SECTION STR
STARTING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000007991794

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 3 minutes before performing any service.**

PREPARATION

PREPARATION

Special Service Tool

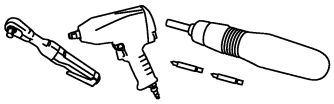
INFOID:0000000007991795

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent Moore No.) Tool name	Description
— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station  AWIIA1239ZZ	Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.

Commercial Service Tool

INFOID:0000000007991796

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts

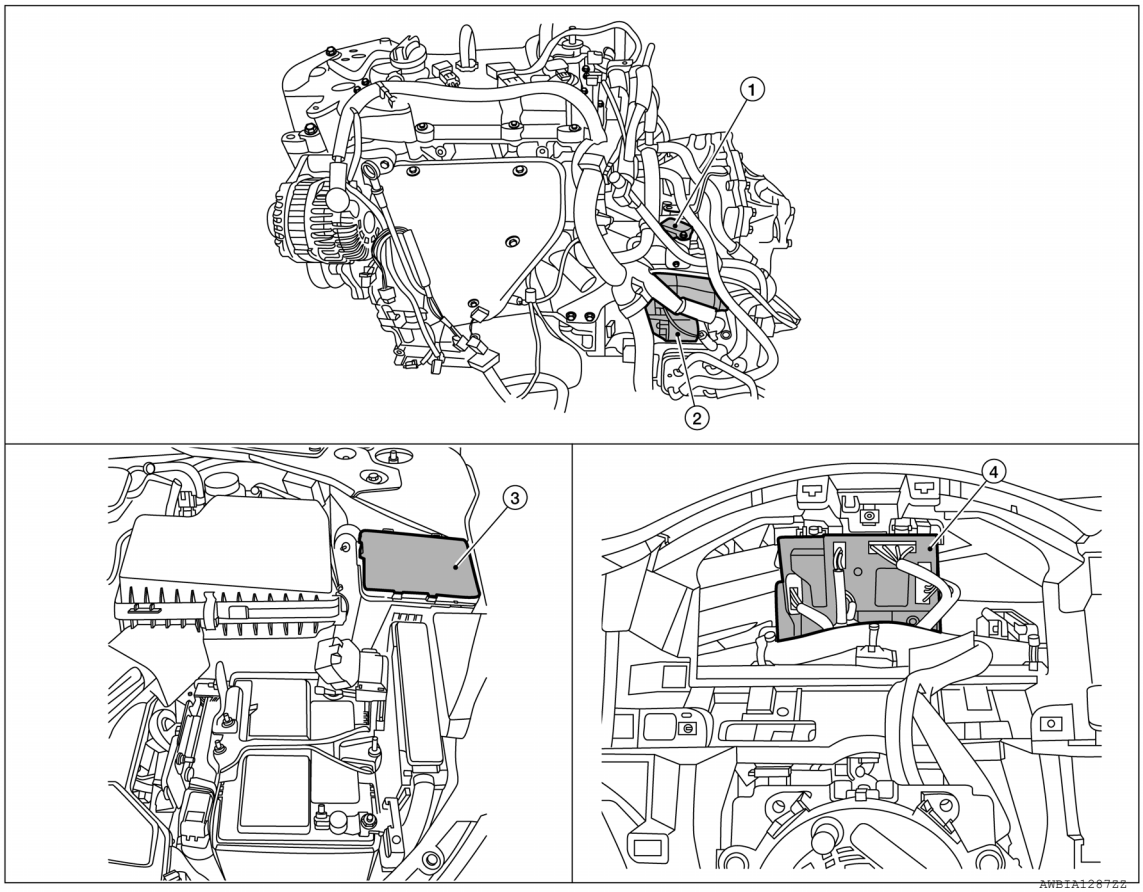
SYSTEM DESCRIPTION

COMPONENT PARTS

QR25DE

QR25DE : Component Parts Location

INFOID:0000000008671026



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

QR25DE : Component Description

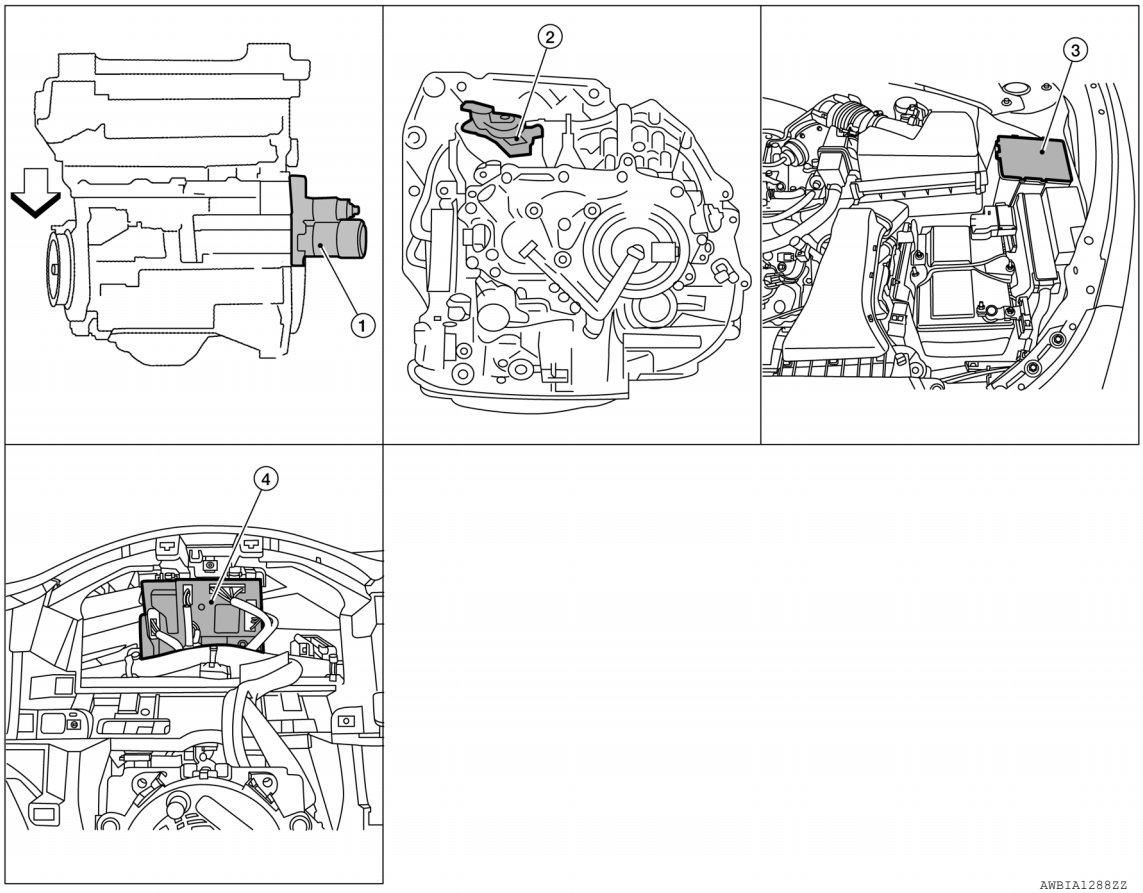
INFOID:0000000008671027

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

VQ35DE : Component Parts Location

INFOID:0000000008525001



AWBIA1288ZZ

⇦ Vehicle front

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

VQ35DE : Component Description

