

A  
B  
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# SECTION SC

## STARTING & CHARGING SYSTEM

### CONTENTS

<p><b>SERVICE INFORMATION</b> ..... 2</p> <p><b>PRECAUTIONS</b> ..... 2</p> <p style="padding-left: 20px;">Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....2</p> <p><b>PREPARATION</b> ..... 3</p> <p style="padding-left: 20px;">Special Service Tool .....3</p> <p style="padding-left: 20px;">Commercial Service Tool .....3</p> <p><b>BATTERY</b> ..... 4</p> <p style="padding-left: 20px;">How to Handle Battery .....4</p> <p style="padding-left: 20px;">Trouble Diagnosis with Battery/Starting/Charging System Tester .....6</p> <p style="padding-left: 20px;">Removal and Installation .....6</p> <p style="padding-left: 20px;">Required Procedures After Battery Disconnection.....7</p> <p><b>STARTING SYSTEM</b> ..... 8</p>	<p style="padding-left: 20px;">System Description ..... 8</p> <p style="padding-left: 20px;">Wiring Diagram - START - ..... 9</p> <p style="padding-left: 20px;">Trouble Diagnosis with Battery/Starting/Charging System Tester ..... 9</p> <p style="padding-left: 20px;">Removal and Installation .....12</p> <p><b>CHARGING SYSTEM</b> .....14</p> <p style="padding-left: 20px;">System Description .....14</p> <p style="padding-left: 20px;">Wiring Diagram - CHARGE - .....15</p> <p style="padding-left: 20px;">Trouble Diagnosis with Battery/Starting/Charging System Tester .....15</p> <p style="padding-left: 20px;">Removal and Installation .....18</p> <p><b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....20</p> <p style="padding-left: 20px;">Battery .....20</p> <p style="padding-left: 20px;">Starter .....20</p> <p style="padding-left: 20px;">Generator .....20</p>
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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:000000004279033

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.

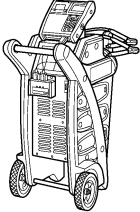
# PREPARATION

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## PREPARATION

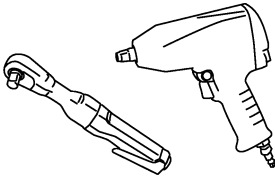
### Special Service Tool

INFOID:000000004279034

Tool number (Kent-Moore No.) Tool name	Description
<p>— (—) Model GR-8 Multitasking Battery Diagnostic Station</p>  <p style="text-align: right;">AWIIA1239ZZ</p>	<p>Tests batteries, starting and charging systems. For operating instructions, refer to diagnostic station instruction manual.</p>

### Commercial Service Tool

INFOID:000000004279035

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

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# BATTERY

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## BATTERY

### How to Handle Battery

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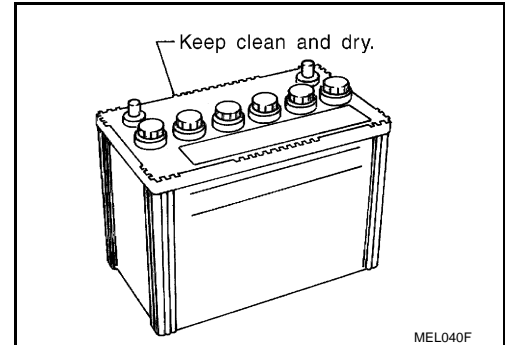
#### CAUTION:

- 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

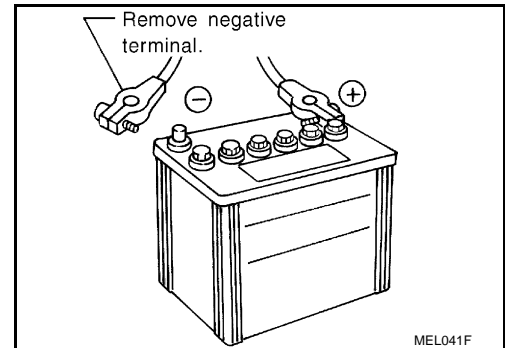
The following precautions must be taken to prevent over-discharging a battery.

- 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".



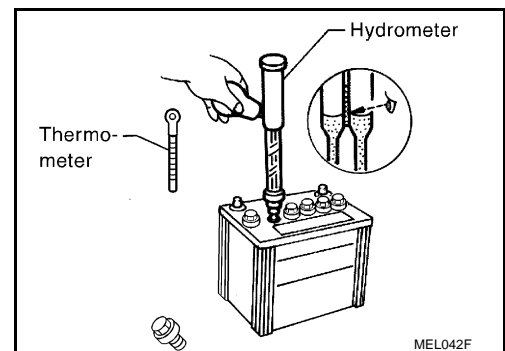
MEL040F

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



MEL041F

- 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.



