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SECTION SC

STARTING & CHARGING SYSTEM

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PRECAUTIONS

PRECAUTIONS

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

EKS001AV

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.

PREPARATION

PREPARATION

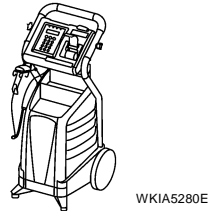
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Special Service Tool

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

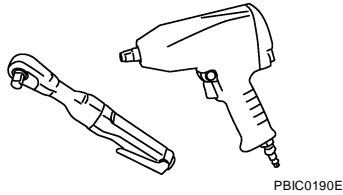
Tool number (Kent-Moore No.) Tool name	Description
<p>— (J-44373) Model 620 Battery/Starting/Charging system tester</p>	<p>Tests batteries, starting and charging systems.</p>
<p>— (J-48087) Battery Service Center</p>	<p>Tests and charges batteries</p>



Commercial Service Tools

EKS001AX

Tool name	Description
<p>Power tool</p>	<p>Loosening bolts and nuts</p>



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BATTERY

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BATTERY

How to Handle Battery

EKS001AY

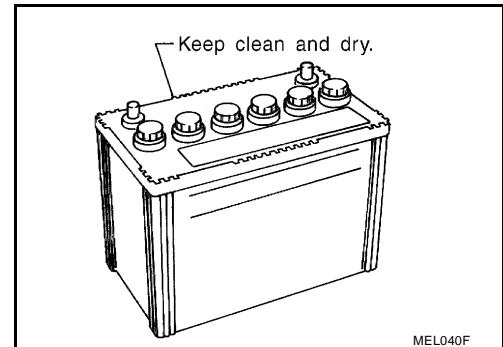
CAUTION:

- 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.

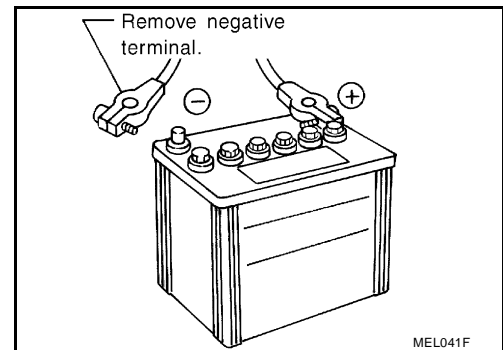
METHODS OF PREVENTING OVER-DISCHARGE

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

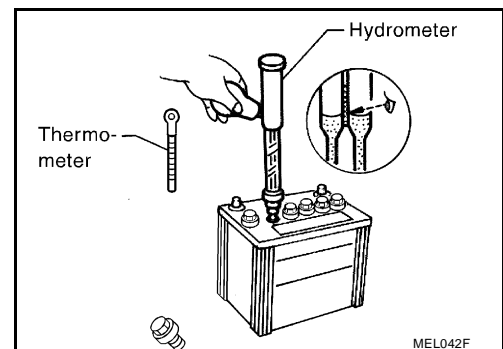
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as "low maintenance" and "maintenance-free".



- 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.



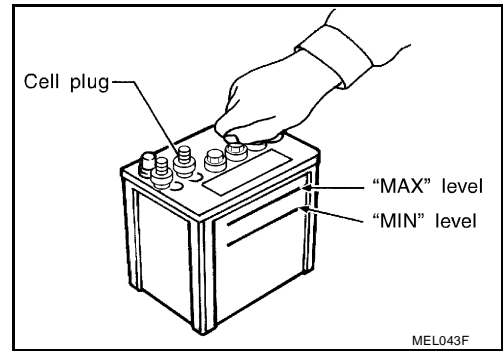
CHECKING ELECTROLYTE LEVEL

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.

BATTERY

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

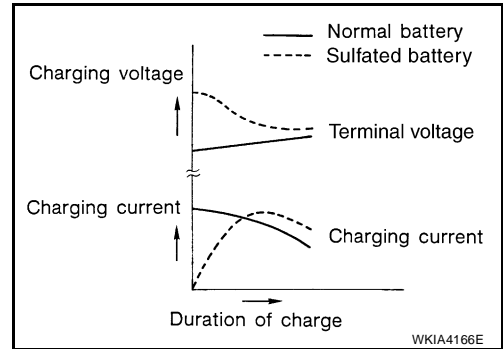


Sulfation

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.

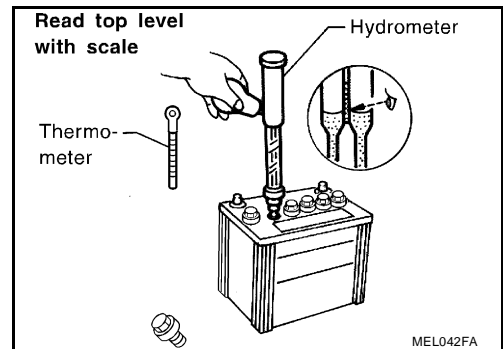
To determine if a battery has been sulfated, note its voltage and current when charging it. Less current and higher voltage are observed in the initial stage of charging sulfated batteries, as shown.

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
-7 (20)	-0.024

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BATTERY

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
-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 Diagnoses with Battery/Starting/Charging System Tester

EKS001AZ

CAUTION:

When working with batteries, always wear appropriate eye protection.

NOTE:

- To ensure a complete and thorough diagnosis, the battery, starter and generator test segments must be done as a set from start to finish.
- If battery surface charge is detected while testing, the tester will prompt you to turn on the headlights to remove the surface charge.
- If necessary, the tester will prompt you to determine if the battery temperature is above or below 0°C (32°F). Choose the appropriate selection by pressing the up or down arrow button, then press “ENTER” to make the selection.

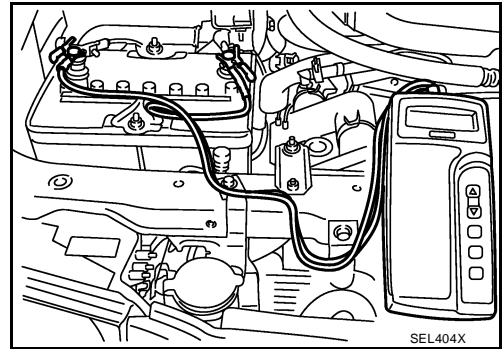
BATTERY

1. Turn off all loads on the vehicle electrical system. Clean or repair as necessary.
2. Visually inspect the battery, battery terminals and cable ends with ignition switch in "OFF" position.

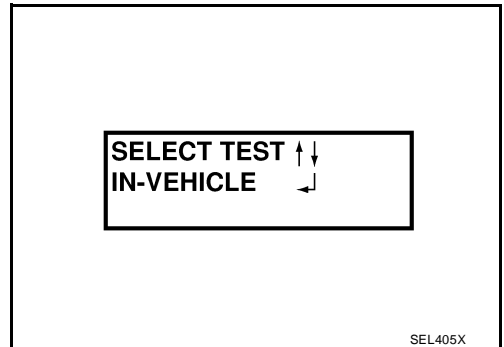
NOTE:

The contact surface between the battery terminals, cable ends and tester leads must be clean for a valid test. A poor connection will prevent testing and a "CHECK CONNECTION" message will appear during the test procedures. If this occurs, clean the battery post and terminals, reconnect them and restart the test.

3. Connect the red tester lead clamp to the positive battery terminal, and the black to the negative terminal.
4. The tester will turn on automatically. Using the arrow keys, select "IN-VEHICLE" on the tester and then press the "ENTER" key.



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5. Locate the battery type and rating stamped or written on the top case of the battery to be tested.

NOTE:

The battery rating will be either of the following:

- **CCA:** Cold Cranking Amps (490 CCA, 550 CCA, etc.)
- **JIS:** Japanese Industrial Standard.

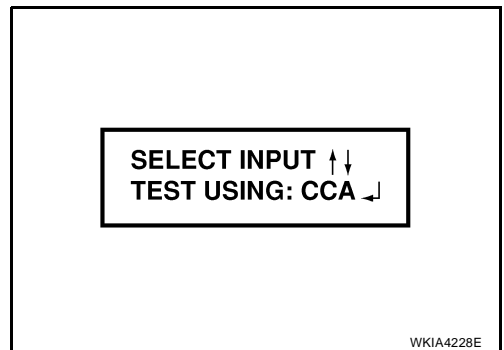
When using the Battery Tester use the CCA rating only.

- The tester requires the CCA rating for the battery be entered exactly as it is written or stamped on the battery.
 - (U.S. market) Refer to the latest "Battery Testing" Technical Service Bulletin (TSB) for a chart which contains these ratings listed by vehicle.
 - You must not use the JIS rating.
6. Using the arrow and "ENTER" keys alternately, select the battery type and rating.

NOTE:

The tester lists five choices; CCA, JIS, IEC, DIN, and EN. Only use CCA.

7. Press "ENTER" to begin the test. Diagnosis results are displayed on the tester. Refer to [SC-8, "DIAGNOSTIC RESULT ITEM CHART"](#).



