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# SECTION STR

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## STARTING SYSTEM

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## PRECAUTION

### PRECAUTIONS

#### Precaution 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. Information necessary to service the system safely is included in the SR 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 SR section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

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

**WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery and wait at least three minutes before performing any service.

# PREPARATION

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## PREPARATION

### PREPARATION


#### Special Service Tool

INFOID:0000000011933350

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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
<p>— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station</p>  <p>AWIIA1239ZZ</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

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Tool name	Description
<p>Power tool</p>  <p>PIIB1407E</p>	<p>Loosening nuts, screws and bolts</p>

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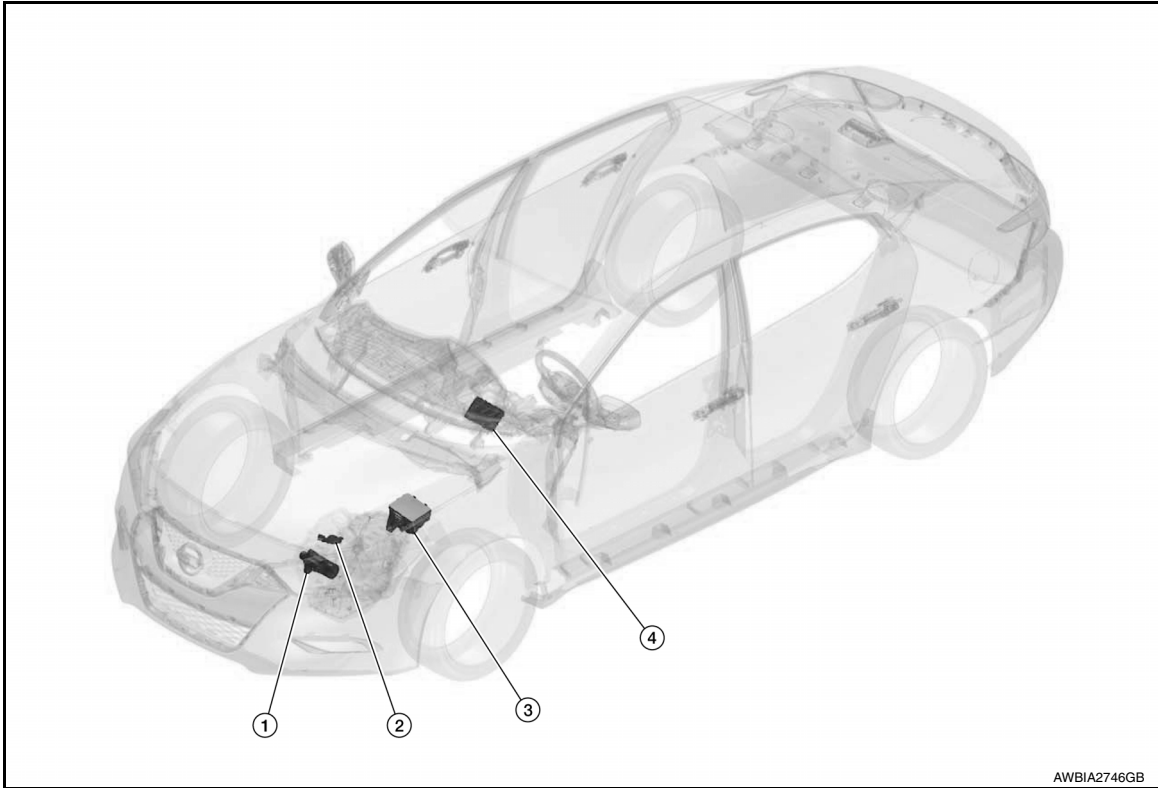
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SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:000000012213876



AWBIA2746GB

Component Description

INFOID:000000012213877

No.	Component part	Description
1.	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.
2.	Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside IPDM E/R when the selector lever is shifted to the P or N position. Refer to <a href="#">TM-14, "CVT CONTROL SYSTEM : Transmission Range Switch"</a> .
3.	IPDM E/R	CPU inside IPDM E/R operates the starter relay when the ignition switch is in the start position. Refer to <a href="#">STR-4, "Component Parts Location"</a> .
4.	BCM	BCM controls the starter relay inside IPDM E/R. Refer to <a href="#">BCS-5, "BODY CONTROL SYSTEM : Component Parts Location"</a> .