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#### CHECKING ELECTROLYTE LEVEL

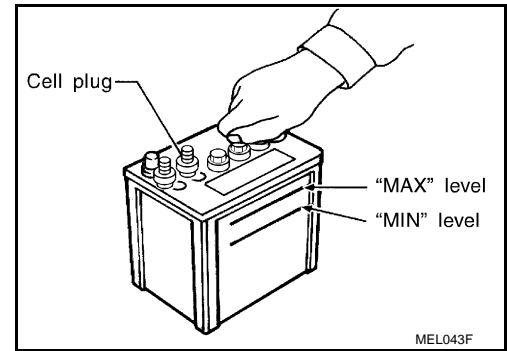
#### WARNING:

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

## < SERVICE INFORMATION >

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

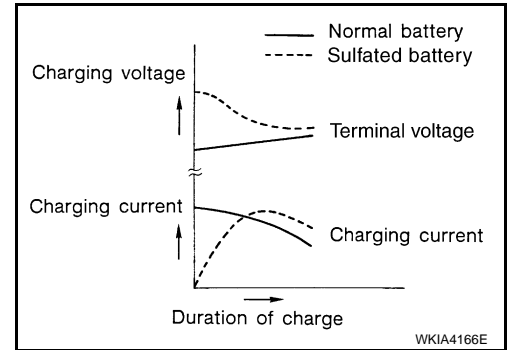


### Sulfation

**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.**

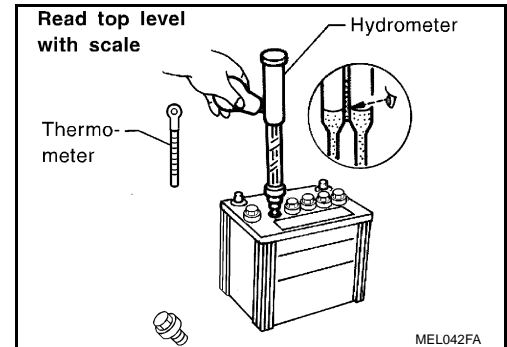
**To determine if a battery has been sulfated, note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulfated batteries.**

**A sulfated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.**



### SPECIFIC GRAVITY CHECK

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 Battery/Starting/Charging System Tester

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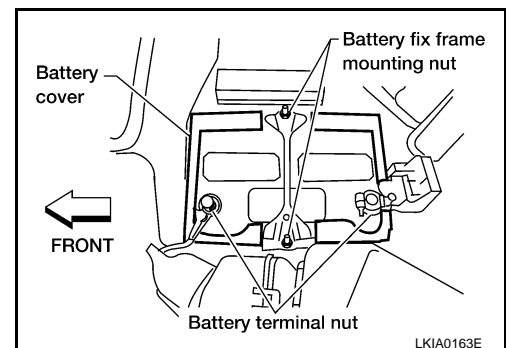
Refer to diagnostic station instruction manual.

## Removal and Installation

INFOID:000000004279038

### REMOVAL

1. Disconnect battery negative and positive terminals.  
**CAUTION:**  
**When disconnecting, disconnect battery negative terminal first.**
2. Remove battery frame nuts and battery frame.
3. Remove battery cover.
4. Remove battery.



# BATTERY

## < SERVICE INFORMATION >

### INSTALLATION

Installation is in the reverse order of removal.

#### **CAUTION:**

**When connecting, connect battery positive terminal first.**

**Battery frame nut** : 4.5 N·m (0.46 kg-m, 40 in-lb)

**Battery terminal nut** : 3.5 N·m (0.36 kg-m, 31 in-lb)

Reset electronic systems as necessary. Refer to [SC-7, "Required Procedures After Battery Disconnection"](#).

### Required Procedures After Battery Disconnection

INFOID:000000004279039

SYSTEM	ITEM	Reference
Brake Control	Steering Angle Sensor Neutral Position	<a href="#">BRC-84</a>
Body, Lock & Security	Power Sliding Door	<a href="#">BL-92</a>
	Automatic Back Door	<a href="#">BL-138</a>
Glasses, Window & Mirrors	Power Window System Initialization	<a href="#">GW-67</a>
Roof	Sunroof Memory Reset/Initialization	<a href="#">RF-11</a>
Seats	Automatic Drive Positioner System Initialization	Refer to Owner's Manual
Audio-visual System	Audio (Radio Preset)	—
	Navi	<a href="#">AV-150</a>
	Rear View Monitor Guiding Line Adjustment	<a href="#">DI-62</a>

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# STARTING SYSTEM

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## STARTING SYSTEM

### System Description

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Power is supplied at all times:

- to starter motor terminal B, and
- through 40A fusible link (letter **k**, 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 4.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to park/neutral position (PNP) switch terminal 1.

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

- through PNP switch terminal 5
- to IPDM E/R terminal 53.

Ground is supplied at all times:

- to IPDM E/R terminals 38, 50 and 60
- through body grounds E9, E15 and E24.

Provided that the IPDM E/R receives a starter relay request ON signal from the BCM over the CAN lines, the IPDM E/R grounds the starter relay and power is supplied:

- from terminal 3 of the IPDM E/R
- to terminal S of the starter motor windings.

