

A

# SECTION STR

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## STARTING SYSTEM

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### CONTENTS

D

E

<b>PRECAUTION</b> .....	2	<b>DTC/CIRCUIT DIAGNOSIS</b> .....	16	F
<b>PRECAUTIONS</b> .....	2	<b>B TERMINAL CIRCUIT</b> .....	16	
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	2	Description .....	16	G
		Diagnosis Procedure .....	16	
<b>PREPARATION</b> .....	3	<b>S CONNECTOR CIRCUIT</b> .....	17	
		Description .....	17	H
<b>PREPARATION</b> .....	3	Diagnosis Procedure .....	17	
Special Service Tools .....	3	<b>SYMPTOM DIAGNOSIS</b> .....	18	I
Commercial Service Tools .....	3	<b>STARTING SYSTEM</b> .....	18	
<b>SYSTEM DESCRIPTION</b> .....	4	Symptom Table .....	18	J
<b>COMPONENT PARTS</b> .....	4	<b>REMOVAL AND INSTALLATION</b> .....	19	
Component Parts Location .....	4	<b>STARTER MOTOR</b> .....	19	K
Starter motor .....	4	<b>VQ37VHR</b> .....	19	
<b>SYSTEM</b> .....	5	VQ37VHR : Exploded View .....	19	L
System Description .....	5	VQ37VHR : Removal and Installation (Vehicle speed sensitive P/S models) .....	19	
<b>WIRING DIAGRAM</b> .....	6	VQ37VHR : Removal and Installation (Direct adaptive steering models) .....	21	M
<b>STARTING SYSTEM</b> .....	6	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	24	N
Wiring Diagram .....	6	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	24	O
<b>BASIC INSPECTION</b> .....	11	Starter Motor .....	24	P
<b>DIAGNOSIS AND REPAIR WORK FLOW</b> .....	11			
Work Flow (With GR8-1200 NI) .....	11			
Work Flow (Without GR8-1200 NI) .....	14			

# PRECAUTIONS

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## PRECAUTION

### PRECAUTIONS

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

INFOID:000000009235863

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.

# PREPARATION

< PREPARATION >

## PREPARATION


### PREPARATION

#### Special Service Tools

INFOID:000000009392931

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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;">AWIA1239ZZ</p>	<p>Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.</p>


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#### Commercial Service Tools

INFOID:000000009235867

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

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# COMPONENT PARTS

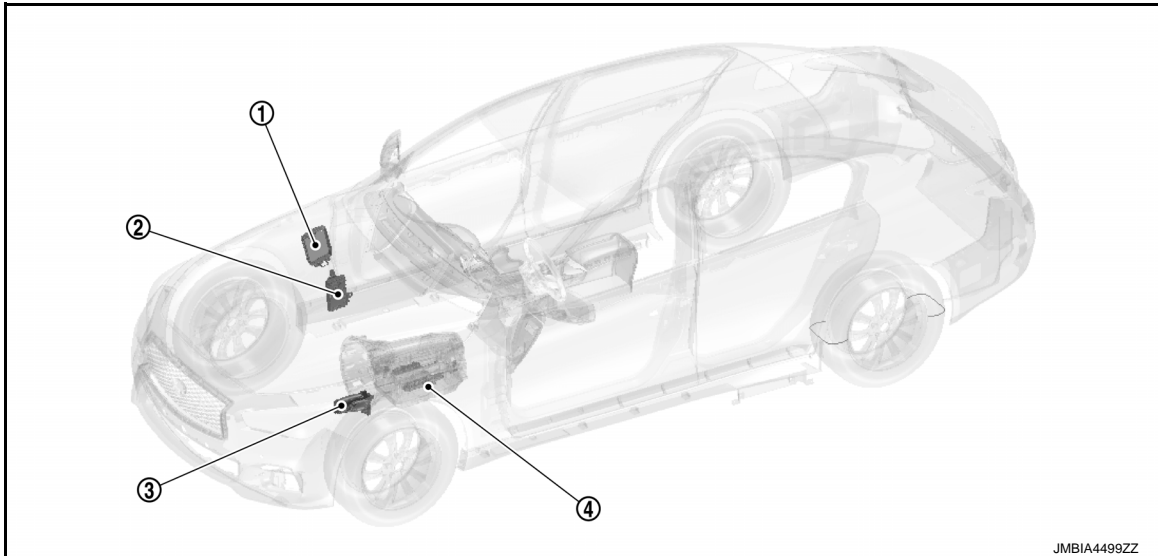
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## SYSTEM DESCRIPTION

### COMPONENT PARTS

#### Component Parts Location

INFOID:000000009394066



**A** A/T assembly

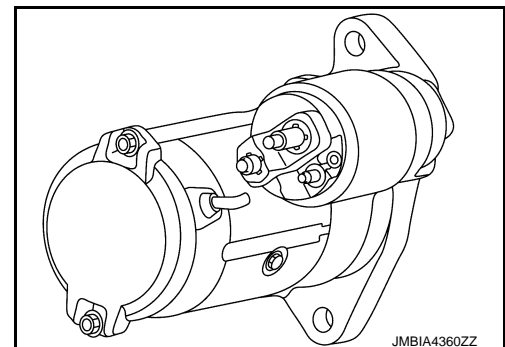
No.	Component	Function
①	IPDM E/R	CPU inside IPDM E/R controls starter control relay. Refer to <a href="#">PCS-4, "Component Parts Location"</a> for detailed installation location.
②	BCM	BCM controls starter relay. Refer to <a href="#">BCS-4, "BODY CONTROL SYSTEM : Component Parts Location"</a> for detailed installation location.
③	Starter motor	Refer to <a href="#">STR-4, "Starter motor"</a> .
④	TCM	TCM supplies power to starter relay and starter control relay when the selector lever is shifted to the P or N position. Refer to <a href="#">TM-12, "A/T CONTROL SYSTEM : Component Parts Location"</a> for detailed installation location.

#### Starter motor

INFOID:000000009394067

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: The "B" terminal is constantly supplied with battery power.
- "S" terminal: The starter motor magnetic switch ("S" terminal) is supplied with power when the cranking condition is satisfied.



