

SECTION STR

STARTING SYSTEM

CONTENTS

PRECAUTION	2	BASIC INSPECTION	12	A
PRECAUTIONS	2	DIAGNOSIS AND REPAIR WORKFLOW	12	STR
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	2	Work Flow (With GR8-1200 NI)	12	
Precaution for Power Generation Voltage Variable Control System	2	Work Flow (Without GR8-1200 NI)	16	C
PREPARATION	3	DTC/CIRCUIT DIAGNOSIS	18	D
PREPARATION	3	B TERMINAL CIRCUIT	18	E
Special Service Tool	3	Description	18	F
Commercial Service Tool	3	Diagnosis Procedure	18	G
SYSTEM DESCRIPTION	4	S CONNECTOR CIRCUIT	20	H
COMPONENT PARTS	4	Description	20	I
QR25DE	4	Diagnosis Procedure	20	J
QR25DE : Component Parts Location	4	SYMPTOM DIAGNOSIS	21	
QR25DE : Component Description	4	STARTING SYSTEM	21	K
VQ35DE	4	Symptom Table	21	L
VQ35DE : Component Parts Location	5	REMOVAL AND INSTALLATION	22	
VQ35DE : Component Description	5	STARTER MOTOR	22	M
SYSTEM	6	QR25DE	22	N
System Diagram	6	QR25DE : Exploded View	22	
System Description	6	QR25DE : Removal and Installation	22	O
Component Description	6	VQ35DE	23	
WIRING DIAGRAM	7	VQ35DE : Exploded View	23	P
STARTING SYSTEM	7	VQ35DE : Removal and Installation	23	
Wiring Diagram	7	SERVICE DATA AND SPECIFICATIONS (SDS)	24	
		STARTER MOTOR	24	
		Starter	24	

PRECAUTIONS

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PRECAUTION

PRECAUTIONS

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

INFOID:000000011103074

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.

Precaution for Power Generation Voltage Variable Control System

INFOID:000000011103075

CAUTION:

For this model, the battery current sensor that is installed to the battery cable at the negative terminal measures the charging/discharging current of the battery, and performs various controls. If the electrical component or the ground wire is connected directly to the battery terminal, the current other than that being measured with the battery current sensor is charging to or discharging from the battery. This condition causes the malfunction of the control, and then the battery discharge may occur. Do not connect the electrical component or the ground wire directly to the battery terminal.

PREPARATION

< PREPARATION >

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PREPARATION


Special Service Tool

INFOID:0000000010484154

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

Tool number (TechMate No.) Tool name	Description
<p>— (165-GR8-1200KIT-NI) Nissan battery and electronics tester</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 Tool

INFOID:0000000010484155

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

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COMPONENT PARTS

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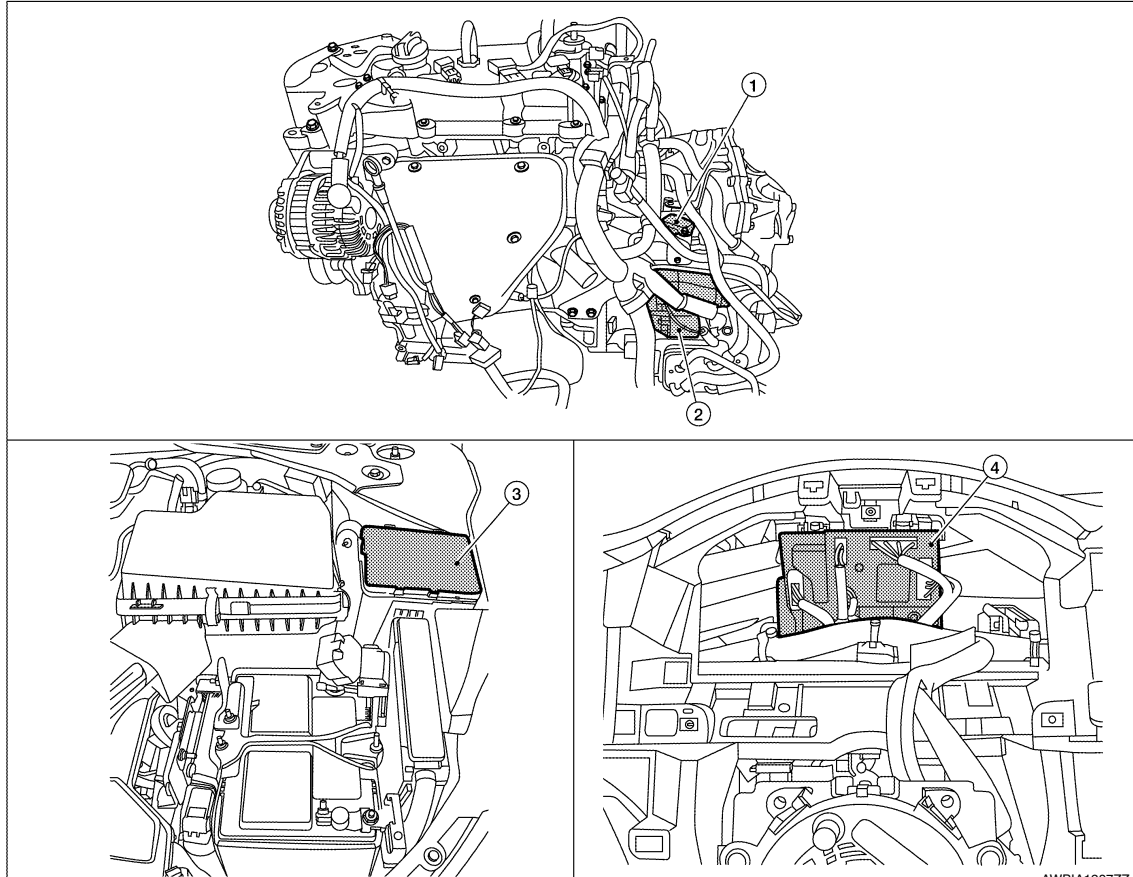
SYSTEM DESCRIPTION

