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# SECTION STR

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## STARTING SYSTEM

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## DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

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### BASIC INSPECTION

#### DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With GR8-1200 NI)

INFOID:000000009354234

##### STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI

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

- GR8-1200 NI Multitasking battery and electrical diagnostic station

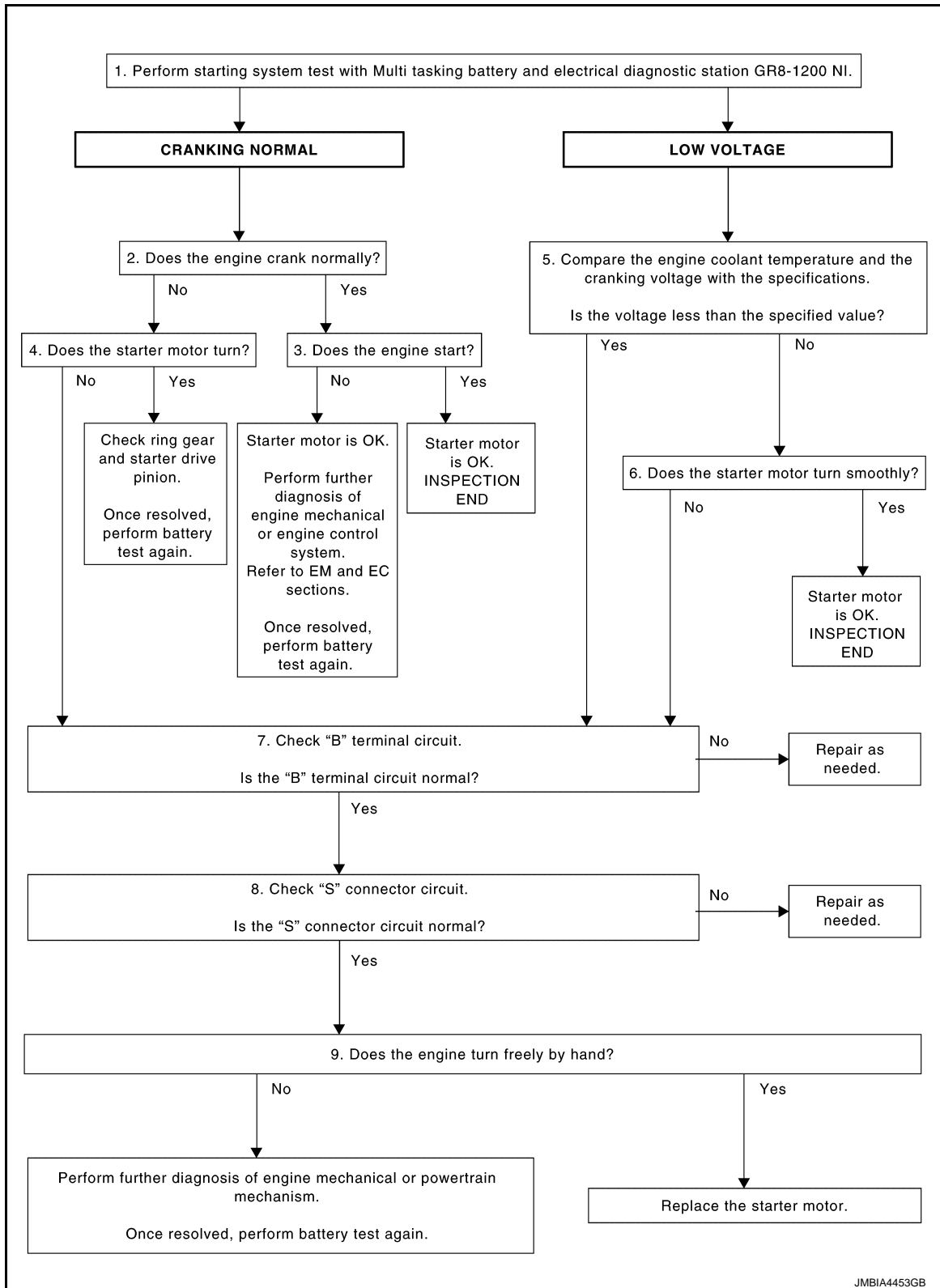
**NOTE:**

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

# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## OVERALL SEQUENCE



### DETAILED FLOW

#### NOTE:

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

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

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# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

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

### Test result

CRANKING NORMAL>>GO TO 2.

LOW VOLTAGE>>GO TO 5.

CHARGE BATTERY>>Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to diagnostic station instruction manual.

REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to diagnostic station instruction manual. If second test result is "REPLACE BATTERY", then do so. Perform battery test again to confirm repair.

## 2. CRANKING CHECK

Check that the starter motor operates correctly.

### Does the engine crank normally?

YES >> GO TO 3.

NO >> GO TO 4.

## 3. ENGINE START CHECK

Check that the engine starts.

### Does the engine start?

YES >> Starter motor is OK. INSPECTION END

NO >> Perform further diagnosis of engine mechanical or engine control system. Refer EM and EC sections. Once resolved, perform battery test again.

## 4. STARTER MOTOR ACTIVATION

Check that the starter motor operates.

### Does the starter motor turn?

YES >> Check ring gear and starter motor drive pinion. Once resolved, perform battery test again.

NO >> GO TO 7.

## 5. COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

Compare the engine coolant temperature and the cranking voltage with the specifications.