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

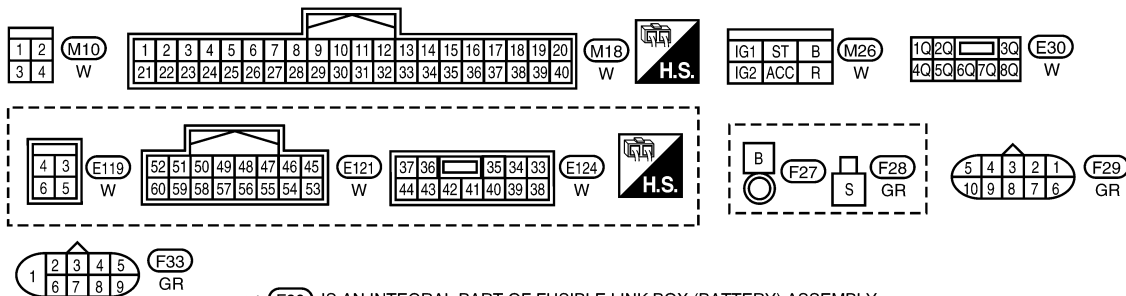
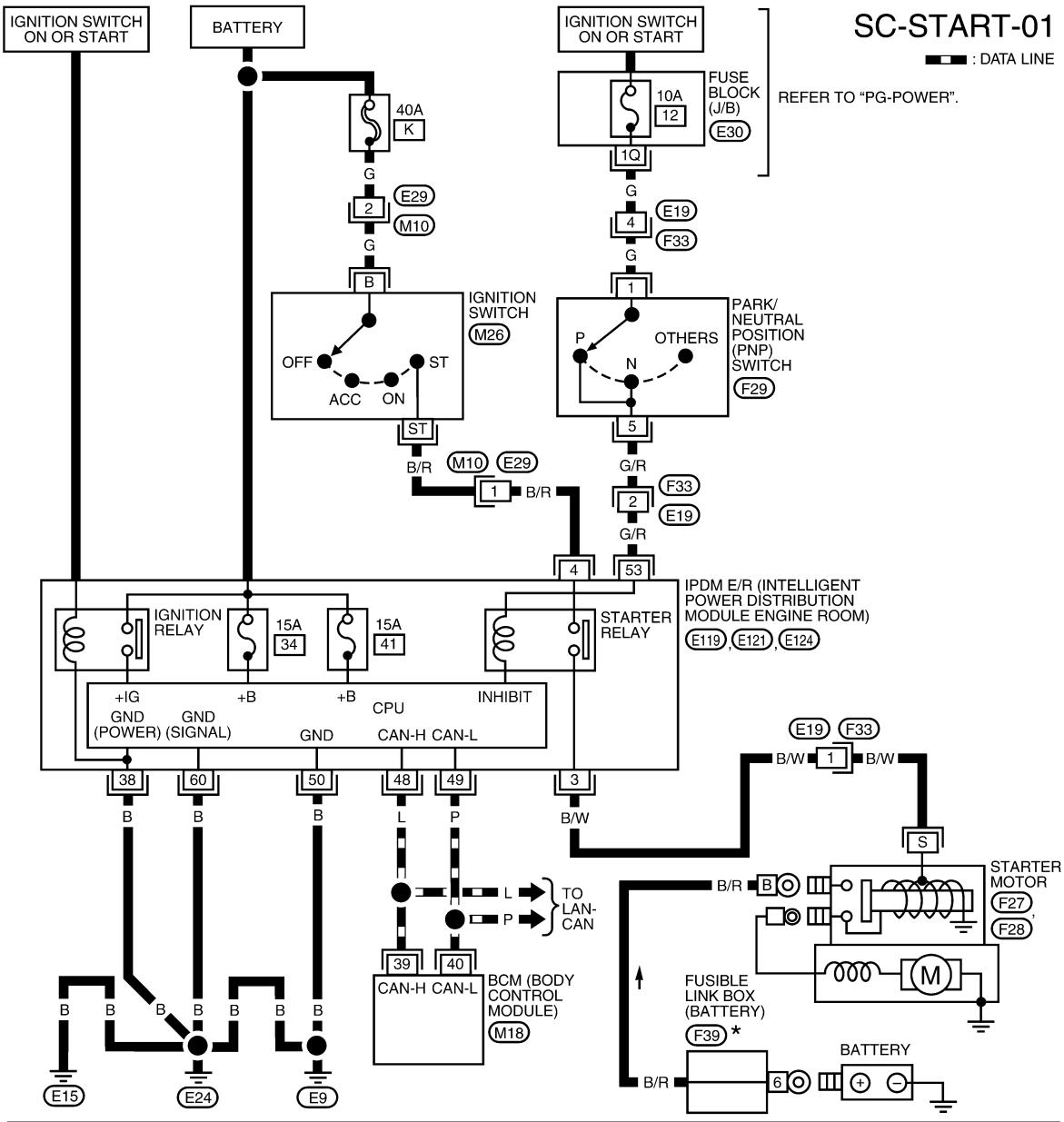