# SYSTEM

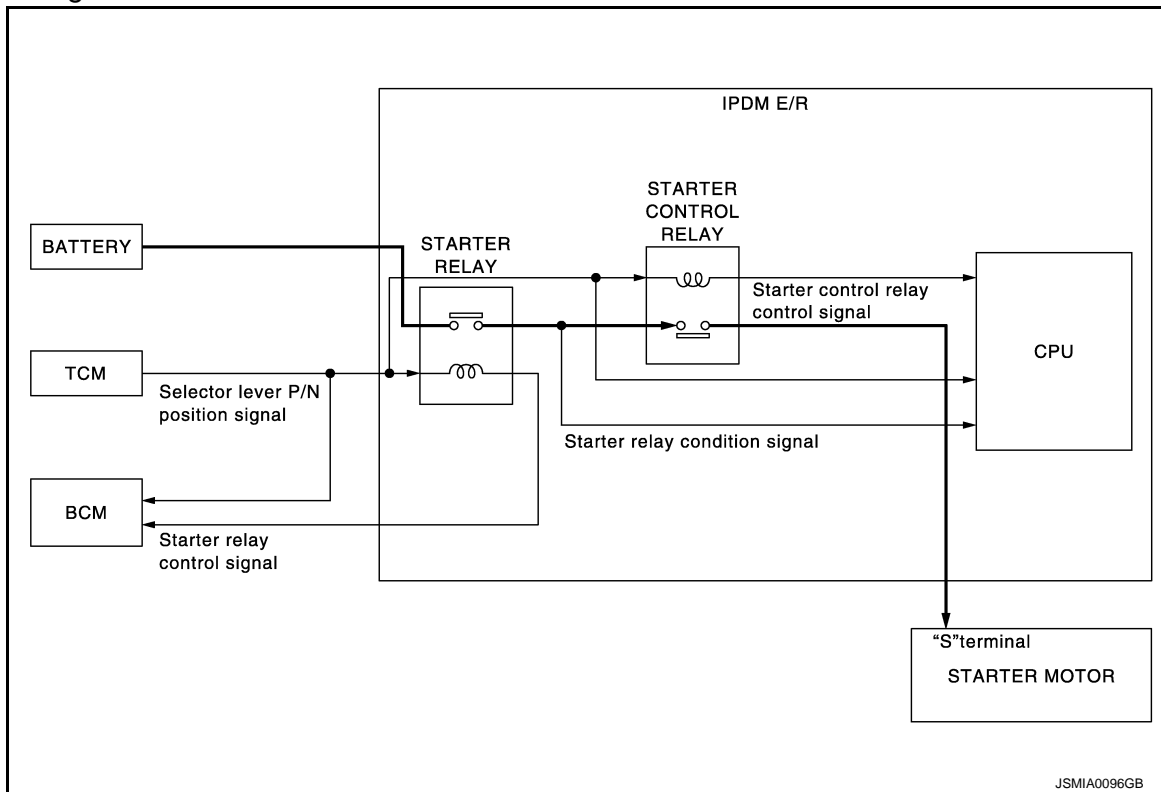
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## SYSTEM

### System Description

INFOID:000000009235873

### System Diagram



### System Description

- 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.

