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SECTION STR

STARTING SYSTEM

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000010994247

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

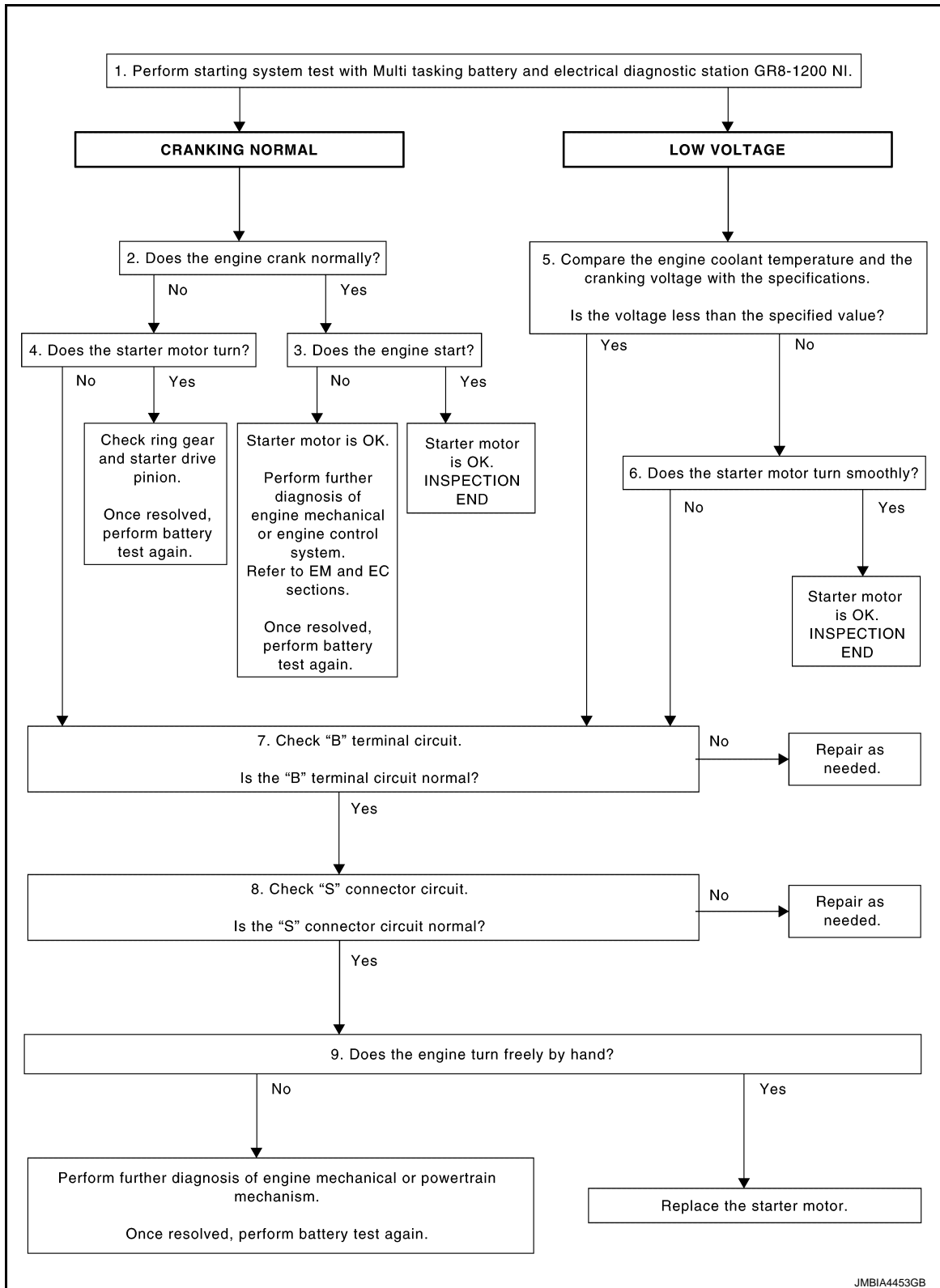
NOTE:

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

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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-9, "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-10, "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.

