

# SECTION **SC**

## STARTING & CHARGING SYSTEM

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# PRECAUTIONS

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## PRECAUTIONS

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

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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

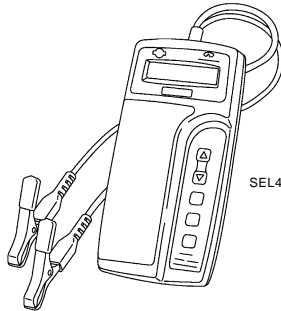
EKS001AW

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
— (J-48087) Battery Service Center	Tests batteries. For instructions, refer to Technical Service Bulletin and Battery Service Center User Guide.
— (J-44373) Model 620 Starting/Charging System Tester	Tests starting and charging system. For operating instructions, refer to Technical Service Bulletin.



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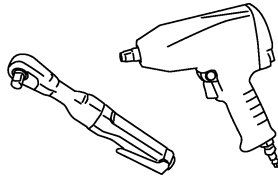


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### Commercial Service Tools

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Tool name	Description
Power tool	Loosening bolts and nuts



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# BATTERY

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## BATTERY

### How to Handle Battery

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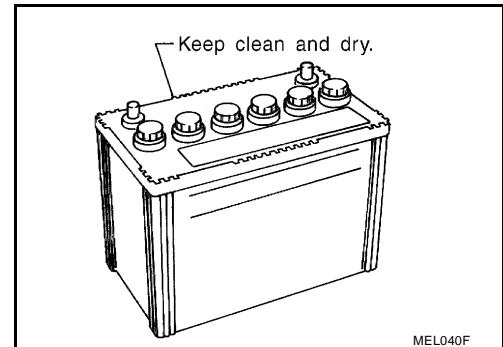
#### CAUTION:

- 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.

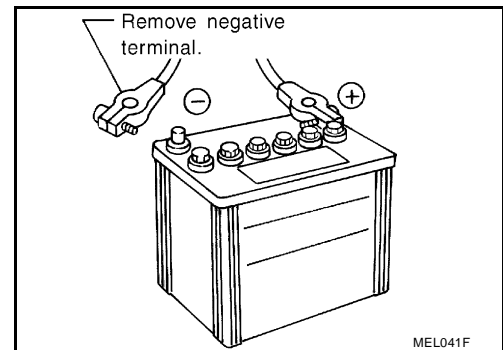
#### METHODS OF PREVENTING OVER-DISCHARGE

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

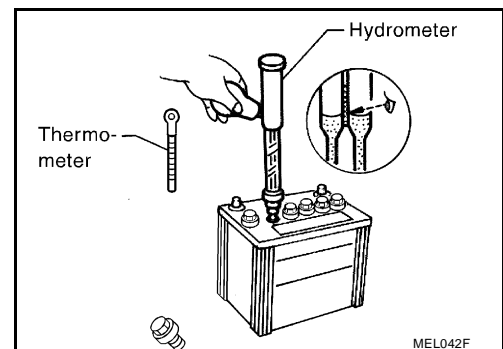
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as "low maintenance" and "maintenance-free".



- 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.



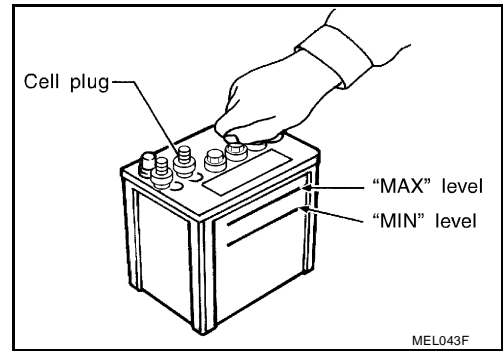
#### CHECKING ELECTROLYTE LEVEL

#### 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.

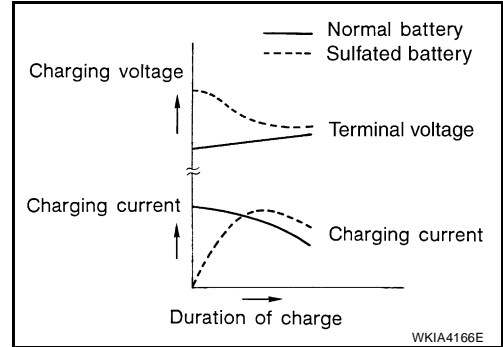


## Sulfation

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.

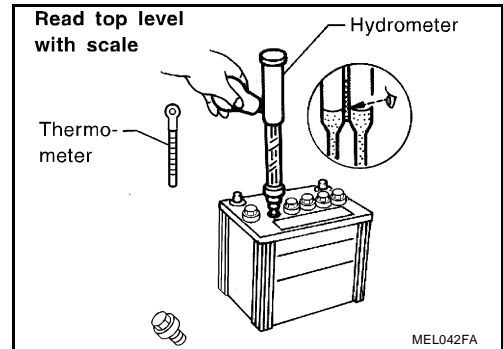
To determine if a battery has been sulfated, note its voltage and current when charging it. Less current and higher voltage are observed in the initial stage of charging sulfated batteries, as shown.

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 Service Center

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For battery testing, use Battery Service Center (J-48087). For details and operating instructions, refer to Technical Service Bulletin and/or Battery Service Center User Guide.

# BATTERY

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## Removal and Installation

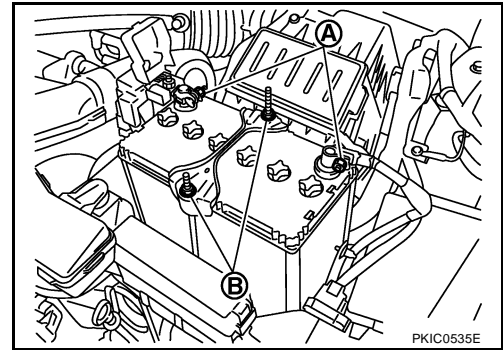
### REMOVAL

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.

