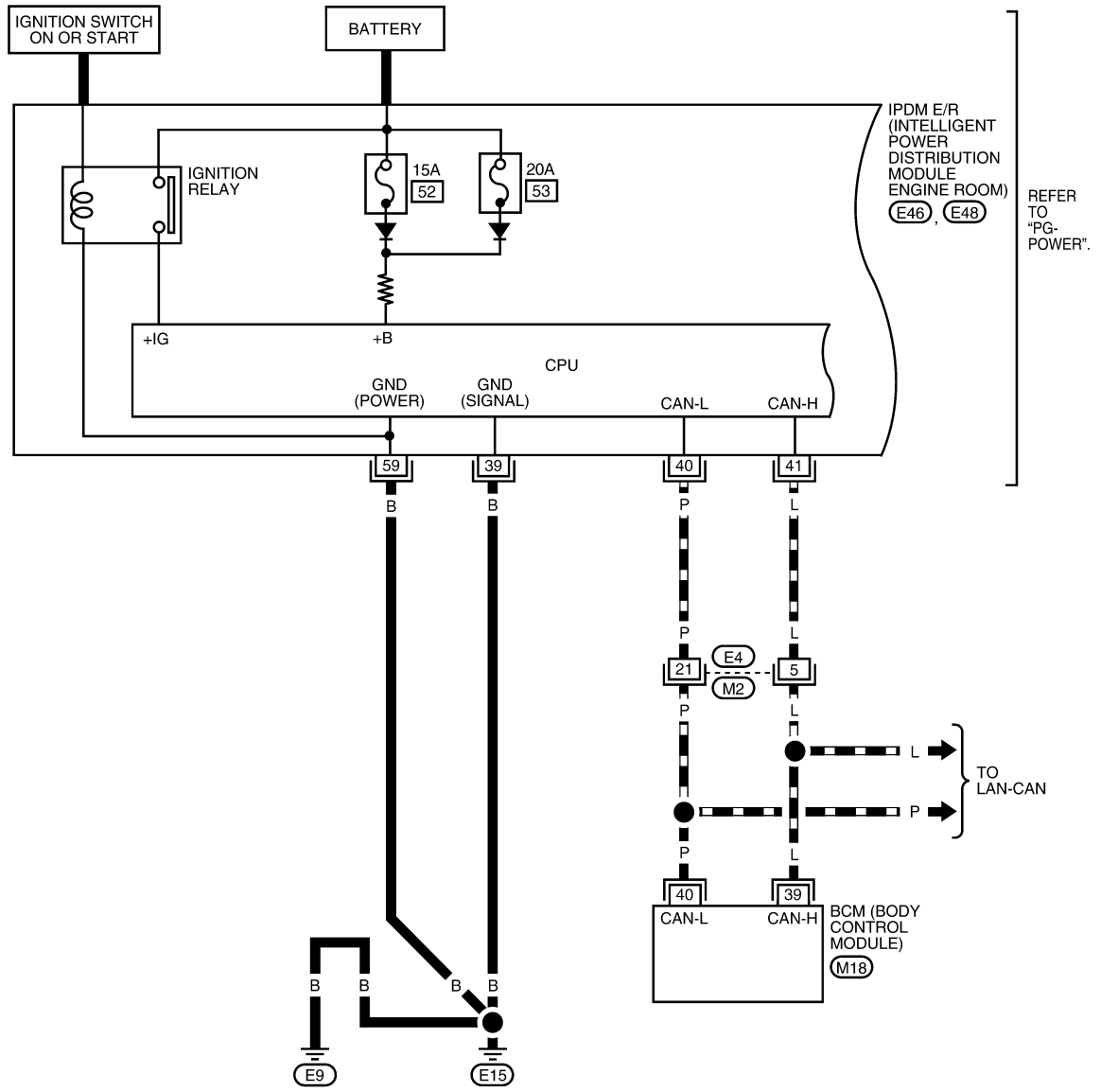


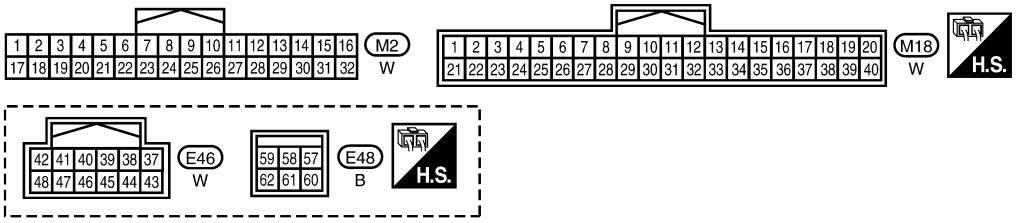


* : F39 IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

BKWA0739E

SC-START-03





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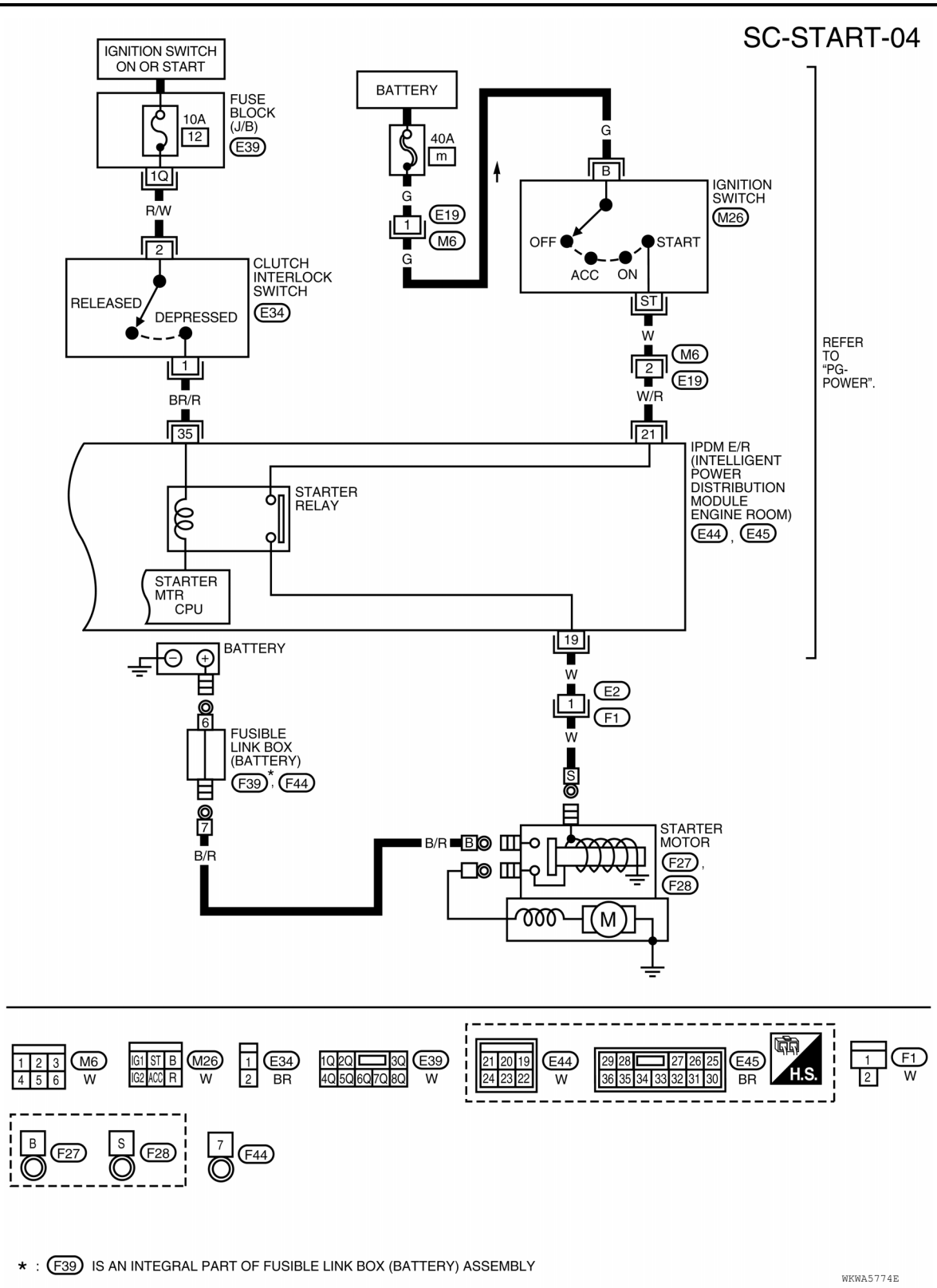
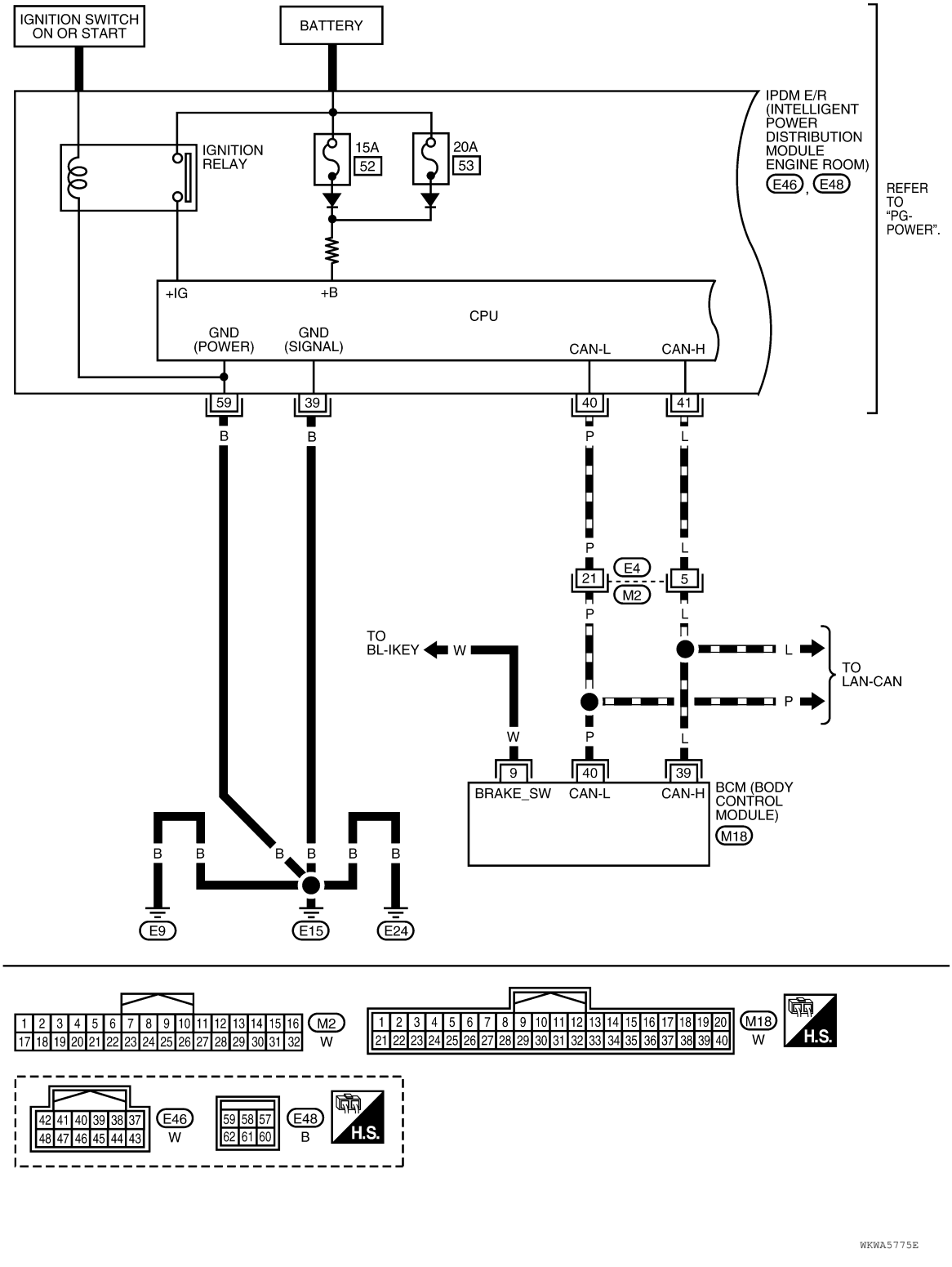
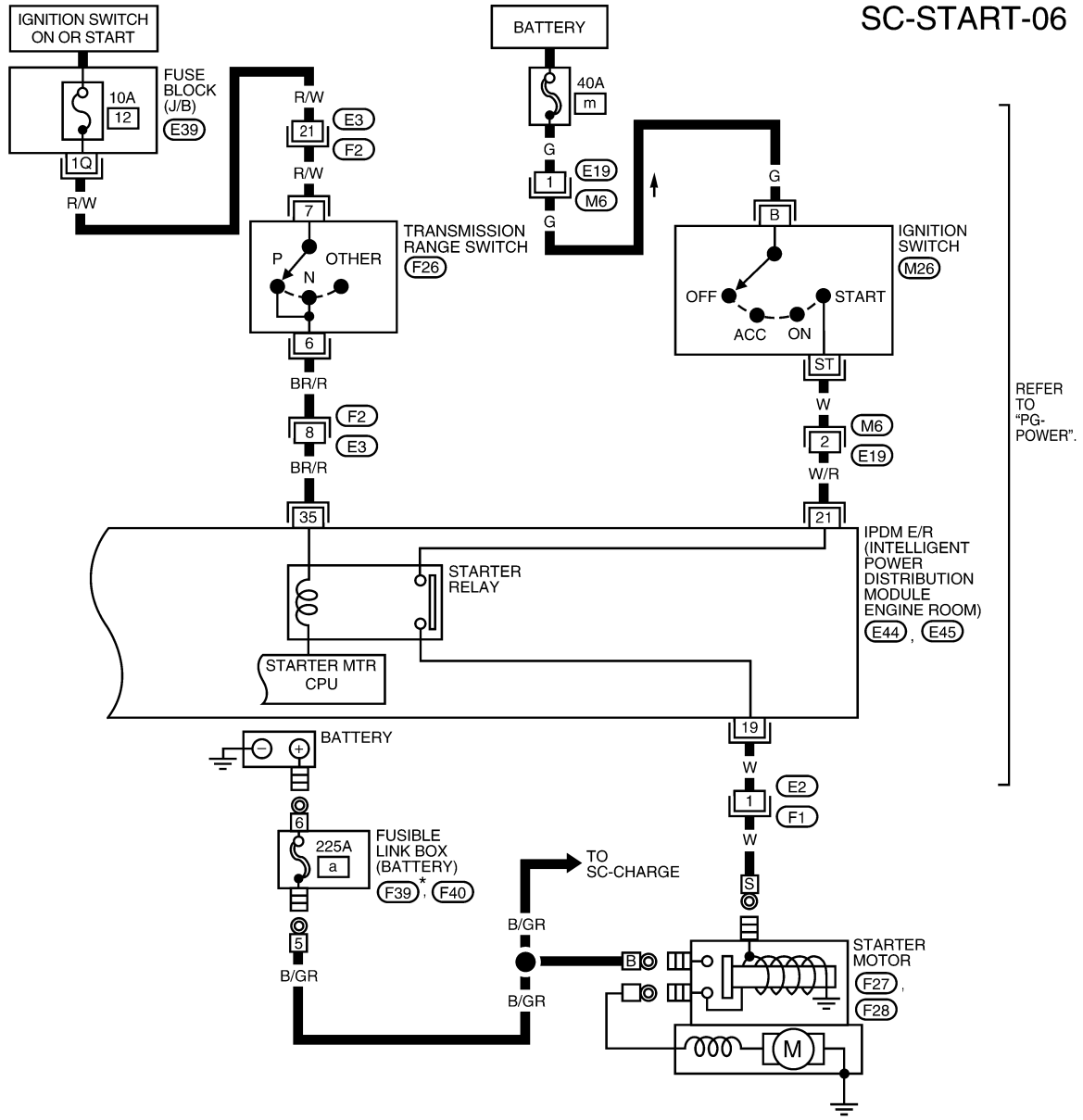

