

A
B
C

SECTION SC

STARTING & CHARGING SYSTEM

CONTENTS

<p>SERVICE INFORMATION 2</p> <p>PRECAUTIONS 2</p> <p style="padding-left: 20px;">Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"2</p> <p style="padding-left: 20px;">Precaution Necessary for Steering Wheel Rotation After Battery Disconnect2</p> <p>PREPARATION 4</p> <p style="padding-left: 20px;">Special Service Tool4</p> <p style="padding-left: 20px;">Commercial Service Tool4</p> <p>BATTERY 5</p> <p style="padding-left: 20px;">How to Handle Battery5</p> <p style="padding-left: 20px;">Trouble Diagnosis with Multitasking Battery Diagnostic Station7</p> <p style="padding-left: 20px;">Removal and Installation7</p> <p style="padding-left: 20px;">Required Procedure After Battery Disconnection.....8</p>	<p>STARTING SYSTEM 9</p> <p style="padding-left: 20px;">System Description 9</p> <p style="padding-left: 20px;">Wiring Diagram - START -11</p> <p style="padding-left: 20px;">Trouble Diagnosis with Multitasking Battery Diagnostic Station16</p> <p style="padding-left: 20px;">Removal and Installation HR16DE19</p> <p style="padding-left: 20px;">Removal and Installation MR18DE20</p> <p>CHARGING SYSTEM21</p> <p style="padding-left: 20px;">System Description21</p> <p style="padding-left: 20px;">Wiring Diagram - CHARGE -22</p> <p style="padding-left: 20px;">Trouble Diagnosis with Multitasking Battery Diagnostic Station22</p> <p style="padding-left: 20px;">Removal and Installation25</p> <p>SERVICE DATA AND SPECIFICATIONS (SDS)27</p> <p style="padding-left: 20px;">Battery27</p> <p style="padding-left: 20px;">Starter27</p> <p style="padding-left: 20px;">Generator27</p>
---	---

A
B
C
D
E
F
G
H
I
J
SC
L
M
N
O
P

PRECAUTIONS

< SERVICE INFORMATION >

SERVICE INFORMATION

PRECAUTIONS

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

INFOID:000000005715888

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:000000005394854

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-III 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.

PRECAUTIONS

< SERVICE INFORMATION >

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-III.

A

B

C

D

E

F

G

H

I

J

SC

L

M

N

O

P

PREPARATION


< SERVICE INFORMATION >

PREPARATION

Special Service Tool

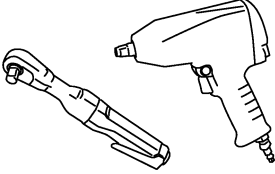
INFOID:000000005394855

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
<p>— (—) Model GR-8 Multitasking Battery Diagnostic Station</p> <div style="text-align: center;">  <p>AWI1A1239ZZ</p> </div>	<p>Tests batteries, starting and charging systems. For operating instructions, refer to diagnostic station instruction manual.</p>

Commercial Service Tool

INFOID:000000005394856

Tool name	Description
<p>Power tool</p> <div style="text-align: center;">  <p>PBIC0190E</p> </div>	<p>Loosening bolts and nuts</p>

BATTERY

< SERVICE INFORMATION >

BATTERY

How to Handle Battery

INFOID:000000005394857

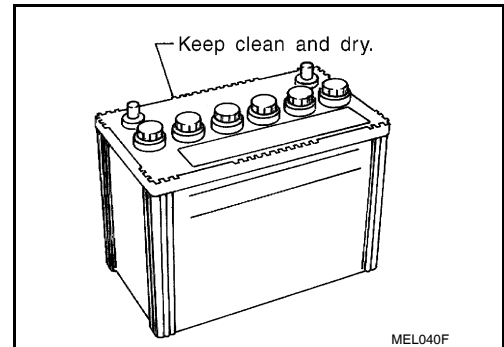
CAUTION:

- 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.

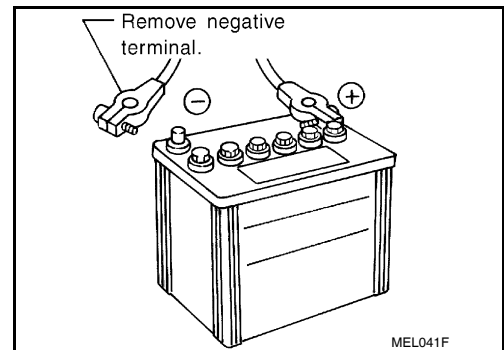
METHODS OF PREVENTING OVER-DISCHARGE

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

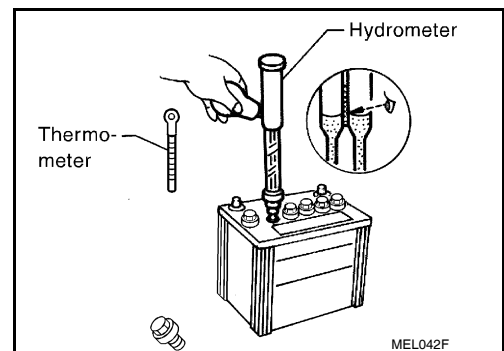
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as “low maintenance” and “maintenance-free”.



- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal.



- 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.



CHECKING ELECTROLYTE LEVEL

WARNING:

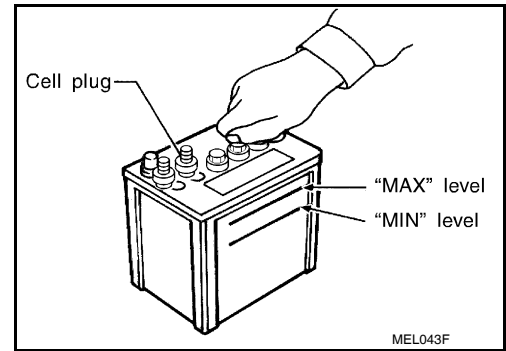
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

A
B
C
D
E
F
G
H
I
J
SC
L
M
N
O
P

BATTERY

< SERVICE INFORMATION >

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

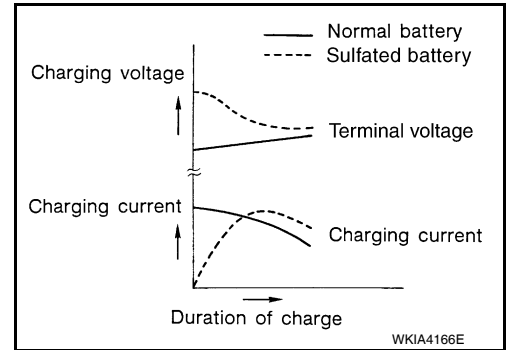


Sulfation

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.

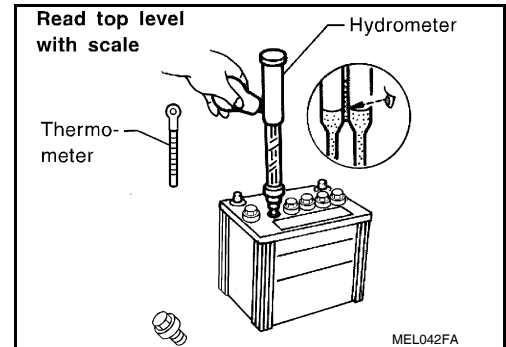
To determine if a battery has been sulfated, note its voltage and current when charging it. Less current and higher voltage are observed in the initial stage of charging sulfated batteries, as shown.

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

1. Read hydrometer and thermometer indications at eye level.
2. Use the following chart 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
4 (40)	-0.016
-1 (30)	-0.020

BATTERY

< SERVICE INFORMATION >

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
-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:

- Do not “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. Do not 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

Amps	Time
50	1 hour
25	2 hours
10	5 hours
5	10 hours

Do not charge at more than 50 ampere rate.

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.

Trouble Diagnosis with Multitasking Battery Diagnostic Station

INFOID:000000005394858

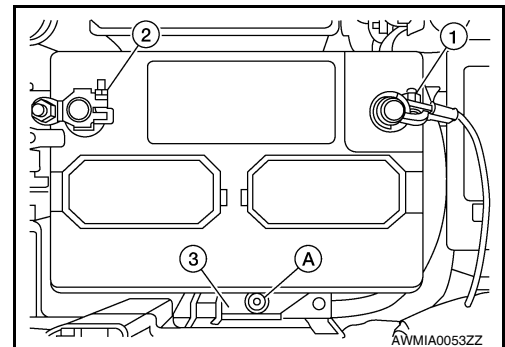
Refer to diagnostic station instruction manual.

Removal and Installation

INFOID:000000005394859

REMOVAL (All except MR18DE with CVT)

1. Disconnect battery negative (1) and positive (2) terminals.



BATTERY

< SERVICE INFORMATION >

CAUTION:

When disconnecting, disconnect the battery negative terminal first.

2. Remove battery hold-down wedge bolt (A) and remove battery hold-down wedge bracket (3).
3. Remove battery cover.
4. Remove battery.

