

A

# SECTION STR

STR

## STARTING SYSTEM

C

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## DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

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### BASIC INSPECTION

#### DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000010576793

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

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

- GR8-1200 NI Multitasking battery and electrical diagnostic station

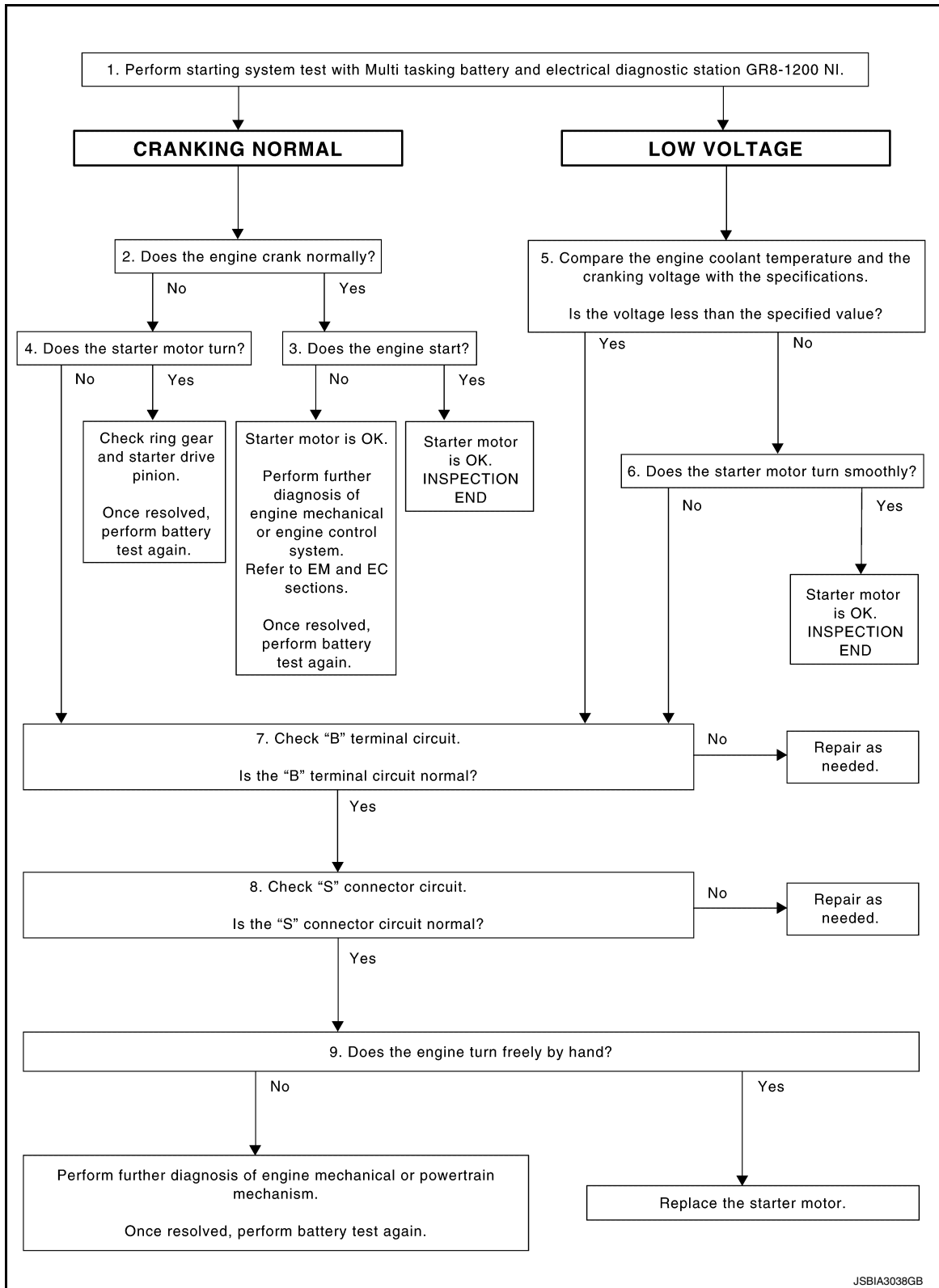
**NOTE:**

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

# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## OVERALL SEQUENCE



### DETAILED FLOW

#### NOTE:

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

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

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

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

### Test result

CRANKING NORMAL>>GO TO 2.

LOW VOLTAGE>>GO TO 5.

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

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

## 2. CRANKING CHECK

Check that the starter motor operates correctly.

### Does the engine crank normally?

YES >> GO TO 3.

NO >> GO TO 4.

## 3. ENGINE START CHECK

Check that the engine starts.

### Does the engine start?

YES >> Starter motor is OK. INSPECTION END

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

## 4. STARTER MOTOR ACTIVATION

Check that the starter motor operates.

### Does the starter motor turn?

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

NO >> GO TO 7.

## 5. COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

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

### Minimum Specification of Cranking Voltage Referencing Coolant Temperature

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

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

YES >> GO TO 7.

NO >> GO TO 6.

## 6. STARTER OPERATION

Check the starter operation status.

### Does the starter motor turn smoothly?

YES >> Starter motor is OK. INSPECTION END

NO >> GO TO 7.

## 7. "B" TERMINAL CIRCUIT INSPECTION

Check "B" terminal circuit. Refer to [STR-10, "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-11, "Diagnosis Procedure"](#).

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

Is "S" connector circuit normal?

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

## 9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

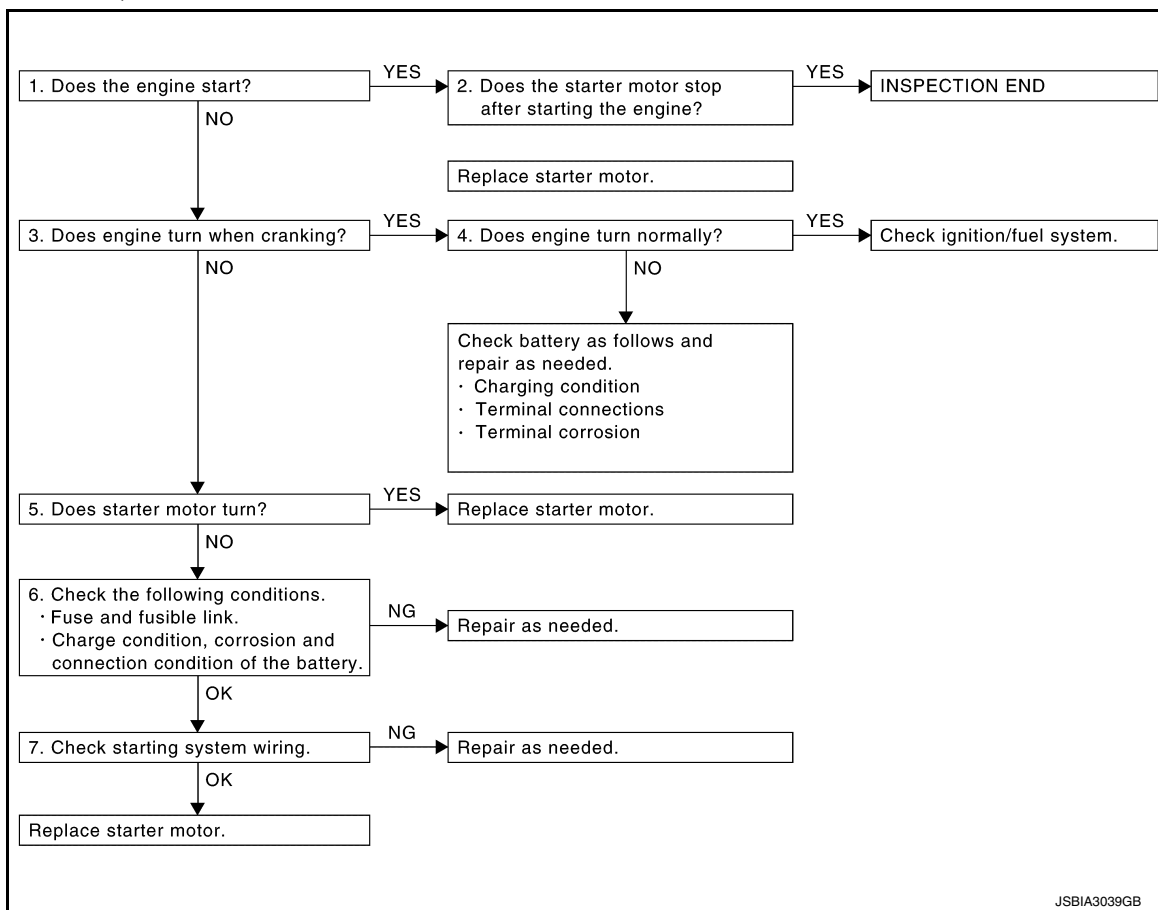
Does the engine turn freely by hand?