SC-START-04
IGNITION SWITCH ON OR START
FUSE BLOCK (J/B)
10A
12
E39
1Q
R/W
2
CLUTCH INTERLOCK SWITCH
RELEASED
DEPRESSED
E34
1
BR/R
35
BATTERY
40A
m
G
E19
M6
B
IGNITION SWITCH
M26
OFF
START
ACC
ON
ST
W
2
W/R
21
REFER TO "PG-POWER".
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E44 , E45
STARTER RELAY
STARTER MTR CPU
19
W
E2
F1
S
STARTER MOTOR
F27 , F28
M
BATTERY
6
FUSIBLE LINK BOX (BATTERY)
F39 * , F44
7
B/R
M6 W
M26 W
E34 BR
E39 W
E44 W
E45 BR
H.S.
F1 W
B F27
S F28
7 F44
* : F39 IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY
WKWA5774E

SC-START-05

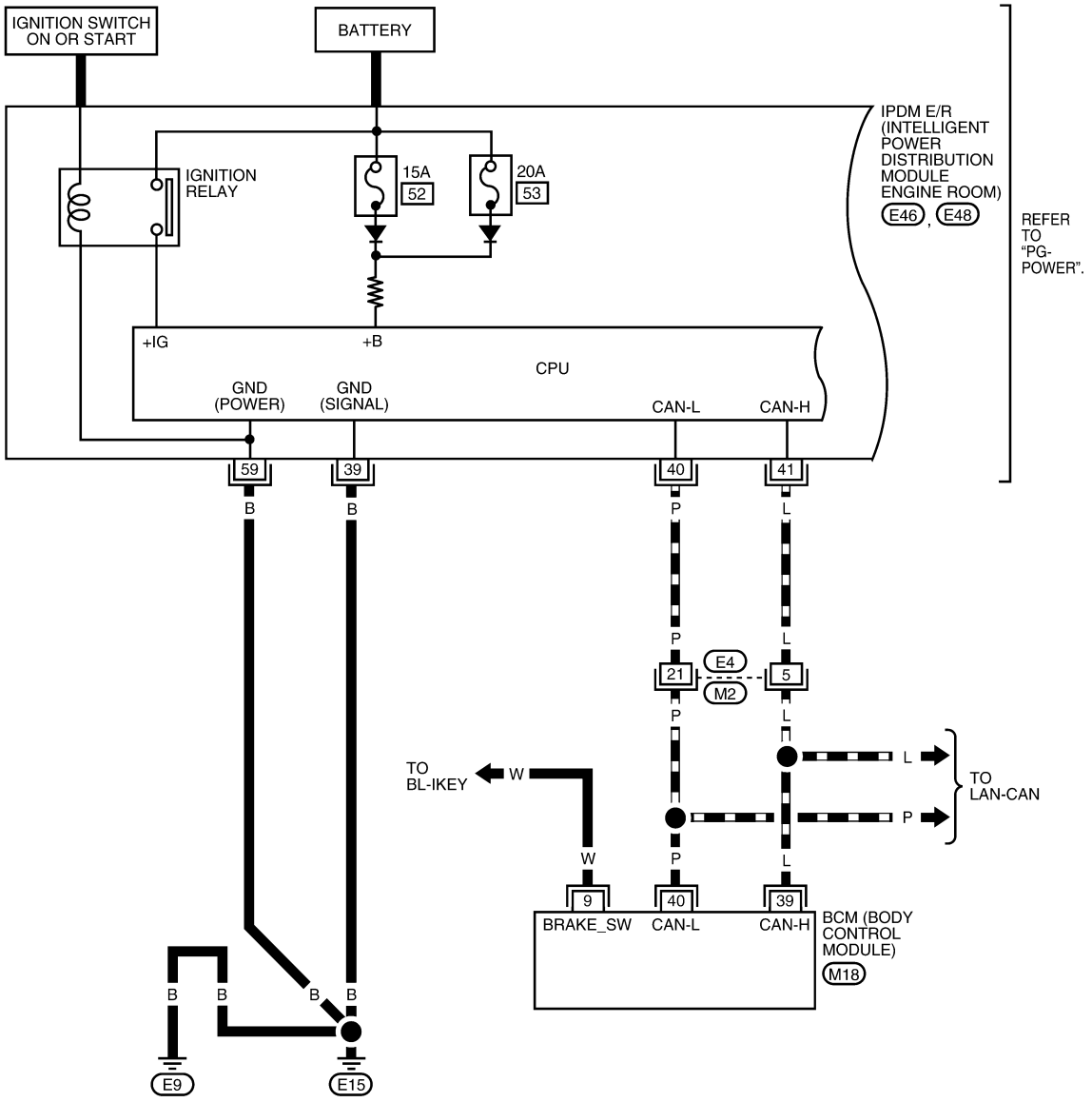

IGNITION SWITCH ON OR START
BATTERY
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E46, E48
REFER TO "PG-POWER".
IGNITION RELAY
15A 52
20A 53
+IG
+B
CPU
GND (POWER)
GND (SIGNAL)
CAN-L
CAN-H
59
39
40
41
B
B
P
L
E4
21
5
M2
TO BL-IKEY
W
TO LAN-CAN
9
BRAKE_SW
BCM (BODY CONTROL MODULE)
M18
E9
E15
E24
M2
W
M18
W
H.S.
E46
W
E48
B
H.S.
WKWA5775E