### Minimum Specification of Cranking Voltage Referencing Coolant Temperature

Engine coolant temperature [°C (°F)]	Voltage [V]
-30 to -20 (-22 to -4)	8.6
-19 to -10 (-2 to 14)	9.1
-9 to 0 (16 to 32)	9.5
More than 1 (More than 34)	9.9

### Is the voltage less than the specified value?

YES >> GO TO 7.

NO >> GO TO 6.

## 6. STARTER OPERATION

Check the starter operation status.

### Does the starter motor turn smoothly?

YES >> Starter motor is OK. INSPECTION END

NO >> GO TO 7.

## 7. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to [STR-9, "Diagnosis Procedure"](#).

### Is "B" terminal circuit normal?

YES >> GO TO 8.

NO >> Repair as needed.

## 8. "S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to [STR-10, "Diagnosis Procedure"](#).

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

### Is "S" connector circuit normal?

- YES >> GO TO 9.
- NO >> Repair as needed.

## 9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

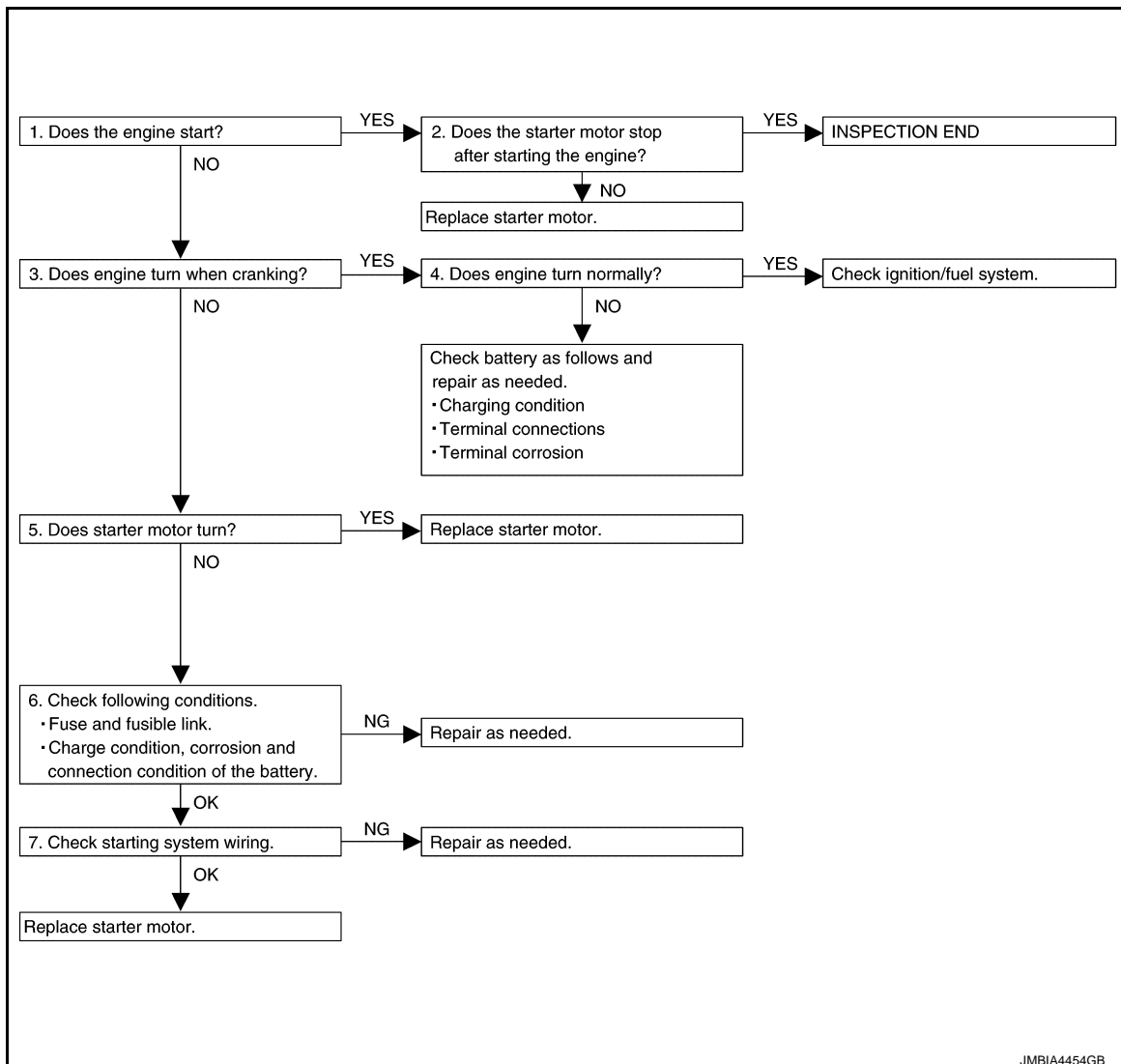
### Does the engine turn freely by hand?

- YES >> Replace starter motor. Refer to [STR-17. "2WD : Removal and Installation"](#) (2WD) or [STR-19. "AWD : Removal and Installation"](#) (AWD).
- NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again using Multitasking battery and electrical diagnostic station GR8-1200 NI. Refer to the diagnostic station Instruction Manual for proper testing procedures.