- YES >> Replace starter motor. Refer to [STR-22. "VQ37VHR : Removal and Installation \(2WD\)"](#) (VQ37VHR[2WD]), [STR-23. "VQ37VHR : Removal and Installation \(AWD\)"](#) (VQ37VHR[AWD]) or [STR-25. "VK50VE : Removal and Installation"](#) (VK50VE).
- 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:0000000010576794

## 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.

## 2. CHECK THAT THE STARTER MOTOR STOPS

Check that the starter motor stops after starting the engine.

# DIAGNOSIS AND REPAIR WORK FLOW

## < BASIC INSPECTION >

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### 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, "VK50VE : Removal and Installation"](#) (VK50VE).

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## 3.CHECK THAT THE ENGINE TURNS WHEN CRANKING

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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-3, "Work Flow"](#).

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## 5.CHECK STARTER MOTOR ACTIVATION

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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, "VK50VE : Removal and Installation"](#) (VK50VE).

NO >> GO TO 6.

---

## 6.CHECK POWER SUPPLY CIRCUIT

---

Check the following conditions.

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

### Are these inspection results normal?

YES >> GO TO 7.

NO >> Repair as needed.

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## 7.CHECK STARTING SYSTEM WIRING

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Check the following.

- "B" terminal circuit. Refer to [STR-10, "Diagnosis Procedure"](#).
- "S" connector circuit. Refer to [STR-11, "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, "VK50VE : Removal and Installation"](#) (VK50VE).

NO >> Repair as needed.

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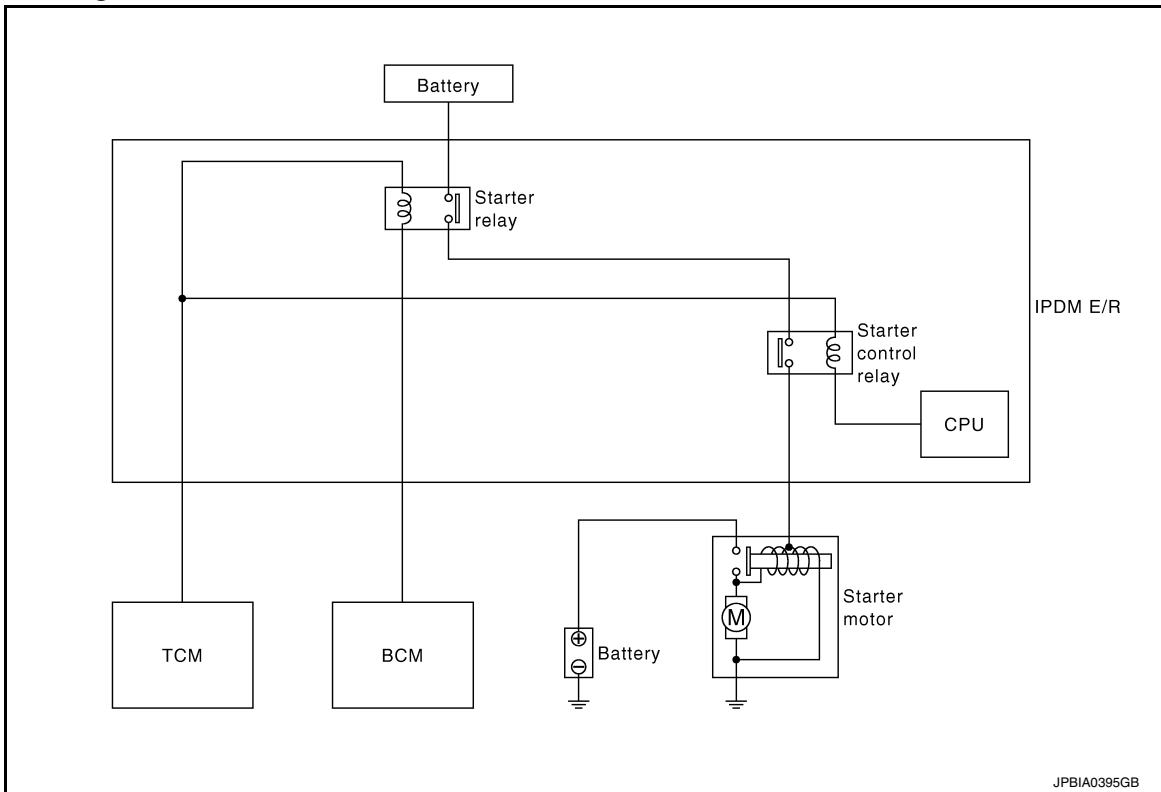
# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### STARTING SYSTEM