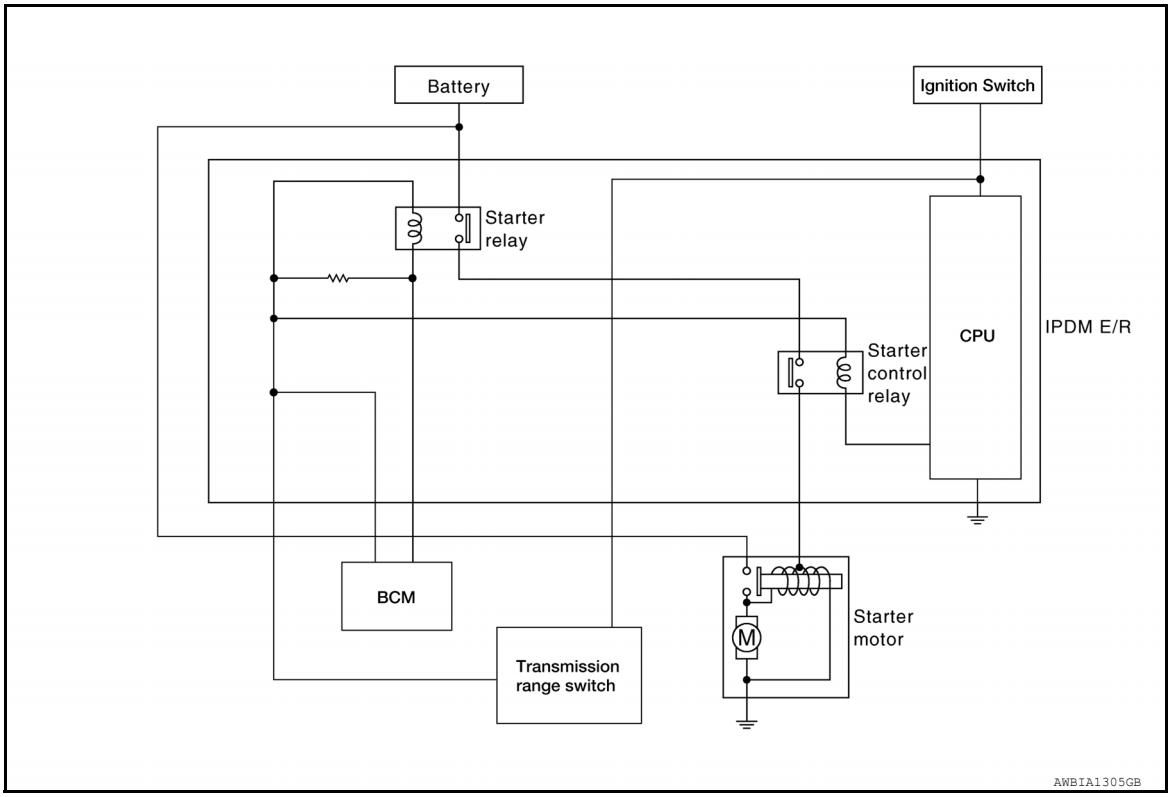
INFOID:0000000008525002

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 Diagram

INFOID:0000000007991784



System Description

INFOID:0000000007991785

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:0000000007991786

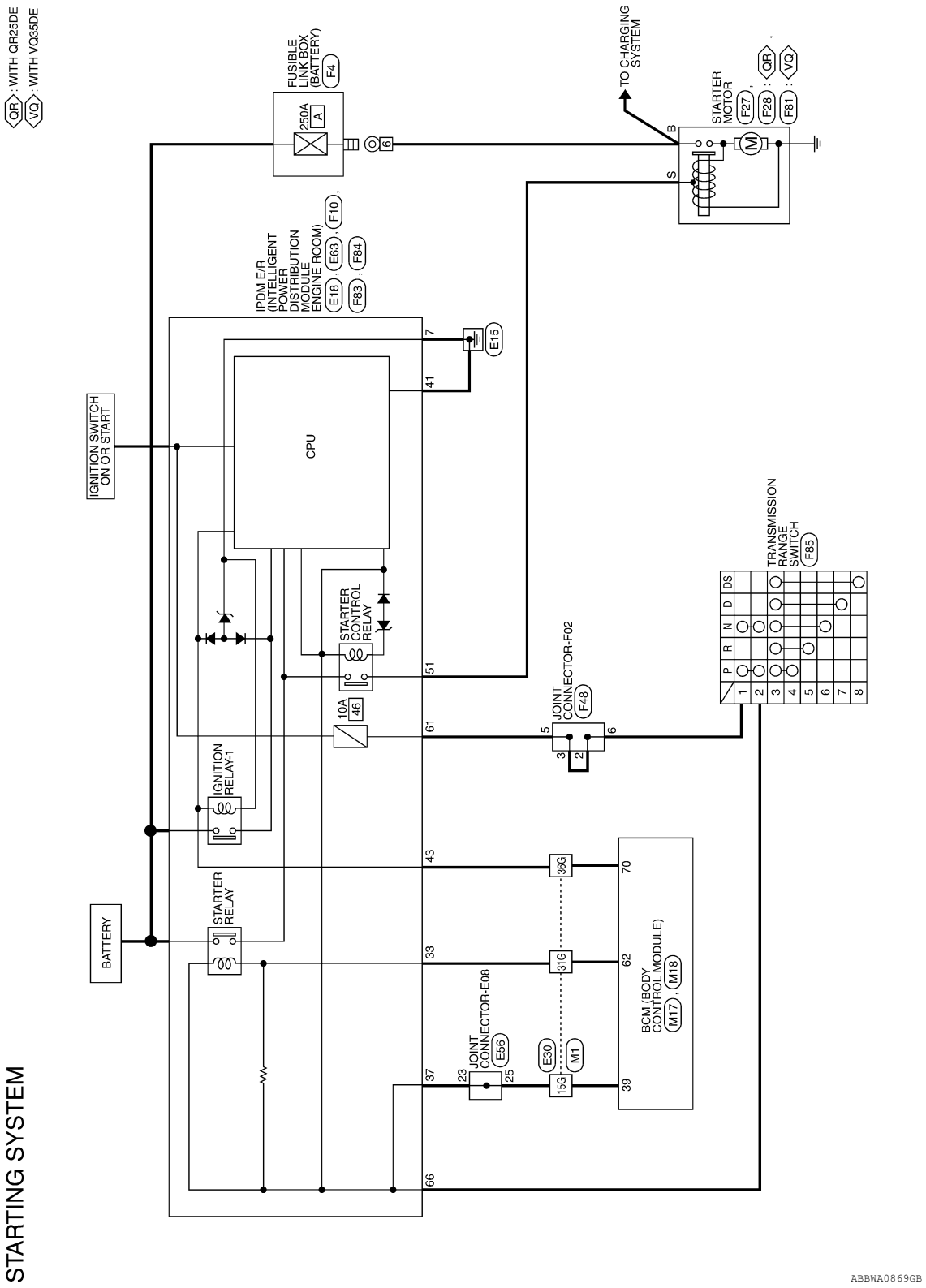
Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside the IPDM E/R when the shift selector is placed in the P or N position.
BCM	BCM controls the starter relay inside IPDM E/R.
IPDM E/R	CPU inside IPDM E/R controls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