# STARTING SYSTEM

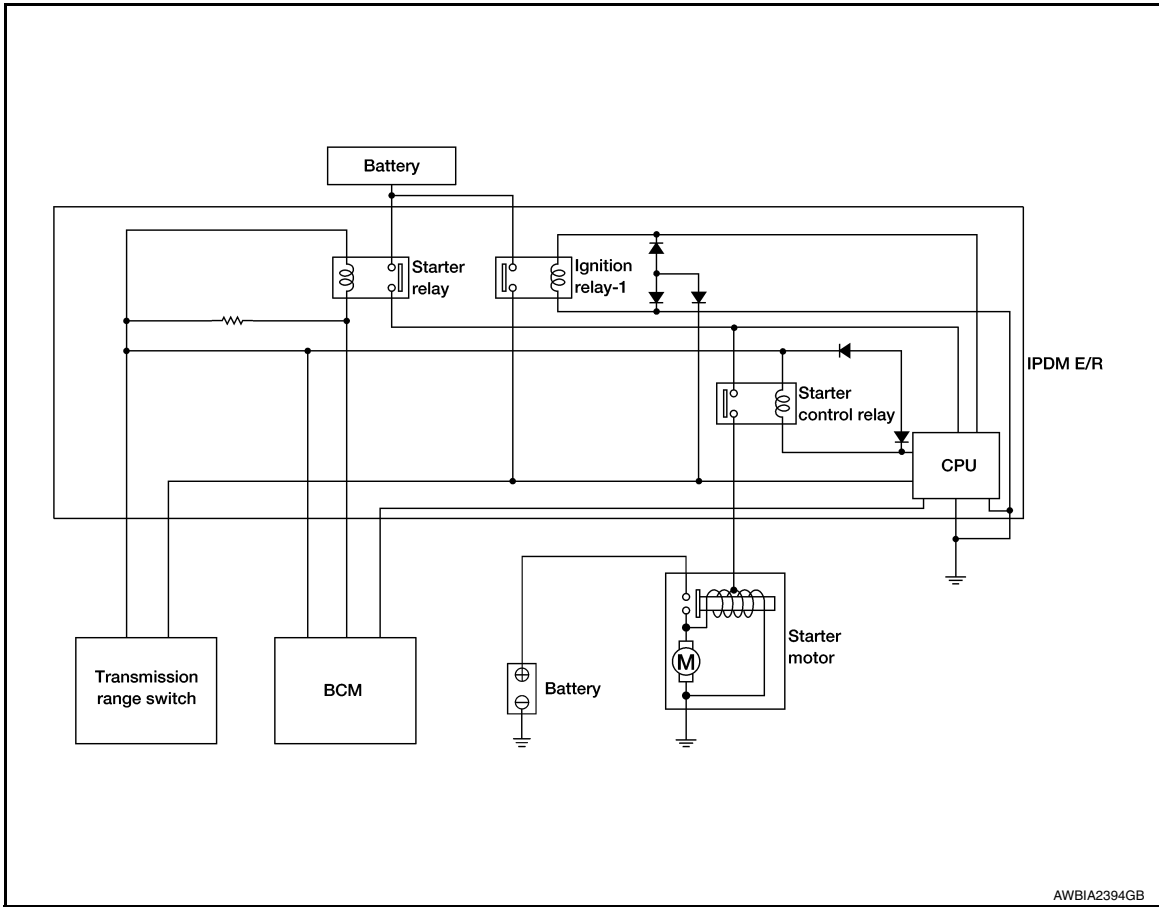
< SYSTEM DESCRIPTION >

[VQ35DE]

## STARTING SYSTEM

### System Diagram

INFOID:000000012213878



### System Description

INFOID:000000012213879

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.