#### System Diagram



#### System Description

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

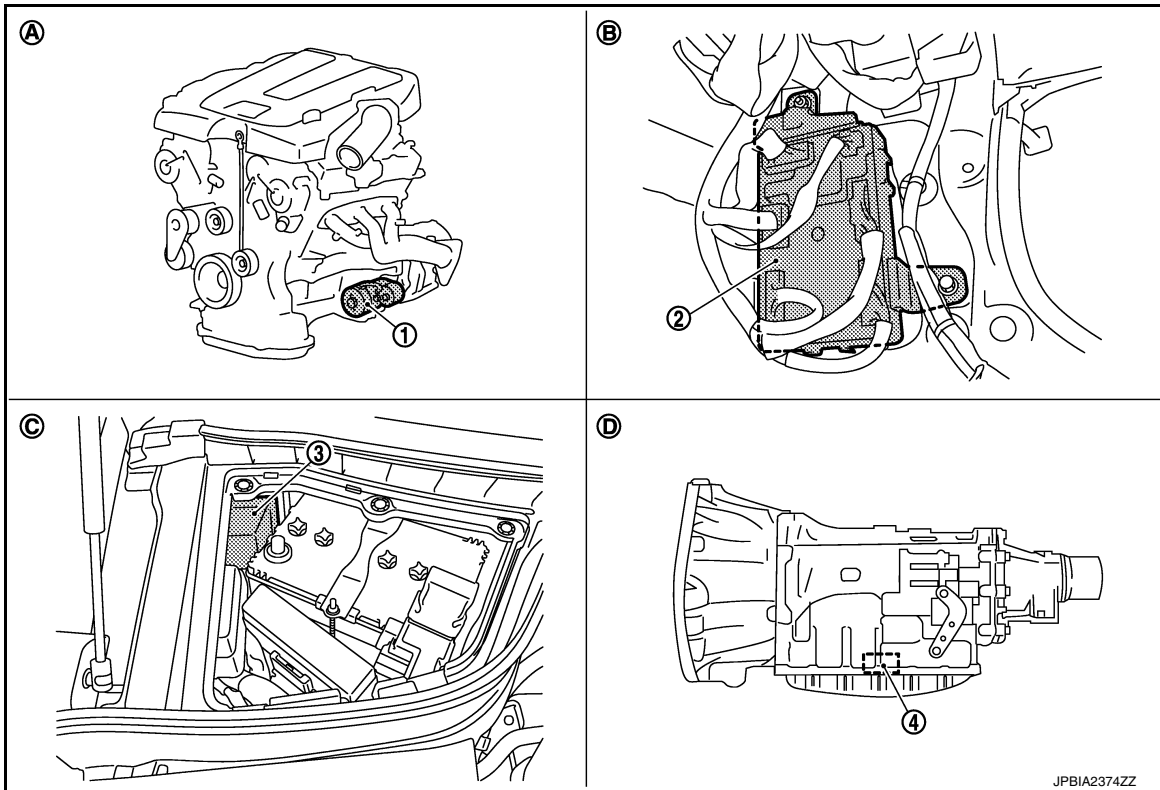
VQ37VHR

# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## VQ37VHR : Component Parts Location

INFOID:000000010576797



1. Starter motor

2. BCM

3. IPDM E/R

4. TCM

A. Cylinder block (bank 2) side

B. Dash side lower (Passenger side)

C. Engine room dash panel RH

D. Inside of A/T (built into A/T)

VK50VE

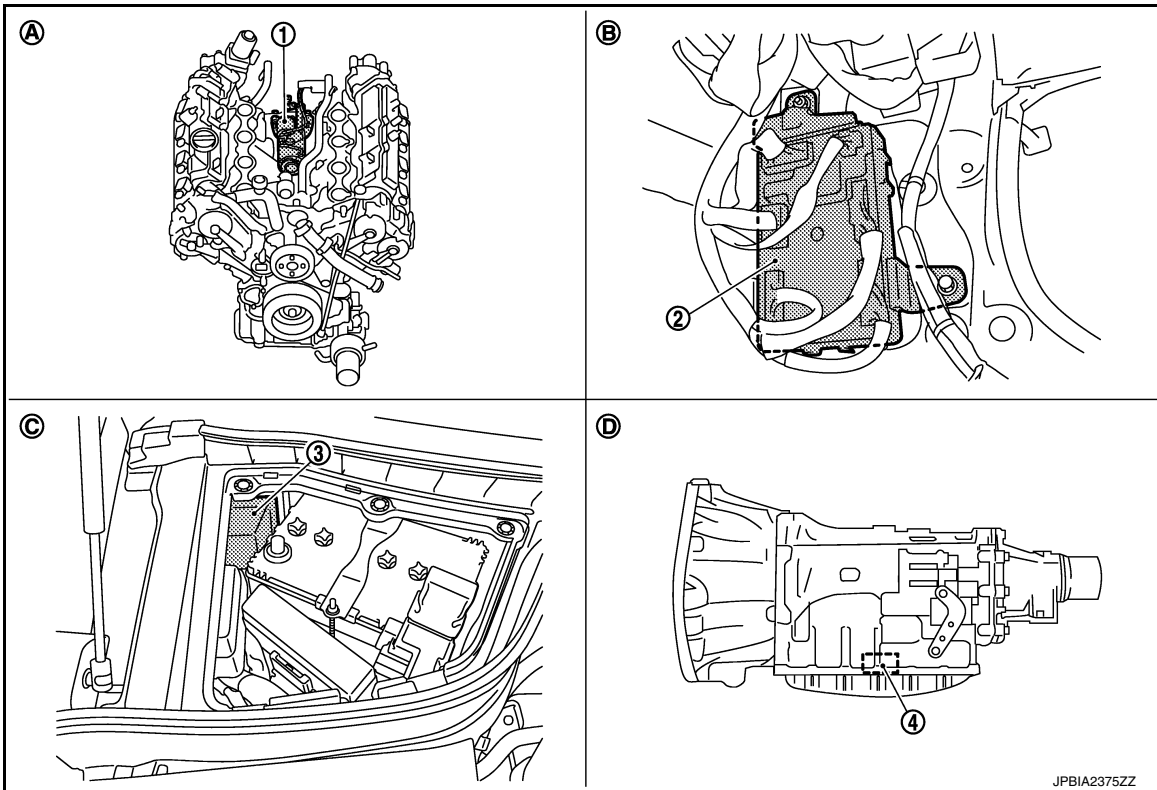


# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## VK50VE : Component Parts Location

INFOID:000000010576798



- |                                   |                                     |                              |
|-----------------------------------|-------------------------------------|------------------------------|
| 1. Starter motor                  | 2. BCM                              | 3. IPDM E/R                  |
| 4. TCM                            |                                     |                              |
| A. Engine                         | B. Dash side lower (Passenger side) | C. Engine room dash panel RH |
| D. Inside of A/T (built into A/T) |                                     |                              |

## Component Description

INFOID:000000010576799

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.

# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:0000000010576800

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

#### Diagnosis Procedure

INFOID:0000000010576801

#### 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 (VQ37VHR) E206 (VK50VE)	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.)
(+)	(-)		
Battery positive terminal	Starter motor "B" terminal	When the ignition switch is in START position	Less than 0.5 V
	E204 (VQ37VHR) E206 (VK50VE)		

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-2, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-5, "Work Flow \(Without GR8-1200 NI\)"](#).  
NO >> Check the starter motor case and ground for poor continuity.

# S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## S CONNECTOR CIRCUIT

### Description

INFOID:0000000110576802

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.

A  
STR

### Diagnosis Procedure

INFOID:0000000110576803

#### 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		
F52 (VQ37VHR) F55 (VK50VE)	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-2. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-5. "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.	
F52 (VQ37VHR) F55 (VK50VE)	1	E7	80	Existed

#### Is the inspection result normal?

- YES >> Further inspection is necessary. Refer to [STR-2. "Work Flow \(With GR8-1200 NI\)"](#) or [STR-5. "Work Flow \(Without GR8-1200 NI\)"](#).
- NO >> Repair the harness.

