

SECTION STR

STARTING SYSTEM

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:000000010100613

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:

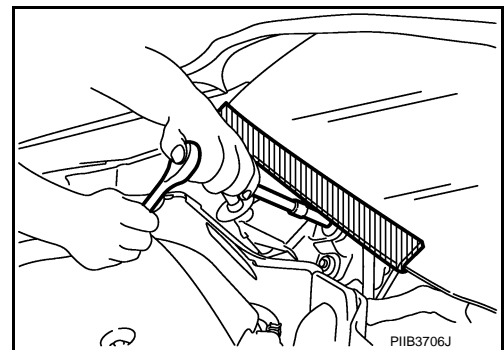
Always observe the following items for preventing accidental activation.

- 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.

Precaution for Procedure without Cowl Top Cover

INFOID:000000010100614

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

INFOID:000000010100615

WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector.

PRECAUTIONS

< PRECAUTION >

(Turning it ON outside the lamp case may cause fire or visual impairments.)

- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

Precautions for Removing of Battery Terminal

INFOID:000000010286870

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

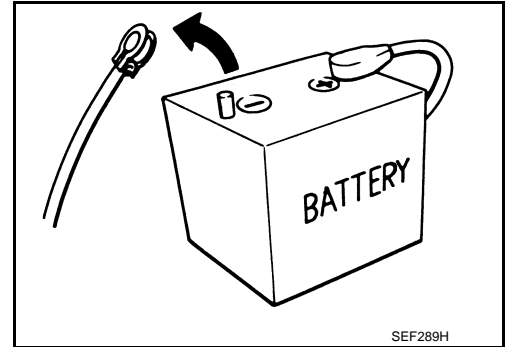
NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.



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PREPARATION


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PREPARATION

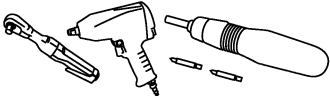
Special Service Tools

INFOID:000000010100616

Tool number (Kent-Moore No.) Tool name	Description
<p>— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station</p>  <p style="text-align: right; font-size: small;">AWIA1239ZZ</p>	<p>Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.</p>

Commercial Service Tools

INFOID:000000010100617

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

COMPONENT PARTS

< SYSTEM DESCRIPTION >

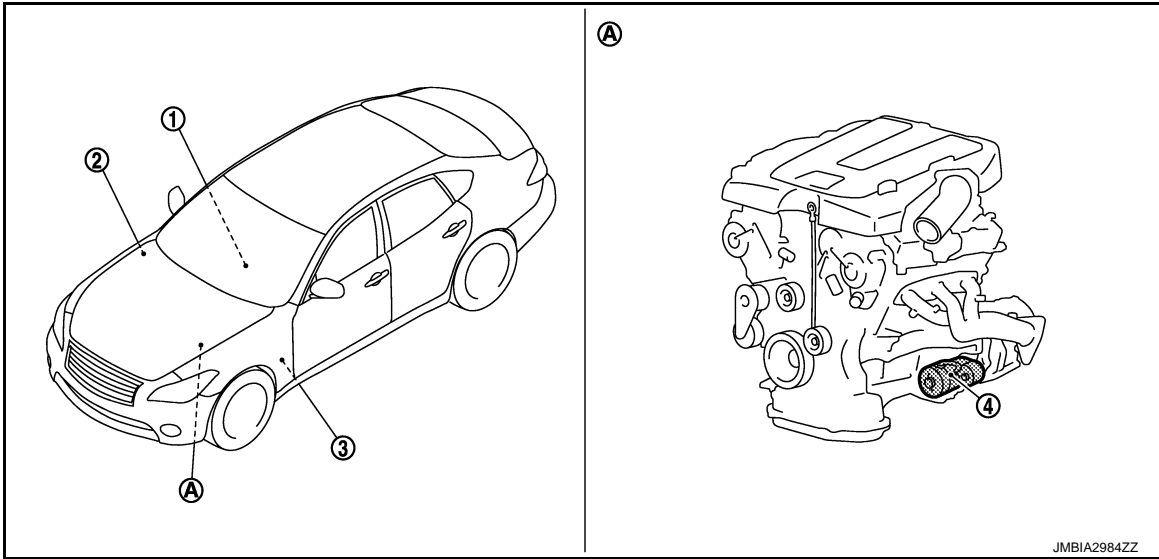
SYSTEM DESCRIPTION

COMPONENT PARTS

VQ37VHR

VQ37VHR : Component Parts Location

INFOID:000000010100618



- 1. TCM
Refer to [TM-11, "A/T CONTROL SYSTEM : Component Parts Location"](#).
- 2. IPDM E/R
Refer to [PCS-5, "IPDM E/R : Component Parts Location"](#).
- 3. BCM
Refer to [BCS-4, "BODY CONTROL SYSTEM : Component Parts Location"](#).
- 4. Starter motor
- A. Engine

VQ37VHR : Component Description

INFOID:000000010100619

Component part	Description
TCM	TCM 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.
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.

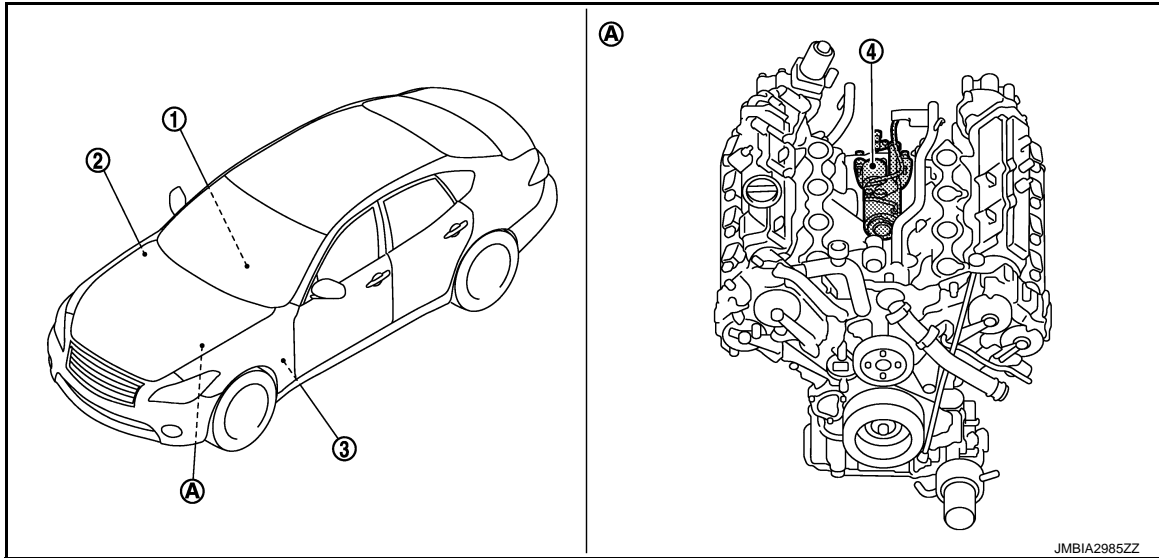
VK56VD

COMPONENT PARTS

< SYSTEM DESCRIPTION >

VK56VD : Component Parts Location

INFOID:0000000101100620



- 1. TCM
Refer to [TM-11, "A/T CONTROL SYSTEM : Component Parts Location"](#).
- 2. IPDM E/R
Refer to [PCS-5, "IPDM E/R : Component Parts Location"](#).
- 3. BCM
Refer to [BCS-4, "BODY CONTROL SYSTEM : Component Parts Location"](#).
- 4. Starter motor
- A. Engine

VK56VD : Component Description

INFOID:0000000101100621

Component part	Description
TCM	TCM 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.
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.