INSTALLATION (All except MR18DE with CVT)

Installation is in the reverse order of removal.

CAUTION:

When connecting, connect the battery positive terminal first.

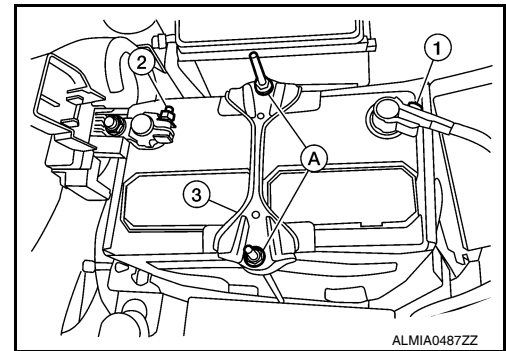
Battery wedge bracket bolt : 14.2 N·m (1.4 kg-m, 10 ft-lb)

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

Reset electronic systems as necessary. Refer to [SC-8, "Required Procedure After Battery Disconnection"](#).

REMOVAL (MR18DE with CVT)

1. Disconnect battery negative (1) and positive (2) terminals.



CAUTION:

When disconnecting, disconnect the battery negative terminal first.

2. Remove battery hold-down frame bolts (A) and remove battery hold-down frame (3).
3. Remove battery cover.
4. Remove battery.

INSTALLATION (MR18DE with CVT)

Installation is in the reverse order of removal.

CAUTION:

When connecting, connect the battery positive terminal first.

Battery hold-down frame bolt : 14.2 N·m (1.4 kg-m, 10 ft-lb)

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

Reset electronic systems as necessary. Refer to [SC-8, "Required Procedure After Battery Disconnection"](#).

Required Procedure After Battery Disconnection

INFOID:000000005394860

System	Item	Reference
Brake Control	Adjustment Of Steering Angle Sensor Neutral Position	BRC-85 .
Engine Control System	Idle Air Volume Learning	EC-26 (with HR16DE) or EC-580 (with MR18DE).
Glasses, Windows & Mirrors	Power Window System Initialization	GW-46 .
Roof	Sunroof Memory Reset/Initialization	RF-11 .
Audio-Visual System	Audio (Radio Preset)	Refer to Owner's Manual.
	NAVI	Refer to Owner's Manual.

STARTING SYSTEM

< SERVICE INFORMATION >

STARTING SYSTEM

System Description

INFOID:000000005394861

M/T Models

Power is supplied at all times

- to starter motor terminal B, and
- through 40A fusible link (letter **h**, 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. 49, located in the IPDM E/R)
- to the clutch interlock switch terminal 1.

With the clutch pedal depressed, power is supplied

- through the clutch interlock switch terminal 2
- to IPDM E/R terminal 35.

Ground is supplied at all times

- to IPDM E/R terminals 39 and 59
- through body grounds 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.

A/T Models

Power is supplied at all times

- to starter motor terminal B, and
- through 40A fusible link (letter **h**, 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. 54, located in the IPDM E/R)
- to transmission range switch terminal 1.

With the selector lever in the P or N position, power is supplied

- through transmission range switch terminal 2
- to IPDM E/R terminal 35.

Ground is supplied at all times

- to IPDM E/R terminals 39 and 59
- through body grounds 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

Power is supplied at all times

- to starter motor terminal B, and
- through 40A fusible link (letter **h**, 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

A
B
C
D
E
F
G
H
I
J
SC
L
M
N
O
P

STARTING SYSTEM

< SERVICE INFORMATION >

- to IPDM E/R terminal 21.
- With the selector lever in the P or N position, power is supplied
- from the transmission control module (TCM) terminal 24
 - to IPDM E/R terminal 35.

Ground is supplied at all times

- to IPDM E/R terminals 39 and 59
- through body grounds E15 and E24.

If the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN network, 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.

STARTING SYSTEM

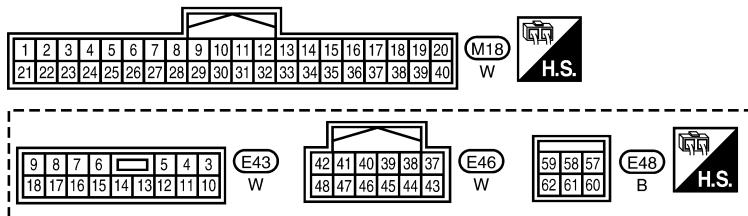
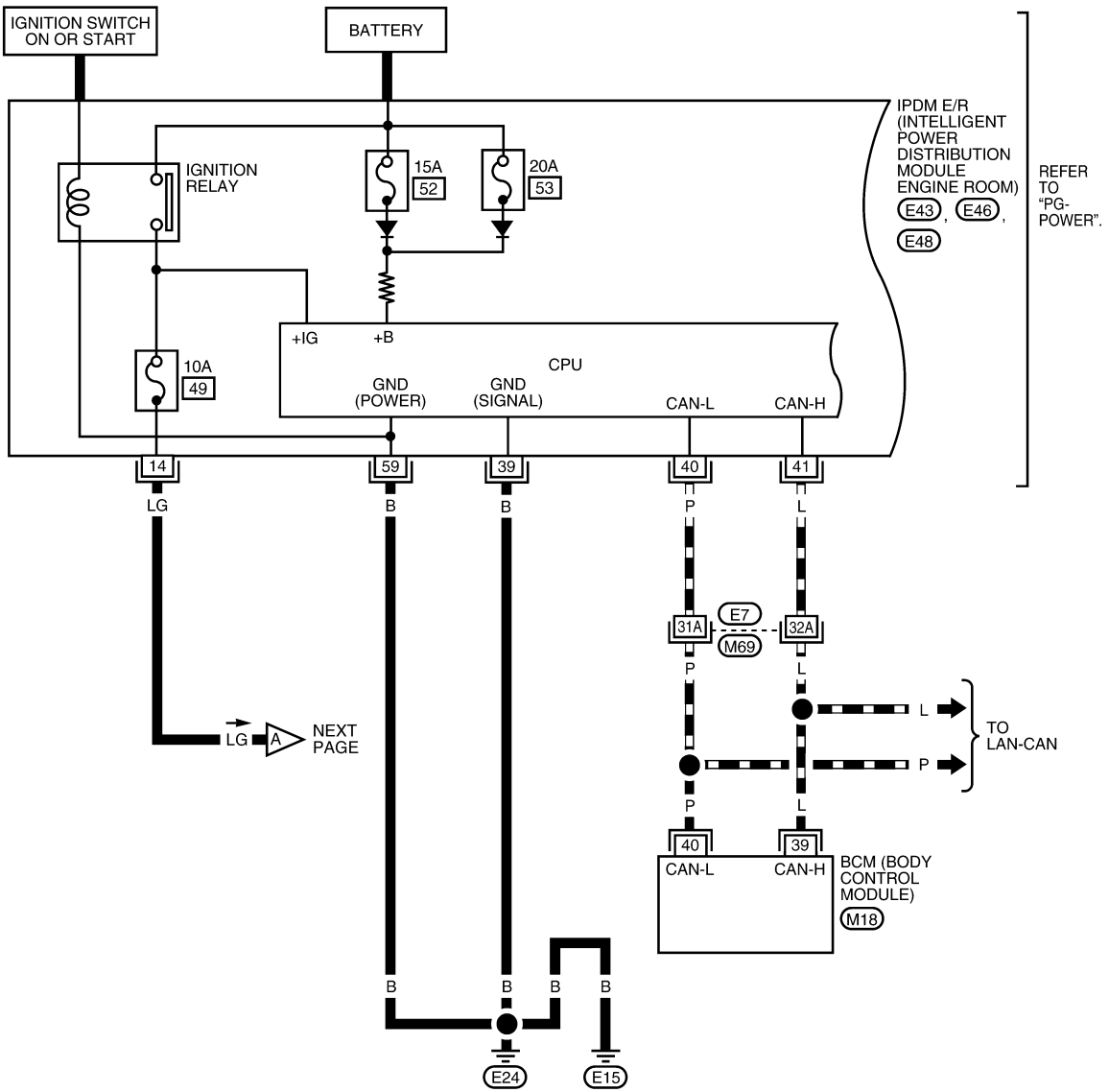
< SERVICE INFORMATION >