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# STARTING SYSTEM

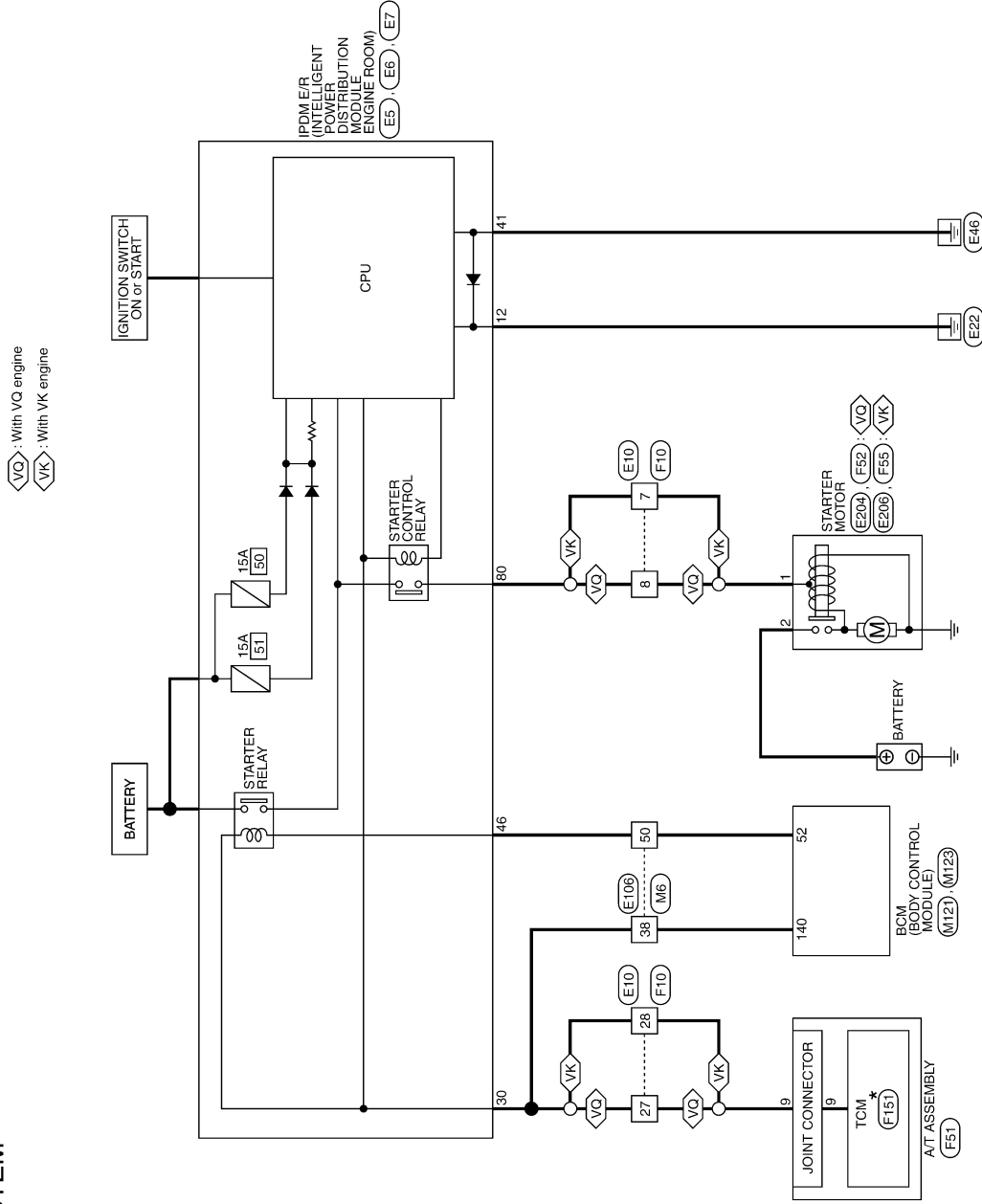
< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

Wiring Diagram - STARTING SYSTEM -

INFOID:000000010576804

STARTING SYSTEM



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

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# STARTING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >

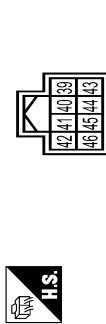
### STARTING SYSTEM

Connector No.	E5
Connector Name	IPM/ER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH20FW-CS12-M4-1V



Terminal No.	Color Of Wire	Signal Name [Specification]
4	V	-
5	L	-
7	B	-
10	SB	-
12	SB	-
13	Y	-
16	LG	-
19	W	-
25	G	-
26	R	-
27	Y	-
28	BG	-
30	GR	-
36	G	-

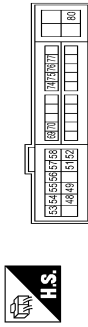
Connector No.	E6
Connector Name	IPM/ER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH08FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
39	P	-
40	L	-
41	B	-
42	Y	-
43	SB	-

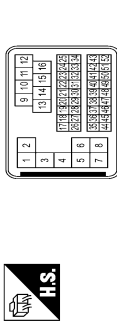
44	W	-
45	G	-
46	BR	-

Connector No.	E7
Connector Name	IPM/ER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH20FW-CS12-M4



Terminal No.	Color Of Wire	Signal Name [Specification]
48	L	-
49	SB	- [With V/G engine]
49	W	- [With VK engine]
51	G	-
52	W	-
53	W	-
54	R	-
55	BR	-
56	BG	-
56	V	- [With VK engine]
56	V	- [With V/G engine]
57	LG	-
58	Y	-
69	W	-
70	BG	-
74	G	-
75	Y	-
76	P	- [With VK engine]
76	V	- [With V/G engine]
77	B	- [With VK engine]
77	L	- [With V/G engine]
80	W	-

Connector No.	E10
Connector Name	WIRE TO WIRE
Connector Type	SAA36MB-RSS-SH23



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With V/G engine]
1	SHIELD	- [With VK engine]
2	SHIELD	- [With VK engine]
2	SHIELD	- [With V/G engine]
3	BR	-
3	G	-
4	BR	- [With VK engine]
4	SHIELD	- [With V/G engine]
5	BR	- [With VK engine]
5	G	- [With V/G engine]
6	BR	- [With VK engine]
6	R	- [With V/G engine]
7	G	- [With VK engine]
7	W	- [With V/G engine]
8	SHIELD	- [With VK engine]
8	SHIELD	- [With V/G engine]
8	W	-
9	W	-
10	G	- [With V/G engine]
10	W	- [With VK engine]
11	R	- [With V/G engine]
11	W	- [With VK engine]
12	BR	- [With V/G engine]
12	W	- [With VK engine]
13	L	- [With V/G engine]
13	R	- [With VK engine]
14	LG	-
15	BG	- [With VK engine]
15	BR	- [With V/G engine]
16	V	- [With V/G engine]
16	W	- [With VK engine]
17	P	-
18	W	-
18	W	-
20	BR	-
20	BR	- [With VK engine]
21	SB	- [With VK engine]

21	Y	- [With V/G engine]
22	G	- [With V/G engine]
23	R	- [With V/G engine]
23	R	- [With VK engine]
23	V	- [With VK engine]
24	G	- [With V/G engine]
24	Y	- [With VK engine]
25	LG	-
26	LG	-
27	G	- [With VK engine]
27	GR	- [With V/G engine]
28	GR	- [With VK engine]
28	V	- [With V/G engine]
29	P	-
30	L	- [With V/G engine]
30	W	- [With VK engine]
31	G	- [With VK engine]
31	W	- [With V/G engine]
32	V	- [With V/G engine]
33	BG	- [With VK engine]
33	W	- [With V/G engine]
34	BG	-
35	R	-
36	SHIELD	-
37	SHIELD	- [With V/G engine]
37	Y	- [With VK engine]
38	L	- [With V/G engine]
38	SHIELD	- [With VK engine]
39	P	- [With V/G engine]
39	W	- [With VK engine]
40	R	- [With V/G engine]
40	SHIELD	- [With VK engine]
41	W	- [With V/G engine]
41	Y	- [With VK engine]
42	LG	- [With V/G engine]
42	SHIELD	- [With VK engine]
43	G	- [With V/G engine]
44	W	- [With VK engine]
45	L	-
46	G	- [With V/G engine]
46	SHIELD	- [With VK engine]
47	B	- [With V/G engine]
47	W	- [With VK engine]
48	BR	- [With V/G engine]
48	R	- [With VK engine]
48	G	- [With V/G engine]
49	L	- [With VK engine]

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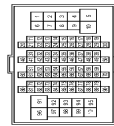
# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

50	B	-	[With VQ engine]
50	G	-	[With VK engine]
51	B	-	[With VK engine]
51	SB	-	[With VQ engine]
52	R	-	-

Connector No.	E106
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-GS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BG	-
3	SB	-
4	LG	-
5	Y	-
6	W	-
7	G	-
8	V	-
9	R	-
10	BR	-
11	B	-
12	G	-
13	R	-
14	W	-
15	SHIELD	-
16	SB	-
17	L	-
18	P	-
19	G	- [With ICC]
20	W	- [With ICC]
20	Y	- [Without ICC]
21	BR	-
22	R	- [With ICC]
22	V	- [Without ICC]
23	G	-
24	L	- [With ICC]
24	P	- [Without ICC]
25	L	- [With ICC]
25	Y	- [Without ICC]