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# STARTING SYSTEM

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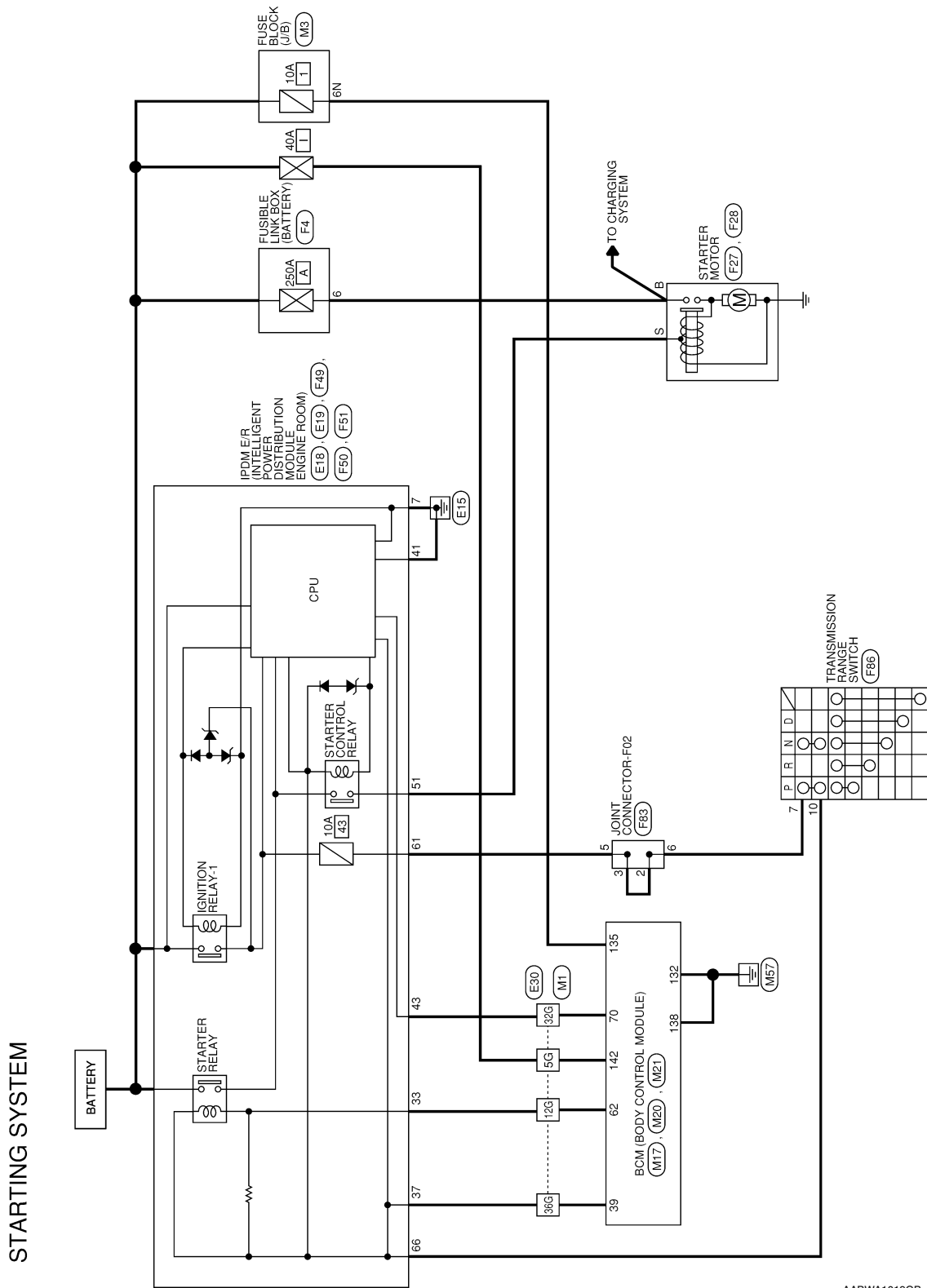
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## WIRING DIAGRAM

### STARTING SYSTEM

Wiring Diagram

INFOID:0000000011933347



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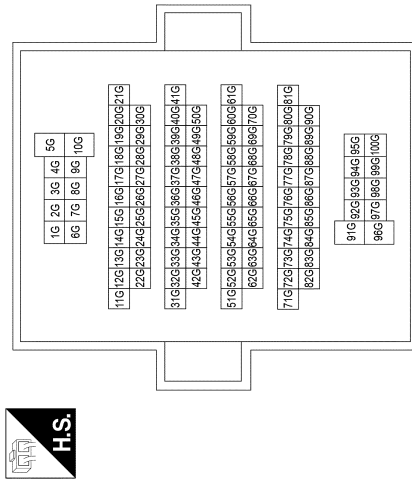
# STARTING SYSTEM

< WIRING DIAGRAM >

[VQ35DE]

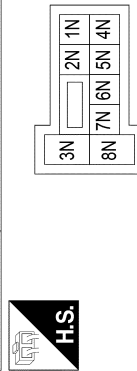
## STARTING SYSTEM CONNECTORS

Connector No.	M1
Connector Name	WIRES TO WIRE
Connector Type	TH80FW-CST6-TM4
Connector Color	WHITE