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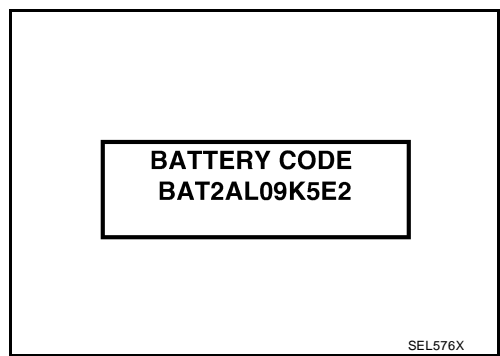
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BATTERY

8. Press "ENTER", then test output code is displayed. Record the test output code on the repair order.
9. Toggle back to the "DIAGNOSTIC SCREEN" for test results.

NOTE:

- If necessary, the tester will ask the user to determine if the battery has just been charged. Choose the appropriate selection by pressing the up or down arrow button and then press the "ENTER" button to make the selection.
- When testing a battery installed in a vehicle that has recently been driven, select "BEFORE CHARGE".
- If the battery has just been slow charged due to a "CHARGE & RETEST" decision by the tester, and the tester asks the user "BEFORE CHARGE/AFTER CHARGE", select "AFTER CHARGE".



DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
GOOD BATTERY	Battery is OK. Refer to SC-26, "Trouble Diagnoses with Battery/Starting/Charging System Tester" .
REPLACE BATTERY	Replace battery. Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. If second test result is "Replace Battery", then do so. Perform battery test again to confirm repair.
BAD CELL-REPLACE	Replace the battery. Perform battery test again with Battery/Starting/Charging system tester to confirm repair.
GOOD-RECHARGE	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester.
CHARGE & RETEST	Perform the slow battery charging. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester to confirm repair. NOTE: If the tester asks the user "BEFORE CHARGE/AFTER CHARGE", select "AFTER CHARGE".

BATTERY

Removal and Installation

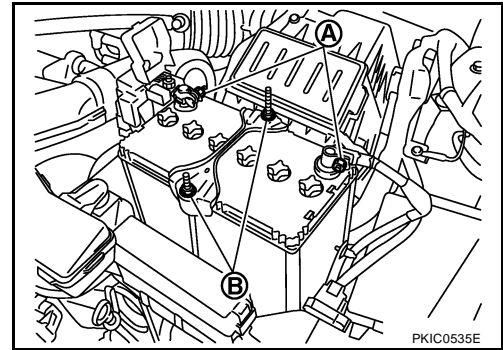
REMOVAL

1. Loosen battery terminal nuts (A), and disconnect both battery cables from battery terminal.

CAUTION:

When disconnecting, disconnect the battery cable from the negative terminal first.

2. Remove battery frame nuts (B) and battery frame.
3. Remove battery shield.
4. Remove battery.



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

When connecting, connect the battery cable to the positive terminal first.

Battery frame nut : 3.9 N·m (0.40 kg-m, 35 in-lb)

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

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STARTING SYSTEM

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STARTING SYSTEM

System Description 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 park/neutral position (PNP) switch terminal 1.

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

- through PNP 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.

STARTING SYSTEM

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.

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CVT MODELS

Power is supplied at all times

B

- 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.

C

With the ignition switch in the START position, power is supplied

- from ignition switch terminal ST
- to IPDM E/R terminal 21.

D

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.

E

Ground is supplied at all times

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

F

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

G

- through terminal 19 of the IPDM E/R
- to terminal S of the starter motor.

H

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.

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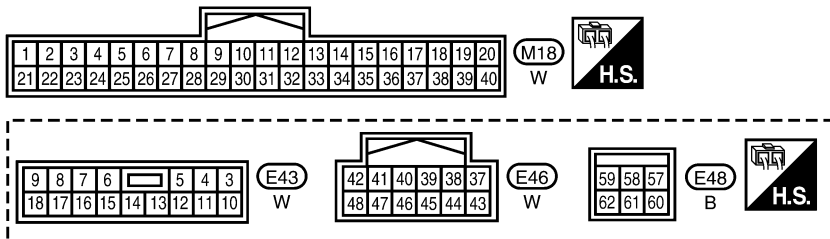
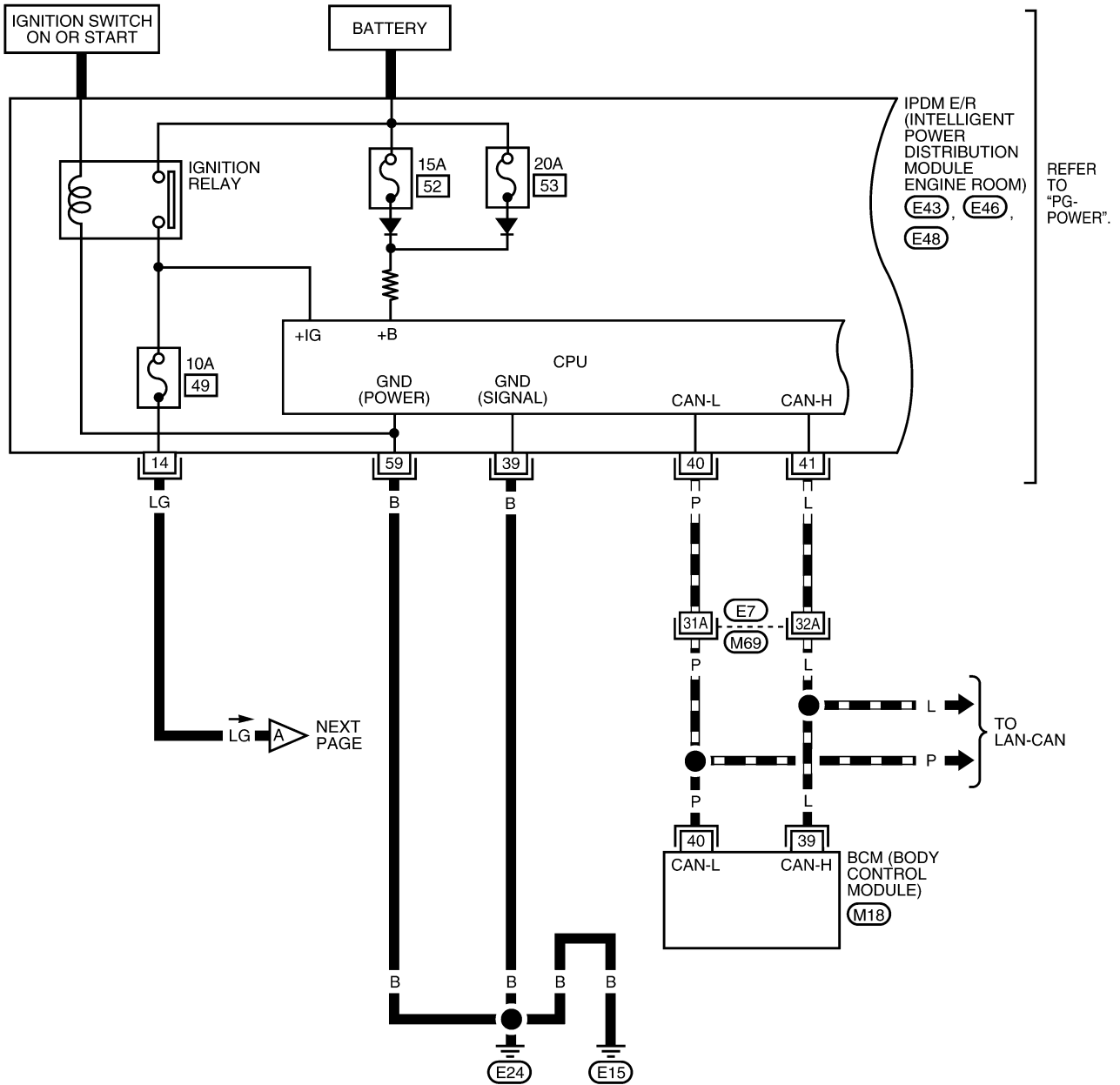
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STARTING SYSTEM

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Wiring Diagram — START — M/T MODELS