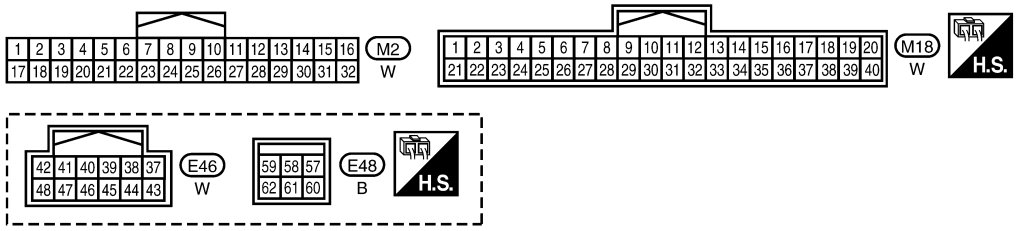


* : F39 IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

ABBWA0641GB

SC-START-07





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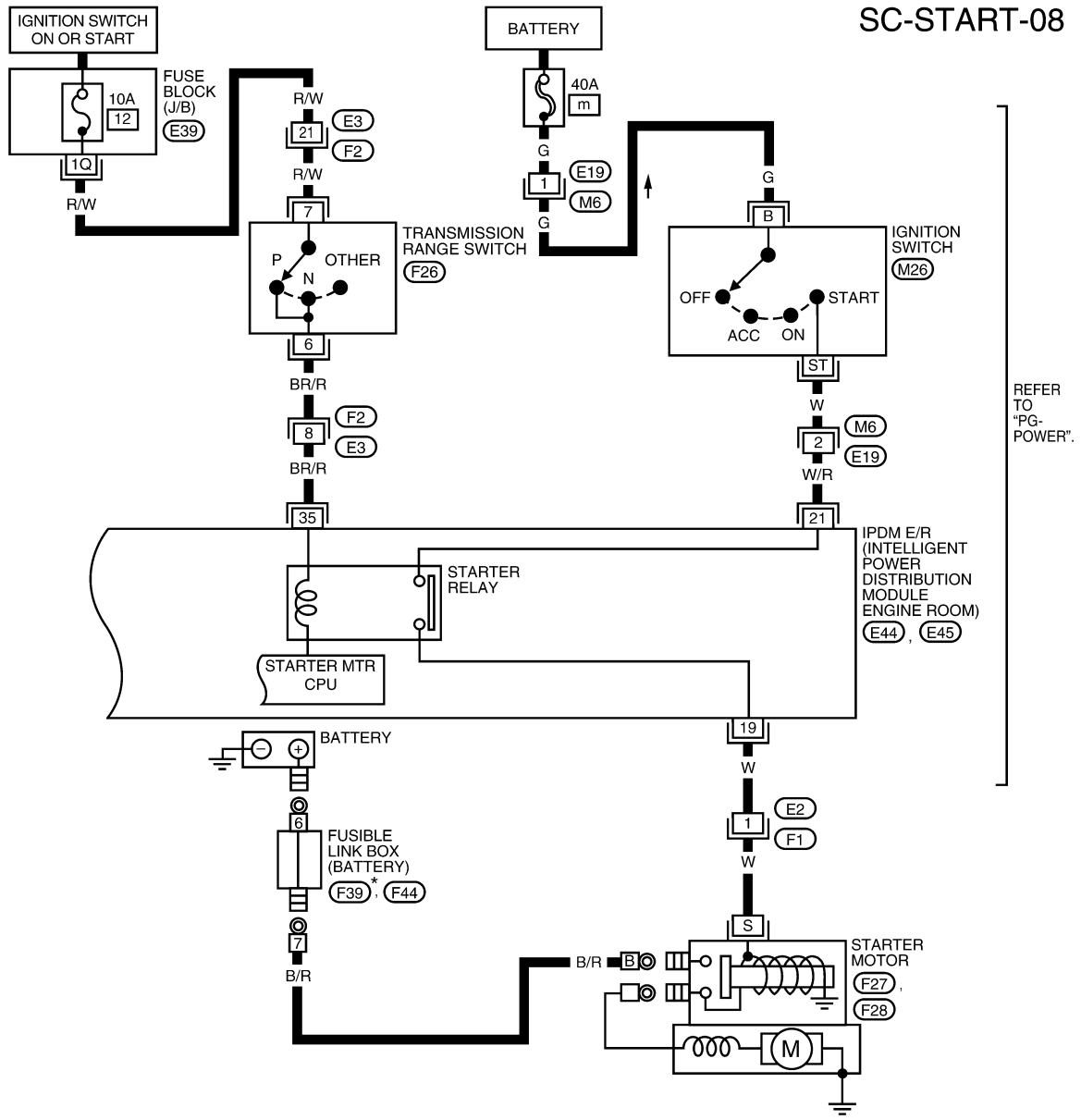


* : F39 IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

ABBWA0642GB

Trouble Diagnosis With GR8-1200 NI

INFOID:0000000009318726

STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI

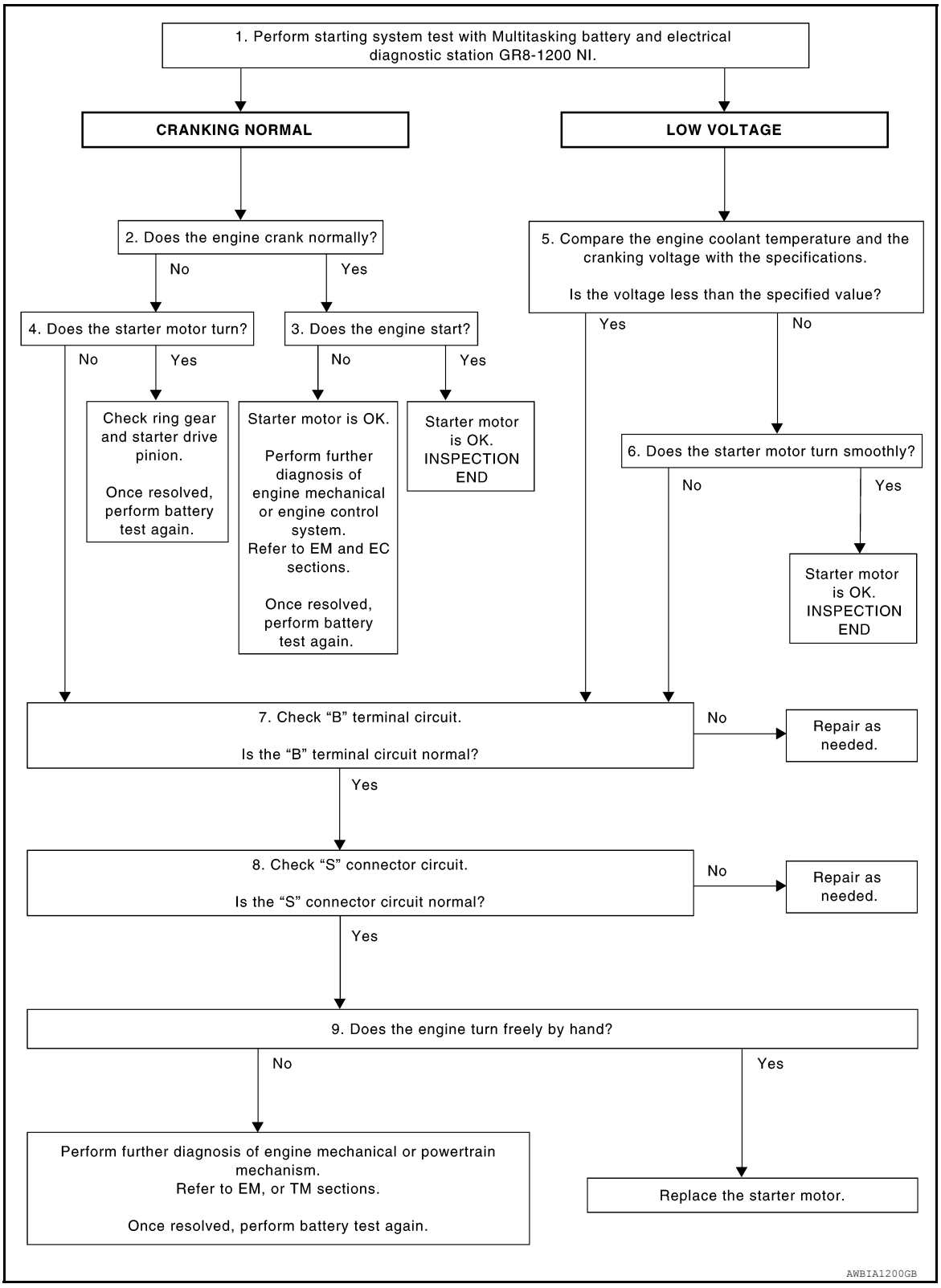
To test the starting system, use the following special service tool:

- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

Refer to the diagnostic station Instruction Manual for proper starting system diagnosis procedures.

OVERALL SEQUENCE



DETAILED FLOW

NOTE:

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

1.DIAGNOSIS WITH MULTITASKING BATTERY AND ELECTRICAL DIAGNOSTIC STATION GR8-1200 NI

Perform the starting system test with Multitasking battery and electrical diagnostic station GR8-1200 NI. For details and operating instructions, refer to diagnostic station Instruction Manual.

Test result

CRANKING NORMAL>>GO TO 2.
LOW VOLTAGE>>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 diagnostic station instruction manual.
REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to diagnostic station instruction manual. 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 >> 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 specifications.

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 >> Inspection End.
NO >> GO TO 7.

7."B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to SC-25, "Diagnosis Procedure 1".

Is "B" terminal circuit normal?

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

8."S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to SC-26, "Diagnosis Procedure 2".

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.

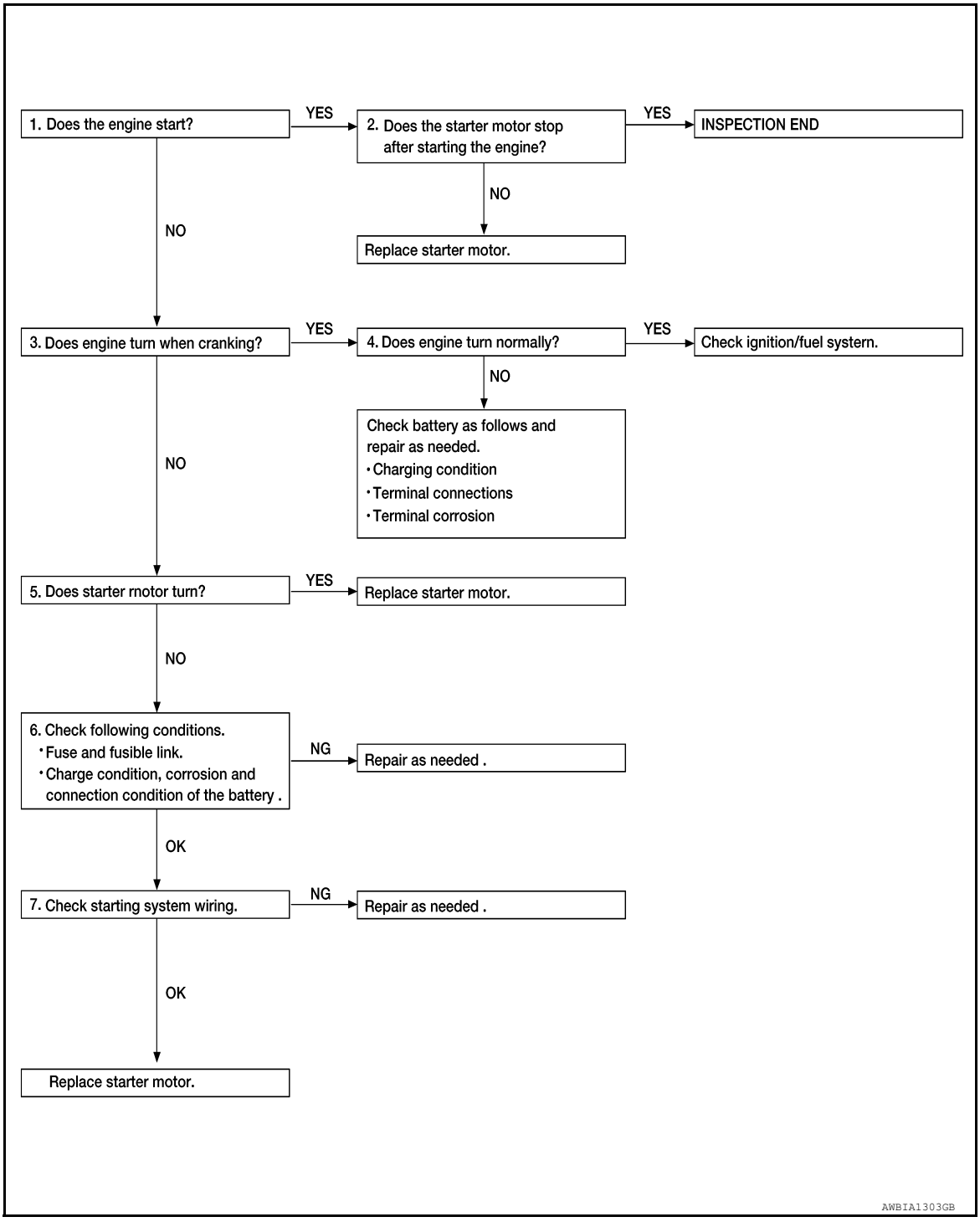
Does the engine turn freely by hand?