A

## 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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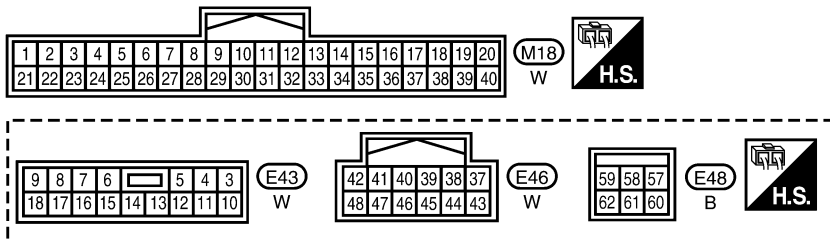
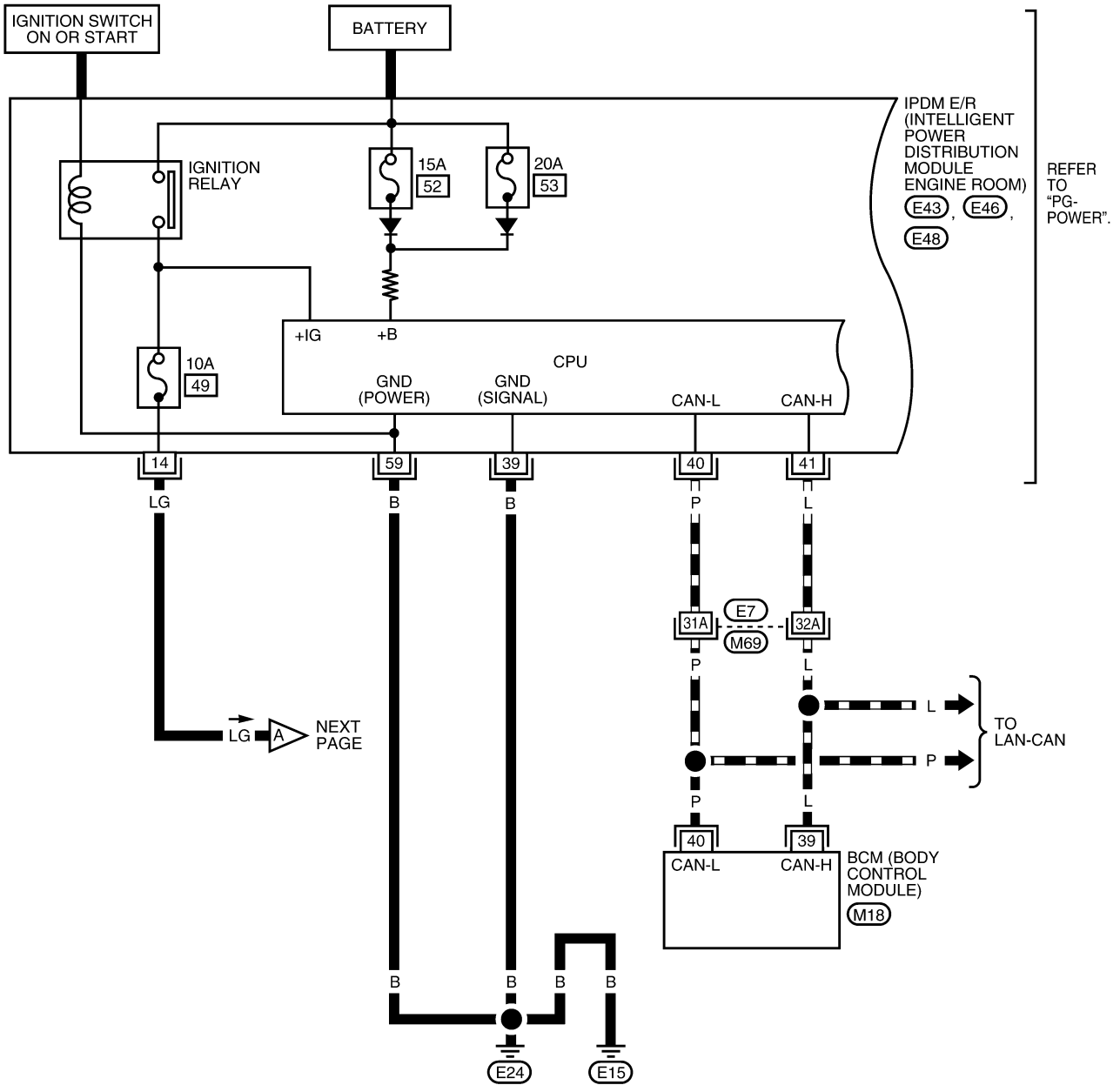
M

# STARTING SYSTEM

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## Wiring Diagram — START — M/T MODELS

## SC-START-01

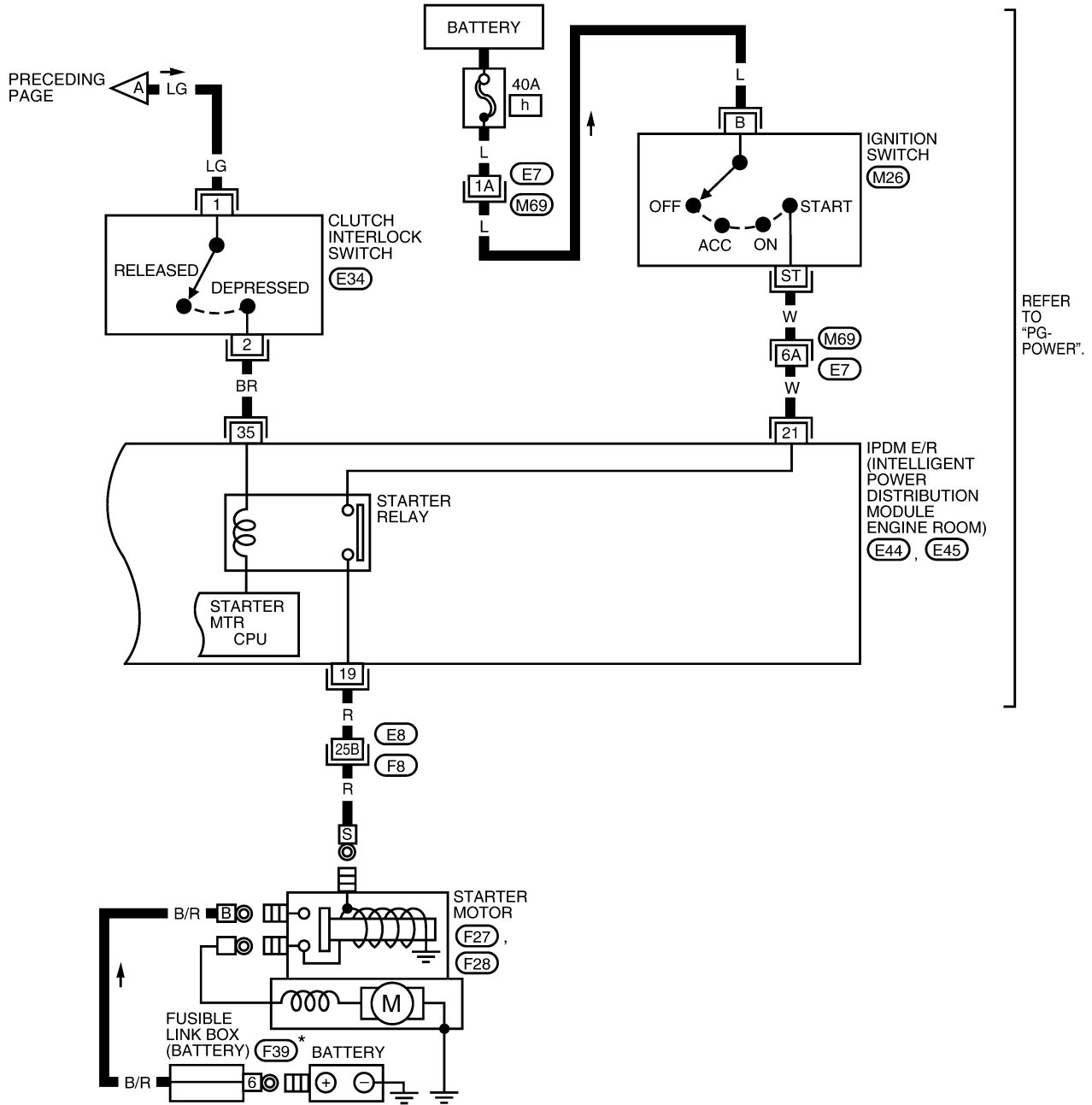


REFER TO THE FOLLOWING.  
(M69) - SUPER MULTIPLE JUNCTION (SMJ)

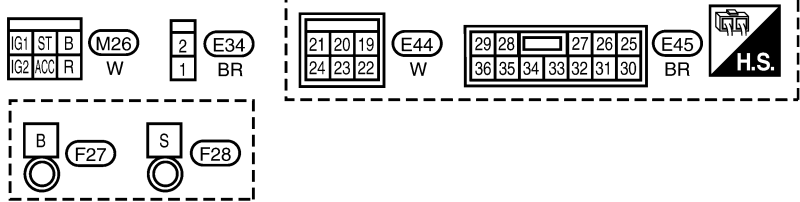
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# STARTING SYSTEM