COMPONENT PARTS

QR25DE

QR25DE : Component Parts Location

INFOID:0000000010484156



- 1. Transmission range switch
- 2. Starter motor
- 3. IPDM E/R
- 4. BCM (view with combination meter removed)

QR25DE : Component Description

INFOID:0000000010484157

Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside the IPDM E/R when the shift selector is placed in the P or N position.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R operates the starter relay when the ignition switch is in the start position.
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.

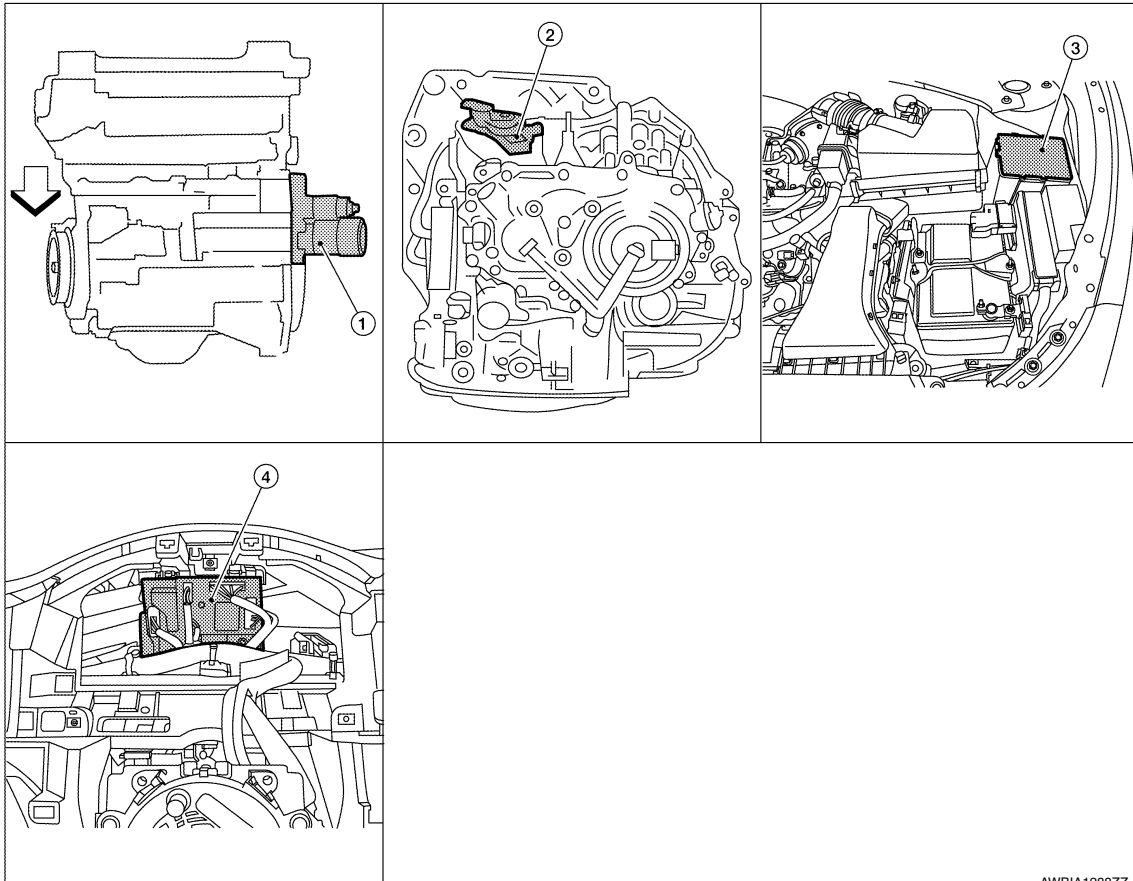
VQ35DE

COMPONENT PARTS

< SYSTEM DESCRIPTION >

VQ35DE : Component Parts Location

INFOID:000000010484158



AWBIA1288ZZ

← Vehicle front

- 1. Starter motor
- 2. Transmission range switch
- 3. IPDM E/R
- 4. BCM (view combination meter removed)

VQ35DE : Component Description

INFOID:000000010484159

Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside the IPDM E/R when the shift selector is placed in the P or N position.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R operates the starter relay when the ignition switch is in the start position.
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.