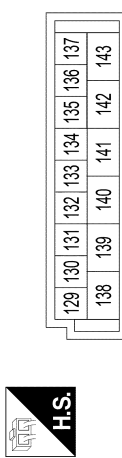
Terminal No.	Color of Wire	Signal Name
5G	W	-
12G	V	-
32G	G	-
36G	L	-

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Type	CS06FW-M2
Connector Color	WHITE



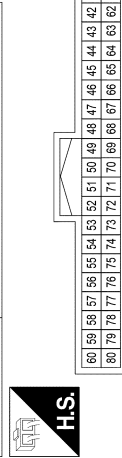
Terminal No.	Color of Wire	Signal Name
6N	LG	-

Connector No.	M17
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	FEA09FW-FHA6-SA
Connector Color	WHITE



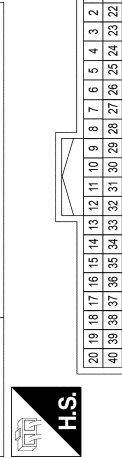
Terminal No.	Color of Wire	Signal Name
132	B	GND2
135	LG	BAT BCM FUSE
138	B	GND1
142	W	BAT-POWER F/L

Connector No.	M20
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FB-NH
Connector Color	BLACK



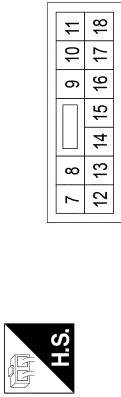
Terminal No.	Color of Wire	Signal Name
62	V	STARTER RELAY OUT
70	G	IGN USM OUT 1

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FG-NH
Connector Color	GREEN



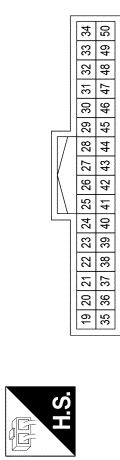
Terminal No.	Color of Wire	Signal Name

38	L	SHIFT N/P
Connector No.	E18	
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	
Connector Type	NS12FW-CS	
Connector Color	WHITE	



Terminal No.	Color of Wire	Signal Name
7	B	P-GND

Connector No.	E19
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH32FW-NH
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
33	R	START CONT
37	Y	CLUTCH L/L SW
41	B	S-GND
43	LG	IGN SIGNAL

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# STARTING SYSTEM

< WIRING DIAGRAM >

[VQ35DE]

Connector No.	F50
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS10FW-CS
Connector Color	WHITE



52	53	54	55
56	57	58	59
60	61		

Terminal No.	61	Color of Wire	Y	Signal Name	AT ECU
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Connector No.	F51
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW-NH
Connector Color	WHITE



62	63	64	65	66	67
68	69	70	71	72	73

Terminal No.	66	Color of Wire	LG	Signal Name	NPSW
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Connector No.	F27
Connector Name	STARTER MOTOR
Connector Type	24340_JA06A
Connector Color	-



Terminal No.	B	Color of Wire	B/R	Signal Name	-
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Connector No.	F28
Connector Name	STARTER MOTOR
Connector Type	X01FGY
Connector Color	GRAY



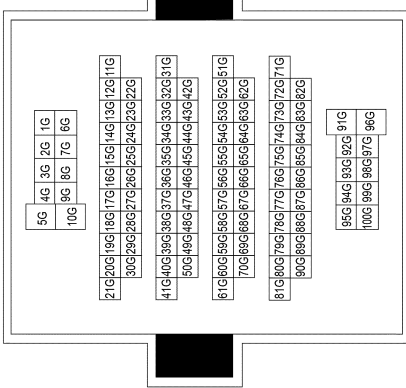
Terminal No.	S	Color of Wire	R	Signal Name	-
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Connector No.	F49
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M01FB-LC
Connector Color	BLACK



Terminal No.	51	Color of Wire	R	Signal Name	STARTER MOTOR
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Connector No.	E30
Connector Name	WIPE TO WIRE
Connector Type	TH80MW-CS116-TM4
Connector Color	WHITE



Terminal No.	5G	Color of Wire	P	Signal Name	-
	12G	Color of Wire	R	Signal Name	-
	35G	Color of Wire	LG	Signal Name	-
	36G	Color of Wire	Y	Signal Name	-

Connector No.	F4
Connector Name	FUSIBLE LINK BOX (BATTERY)
Connector Type	24340_JA04D
Connector Color	-



Terminal No.	6	Color of Wire	B/R	Signal Name	-
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# STARTING SYSTEM