26	SHIELD	-	-
28	G	-	-
29	LG	-	-
30	BG	-	-
32	W	-	-
33	Y	-	-
34	BG	-	-
37	Y	-	-
38	GR	-	-
39	LG	-	-
41	LG	-	-
42	V	-	-
43	R	-	-
44	G	-	-
45	GR	-	-
46	W	-	-
47	L	-	-
48	P	-	-
49	SB	-	-
50	BR	-	-
51	B	-	-
52	Y	-	-
53	BG	-	-
54	R	-	-
55	SB	-	-
59	P	-	-
60	SB	-	-
61	V	-	-
62	P	-	-
63	LG	-	-
64	L	-	-
65	BG	-	-
69	L	-	-
70	SHIELD	-	-
71	G	-	-
72	G	-	-
73	R	-	-
74	BR	-	-
76	L	-	-
77	W	-	-
78	Y	-	-
80	SB	-	-
81	L	-	-
82	W	-	-
83	LG	-	-
84	GR	-	-
85	G	-	-
86	P	-	-
87	W	-	-
88	BG	-	-

89	LG	-	-
90	BR	-	-
91	GR	-	-
92	BR	-	-
93	SB	-	-
95	Y	-	-
96	W	-	-
97	W	-	-
98	SHIELD	-	-
100	Y	-	-

Connector No.	E204
Connector Name	STARTER MOTOR
Connector Type	Z4348_51E61



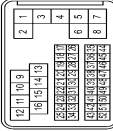
Terminal No.	2
Color Of Wire	BY
Signal Name [Specification]	-

Connector No.	E206
Connector Name	STARTER MOTOR
Connector Type	E-BA8



Terminal No.	2
Color Of Wire	BY
Signal Name [Specification]	-

Connector No.	F10
Connector Name	WIRE TO WIRE
Connector Type	ISAA36FB-RS8-SH28



Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [With VQ engine]
1	SHIELD	- [With VK engine]
2	SHIELD	- [With VQ engine]
2	Y	- [With VK engine]
3	BR	- [With VQ engine]
3	G	- [With VK engine]
4	BR	- [With VQ engine]
4	SHIELD	- [With VK engine]
5	B	- [With VQ engine]
5	BR	- [With VK engine]
6	R	- [With VQ engine]
6	W	- [With VK engine]
7	G	- [With VQ engine]
7	R	- [With VK engine]
8	SHIELD	- [With VQ engine]
8	W	- [With VK engine]
9	W	-
10	G	-
11	R	- [With VQ engine]
11	Y	- [With VK engine]
12	P	- [With VQ engine]
12	V	- [With VK engine]
13	L	- [With VQ engine]
13	P	- [With VK engine]
14	L	- [With VQ engine]
14	LG	- [With VK engine]
15	O	- [With VQ engine]
15	R	- [With VK engine]
16	R	- [With VQ engine]
16	Y	- [With VK engine]
17	GR	-
18	G	-
19	O	-
20	R	-
21	V	- [With VK engine]
21	Y	- [With VQ engine]

# STARTING SYSTEM

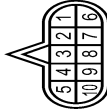
< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

22	B	G	- [With VK engine]
22	G	G	- [With VG engine]
23	LG	W	- [With VK engine]
23	Y	W	- [With VG engine]
24	LG	-	- [With VK engine]
24	Y	-	- [With VG engine]
25	V	-	-
26	O	-	-
27	GR	F51	- [With VG engine]
27	SB	AT ASSEMBLY	- [With VK engine]
28	BR	RK10FG-DGY	- [With VG engine]
28	LG	-	- [With VK engine]
29	L	-	- [With VG engine]
29	P	-	- [With VK engine]
30	GR	-	- [With VG engine]
30	R	-	- [With VK engine]
31	ER	-	- [With VG engine]
31	P	-	- [With VK engine]
32	G	-	- [With VG engine]
32	W	-	- [With VK engine]
33	L	-	- [With VG engine]
33	SB	-	- [With VK engine]
34	O	-	-
35	P	-	-
36	SHIELD	-	-
37	SHIELD	-	-
37	Y	-	- [With VK engine]
38	SHIELD	-	- [With VG engine]
38	W	-	- [With VK engine]
39	Y	-	- [With VG engine]
39	W	-	- [With VK engine]
40	G	-	- [With VG engine]
40	SHIELD	-	- [With VK engine]
41	B	-	-
41	Y	-	- [With VG engine]
42	GR	-	- [With VK engine]
42	SHIELD	-	- [With VG engine]
43	R	-	- [With VK engine]
44	W	-	- [With VG engine]
44	LG	-	-
45	L	-	-
46	G	-	- [With VK engine]
46	SHIELD	-	- [With VG engine]
47	B	-	- [With VK engine]
47	W	-	- [With VG engine]
48	LG	-	- [With VK engine]
48	R	-	- [With VG engine]
49	G	-	- [With VK engine]
49	L	-	- [With VG engine]
50	B	-	- [With VK engine]

50	G	-	- [With VK engine]
51	B	-	- [With VK engine]
51	W	-	- [With VG engine]
52	R	-	-

Connector No.	F51
Connector Name	AT ASSEMBLY
Connector Type	RK10FG-DGY



Terminal No.	Color	Wire	Signal Name [Specification]
1	Y	R	IGNITION POWER SUPPLY
2	R	R	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	L	L	CAN-H
4	V	V	K-LINE
5	B	B	GROUND
6	Y	Y	IGNITION POWER SUPPLY
7	R	R	BACK-UP LAMP RELAY
8	P	P	CAN-L
9	GR	GR	STARTER RELAY [With VG engine]
9	LG	LG	STARTER RELAY [With VK engine]
10	B	B	GROUND

Connector No.	F52
Connector Name	STARTER MOTOR
Connector Type	X01MGY



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

Connector No.	F55
Connector Name	STARTER MOTOR
Connector Type	X01FCY



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

Connector No.	F151
Connector Name	TCM
Connector Type	SPT0FG



Terminal No.	Color	Wire	Signal Name [Specification]
1	W	W	IGNITION POWER SUPPLY
2	B	B	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	R	R	CAN-H
4	O	O	K-LINE
5	G	G	GROUND
6	GR	GR	IGNITION POWER SUPPLY
7	L	L	BACK-UP LAMP RELAY
8	BR	BR	CAN-L
9	Y	Y	STARTER RELAY
10	WB	WB	GROUND

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



Terminal No.	Color	Wire	Signal Name [Specification]
1	G	G	-
2	BG	BG	- [Without Auto aircon seat]
3	LG	LG	- [Without Auto aircon seat]
3	SB	SB	- [With Auto aircon seat]
4	LG	LG	-
5	GR	GR	-
6	W	W	-
7	G	G	-
8	W	W	-
9	P	P	-
10	BR	BR	-
11	B	B	-
12	G	G	-
13	R	R	-
14	W	W	-
15	SHIELD	-	-
16	BR	BR	-
17	L	L	-
18	P	P	-
19	G	G	-
20	GR	GR	- [Without ICC]
20	W	W	- [With ICC]
21	BR	BR	- [Without ICC]
21	R	R	- [With ICC]
22	L	L	- [Without ICC]
22	R	R	- [With ICC]
23	G	G	-
24	L	L	- [With ICC]
24	P	P	- [Without ICC]
25	W	W	- [Without ICC]
25	Y	Y	- [With ICC]
26	SHIELD	-	-
28	GR	GR	-
29	V	V	-
30	BG	BG	-
32	W	W	-

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# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