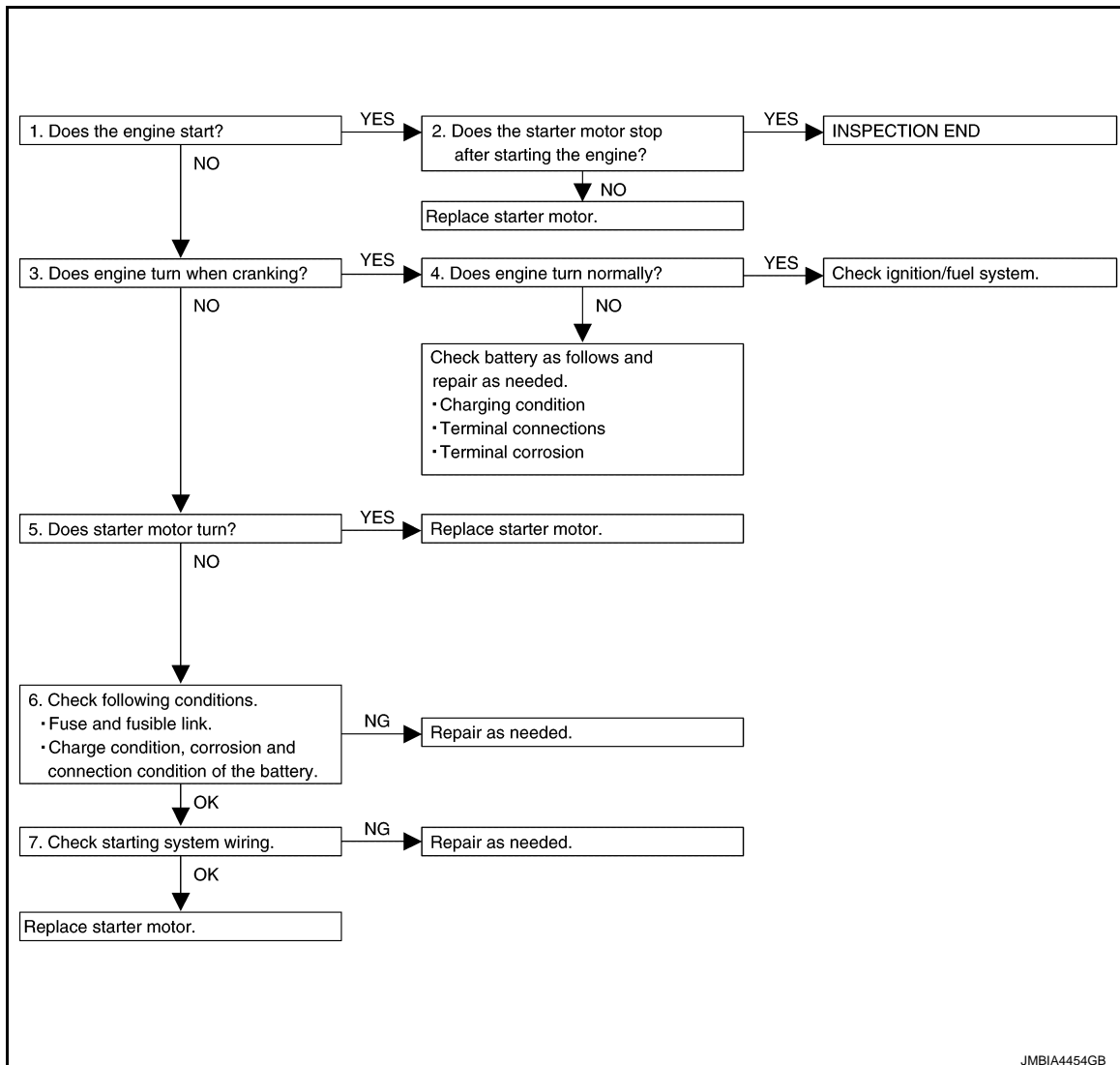
Does the engine turn freely by hand?

- YES >> Replace starter motor. Refer to [STR-20. "Removal and Installation"](#).
- 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:000000010994248

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.

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

NO >> GO TO 3.

2.CHECK THAT THE STARTER MOTOR STOPS

Check that the starter motor stops after starting the engine.

Does the starter motor stop?

YES >> INSPECTION END

NO >> Replace starter motor. Refer to [STR-20, "Removal and Installation"](#).

3.CHECK THAT THE ENGINE TURNS WHEN CRANKING

Check that the engine turns when cranking.

Does engine turn when cranking?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK THE ENGINE SPEED WHEN CRANKING

Check that the engine speed is not low when cranking.

Does engine turn normally?

YES >> Check ignition/fuel system.

NO >> Check charge condition, corrosion and connection condition of the battery. Refer to [PG-3, "Work Flow"](#).