# STARTING SYSTEM

< WIRING DIAGRAM >

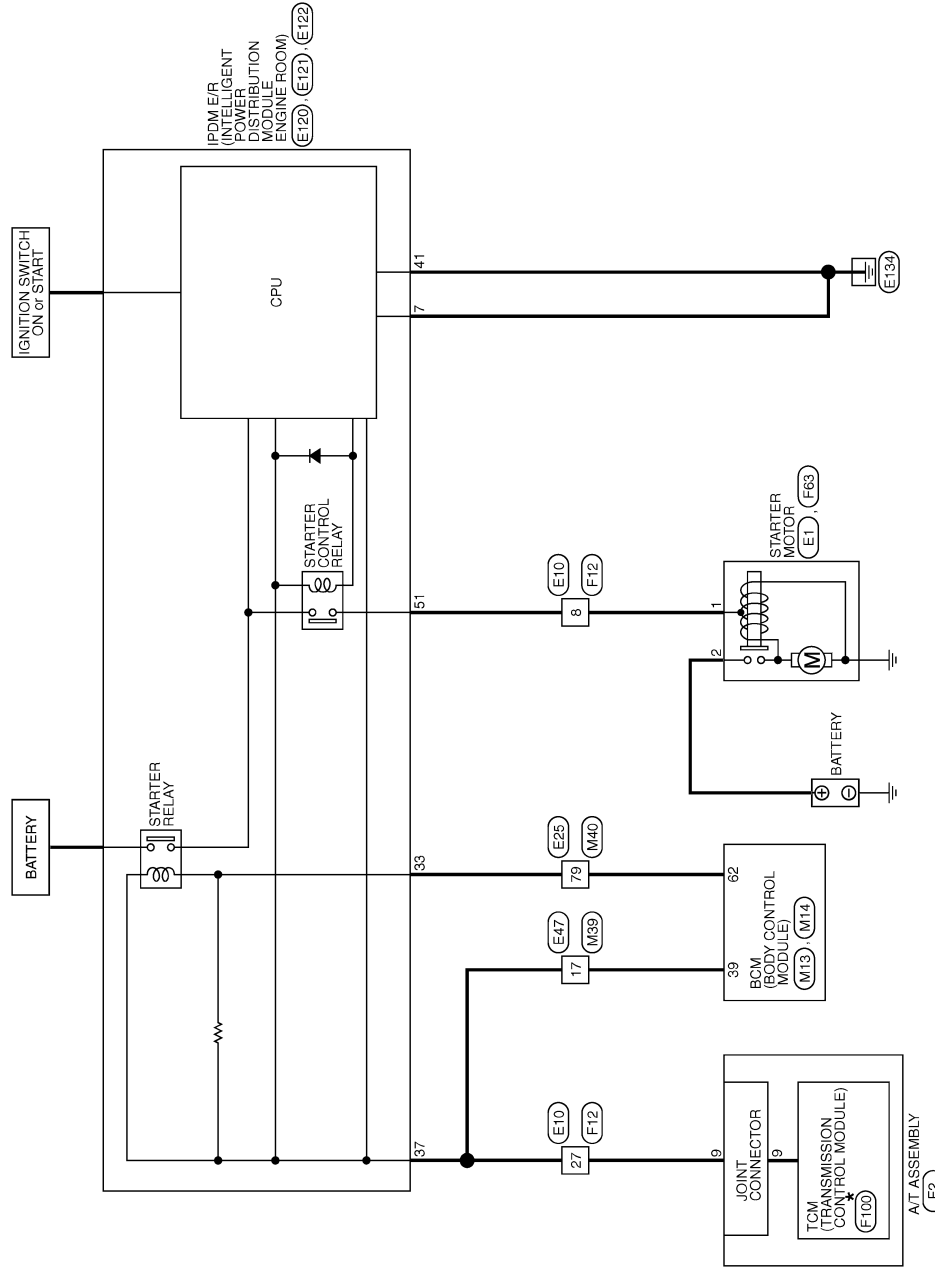
## WIRING DIAGRAM

### STARTING SYSTEM

Wiring Diagram

INFOID:000000009235874

STARTING SYSTEM



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

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JRBWC3033GB

# STARTING SYSTEM

< WIRING DIAGRAM >

## STARTING SYSTEM

Connector No.	E1
Connector Name	STARTER MOTOR
Connector Type	24346-31E1



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

Connector No.	E10
Connector Name	WIRE TO WIRE
Connector Type	SAAS30MB-R55F-SH2S



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/Y	-
2	SHIELD	-
3	L/B	-
4	SHIELD	-
5	BR	-
6	SB	-
7	G	-
8	W	-
9	W	-
10	Y	-
11	P	-
12	SB	-
13	G	-
14	L/G	-
15	L/G	-
16	BR	-
17	L	-
18	P	-

19	GR	-
20	G	-
21	V	-
22	Y	-
23	L	-
24	GR	-
25	V	-
26	BR	-
27	W	-
28	V	-
29	BR	-
30	R	-
31	P	-
32	G	-
33	B	-
34	L/G	-
35	L/G	-
36	W	-
37	SHIELD	-
38	L	-
39	P	-
40	R	-
41	W	-
42	L/G	-
43	G	-
44	V	-
45	Y	-
46	SHIELD	-
47	BR	-
48	G	-
49	B	-
50	R	-
51	SB	-
52	R	-

Connector No.	E25
Connector Name	WIRE TO WIRE
Connector Type	TH30PW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
2	W	-
3	GR	-
4	GR	-
5	SB	-
6	V	-
7	L	-
10	BR	-
11	L	-
12	GR	-
13	W	-
14	B	-
15	SB	-
16	Y	-
17	BR	-
18	P	-
31	G	-
32	G	-
33	R	-
34	V	-
35	V	-
36	R	-
37	V	-
38	L	-
39	Y	-
40	S5	-
41	L/G	-
44	Y	-
45	W	-
46	B	-
47	G	-
48	SHIELD	-
49	R	-
50	P	-
51	W	-
52	W	-
53	V	-
54	P	-
55	W	-

56	SB	-
57	EG	-
58	EG	-
59	W	-
61	R	-
64	Y	-
65	SB	-
66	GR	-
67	L/G	-
68	B/G	-
71	L/G	-
72	V	-
73	G	-
74	BR	-
75	V	-
76	Y	-
78	SB	-
79	SB	-
83	R	-
86	B/G	-
91	G	-
92	Y	-
94	GR	-
95	B/G	-
96	W	-
97	L/G	-
98	L	-
99	P	-
100	SHIELD	-

Connector No.	E47
Connector Name	WIRE TO WIRE
Connector Type	TH32MM-HH



Terminal No.	Color Of Wire	Signal Name [Specification]
2	VC	-
3	V	-
4	L	-
4	P	- [With Gateway]
4	R	-

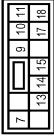
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# STARTING SYSTEM

< WIRING DIAGRAM >

## STARTING SYSTEM

Connector No.	E120
Connector Name	POWER FOR INTELLIGENT POWER DISTRIBUTION/MODULE ENGINE ROOM
Connector Type	MS12FW-CS




Terminal No.	Color	Wire	Signal Name [Specification]
7	W	W	
9	Y	Y	
10	LG	LG	
11	V	V	
13	Y	Y	
14	SB	SB	
15	Y	Y	
17	GR	GR	
18	L	L	

Connector No.	E121
Connector Name	POWER FOR INTELLIGENT POWER DISTRIBUTION/MODULE ENGINE ROOM
Connector Type	TH132FW-NH



Terminal No.	Color	Wire	Signal Name [Specification]
19	GR	GR	
20	LG	LG	
21	LG	LG	
22	W	W	
23	Y	Y	
24	Y	Y	
25	GR	GR	
26	P	P	
29	L	L	
31	G	G	
33	SB	SB	
34	Y	Y	
35	G	G	
36	SB	SB	
37	GR	GR	
38	BR	BR	
41	GR	GR	
48	V	V	

Connector No.	E122
Connector Name	POWER FOR INTELLIGENT POWER DISTRIBUTION/MODULE ENGINE ROOM
Connector Type	M01FB-LC



Terminal No.	Color	Wire	Signal Name [Specification]
51	W	W	

Connector No.	F2
Connector Name	A/T ASSEMBLY
Connector Type	BK10FG-DG



Terminal No.	Color	Wire	Signal Name [Specification]
1	W	W	IGNITION POWER SUPPLY
2	P	P	BATTERY POWER SOURCE/MEMORY BACK-UP
3	L	L	CAN-L
4	LG	LG	K-LINE
5	B	B	GROUND
6	GR	GR	IGNITION POWER SUPPLY
7	BG	BG	BACK-UP LAMP RELAY
8	P	P	CAN-L
9	GR	GR	STARTER RELAY
10	B	B	GROUND

Connector No.	F12
Connector Name	WIRE TO WIRE
Connector Type	SAA38FB-RSS-SH2B



Terminal No.	Color	Wire	Signal Name [Specification]
1	E7	E7	
2	SHIELD	SHIELD	
3	SHIELD	SHIELD	
4	SHIELD	SHIELD	
5	BR	BR	
6	GR	GR	
7	G	G	
8	W	W	
9	W	W	
10	G	G	