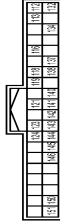
33	Y	-	-
34	L	-	-
37	G	-	-
38	R	-	-
39	G	-	-
41	L	-	-
42	W	-	-
43	R	-	-
44	LG	-	-
45	GR	-	-
46	W	-	-
47	L	-	-
48	P	-	-
49	BG	-	-
50	LG	-	-
51	SB	-	-
52	Y	-	-
53	BG	-	-
54	BR	-	-
55	SB	-	-
59	SB	-	-
60	SB	-	-
61	V	-	-
62	P	-	-
63	R	-	-
64	L	-	-
65	BG	-	-
69	V	-	-
70	SHIELD	-	-
71	BG	-	-
72	GR	-	-
73	W	-	-
74	SB	-	-
76	V	-	-
77	V	-	-
78	Y	-	-
80	BG	-	-
81	L	-	-
82	W	-	-
83	Y	-	-
84	L	-	-
85	P	-	-
86	BR	-	-
87	P	-	-
88	V	-	-
89	G	-	-
90	P	-	-
91	R	-	-
92	R	-	-
93	GR	-	-

95	G	-	-
96	W	-	-
97	W	-	-
98	SHIELD	-	-
100	Y	-	-

Connector No.	M121
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FGY-NH



Connector No.	M123
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FG-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
112	GR	RAIN SENSOR SERIAL LINK
113	P	OPTICAL SENSOR
116	BR	STOP LAMP SW 1
118	P	STOP LAMP SW 2
119	SB	DR DOOR UNLOCK SENSOR
121	BR	KEY SLOT SW
123	W	IGN PB
124	LG	PASSENGER DOOR SW
132	BG	POWER WINDOW SW COMM
134	GR	LOCK IND
137	B	RECEIVERSENSOR GND
138	Y	SENSOR POWER SUPPLY
140	R	SHIFT NP
141	G	SECURITY INDICATOR OUTPUT
142	BG	COMBI SW OUTPUT 5
143	P	COMBI SW OUTPUT 1
144	G	COMBI SW OUTPUT 2
145	L	COMBI SW OUTPUT 3
146	SB	COMBI SW OUTPUT 4
150	GR	DRIVER DOOR SW
151	G	REAR WINDOW DEFOGGER RELAY CONT

Terminal No.	Color Of Wire	Signal Name [Specification]
34	SB	LUGGAGE ROOM ANT-
35	V	LUGGAGE ROOM ANT+
38	B	BACK DOOR ANT-
39	W	BACK DOOR ANT+
47	Y	IGN RELAY (PDM E/R) CONT
52	LG	STARTER RELAY CONT
60	SB	ENG START SW
61	W	TRUNK REQUEST SW
64	L	I-KEY WARN BUZZER (ENG ROOM)
65	BG	REAR WIPER STOP POSITION
66	LG	BACK DOOR SW
67	P	BACK DOOR OPENER SW
68	BR	REAR RH DOOR SW
69	R	REAR LH DOOR SW

JRBWC7790GB



# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:0000000010576805

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STR

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

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# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:000000010576806

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:**

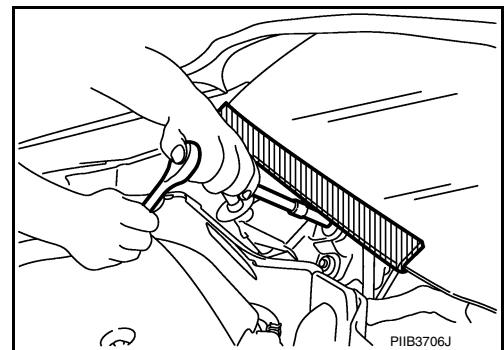
Always observe the following items for preventing accidental activation.

- 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:000000010576807

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:000000010576808

#### **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 Battery Terminal

INFOID:000000010741355

- 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.

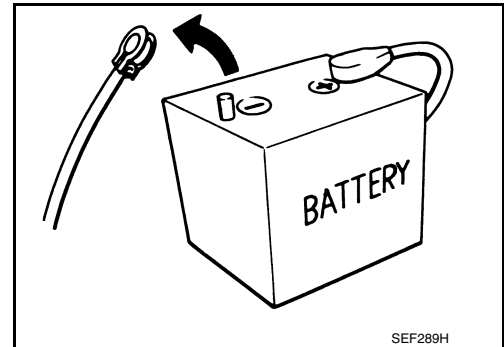
### NOTE:

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

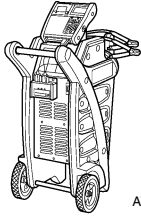
< PREPARATION >

## PREPARATION

### PREPARATION

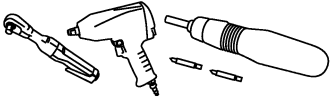
#### Special Service Tools

INFOID:000000010576809

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:000000010576810

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

# STARTER MOTOR

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### STARTER MOTOR

VQ37VHR

VQ37VHR : Exploded View

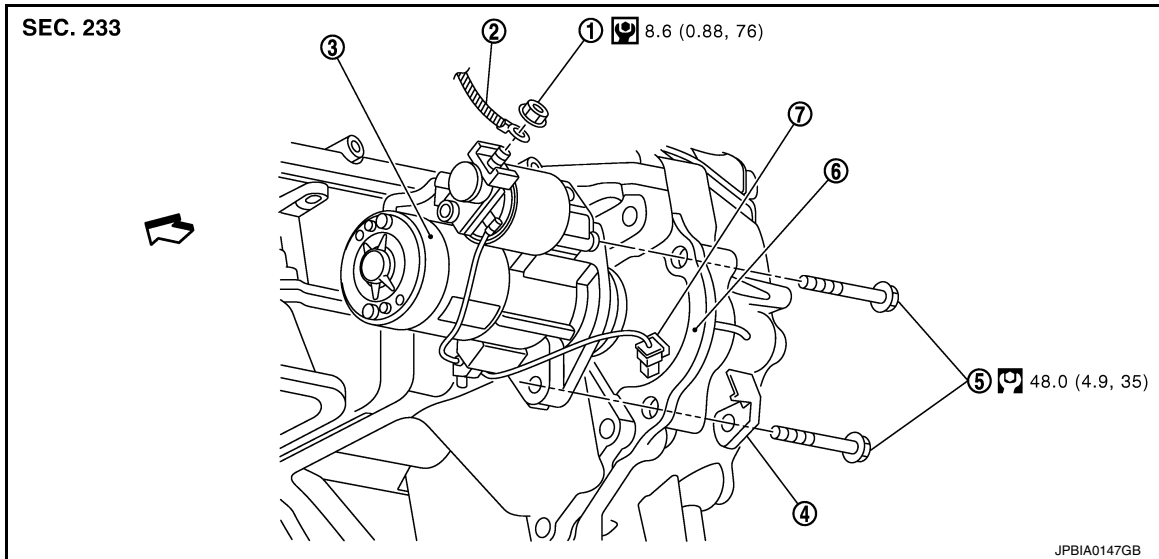
INFOID:000000010576811

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### REMOVAL

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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

J

: N·m (kg-m, ft-lb)

K

: N·m (kg-m, in-lb)