YES >> Replace starter motor. Refer to SC-27, "Removal and Installation MR20DE" or SC-28, "Removal and Installation QR25DE".
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again using Multitasking battery and electrical diagnostic station GR8-1200 NI. Refer to the diagnostic station Instruction Manual for proper testing procedures.

Trouble Diagnosis Without GR8-1200 NI

INFOID:0000000009318727

OVERALL SEQUENCE



DETAILED FLOW

NOTE:

If any malfunction is found, immediately disconnect the battery cable from the negative terminal.

1.CHECK ENGINE START

Crank the engine and check that the engine starts.

Does the engine start?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK THAT THE STARTER MOTOR STOPS

Check that the starter motor stops after starting the engine.

Does the starter motor stop?

YES >> Inspection End.
NO >> Replace starter motor. Refer to SC-27, "Removal and Installation MR20DE" or SC-28, "Removal and Installation QR25DE".

3.CHECK THAT THE ENGINE TURNS WHEN CRANKING

Check that the engine turns when cranking.

Does engine turn when cranking?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK THE ENGINE SPEED WHEN CRANKING

Check that the engine speed is not low when cranking.

Does engine turn normally?

YES >> Check ignition/fuel system.
NO >> Check charge condition, corrosion and connection condition of the battery. Refer to SC-5, "How to Handle Battery".

5.CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to SC-27, "Removal and Installation MR20DE" or SC-28, "Removal and Installation QR25DE".
NO >> GO TO 6.

6.CHECK POWER SUPPLY CIRCUIT

Check the following conditions:
- Fuse and fusible link
- Charge condition, corrosion and connection of the battery.

Are these inspection results normal?

YES >> GO TO 7.
NO >> Repair as needed.

7.CHECK STARTING SYSTEM WIRING

Check the following:
- “B” terminal circuit. Refer to SC-25, "Diagnosis Procedure 1".
- “S” terminal circuit. Refer to SC-26, "Diagnosis Procedure 2".

Are the inspection results normal?

YES >> Replace starter motor. Refer to SC-27, "Removal and Installation MR20DE" or SC-28, "Removal and Installation QR25DE".
NO >> Repair as needed.

Diagnosis Procedure 1

INFOID:0000000009318728

CAUTION:
Before testing, perform the following procedure to ensure the engine cannot start.
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.

(+)		(-)	Voltage
Connector	Terminal		
F27	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 the transmission into park or neutral.
2. Check voltage between battery positive terminal and starter motor connector F27 terminal B while cranking the engine.

(+)	(-)		Condition	Voltage
Connector	Connector	Terminal		
Battery (+) terminal	F27	B	While cranking the engine	Less than 0.2V

Is the voltage drop less than 0.2V?

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)

Check voltage between starter motor case and battery negative terminal while cranking the engine.

(+)	(-)	Condition	Voltage
Starter motor case	Battery (-) terminal	While cranking the engine	Less than 0.2V

Is the voltage drop less than 0.2V?

YES >> Terminal B circuit is OK. Further inspection is necessary. Refer to SC-20, "Trouble Diagnosis With GR8-1200 NI" or SC-24, "Trouble Diagnosis Without GR8-1200 NI".
NO >> Check the starter motor case to engine mounting for high resistance.

Diagnosis Procedure 2

INFOID:0000000009318729

CAUTION:
Before testing, perform the following procedure to ensure the engine cannot start.
1. Remove fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is depleted.

1.CHECK STARTER MOTOR MAGNETIC SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector F28.
3. Shift transmission into park or neutral.
4. Check voltage between starter motor harness connector F28 terminal S and ground with the ignition switch in START.

(+)		(-)	Condition	Voltage
Connector	Terminal			
F28	S	Ground	Ignition switch in START	Battery voltage

Is battery voltage present?

YES >> Magnetic switch circuit is OK. Further inspection is necessary. Refer to SC-20, "Trouble Diagnosis With GR8-1200 NI" or SC-24, "Trouble Diagnosis Without GR8-1200 NI".
NO >> GO TO 2

2.CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check the IPDM E/R harness connector E44 and starter motor harness connector F28 for damage, bent pins and loose connections.

Is the inspection result normal?

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

3. CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect IPDM E/R connector E44 and starter motor connector F28.
2. Check continuity between starter motor harness connector F28 terminal S and IPDM E/R harness connector E44 terminal 19.

Connector	Terminal	Connector	Terminal	Continuity
F28	S	E44	19	Yes

3. Check continuity between starter motor harness connector F28 terminal S and ground.

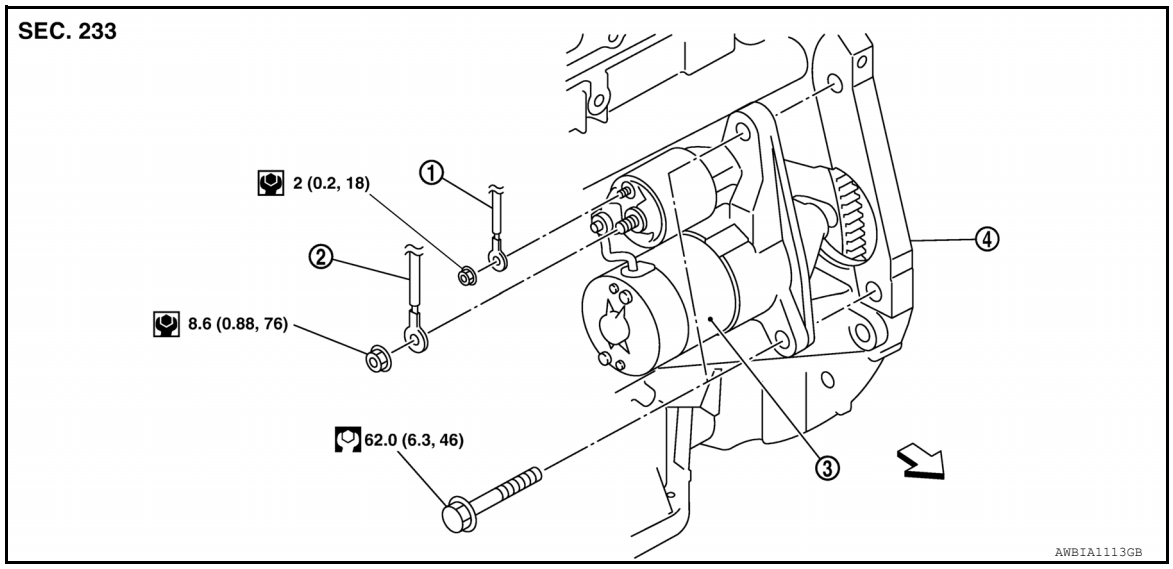
Connector	Terminal	Ground	Continuity
F28	S		No

Are the continuity test results as specified?

YES >> Further inspection is necessary. Refer to SC-20, "Trouble Diagnosis With GR8-1200 NI" or SC-24, "Trouble Diagnosis Without GR8-1200 NI".
NO >> Repair the harness.

Removal and Installation MR20DE

INFOID:0000000007403050



1. "S" terminal harness
2. "B" terminal harness
3. Starter motor
4. Cylinder block
⇦ Vehicle front

REMOVAL

1. Disconnect the battery negative terminal. Refer to SC-7, "Removal and Installation (MR20DE Battery)".
2. Remove "S" terminal nut.
3. Remove “B” terminal nut.
4. Remove starter motor bolts.
5. Remove starter motor.

INSTALLATION

Installation is in the reverse order of removal.

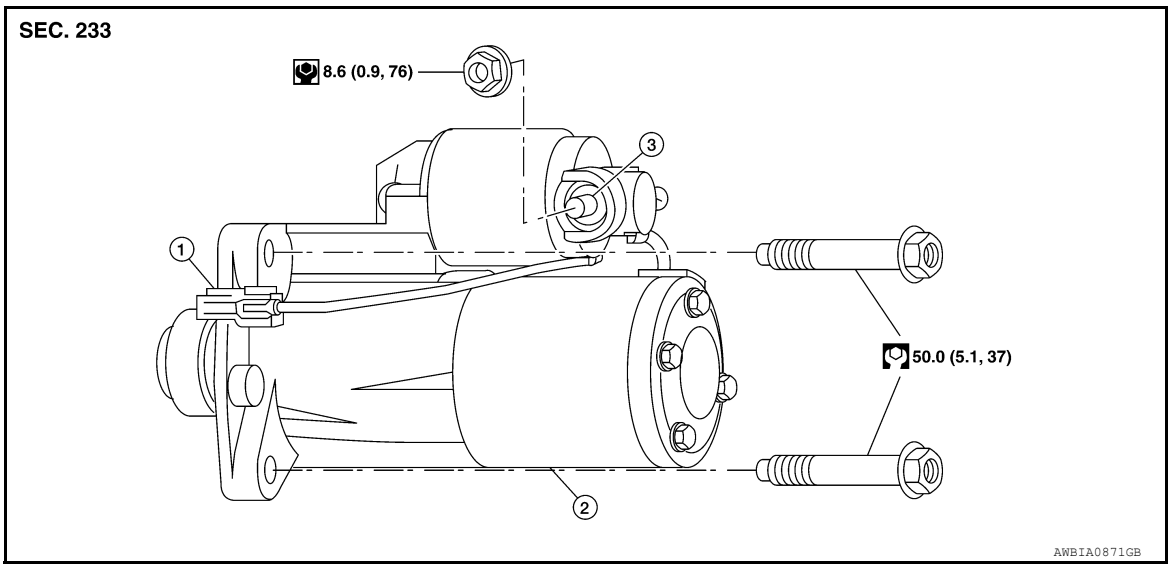
CAUTION:

Be sure to tighten “B” terminal nut carefully.