SC-START-01

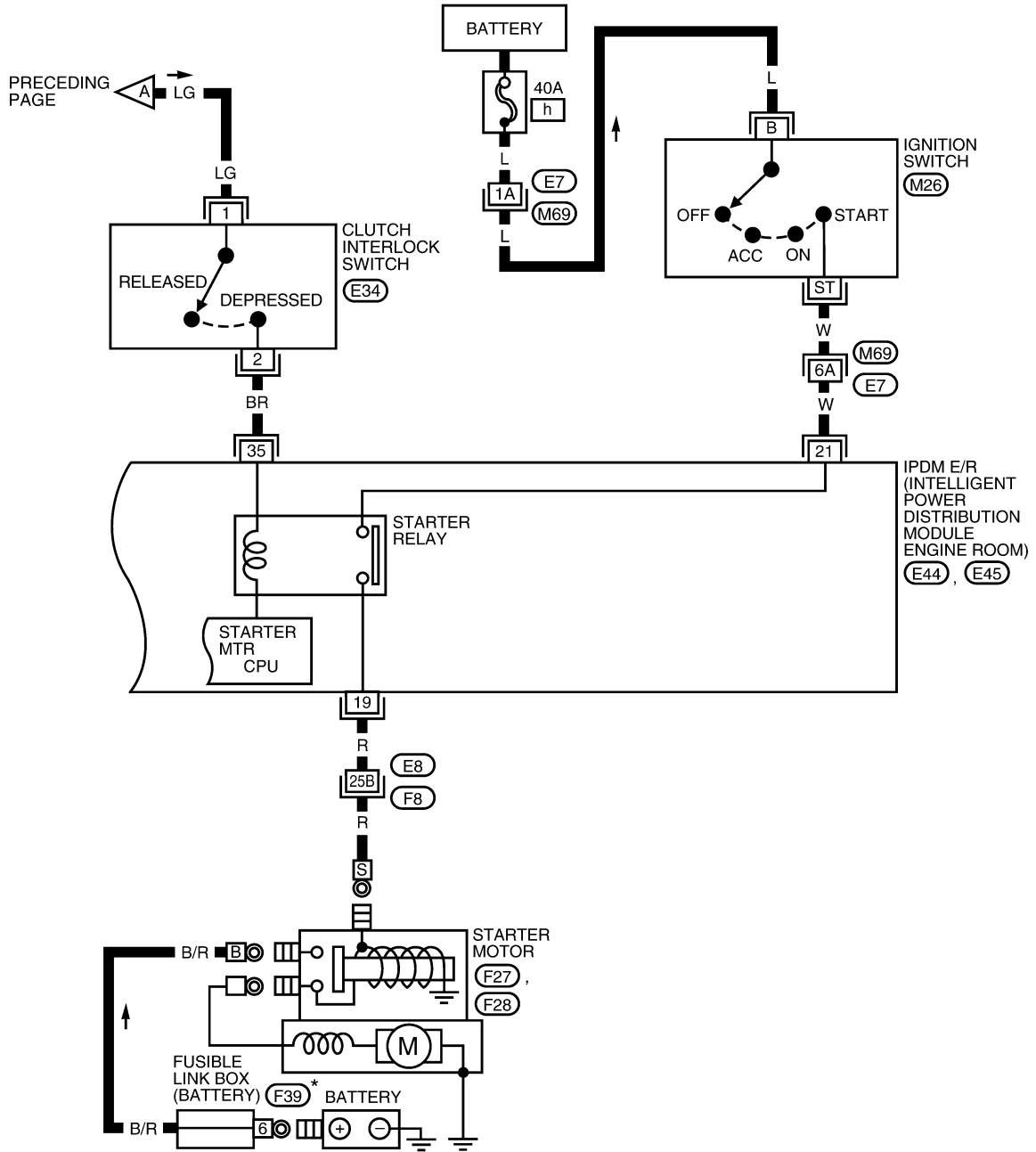


REFER TO THE FOLLOWING.
(M69) - SUPER MULTIPLE JUNCTION (SMJ)

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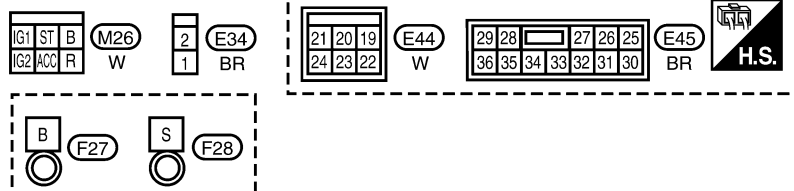
STARTING SYSTEM

SC-START-02



REFER TO "PG-POWER".

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REFER TO THE FOLLOWING.
 (M69), (F8) - SUPER
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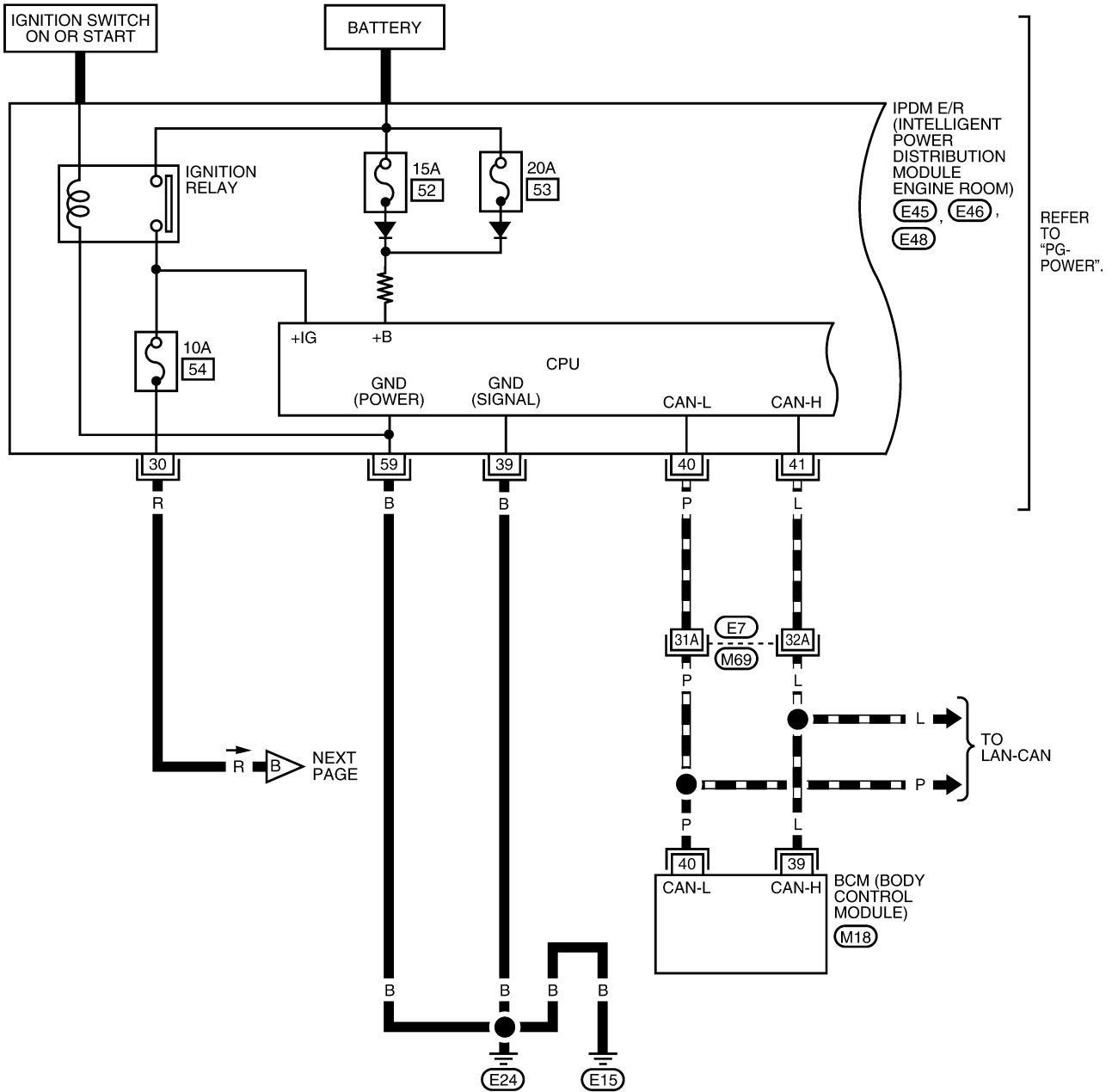
* : (F39) IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

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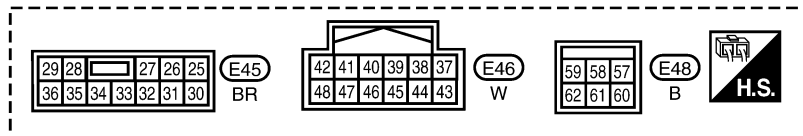
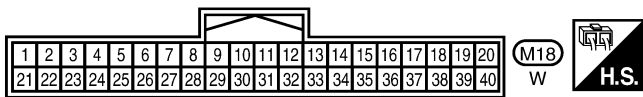
STARTING SYSTEM