Wiring Diagram - START -

INFOID:000000005394862

M/T Models

SC-START-01

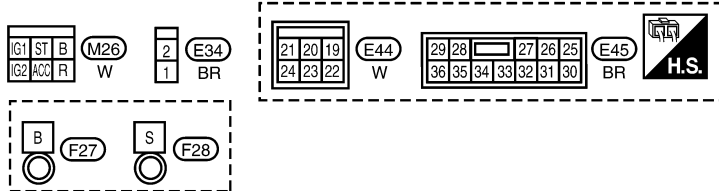
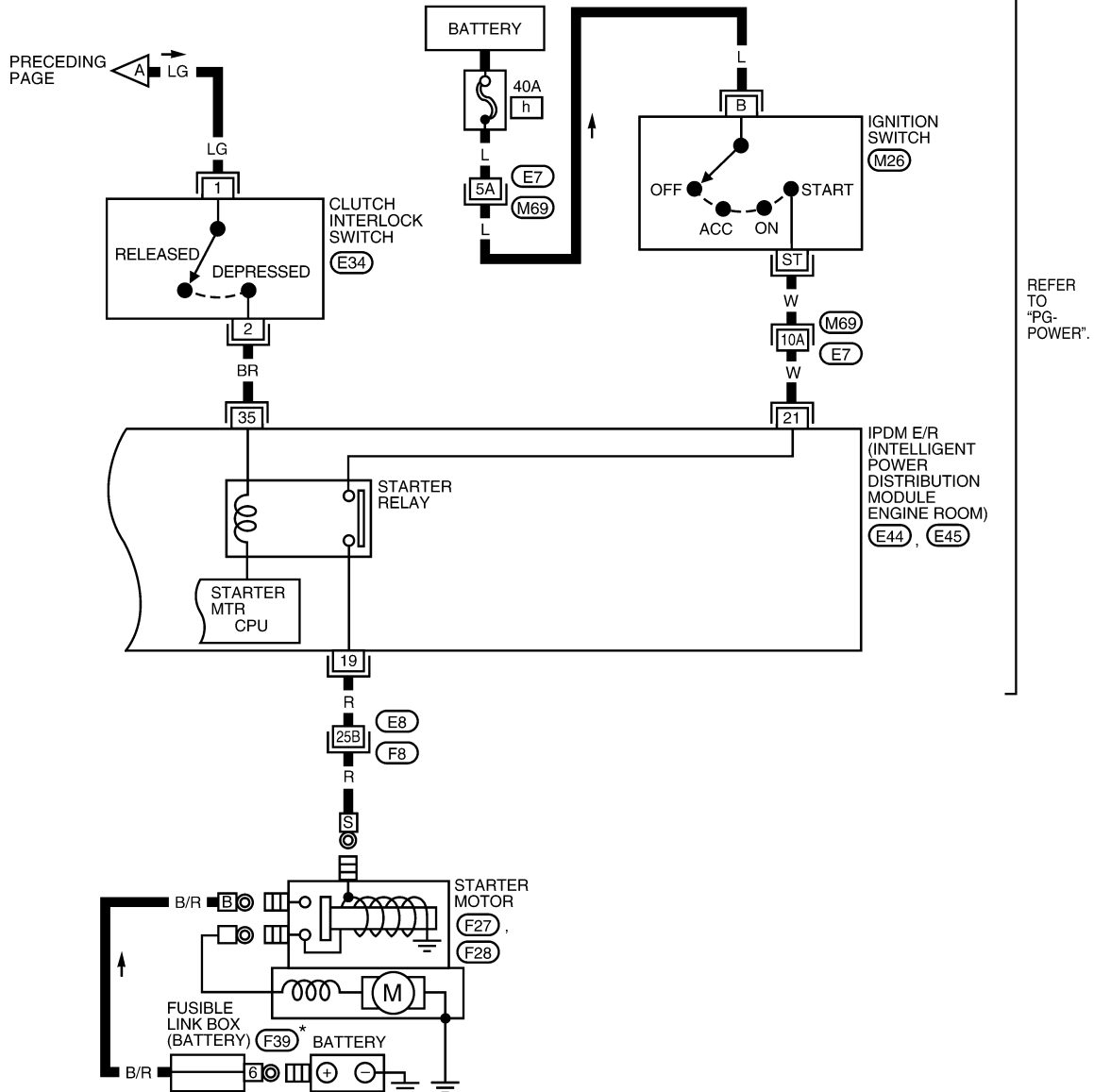


WKWA4964E

STARTING SYSTEM

< SERVICE INFORMATION >

SC-START-02



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

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

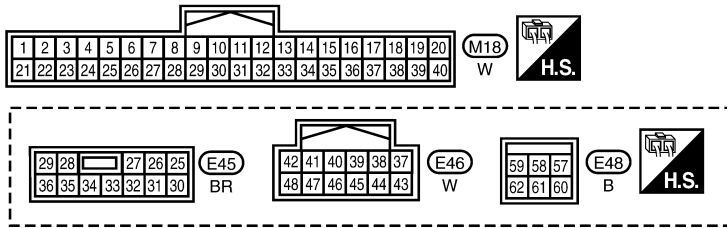
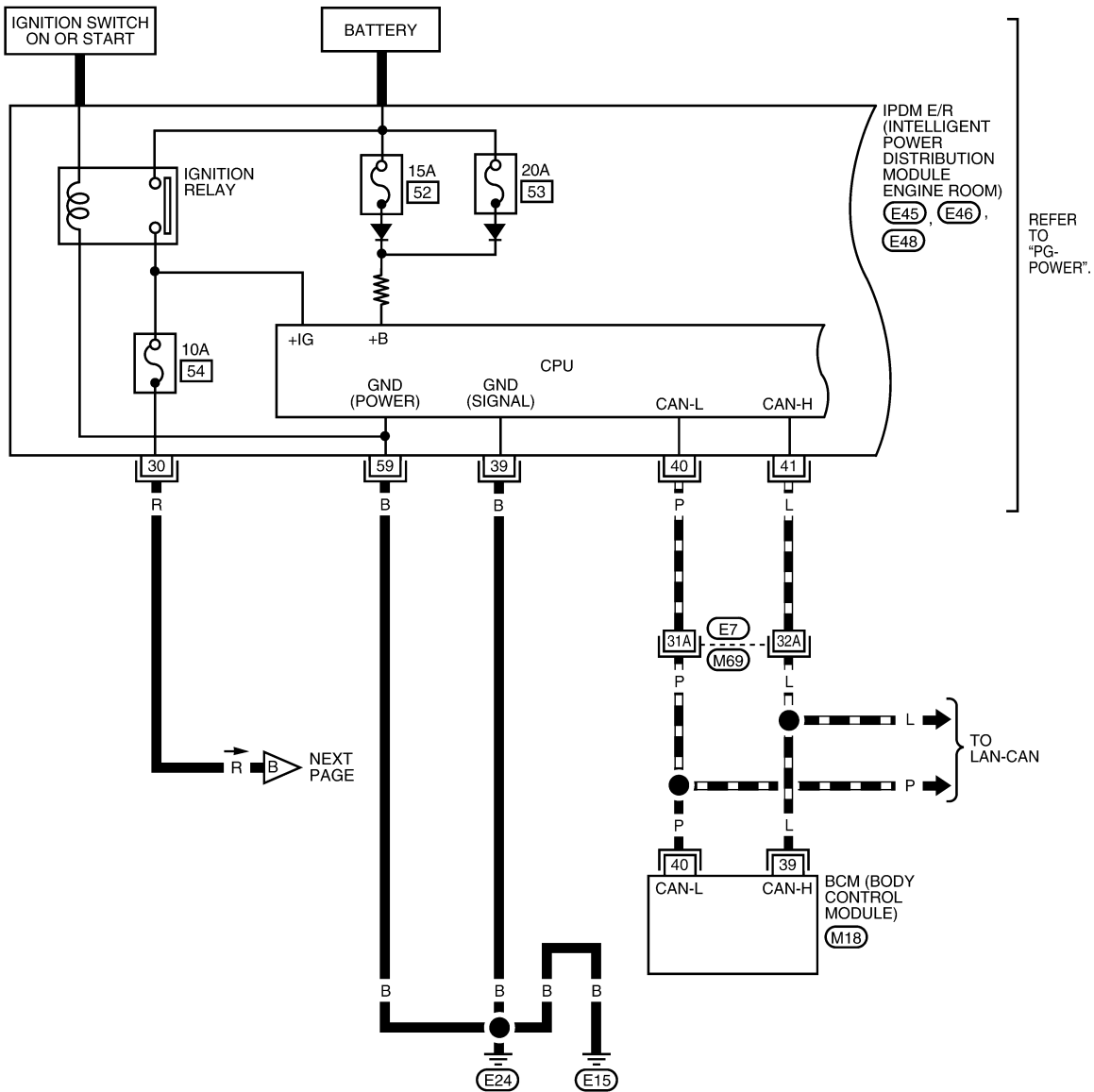
ABBWA0462GB