< WIRING DIAGRAM >

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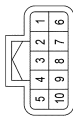
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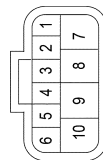
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Connector No.	F83
Connector Name	JOINT CONNECTOR-F02
Connector Type	RH10FB
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
2	Y	-
3	Y	-
5	Y	-
6	Y	-

Connector No.	F86
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	YDX08FB-HS4
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
7	Y	-
10	LG	-

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## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

#### Work Flow (With GR8-1200 NI)

INFOID:0000000011933338

#### 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:**

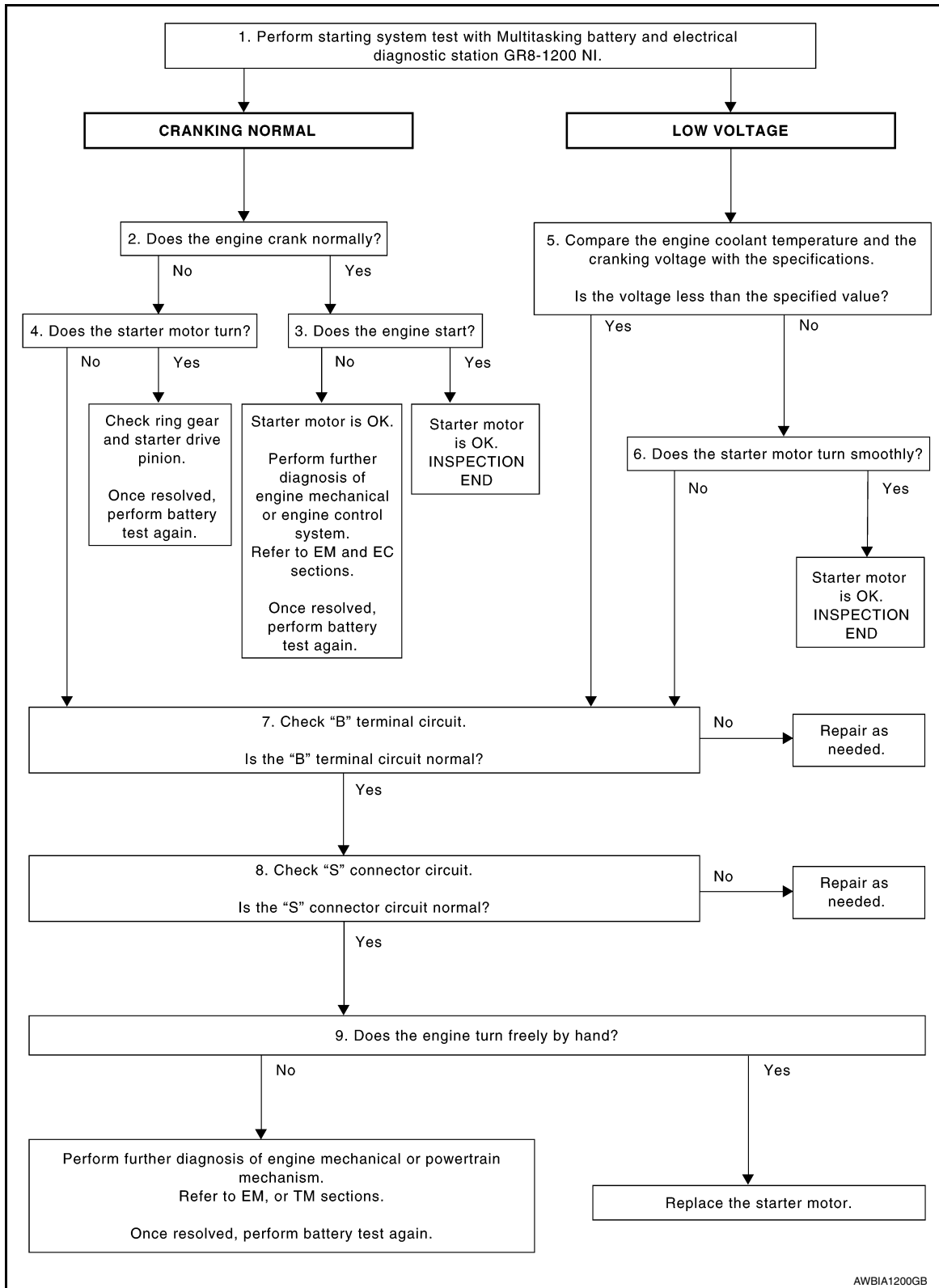
Refer to the diagnostic station Instruction Manual for proper starting system diagnosis procedures.

# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[VQ35DE]

## OVERALL SEQUENCE



### DETAILED FLOW

#### NOTE:

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

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

# DIAGNOSIS AND REPAIR WORKFLOW

[VQ35DE]

## < 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 properly.

### 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 >> Inspection End.

NO >> Perform further diagnosis of engine mechanical or engine control system. Refer to 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 verify the cranking voltage is within 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.

### Does the starter motor turn smoothly?

YES >> Inspection End.

NO >> GO TO 7.

## 7. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to [STR-16, "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-17, "Diagnosis Procedure"](#).

# DIAGNOSIS AND REPAIR WORKFLOW

[VQ35DE]

< 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-19. "Removal and Installation"](#).

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.

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# DIAGNOSIS AND REPAIR WORKFLOW

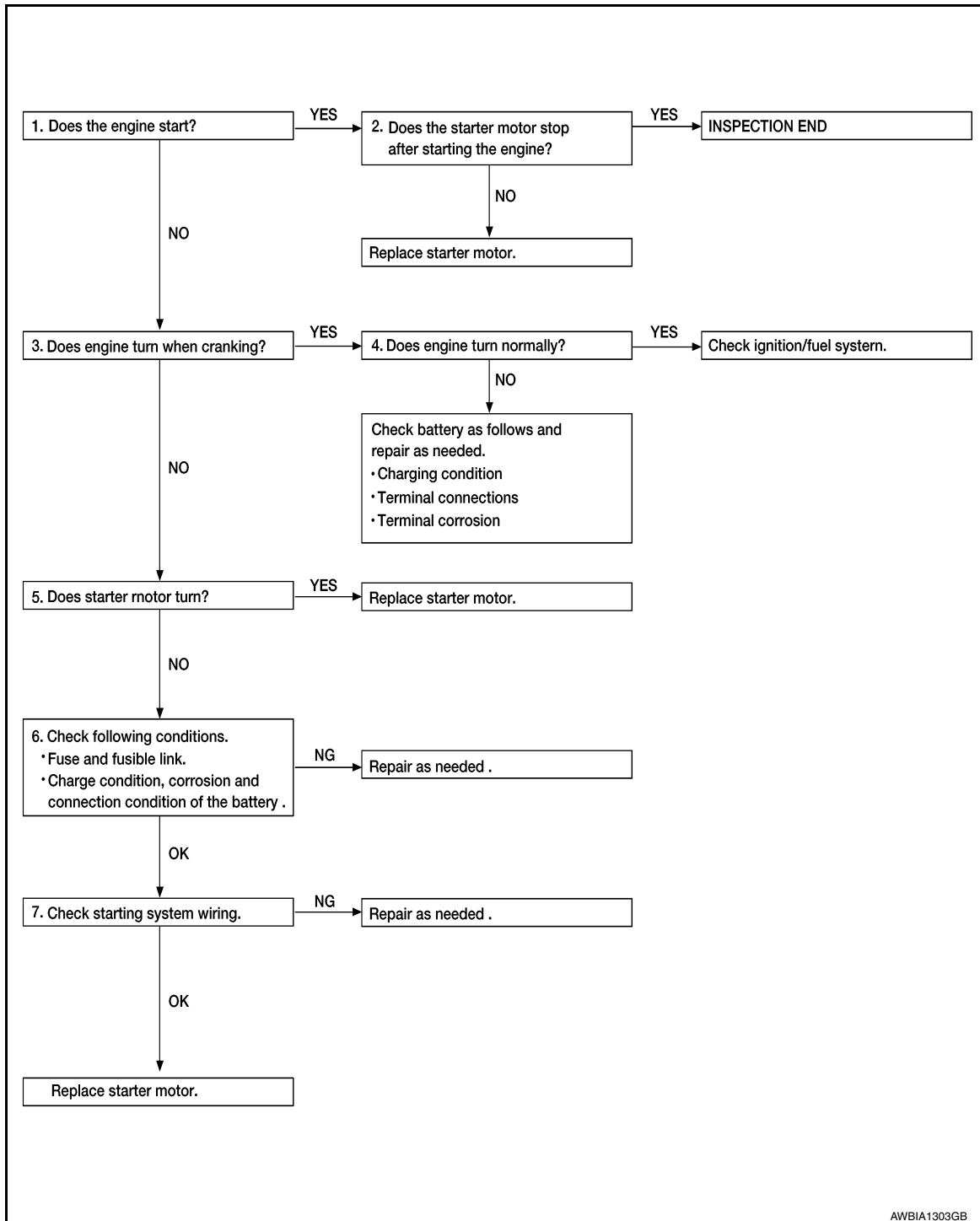
< BASIC INSPECTION >

[VQ35DE]

Work Flow (Without GR8-1200 NI)

INFOID:000000011933339

## 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?

YES >> GO TO 2.