WIRING DIAGRAM

STARTING SYSTEM

Wiring Diagram

INFOID:0000000007991792



STARTING SYSTEM CONNECTORS

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

H.S.

1G	2G	3G	4G	5G
6G	7G	8G	9G	10G

11G	12G	13G	14G	15G	16G	17G	18G	19G	20G	21G
22G	23G	24G	25G	26G	27G	28G	29G	30G		

31G	32G	33G	34G	35G	36G	37G	38G	39G	40G	41G
42G	43G	44G	45G	46G	47G	48G	49G	50G		

51G	52G	53G	54G	55G	56G	57G	58G	59G	60G	61G
62G	63G	64G	65G	66G	67G	68G	69G	70G		

71G	72G	73G	74G	75G	76G	77G	78G	79G	80G	81G
82G	83G	84G	85G	86G	87G	88G	89G	90G		

91G	92G	93G	94G	95G
96G	97G	98G	99G	100G

Terminal No.	Color of Wire	Signal Name
15G	L	–
31G	BR	–
36G	G	–

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

H.S.

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21

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

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

H.S.

60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61

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

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

H.S.

7	8		9	10	11
12	13	14	15	16	17	18

Terminal No.	Color of Wire	Signal Name
7	B	GND(POWER)

ABBIA1275GB

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

H.S.

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

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

H.S.

Terminal No.	Color of Wire	Signal Name
15G	W	–
31G	R	–
36G	LG	–

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
51	R	STARTER MOTOR

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

H.S.

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

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

H.S.

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

ABBIA1276GB

Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	–

H.S.

Terminal No.	Color of Wire	Signal Name
B	B/R	–

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

H.S.

Terminal No.	Color of Wire	Signal Name
S	R	–

Connector No.	F48
Connector Name	JOINT CONNECTOR-F02
Connector Color	BLACK

H.S.

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

Connector No.	F81
Connector Name	STARTER MOTOR (WITH VQ35DE)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
S	R	–

Connector No.	F83
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
61	Y	AT ECU

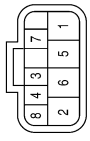
Connector No.	F84
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
66	LG	NPSW