STARTING SYSTEM

< SERVICE INFORMATION >

A/T Models

SC-START-03



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

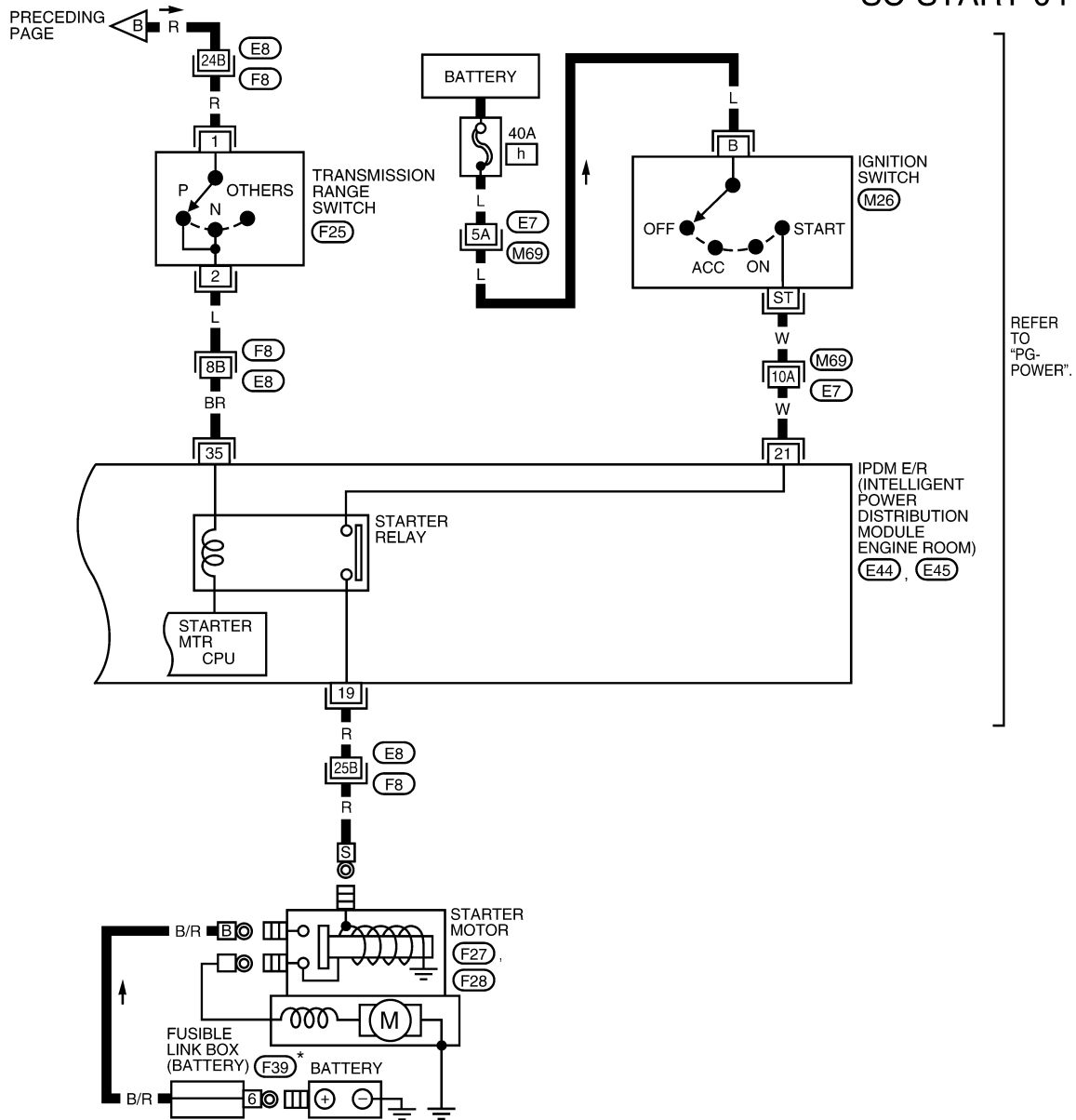
WKWA4966E

A
B
C
D
E
F
G
H
I
J
SC
L
M
N
O
P

STARTING SYSTEM

< SERVICE INFORMATION >

SC-START-04



REFER TO THE FOLLOWING.

(M69), (F8) - SUPER MULTIPLE JUNCTION (SMJ)

IG1	ST	B
IG2	ACC	R

(M26) W

21	20	19
24	23	22

(E44) W

29	28	27	26	25		
36	35	34	33	32	31	30

(E45) BR

3	1	2	7	8
4	5	9	6	

(F25) B

B	F27	S	F28
---	-----	---	-----

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

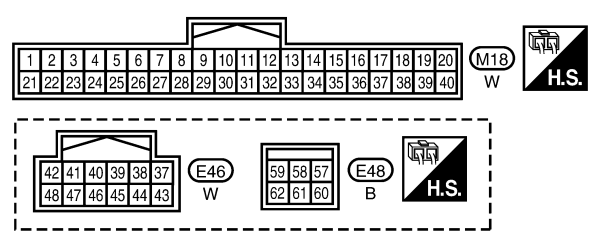
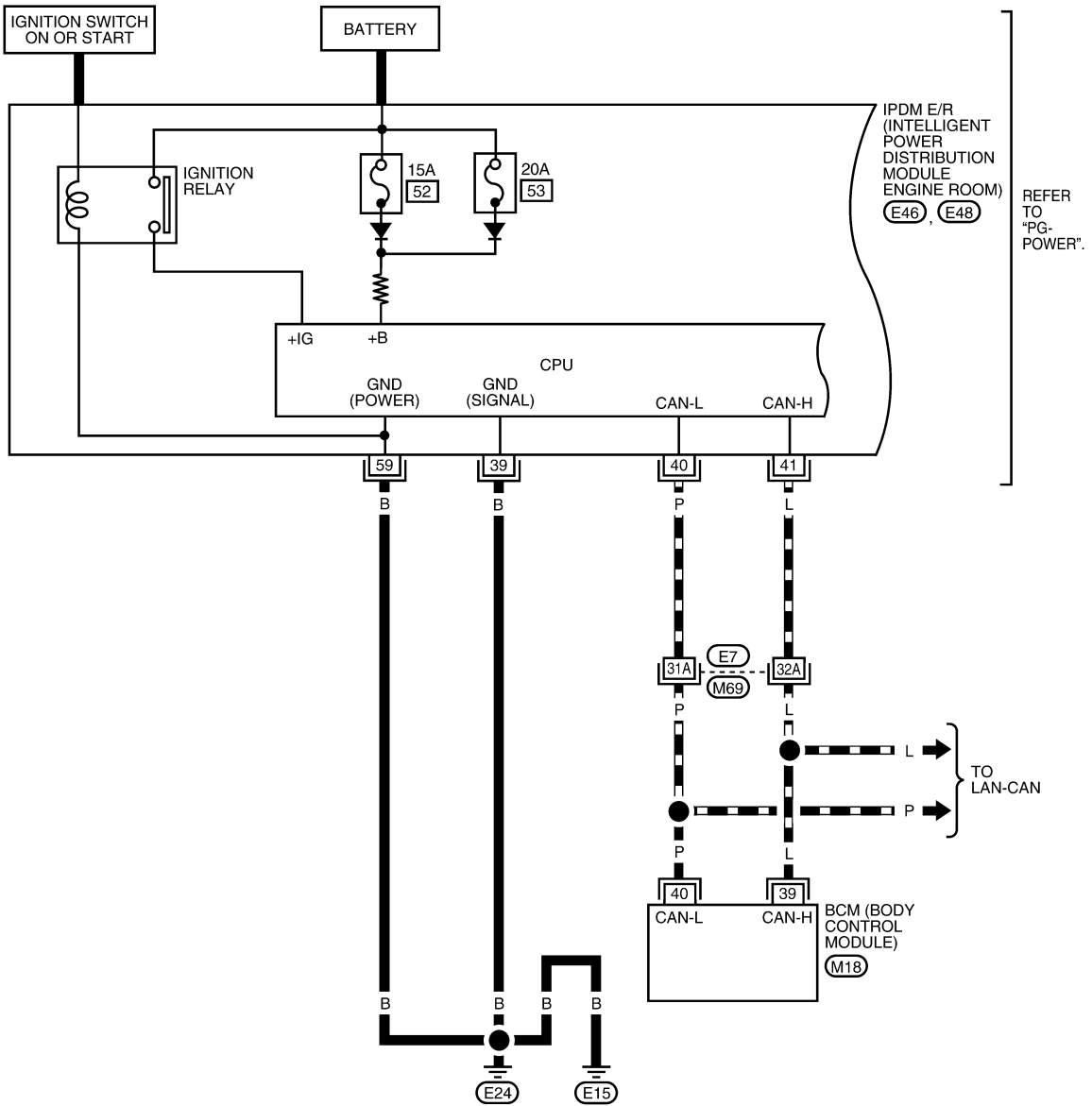
ABBWA0463GB