11	B	B	
12	L	L	
13	L	L	
14	LG	LG	
15	P	P	
16	Y	Y	
17	L	L	
18	P	P	
19	GR	GR	
20	BG	BG	
21	LG	LG	
22	W	W	
23	Y	Y	
24	LG	LG	
25	W	W	
26	V	V	
27	V	V	
28	BR	BR	
29	LG	LG	
30	R	R	
31	P	P	
32	GR	GR	
33	B	B	
34	BG	BG	
35	LG	LG	
36	SB	SB	
37	SHIELD	SHIELD	
38	W	W	
39	Y	Y	
40	G	G	
41	B	B	
42	GR	GR	
43	R	R	
44	BG	BG	
45	Y	Y	
46	SHIELD	SHIELD	
47	W	W	
48	LG	LG	
49	L	L	
50	R	R	
51	SB	SB	
52	G	G	



# STARTING SYSTEM

< WIRING DIAGRAM >

## STARTING SYSTEM

Connector No.	F100
Connector Name	STARTER MOTOR
Connector Type	XDMGX



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

Connector No.	F100
Connector Name	TCM(TRANSMISSION CONTROL MODULE)
Connector Type	SPT0FC



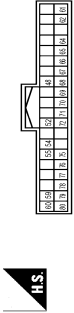
Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	IGNITION POWER SUPPLY
2	-	BATTERY POWER SUPPLY (MEMORY BACK-UP)
3	-	CAN-H
4	-	K-LINE
5	-	GROUND
6	-	IGNITION POWER SUPPLY
7	-	BACK-UP LAMP RELAY
8	-	CAN-L
9	-	STARTER RELAY
10	-	GROUND

Connector No.	M13
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FC-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	PUSH SW
2	R	SENS. SENSOR
3	RG	OPTICAL SENSOR
4	LG	COMBI SW OUTPUT 5
5	W	COMBI SW OUTPUT 4
6	SB	COMBI SW OUTPUT 3
7	L	COMBI SW OUTPUT 2
8	G	COMBI SW OUTPUT 1
9	G	ONE TOUCH UNLK SENS (DR)
10	G	ONE TOUCH UNLK SENS (PASS)
11	P	RECEIVER/SENSOR OND
12	L	SECURITY IND LAMP CONT
13	R	DEFENT SW
14	SB	STEP LAMP CONT
15	R	STOP LAMP SW
16	R	EXTENDED STOP/RELEASE SW
17	P	DR DOOR UNLK SENS
18	W	TR LID OP CANCEL SW
19	G	HAZARD SW
20	BR	P-IN POSITION

Connector No.	M14
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FB-NH



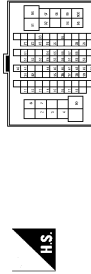
Terminal No.	Color Of Wire	Signal Name [Specification]
28	R	PUSH-ENTR (IGN SW) ILL PWR
29	SB	COMBI SW
30	V	COMBI LINE
31	V	RAM SENSOR
32	P	CAN-H
33	L	CAN-L
34	G	REAR WINDOW DEF RLY CONT
35	G	STARTER RLY CONT
36	R	F-KEY WARN BUZZER
37	B	OUTS HD LAMP CONT
38	B	BLOWER FAN RLY CONT
39	W/B	IGN RLY (F/B) CONT
40	R	DIMMER
41	GR	A/T SHFT SELECT PWR SHLY
42	B	IGN RELAY (UP/DN) F/B CONT
43	SB	COMBI SW INPUT 1
44	SB	PASS DOOR RECS SW
45	BR	COMBI SW INPUT 5
46	RG	COMBI SW INPUT 4
47	V	COMBI SW INPUT 3
48	Y	COMBI SW INPUT 2
49	LG	COMBI SW INPUT 1
50	L	TR LID OP/RM SW

Connector No.	M49
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W/B	-
2	SB	-
3	SB	-
4	P	- [Without Gateways]
5	P	- [With Gateways]
6	R	-
7	L	-
8	W	-
9	G	-
10	G	-
11	R	-
12	R	-
13	BR	-
14	BR	-
15	BR	-
16	BR	-
17	BR	-
18	BR	-
19	BR	-
20	W/B	-
21	W	-
22	W	-
23	W	-
24	W	-
25	W	-
26	W	-
27	W	-
28	W	-
29	W	-
30	W	-
31	W	-
32	LG	-

Connector No.	M40
Connector Name	WIRE TO WIRE
Connector Type	TH30MM-CSP-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	L	-
3	L	-
4	V	-

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# STARTING SYSTEM

< WIRING DIAGRAM >

STARTING SYSTEM					
9	W/B	-			
10	W	-			
11	W	-			
12	B	-			
13	GR	-			
14	B	-			
15	SB	-			
16	B	-			
17	LG	-			
18	B	-			
31	W	-			
32	V	-			
35	BG	-			
37	G	-			
38	B	-			
39	Y	-			
40	GR	-			
41	L	-			
44	BR	-			
45	W	-			
46	G	-			
47	R	-			
48	SHIELD	-			
49	B	-			
50	BR	-			
51	L	-			
52	R	-			
54	V	-			
55	P	-			
56	BG	-			
57	GR	-			
58	B	-			
59	SB	-			
61	W/B	-			
64	Y	-			
65	R	-			
66	V	-			
67	LG	-			
68	BG	-			
72	LG	-			
73	R	-			
74	BR	-			
75	B	-			
78	G	-			
79	R	-			
83	R	-			