# STARTING SYSTEM

< SERVICE INFORMATION >

## Wiring Diagram - START -

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WKWA5124E

## Trouble Diagnosis with Battery/Starting/Charging System Tester

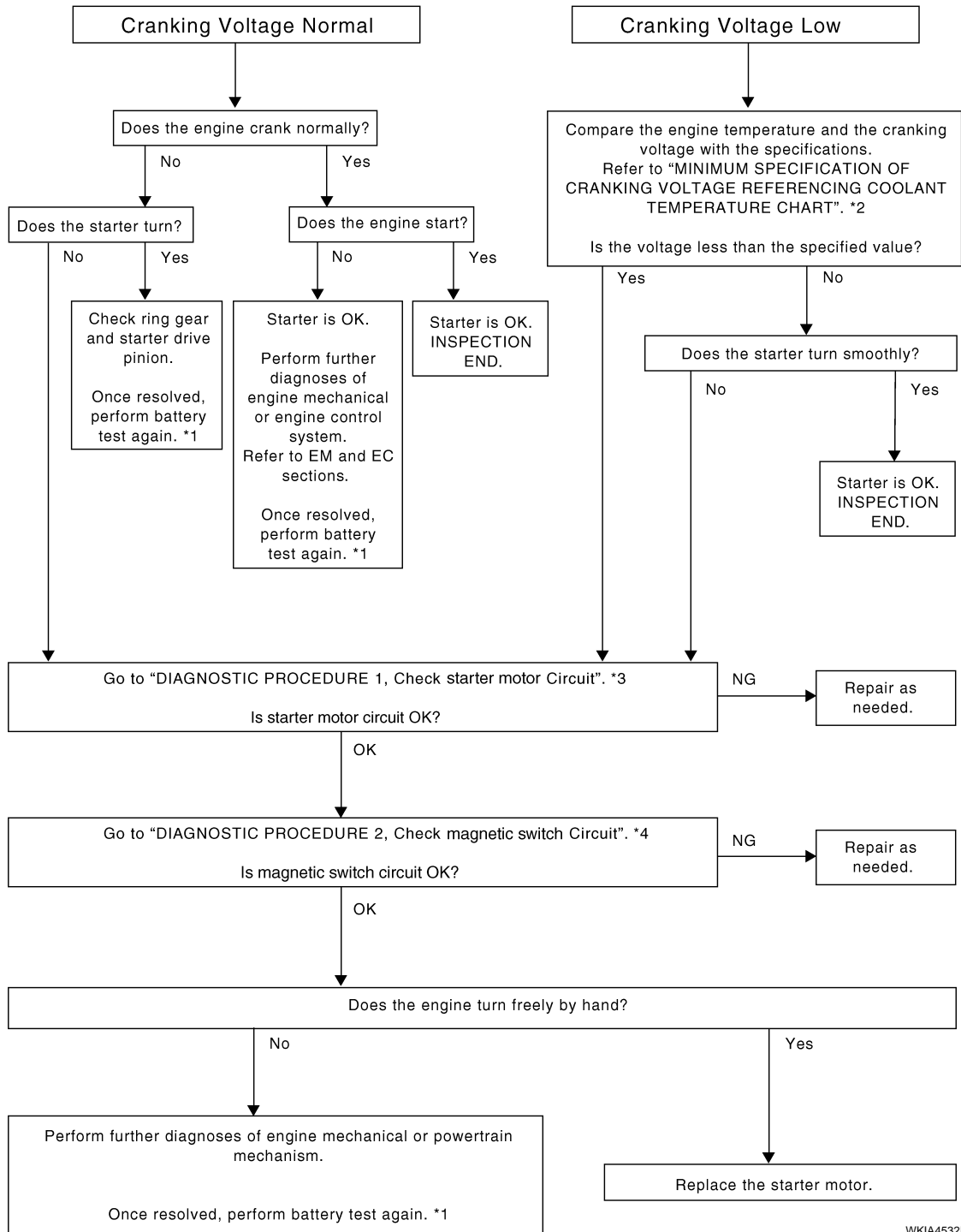
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Refer to diagnostic station instruction manual.

### WORK FLOW

# STARTING SYSTEM

< SERVICE INFORMATION >



WKIA4532E

\*1 "Trouble Diagnoses with Battery/ Starting/Charging System Tester"

\*2 "Check Starter Motor Circuit"

\*3 "DIAGNOSTIC PROCEDURE 1"

\*4 "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.

# STARTING SYSTEM

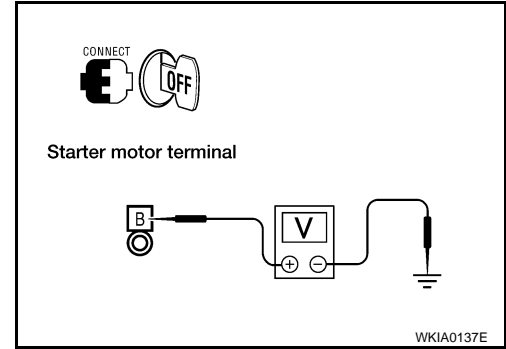
## < SERVICE INFORMATION >

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.



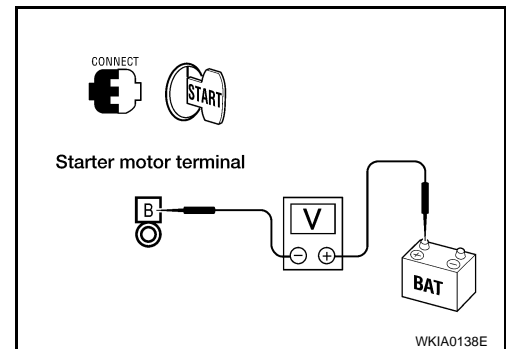
## 2.CHECK VOLTAGE DROP ON STARTER MOTOR CIRCUIT

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 0.5V**

### OK or NG

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



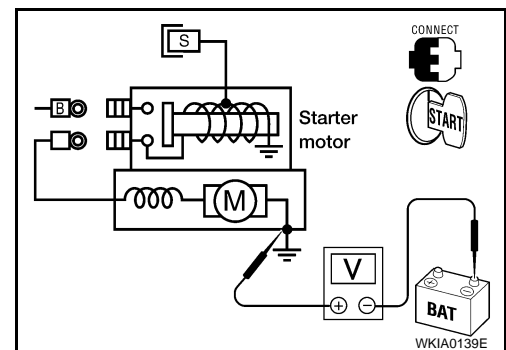
## 3.CHECK VOLTAGE DROP ON STARTER MOTOR GROUND CIRCUIT

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 "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

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.

# STARTING SYSTEM

## < SERVICE INFORMATION >

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

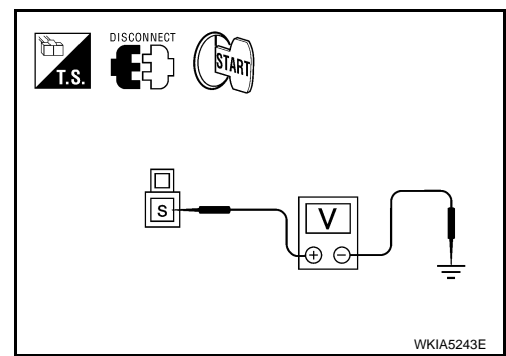
**Ignition switch in START : Battery voltage**

### OK or NG

OK >> GO TO 2.