SC-START-02



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

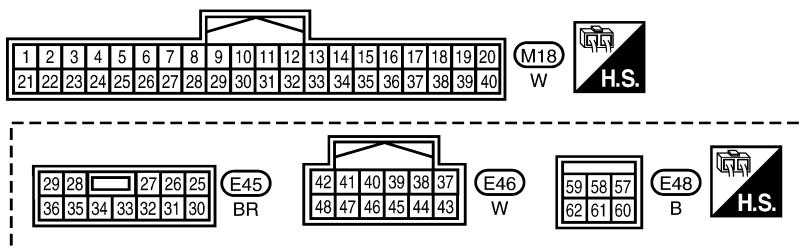
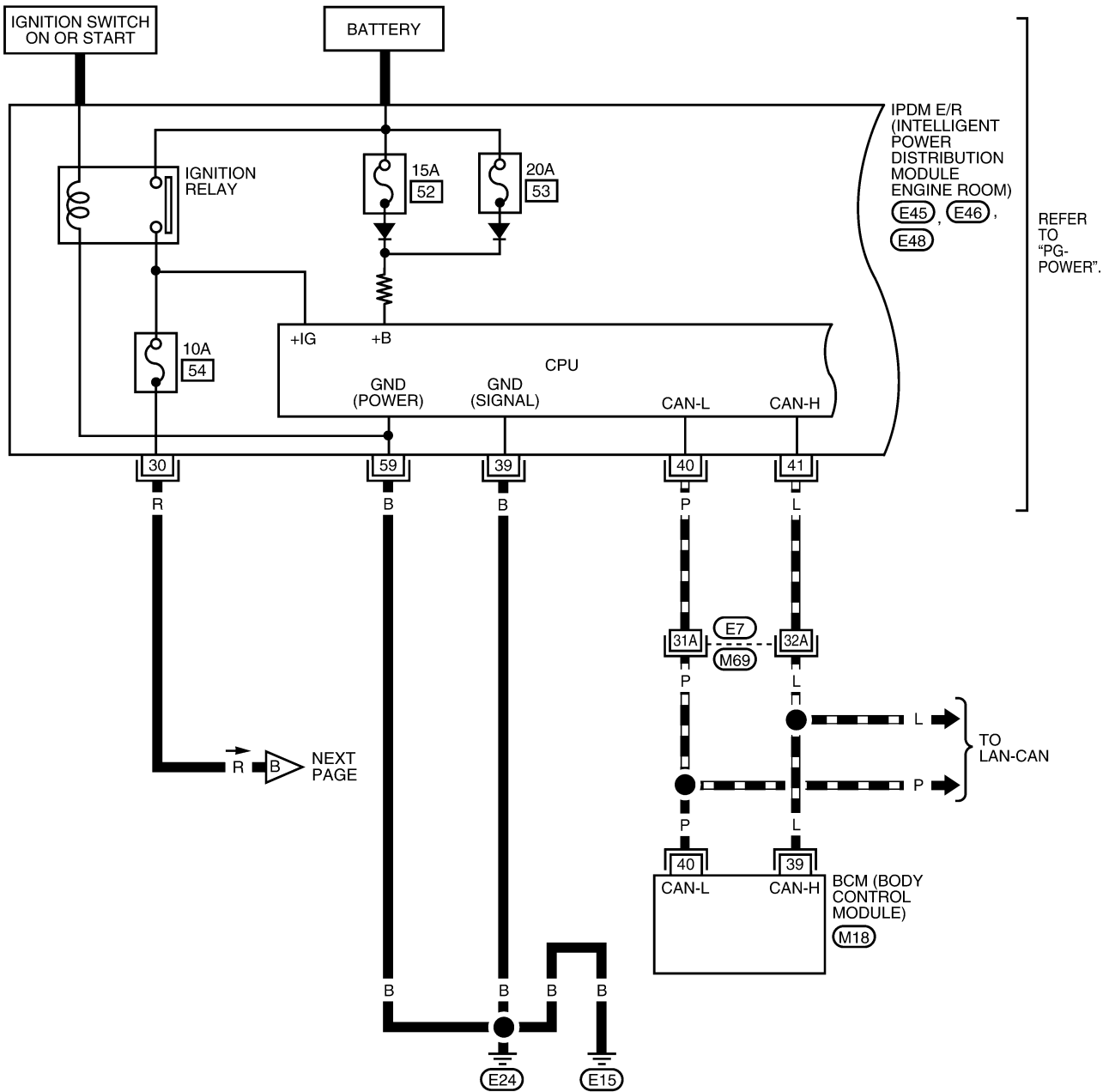
\* : (F39) IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