ABBIA1277GB

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



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

ABBIA1278GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000008521046

STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI

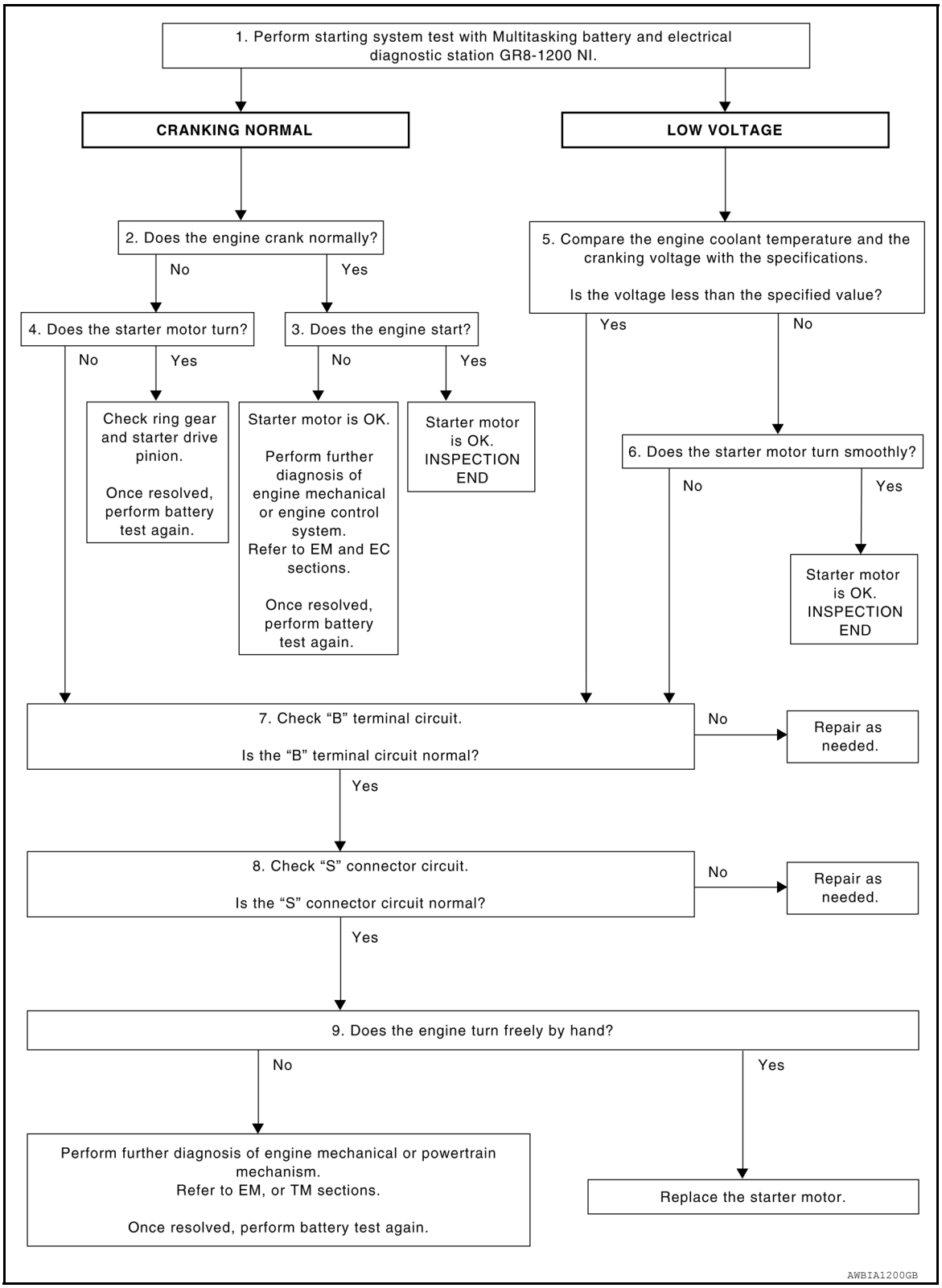
To test the starting system, use the following special service tool:

- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

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

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

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-18, "Diagnosis Procedure".

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?