NG >> Check the following:

- 40A fusible link (letter **k**, located in fuse and fusible link box)
- 15A fuses [No. 34 and 41, located in the intelligent power distribution module engine room (IPDM E/R)]
- Ignition switch
- Starter relay [within the intelligent power distribution module engine room (IPDM E/R)]
- Starter relay request ON signal
- Harness for open or short



## 2. CHECK VOLTAGE DROP ON MAGNETIC SWITCH CIRCUIT

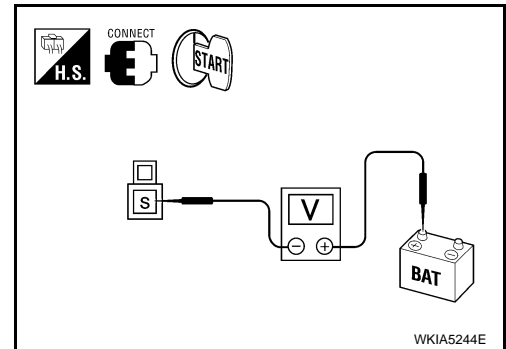
- Connect starter motor connector F28.
- Check voltage between starter motor connector F28 terminal S and battery positive terminal using a digital circuit tester.

**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 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

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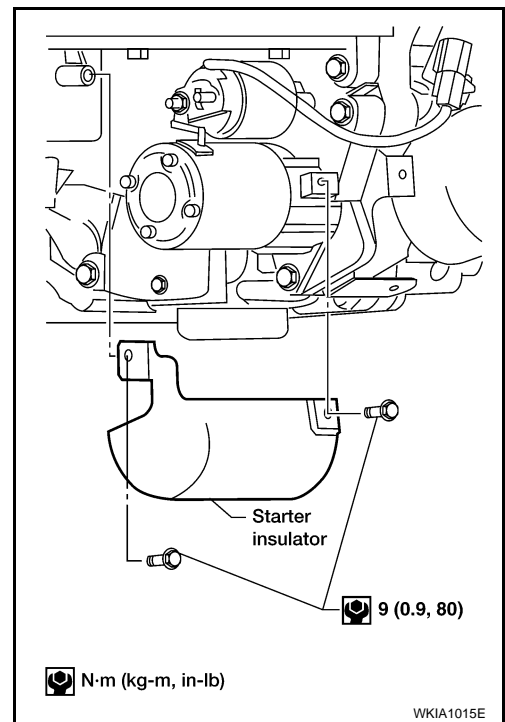
### REMOVAL

- Disconnect the battery negative terminal. Refer to [SC-6, "Removal and Installation"](#).

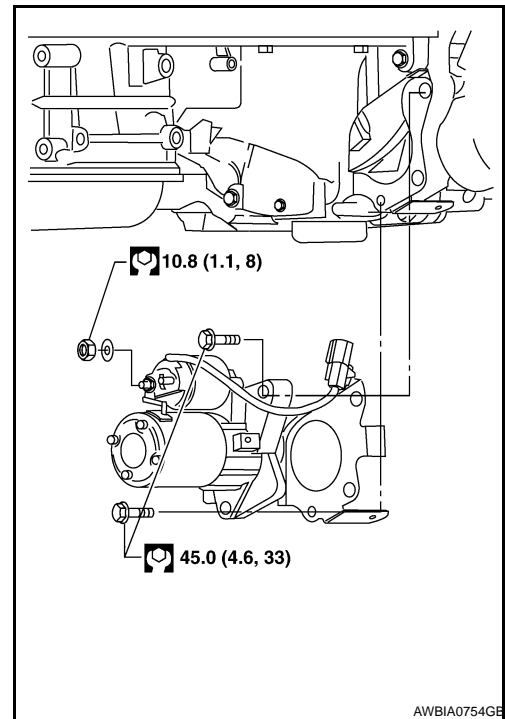
# STARTING SYSTEM

## < SERVICE INFORMATION >

2. Remove the starter insulator.



3. Remove the harness bracket and harness protector from the starter engine room harness.
4. Disconnect the starter harness connectors.
5. Remove the two starter bolts, using power tools.
6. Remove the starter.



## INSTALLATION

Installation is in the reverse order of removal.

A  
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F  
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# CHARGING SYSTEM

< SERVICE INFORMATION >

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## CHARGING SYSTEM

### System Description

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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 S through:

- 10A fuse (No. 26, located in the fuse and fusible link box).

Terminal B supplies power to charge the battery and operate the vehicle's electrical system. Output voltage is controlled by the IC regulator at terminal S detecting the input voltage. The charging circuit is protected by the 140A fusible link [letter **a**, located in the fusible link box (battery)].

Ground is supplied:

- to generator terminal E
- through body ground E116.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 14, located in the fuse block (J/B)]
- to combination meter terminal 38 for the charge warning lamp.

Ground is supplied to terminal 2 of the combination meter through terminal L of the generator. With power and ground supplied, the charge warning lamp will illuminate. When the generator is providing sufficient voltage with the engine running, 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.