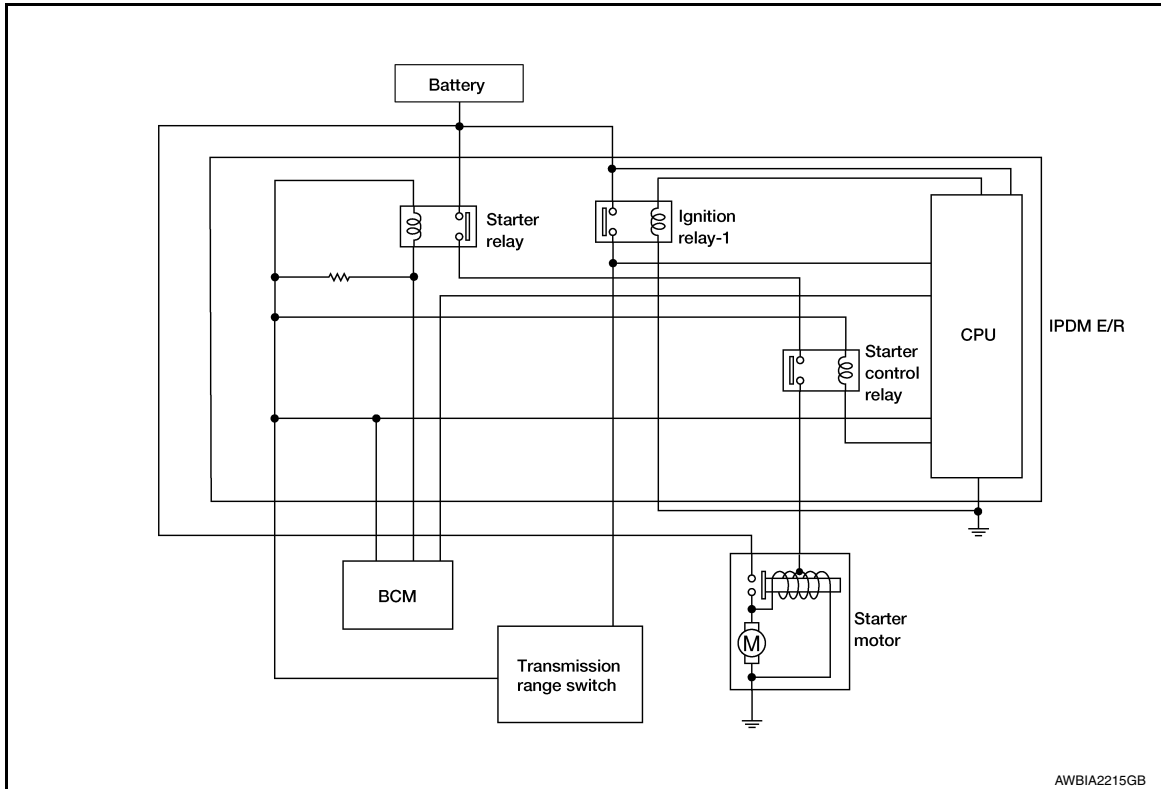
SYSTEM

< SYSTEM DESCRIPTION >

SYSTEM

System Diagram

INFOID:000000010484160



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System Description

INFOID:000000010484161

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.

Component Description

INFOID:000000010484162

Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside the IPDM E/R when the shift selector is placed in the P or N position.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R controls the starter control relay.
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.

STARTING SYSTEM

< WIRING DIAGRAM >

WIRING DIAGRAM

STARTING SYSTEM

Wiring Diagram

INFOID:0000000010484163

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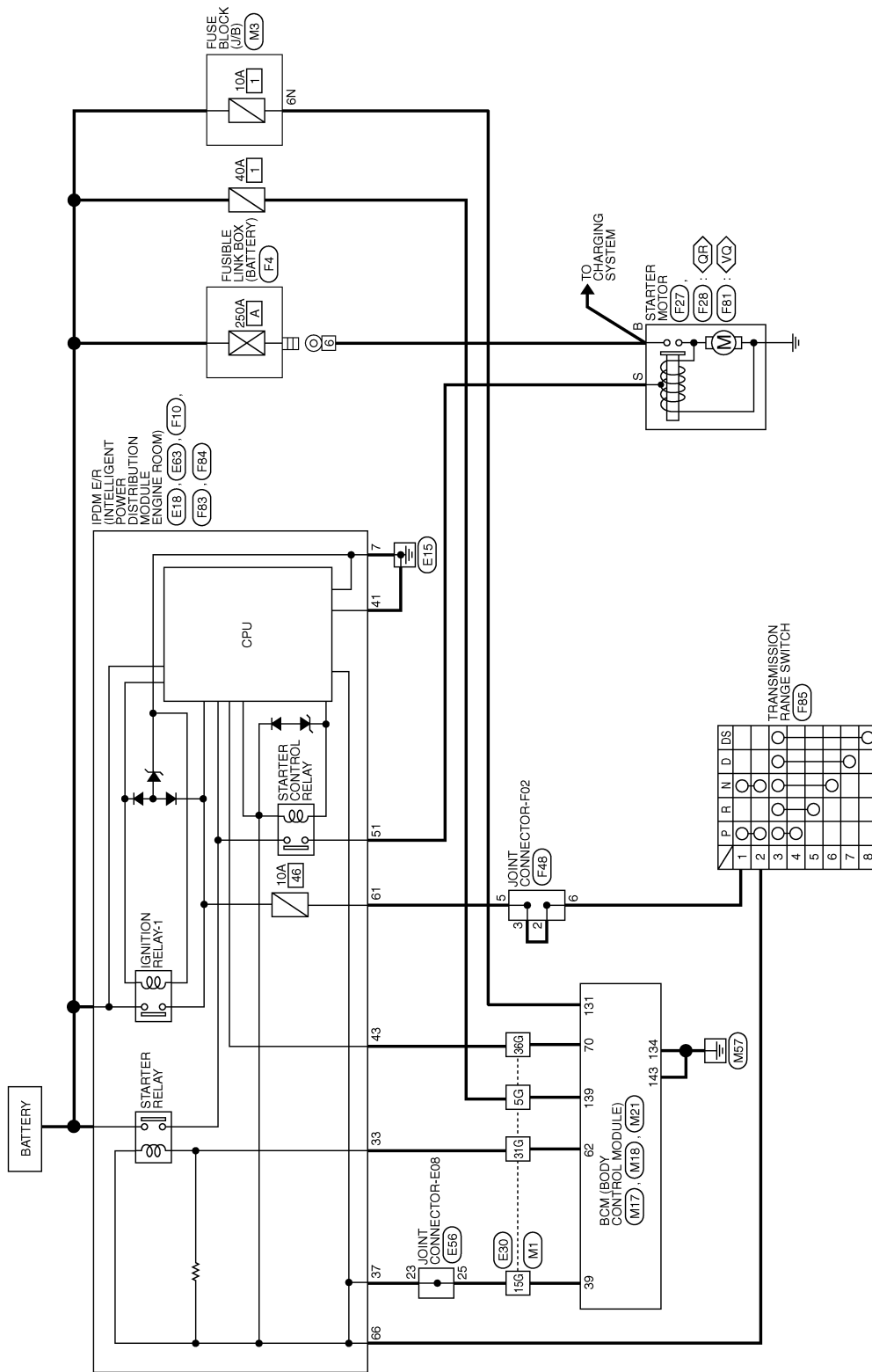
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OR : WITH QR25DE
VO : WITH VQ35DE