5.CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to [STR-20, "Removal and Installation"](#).

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.

7.CHECK STARTING SYSTEM WIRING

Check the following.

- "B" terminal circuit. Refer to [STR-9, "Diagnosis Procedure"](#).
- "S" connector circuit. Refer to [STR-10, "Diagnosis Procedure"](#).

Are these inspection results normal?

YES >> Replace starter motor. Refer to [STR-20, "Removal and Installation"](#).

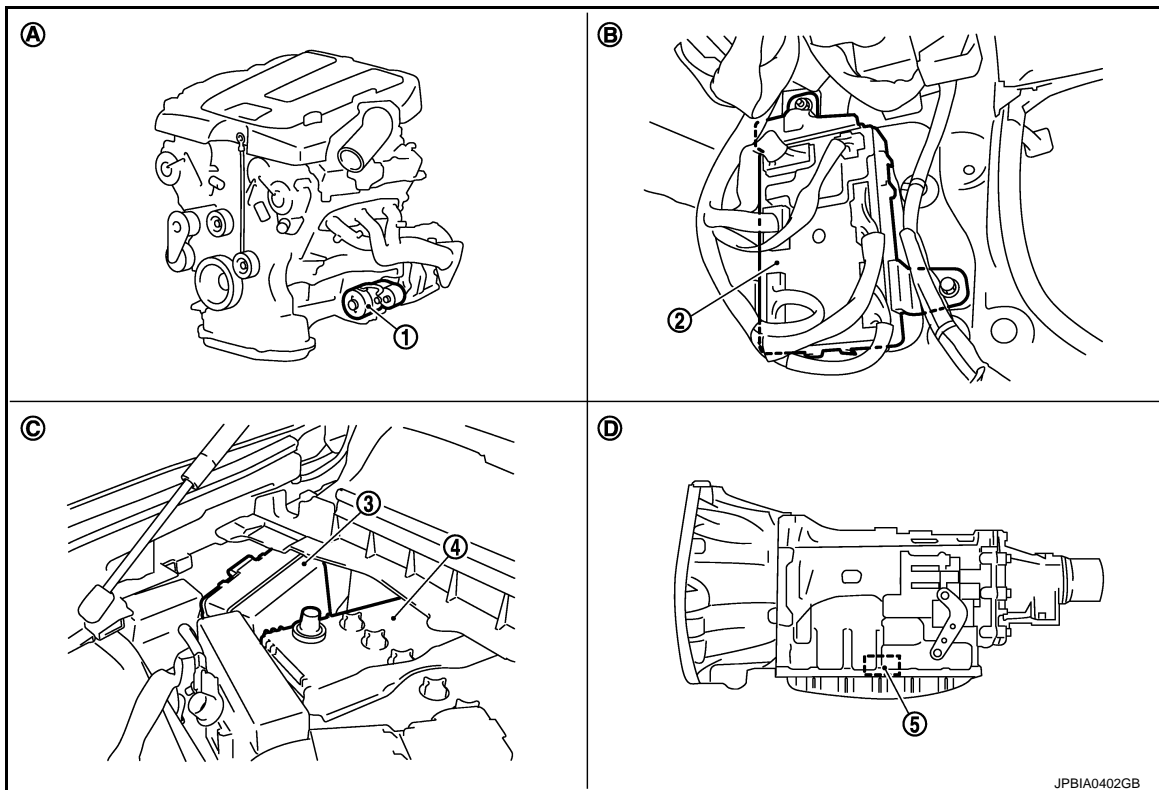
NO >> Repair as needed.

STARTING SYSTEM

< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:0000000110994251



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- | | | |
|--------------------------------|-------------------------------------|------------------------------|
| 1. Starter motor | 2. BCM | 3. IPDM E/R |
| 4. Battery | 5. TCM | |
| A. Cylinder block (bank2) side | B. Dash side lower (Passenger side) | C. Engine room dash panel RH |
| D. Inside of A/T assembly | | |

Component Description

INFOID:0000000110994252

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:0000000010994253

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

Diagnosis Procedure

INFOID:0000000010994254

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	

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		

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:000000010994255

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.

Diagnosis Procedure

INFOID:000000010994256

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	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 CONNECTOR

1. Turn ignition switch OFF.
2. Check the following terminals and connectors for damage, bend and loose connection.
 - Harness connector F1
 - Harness connector E3

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair the terminal and connector.

3.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	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.

STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM

Wiring Diagram - STARTING SYSTEM -

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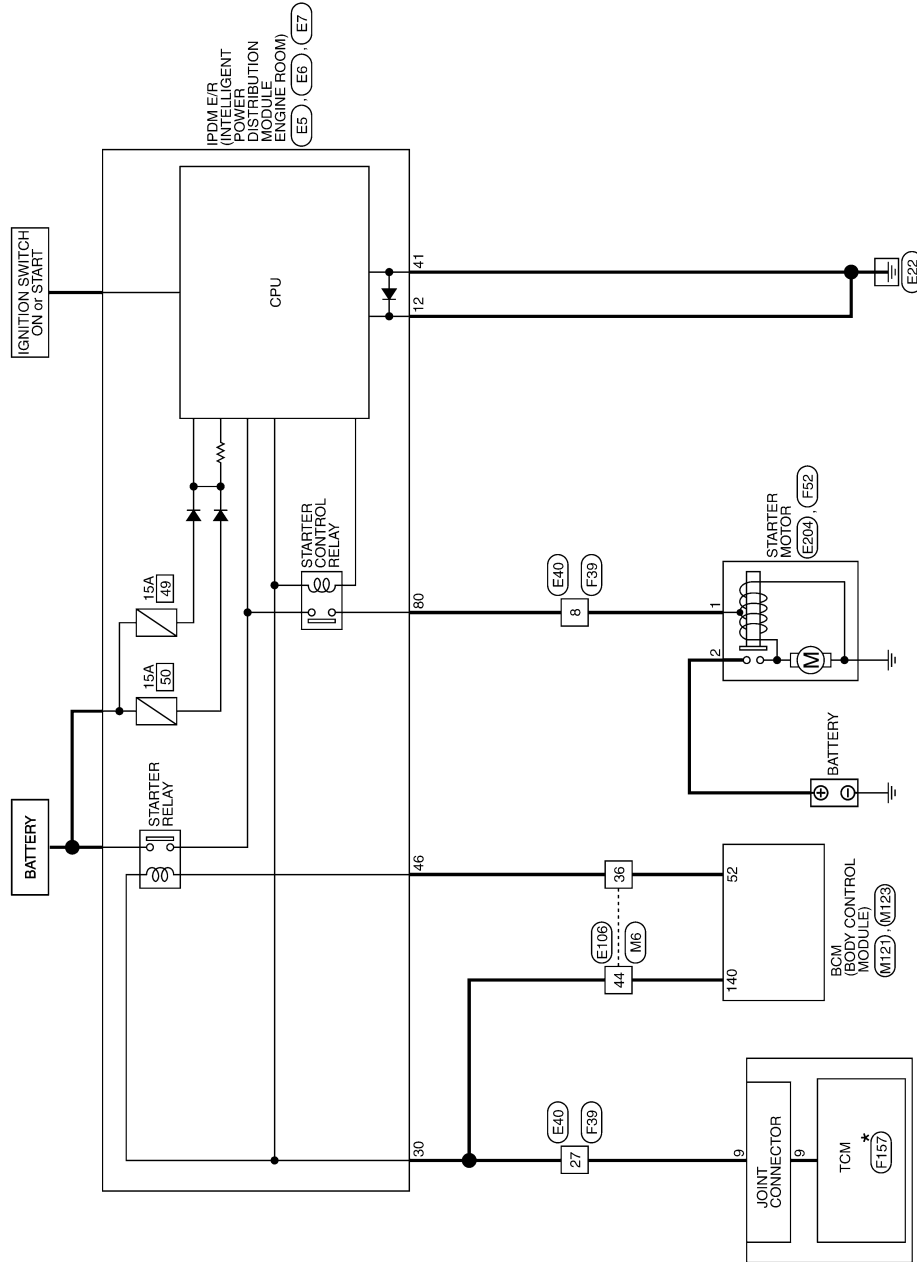
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STARTING SYSTEM



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

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STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM

Connector No.	E5	ENGINE INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Name	TH20FW-CS12-M4-1V	
Connector Type		



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	
2	SB	
3	P	
4	B/W	
5	LG	
6	R	
7	G	
8	BG	
9	W	
10	P	
11	BG	
12	L	
13	GR	
14	G	

Connector No.	E6	ENGINE INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Name	TH88FW-ANF	
Connector Type		



Terminal No.	Color Of Wire	Signal Name [Specification]
39	P	
40	L	
41	B/W	
42	GR	
43	G	
44	LG	