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# STARTING SYSTEM

A/T MODELS

SC-START-03

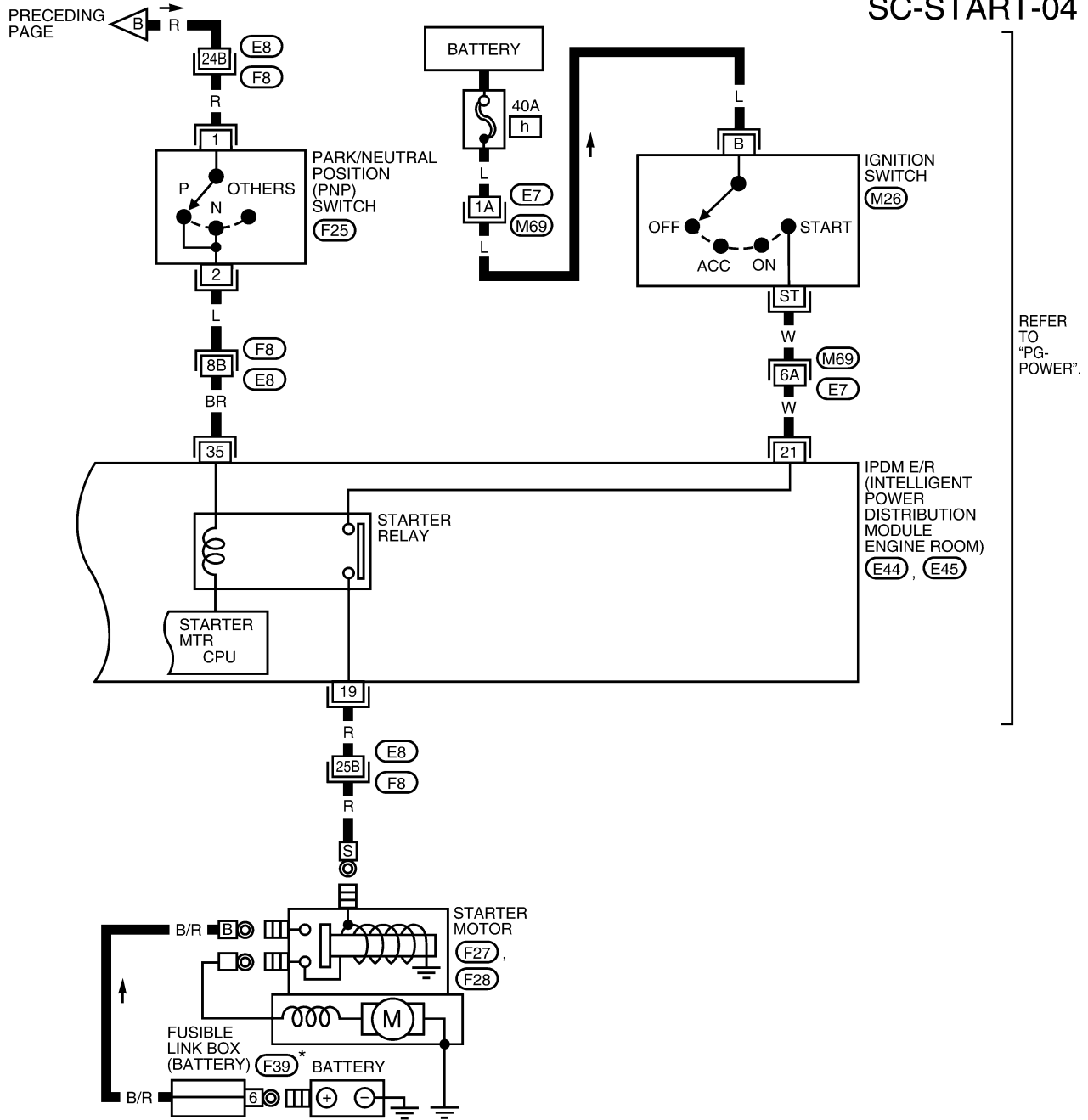


REFER TO THE FOLLOWING.  
 (M69) - SUPER MULTIPLE JUNCTION (SMJ)

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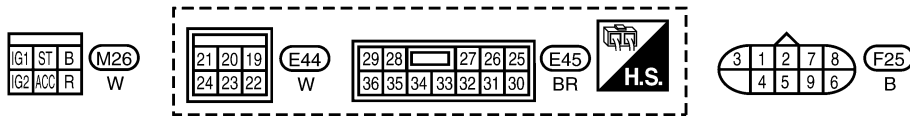
# STARTING SYSTEM

SC-START-04



REFER TO "PG-POWER".

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

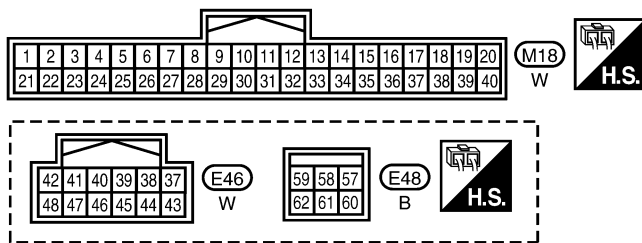
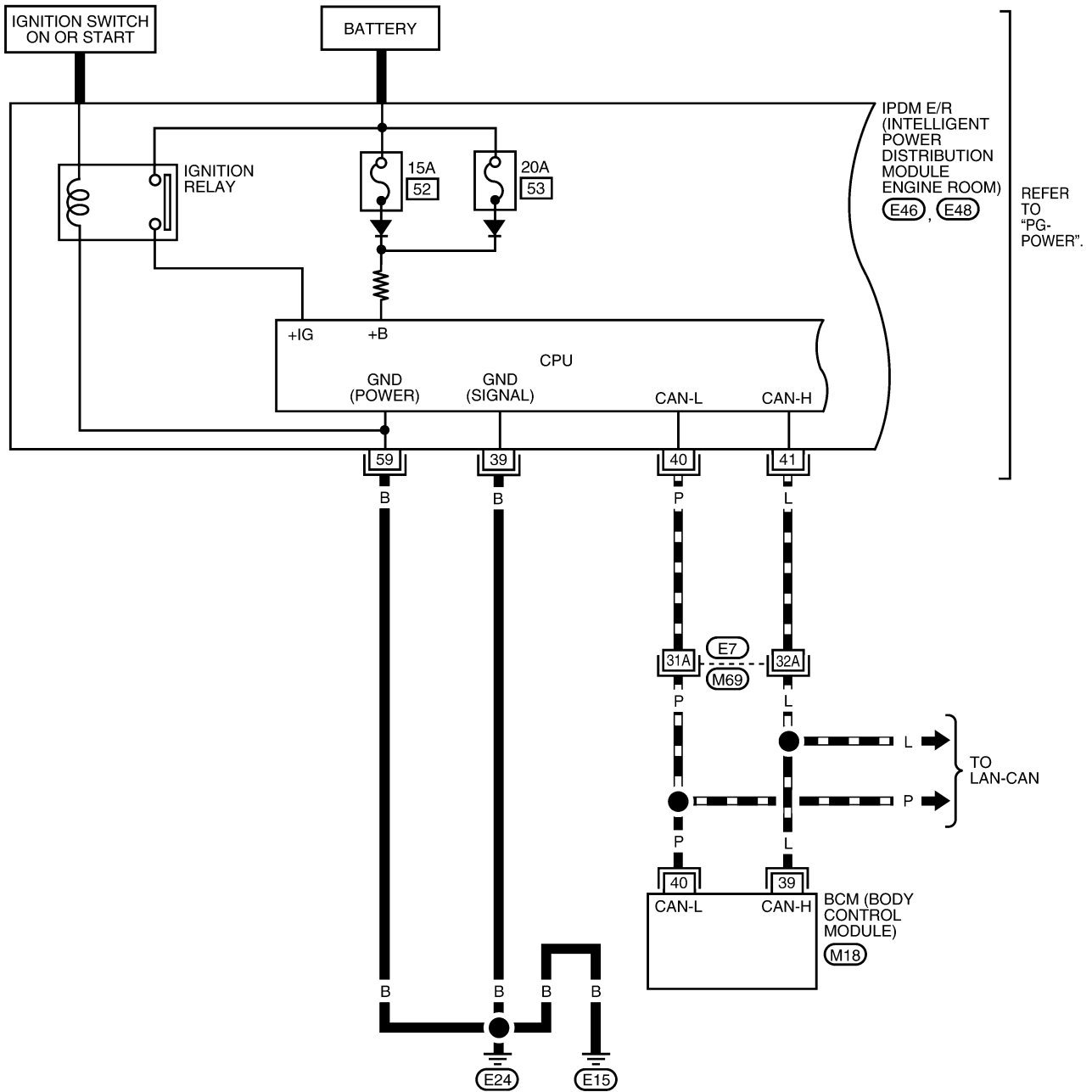
\* : (F39) IS AN INTEGRAL PART OF FUSIBLE LINK BOX (BATTERY) ASSEMBLY