STARTING SYSTEM



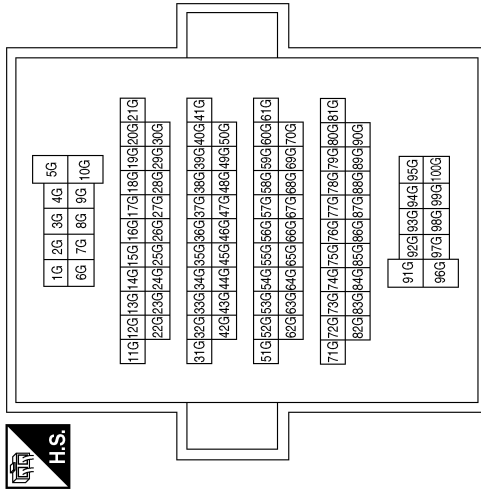
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STARTING SYSTEM

< WIRING DIAGRAM >

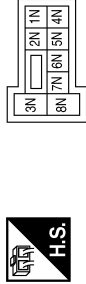
STARTING SYSTEM CONNECTORS

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE



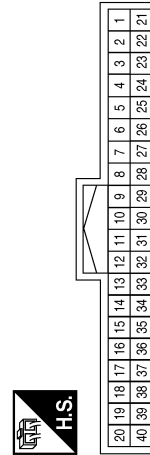
Terminal No.	Color of Wire	Signal Name
5G	W	-
15G	L	-
31G	BR	-
36G	G	-

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE



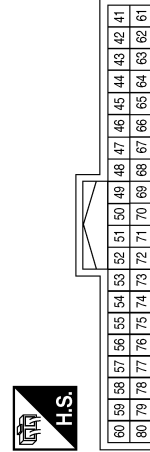
Terminal No.	Color of Wire	Signal Name
6N	W	-

Connector No.	M17
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	GREEN



Terminal No.	Color of Wire	Signal Name
39	L	SHIFT N/P

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	BLACK



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

Connector No.	M21
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	WHITE



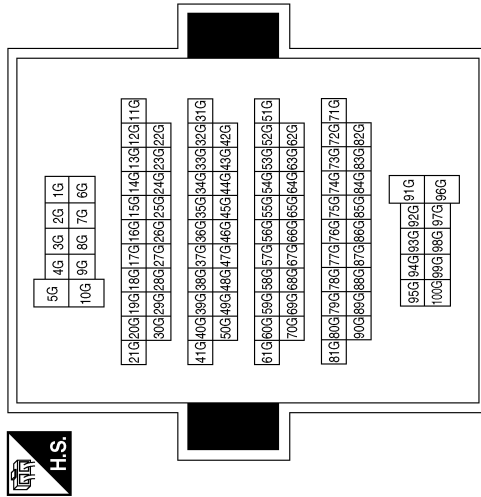
Terminal No.	Color of Wire	Signal Name
131	W	BAT BCM FUSE
134	B	GND 2
139	W	BAT POWER F/L
143	B	GND 1

STARTING SYSTEM

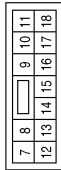
< WIRING DIAGRAM >

Terminal No.	Color of Wire	Signal Name
5G	P	-
15G	W	-
31G	R	-
36G	LG	-

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

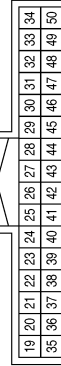


Terminal No.	Color of Wire	Signal Name
7	B	P-GND

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

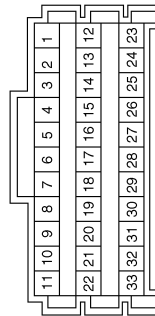


Connector No.	E63
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



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

Connector No.	E56
Connector Name	JOINT CONNECTOR-E08
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
23	W	-
25	W	-

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



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STARTING SYSTEM



< WIRING DIAGRAM >

Connector No.	F28
Connector Name	STARTER MOTOR (WITH QR25DE)
Connector Color	-



Terminal No.	S	Color of Wire	R	Signal Name	-
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Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	-


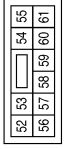
Terminal No.	B	Color of Wire	B/R	Signal Name	-
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Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK



Terminal No.	51	Color of Wire	R	Signal Name	STARTER MOTOR
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Connector No.	F83
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE


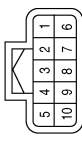
Terminal No.	61	Color of Wire	Y	Signal Name	AT ECU
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Connector No.	F81
Connector Name	STARTER MOTOR (WITH VQ35DE)
Connector Color	GRAY

Terminal No.	S	Color of Wire	R	Signal Name	-
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Connector No.	F48
Connector Name	JOINT CONNECTOR-F02
Connector Color	BLACK

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

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STARTING SYSTEM

< WIRING DIAGRAM >

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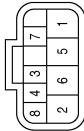
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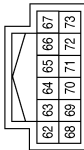
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Connector No.	F85
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	-
2	LG	-

Connector No.	F84
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
66	LG	NPSW

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DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow (With GR8-1200 NI)

INFOID:000000010484164

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

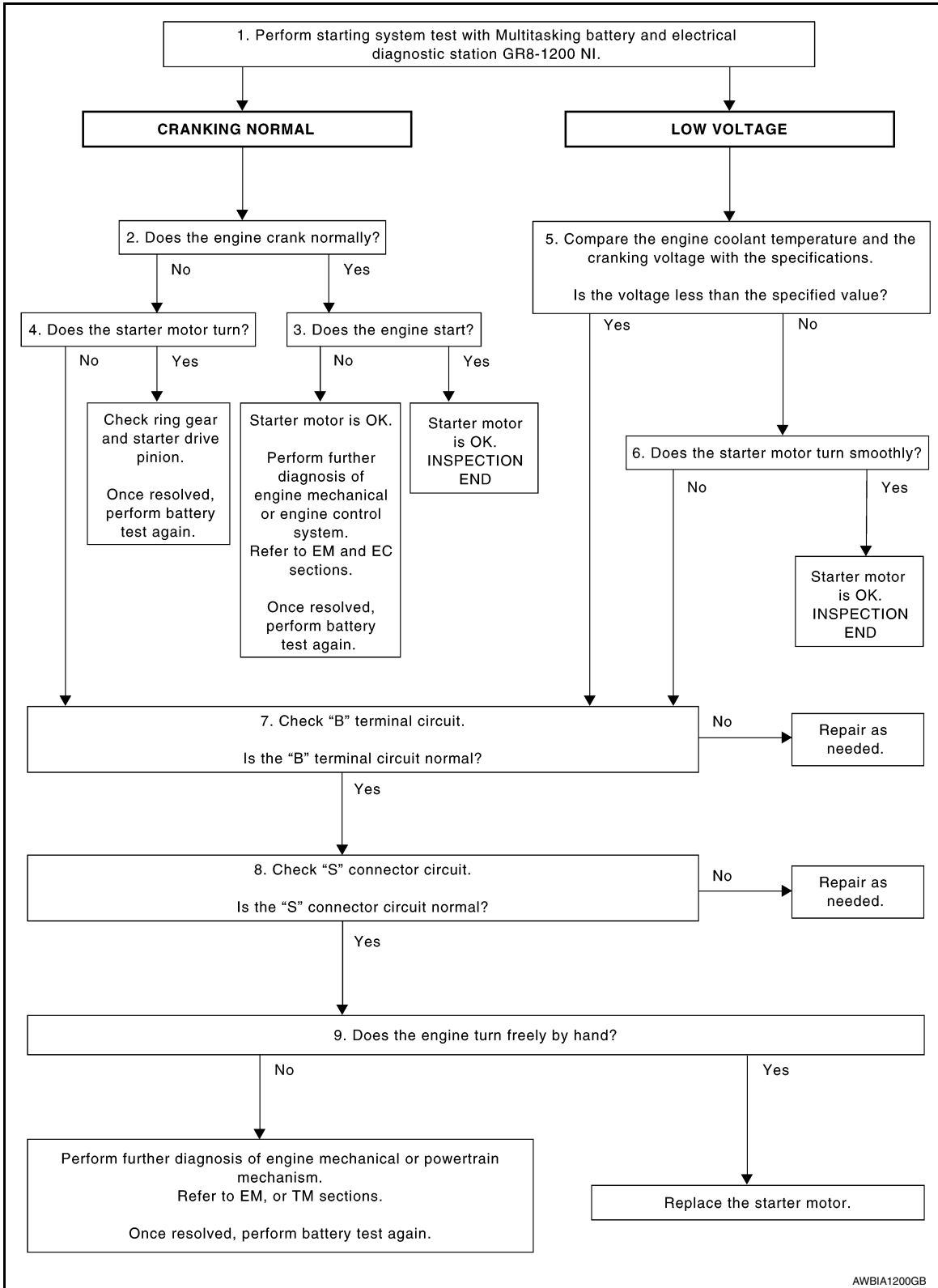
NOTE:

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

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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

< 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-18, "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-20, "Diagnosis Procedure"](#).

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

Is "S" connector circuit normal?

YES >> GO TO 9.

NO >> Repair as needed.

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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-22. "QR25DE : Removal and Installation"](#) (QR25DE) or [STR-23. "VQ35DE : Removal and Installation"](#) (VQ35DE).