88	V	-			
89	W	-			
92	R	-			
94	BG	-			
95	BR	-			
96	W	-			
97	LG	-			
98	Y	-			
99	BR	-			
100	SHIELD	-			

JRBWC3037GB

# DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With GR8-1200 NI)

INFOID:000000009393087

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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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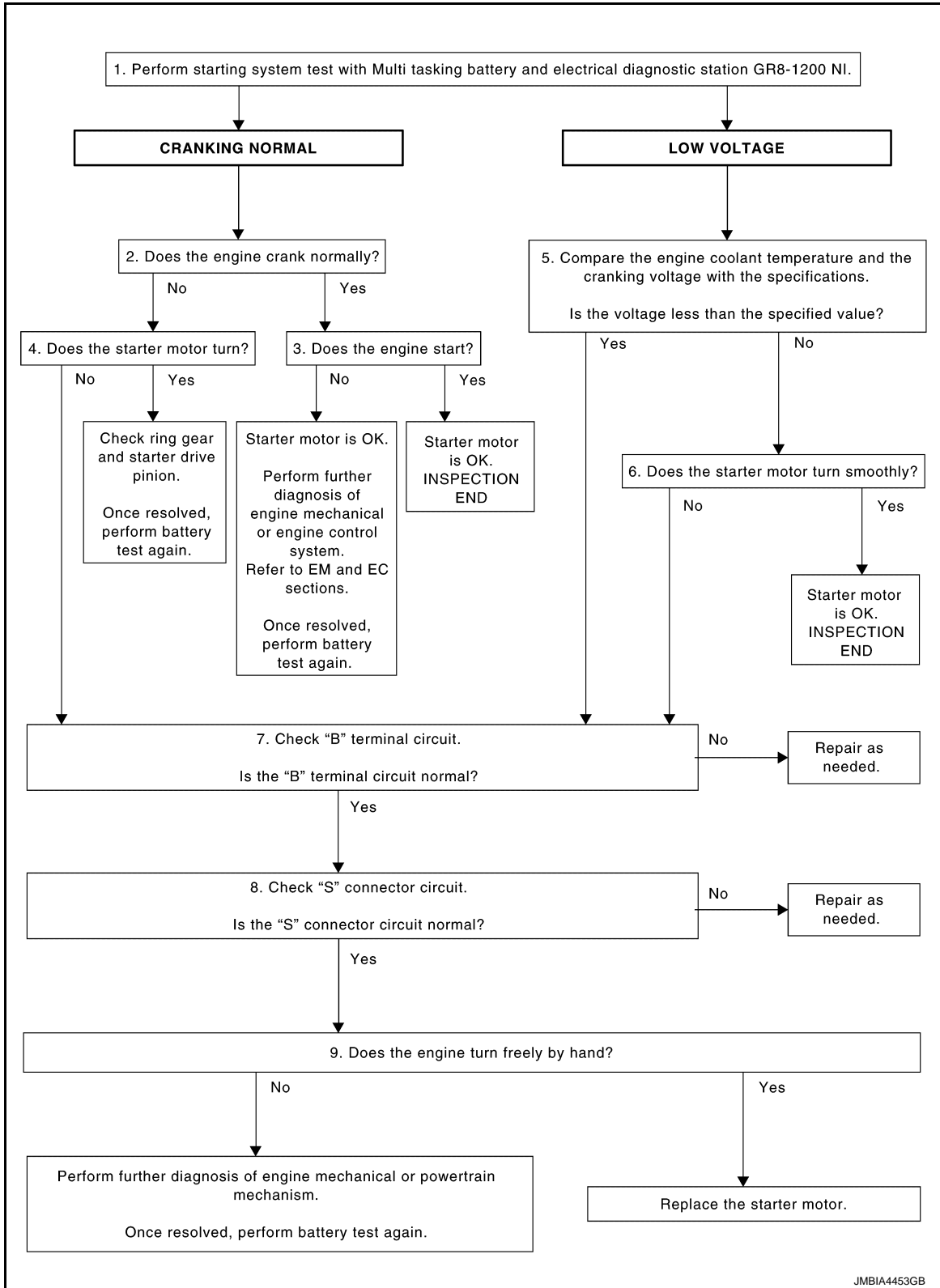
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# DIAGNOSIS AND REPAIR WORK FLOW

< 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 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-16, "Diagnosis Procedure"](#).

### Is "B" terminal circuit normal?

YES >> GO TO 8.

NO >> Repair as needed.

## 8. "S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to [STR-17, "Diagnosis Procedure"](#).

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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.

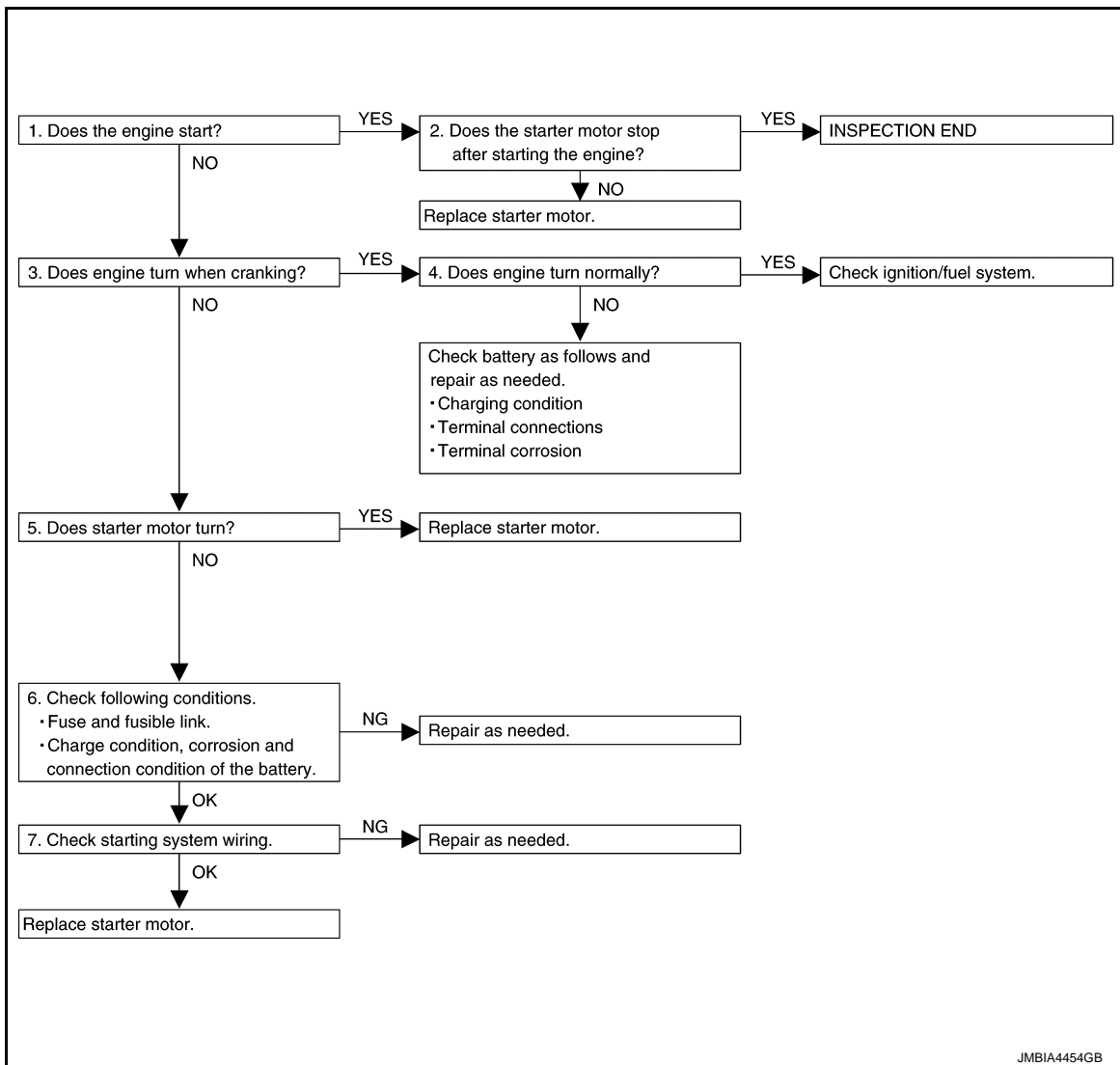
### Does the engine turn freely by hand?