## Work Flow (Without GR8-1200 NI)

INFOID:000000009354235

## OVERALL SEQUENCE



## DETAILED FLOW

### NOTE:

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

## 1. CHECK ENGINE START

Crank the engine and check that the engine starts.

### Does the engine start?

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

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

## 2.CHECK THAT THE STARTER MOTOR STOPS

---

Check that the starter motor stops after starting the engine.

Does the starter motor stop?

- YES >> INSPECTION END  
NO >> Replace starter motor. Refer to [STR-17, "2WD : Removal and Installation"](#) (2WD) or [STR-19, "AWD : Removal and Installation"](#) (AWD).

## 3.CHECK THAT THE ENGINE TURNS WHEN CRANKING

---

Check that the engine turns when cranking.

Does engine turn when cranking?

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

## 4.CHECK THE ENGINE SPEED WHEN CRANKING

---

Check that the engine speed is not low when cranking.

Does engine turn normally?

- YES >> Check ignition/fuel system.  
NO >> Check charge condition, corrosion and connection condition of the battery. Refer to [PG-3, "Work Flow"](#).

## 5.CHECK STARTER MOTOR ACTIVATION

---

Check that the starter motor runs at cranking.

Does starter motor turn?

- YES >> Replace starter motor. Refer to [STR-17, "2WD : Removal and Installation"](#) (2WD) or [STR-19, "AWD : Removal and Installation"](#) (AWD).  
NO >> GO TO 6.

## 6.CHECK POWER SUPPLY CIRCUIT

---

Check the following conditions.

- Fuse and fusible link
- Charge condition, corrosion and connection condition of the battery. Refer to [PG-3, "Work Flow"](#).

Are these inspection results normal?

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

## 7.CHECK STARTING SYSTEM WIRING

---

Check the following.

- "B" terminal circuit. Refer to [STR-9, "Diagnosis Procedure"](#).
- "S" connector circuit. Refer to [STR-10, "Diagnosis Procedure"](#).

Are these inspection results normal?

- YES >> Replace starter motor. Refer to [STR-17, "2WD : Removal and Installation"](#) (2WD) or [STR-19, "AWD : Removal and Installation"](#) (AWD).  
NO >> Repair as needed.

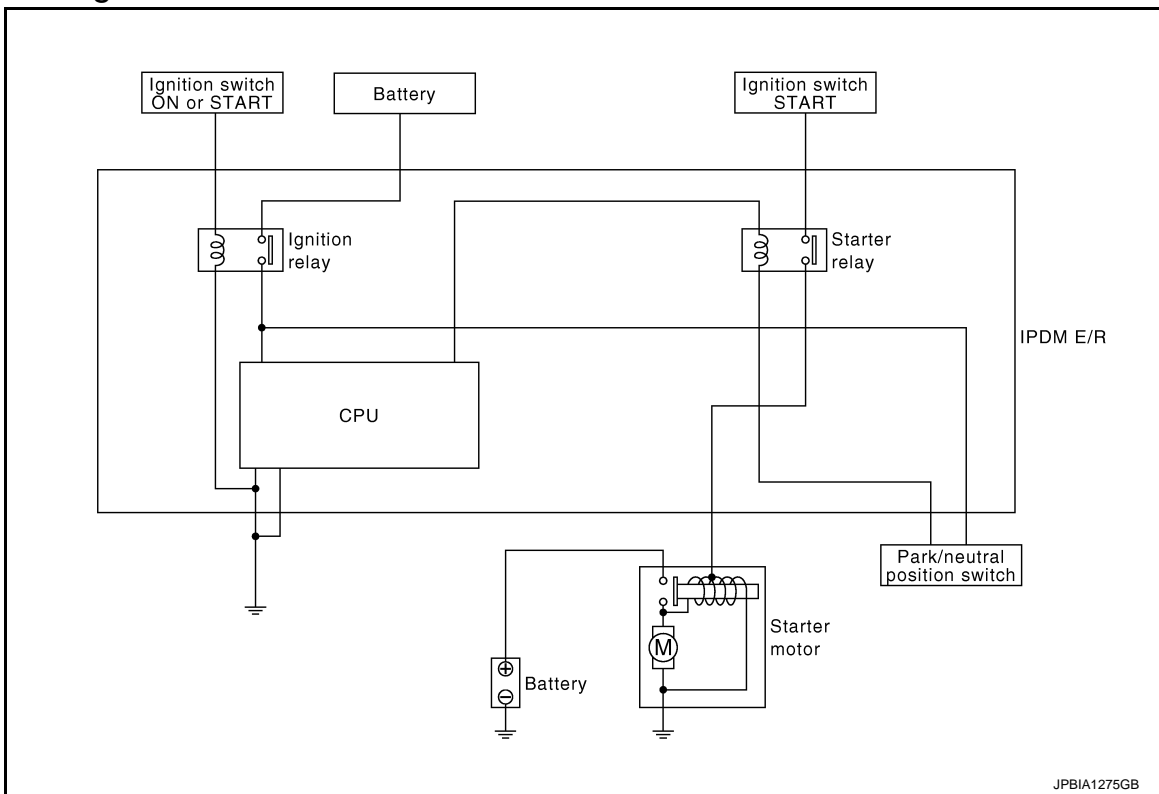
# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### STARTING SYSTEM