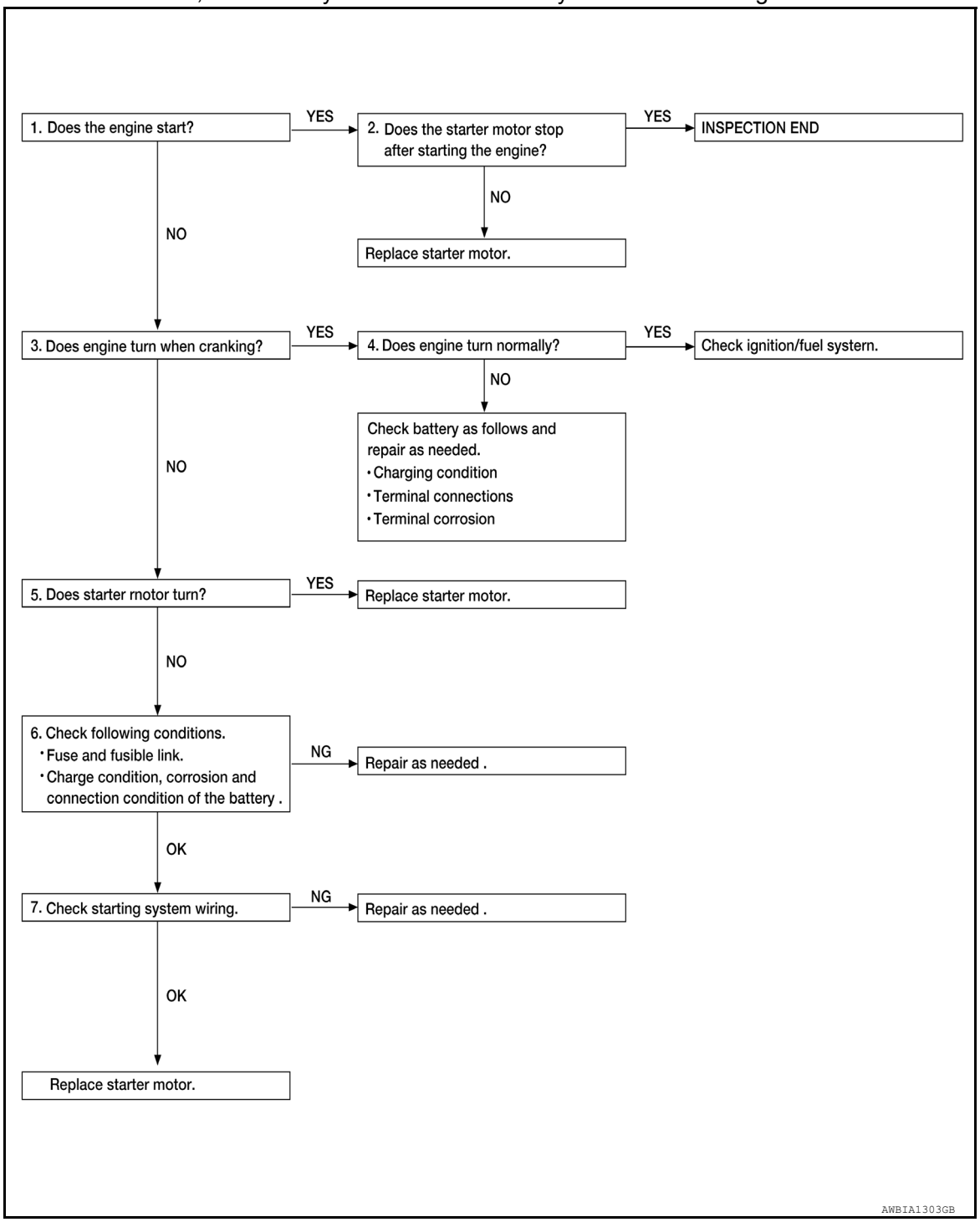
YES >> Replace starter motor.
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again using Multitasking battery and electrical diagnostic station GR8-1200 NI. Refer to the diagnostic station Instruction Manual for proper testing procedures.

Work Flow (Without GR8-1200 NI)

INFOID:0000000008521047

OVERALL SEQUENCE

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



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.

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.

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000008521051

Terminal “B” is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000008521052

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		
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 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		
Battery positive terminal	F27	B	When the ignition switch is in START position	Less than 0.5V

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?

YES >> “B” terminal circuit is OK. Further inspection is necessary. Refer to STR-12, "Work Flow (With GR8-1200 NI)" or STR-15, "Work Flow (Without GR8-1200 NI)".

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

S CONNECTOR CIRCUIT

Description

INFOID:0000000007991789

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:0000000007991790

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-15, "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-15, "Work Flow (Without GR8-1200 NI)".

NO >> Repair or replace the harness or connectors.