- YES >> Replace starter motor. Refer to [STR-19, "VQ37VHR : Removal and Installation \(Vehicle speed sensitive P/S models\)"](#) (Vehicle speed sensitive P/S models) or [STR-21, "VQ37VHR : Removal and Installation \(Direct adaptive steering models\)"](#) (Direct adaptive steering models).
- 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:000000009393088

## 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-19, "VQ37VHR : Removal and Installation \(Vehicle speed sensitive P/S models\)"](#) (Vehicle speed sensitive P/S models) or [STR-21, "VQ37VHR : Removal and Installation \(Direct adaptive steering models\)"](#) (Direct adaptive steering models).

STR

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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.

E

F

## 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-98, "Work Flow"](#).

G

H

## 5.CHECK STARTER MOTOR ACTIVATION

---

Check that the starter motor runs at cranking.

### Does starter motor turn?

- YES >> Replace starter motor. Refer to [STR-19, "VQ37VHR : Removal and Installation \(Vehicle speed sensitive P/S models\)"](#) (Vehicle speed sensitive P/S models) or [STR-21, "VQ37VHR : Removal and Installation \(Direct adaptive steering models\)"](#) (Direct adaptive steering models).  
NO >> GO TO 6.

I

J

## 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-98, "Work Flow"](#).

K

L

### Are these inspection results normal?

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

M

## 7.CHECK STARTING SYSTEM WIRING

---

Check the following.

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

N

### Are these inspection results normal?

- YES >> Replace starter motor. Refer to [STR-19, "VQ37VHR : Removal and Installation \(Vehicle speed sensitive P/S models\)"](#) (Vehicle speed sensitive P/S models) or [STR-21, "VQ37VHR : Removal and Installation \(Direct adaptive steering models\)"](#) (Direct adaptive steering models).  
NO >> Repair as needed.

O

P

# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:000000009235877

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

#### Diagnosis Procedure

INFOID:000000009235878

#### 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.

(+)		(-)	Voltage (Approx.)
Starter motor			
Connector	Terminal		
E1	2	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 A/T selector lever to "P" or "N" position.
2. Check voltage between battery positive terminal and starter motor "B" terminal.

(+)	(-)		Condition	Voltage (Approx.)
	Starter motor			
	Connector	Terminal		
Battery positive terminal	E1	2	When the ignition switch is in START position	Less than 0.5 V

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-11, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-14, "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:000000009235879

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.

STR

### Diagnosis Procedure

INFOID:000000009235880

#### 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.

(+)		(-)	Condition	Voltage (Approx.)
Starter motor				
Connector	Terminal			
F63	1	Ground	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-11, "Work Flow \(With GR8-1200 NI\)"](#) or [STR-14, "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		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F63	1	E122	51	Existed

#### Is the inspection result normal?

- YES >> Further inspection is necessary. Refer to [SEC-54, "Work Flow"](#).
- NO >> Repair the harness.

# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:000000009235881

Symptom	Reference
No normal cranking	Refer to <a href="#">STR-11. "Work Flow (With GR8-1200 NI)"</a> or <a href="#">STR-14. "Work Flow (Without GR8-1200 NI)"</a> .
Starter motor does not rotate	