#### System Diagram



INFOID:000000007350000

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#### System Description

INFOID:000000007350001

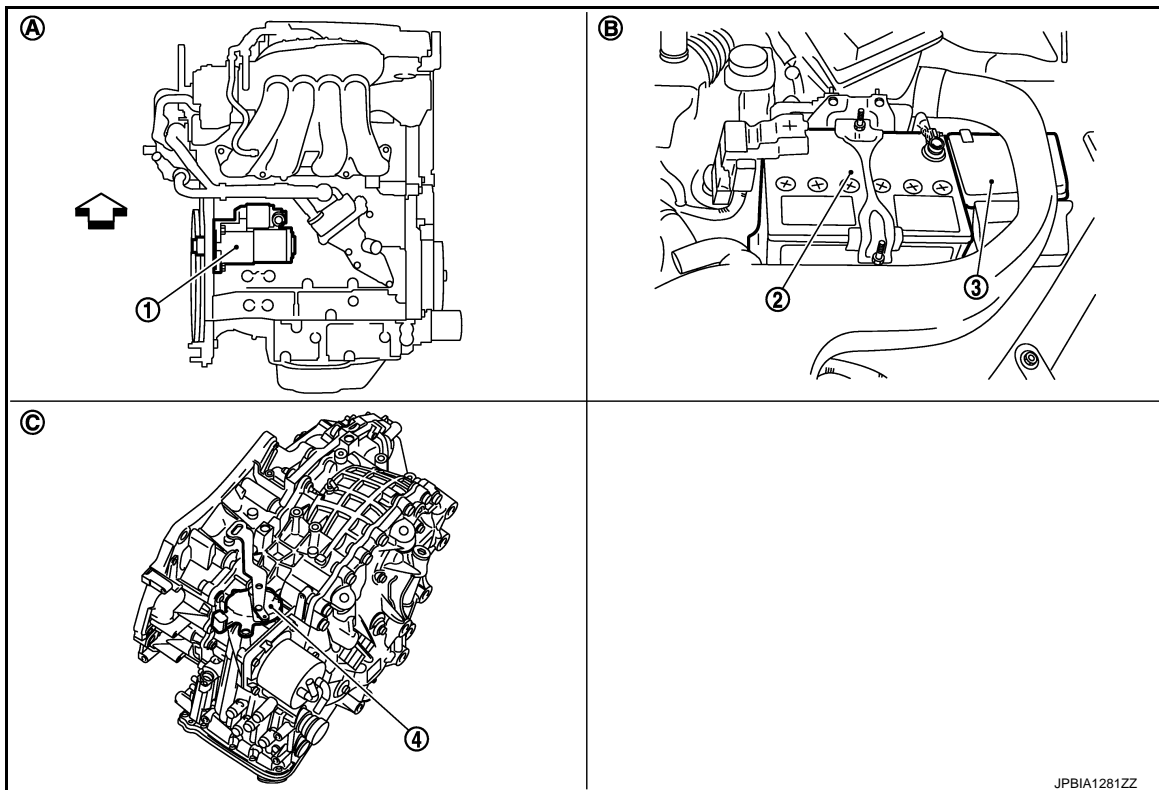
The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## Component Parts Location

INFOID:000000007350002



- |                              |                     |                 |
|------------------------------|---------------------|-----------------|
| 1. Starter motor             | 2. Battery          | 3. IPDM E/R     |
| 4. Transmission range switch | B. Engine room (LH) | C. CVT assembly |
| A. Engine                    |                     |                 |
- ↔ : Vehicle front

## Component Description

INFOID:000000007350003

Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay inside IPDM E/R when the selector lever is shifted to the P or N position.
IPDM E/R	CPU inside IPDM E/R controls the starter relay. Ignition relay inside IPDM E/R supplies power to the transmission range switch when ignition switch is ON or START.
Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the "S" terminal is supplied with electric power.



# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:000000007350004

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The "B" terminal is constantly supplied with battery power.

#### Diagnosis Procedure

INFOID:000000007350005

#### CAUTION:

Perform diagnosis under the condition that engine cannot start by the following procedure.

1. Remove fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.

#### 1. CHECK "B" TERMINAL CIRCUIT

1. Turn ignition switch OFF.
2. Check that starter motor "B" terminal connection is clean and tight.
3. Check voltage between starter motor "B" terminal and ground.

(+)		(-)	Voltage (Approx.)
Starter motor			
Connector	Terminal		
F49	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Check harness between battery and starter motor for open circuit.

#### 2. CHECK BATTERY CABLE CONNECTION STATUS (VOLTAGE DROP TEST)

1. Shift CVT selector lever to "P" or "N" position.
2. Check voltage between battery positive terminal and starter motor "B" terminal.

(+)	(-)		Condition	Voltage (Approx.)
	Starter motor			
	Connector	Terminal		
Battery positive terminal	F49	2	When the ignition switch is in START position	Less than 0.5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check harness between the battery and the starter motor for poor continuity.

#### 3. CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift CVT selector lever to "P" or "N" position.
2. Check voltage between starter motor case and battery negative terminal.

Terminals		Condition	Voltage (Approx.)
(+)	(-)		
Starter motor case	Battery negative terminal	When the ignition switch is in START position	Less than 0.2 V

Is the inspection result normal?

YES >> "B" terminal circuit is OK. Further inspection is necessary. Refer to [STR-2. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-5. "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> Check the starter motor case and ground for poor continuity.