STARTING SYSTEM

< SERVICE INFORMATION >

CVT Models

SC-START-05



REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

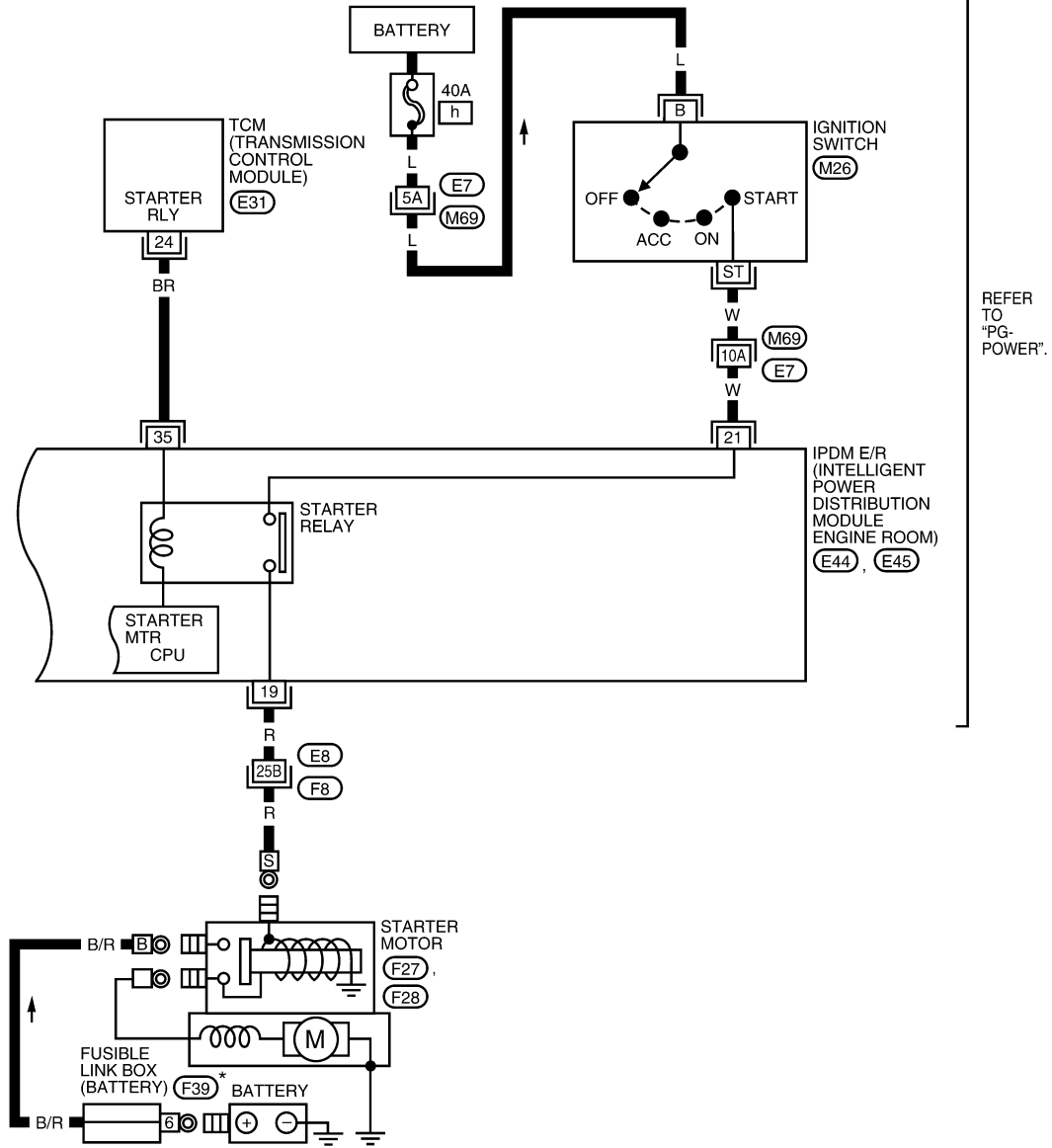
WKWA4968E

A
 B
 C
 D
 E
 F
 G
 H
 I
 J
 SC
 L
 M
 N
 O
 P

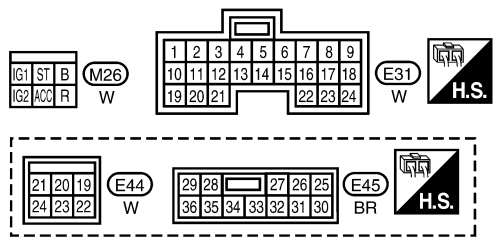
STARTING SYSTEM

< SERVICE INFORMATION >

SC-START-06



REFER TO "PG-POWER".



REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
 MULTIPLE JUNCTION (SMJ)

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

ABBWA0464GB

Trouble Diagnosis with Multitasking Battery Diagnostic Station

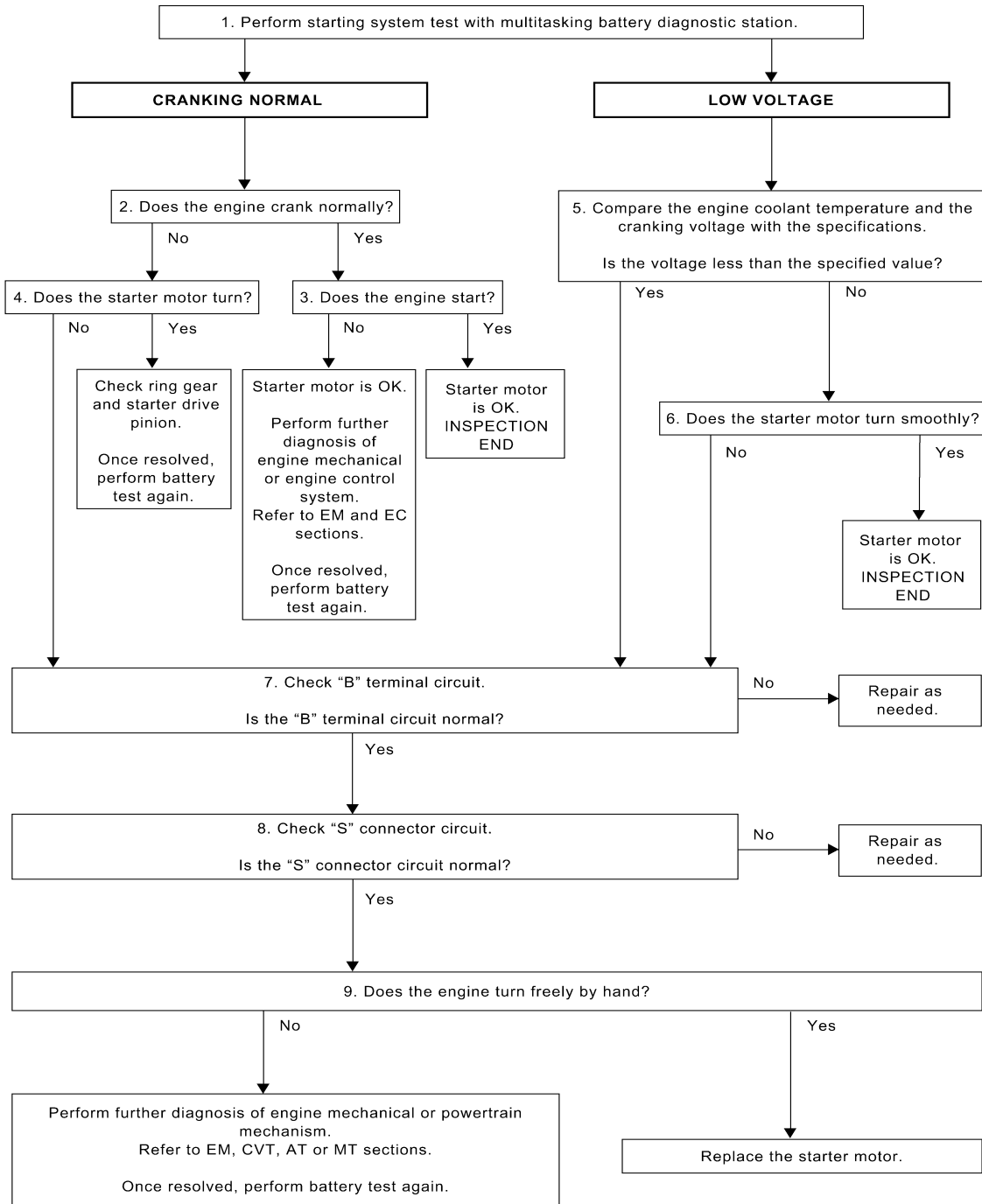
INFOID:000000005394863

Refer to diagnostic station instruction manual.

WORK FLOW

STARTING SYSTEM

< SERVICE INFORMATION >



AWBIA0771GB

DIAGNOSTIC PROCEDURE 1

Check Starter Motor Circuit

1. CHECK POWER SUPPLY TO STARTER MOTOR

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Check that the starter motor connector F27 connection is clean and tight.