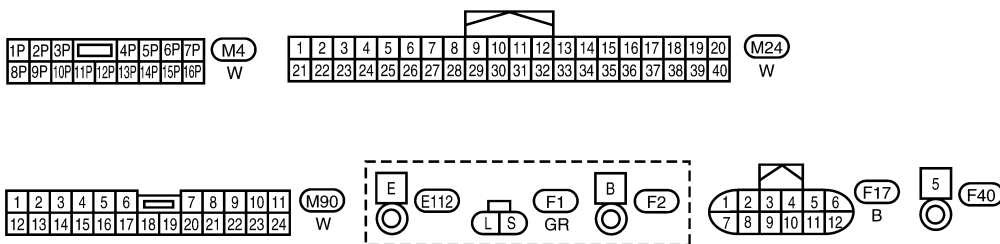
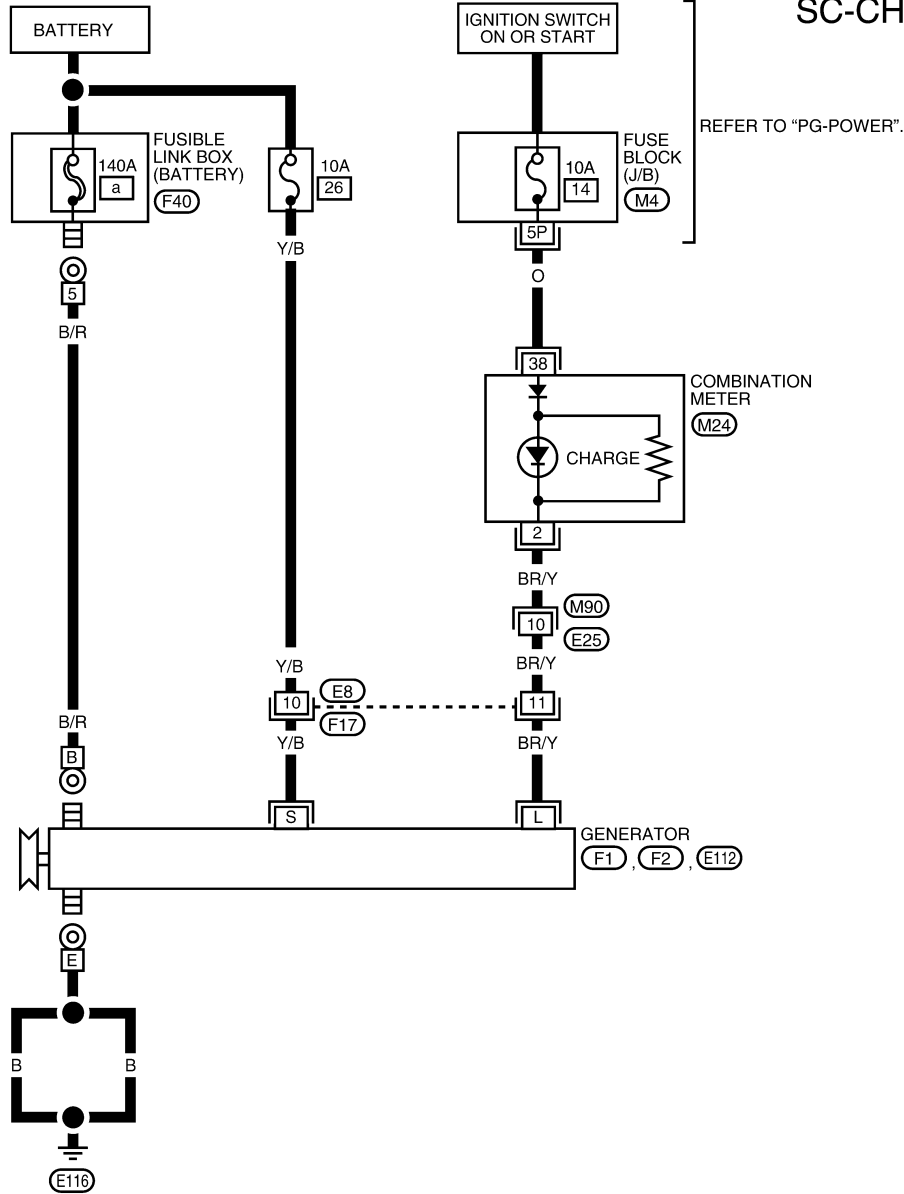
# CHARGING SYSTEM