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# STARTING SYSTEM

CVT MODELS

SC-START-05

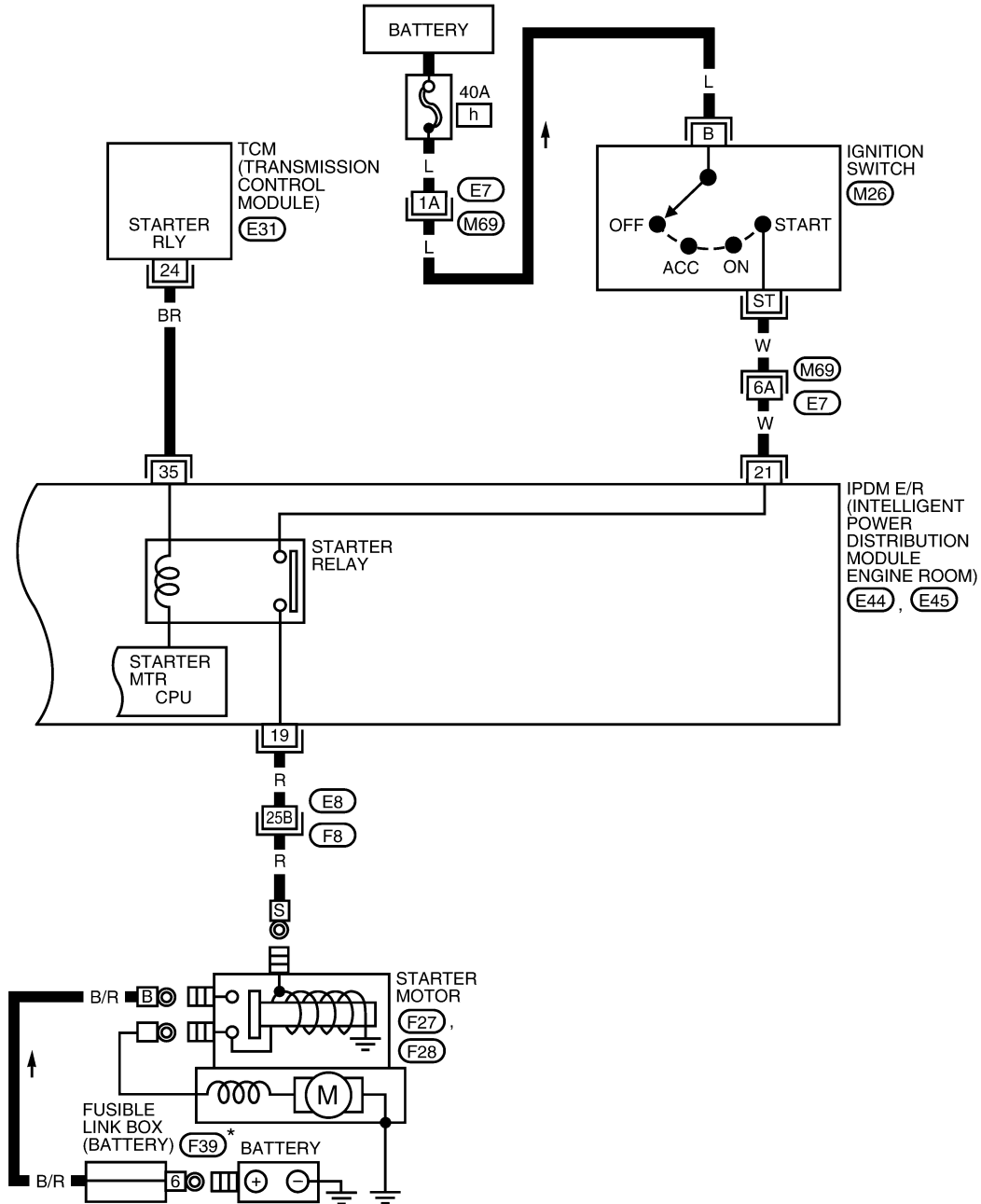


REFER TO THE FOLLOWING.  
 [M69] - SUPER MULTIPLE JUNCTION (SMJ)

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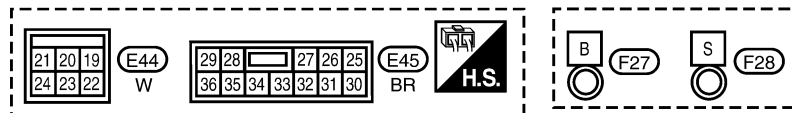
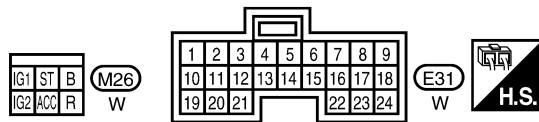
# STARTING SYSTEM

SC-START-06



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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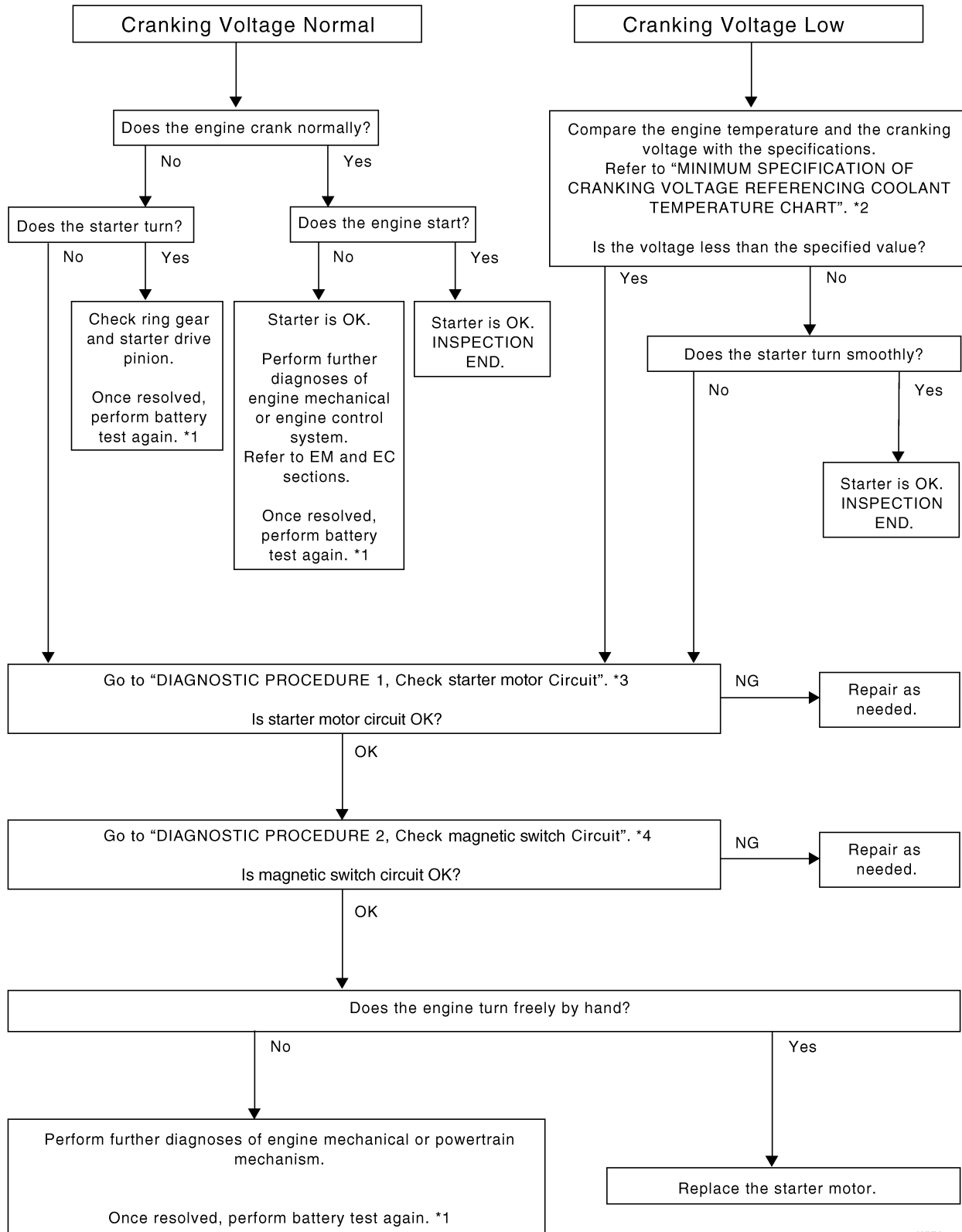
# STARTING SYSTEM

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## Trouble Diagnoses with Starting/Charging System Tester

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

### WORK FLOW



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# STARTING SYSTEM

\*1 For battery testing, use Battery Service Center (J-48087). For details and operating instructions, refer to Technical Service Bulletin and/or Battery Service Center User Guide.