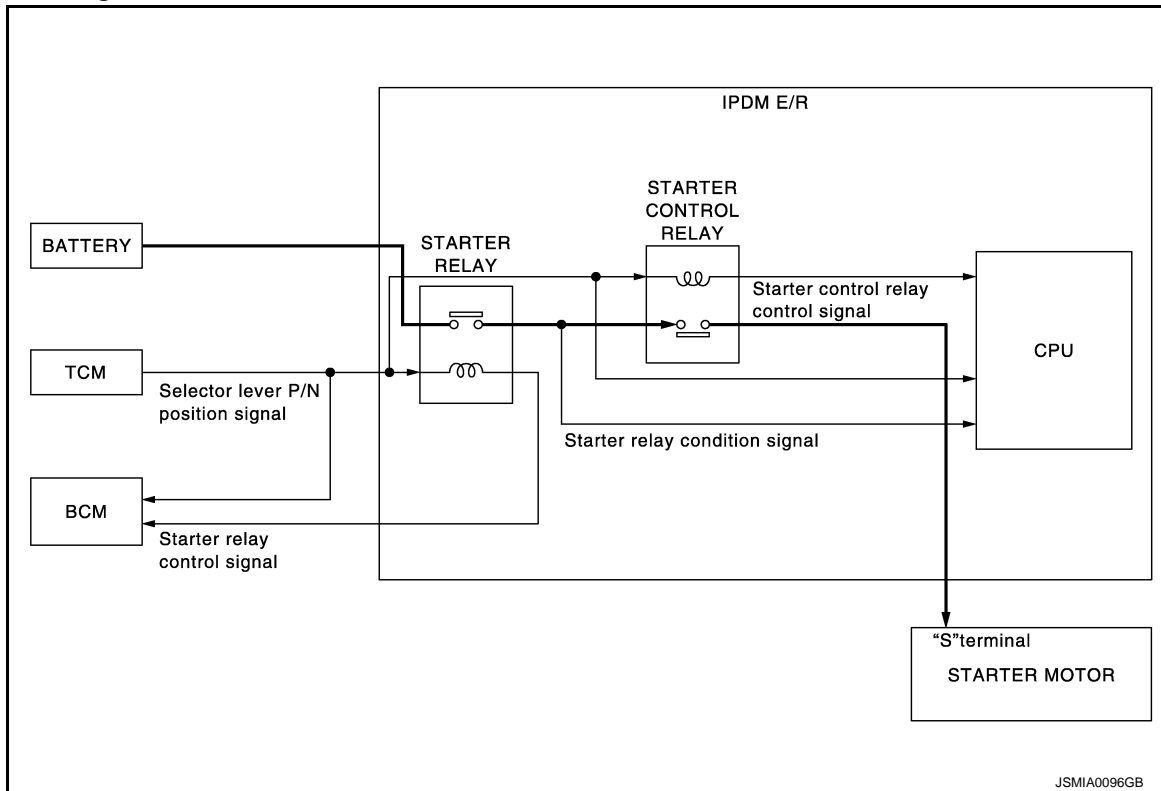
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SYSTEM

System Diagram

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System Description

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- When selector lever is P or N, power is supplied to starter relay and starter control relay by TCM. And BCM and IPDM E/R (CPU) detect selector lever P/N condition by the inputted signal.
- When starter operating condition is satisfied, IPDM E/R turns starter control relay ON by starter control relay control signal.
- When engine cranking condition is satisfied, BCM turns starter relay ON by starter relay control signal.
- Then battery power is supplied to starter motor ("S" terminal) through starter control relay and starter relay. And IPDM E/R (CPU) detect starter relay condition by the inputted signal.

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STARTING SYSTEM

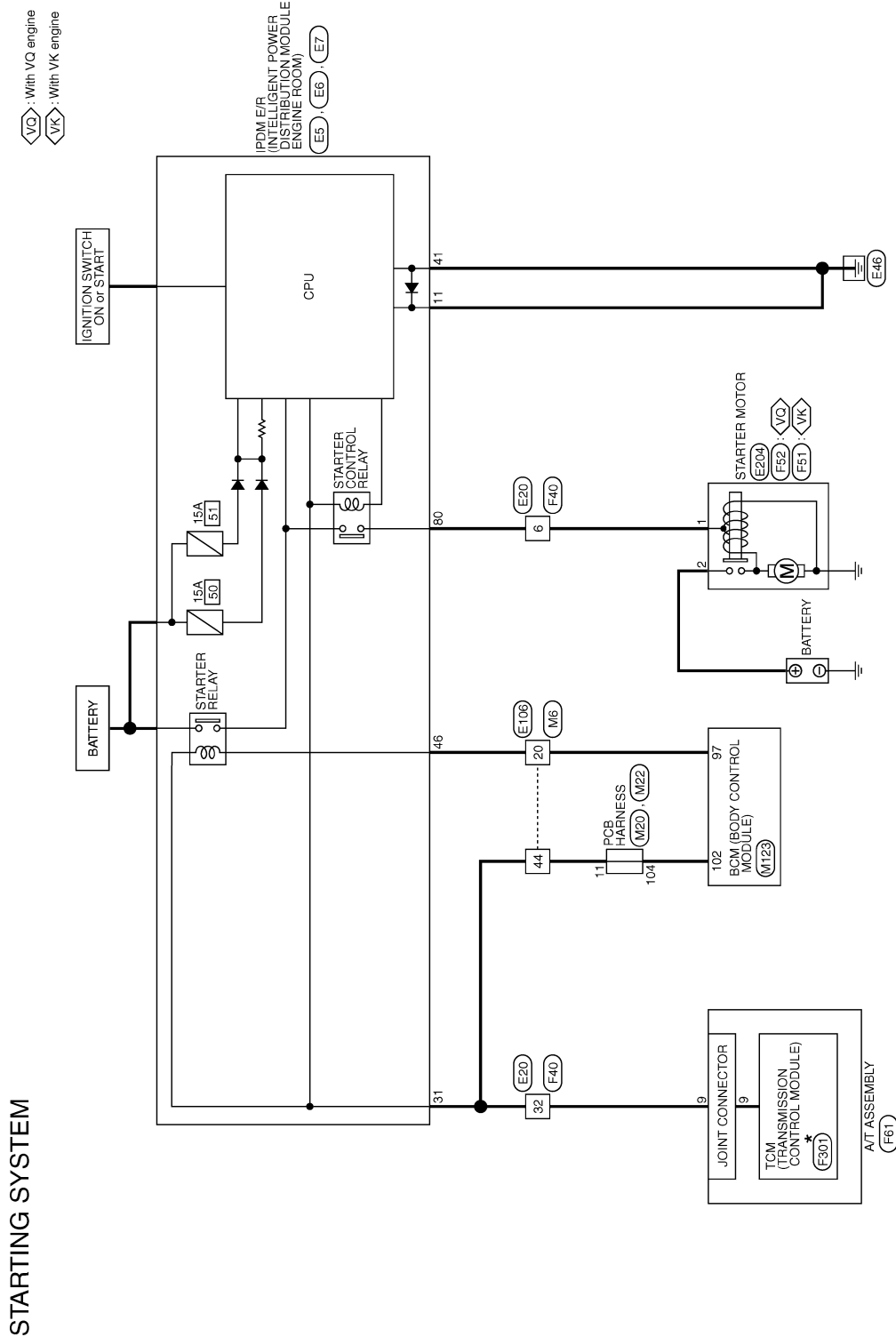
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WIRING DIAGRAM

STARTING SYSTEM

Wiring Diagram

INFOID:000000010100624



*: This connector is not shown in "Harness Layout".