STARTING SYSTEM

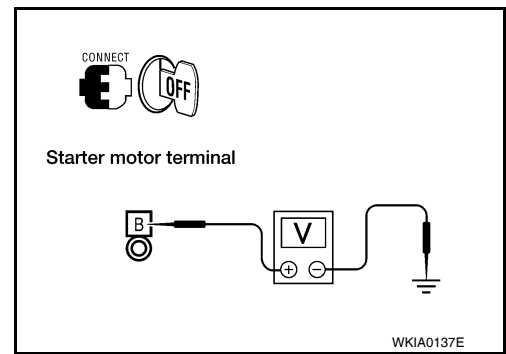
< SERVICE INFORMATION >

- Check voltage between starter motor connector F27 terminal B and ground using a digital circuit tester.

Battery voltage should exist

OK or NG

- OK >> GO TO 2.
 NG >> Check harness between the battery and the starter motor for open circuit.



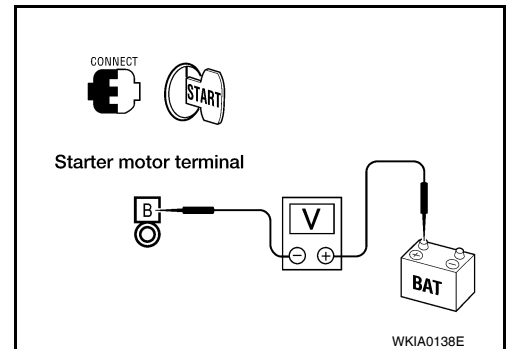
2. CHECK VOLTAGE DROP ON STARTER MOTOR CIRCUIT

- Check voltage between starter motor connector F27 terminal B and battery positive terminal using a digital circuit tester.

Ignition switch in START : Less than 0.2V

OK or NG

- OK >> GO TO 3.
 NG >> Check harness between the battery and the starter motor for poor continuity.



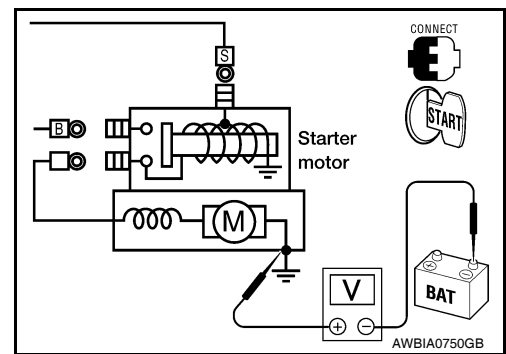
3. CHECK VOLTAGE DROP ON STARTER MOTOR GROUND CIRCUIT

- Check voltage between starter motor case and battery negative terminal using a digital circuit tester.

Ignition switch in START : Less than 0.2V

OK or NG

- OK >> Starter motor ground circuit is OK. Further inspection is necessary. Refer to "WORK FLOW".
 NG >> Check harness between the starter motor case and ground for poor continuity.



DIAGNOSTIC PROCEDURE 2

Check Magnetic Switch Circuit

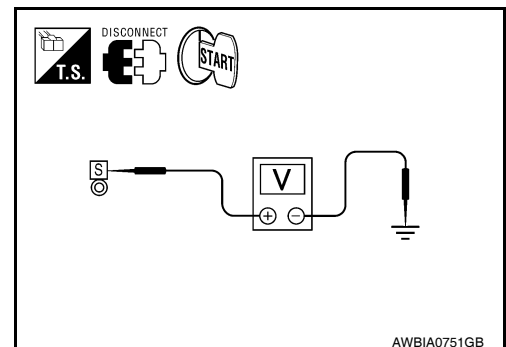
1. CHECK POWER SUPPLY TO MAGNETIC SWITCH

- Remove the fuel pump fuse.
- Crank or start the engine (where possible) until the fuel pressure is released.
- Turn the ignition switch OFF.
- Disconnect starter motor connector F28.
- Check voltage between starter motor connector F28 terminal S and ground using a digital circuit tester.

Ignition switch in START : Battery voltage

OK or NG

- OK >> GO TO 2.
 NG >> Check the following:
 - 40A fusible link (letter **h**, located in fuse and fusible link box)



STARTING SYSTEM

< SERVICE INFORMATION >

- 10A fuse (No. 49, M/T models, located in the IPDM E/R)
- 15A fuse (No. 52, located in the IPDM E/R)
- 20A fuse (No. 53, located in the IPDM E/R)
- Transmission range switch, clutch interlock switch or TCM depending on equipment
- Ignition switch
- Ignition relay IPDM E/R
- Starter relay IPDM E/R
- Starter relay request ON signal from BCM
- Harness for open or short circuit

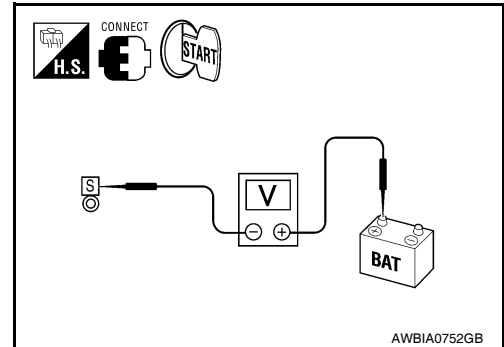
2. CHECK VOLTAGE DROP ON MAGNETIC SWITCH CIRCUIT

1. Connect starter motor connector F28.
2. Check voltage between starter motor connector F28 terminal S and battery positive terminal using a digital circuit tester.

Ignition switch in START : Less than 1V

OK or NG

- OK >> Magnetic switch circuit is OK. Further inspection is necessary. Refer to "WORK FLOW".
- NG >> Check harness, components and connections between the battery and the magnetic switch for poor continuity.

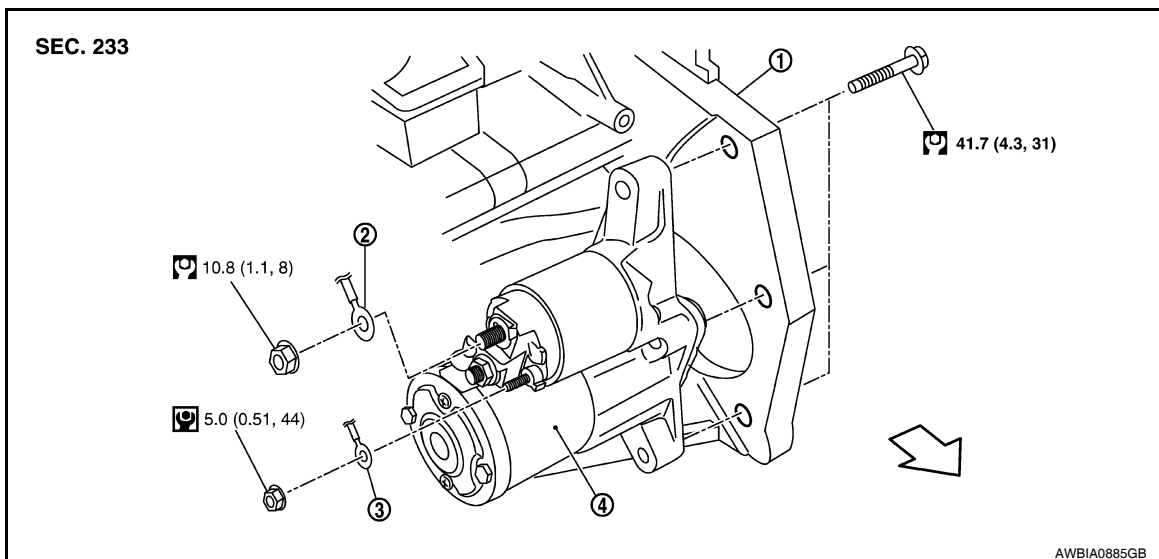


MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE

Engine coolant temperature	Voltage V
-30°C to -20°C (-22°F to -4°F)	8.4
-19°C to -10°C (-2°F to 14°F)	8.9
-9°C to 0°C (16°F to 32°F)	9.3
More than 1°C (More than 34°F)	9.7

Removal and Installation HR16DE

INFOID:000000005394864



1. Cylinder block
4. Starter motor

2. "B" terminal harness
- ↶ Engine front

3. "S" terminal harness

STARTING SYSTEM

< SERVICE INFORMATION >

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove air duct (inlet). [EM-17, "Removal and Installation"](#)
3. Remove reservoir tank. Refer to [CO-17, "Removal and Installation"](#).
4. Remove "S" terminal nut.
5. Remove "B" terminal nut.
6. Remove starter motor bolts.
7. Remove starter motor.