C

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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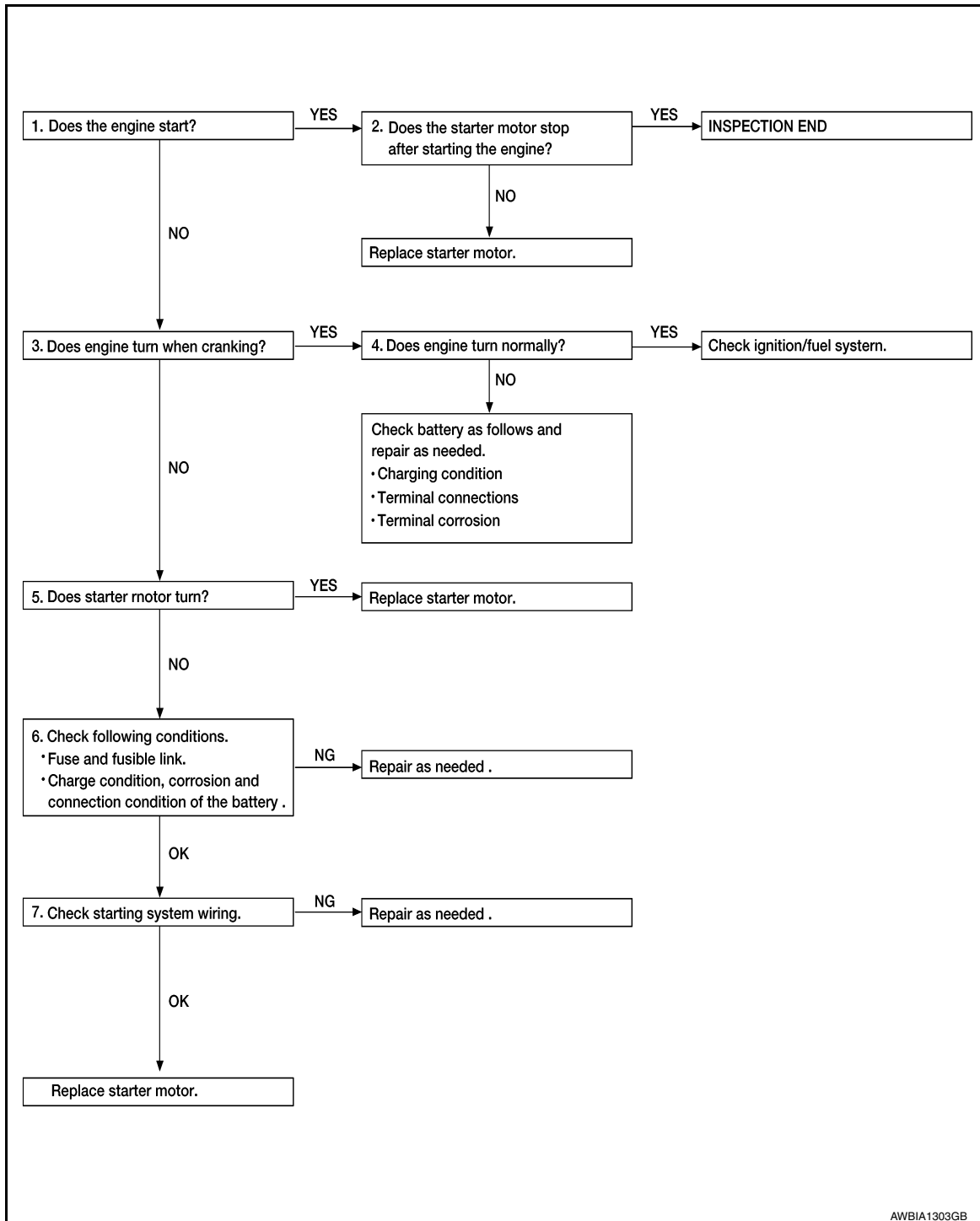
DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

Work Flow (Without GR8-1200 NI)

INFOID:000000010484165

OVERALL SEQUENCE



AWBIA1303GB

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 >

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-22, "QR25DE : Removal and Installation"](#) (QR25DE) or [STR-23, "VQ35DE : Removal and Installation"](#) (VQ35DE).

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.

5. CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to [STR-22, "QR25DE : Removal and Installation"](#) (QR25DE) or [STR-23, "VQ35DE : Removal and Installation"](#) (VQ35DE).

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-18, "Diagnosis Procedure"](#).
- "S" terminal circuit. Refer to [STR-20, "Diagnosis Procedure"](#).

Are the inspection results normal?

YES >> Replace starter motor. Refer to [STR-22, "QR25DE : Removal and Installation"](#) (QR25DE) or [STR-23, "VQ35DE : Removal and Installation"](#) (VQ35DE).

NO >> Repair as needed.

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B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000010484166

Terminal "B" is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000010484167

Regarding Wiring Diagram information, refer to [STR-7. "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 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 connector F27 and ground.

Terminals			Voltage (Approx.)
(+)	(-)		
Starter motor B terminal	Terminal		Battery voltage
F27	B		
		Ground	

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 selector to P (Park) or N (Neutral) position.
2. Check voltage between battery positive terminal and starter motor B terminal.

Terminals			Condition	Voltage (Approx.)
(+)	(-)			
	Starter motor "B" terminal	Terminal	When the ignition switch is in START position	Less than 0.5V
Battery positive terminal	F27	B		

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check harness between the battery and starter motor for poor continuity.

3. CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift selector lever to P (Park) or N (Neutral) 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 0.2V

Is the inspection result normal?

B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

- YES >> "B" terminal circuit is OK. Further inspection is necessary. Refer to [STR-12. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-16. "Work Flow \(Without GR8-1200 NI\)"](#).
- NO >> Check the starter motor case to engine mounting for high resistance.

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S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

S CONNECTOR CIRCUIT

Description

INFOID:000000010484168

The starter motor magnetic switch is supplied with power when the ignition switch is turned to the START position while the selector lever is in the P (Park) or N (Neutral) position.