STARTING SYSTEM

< WIRING DIAGRAM >

STARTING SYSTEM

Connector No.	E5
Connector Name	POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TH20PW-CS12-M4-1V



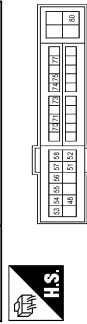
Terminal No.	Color Of Wire	Signal Name [Specification]
4	W	ENG SOL
5	L	ECM V+ [With VQ engine]
6	SB	ECM V- [With VQ engine]
7	R	ETC [With VQ engine]
8	L/Y	A/C COMP [With VK engine]
9	P	A/C COMP [With VQ engine]
10	V	ECM BAT
11	B	P-GND
12	G	ABS ECU
13	GR	FUEL PUMP [With VQ engine]
13	W	FUEL PUMP [With VK engine]
16	V	WIPER AUTO STOP
17	Y	IGN SIGNAL
22	BR	DTRL RLY [With VQ engine]
23	SB	DTRL RLY [With VK engine]
24	O	HOOD SW
25	LG	SUB ECU
30	BR	PUSH START SW
31	BR	NP SW [With VK engine]
31	W	NP SW [With VQ engine]
36	GR	F, LIGN SW

Connector No.	E6
Connector Name	POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TH08PW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
39	P	CAN-L
40	L	S-GND
42	V	MOTOR FAN RLY CONT [With VK engine]
42	Y	MOTOR FAN RLY CONT [With VQ engine]
43	SB	DETENT SW
44	GR	HORN RLY [With VK engine]
44	LG	HORN RLY [With VQ engine]
45	G	HORN SW
46	BR	START CONT

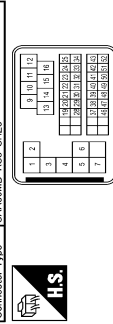
Connector No.	E7
Connector Name	POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TH20PW-CS12-M4



Terminal No.	Color Of Wire	Signal Name [Specification]
48	W	DTRL DEICER
51	O	WASH MTR
52	G	INJECTOR #1
54	P	FEWMPLE LO
55	R	TAIL LUM
56	GR	O2 SENS #1
57	V	O2 SENS #2
58	BR	AT ECU

70	LG	SSOPF
71	M	MOTOR V
72	G	START I2-E-R
74	R	START I2-E-L
75	Y	OIL PRESSURE SW
77	B	FFR
80	W	STARTER MOTOR

Connector No.	E20
Connector Name	WIRE TO WIRE
Connector Type	SAX38MB-RS3-SI23



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/W	
2	SHIELD	
3	L/B	
4	SHIELD	
5	L/W	
6	L/B	
9	P	
10	G	
11	W	[With VK engine]
12	V	[With VQ engine]
13	L	
14	V	[With VK engine]
14	V	[With VQ engine]
15	SB	
16	GR	
19	W	
20	BR	
21	G	
22	L	
23	O	
24	GR	
25	Y	
26	V	
28	V	
29	Y	

30	B	
31	LG	
32	V	
33	BR	
34	O	
37	SHIELD	
38	G	
39	Y	
40	R	
41	W	
42	L	
43	B	
46	SHIELD	
47	R	
48	L	
49	G	
51	Y	
52	W	

Connector No.	E108
Connector Name	WIRE TO WIRE
Connector Type	TH88PW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	
2	W	
3	SB	
4	LG	
5	O	
7	GR	
8	G	
9	W	
10	BR	
11	V	
12	V	
13	GR	
14	GR	
15	V	

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STARTING SYSTEM



< WIRING DIAGRAM >

STARTING SYSTEM

19	V	-	-	-
16	GR	-	-	-
18	V	-	-	-
20	BR	-	-	-
21	P	-	-	-
22	L	-	-	-
23	P	-	-	-
27	SHIELD	-	-	-
28	L/O	-	-	-
29	W/L	-	-	-
31	BR	-	-	-
32	G	-	-	-
33	O	-	-	-
34	Y	-	-	-
41	BR	-	-	-
44	W	-	-	-
45	L	-	-	-
46	GR	-	-	-
47	V	-	-	-
48	G	-	-	-
49	O	-	-	-
50	LG	-	-	-
60	W	-	-	-
61	G	-	-	-
62	Y	-	-	-
63	BR	-	-	-
64	B	-	-	-
65	Y	-	-	-
66	R	-	-	-
69	SB	-	-	-
77	O	-	-	-
78	SB	-	-	-
80	G	-	-	-
81	R	-	-	-
82	SB	-	-	-
83	GR	-	-	-
84	Y	-	-	-
85	Y	-	-	-
86	L	-	-	-
87	V	-	-	-
88	BR	-	-	-
89	LG	-	-	-
90	W	-	-	-
91	W	-	-	-
92	W	-	-	-
93	P	-	-	-
94	LG	-	-	-
95	W	-	-	-
97	R	-	-	-
98	Y	-	-	-


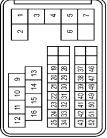
68	V	-	-	-
100	V	-	-	-

Connector No. E204
 Connector Name STARTER MOTOR
 Connector Type 2434E 51EE1

Terminal No.	2
Color Of Wire	B/Y
Signal Name [Specification]	-

Connector No. F40
 Connector Name WIRE TO WIRE
 Connector Type ISAA3BF-RSS-SHZ8






Terminal No.	1	L/W	-	-
2	SHIELD	-	-	-
3	L/B	-	-	-
4	SHIELD	-	-	-
5	L/W	-	-	-
6	R	-	-	-
7	W	-	-	-
8	W	-	-	-
9	W	-	-	-
10	G	-	-	-
11	G	-	-	-
12	W	-	-	-
13	P	-	-	-
14	V	-	-	-

Signal Name [Specification]
 - [With VK engine]
 - [With V2 engine]



15	R	-	-	-
16	O	-	-	-
18	Y	-	-	-
19	L	-	-	-
20	GR	-	-	-
21	G	-	-	-
22	W	-	-	-
23	L	-	-	-
24	Y	-	-	-
25	LG	-	-	-
26	R	-	-	-
29	W	-	-	-
30	B	-	-	-
31	W	-	-	-
32	LG	-	-	-
33	P	-	-	-
34	Y	-	-	-
37	SHIELD	-	-	-
38	L/G	-	-	-
39	O/L	-	-	-
39	L/Y	-	-	-
39	P	-	-	-
40	W/L	-	-	-
41	O/L	-	-	-
41	W	-	-	-
42	LG	-	-	-
43	O	-	-	-
44	W	-	-	-
46	SHIELD	-	-	-
47	L/G	-	-	-
47	W	-	-	-
48	BR	-	-	-
48	L/Y	-	-	-
49	O/L	-	-	-
49	W/L	-	-	-
50	O/L	-	-	-
50	W/L	-	-	-
51	O	-	-	-
51	SB	-	-	-
52	W	-	-	-