\*2 [SC-19, "MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCE COOLANT TEMPERATURE"](#)

\*3 [SC-17, "Check Starter Motor Circuit"](#)

\*4 [SC-18, "Check Magnetic Switch Circuit"](#)

## DIAGNOSTIC PROCEDURE 1 Check Starter Motor Circuit

### 1. CHECK POWER SUPPLY TO STARTER MOTOR

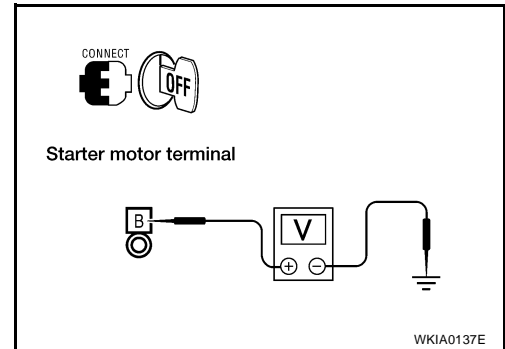
1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Check that the starter motor connector F27 connection is clean and tight.
5. Check voltage between starter motor connector F27 terminal B and ground using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

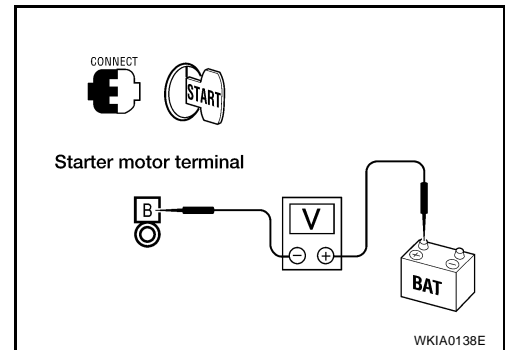
1. Check voltage between starter motor connector F27 terminal B and battery positive terminal using a digital circuit tester.

**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

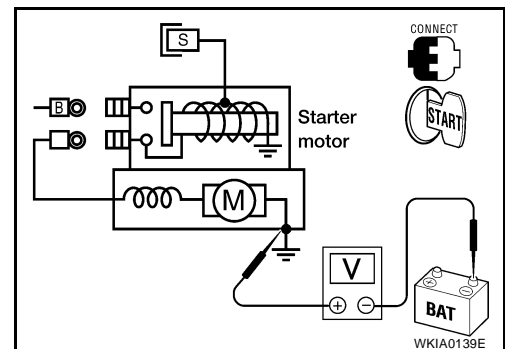
1. Check voltage between starter motor case and battery negative terminal using a digital circuit tester.

**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-16, "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.

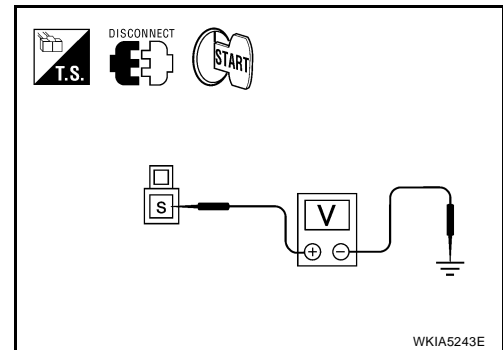
**Ignition switch in START : Battery voltage**

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

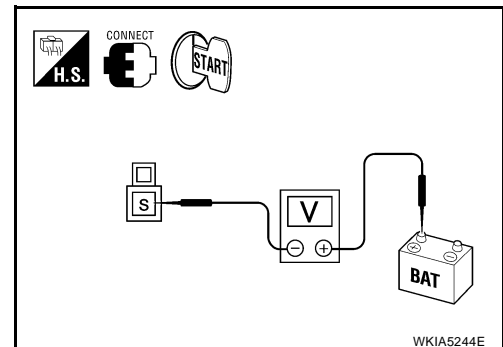
1. Connect starter motor connector F28.
2. Check voltage between starter motor connector F28 terminal S and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Magnetic switch circuit is OK. Further inspection is necessary. Refer to [SC-16, "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

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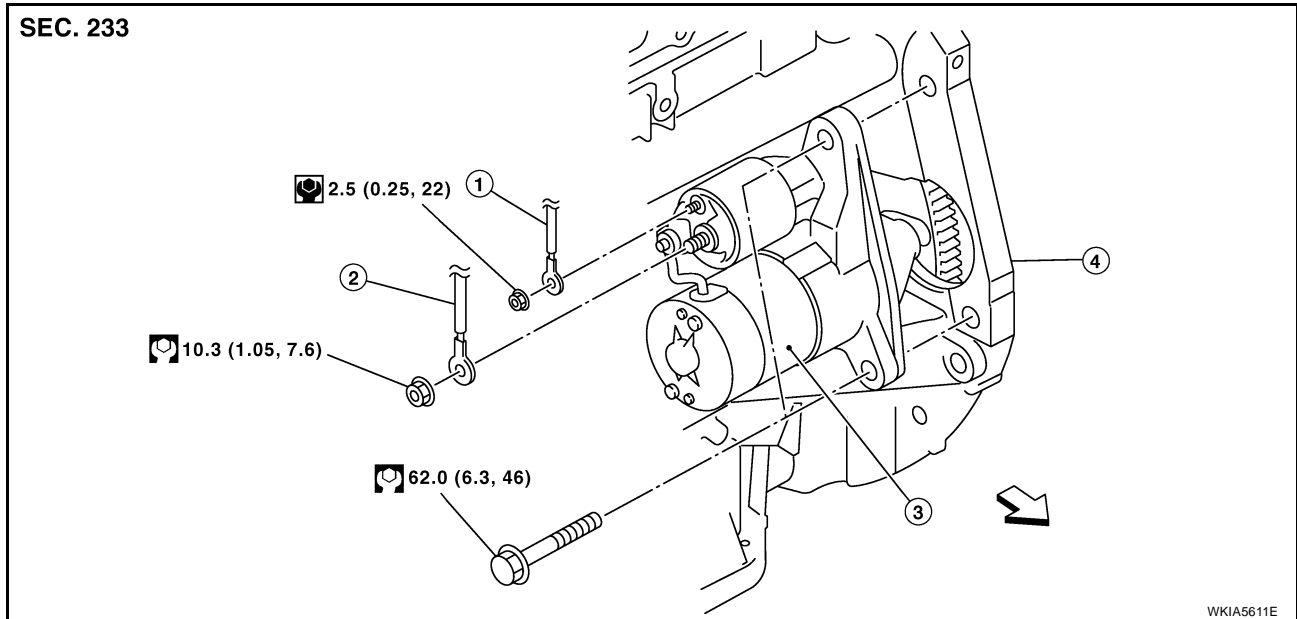
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# STARTING SYSTEM

## Removal and Installation

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### 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.**