A/T MODELS

SC-START-03



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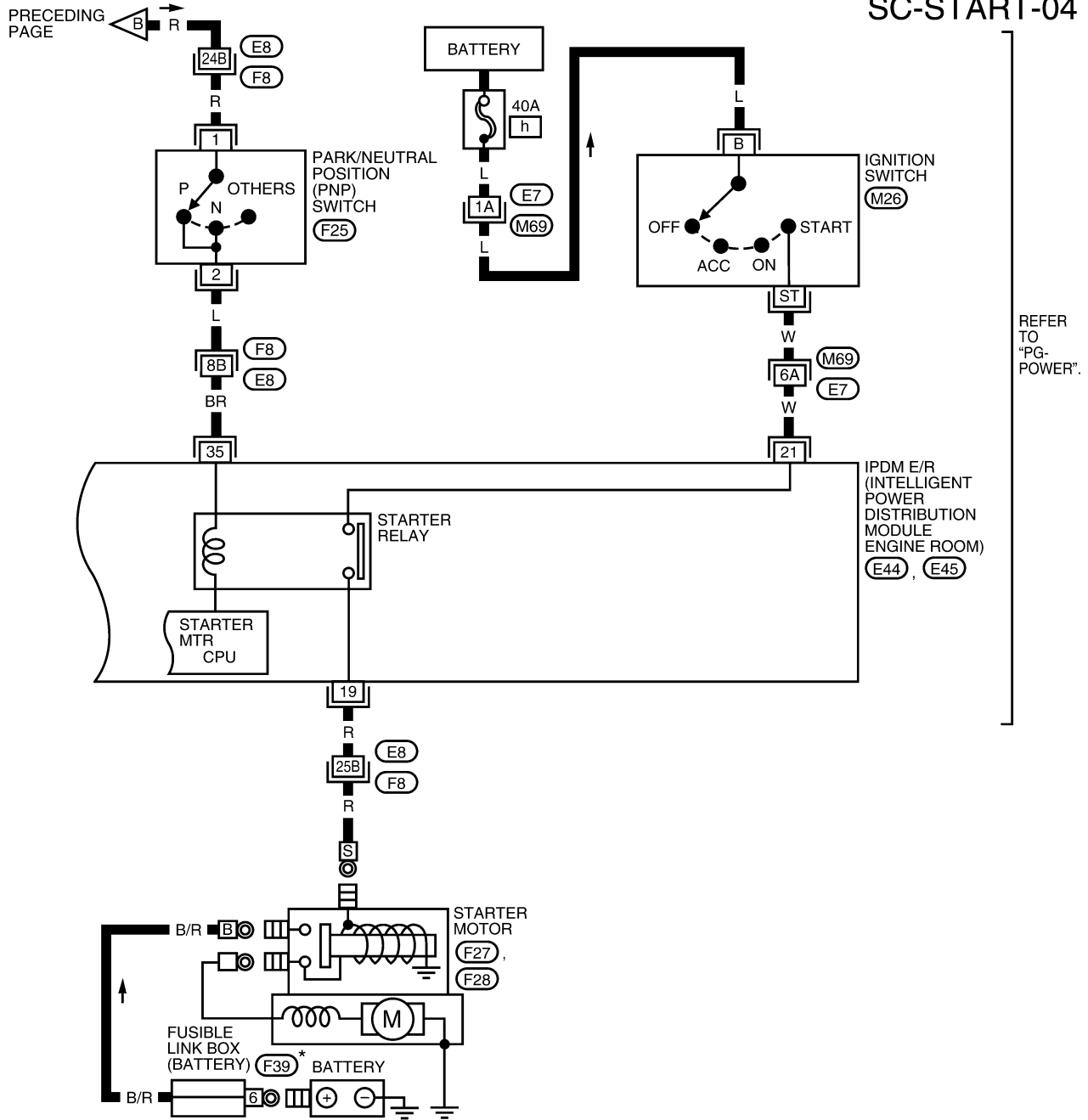


REFER TO THE FOLLOWING.
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

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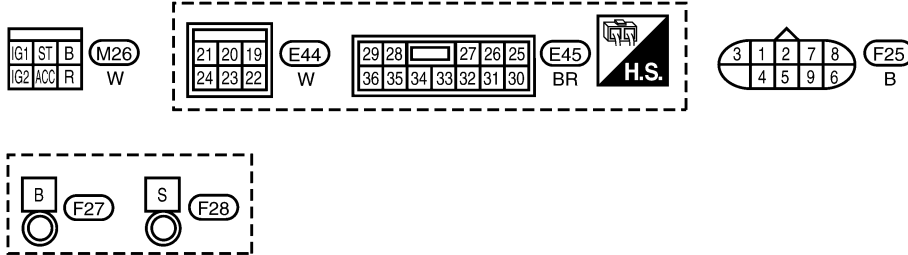
STARTING SYSTEM

SC-START-04



REFER TO "PG-POWER".

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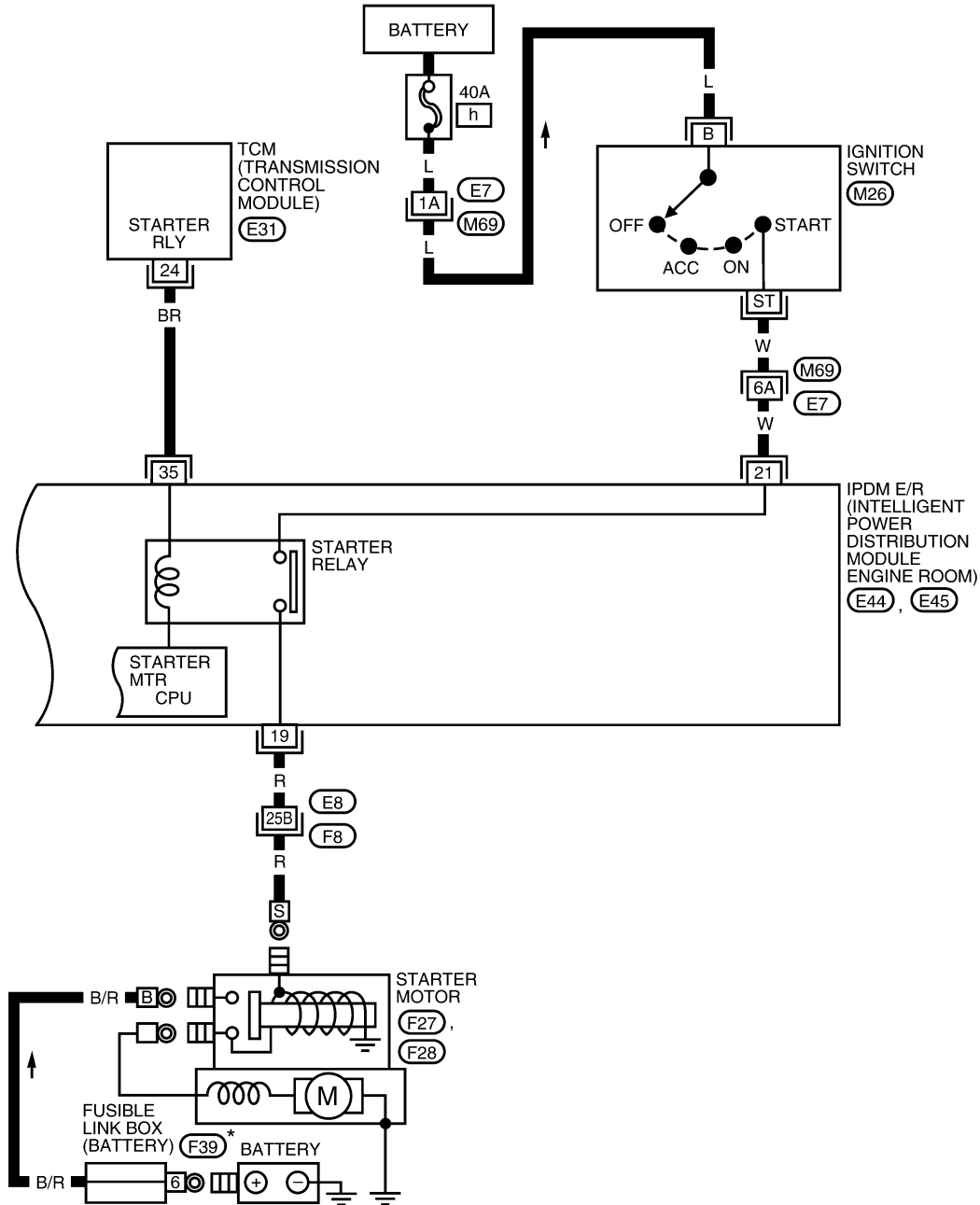
REFER TO THE FOLLOWING.
(M69), (F8) - SUPER MULTIPLE JUNCTION (SMJ)

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

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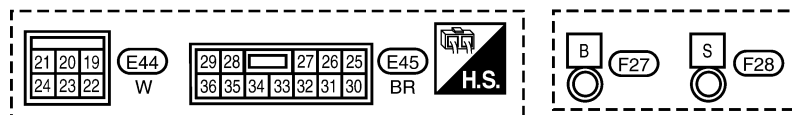
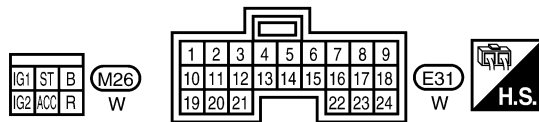
STARTING SYSTEM

SC-START-06



REFER TO "PG-POWER".