# S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## S CONNECTOR CIRCUIT

### Description

INFOID:000000007350006

The starter motor magnetic switch is supplied with power when the ignition switch is turned to START with the selector lever "P" or "N" position.

### Diagnosis Procedure

INFOID:000000007350007

#### CAUTION:

Perform diagnosis under the condition that engine cannot start by the following procedure.

1. Remove fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.

#### 1. CHECK "S" CONNECTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector.
3. Shift CVT selector lever to "P" or "N" position.
4. Check voltage between starter motor harness connector and ground.

(+)		(-)	Condition	Voltage (Approx.)
Starter motor				
Connector	Terminal			
F47	1	Ground	When the ignition switch is in START position	Battery voltage

Is the inspection result normal?

YES >> "S" connector circuit is OK. Further inspection is necessary. Refer to [STR-2. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-5. "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> GO TO 2.

#### 2. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check the following terminals and connectors for damage, bend and loose connection.
  - Harness connector E8
  - Harness connector F122

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair the terminal and connector.

#### 3. CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect IPDM E/R connector.
2. Check continuity between starter motor harness connector and IPDM E/R harness connector.

Starter motor harness connector		IPDM E/R harness connector		Continuity
Connector	Terminal	Connector	Terminal	
F47	1	E10	3	Existed

Is the inspection result normal?

YES >> Inspect IPDM E/R and power supply circuit. Refer to [PCS-15. "Diagnosis Procedure"](#).

NO >> Repair the harness.

# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

### Wiring Diagram - STARTING SYSTEM -

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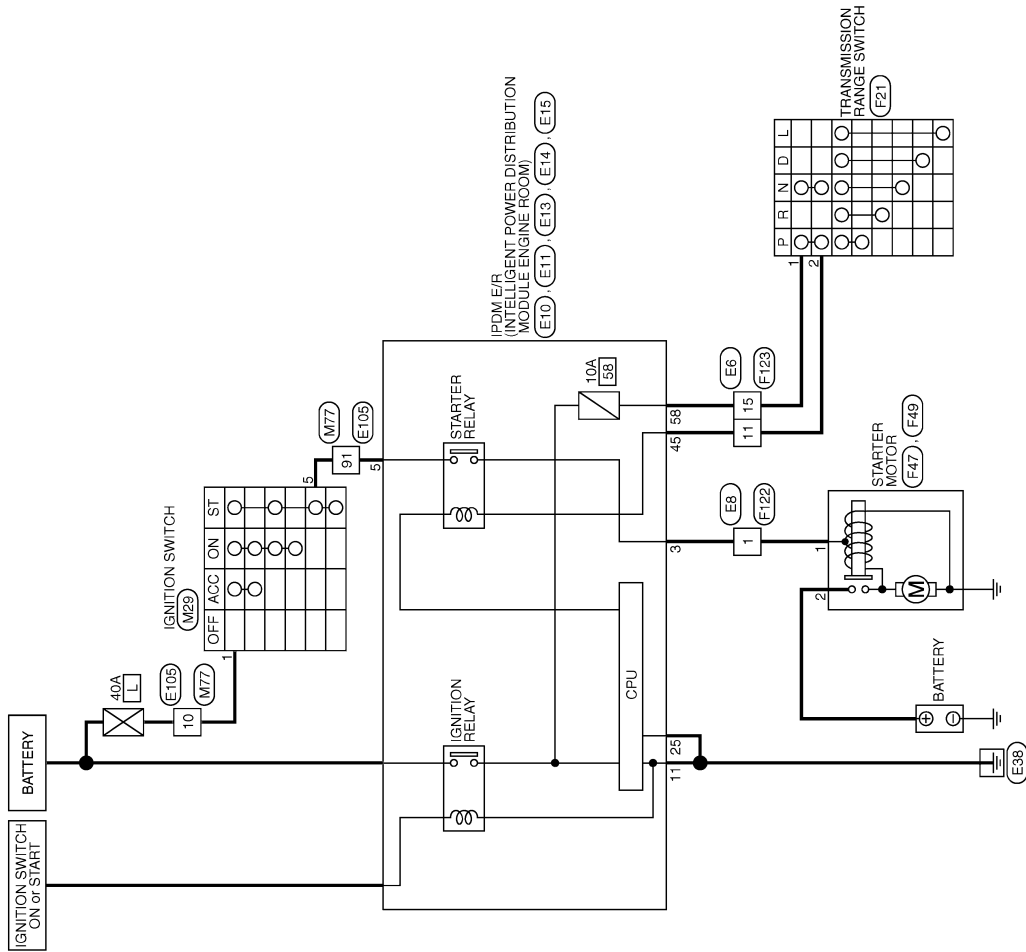
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### STARTING SYSTEM



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# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:000000007350009

Symptom	Reference
No normal cranking	Refer to <a href="#">STR-2. "Work Flow (With GR8-1200 NI)"</a> or <a href="#">STR-5. "Work Flow (Without GR8-1200 NI)"</a> .
Starter motor does not rotate	

# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS FOR USA AND CANADA

#### FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000007350010

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 AIR BAG" and "SEAT BELT" of this Service Manual.