Connector No. F51
 Connector Name STARTER MOTOR
 Connector Type X01FGY



Terminal No.	1
Color Of Wire	R
Signal Name [Specification]	-

Connector No. F52
 Connector Name STARTER MOTOR
 Connector Type X01MGY

Terminal No.	1
Color Of Wire	W
Signal Name [Specification]	-

Connector No. F53
 Connector Name A/T ASSEMBLY
 Connector Type RK10FG-DDY

JRBWC5573GB

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< WIRING DIAGRAM >

STARTING SYSTEM

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	POWER SUPPLY (BACK UP)
2	R	POWER SUPPLY (BACK UP)
3	L	HEV SYSTEM CAN-H
4	V	K-LINE
5	B	GND
6	G	POWER SUPPLY (IGN)
7	SB	BACK-UP LAMP RELAY
8	P	HEV SYSTEM CAN-L
9	BR	P/A SIGNAL [Without paddle shifter]
9	LG	P/N SIGNAL [With paddle shifter]
10	B	GROUND

Connector No.	F301
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	SEPIBFG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	VIGN
2	W	BATT
3	W	CAN-H
4	W	K-LINE
5	W	GND
6	W	VIGN
7	W	REV LAMP RLY
8	W	CAN-L
9	W	START RLY
10	W	GND

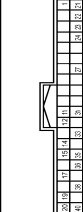
Connector No.	M6
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	
2	SB	
3	LG	
4	LG	
5	W	
7	BG	
8	G	
9	Y	
10	W	
11	R	
12	V	
13	LG	
14	L	
15	V	
16	R	
17	Y	
20	SB	
21	BR	
22	L	
23	P	
27	SHIELD	
28	V	
29	SB	
31	BG	
32	P	
33	R	
34	BG	
41	BR	
42	R	
45	Y	
46	BG	
47	V	
48	G	
48	BG	
50	W	

Terminal No.	Color Of Wire	Signal Name [Specification]
60	GR	
62	LG	
63	BR	
64	L	
65	R	
66	P	
67	L	
71	B	
79	V	
80	G	
81	L	
82	B	
83	BG	
84	SB	
86	L	
87	V	
88	V	
89	LG	
90	BG	
91	W	
92	BG	
93	G	
94	Y	
95	W	
97	SB	
98	R	
99	W	
100	L	

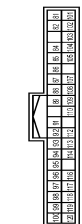
Connector No.	M20
Connector Name	PCB HARNESS
Connector Type	TH40FB-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	
11	BR	
12	R	
14	L	

Terminal No.	Color Of Wire	Signal Name [Specification]
15	B	
16	W	
19	W	
20	R	
21	B	
22	R	
23	L	
24	L	
27	P	
31	V	
33	V	
35	L	
36	P	
38	L	
40	Y	

Connector No.	M22
Connector Name	PCB HARNESS
Connector Type	TH40FB-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
81	P	
82	P	
84	B	
85	B	
86	B	
87	B	
88	B	
89	Y	
91	V	
92	V	
93	B	
94	B	
96	LG	
97	LG	
98	G	
99	G	
100	G	
101	L	

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STARTING SYSTEM

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STARTING SYSTEM

102	B	--	--
103	BR	--	--
104	BR	--	--
105	R	--	--
107	Y	--	--
108	Y	--	--
109	BR	--	--
110	Y	--	--
112	B	--	--
113	P	--	--
114	L	--	--
116	B	--	--
117	B	-- [With VK engine]	--
117	BG	-- [With VQ engine]	--
118	B	--	--
118	G	--	--
120	V	--	--

Connector No.	M123
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	THMPW-NH



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----

91	GR	LOCK IND
92	B	PUSH-BTN IGN SW ILL GND
93	V	L-KEY WASH BUZZER
96	SB	ACC RELAY CONT
97	SB	STARTER RELAY CONT
98	B	IGN RELAY (F/D/M/E/R) CONT
99	R	IGN RELAY (F/B) CONT
100	SB	PASS DOOR REQ SW
102	BR	P/N POSITION
104	GR	A/T SHIFT SELECT PWR SPLY
105	R	STOP LAMP SW 2
106	B	BLWR RELAY CONT
109	Y	ACC IND

Terminal No.	Wire	Signal Name [Specification]
72	B	OUTS HD LAMP OUTPUT
73	V	ON IND
75	G	DR DOOR REQ SW
76	BR	PUSH SW
78	BR	DRIVER DOOR ANT+
79	SB	DRIVER DOOR ANT-
80	LG	PASSENGER DOOR ANT+
81	V	PASSENGER DOOR ANT-
82	V	REAR EMER ANT+
83	SB	REAR EMER ANT-
84	BR	ROOM ANT+
85	Y	ROOM ANT-
86	R	ROOM ANT2+
87	G	ROOM ANT2-
88	V	TRUNK ROOM ANT+
89	SB	TRUNK ROOM ANT-
90	R	PUSH-BTN IGN SW ILL PWR

JRBWC5575GB

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000010100625

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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.

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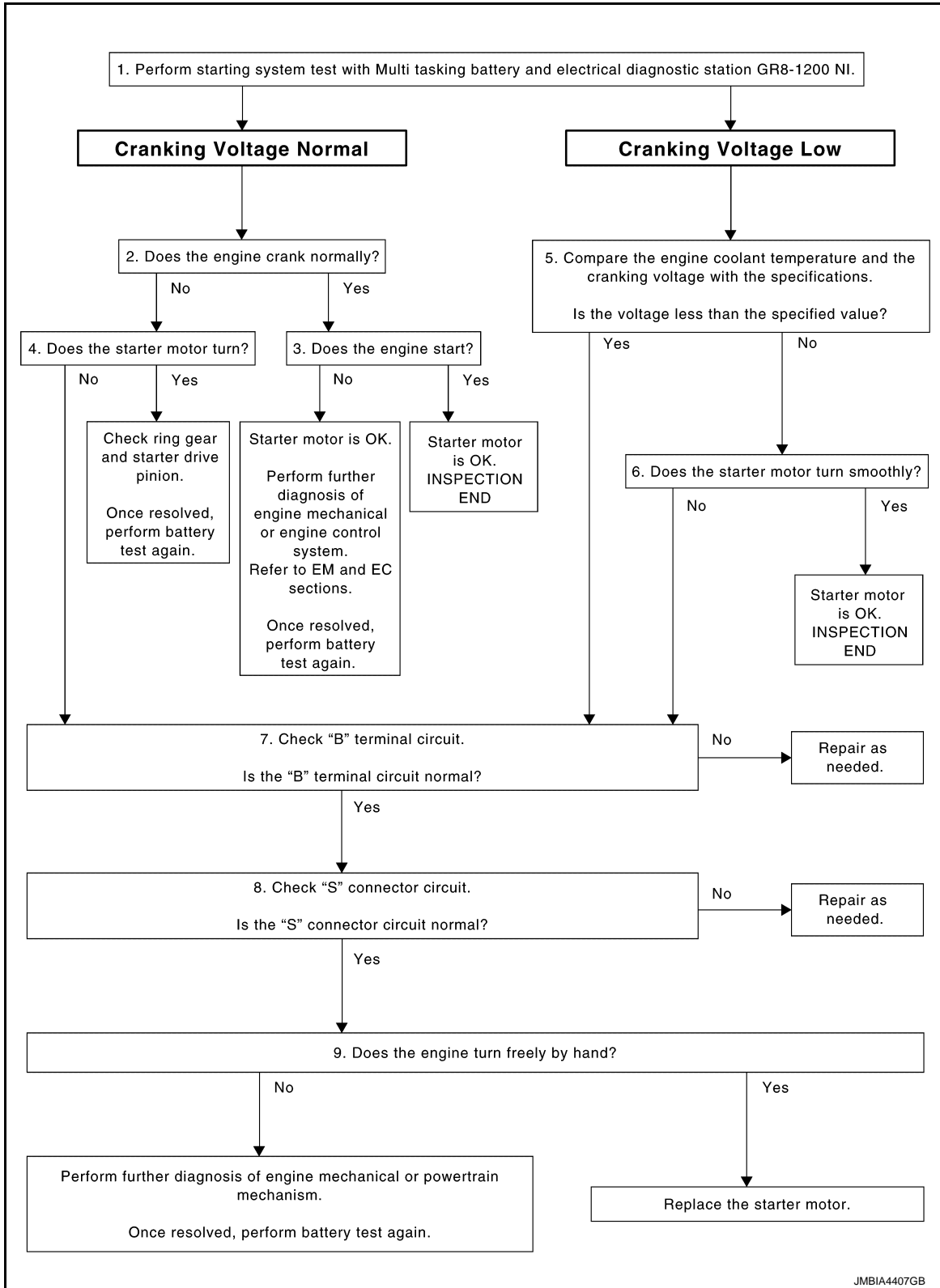
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DIAGNOSIS AND REPAIR WORK FLOW