< SERVICE INFORMATION >

## Wiring Diagram - CHARGE -

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### SC-CHARGE-01



WKWA4658E

Trouble Diagnosis with Battery/Starting/Charging System Tester

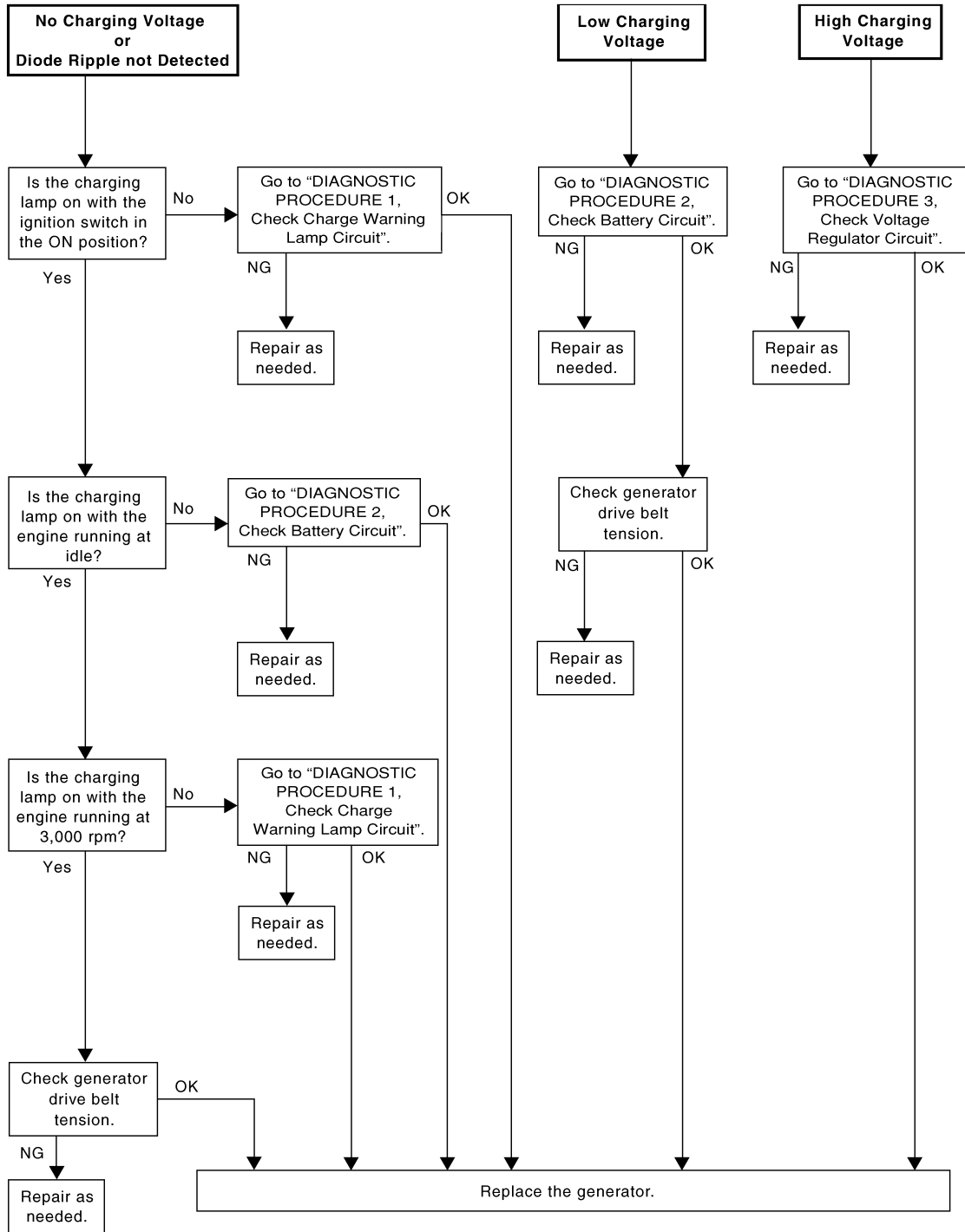
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Refer to diagnostic station instruction manual.

# CHARGING SYSTEM

< SERVICE INFORMATION >

## WORK FLOW



WKIA4022E

## DIAGNOSTIC PROCEDURE 1

Check Charge Warning Lamp Circuit

### 1. CHECK CHARGE WARNING LAMP CIRCUIT CONNECTION

Check to see if terminal "L" is clean and tight.

#### OK or NG

OK >> GO TO 2.

NG >> Repair terminal "L" connection. Confirm repair by performing complete Battery/Starting/Charging system test.



# CHARGING SYSTEM

< SERVICE INFORMATION >

## 2. CHECK CHARGE WARNING LAMP CIRCUIT

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

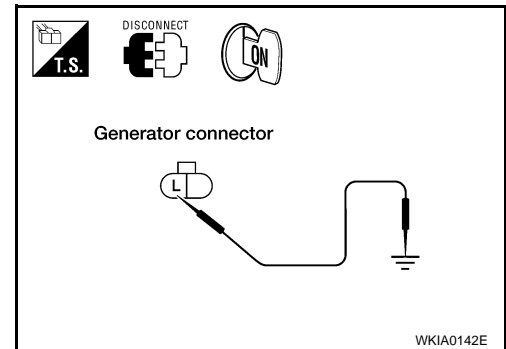
**CHARGE lamp should light up.**

OK or NG

OK >> GO TO "WORK FLOW".

NG >> Check the following.

- 10A fuse [No. 14, 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 "B" is clean and tight.

OK or NG

OK >> GO TO 2.

NG >> Repair terminal "B" connection. Confirm repair by performing complete Battery/Starting/Charging system test.

## 2. CHECK BATTERY CIRCUIT

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

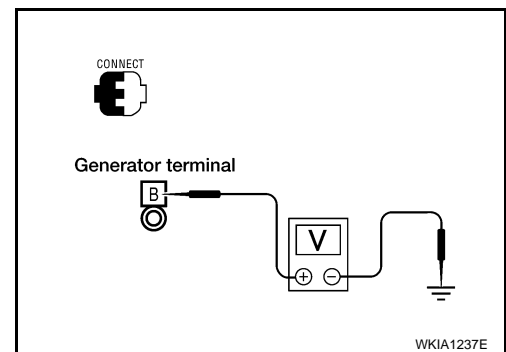
**Battery voltage should exist.**

OK or NG

OK >> GO TO 3.

NG >> Check the following.

- 140A 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

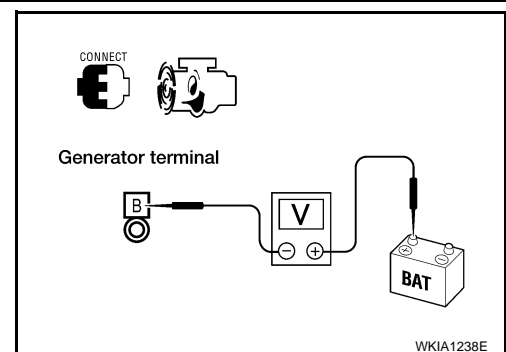
Check voltage between generator connector F2 terminal B and battery positive terminal using a digital circuit tester.