#### **WARNING:**

**Always observe the following items for preventing accidental activation.**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

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

#### **WARNING:**

**Always observe the following items for preventing accidental activation.**

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

#### FOR MEXICO

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

INFOID:000000007350012

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. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

#### **WARNING:**

**Always observe the following items for preventing accidental activation.**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

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

#### **WARNING:**

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## PRECAUTIONS

< PRECAUTION >

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**Always observe the following items for preventing accidental activation.**

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

# PREPARATION

< PREPARATION >

## PREPARATION


### PREPARATION

#### Special Service Tools

INFOID:000000009354233

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Tool number (Kent-Moore No.) Tool name	Description
<p>— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station</p>  <p style="text-align: center;">AWI1A1239ZZ</p>	<p>Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.</p>


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#### Commercial Service Tools

INFOID:000000007350015

Tool name	Description
<p>Power tool</p>  <p style="text-align: center;">PIIB1407E</p>	<p>Loosening bolts, nuts and screws</p>

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# STARTER MOTOR

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

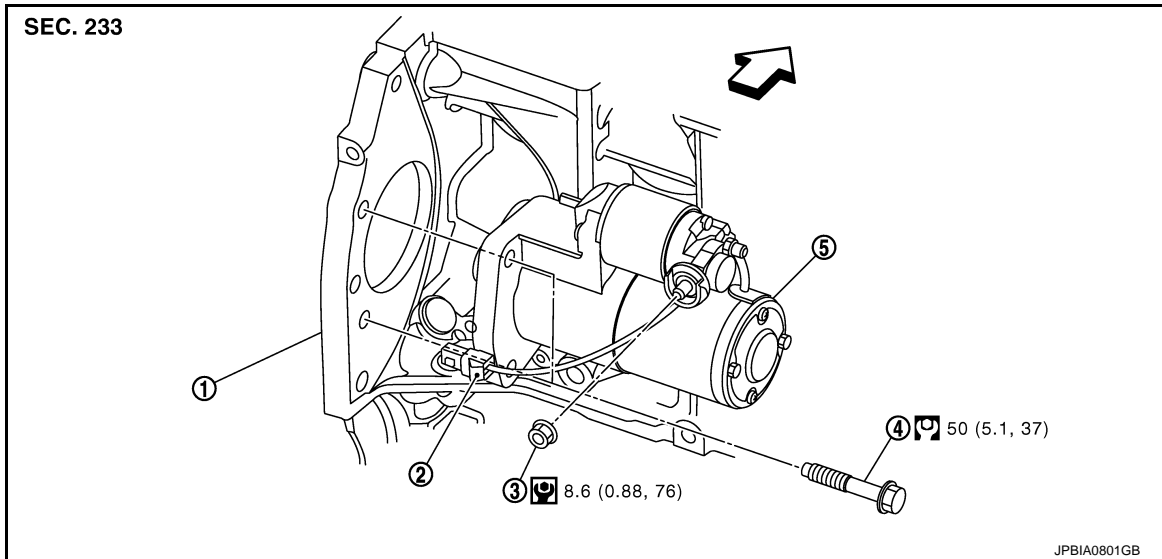
### STARTER MOTOR

2WD

2WD : Exploded View

INFOID:000000007350016

#### REMOVAL



1. Cylinder block
2. "S" connector
3. "B" terminal nut
4. Starter motor mounting bolt
5. Starter motor

↔ : Vehicle front

Refer to [GI-4, "Components"](#) for symbols in the figure.