< 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

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 VOLTAGE NORMAL>>GO TO 2.

CRANKING VOLTAGE LOW>>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-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-19, "Diagnosis Procedure"](#).

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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.

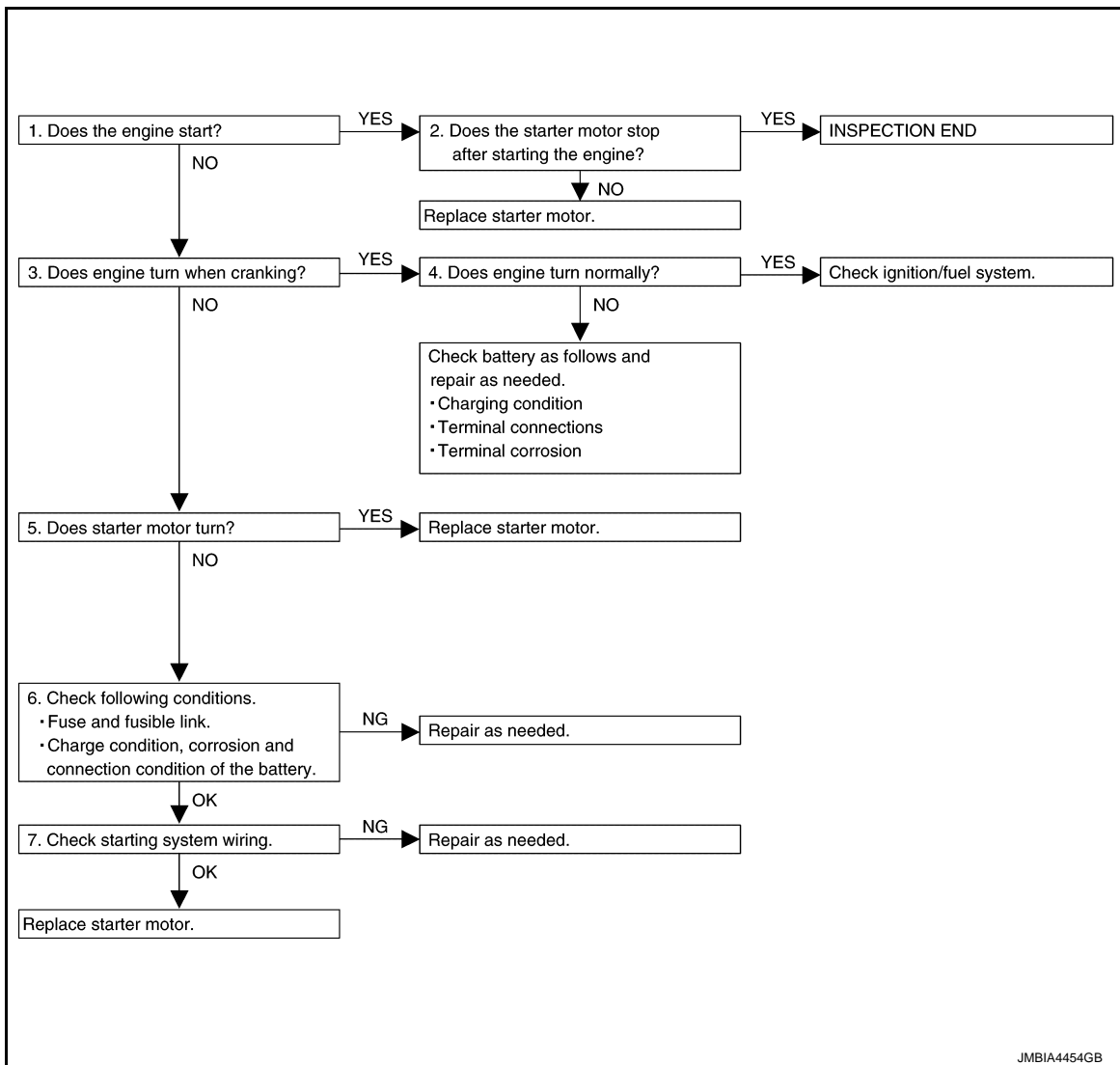
Does the engine turn freely by hand?

- YES >> Replace starter motor. Refer to [STR-22. "VQ37VHR : Removal and Installation \(2WD\)"](#) (VQ37VHR[2WD]), [STR-23. "VQ37VHR : Removal and Installation \(AWD\)"](#) (VQ37VHR[AWD]) or [STR-25. "VK56VD : Removal and Installation"](#) (VK56VD).
- 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:000000010100626

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.

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Does the engine start?

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

A

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. "VQ37VHR : Removal and Installation \(2WD\)"](#) (VQ37VHR[2WD]), [STR-23. "VQ37VHR : Removal and Installation \(AWD\)"](#) (VQ37VHR[AWD]) or [STR-25. "VK56VD : Removal and Installation"](#) (VK56VD).

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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.

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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-120. "Work Flow"](#).

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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. "VQ37VHR : Removal and Installation \(2WD\)"](#) (VQ37VHR[2WD]), [STR-23. "VQ37VHR : Removal and Installation \(AWD\)"](#) (VQ37VHR[AWD]) or [STR-25. "VK56VD : Removal and Installation"](#) (VK56VD).
NO >> GO TO 6.

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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-120. "Work Flow"](#).

Are these inspection results normal?

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

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7.CHECK STARTING SYSTEM WIRING

Check the following.

- "B" terminal circuit. Refer to [STR-18. "Diagnosis Procedure"](#).
- "S" connector circuit. Refer to [STR-19. "Diagnosis Procedure"](#).

Are these inspection results normal?