### DISASSEMBLY

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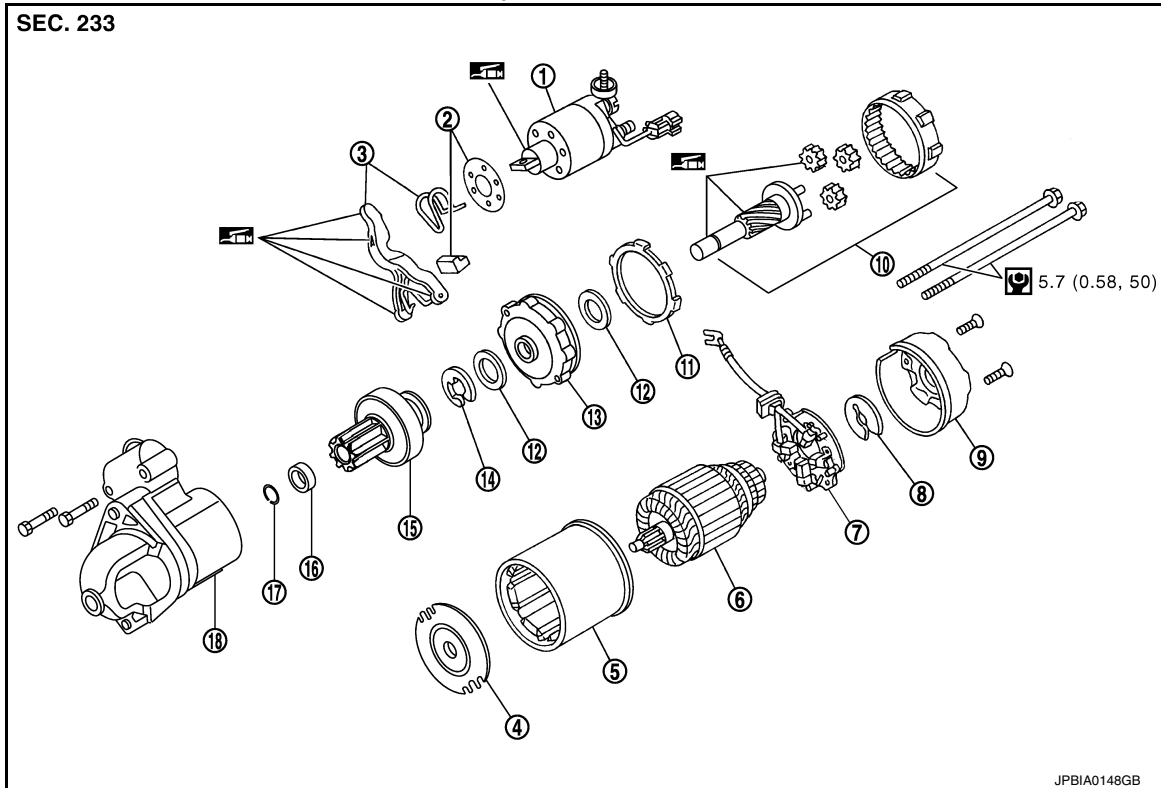
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# STARTER MOTOR


< 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)

## NOTE:

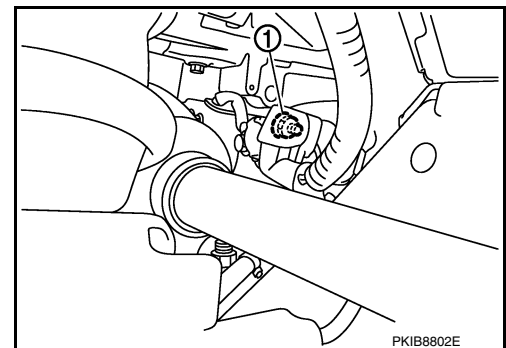
Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.

## VQ37VHR : Removal and Installation (2WD)

INFOID:000000010576812

### Removal

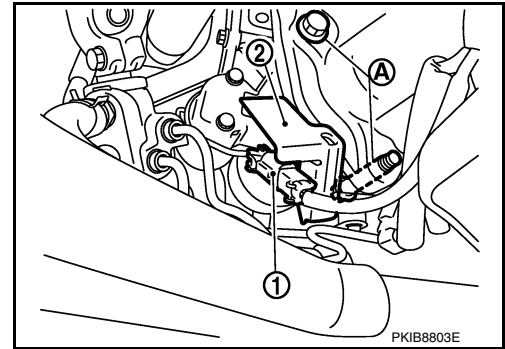
1. Disconnect the battery cable from the negative terminal. Refer to [PG-126, "Removal and Installation"](#).
2. Remove engine undercover using power tools.
3. Remove "B" terminal nut (1).



# STARTER MOTOR

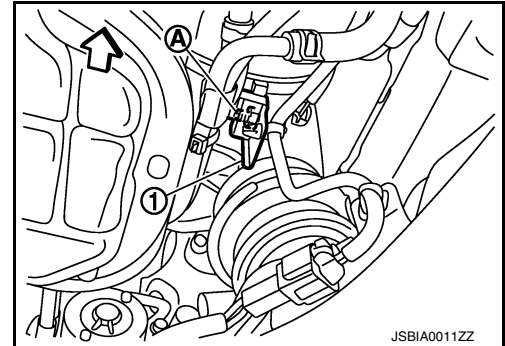
## < REMOVAL AND INSTALLATION >

4. Disconnect "S" connector (1).
5. Remove starter motor mounting bolts (A) and harness bracket (2), using power tools.



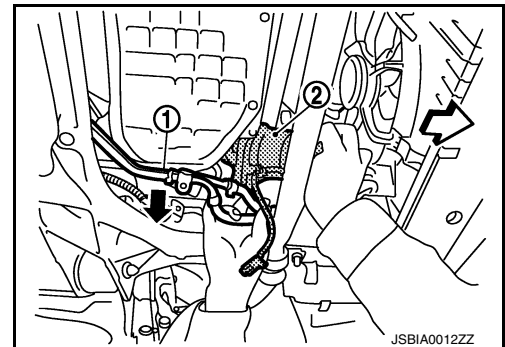
6. Remove compressor bracket bolts (A).
7. Remove compressor bracket (1).

← : Vehicle front



8. Remove A/T fluid cooler tube clip bolts and bracket. Refer to [TM-206, "2WD : Exploded View"](#).
9. Move A/T fluid cooler tube (1) downward.
10. Remove starter motor (2) forward from the vehicle.

← : Vehicle front



## INSTALLATION

Install in the reverse order of removal.

### **CAUTION:**

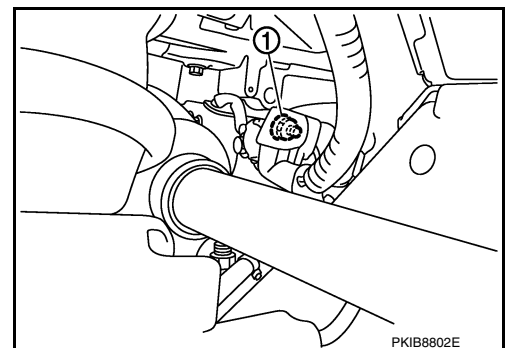
**Be sure to tighten "B" terminal nut carefully.**

## VQ37VHR : Removal and Installation (AWD)

INFOID:0000000010576813

### Removal

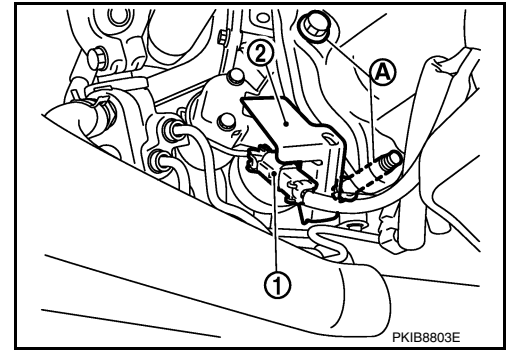
1. Disconnect the battery cable from the negative terminal. Refer to [PG-126, "Removal and Installation"](#).
2. Remove engine undercover, using power tools.
3. Remove "B" terminal nut (1).