# CHARGING SYSTEM

## CHARGING SYSTEM

PFP:23100

### System Description

EKS00IB3

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

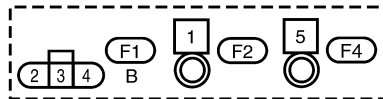
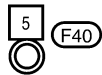
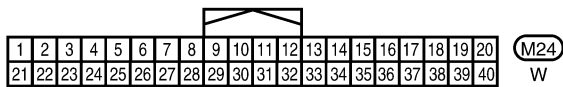
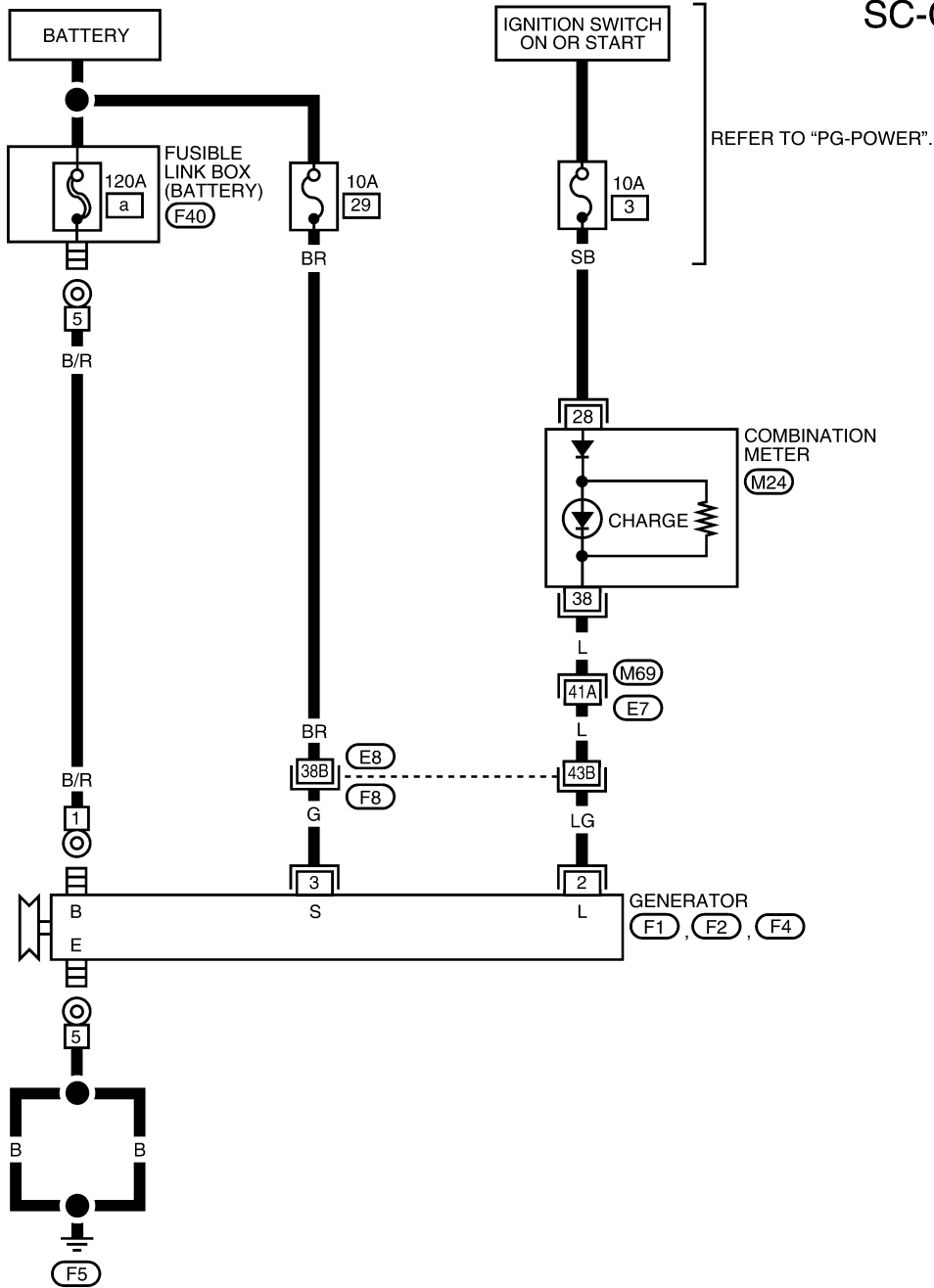
M

# CHARGING SYSTEM

## Wiring Diagram — CHARGE —

EKS001B4

### SC-CHARGE-01



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

WKWA4970E

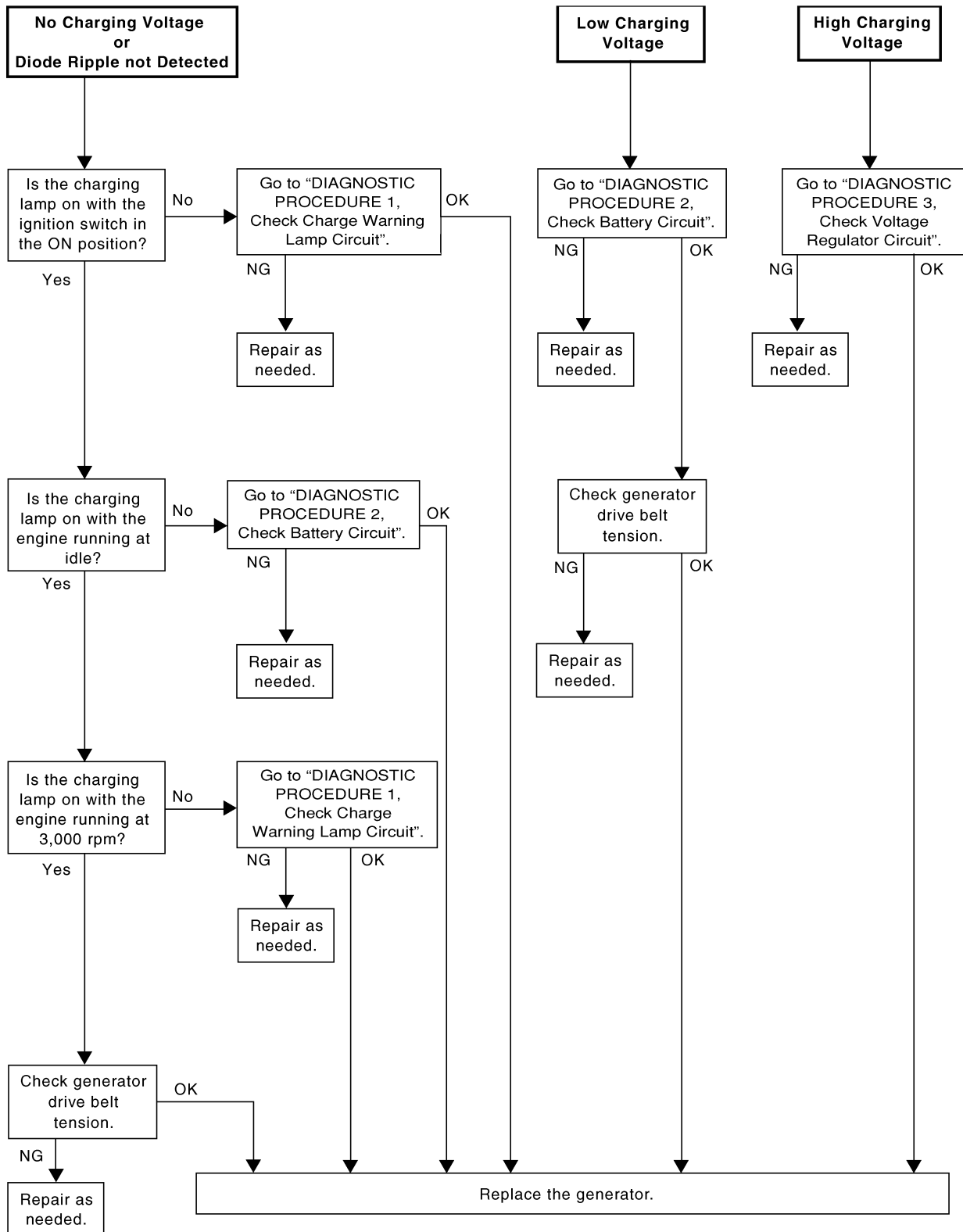
# CHARGING SYSTEM

## Trouble Diagnoses with Starting/Charging System Tester

EKS001B5

For charging system testing, use Starting/Charging System Tester (J-44373). For details, refer to Technical Service Bulletin.