- YES >> Replace starter motor. Refer to [STR-22. "VQ37VHR : Removal and Installation \(2WD\)"](#) (VQ37VHR[2WD]), [STR-23. "VQ37VHR : Removal and Installation \(AWD\)"](#) (VQ37VHR[AWD]) or [STR-25. "VK56VD : Removal and Installation"](#) (VK56VD).
NO >> Repair as needed.

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B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:000000010100627

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

Diagnosis Procedure

INFOID:000000010100628

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.

Terminals		Voltage (Approx.)
(+)	(-)	
Starter motor "B" terminal	Terminal	Battery voltage
E204	2	
	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 A/T selector lever to "P" or "N" position.
2. Check voltage between battery positive terminal and starter motor "B" terminal.

Terminals		Condition	Voltage (Approx.)
(+)	(-)		
	Starter motor "B" terminal	When the ignition switch is in START position	Less than 0.5 V
	Terminal		
Battery positive terminal	E204		
	2		

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 A/T 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-13, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-16, "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:000000010100629

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 or N position.

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Diagnosis Procedure

INFOID:000000010100630

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 A/T selector lever to "P" or "N" position.
4. Check voltage between starter motor harness connector and ground.

Terminals		Condition	Voltage (Approx.)
(+)	(-)		
Starter motor harness connector	Terminal		
F51 (VK56VD) F52 (VQ37VHR)	1	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-13. "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 and IPDM E/R harness connector.

Starter motor harness connector		IPDM E/R harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F51 (VK56VD) F52 (VQ37VHR)	1	E7	80	Existed

Is the inspection result normal?

- YES >> Further inspection is necessary. Refer to [SEC-50. "Work Flow"](#).
- NO >> Repair the harness.

STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:000000010100631

Symptom	Reference
No normal cranking	Refer to STR-13, "Work Flow (With GR8-1200 NI)" or STR-16, "Work Flow (Without GR8-1200 NI)" .
Starter motor does not rotate	

STARTER MOTOR

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

STARTER MOTOR

VQ37VHR

VQ37VHR : Exploded View

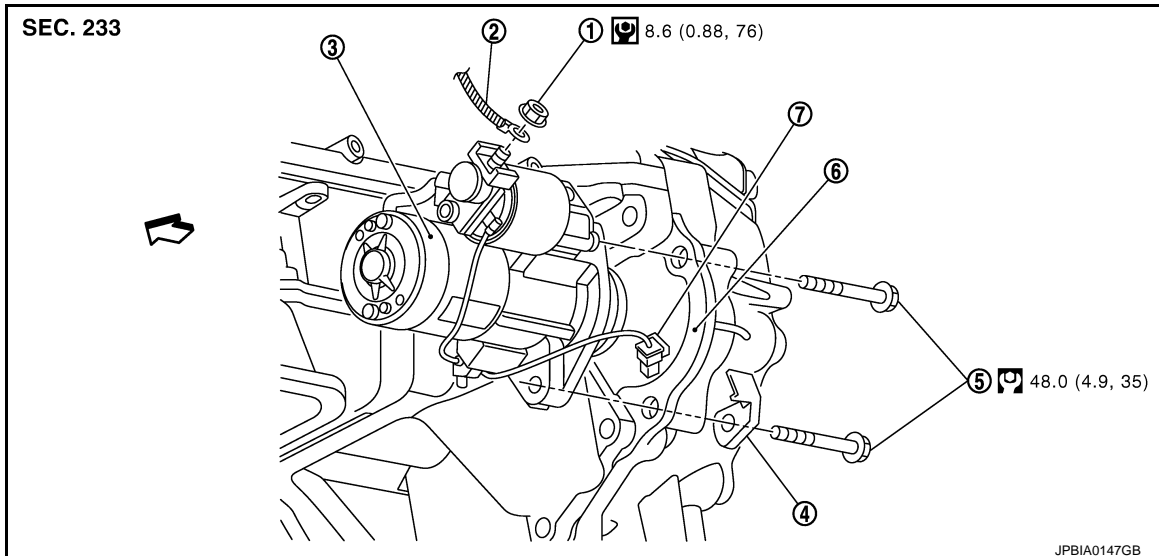
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| 1. "B" terminal nut | 2. "B" terminal harness | 3. Starter motor |
| 4. Harness clip bracket | 5. Starter motor mounting bolt | 6. Converter housing |
| 7. "S" connector | | |

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↔ : Engine front

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: N·m (kg-m, ft-lb)

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: N·m (kg-m, in-lb)

DISASSEMBLY

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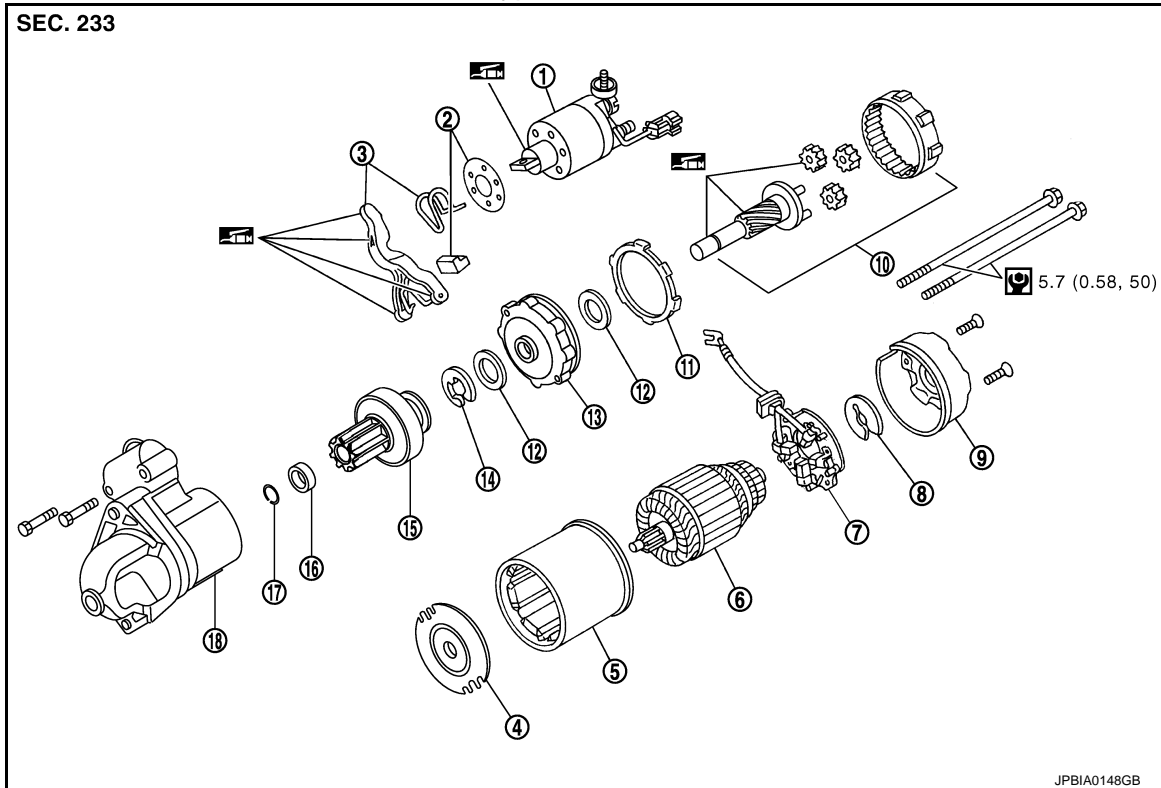
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STARTER MOTOR