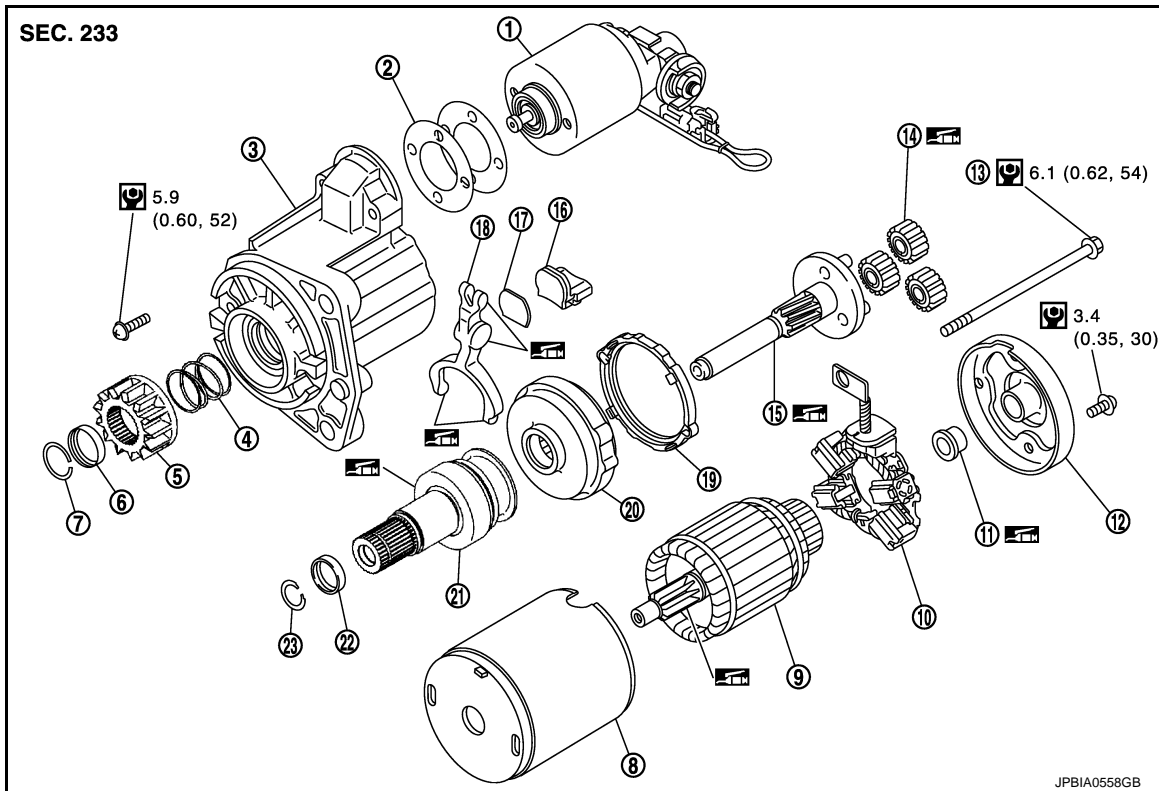
#### DISASSEMBLY

Type: M000TA0271




# STARTER MOTOR

## < REMOVAL AND INSTALLATION >



- |                             |                    |                         |
|-----------------------------|--------------------|-------------------------|
| 1. Magnetic switch assembly | 2. Adjusting plate | 3. Gear case            |
| 4. Spring                   | 5. Pinion          | 6. Pinion stopper       |
| 7. Stopper ring             | 8. Yoke            | 9. Armature             |
| 10. Brush holder assembly   | 11. Metal RR       | 12. Rear cover          |
| 13. Through bolt            | 14. Planetary gear | 15. Gear shaft          |
| 16. Packing                 | 17. Plate          | 18. Shift lever         |
| 19. Packing                 | 20. Internal gear  | 21. Over running clutch |
| 22. Retainer ring           | 23. Snap ring      |                         |

 : High-temperature grease point

Refer to [GI-4, "Components"](#) for symbols not described on the above.

## 2WD : Removal and Installation

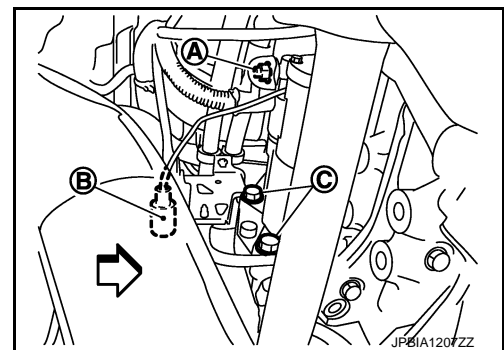
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### REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove "B" terminal nut (A) and "B" terminal harness.

 : Vehicle front

3. Disconnect "S" connector (B).
4. Remove starter motor mounting bolts (C), using power tools.



5. Remove starter motor downward from the vehicle.

### INSTALLATION

# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

Install in the reverse order of removal.

### CAUTION:

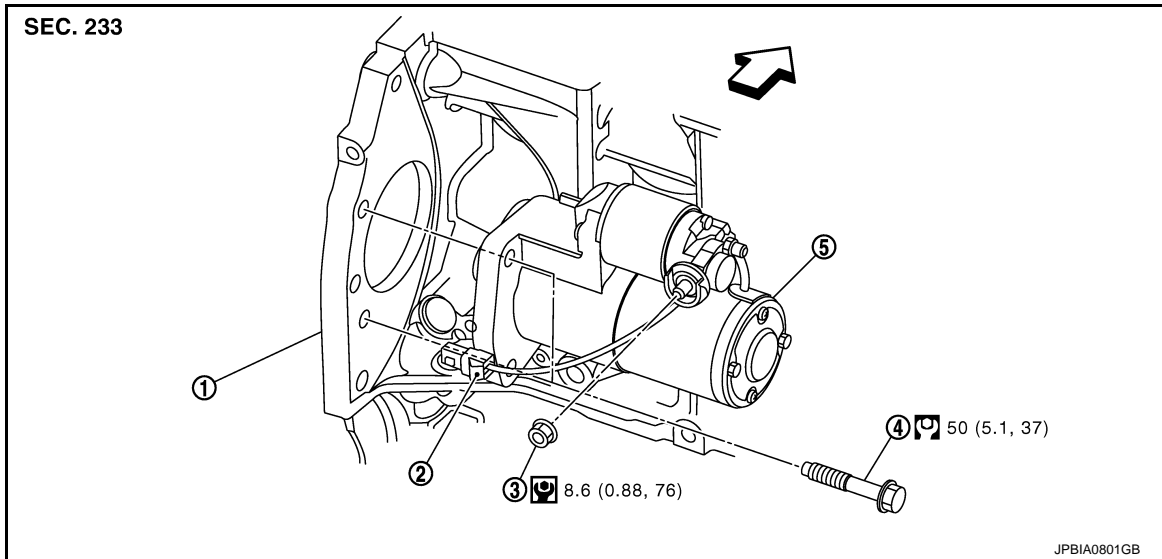
Be sure to tighten "B" terminal nut carefully.