Removal and Installation QR25DE

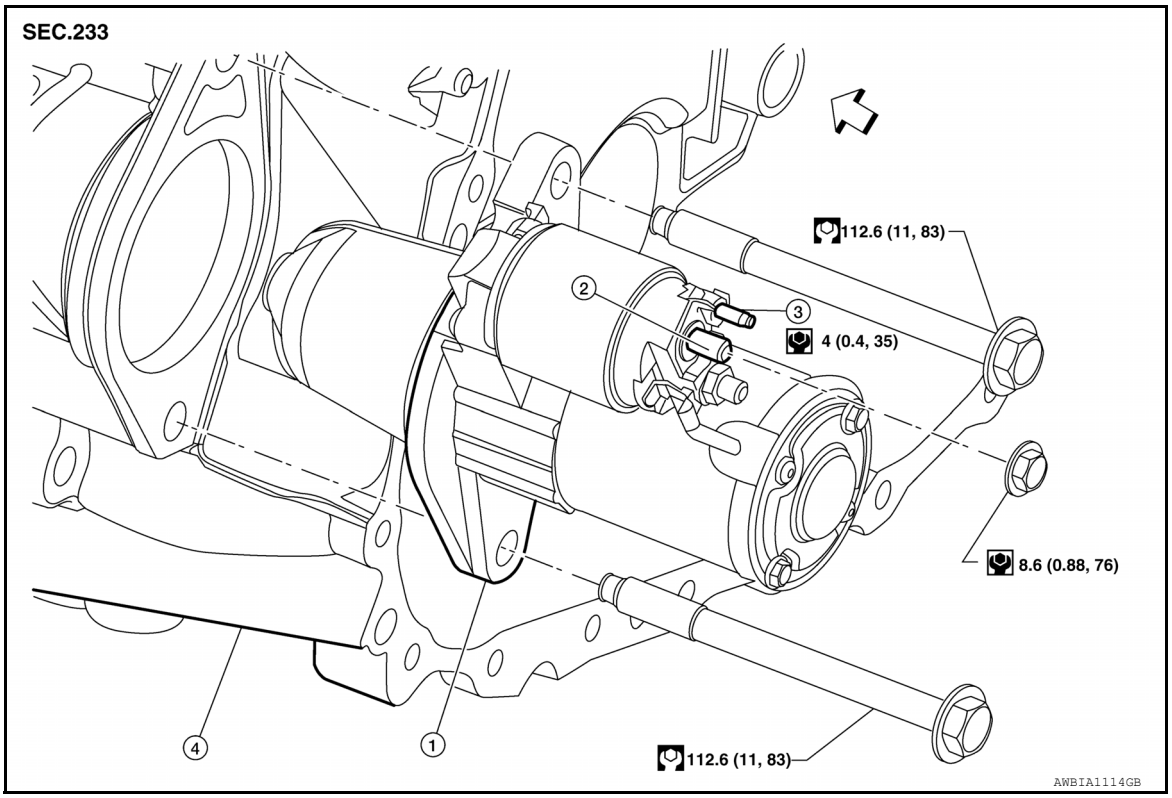
INFOID:0000000007403051

CVT Models



1. "S" terminal harness
2. Starter motor
3. "B" terminal

M/T Models



1. Starter motor
2. "B" terminal
3. "S" terminal
4. Transaxle assembly
⇦ Engine front

REMOVAL

1. Disconnect the battery negative terminal. Refer to SC-8, "Removal and Installation (QR25DE Battery)".

2. Raise vehicle.
3. Disconnect “S” terminal connector.
4. Remove “B” terminal nut.
5. Remove starter motor bolts.
6. Remove starter motor.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Be sure to tighten “B” terminal nut carefully.

CHARGING SYSTEM

System Description

INFOID:0000000007403052

The generator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC regulator.
Power is supplied at all times to generator terminal 3 through
- 10A fuse [No. 26, located in the fuse block (J/B)].

Power is supplied through terminal 1 to charge the battery and operate the vehicle's electrical system. Output voltage is monitored at terminal 3 by the IC regulator. The charging circuit is protected by the 225A fusible link [letter **a**, located in the fusible link box (battery)].
Ground is supplied
- to generator terminal 5
- through body ground F5 (MR20DE)
- through body ground E62 (QR25DE) and
- through the generator case to the cylinder block

With the ignition switch in the ON or START position, power is supplied
- through 10A fuse [No. 14, located in the fuse block (J/B)]
- to combination meter terminal 2 for the charge warning lamp.

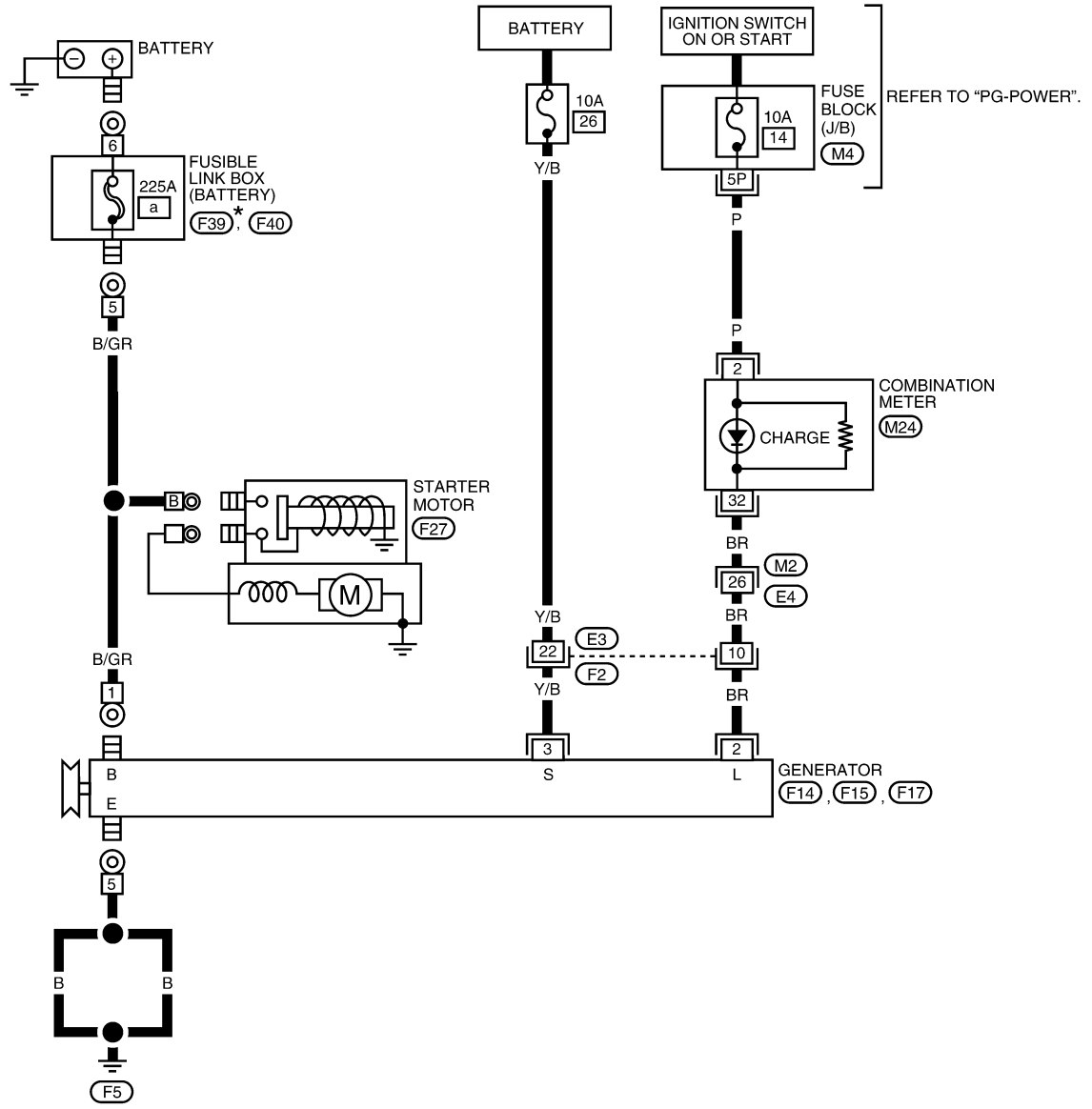
The IC regulator controls ground to terminal 32 of the combination meter through terminal 2 of the generator. When the ignition is turned on and power becomes available at terminal 2, this "wakes up" the regulator. The regulator monitors charge output and grounds terminal 2 or leaves it open depending on charge output. With power and ground supplied, the charge warning lamp will illuminate. When the generator is providing sufficient voltage, the ground is opened and the charge warning lamp will go off.
If the charge warning lamp illuminates with the engine running, a malfunction is indicated.

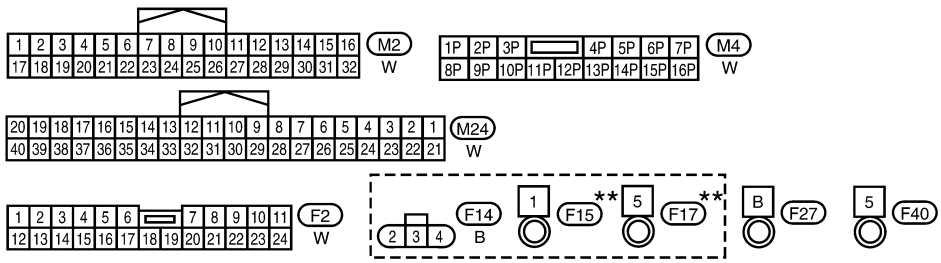
Wiring Diagram - CHARGE -

INFOID:0000000007403053

MR20DE

SC-CHARGE-01





*: F39 IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

**: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION

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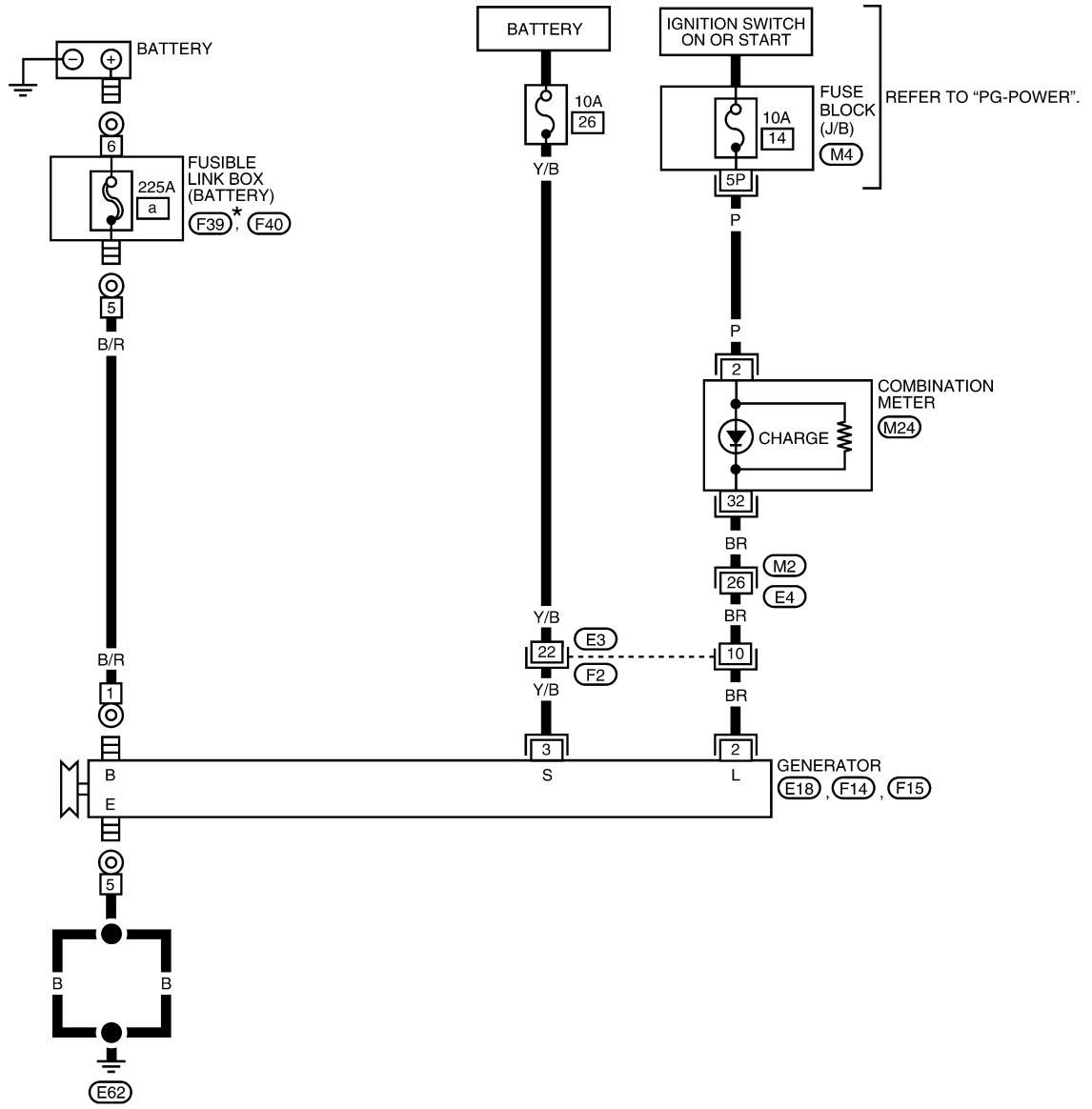
SC-CHARGE-02