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

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

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STARTING SYSTEM

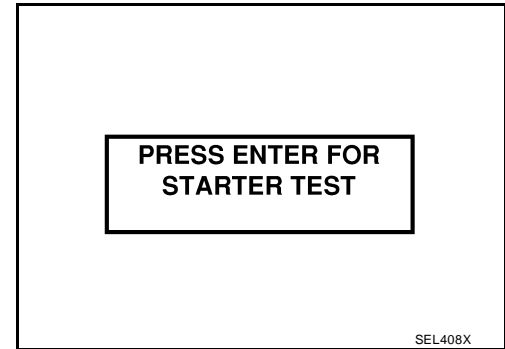
EKS001B2

Trouble Diagnoses with Battery/Starting/Charging System Tester

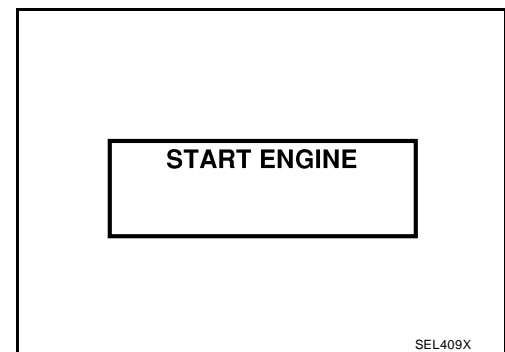
NOTE:

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

1. Turn off all loads on the vehicle electrical system.
2. Perform battery test with Battery/Starting/Charging system tester. Refer to [SC-6, "Trouble Diagnoses with Battery/Starting/Charging System Tester"](#) .
3. Press "ENTER" to begin the starting system test.



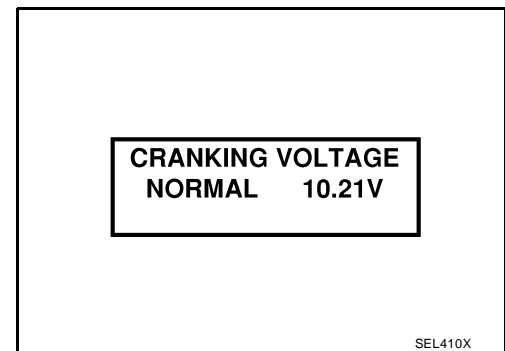
4. Start the engine.



5. Diagnosis result is displayed on the tester. Refer to [SC-18, "DIAGNOSTIC RESULT ITEM CHART"](#) .

NOTE:

- If the starter performs normally but the engine does not start, perform engine diagnosis.
- For intermittent "NO CRANK" or "NO STARTER OPERATION" incidents, refer to [SC-21, "DIAGNOSTIC PROCEDURE 2"](#) .

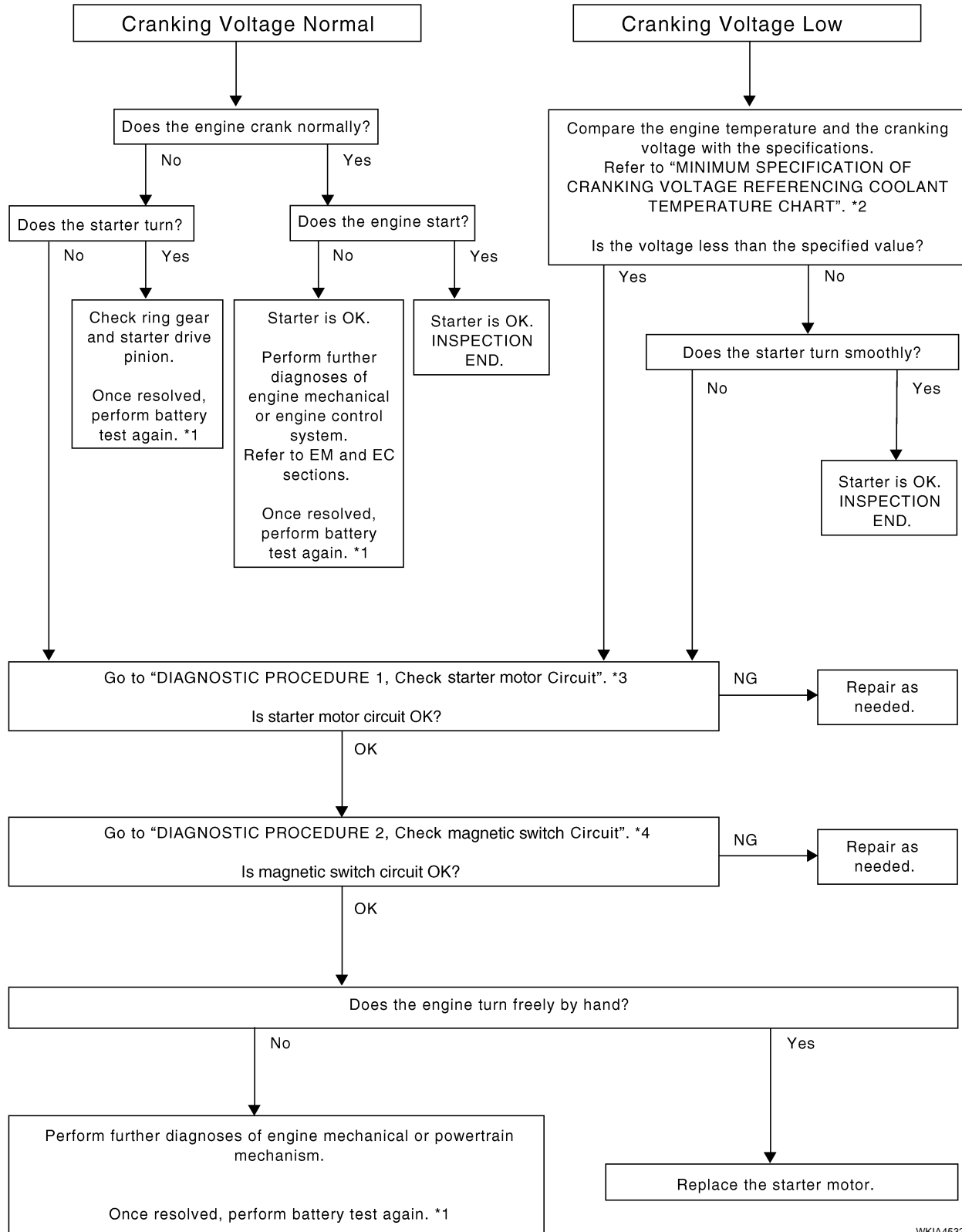


DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
CRANKING VOLTAGE NORMAL	Go to "WORK FLOW", SC-19, "WORK FLOW" .
CRANKING VOLTAGE LOW	
CHARGE BATTERY	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-6, "Trouble Diagnoses with Battery/Starting/Charging System Tester" .
REPLACE BATTERY	Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-6, "Trouble Diagnoses with Battery/Starting/Charging System Tester" . If second test result is "REPLACE BATTERY", then do so. Perform battery test again to confirm repair.

STARTING SYSTEM

WORK FLOW



*1 [SC-6, "Trouble Diagnoses with Battery/Starting/Charging System Tester"](#)

*2 [SC-22, "MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE"](#)

*3 [SC-20, "Check Starter Motor Circuit"](#)

*4 [SC-21, "Check Magnetic Switch Circuit"](#)

WKIA4532E

STARTING SYSTEM

DIAGNOSTIC PROCEDURE 1

Check Starter Motor Circuit

1. CHECK POWER SUPPLY TO STARTER MOTOR

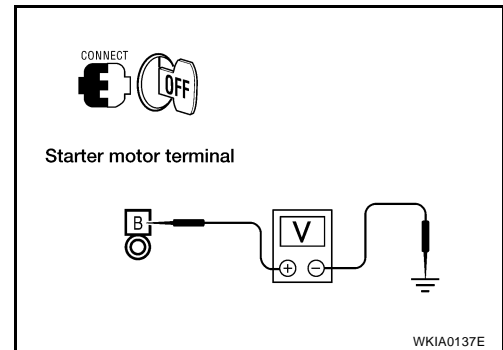
1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Check that the starter motor connector F27 connection is clean and tight.
5. Check voltage between starter motor connector F27 terminal B and ground using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

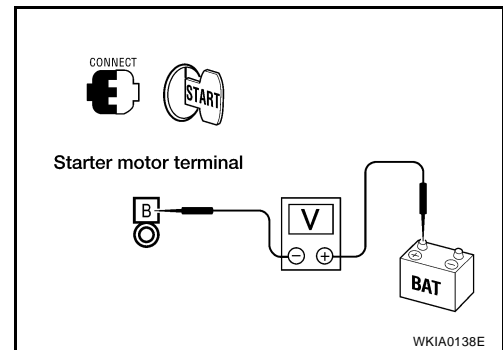
1. Check voltage between starter motor connector F27 terminal B and battery positive terminal using a digital circuit tester.

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

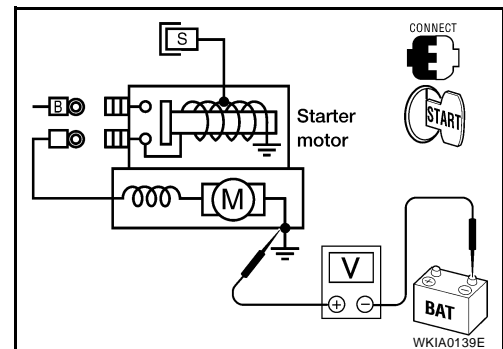
1. Check voltage between starter motor case and battery negative terminal using a digital circuit tester.