AWD

AWD : Exploded View

INFOID:000000007350019

## REMOVAL



- |                                |                  |                     |
|--------------------------------|------------------|---------------------|
| 1. Cylinder block              | 2. "S" connector | 3. "B" terminal nut |
| 4. Starter motor mounting bolt | 5. Starter motor |                     |

⇨ : Vehicle front

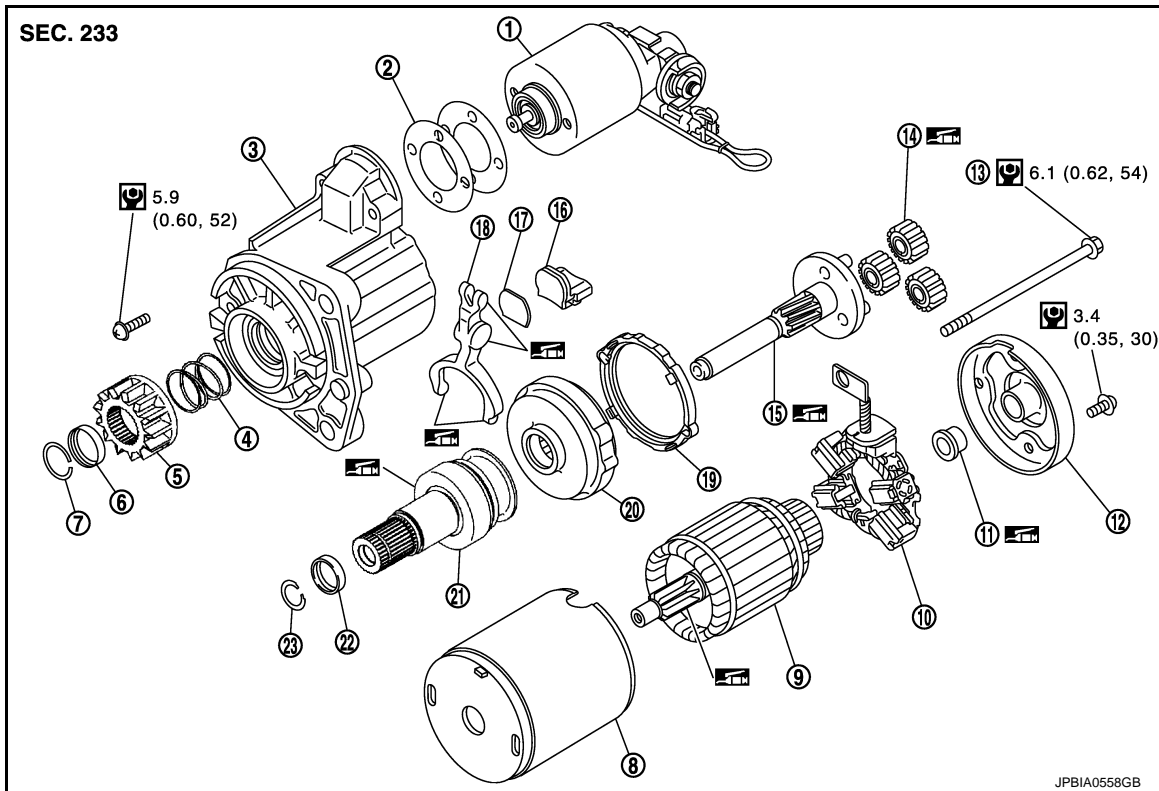
Refer to [GI-4, "Components"](#) for symbols in the figure.

## DISASSEMBLY

Type: M000TA0271

# STARTER MOTOR

## < REMOVAL AND INSTALLATION >



- |                             |                    |                         |
|-----------------------------|--------------------|-------------------------|
| 1. Magnetic switch assembly | 2. Adjusting plate | 3. Gear case            |
| 4. Spring                   | 5. Pinion          | 6. Pinion stopper       |
| 7. Stopper ring             | 8. Yoke            | 9. Armature             |
| 10. Brush holder assembly   | 11. Metal RR       | 12. Rear cover          |
| 13. Through bolt            | 14. Planetary gear | 15. Gear shaft          |
| 16. Packing                 | 17. Plate          | 18. Shift lever         |
| 19. Packing                 | 20. Internal gear  | 21. Over running clutch |
| 22. Retainer ring           | 23. Snap ring      |                         |

: High-temperature grease point

Refer to [GI-4, "Components"](#) for symbols not described on the above.

## AWD : Removal and Installation

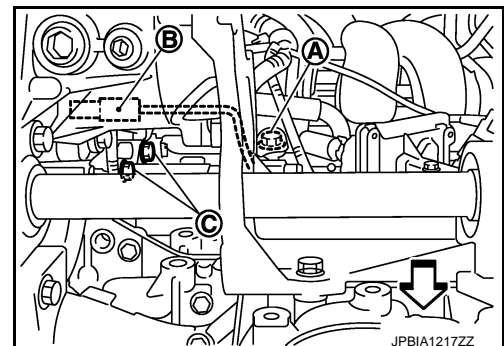
INFOID:000000007350020

### REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove front wheel and tire (RH).
3. Remove "B" terminal nut (A) and "B" terminal harness.

: Vehicle front

4. Disconnect "S" connector (B).
5. Remove starter motor mounting bolts (C), using power tools.



6. Slide the alternator out and remove.

## STARTER MOTOR

< REMOVAL AND INSTALLATION >

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### INSTALLATION

Install 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)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Starter Motor

INFOID:000000007350022

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Applied model		QR25DE
Type		M000TA0271
		MITSUBISHI make
		Reduction gear type
System voltage	[V]	12
No-load	Terminal voltage	[V] 11
	Current	[A] Less than 90
	Revolution	[rpm] More than 2,400

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