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000007991793

Symptom	Reference
No normal cranking	Refer to STR-12, "Work Flow (With GR8-1200 NI)" or STR-15, "Work Flow (Without GR8-1200 NI)".
Starter motor does not rotate	

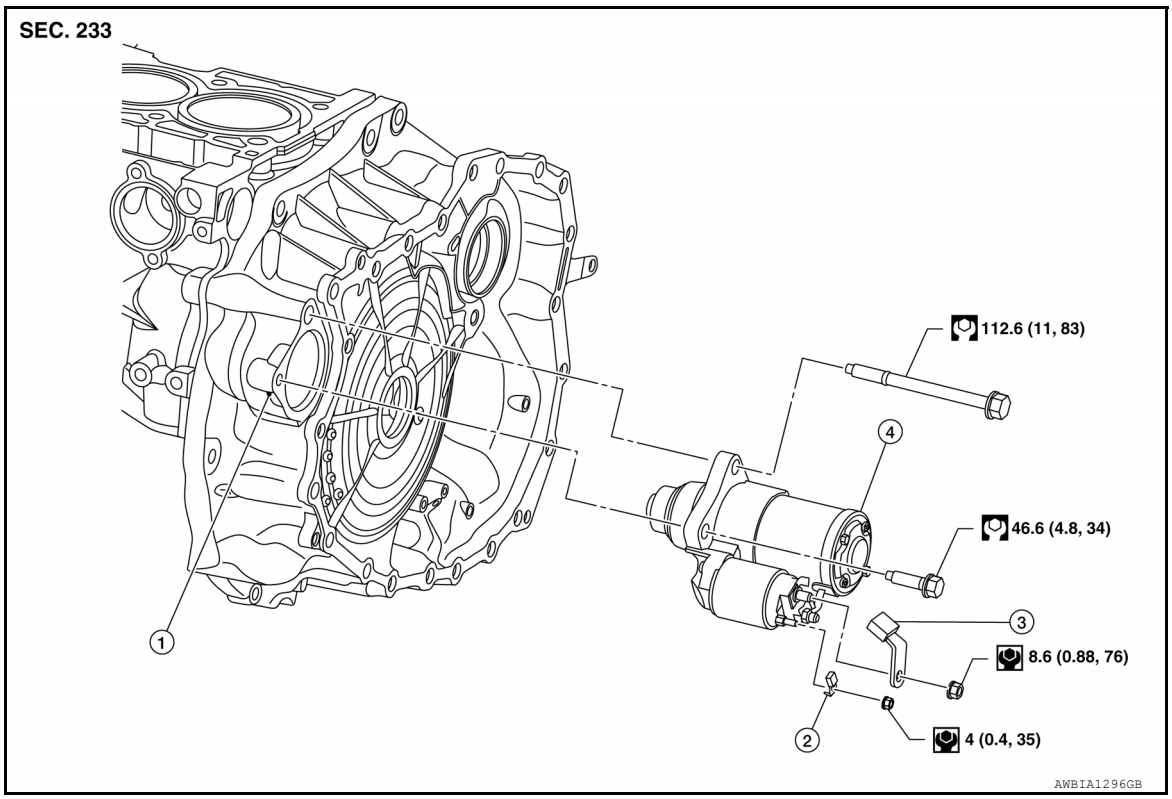
REMOVAL AND INSTALLATION

STARTER MOTOR

QR25DE

QR25DE : Exploded View

INFOID:0000000008471288



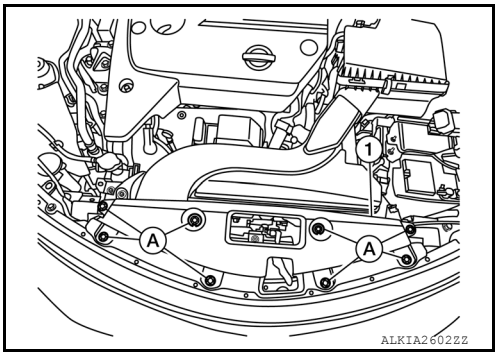
1. Converter housing
2. “B” terminal harness
3. “S” connector
4. Starter motor

QR25DE : Removal and Installation

INFOID:0000000007991797

REMOVAL

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



2. Remove front air duct. Refer to EM-29, "Exploded View".
3. Remove battery and battery tray support. Refer to PG-72, "Exploded View".
4. Disconnect the starter motor harness connectors.
5. Remove the two starter motor bolts, using power tools.
6. Remove the starter motor.