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

OK or NG

OK >> Replace the generator. Refer to [SC-18. "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.



## DIAGNOSTIC PROCEDURE 3

Check Voltage Regulator Circuit

# CHARGING SYSTEM

## < SERVICE INFORMATION >

### 1. CHECK VOLTAGE REGULATOR CIRCUIT CONNECTION

Check to see if terminal "S" is clean and tight.

#### OK or NG

OK >> GO TO 2.

NG >> Repair terminal "S" connection. Confirm repair by performing complete Battery/Starting/Charging system test.

### 2. CHECK VOLTAGE REGULATOR CIRCUIT

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

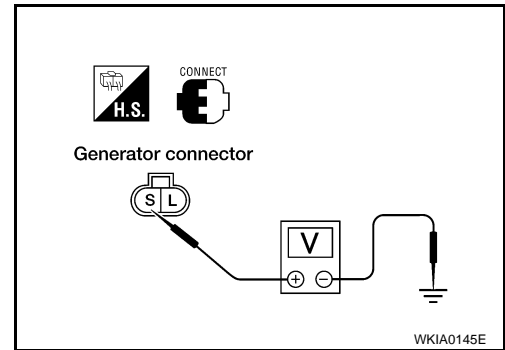
**Battery voltage should exist.**

#### OK or NG

OK >> GO TO 3.

NG >> Check the following.

- 10A fuse (No. 26, located in fuse and fusible link box)
- Harness for open or short between generator and fuse



### 3. CHECK VOLTAGE DROP ON VOLTAGE REGULATOR CIRCUIT

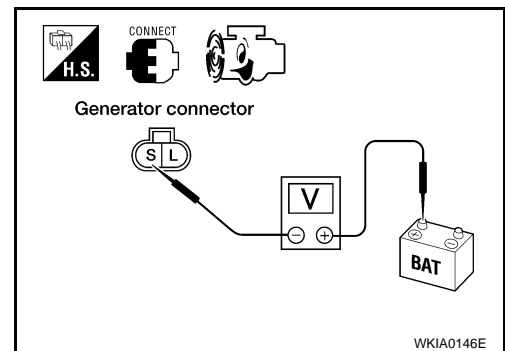
Check voltage between generator connector F1 terminal S and battery positive terminal using a digital circuit tester.

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

#### OK or NG

OK >> Replace the generator. Refer to [SC-18, "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.



## MALFUNCTION INDICATOR

The IC regulator warning function activates to illuminate "CHARGE" warning lamp, if any of the following symptoms occur while generator is operating:

- Excessive voltage is produced.
- No voltage is produced.

## Removal and Installation

INFOID:000000004279047

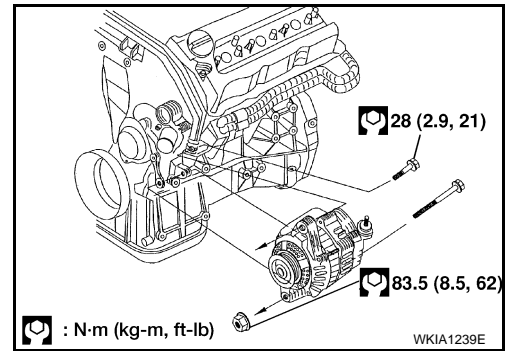
### REMOVAL

1. Disconnect the battery negative terminal. Refer to [SC-6, "Removal and Installation"](#).
2. Remove the radiator. Refer to [CO-16](#).
3. Remove the front wheel and tire (RH). Refer to [WT-6, "Conventional Tire and Wheel"](#).
4. Remove fender protector (RH). Refer to [EI-21, "Removal and Installation"](#).
5. Remove the drive belt. Refer to [EM-12](#).
6. Remove the idler pulley.
7. Remove the generator adjustable top mount, using power tools.

# CHARGING SYSTEM

## < SERVICE INFORMATION >

8. Remove the generator lower bolt and nut, using power tools.
9. Disconnect the generator harness connectors.
10. Remove the generator.



## INSTALLATION

Installation is in the reverse order of removal.

- Install the generator and check tension of drive belt. Refer to [EM-12. "Tension Adjustment"](#).

### **CAUTION:**

**Be sure to tighten B terminal nut carefully.**

**B terminal nut torque : 11 Nm (1.1 kg-m, 8 ft-lb)**

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

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Battery

INFOID:000000004279048

Type	Gr. 24
Capacity (20 HR) minimum V-AH	12-63
Cold cranking current A (For reference value)	550 @ -18°C (0°F)

#### Starter

INFOID:000000004279049

Manufacturer	Mitsubishi M000T20777ZC	
Type	Reduction gear type	
System voltage	12V	
No-load	Terminal voltage	11V
	Current	90A max.
	Revolution	2,400 rpm min.

#### Generator

INFOID:000000004279050

Type	TG15C026
	Valeo
Nominal rating	12V-130A
Ground polarity	Negative
Minimum revolution under no-load (When 13.5 volts is applied)	1,200 rpm
Hot output current (When 13.5 volts is applied)	More than 52A/1,500 rpm More than 82A/1,800 rpm More than 115A/2,500 rpm More than 130A/5,000 rpm
Regulated output voltage	14.1 - 14.7V @ 20°C