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Trouble Diagnosis With EXP-800 NI or GR8-1200 NI

INFOID:0000000009318730

CHARGING SYSTEM DIAGNOSIS WITH EXP-800 NI OR GR8-1200 NI

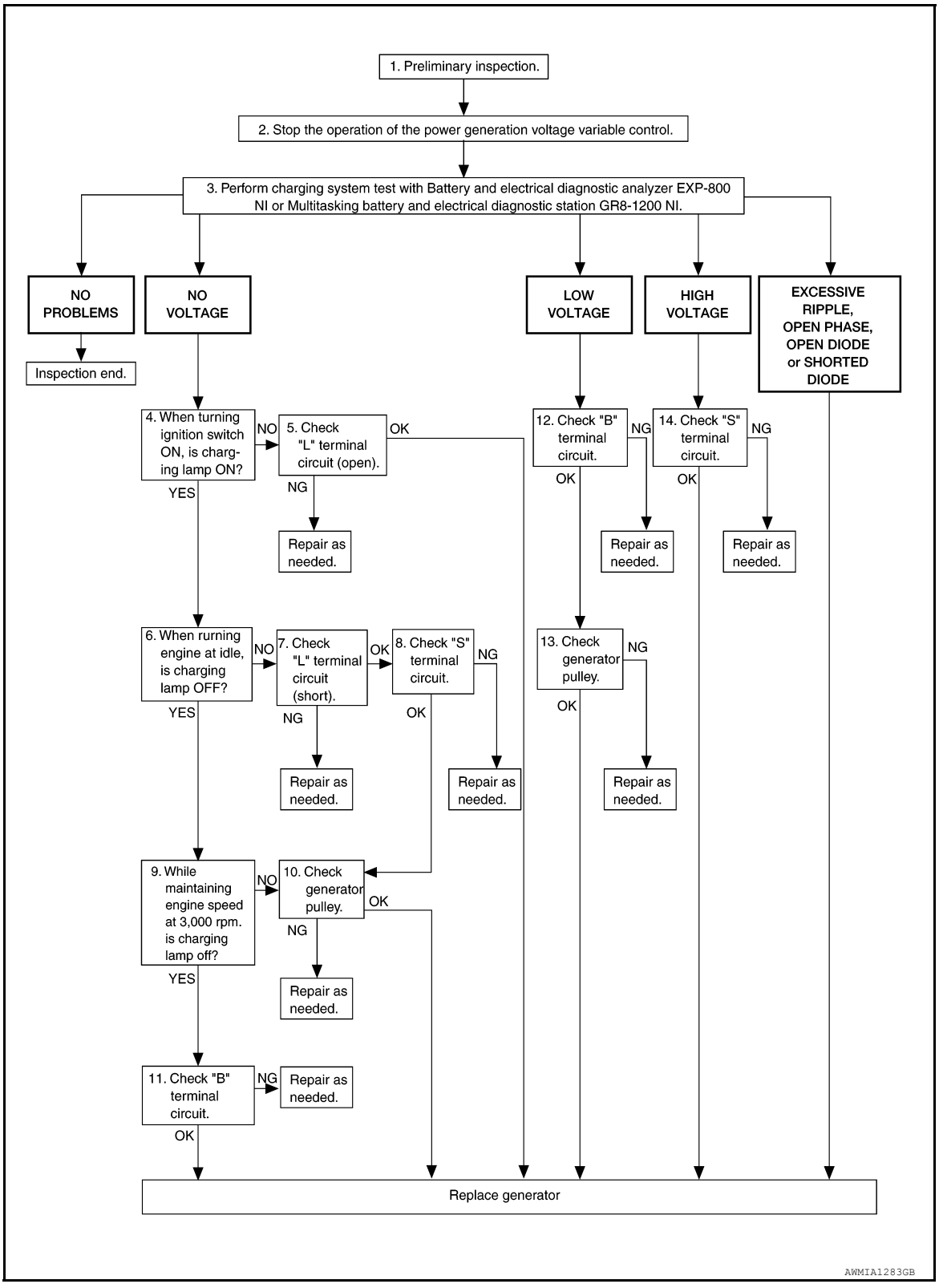
To test the charging system, use the following special service tools:

- EXP-800 NI Battery and electrical diagnostic analyzer
- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

Refer to the applicable Instruction Manual for proper charging system diagnosis procedures.

OVERALL SEQUENCE



DETAILED FLOW

NOTE:

To ensure a complete and thorough diagnosis, the battery, stater and generator test segments must be done as a set from start to finish.

1.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to SC-37, "Preliminary Inspection".

>> GO TO 2.

2. STOP POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

Stop the operation of the power generation voltage variable control in either of the following procedures.

- After selecting “ENGINE” using CONSULT, set the DUTY value of “ALTERNATOR DUTY” to 0 % by selecting “ALTERNATOR DUTY” of “Active Test”. Continue “Active Test” until the end of inspection. (When the DUTY value is 0 or 100 %, the normal power generation is performed according to the characteristic of the IC regulator of the generator.)
- Turn the ignition switch OFF, and disconnect the battery current sensor connector. [However, DTC (P1550–P1554) of the engine might remain. After finishing the inspection, connect the battery current sensor connector and erase the self diagnosis results history of the engine using CONSULT.]

>> GO TO 3.

3. DIAGNOSIS WITH EXP-800 NI OR GR8-1200 NI

Perform the charging system test using Multitasking battery and electrical diagnostic station GR8-1200 NI or Battery and electrical diagnostic analyzer EXP-800 NI. Refer to the applicable Instruction Manual for proper testing procedures.

Test result

NO PROBLEMS>>Charging system is normal and will also show “DIODE RIPPLE” test result.
NO VOLTAGE>>GO TO 4.
LOW VOLTAGE>>GO TO 12.
HIGH VOLTAGE>>GO TO 14.
EXCESSIVE RIPPLE, OPEN PHASE, OPEN DIODE or SHORTED DIODE>>Replace the generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE". Perform “DIODE RIPPLE” test again using Multitasking battery and electrical diagnostic station GR8-1200 NI or Battery and electrical diagnostic analyzer EXP-800 NI to confirm repair.

4. INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS ON)

Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> GO TO 6.
NO >> GO TO 5.

5. “L” TERMINAL CIRCUIT (OPEN) INSPECTION

Check “L” terminal circuit (open). Refer to SC-39, "Diagnosis Procedure 2".

Is the “L” terminal circuit normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

6. INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle.

Does the charge warning lamp turn OFF?

YES >> GO TO 9.
NO >> GO TO 7.

7. “L” TERMINAL CIRCUIT (SHORT) INSPECTION

Check “L” terminal circuit (short). Refer to SC-40, "Diagnosis Procedure 3".

Is the “L” terminal circuit normal?

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

8. “S” TERMINAL CIRCUIT INSPECTION

Check “S” terminal circuit. Refer to SC-40, "Diagnosis Procedure 4".

Is the “S” terminal circuit normal?

YES >> GO TO 10.
NO >> Repair as needed.

9. INSPECTION WITH CHARGE WARNING LAMP (ENGINE AT 3,000 RPM)

Increase and maintain the engine speed at 3,000 rpm.

Does the charge warning lamp remain off?

YES >> GO TO 11.
NO >> GO TO 10.

10. INSPECTION OF GENERATOR PULLEY

Check generator pulley. Refer to SC-43, "Generator Pulley Inspection".

Is generator pulley normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

11. “B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to SC-38, "Diagnosis Procedure 1".

Is “B” terminal circuit normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

12. “B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to SC-38, "Diagnosis Procedure 1".

Is “B” terminal circuit normal?

YES >> GO TO 13.
NO >> Repair as needed.

13. INSPECTION OF GENERATOR PULLEY

Check generator pulley. Refer to SC-43, "Generator Pulley Inspection".

Is generator pulley normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

14. “S” TERMINAL CIRCUIT INSPECTION

Check “S” terminal circuit. Refer to SC-40, "Diagnosis Procedure 4".

Is the “S” terminal circuit normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