< REMOVAL AND INSTALLATION >

Type: S114-932



- | | | |
|-----------------------------|-------------------------|------------------------|
| 1. Magnetic switch assembly | 2. Dust cover kit | 3. Shift lever set |
| 4. Center bracket (A) | 5. Yoke assembly | 6. Armature assembly |
| 7. Brush holder assembly | 8. Thrust washer | 9. Rear cover assembly |
| 10. Shaft gear assembly | 11. Packing | 12. Thrust washer |
| 13. Center bracket (P) | 14. E-ring | 15. Pinion assembly |
| 16. Pinion stopper | 17. Pinion stopper clip | 18. Gear case assembly |

 : High-temperature grease point

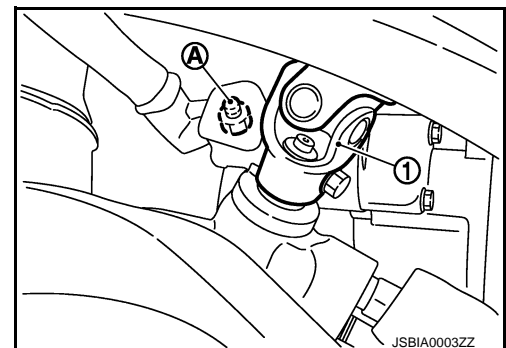
 : N·m (kg·m, in·lb)

VQ37VHR : Removal and Installation (2WD)

INFOID:000000010100633

Removal

1. Disconnect the battery cable from the negative terminal. Refer to [PG-127, "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-31, "FRONT UNDER COVER : Removal and Installation"](#).
3. Remove road wheel and tire (Front LH). Refer to [WT-65, "Removal and Installation"](#).
4. Disconnect steering lower joint (1), then remove it. Refer to [ST-38, "Removal and Installation"](#).
5. Remove "B" terminal nut (A).



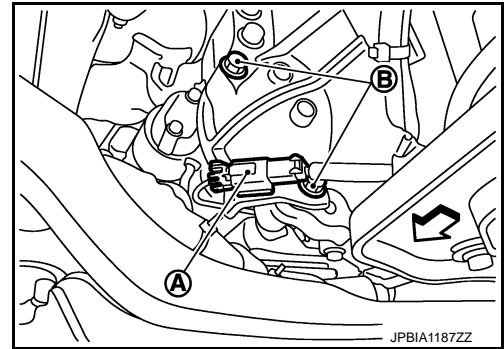
STARTER MOTOR

< REMOVAL AND INSTALLATION >

6. Disconnect "S" connector (A).

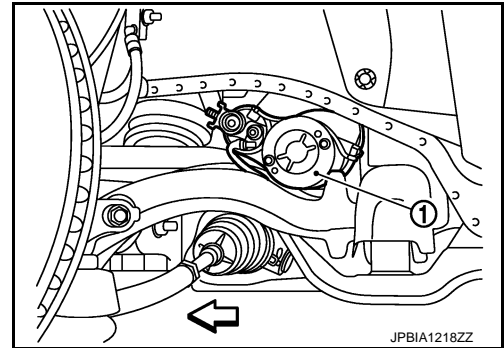
↔ : Vehicle front

7. Remove starter motor mounting bolts (B), using power tools.



8. Remove starter motor (1) from the side of the vehicle.

↔ : Vehicle front



INSTALLATION

Note the following item, and install in the reverse order of removal.

CAUTION:

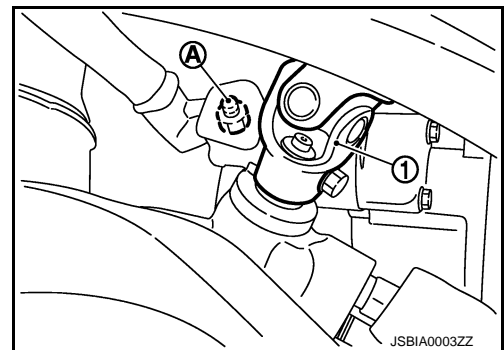
Be careful to tighten "B" terminal nut carefully.

VQ37VHR : Removal and Installation (AWD)

INFOID:0000000010100634

Removal

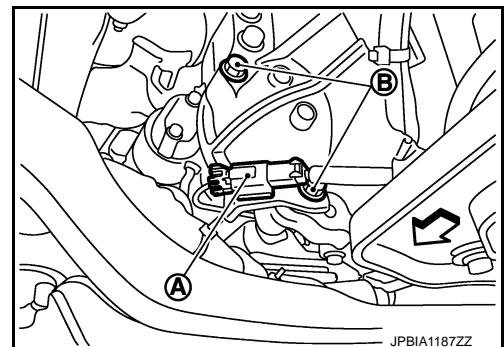
1. Disconnect the battery cable from the negative terminal. Refer to [PG-127, "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-31, "FRONT UNDER COVER : Removal and Installation"](#).
3. Remove road wheel and tire (front LH). Refer to [WT-65, "Removal and Installation"](#).
4. Disconnect steering lower joint (1), and then remove it. Refer to [ST-38, "Removal and Installation"](#).
5. Remove "B" terminal nut (A).



6. Disconnect "S" connector (A).

↔ : Vehicle front

7. Remove starter motor mounting bolts (B), using power tools.

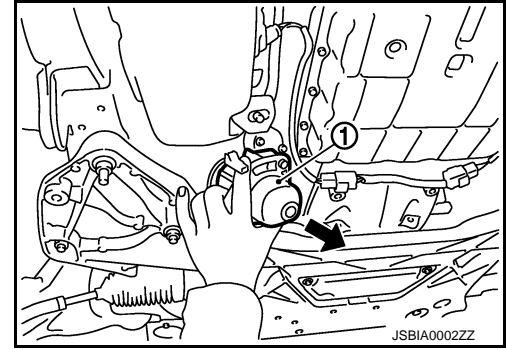


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STARTER MOTOR

< REMOVAL AND INSTALLATION >

8. Remove exhaust mounting bracket. Refer to [EX-5, "VQ37VHR : Exploded View"](#).
9. Remove starter motor (1) downward from the vehicle.



INSTALLATION

Note the following item, and then install in the reverse order of removal.