Ignition switch in START : Less than 0.2V

OK or NG

OK >> Starter motor ground circuit is OK. Further inspection is necessary. Refer to [SC-19. "WORK FLOW"](#).

NG >> Check harness between the starter motor case and ground for poor continuity.



STARTING SYSTEM

DIAGNOSTIC PROCEDURE 2

Check Magnetic Switch Circuit

1. CHECK POWER SUPPLY TO MAGNETIC SWITCH

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. Disconnect starter motor connector F28.
5. Check voltage between starter motor connector F28 terminal S and ground using a digital circuit tester.

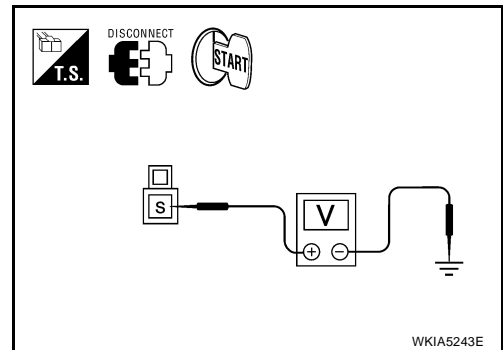
Ignition switch in **START** : Battery voltage

OK or NG

OK >> GO TO 2.

NG >> Check the following:

- 40A fusible link (letter **h** , located in fuse and fusible link box)
- 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)
- PNP 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

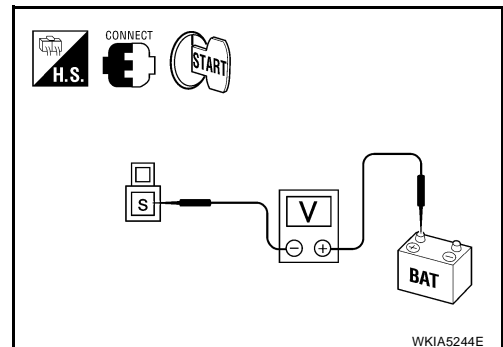
1. Connect starter motor connector F28.
2. Check voltage between starter motor connector F28 terminal S and battery positive terminal using a digital circuit tester.

Ignition switch in **START** : Less than 1V

OK or NG

OK >> Magnetic switch circuit is OK. Further inspection is necessary. Refer to [SC-19, "WORK FLOW"](#) .

NG >> Check harness, components and connections between the battery and the magnetic switch for poor continuity.



STARTING SYSTEM

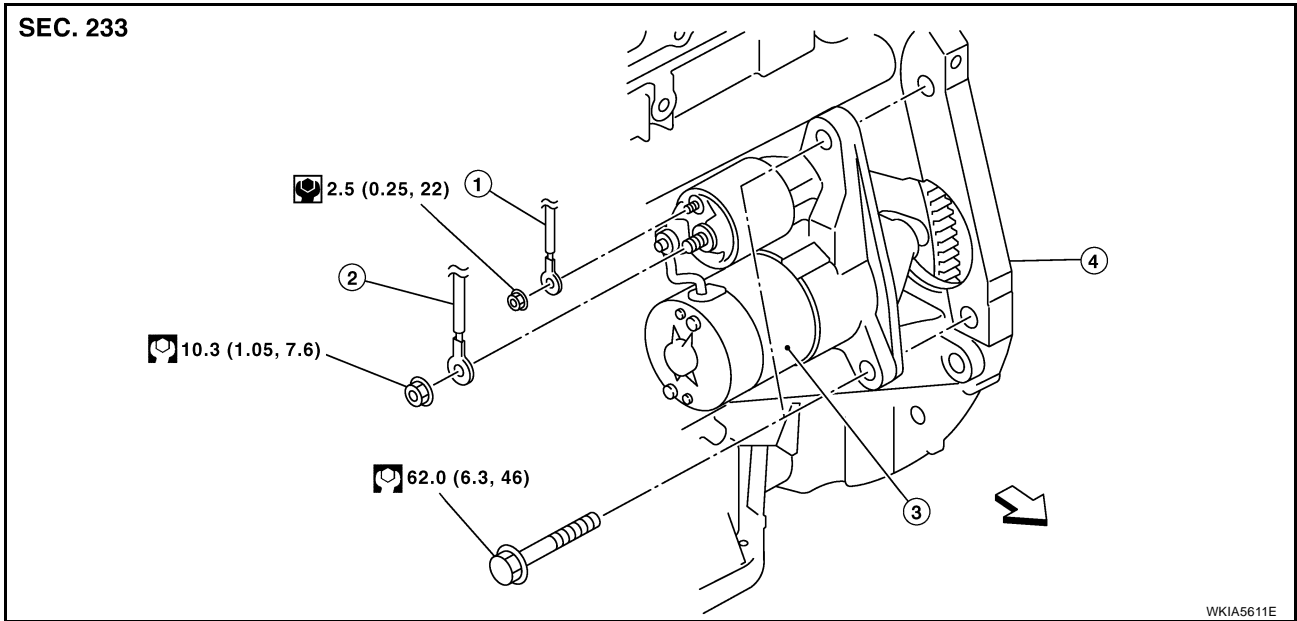
MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE

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

STARTING SYSTEM

Removal and Installation

EKS00HUY



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

REMOVAL

1. Disconnect the battery negative terminal.
2. Remove air duct (inlet). Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#) .
3. Remove reservoir tank. Refer to [CO-11, "RADIATOR"](#) .
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.

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CHARGING SYSTEM

CHARGING SYSTEM

PFP:23100

System Description

EKS001B3

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.

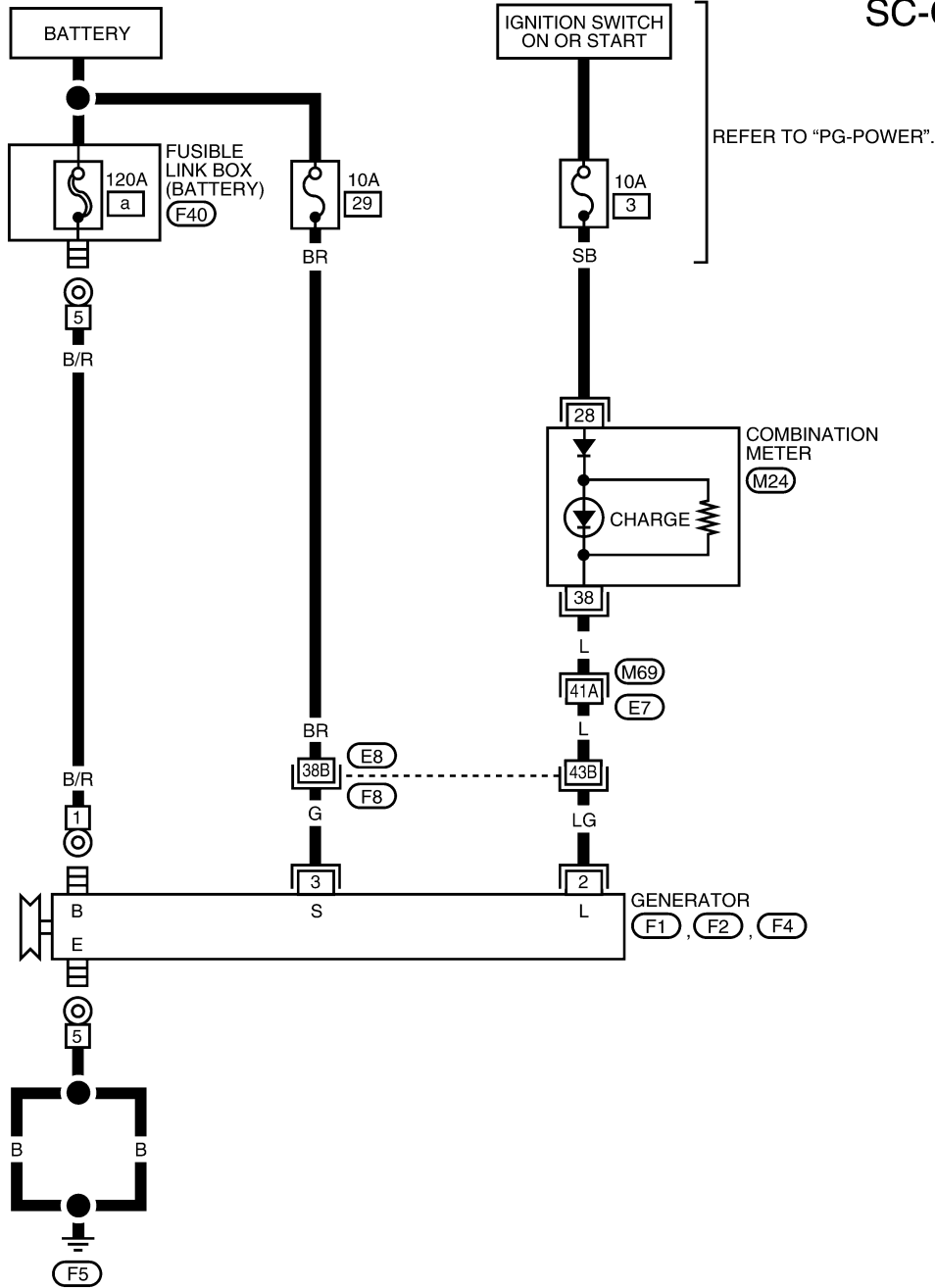
If the charge warning lamp illuminates with the engine running, a malfunction is indicated.