INSTALLATION

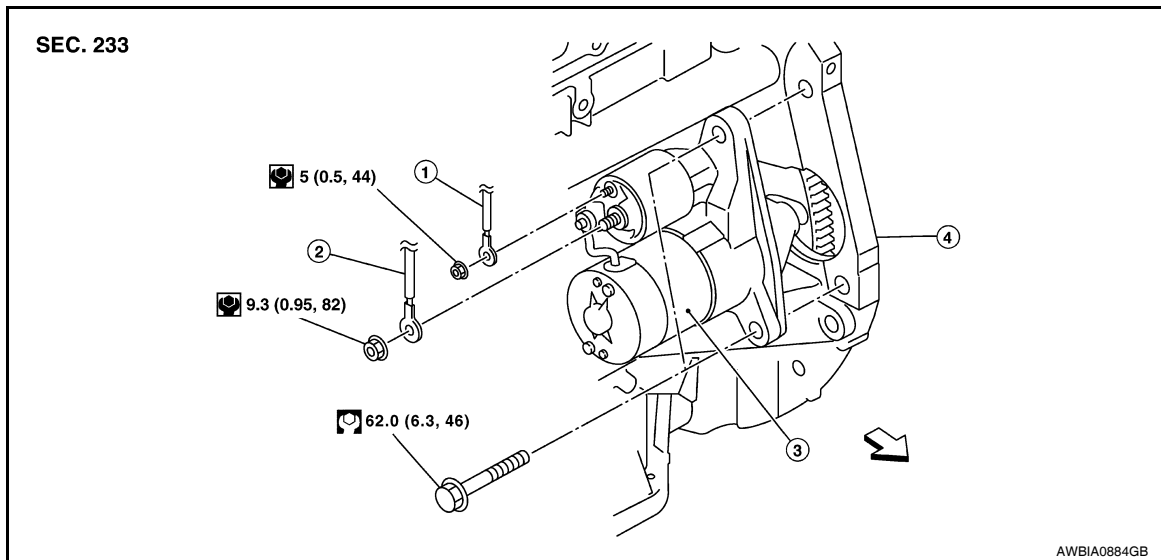
Installation is in the reverse order of removal.

CAUTION:

Be sure to tighten "B" terminal nut carefully.

Removal and Installation MR18DE

INFOID:000000005394865



- | | | |
|-------------------------|-------------------------|------------------|
| 1. "S" terminal harness | 2. "B" terminal harness | 3. Starter motor |
| 4. Cylinder block | ⇐ Front | |

REMOVAL

1. Disconnect the battery negative terminal. Refer to [SC-7, "Removal and Installation"](#).
2. Remove air duct (inlet). Refer to [EM-135, "Removal and Installation"](#).
3. Remove reservoir tank. Refer to [CO-17, "Removal and Installation"](#).
4. Remove "S" terminal nut.
5. Remove "B" terminal nut.
6. Remove starter motor bolts.
7. Remove starter motor.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Be sure to tighten terminal nuts carefully.

CHARGING SYSTEM

< SERVICE INFORMATION >

CHARGING SYSTEM

System Description

INFOID:000000005394866

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. 29, located in the fuse and fusible link box).

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 120A fusible link [letter **a** , located in the fusible link box (battery)].

Ground is supplied

- to generator terminal 5
- through body ground F5, 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. 3, located in the fuse block (J/B)]
- to combination meter terminal 28 for the charge warning lamp.

The IC regulator controls ground to terminal 38 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.

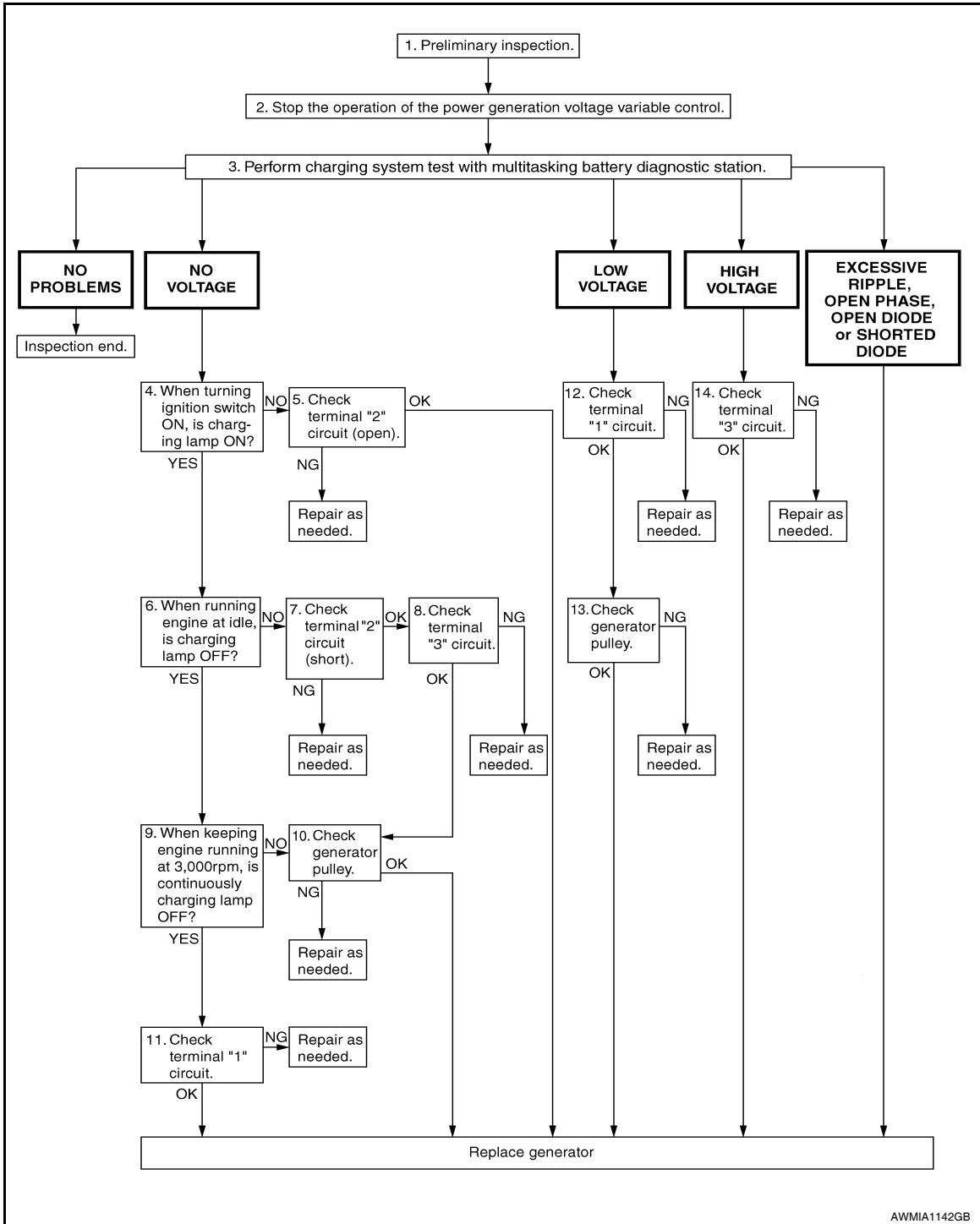
If the charge warning lamp illuminates with the engine running, a malfunction is indicated.

A
B
C
D
E
F
G
H
I
J
SC
L
M
N
O
P

CHARGING SYSTEM

< SERVICE INFORMATION >

WORK FLOW



DIAGNOSTIC PROCEDURE 1

Check Charge Warning Lamp Circuit

1. CHECK CHARGE WARNING LAMP CIRCUIT CONNECTION

Check to see if terminal 2 is clean and tight.

OK or NG

OK >> GO TO 2.

NG >> Repair terminal 2 connection. Confirm repair by performing complete Starting/Charging system test. Refer to diagnostic station instruction manual.

CHARGING SYSTEM

< SERVICE INFORMATION >

2. CHECK CHARGE WARNING LAMP CIRCUIT

1. Disconnect generator connector F1.
2. Apply ground to generator connector F1 terminal 2 with the ignition switch in the ON position.

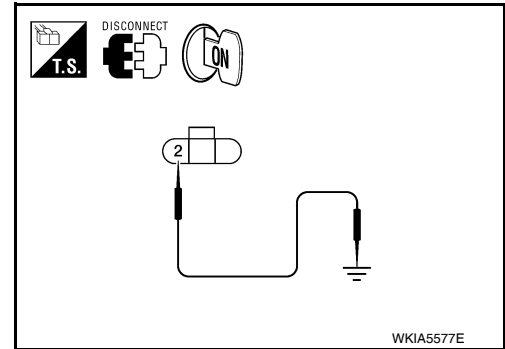
CHARGE lamp should light up.

OK or NG

OK >> GO TO "WORK FLOW" .

NG >> Check the following.

- 10A fuse [No. 3, located in fuse block (J/B)]
- CHARGE lamp
- Harness for open or short between combination meter and fuse
- Harness for open or short between combination meter and generator



DIAGNOSTIC PROCEDURE 2

Check Battery Circuit

1. CHECK BATTERY CIRCUIT CONNECTION

Check to see if terminal 1 is clean and tight.

OK or NG

OK >> GO TO 2.

NG >> Repair terminal 1 connection. Confirm repair by performing complete Starting/Charging system test. Refer to diagnostic station instruction manual.

2. CHECK BATTERY CIRCUIT

Check voltage between generator connector F2 terminal 1 and ground using a digital circuit tester.