Diagnosis Procedure

INFOID:000000010484169

Regarding Wiring Diagram information, refer to [STR-7, "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 "S" CONNECTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector.
3. Shift selector lever to "P" (Park) or "N" (Neutral) position.
4. Check voltage between starter motor harness connector F28 (QR25DE) or F81 (VQ35DE) and ground.

(+)		(-)	Condition	Voltage (Approx.)
Connector	Terminal			
F28 (QR25DE)	S	Ground	When the ignition switch is in START position	Battery voltage
F81 (VQ35DE)				

Is the inspection result normal?

YES >> "S" circuit is OK. Further inspection is necessary. Refer to [STR-12, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-16, "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> GO TO 2.

2. CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect IPDM E/R connector.
2. Check continuity between starter motor harness connector F28 (QR25DE) or F81 (VQ35DE) and the IPDM E/R harness connector F10.

Starter motor harness connector		IPDM E/R harness connector		Continuity
Connector	Terminal	Connector	Terminal	
F28 (QR25DE)	S	F10	51	Yes
F81 (VQ35DE)				

Is the inspection result normal?

YES >> Further inspection is necessary. Refer to [STR-12, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-16, "Work Flow \(Without GR8-1200 NI\)"](#).

NO >> Repair or replace the harness or connectors.

STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:000000010484170

A

STR

Symptom	Reference
No normal cranking	Refer to STR-12. "Work Flow (With GR8-1200 NI)" or STR-16. "Work Flow (Without GR8-1200 NI)" .
Starter motor does not rotate	

C

D

E

F

G

H

I

J

K

L

M

N

O

P

STARTER MOTOR

< REMOVAL AND INSTALLATION >

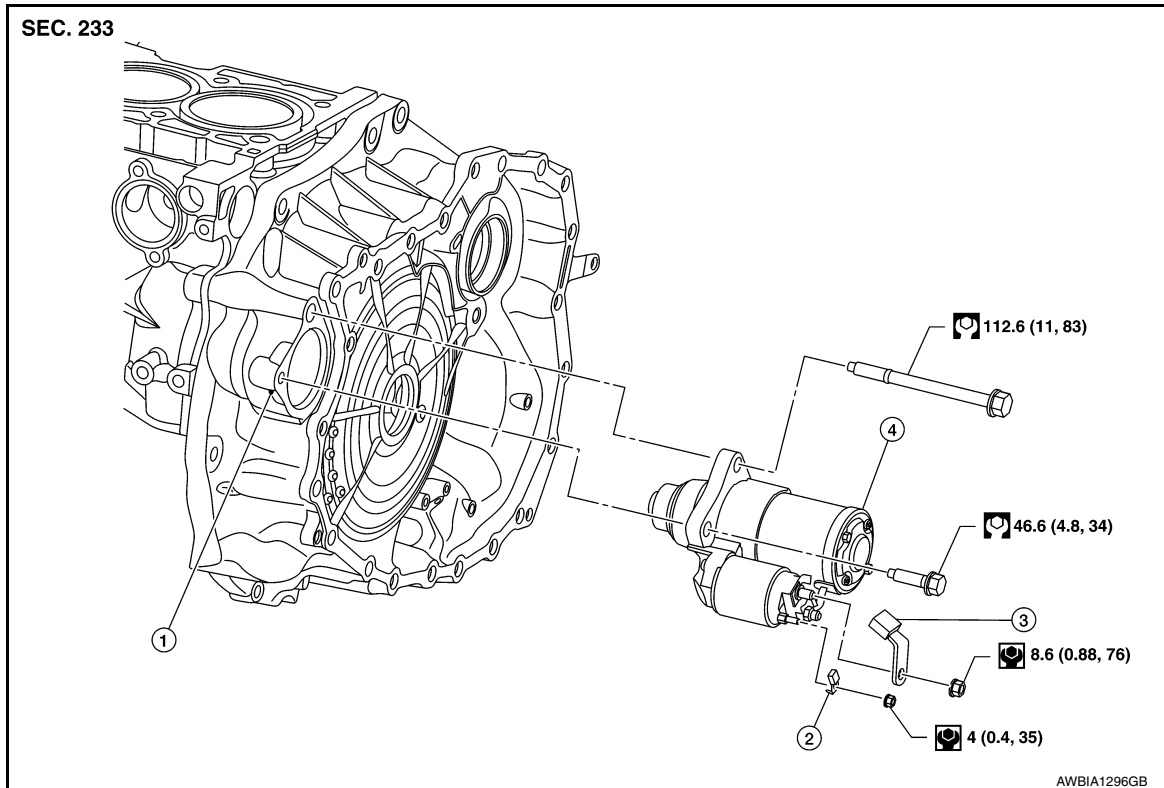
REMOVAL AND INSTALLATION

STARTER MOTOR

QR25DE

QR25DE : Exploded View

INFOID:000000010484171



1. Converter housing
4. Starter motor

2. "B" terminal harness

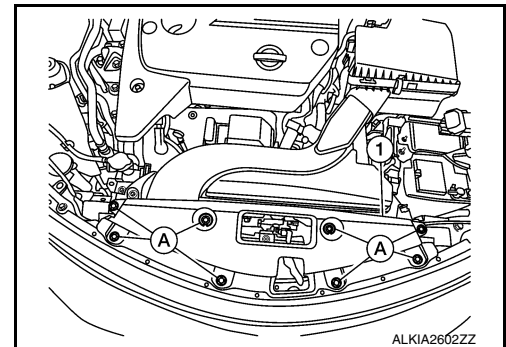
3. "S" connector

QR25DE : Removal and Installation

INFOID:000000010484172

REMOVAL

1. Remove the core support cover clips (A), then remove the core support cover (1).



2. Remove battery tray. Refer to [PG-80, "Removal and Installation"](#).
3. Disconnect the harness connectors from the starter motor.
4. Remove the two starter motor bolts using power tools.
5. Remove the starter motor.