Trouble Diagnosis Without EXP-800 NI or GR8-1200 NI

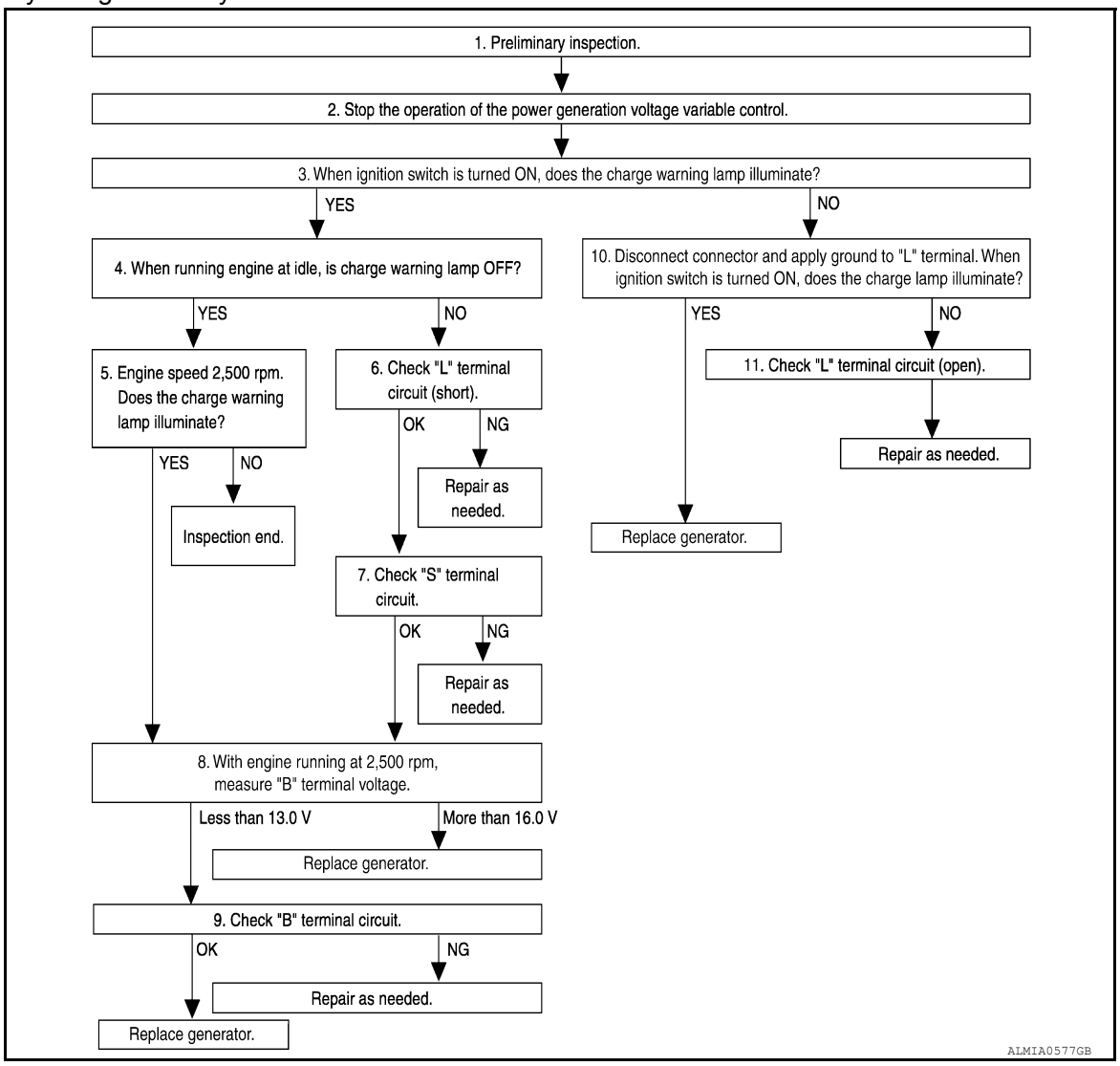
INFOID:0000000009318731

OVERALL SEQUENCE

Before performing a generator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test.

- Before starting, inspect the fusible link.

- Use fully charged battery.



DETAILED FLOW

1.PRELIMINARY INSPECTION

Perform the preliminary inspection. Refer to SC-37, "Preliminary Inspection".

>> GO TO 2.

2.STOP POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

Stop the operation of the power generation voltage variable control in either of the following procedures:

- After selecting “ENGINE” using CONSULT, set the DUTY value of “ALTERNATOR DUTY” to 0 % by selecting “ALTERNATOR DUTY” with “Active Test”. Continue “Active Test” until the end of inspection. (When the DUTY value is 0 or 100 %, the normal power generation is performed according to the characteristic of the IC regulator of the generator.)
- Turn the ignition switch OFF, and disconnect the battery current sensor connector. [However, DTC (P1550 - P1554) of the engine might remain. After finishing the inspection, connect the battery current sensor connector and erase the self-diagnostic results history of the engine using CONSULT.]

>> GO TO 3.

3.INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS TURNED ON)

When ignition switch is turned ON.

Does the charge warning lamp illuminate?

YES >> GO TO 4.
NO >> GO TO 10.

4. INSPECTION WITH CHARGE WARNING LAMP (IDLING)

Start the engine and run it at idle
Does the charge warning lamp turn OFF?

YES >> GO TO 5.
NO >> GO TO 6.

5. INSPECTION WITH CHARGE WARNING LAMP (ENGINE AT 2,500 RPM)

Increase and maintain the engine speed at 2,500 rpm.
Does the charge warning lamp illuminate?

YES >> GO TO 8.
NO >> Inspection End.

6. "L" TERMINAL CIRCUIT (SHORT) INSPECTION

Check terminal "L" circuit for (short). Refer to SC-40, "Diagnosis Procedure 3".
Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair as needed.

7. "S" TERMINAL CIRCUIT INSPECTION

Check terminal "S" circuit. Refer to SC-40, "Diagnosis Procedure 4".
Is the inspection result normal?

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

8. MEASURE "B" TERMINAL VOLTAGE

Start engine. With engine running at 2,500 rpm, measure "B" terminal voltage.
What voltage does the measurement result show?

Less than 13.0 V>>GO TO 9.
More than 16.0 V>>Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".

9. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to SC-38, "Diagnosis Procedure 1".
Is the inspection result normal?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> Repair as needed.

10. INSPECTION WITH CHARGE WARNING LAMP (IGNITION SWITCH IS ON)

1. Disconnect generator connector and apply ground to "L" terminal.
2. Turn the ignition switch ON.

Does the charge warning lamp illuminate?

YES >> Replace generator. Refer to SC-41, "Removal and Installation MR20DE" or SC-42, "Removal and Installation QR25DE".
NO >> GO TO 11.

11. CHECK "L" TERMINAL CIRCUIT (OPEN)

Check "L" terminal circuit (OPEN). Refer to SC-39, "Diagnosis Procedure 2".

>> Repair as needed.

Preliminary Inspection

INFOID:0000000009325285

1. CHECK BATTERY TERMINALS CONNECTION

Check if battery terminals are clean and tight.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair battery terminals connection.Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

2.CHECK FUSE

Check for blown fuse and fusible link.

Unit	Power source (Power supply terminals)	Fuse or Fusible Link
Generator	Battery (terminal 3)	Fuse 26
	Battery (terminal 1)	Fusible Link a
Combination meter	Ignition switch ON (terminal 2)	Fuse 14

Is the inspection result normal?

YES >> GO TO 3.
NO >> Be sure to eliminate cause of malfunction before installing new fuse or fusible link.

3.CHECK GENERATOR GROUND TERMINAL CONNECTION

Verify connector E206 terminal 5 (generator ground harness) is clean and tight.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair connection.

4.CHECK DRIVE BELT TENSION

Check drive belt tension. Refer to EM-13, "Checking Drive Belts" (MR20DE) or EM-130, "Checking Drive Belts" (QR25DE).

Is the inspection result normal?

YES >> Inspection End.
NO >> Repair as needed.

Diagnosis Procedure 1

INFOID:0000000009318751

1.CHECK TERMINAL “1” CONNECTION

1. Turn ignition switch OFF.
2. Verify terminal “1” is clean and tight.

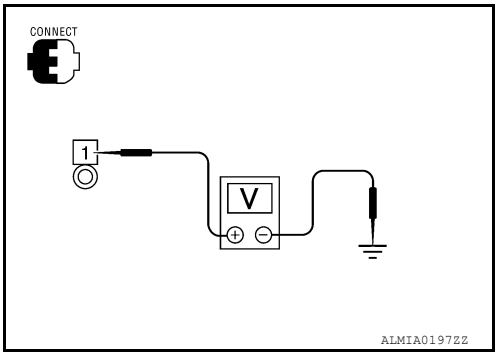
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair terminal “1” connection. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

2.CHECK TERMINAL “1” CIRCUIT

Check voltage between generator connector F15 terminal 1 and ground.

(+)		(-)	Voltage
Connector	Terminal		
F15	1	Ground	Battery voltage

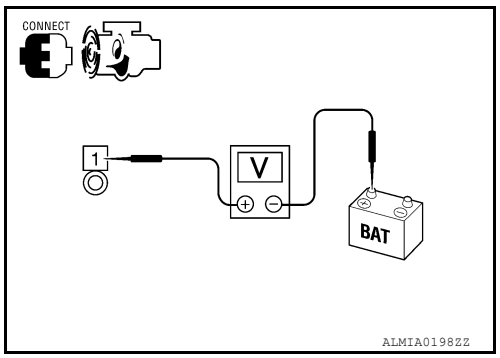


Is voltage reading as specified?

YES >> GO TO 3.
NO >> Check harness for open between generator and fusible link.

3.CHECK TERMINAL “1” CONNECTION (VOLTAGE DROP TEST)

1. Start engine, then engine running at idle and warm.
2. Check voltage between battery positive terminal and generator connector F15 terminal 1.



(+)		(-)	Voltage
Connector	Terminal		
F15	1	Battery positive terminal	Less than 0.2V

Is the voltage reading as specified?

YES >> Terminal “1” circuit is normal. Refer to SC-32, "Trouble Diagnosis With EXP-800 NI or GR8-1200 NI" or SC-35, "Trouble Diagnosis Without EXP-800 NI or GR8-1200 NI".

NO >> Check harness between battery and generator for high resistance.

Diagnosis Procedure 2

INFOID:0000000009318752

1.CHECK “L” TERMINAL CONNECTION

1. Turn ignition switch OFF.
2. Check if “L” terminal is clean and tight.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair “L” terminal connection. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to applicable Instruction Manual for proper testing procedures.

2.CHECK “L” TERMINAL CIRCUIT (OPEN)

1. Disconnect the generator connector.
2. Apply ground to generator harness connector terminal.
3. Check condition of the charge warning lamp with the ignition switch in the ON position.

Generator		Ground	Condition	
Connector	Terminal		Ignition switch position	Charge warning lamp
F14	2		ON	Illuminate

Does it illuminate?

YES >> “L” terminal circuit is normal. Refer to SC-32, "Trouble Diagnosis With EXP-800 NI or GR8-1200 NI" or SC-35, "Trouble Diagnosis Without EXP-800 NI or GR8-1200 NI".

NO >> GO TO 3.

3.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect the battery cable from the negative terminal.
2. Disconnect the combination meter connector.
3. Check continuity between generator harness connector and combination meter harness connector.

Generator		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	M24	32	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the harness or connectors.

4.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

Check continuity between combination meter harness connector and fuse block (J/B).

Combination meter		Fuse box (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M24	2	M4	5P	Yes

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace the harness or connectors.

5.CHECK POWER SUPPLY CIRCUIT

1. Connect the battery cable to the negative terminal.
2. Check voltage between combination meter harness connector and ground.

(+)		(-)	Condition	Voltage (Approx.)
Combination meter				
Connector	Terminal			
M24	2	Ground	When the ignition switch is in ON position	Battery voltage

Is the inspection result normal?

YES >> Replace the combination meter. Refer to DI-22, "Removal and Installation".
NO >> Repair or replace the harness or connectors.

Diagnosis Procedure 3

INFOID:0000000009318787

1.CHECK “L” TERMINAL CIRCUIT (SHORT)

1. Turn ignition switch OFF.
2. Disconnect generator connector.
3. Turn ignition switch ON.

Does charge warning lamp illuminate?

YES >> GO TO 2.
NO >> Refer to SC-32, "Trouble Diagnosis With EXP-800 NI or GR8-1200 NI" or SC-35, "Trouble Diagnosis Without EXP-800 NI or GR8-1200 NI".

2.CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

1. Turn ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Disconnect combination meter connector.
4. Check continuity between the combination meter harness connector and ground.

Combination meter		Ground	Continuity
Connector	Terminal		
F14	2		No

Is the inspection result normal?

YES >> Replace the combination meter. Refer to DI-22, "Removal and Installation".
NO >> Repair or replace the harness or connectors.

Diagnosis Procedure 4

INFOID:0000000009318788

1.CHECK VOLTAGE REGULATOR CIRCUIT CONNECTION

Check to see if connector F14 terminal 3 is clean and tight.