CHARGING SYSTEM

Wiring Diagram — CHARGE —

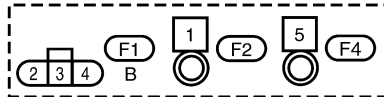
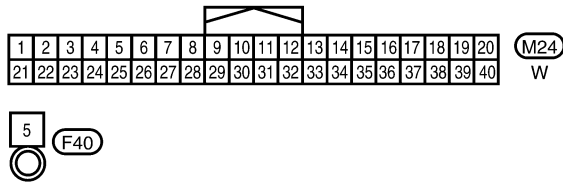
EKS001B4

SC-CHARGE-01



REFER TO "PG-POWER".

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

WKWA4970E

CHARGING SYSTEM

EKS001B5

Trouble Diagnoses with Battery/Starting/Charging System Tester

NOTE:

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

1. Turn off all loads on the vehicle electrical system.
2. Perform battery and starting system test with Battery/Starting/Charging system tester.
3. Press "ENTER" to begin the charging system test.
4. Start engine.



PRESS ENTER FOR
CHARGING TEST

SEL417X

5. Press "ENTER" until "LOADS OFF REV ENGINE 5 SEC" is displayed.
6. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return the engine to idle. Once the increase in engine rpm is detected, press "ENTER" to continue.



LOADS OFF
REV ENGINE 5 SEC

SEL418X

NOTE:

- If after 30 seconds an increase in engine idle speed is not detected, "RPM NOT DETECTED" will display.
- Some engines may have a higher idle initially after starting, particularly when the engine is cold. The tester may detect this without any other action being taken. If this occurs, continue on with the testing process. The final results will not be affected.

7. The tester now checks the engine at idle and performs the DIODE/RIPPLE check.
8. When complete, the tester will prompt you to turn on the following electrical loads.
 - Heater fan set to highest speed. Do not run the A/C or windshield defroster.
 - Headlamp high beam
 - Rear window defogger



*** TESTING ***
ENGINE AT IDLE



*** TESTING ***
DIODE/RIPPLE

SEL419X

NOTE:

Do not run the windshield wipers or any other cyclical loads.

9. Press "ENTER" to continue.



TURN LOADS ON
ENTER TO CONT...

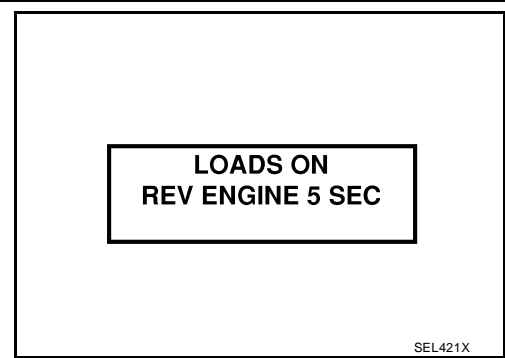
SEL420X

CHARGING SYSTEM

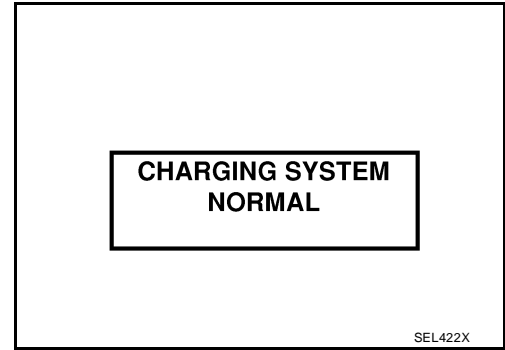
10. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return the engine to idle. Once the increase in engine rpm is detected, press "ENTER" to continue.

NOTE:

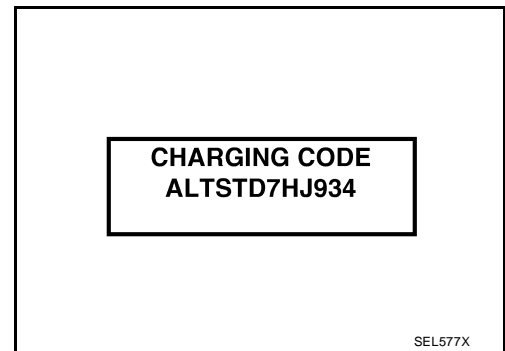
If after 30 seconds an increase in engine idle speed is not detected, "RPM NOT DETECTED" will be displayed. Press "ENTER" to restart the test.



11. Diagnostic result is displayed on the tester. Refer to [SC-27, "DIAGNOSTIC RESULT ITEM CHART"](#).



12. Press "ENTER" then test output code is displayed. Record the test output code on the repair order.
 13. Toggle back to the "DIAGNOSTIC SCREEN" for test results.

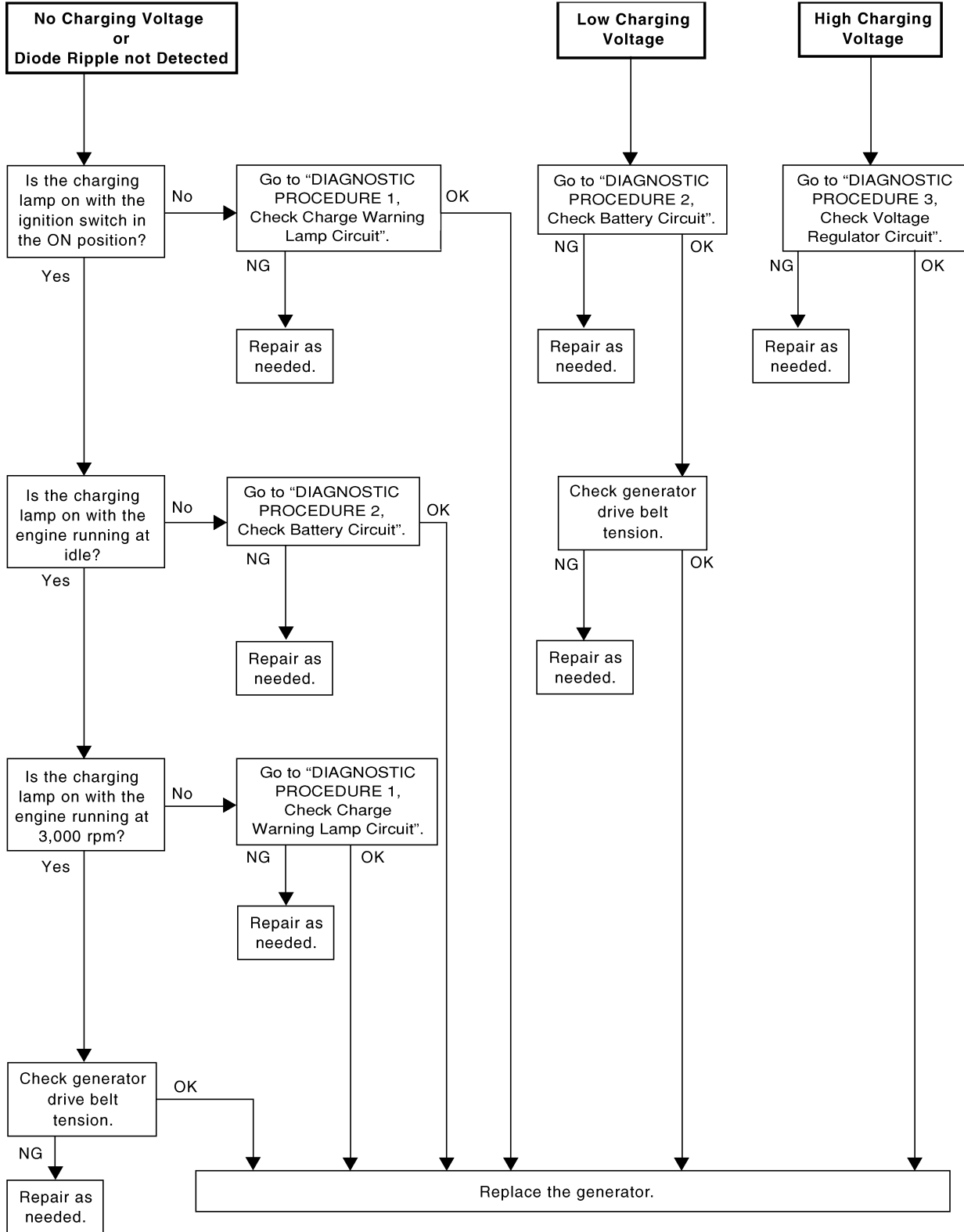


DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
CHARGING SYSTEM NORMAL	Charging system is normal and will also show DIODE RIPPLE test result.
NO CHARGING VOLTAGE	Go to SC-28, "WORK FLOW" .
LOW CHARGING VOLTAGE	
HIGH CHARGING VOLTAGE	
DIODE RIPPLE NORMAL	Diode ripple is OK and will also show CHARGING VOLTAGE test result.
EXCESS RIPPLE DETECTED	Replace the generator. Perform "DIODE RIPPLE" test again using Battery/Starting/Charging system tester to confirm repair.
DIODE RIPPLE NOT DETECTED	Go to SC-28, "WORK FLOW" .