NO >> GO TO 3.

# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

[VQ35DE]

## 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-19. "Removal and Installation"](#).

## 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-92. "How to Handle Battery"](#).

## 5. CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to [STR-19. "Removal and Installation"](#).

NO >> GO TO 6.

## 6. CHECK POWER SUPPLY CIRCUIT

Check the following conditions:

- Fuse and fusible link
- Charge condition, corrosion and connection of the battery.

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-16. "Diagnosis Procedure"](#).
- "S" terminal circuit. Refer to [STR-17. "Diagnosis Procedure"](#).

Are the inspection results normal?

YES >> Replace starter motor. Refer to [STR-19. "Removal and Installation"](#).

NO >> Repair as needed.

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## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Diagnosis Procedure

INFOID:0000000012214532

Regarding Wiring Diagram information, refer to [STR-6. "Wiring Diagram"](#).

**CAUTION:**

**Perform diagnosis under the condition that the 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 depleted.

#### 1. CHECK TERMINAL B POWER SUPPLY VOLTAGE

1. Turn ignition switch OFF.
2. Make sure that starter motor connector F27 connection is clean and tight.
3. Check voltage between starter motor connector F27 and ground.

(+)		(-)	Voltage (Approx.)
Connector	Terminal		
F27	B	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 (VOLTAGE DROP TEST)

1. Shift the transmission into P (Park) or N (Neutral).
2. Check voltage between battery positive terminal and starter motor connector F27 while cranking the engine.

(+)	(-)		Condition	Voltage (Approx.)
	Connector	Terminal		
Battery (+) terminal	F27	B	While cranking the engine	Less than 0.5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check harness between the battery and the starter motor for high resistance.

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

Check voltage between starter motor case and battery negative terminal while cranking the engine.

(+)	(-)	Condition	Voltage (Approx.)
Starter motor case	Battery (-) terminal	While cranking the engine	Less than 0.5V

Is the inspection result normal?

YES >> Terminal B circuit is OK. Further inspection is necessary. Refer to [STR-10. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-14. "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> Check the starter motor case to engine mounting for high resistance.



# S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ35DE]

## S CONNECTOR CIRCUIT

### Diagnosis Procedure

INFOID:000000012214533

Regarding Wiring Diagram information, refer to [STR-6, "Wiring Diagram"](#).

#### 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 STARTER MOTOR MAGNETIC SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector F28.
3. Shift transmission into P (Park) or N (Neutral).
4. Check voltage between starter motor connector F28 and ground with the ignition in START.

(+)		(-)	Condition	Voltage (Approx.)
Connector	Terminal			
F28	S	Ground	Ignition switch in START position	Battery voltage

Is the inspection result normal?

YES >> Magnetic switch circuit is OK. Further inspection is necessary. Refer to [STR-10, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-14, "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> GO TO 2.

#### 2. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check the IPDM E/R connector F49 and starter motor connector F28 for damage, bent pins and loose connections.

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 F49 and starter motor connector F28.
2. Check continuity between starter motor connector F28 and IPDM E/R connector F49.

Connector	Terminal	Connector	Terminal	Continuity
F28	S	F49	51	Yes

3. Check continuity between starter motor connector F28 and ground.

Connector	Terminal	—	Continuity
F28	S	Ground	No

Is the inspection result normal?

YES >> Further inspection is necessary. Refer to [STR-10, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-14, "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> Repair the harness.