# STARTER MOTOR

< REMOVAL AND INSTALLATION >

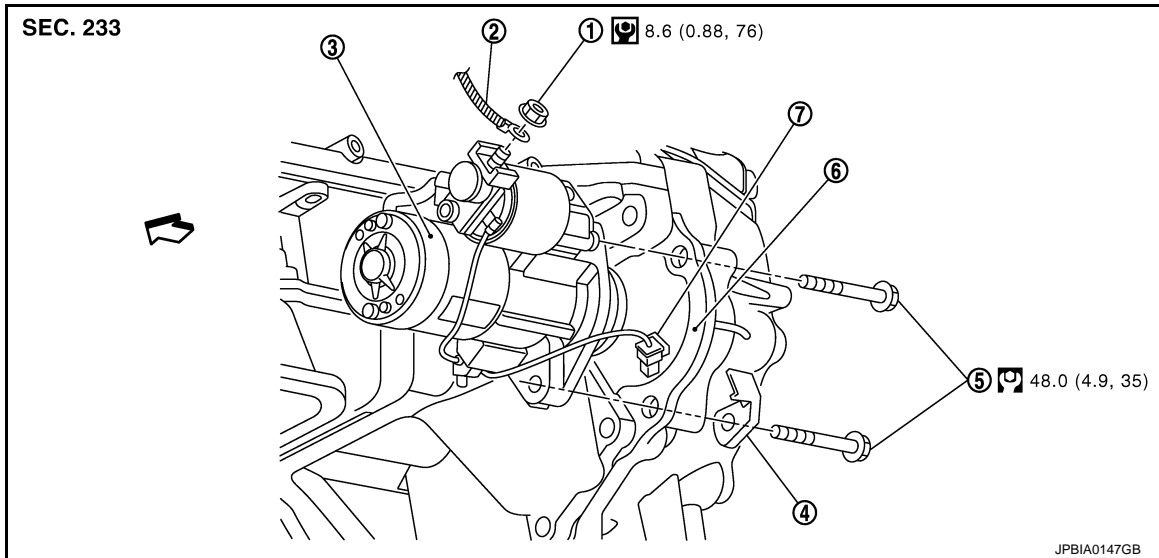
## REMOVAL AND INSTALLATION

### STARTER MOTOR

VQ37VHR

VQ37VHR : Exploded View

INFOID:000000009235882



- |                        |                               |                     |
|------------------------|-------------------------------|---------------------|
| 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        |                               |                     |
- ←: Vehicle front
- : N·m (kg-m, in-lb)
- : N·m (kg-m, ft-lb)

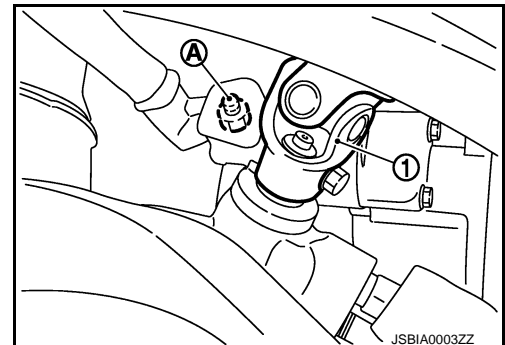
### VQ37VHR : Removal and Installation (Vehicle speed sensitive P/S models)

INFOID:000000009693915

#### Removal

##### 2WD models

1. Disconnect the battery cable from the negative terminal. Refer to [PG-106. "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-32. "FRONT UNDER COVER : Exploded View"](#).
3. Remove road wheel and tire (Front LH). Refer to [WT-62. "Removal and Installation"](#).
4. Disconnect steering lower joint ①, then remove it. Refer to [ST-34. "Removal and Installation"](#).
5. Remove "B" terminal nut ①.



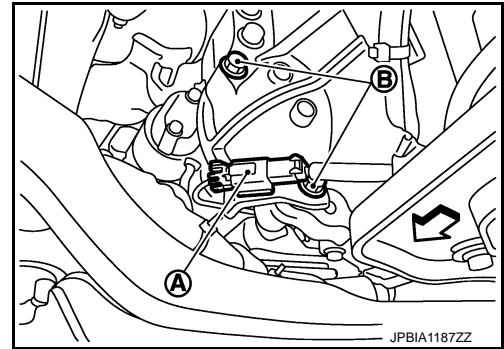
# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

6. Disconnect "S" connector (A).

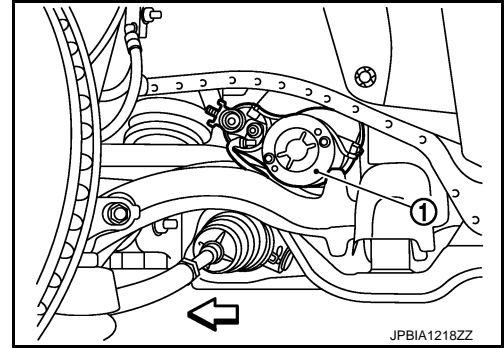
⇐ : Vehicle front

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



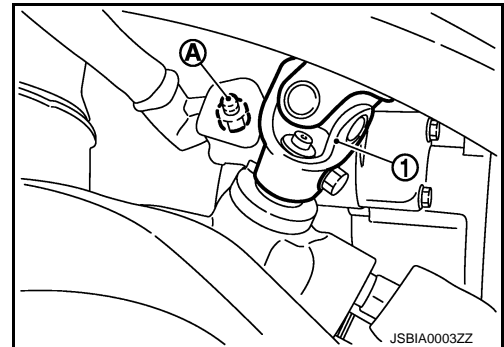
8. Remove starter motor (1) from the side of the vehicle.

⇐ : Vehicle front



### AWD models

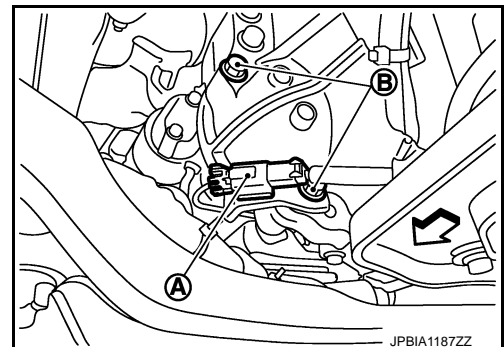
1. Disconnect the battery cable from the negative terminal. Refer to [PG-106. "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-32. "FRONT UNDER COVER : Exploded View"](#).
3. Remove road wheel and tire (front LH). Refer to [WT-62. "Removal and Installation"](#).
4. Disconnect steering lower joint (1), and then remove it. Refer to [ST-34. "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.

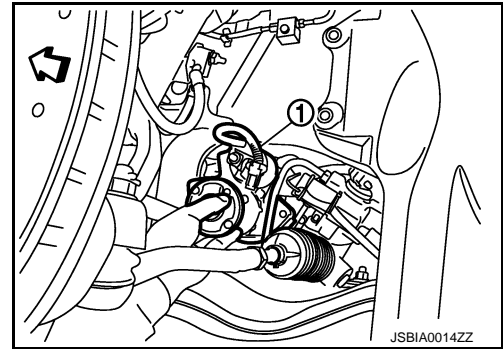


# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

8. Remove starter motor ① left side from the vehicle.

↶ : Vehicle front



## INSTALLATION

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

### **CAUTION:**

**Never tighten "B" terminal nut carefully.**

VQ37VHR : Removal and Installation (Direct adaptive steering models)

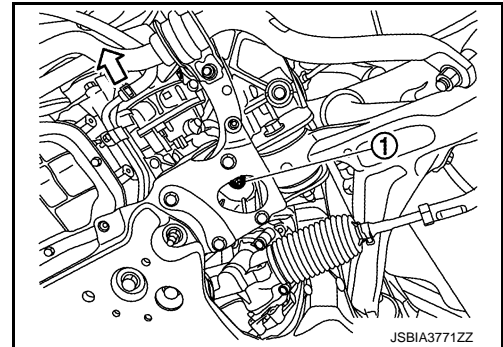
INFOID:000000009235883

## Removal

### 2WD models

1. Disconnect the battery cable from the negative terminal. Refer to [PG-106, "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-32, "FRONT UNDER COVER : Exploded View"](#).
3. Remove engine mount mounting nut ① (left side).