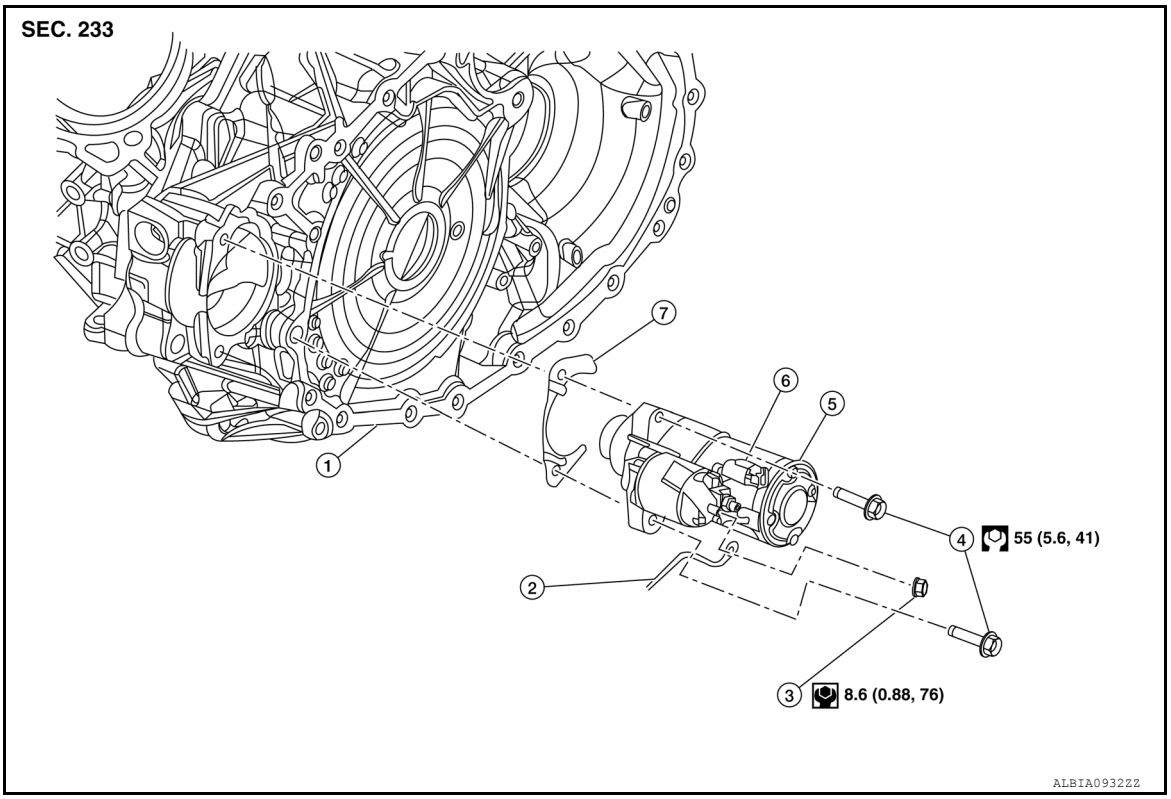
INSTALLATION

Installation is in the reverse order of removal.

VQ35DE

VQ35DE : Exploded View

INFOID:0000000008671033



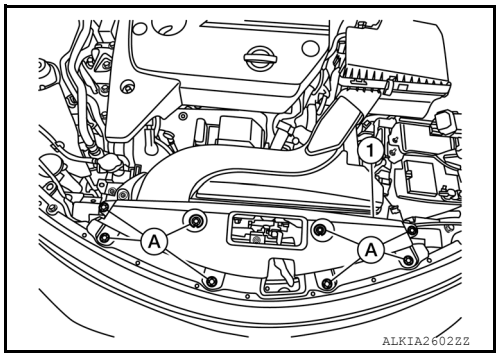
1. Converter housing
2. “B” terminal harness
3. “B” terminal nut
4. Starter motor bolt
5. Starter motor
6. “S” connector
7. Shim

VQ35DE : Removal and Installation

INFOID:0000000008671034

REMOVAL

1. Remove the battery and battery tray support. Refer to PG-72, "Exploded View".
2. Remove the core support cover clips (A), then remove the core support (1).



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.

SERVICE DATA AND SPECIFICATIONS (SDS)

STARTER MOTOR

Starter

INFOID:0000000007991798

Application		QR25DE	VQ35DE
		CVT model	
Manufacturer		Melco	
Model number*		M000TB0071	M000TA0073
Type		Reduction gear type	
System voltage		12V	
No-load	Terminal voltage	11V	
	Current	Less than 90A	
	Revolution	More than 2,370 rpm	More than 2,400 rpm

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