**SYMPTOM DIAGNOSIS**

## STARTING SYSTEM

## Symptom Table

INFOID:0000000011933348

Symptom	Reference
No normal cranking	Refer to <a href="#">STR-10, "Work Flow (With GR8-1200 NI)"</a> or <a href="#">STR-14, "Work Flow (Without GR8-1200 NI)"</a> .
Starter motor does not rotate	

# STARTER MOTOR

< REMOVAL AND INSTALLATION >

[VQ35DE]

## REMOVAL AND INSTALLATION

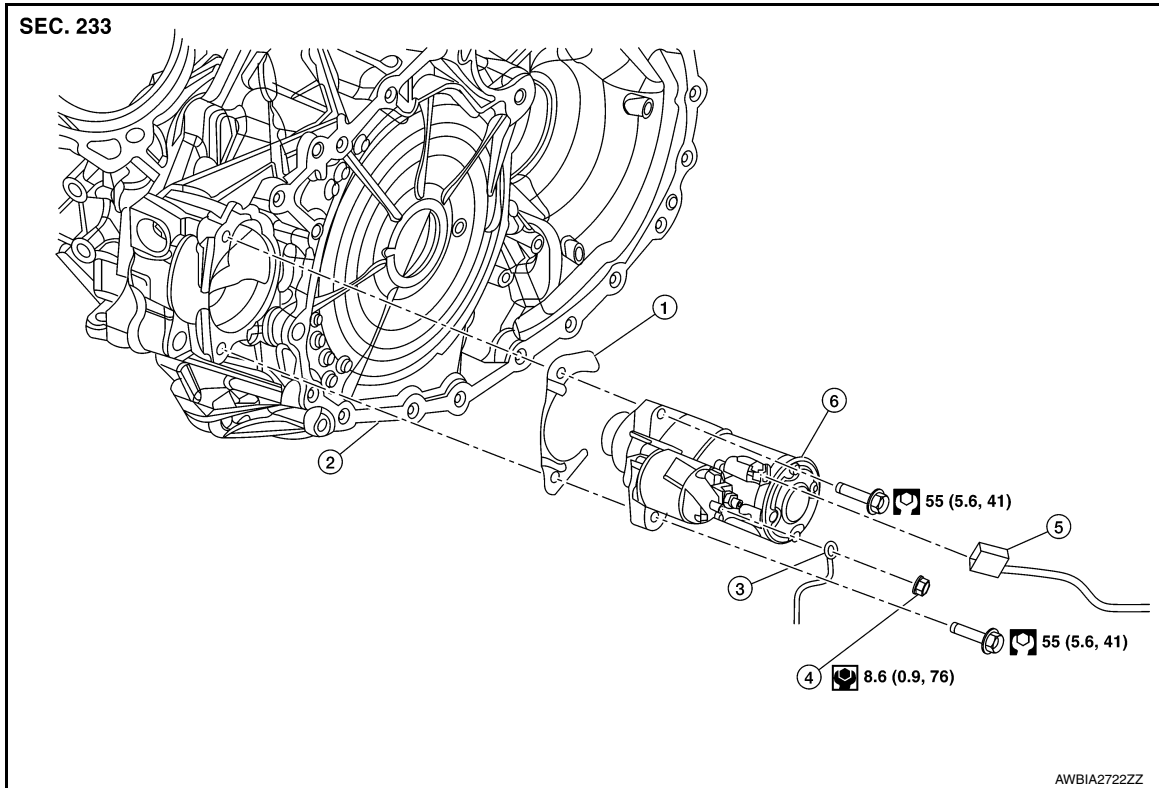
### STARTER MOTOR

Exploded View

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|---------------------|------------------------------|-------------------------|
| 1. Shim             | 2. Converter housing         | 3. "B" terminal harness |
| 4. "B" terminal nut | 5. Starter harness connector | 6. Starter motor        |

### Removal and Installation

INFOID:0000000011933352

#### REMOVAL

1. Remove the battery tray. Refer to [PG-103, "Removal and Installation \(Battery Tray\)"](#).
2. Remove the "B" terminal nut and disconnect "B" terminal and starter harness connectors.
3. Remove the starter bolts, then remove the starter.

#### CAUTION:

**Do not contact with or damage surrounding parts when removing starter from vehicle.**

#### INSTALLATION

Installation is in the reverse order of removal.

- Reset electronic systems as necessary. Refer to [PG-95, "ADDITIONAL SERVICE WHEN REMOVING BATTERY NEGATIVE TERMINAL : Special Repair Requirement"](#).

#### CAUTION:

**Be careful to tighten "B" terminal nut to specified torque.**

**"B" terminal nut : 8.6 N·m (0.9 kg-m, 76 in-lb)**

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# STARTER MOTOR

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ35DE]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### STARTER MOTOR

#### Starter

INFOID:0000000011933353

Application		VQ35DE
		CVT model
Type*		MITSUBISHI M000TB0272ZC
		Reduction gear type
System voltage		12V
No-load	Terminal voltage	11V
	Current	Less than 90A
	Revolution	More than 2,370 rpm

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