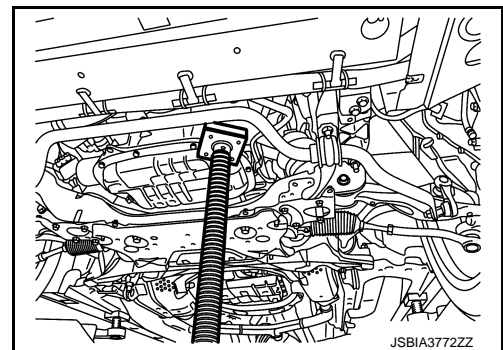
↶ : Vehicle front



4. Set jack under oil pan edge. Up to engine assembly about 25 mm (1.0 inch) and secure work space.

### **CAUTION:**

- Check the stable condition when using a jack.
- Never damage oil pan with a jack.



5. Remove "B" terminal nut.

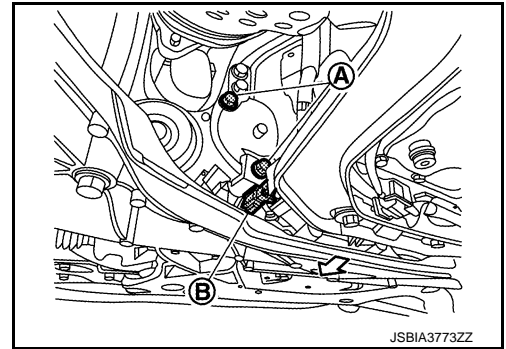
# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

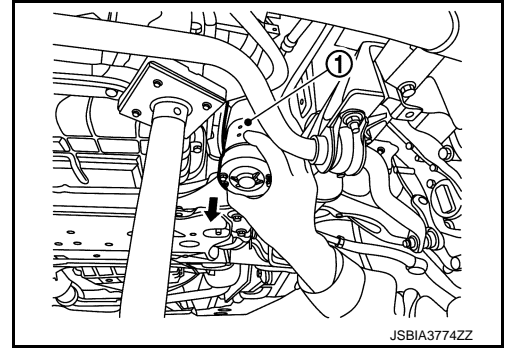
6. Disconnect "S" connector ②.

↩ : Vehicle front

7. Remove starter motor mounting bolts ①, using power tools.

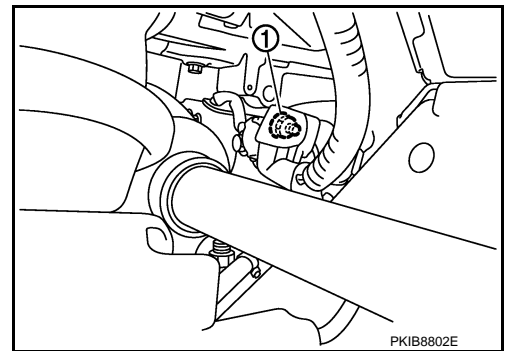


8. Remove starter motor ① from the front side of the vehicle.



### AWD models

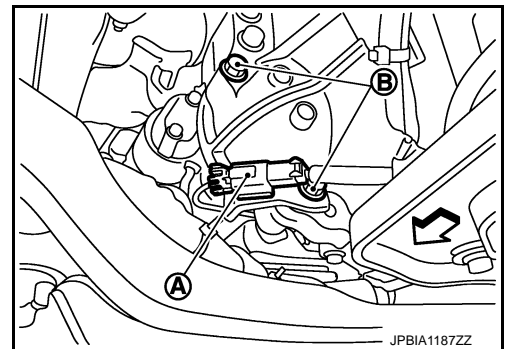
1. Disconnect the battery cable from the negative terminal. Refer to [PG-106. "Removal and Installation"](#).
2. Remove front undercover. Refer to [EXT-32. "FRONT UNDER COVER : Exploded View"](#).
3. Remove road wheel and tire (front LH). Refer to [WT-62. "Removal and Installation"](#).
4. Remove front drive shaft (left side). Refer to [FAX-25. "LEFT SIDE : Removal and Installation"](#).
5. Remove "B" terminal nut ①.



6. Disconnect "S" connector ①.

↩ : Vehicle front

7. Remove starter motor mounting bolts ②, using power tools.

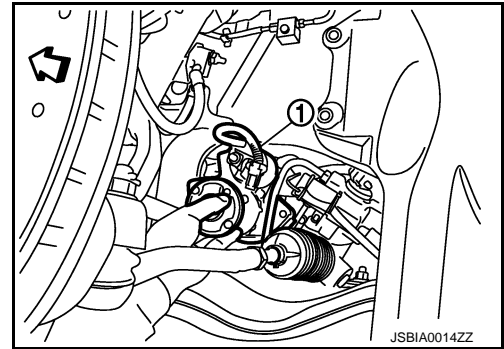


# STARTER MOTOR

## < REMOVAL AND INSTALLATION >

8. Remove starter motor ① to left side from the vehicle.

↔ : Vehicle front



## INSTALLATION

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

### **CAUTION:**

**Never tighten "B" terminal nut carefully.**

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# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Starter Motor

INFOID:000000009235891

Applied model		VQ37VHR	
Type		Direct adaptive steering models	Vehicle speed sensitive P/S models
		S114-932	S114-967
		HITACHI make	
		Reduction gear type	
System voltage		[V]	12
No-load	Terminal voltage	[V]	11
	Current	[A]	Less than 110
	Revolution	[rpm]	More than 2,700