INSTALLATION

STARTER MOTOR

< REMOVAL AND INSTALLATION >

Installation is in the reverse order of removal.

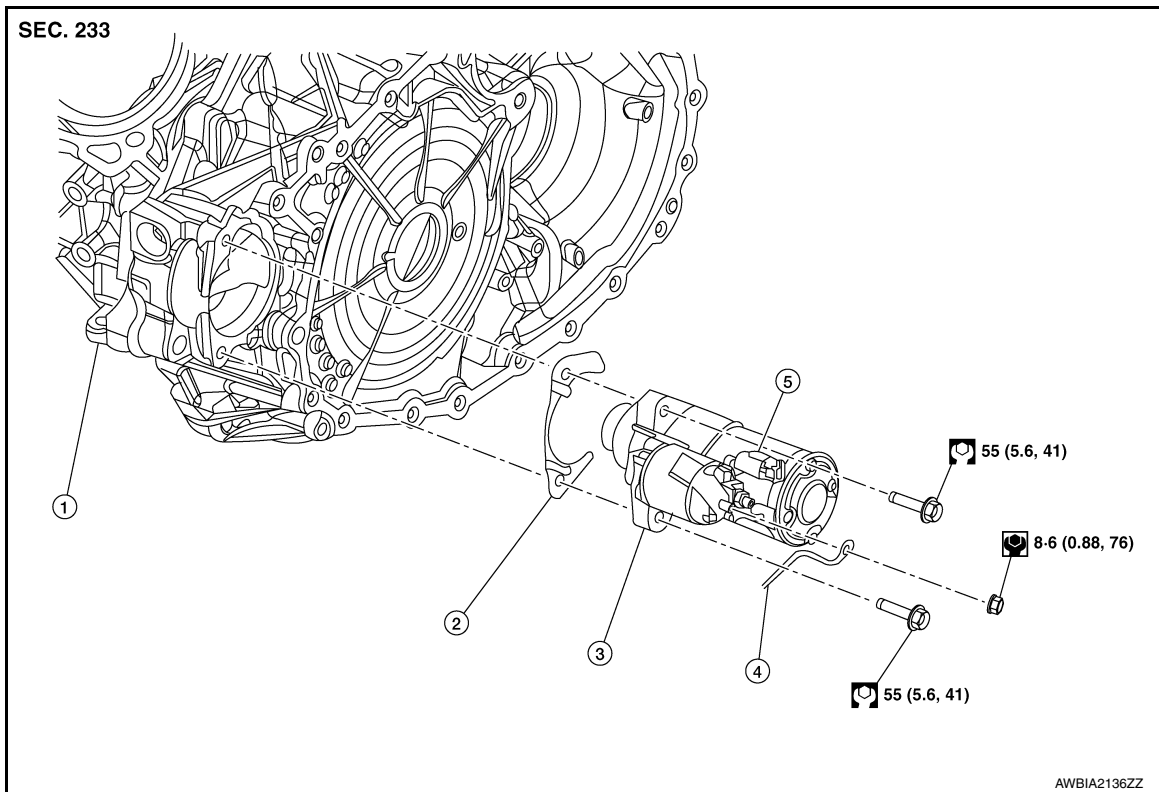
VQ35DE

VQ35DE : Exploded View

INFOID:000000010484173

A

STR



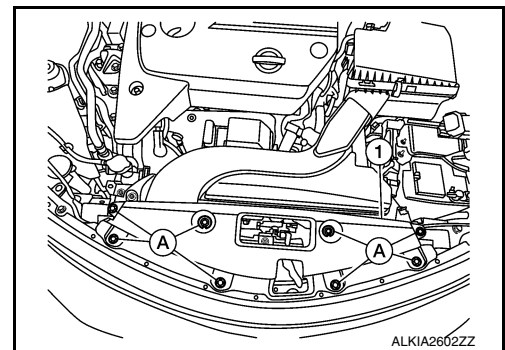
- | | | |
|-------------------------|------------------|------------------|
| 1. Cylinder block | 2. Shim | 3. Starter motor |
| 4. "B" terminal harness | 5. "S" connector | |

VQ35DE : Removal and Installation

INFOID:000000010484174

REMOVAL

1. Remove the core support cover clips (A), then remove the core support cover (1).



2. Remove the battery tray. Refer to [PG-80. "Removal and Installation"](#).
3. Disconnect the "S" connector and the "B" terminal.
4. Remove the two starter motor bolts using power tools.
5. Remove the starter motor.

INSTALLATION

Installation is in the reverse order of removal.

C

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STARTER MOTOR

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

STARTER MOTOR

Starter

INFOID:000000010484175

Application	QR25DE	VQ35DE
	CVT model	
Manufacturer	Mitsubishi	
Model number*	M000TB0071ZC	M000TB0271ZC
Type	Reduction gear type	
System voltage	12V	
	Terminal voltage	
	11V	
No-load	Current	Less than 90A
	Revolution	More than 2,370 rpm
		More than 2,370 rpm

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