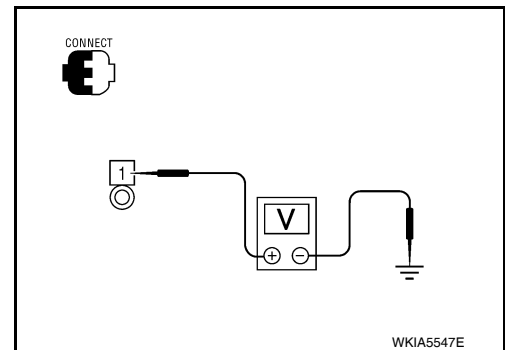
Battery voltage should exist.

OK or NG

OK >> GO TO 3.

NG >> Check the following.

- 120A fusible link [letter **a** , located in fusible link box (battery)]
- Harness for open or short between generator and fusible link



3. CHECK VOLTAGE DROP ON BATTERY CIRCUIT

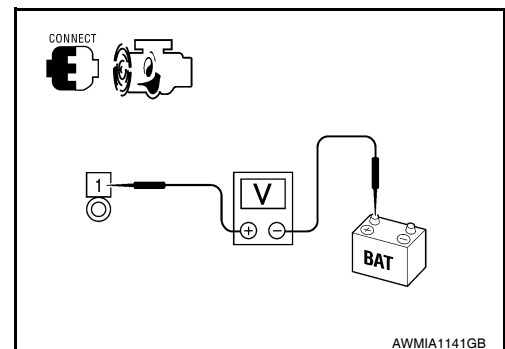
Check voltage between generator connector F2 terminal 1 and battery positive terminal using a digital circuit tester.

With engine running : Less than 0.2V at idle and warm

OK or NG

OK >> Replace the generator. Refer to [SC-25. "Removal and Installation"](#) . Confirm repair by performing complete Starting/Charging system test. Refer to diagnostic station instruction manual.

NG >> Check harness between the battery and the generator for poor continuity.



DIAGNOSTIC PROCEDURE 3

Check Voltage Regulator Circuit

CHARGING SYSTEM

< SERVICE INFORMATION >

1. CHECK VOLTAGE REGULATOR CIRCUIT CONNECTION

Check to see if terminal 3 is clean and tight.

OK or NG

OK >> GO TO 2.

NG >> Repair terminal 3 connection. Confirm repair by performing complete Starting/Charging system test. Refer to diagnostic station instruction manual.

2. CHECK VOLTAGE REGULATOR CIRCUIT

Check voltage between generator connector F1 terminal 3 and ground using a digital circuit tester.

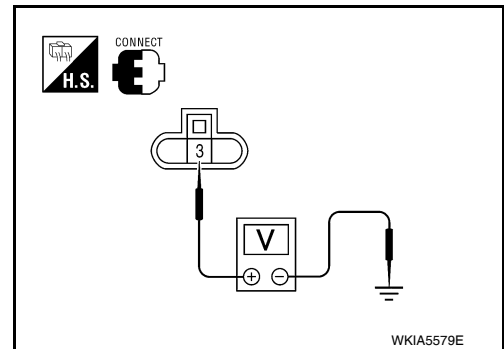
Battery voltage should exist.

OK or NG

OK >> GO TO 3.

NG >> Check the following.

- 10A fuse (No. 29, located in fuse and fusible link box)
- Harness for open or short between generator and fuse



3. CHECK VOLTAGE DROP ON VOLTAGE REGULATOR CIRCUIT

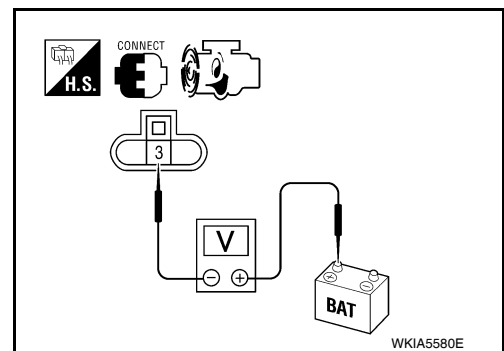
Check voltage between generator connector F1 terminal 3 and battery positive terminal using a digital circuit tester.

**With engine running : Less than 0.2V
at idle and warm**

OK or NG

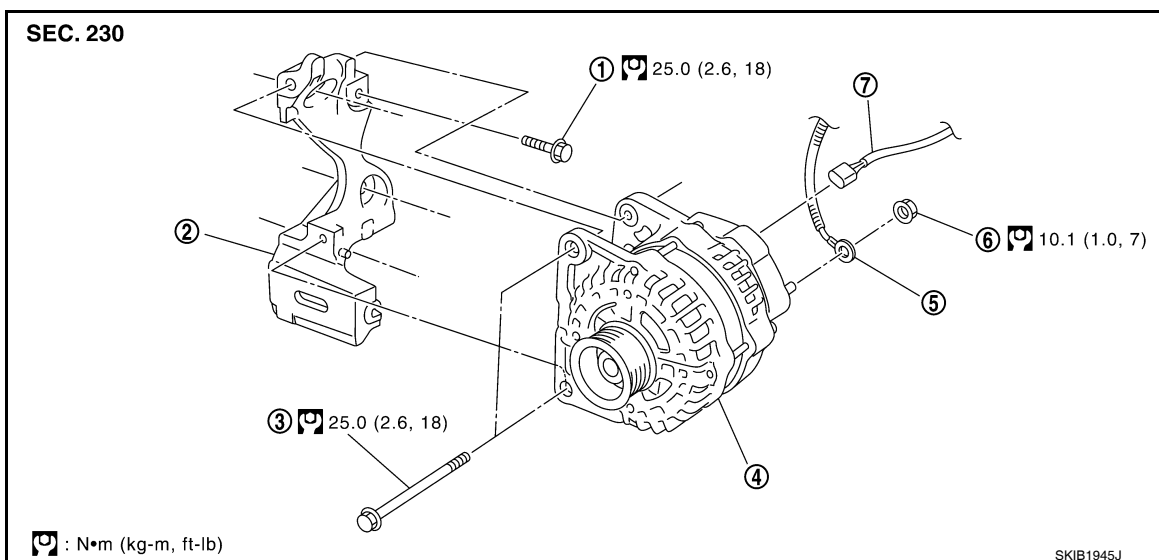
OK >> Replace the generator. Refer to [SC-25, "Removal and Installation"](#) . Confirm repair by performing complete Starting/Charging system test. Refer to diagnostic station instruction manual.

NG >> Check harness between the battery and the generator for poor continuity.



Removal and Installation

INFOID:000000005394869



CHARGING SYSTEM

< SERVICE INFORMATION >

- | | | |
|---------------------------|-----------------------------------|---------------------|
| 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"](#).
2. Remove drive belt. Refer to [EM-15, "Removal and Installation"](#) (HR16DE), [EM-132, "Removal and Installation"](#) (MR18DE).
3. Remove radiator reservoir tank. Refer to [CO-17, "Removal and Installation"](#) (HR16DE), [CO-41, "Removal and Installation"](#) (MR18DE).
4. Disconnect generator connector.
5. Remove "B" terminal nut.
6. Remove generator bolts.
7. Remove generator assembly from the vehicle.

GENERATOR PULLEY INSPECTION

- Check that the generator pulley does not rattle.
- Check that the generator pulley nut is properly tightened.

Generator pulley nut : 118 N·m (12.0 kg-m, 87 ft-lb)

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Be sure to tighten "B" terminal nut carefully.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

SERVICE DATA AND SPECIFICATIONS (SDS)

Battery

INFOID:000000005394870

Applied model	MT, A/T	CVT
Type*	T4	Gr.51 R
20 hours rate capacity	12 V - 47 AH	12 V - 43 AH
Cold Cranking Amps. (CCA)	470	410

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

Starter

INFOID:000000005394871

Applied model		HR16DE	MR18DE
Type*		S114_954	S114 - 955
		HITACHI make	HITACHI make
		Reduction gear type	Reduction gear type
System voltage		12 V	12 V
No-load	Terminal voltage	11 V	11 V
	Current	Less than 110 A	Less than 110 A
	Revolution	More than 3,000 rpm	More than 3,000 rpm

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

Generator

INFOID:000000005394872

Applied model		HR16DE	MR18DE
Type*		A002TJ0291ZC	A002TG1581AC
		MITSUBISHI make	MITSUBISHI make
Nominal rating		12 V - 100 A	12 V - 100 A
Ground polarity		Negative	Negative
Minimum revolution under no-load (when 13.5 V is applied)		Less than 1,000 rpm	Less than 1,000 rpm
Hot output current (when 13.5 V is applied)		More than 27 A/1,300 rpm More than 95 A/2,500 rpm More than 116 A/5,000 rpm	More than 16 A/1,300 rpm More than 82 A/2,500 rpm More than 97 A/5,000 rpm
Regulated output voltage		14.1 - 14.7 V	14.1 - 14.7 V

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