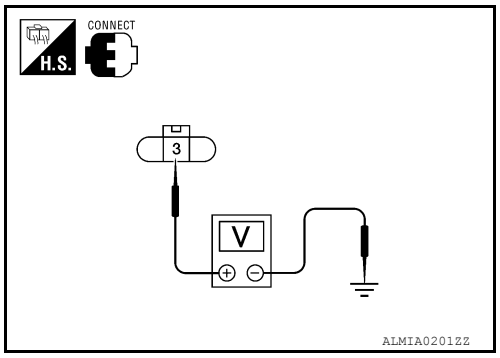
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair terminal "3" connection. Confirm repair by performing complete Charging system test using EXP-800 NI or GR8-1200 NI (if available). Refer to the applicable Instruction Manual for proper testing procedures.

2. CHECK VOLTAGE REGULATOR CIRCUIT

Check voltage between generator harness connector F14 terminal 3 and ground.



3 - ground	**Battery voltage**

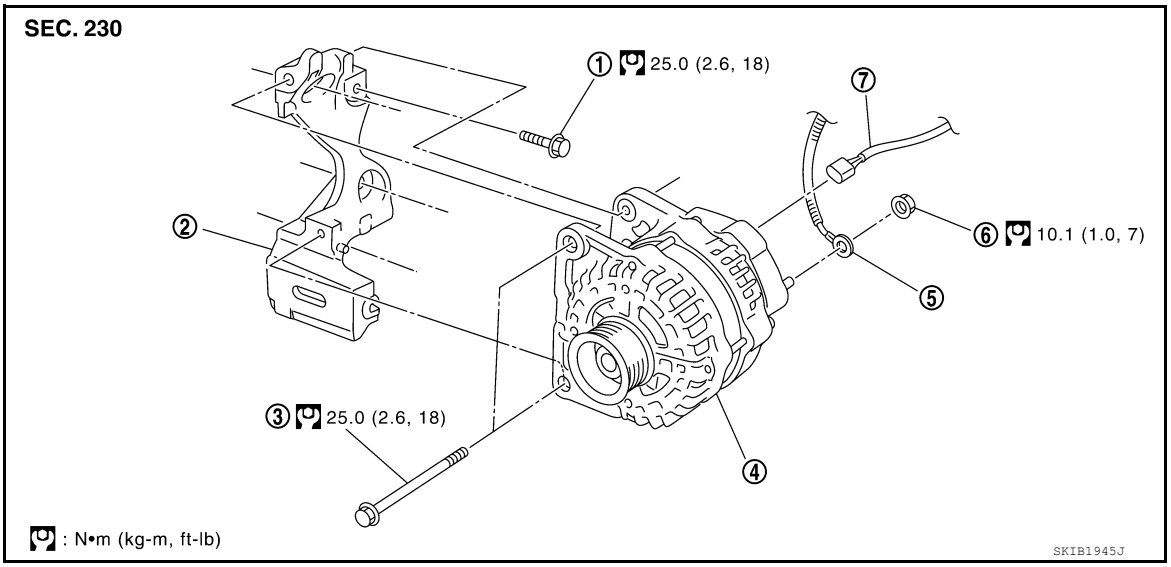
Does battery voltage exist?

YES >> Refer to SC-32, "Trouble Diagnosis With EXP-800 NI or GR8-1200 NI" or SC-35, "Trouble Diagnosis Without EXP-800 NI or GR8-1200 NI".

NO >> Check harness for open between generator and fuse.

Removal and Installation MR20DE

INFOID:0000000007403055



1. Generator bracket bolt
2. Generator bracket
3. Generator bolt
4. Generator
5. Generator "B" terminal harness
6. "B" terminal nut
7. Generator connector

REMOVAL

1. Disconnect the battery negative terminal. Refer to SC-7, "Removal and Installation (MR20DE Battery)".
2. Remove RH front wheel and tire. Refer to WT-7, "Adjustment".
3. Remove splash shield RH. Refer to EI-23, "Component".
4. Remove drive belt. Refer to EM-13, "Removal and Installation".
5. Disconnect generator connector.
6. Remove “B” terminal nut.
7. Remove generator bolts.
8. Remove generator assembly from the vehicle.

INSTALLATION

CAUTION:

Generator bolts must be tightened in sequence.

1. Install and temporarily tighten the lower generator bolt.
2. Install and temporarily tighten the upper generator bolt.
3. Tighten the upper generator bolt to specification.

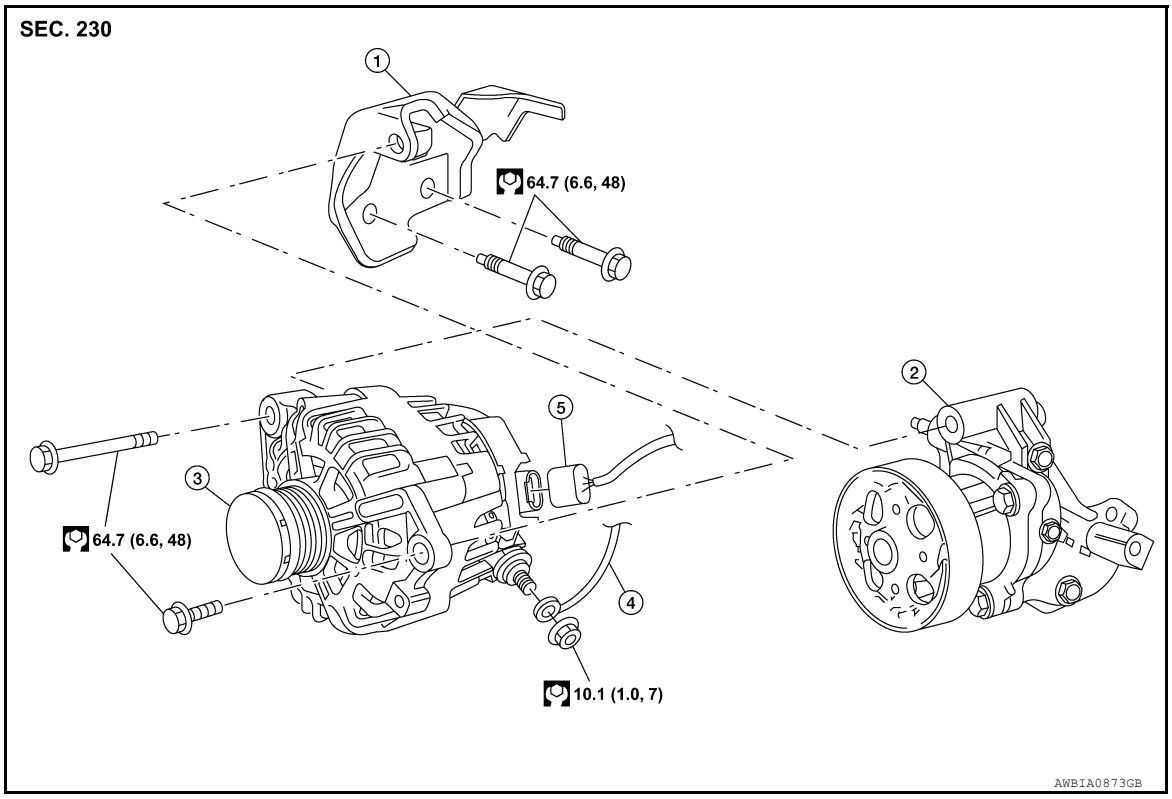
4. Tighten the lower generator bolt to specification.

NOTE:
Slide bushing must contact engine bracket after generator is installed.
Installation of the remaining components is in the reverse order of removal.

CAUTION:
Be sure to tighten “B” terminal nut carefully.

Removal and Installation QR25DE

INFOID:0000000007403056



1. Generator bracket
2. Water pump
3. Generator
4. Generator "B" terminal harness
5. Generator connector

REMOVAL

1. Disconnect the battery negative terminal. Refer to SC-8, "Removal and Installation (QR25DE Battery)".
2. Remove splash shield RH. Refer to EI-23, "Component".
3. Remove drive belt. Refer to EM-13, "Removal and Installation".
4. Disconnect generator connector.
5. Remove “B” terminal nut.
6. Remove harness bracket and position aside.
7. Remove generator bolts.
8. Remove generator assembly from the vehicle.

INSTALLATION

CAUTION:
Generator bolts must be tightened in sequence.

1. Install and temporarily tighten the lower generator bolt.
2. Install and temporarily tighten the upper generator bolt.
3. Tighten the upper generator bolt to specification.
4. Tighten the lower generator bolt to specification.

NOTE:
Slide bushing must contact engine bracket after generator is installed.

Installation of the remaining components is in the reverse order of removal.

CAUTION:

Be sure to tighten "B" terminal nut carefully.

Generator Pulley Inspection

INFOID:0000000007403057

GENERATOR PULLEY INSPECTION

One-Way Clutch Pulley Check

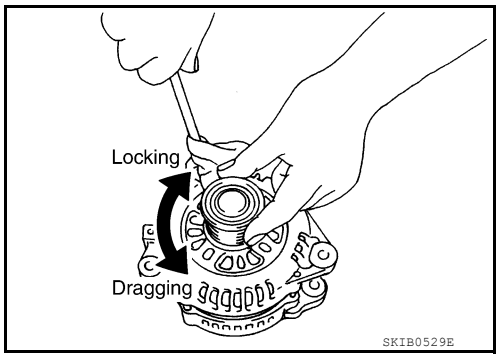
CAUTION:

Be careful not to damage rotor

NOTE:

Secure rotor using suitable tool and a rolled shop towel.

1. Check for locking; (Outer ring is turned clockwise when viewed from front.)
   - If it rotates in both directions, replace generator.
2. Check for dragging. (Outer ring is turned counterclockwise when viewed from front.)
   - If it locks or unusual resistance is felt, replace generator.



SERVICE DATA AND SPECIFICATIONS (SDS)

Battery

INFOID:0000000007403058

Engine	MR20DE	QR25DE
Type*	21 R	40R
Capacity (20 HR) minimum V-AH	12 V - 49 AH minimum	12V - 60 AH minimum
Cold Cranking Amps	470 @ -18°C (0°F)	550 @ -18°C (0°F)

*: Always check with the Parts Department for the latest parts information.

Starter

INFOID:0000000007403059

Engine		MR20DE		QR25DE	
Application		California	Except California	CVT	M/T
Manufacturer		HITACHI		MELCO	
Part number*		S114-944A	S114-955	M000TA0271	M000T22272
Type		Gear reduction			
System voltage		12 V			
No-load	Terminal voltage	11 V			
	Current	Less than 110 A		Less than 90A	
	Revolution	More than 3,750 rpm	More than 3,000 rpm	More than 2,400 rpm	More than 2,000 rpm

*: Always check with the Parts Department for the latest parts information.

Generator

INFOID:0000000007403060

Engine	MR20DE	QR25DE
Manufacturer	MELCO	VALEO
Part number*	A002TG1581AC	2613510
Nominal rating	13.5 V - 100 A	14 V - 110 A
Ground polarity	Negative	
Minimum revolution under no-load	1,000 rpm	1,200 rpm
Hot output current (when 13.5 V is applied @ 20°C)	More than 16 A/1,300 rpm More than 82 A/2,500 rpm More than 97 A/5,000 rpm	More than 46 A/1,500 rpm More than 68 A/1,800 rpm More than 91 A/2,500 rpm More than 105 A/5,000 rpm
Regulated output voltage@ 20°C	14.1 - 14.7 V	11.7 - 15.3 V

*: Always check with the Parts Department for the latest parts information.