CHARGING SYSTEM

WORK FLOW



WKIA4022E

CHARGING SYSTEM

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 Battery/Starting/Charging system test.

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.

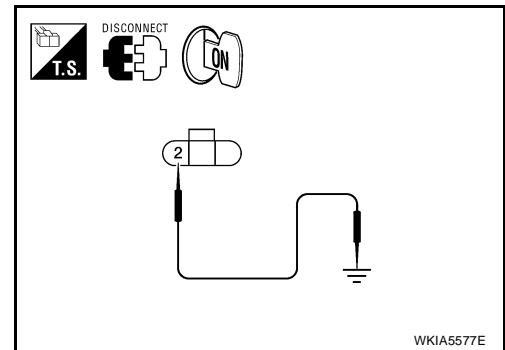
CHARGE lamp should light up.

OK or NG

OK >> GO TO [SC-28, "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



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CHARGING SYSTEM

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 Battery/Starting/Charging system test.

2. CHECK BATTERY CIRCUIT

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

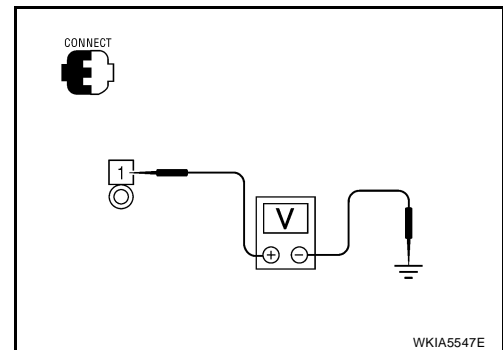
Battery voltage should exist.

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

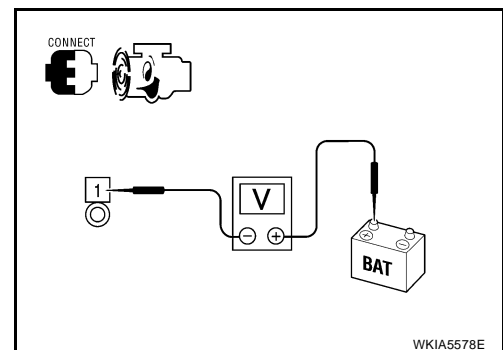
Check voltage between generator connector F2 terminal 1 and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Replace the generator. Refer to [SC-32, "Removal and Installation"](#) . Confirm repair by performing complete Battery/Starting/Charging system test.

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



CHARGING SYSTEM

DIAGNOSTIC PROCEDURE 3

Check Voltage Regulator Circuit

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 Battery/Starting/Charging system test.

2. CHECK VOLTAGE REGULATOR CIRCUIT

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

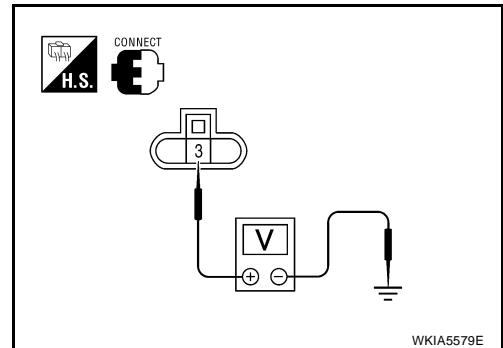
Battery voltage should exist.

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

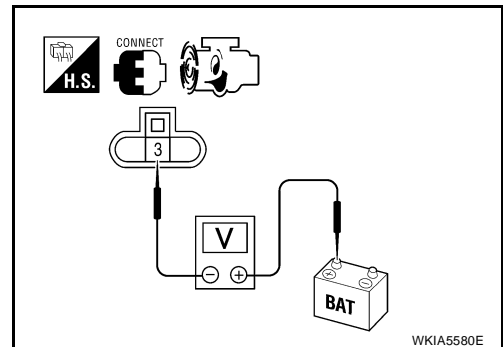
Check voltage between generator connector F1 terminal 3 and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Replace the generator. Refer to [SC-32, "Removal and Installation"](#) . Confirm repair by performing complete Battery/Starting/Charging system test.

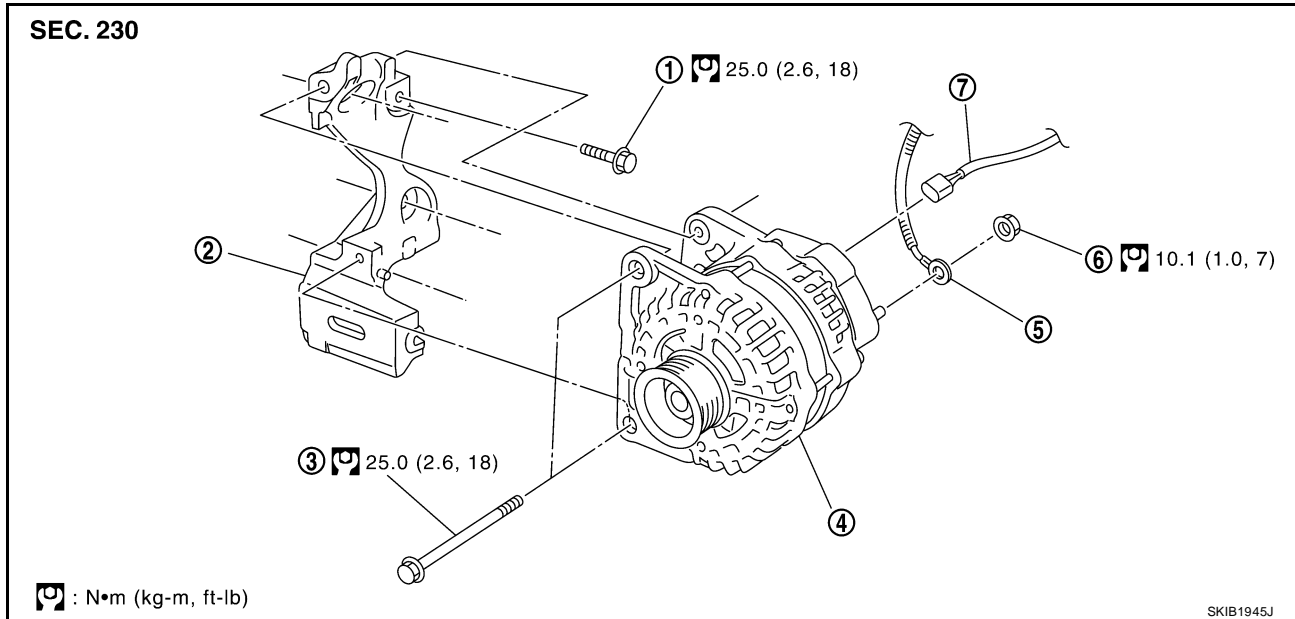
NG >> Check harness between the battery and the generator for poor continuity.



CHARGING SYSTEM

Removal and Installation

EKS00HV3



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

REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove drive belt. Refer to [EM-13, "Components"](#).
3. Disconnect alternator connector.
4. Remove "B" terminal nut.
5. Remove alternator bolts.
6. Remove alternator 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 DATA AND SPECIFICATIONS (SDS)

PF0:00030

Battery

EKS00HV5

	NAM M/T, A/T	USA/CAN CVT
Type	TR4	Gr.51 R
20 hours rate capacity	12 V - 47 AH	12 V - 47 AH
Cold Cranking Amps. (CCA)	470	470

Starter

EKS00HV6

Type	S114 - 901	
	HITACHI make	
	Reduction gear type	
System voltage	12 V	
No-load	Terminal voltage	11 V
	Current	Less than 110 A
	Revolution	More than 3,000 rpm
Minimum diameter of commutator	28.0 mm (1.102 in)	
Minimum length of brush	10.5 mm (0.413 in)	
Brush spring tension	16.2 N (1.65 kg, 3.64 lb)	
Clearance between bearing metal and armature shaft	Less than 0.2 mm (0.008 in)	
Movement "L" in height of pinion assembly	0.3 - 2.5 mm (0.012 - 0.098 in)	

Alternator

EKS00HV7

Type	LR1140 - 803	
	MITSUBISHI make	
Nominal rating	12 V - 140 A	
Ground polarity	Negative	
Minimum revolution under no-load (when 13.5 V is applied)	Less than 1,200 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	
Regulated output voltage	14.1 - 14.7 V	
Minimum length of brush	More than 6.00 mm (0.236 in)	
Brush spring pressure	1.1 - 3.7 N (112 - 378 g, 4.00 - 13.3 oz)	
Slip ring minimum outer diameter	More than 14.7 mm (0.579 in)	
Rotor (field coil) resistance	1.61 - 1.91 Ω	

SERVICE DATA AND SPECIFICATIONS (SDS)