# STARTER MOTOR

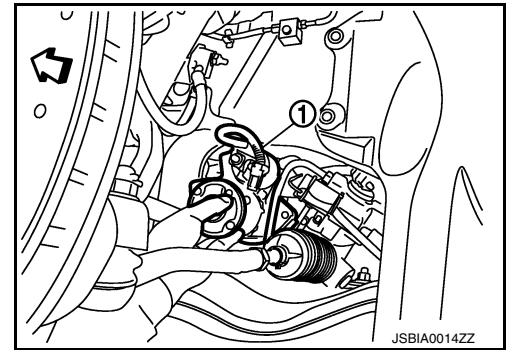
## < REMOVAL AND INSTALLATION >

4. Disconnect "S" connector (1).
5. Remove starter motor mounting bolts (A) and harness bracket (2), using power tools.



6. Remove front drive shaft left side housing bolts. Refer to [FAX-27, "Exploded View"](#).
7. Move a front drive shaft left side forward.
8. Remove stater motor (1) to left side from the vehicle.

← : Vehicle front



## INSTALLATION

Install in the reverse order of removal.

### CAUTION:

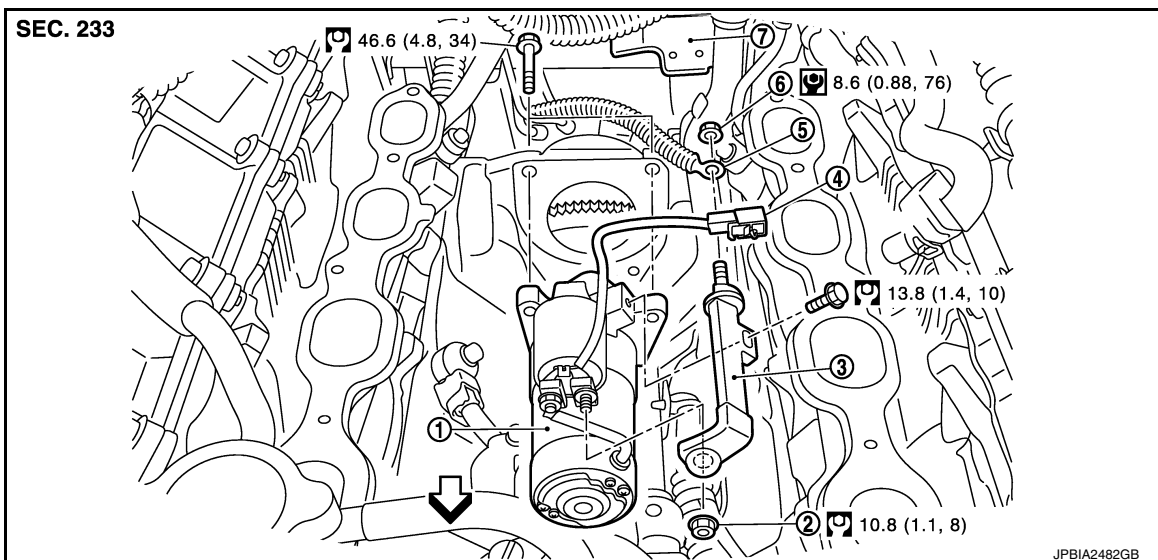
Be sure to tighten "B" terminal nut carefully.

VK50VE

VK50VE : Exploded View

INFOID:000000010576814

## REMOVAL




- |                          |                               |                           |
|--------------------------|-------------------------------|---------------------------|
| 1. Starter motor         | 2. "B" terminal extension nut | 3. "B" terminal extension |
| 4. "S" connector         | 5. "B" terminal harness       | 6. "B" terminal nut       |
| 7. "S" connector bracket |                               |                           |




# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

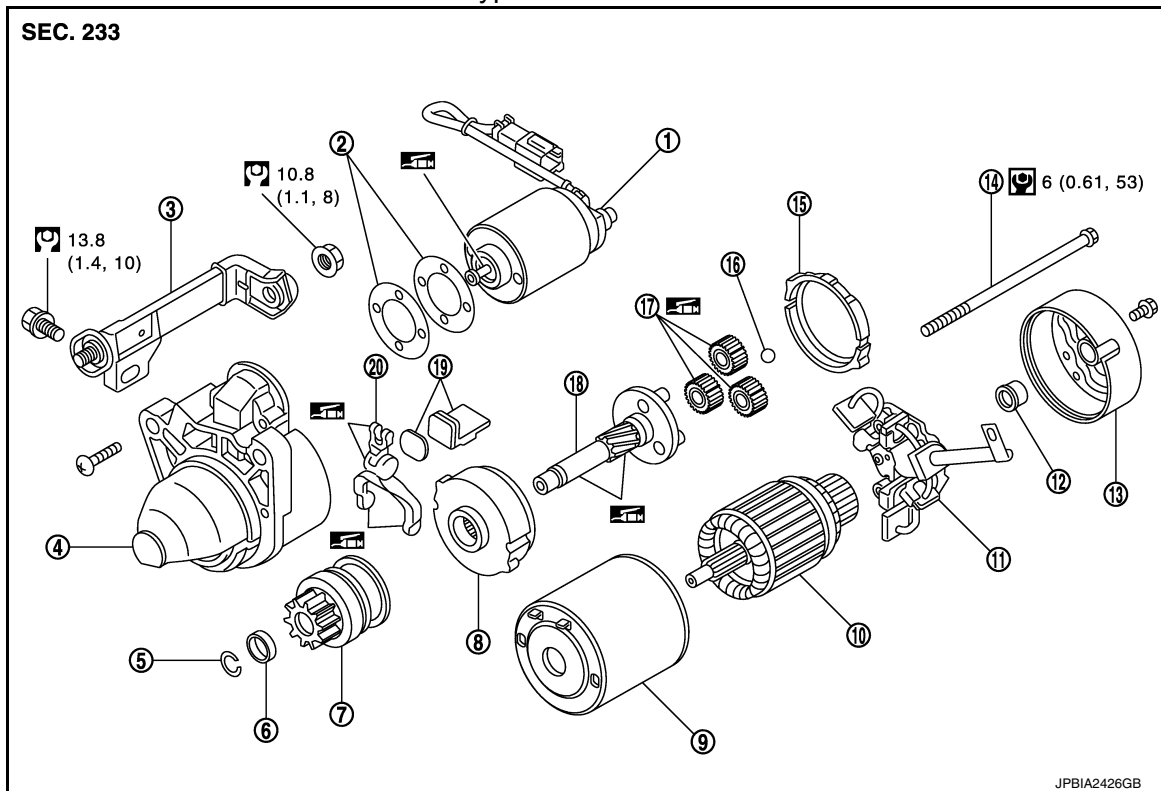
↶ : Engine front

 : N·m (kg-m, ft-lb)


 : N·m (kg-m, in-lb)


### DISASSEMBLY


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)

### NOTE:

Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.

### VK50VE : Removal and Installation

INFOID:000000010576815

#### REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to [PG-126, "Removal and Installation"](#).
2. Remove engine cover, using power tools. Refer to [EM-184, "Exploded View"](#).
3. Remove intake manifold. Refer to [EM-189, "Exploded View"](#).
4. Remove "B" terminal nut.

## STARTER MOTOR

### < REMOVAL AND INSTALLATION >

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5. Disconnect "S" connector.
6. Remove starter motor mounting bolts using power tools.
7. Remove starter motor upward from the vehicle.

### INSTALLATION

Install in the reverse order of removal.

**CAUTION:**

**Be sure to tighten "B" terminal nut carefully.**

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

INFOID:0000000010576816

A

STR

Applied model		VQ37VHR	VK50VE
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

C

D

E

F

G

H

I

J

K

L

M

N

O

P