CAUTION:

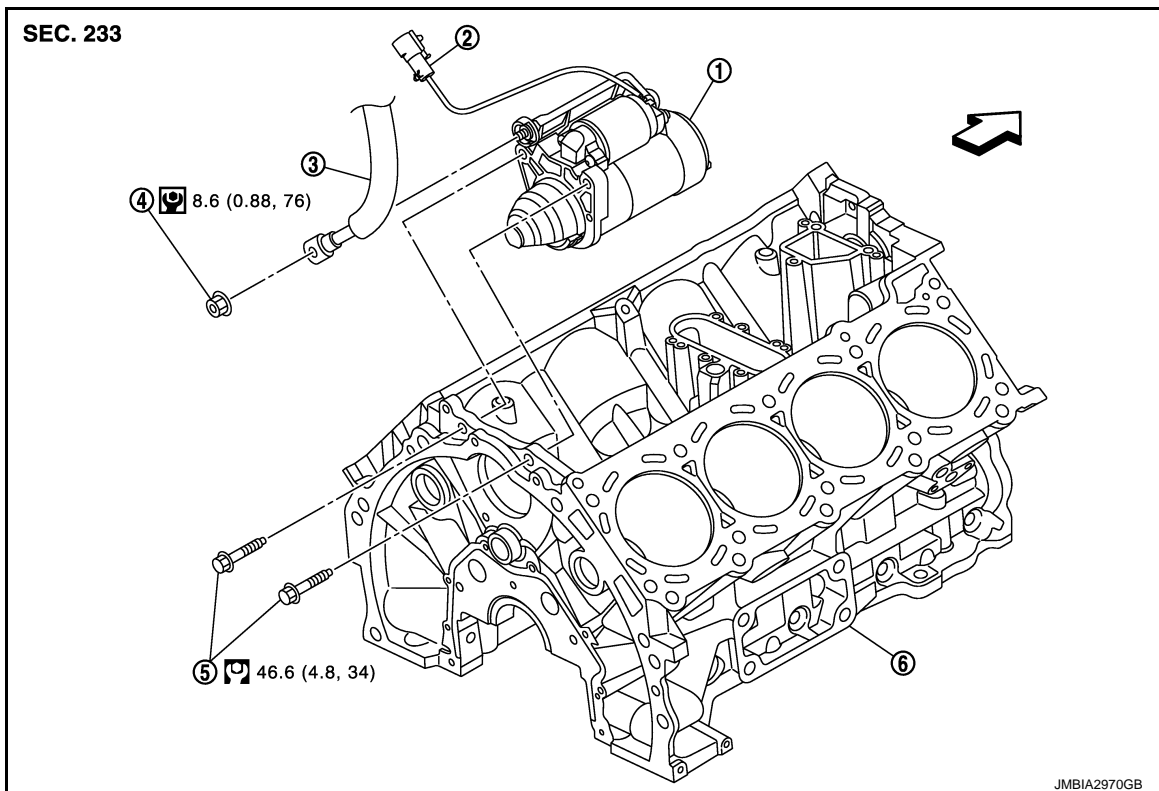
Be careful to tighten "B" terminal nut carefully.

VK56VD

VK56VD : Exploded View

INFOID:000000010100635

REMOVAL



- | | | |
|---------------------|--------------------------------|-------------------------|
| 1. Starter motor | 2. "S" connector | 3. "B" terminal harness |
| 4. "B" terminal nut | 5. Starter motor mounting bolt | 6. Cylinder block |

← : Engine front

: N·m (kg-m, ft-lb)

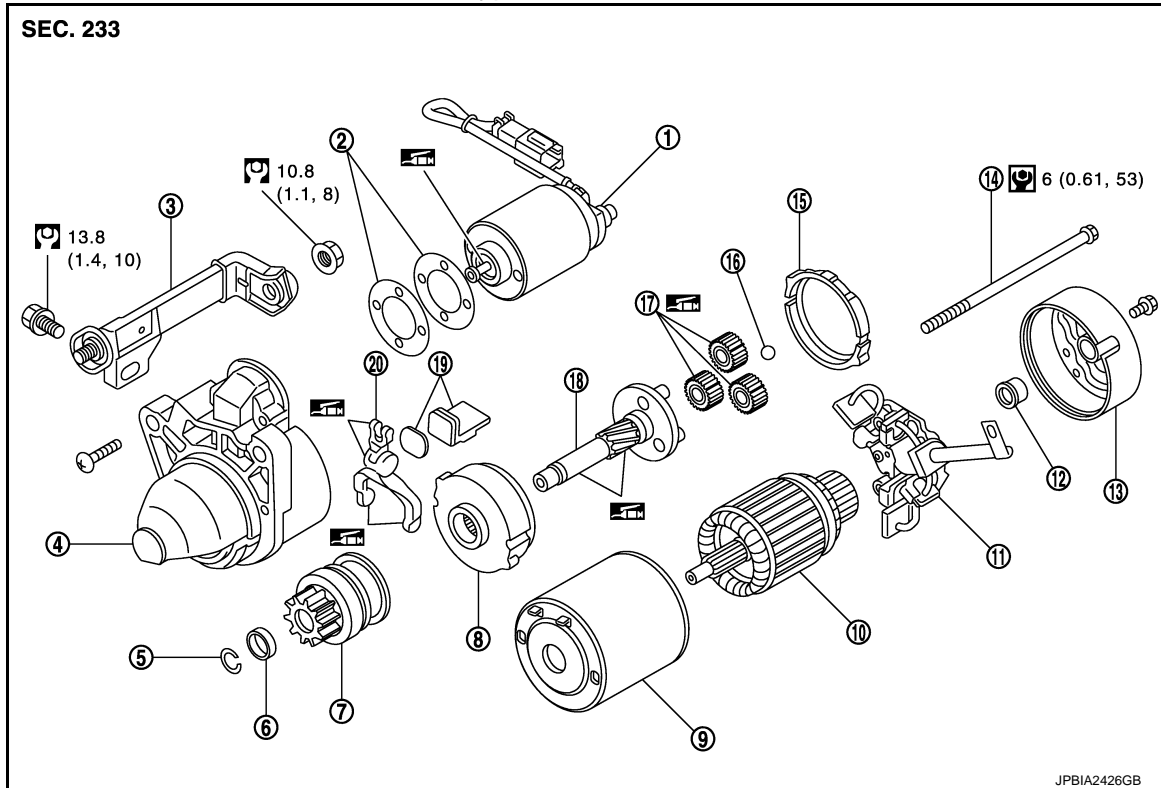
: N·m (kg-m, in-lb)

DISASSEMBLY

STARTER MOTOR

< REMOVAL AND INSTALLATION >

Type: M001T30671



- | | | |
|-----------------------------|---------------------------|---------------------------|
| 1. Magnetic switch assembly | 2. Adjusting plate | 3. "B" terminal extension |
| 4. Gear case assembly | 5. Stopper ring | 6. Stopper |
| 7. Pinion assembly | 8. Internal gear | 9. Yoke assembly |
| 10. Armature assembly | 11. Brush holder assembly | 12. Metal RR |
| 13. Rear cover | 14. Through bolt | 15. Packing |
| 16. Ball | 17. Planetary gear | 18. Gear shaft |
| 19. Dust cover kit | 20. Shift lever | |

: High-temperature grease point

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

VK56VD : Removal and Installation

INFOID:000000010100636

REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to [PG-127. "Removal and Installation"](#).
2. Remove engine cover. Refer to [EM-189. "Removal and Installation"](#).
3. Remove intake manifold. Refer to [EM-198. "Removal and Installation"](#).
4. Remove "B" terminal nut, and disconnect "B" terminal harness.
5. Disconnect "S" connector.
6. Remove starter motor mounting bolts.
7. Remove starter motor upward from the vehicle.

INSTALLATION

Note the following item, and then install in the reverse order of removal.

CAUTION:

Be careful 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:0000000010100637

Applied model		VQ37VHR	VK56VD
Type		S114-932	M001T30671
		HITACHI make	mitsubishi make
		Reduction gear type	
System voltage [V]		12	
No-load	Terminal voltage [V]	11	
	Current [A]	Less than 110	Less than 120
	Revolution [rpm]	More than 2,700	More than 3,220