### WORK FLOW



WKIA4022E

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

# 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 Starting/Charging system test. Refer to Technical Service Bulletin.

#### 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.

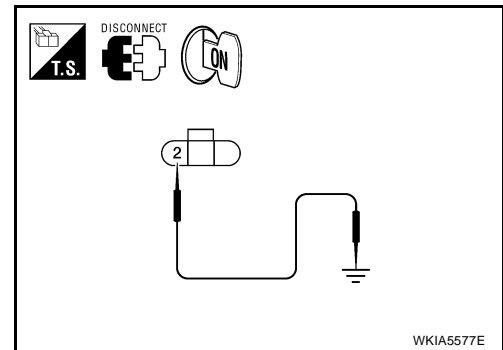
**CHARGE lamp should light up.**

OK or NG

OK >> GO TO [SC-23, "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



WKIA5577E



# 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 Starting/Charging system test. Refer to Technical Service Bulletin.

#### 2. CHECK BATTERY CIRCUIT

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

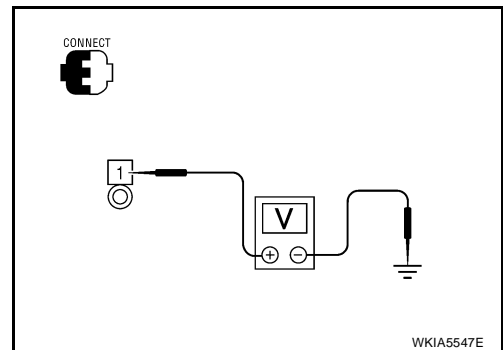
**Battery voltage should exist.**

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

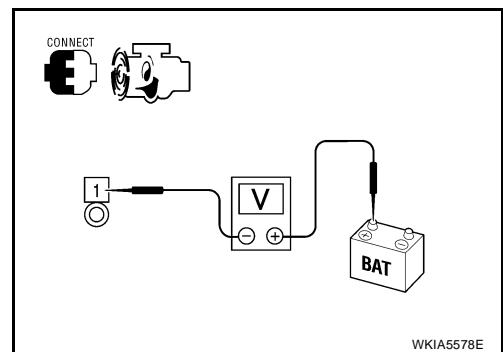
Check voltage between generator connector F2 terminal 1 and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Replace the generator. Refer to [SC-27, "Removal and Installation"](#) . Confirm repair by performing complete Starting/Charging system test. Refer to Technical Service Bulletin.

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 Starting/Charging system test. Refer to Technical Service Bulletin.

#### 2. CHECK VOLTAGE REGULATOR CIRCUIT

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

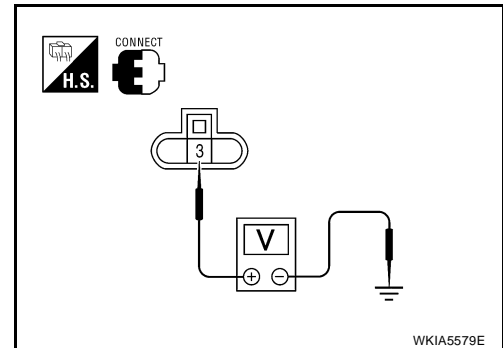
**Battery voltage should exist.**

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

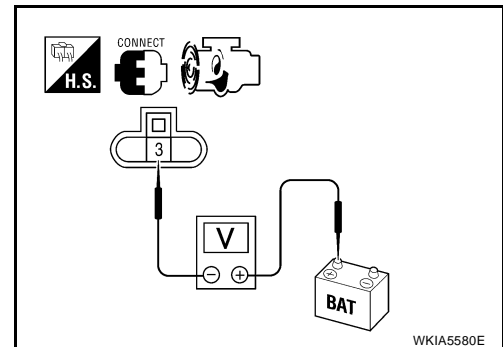
Check voltage between generator connector F1 terminal 3 and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Replace the generator. Refer to [SC-27, "Removal and Installation"](#) . Confirm repair by performing complete Starting/Charging system test. Refer to Technical Service Bulletin.

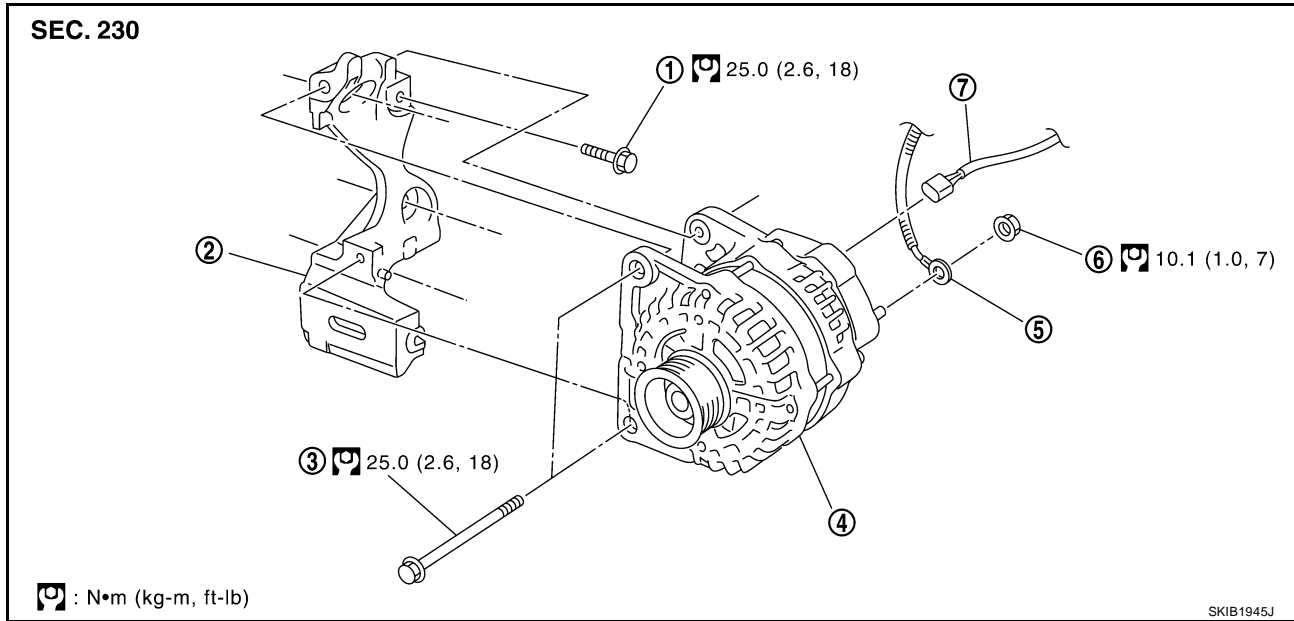
NG >> Check harness between the battery and the generator for poor continuity.



# CHARGING SYSTEM

## Removal and Installation

EKS00HV3



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

PF:00030

### Battery

EKS00HV5

	M/T, A/T	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)	

### Generator

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	