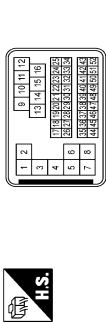
45	V	
46	SB	

Connector No.	E7	ENGINE INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Name	TH20FW-CS12-M4	
Connector Type		



Terminal No.	Color Of Wire	Signal Name [Specification]
48	L	
49	BG	
50	Y	
51	W	
52	P	
53	BG	
54	SB	
55	BR	
56	G	
57	GR	
58	GR	
59	BR	
60	GR	
61	PC	
62	Y	
63	SB	
64	SB	
65	R	
66	W	
67	R	
68	W	
69	L	
70	GR	
71	V	
72	V	
73	L	
74	GR	
75	V	
76	Y	
77	R	
78	SB	
79	W	
80	W	

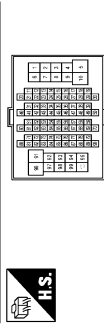
Connector No.	E40	WIRE TO WIRE
Connector Name	SA438MB-RSS-SHZ8	
Connector Type		



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	
2	SHIELD	
3	Y	
4	SHIELD	
5	BR	
6	G	
7	W	
8	W	
9	Y	
10	Y	
11	P	
12	SB	
13	L	
14	G	
15	BG	
16	BR	
17	EG	
18	Y	
19	EG	
20	B	
21	SB	
22	W	
23	L	
24	GR	
25	V	
26	GR	
27	GR	
28	V	
29	P	
30	R	
31	BR	
32	G	
33	G	
34	EG	
35	SB	
36	SB	
37	SHIELD	
38	L	
39	P	
40	R	

41	W	
42	G	
43	G	
44	GR	
45	SHIELD	
46	W	
47	BR	
48	G	
49	B	
50	B	
51	SB	
52	R	

Connector No.	E106	WIRE TO WIRE
Connector Name	TH88FW-CS16-TM4	
Connector Type		



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	
2	EG	
3	G	
4	Y	
5	V	
6	V	
7	R	
8	R	
9	V	
10	V	
11	V	
12	R	
13	L	
14	GR	
15	P	
16	W	
17	SB	
18	EG	
19	LG	
20	EG	
21	SB	
22	Y	
23	R	
24	B	
25	R	
26	R	
27	R	
28	R	
29	R	
30	R	
31	R	
32	R	
33	R	
34	R	
35	R	
36	R	
37	R	
38	R	
39	R	
40	R	
41	R	

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< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM

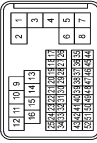
42	LG	-	-
43	G	-	-
44	BR	-	-
45	BR	-	-
46	LG	-	-
47	V	-	-
48	P	-	-
49	L	-	-
66	GR	-	-
67	LG	-	-
80	R	-	-
81	P	-	-
82	G	-	-
83	V	-	-
84	L	-	-
85	V	-	-
97	W	-	-
98	GR	-	-
99	LG	-	-
100	P	-	-

Connector No.	E204
Connector Name	STARTER MOTOR
Connector Type	Z4346, 51E61



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

Connector No.	F39
Connector Name	WIRE TO WIRE
Connector Type	SA33EF-RS-SZ8



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/Y	-
2	SHIELD	-
3	SHIELD	-
4	SHIELD	-
5	BR	-
6	GR	-
7	G	-
8	W	-
9	W	-
10	G	-
11	R	-
12	P	-
13	L	-
14	LG	-
15	R	-
16	O	-
17	L	-
18	LG	- [AWD models] - [2WD models]
19	P	-
20	O	-
21	BR	-
22	G	-
23	Y	-
24	LG	-
25	V	-
27	GR	-
28	BR	-
29	L	-
30	R	-
31	P	-
32	BR	-
33	BR	-
34	O	-
37	B	- [AWD models] - [2WD models]
38	W	- [AWD models] - [2WD models]

39	Y	-
40	G	-
41	B	-
42	GR	-
43	R	-
45	O	-
46	SHIELD	-
47	W/L	-
48	LG	-
49	O/L	-
50	L/Y	-
51	W	-
52	L/V	-

Connector No.	F51
Connector Name	A/T ASSEMBLY
Connector Type	RK1DFC-DBY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	R	-
4	V	-
5	B	-
6	G	-
7	R	-
8	P	-
9	GR	-
10	B	-

Connector No.	F52
Connector Name	STARTER MOTOR
Connector Type	X01MGY



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

Connector No.	F157
Connector Name	TCM
Connector Type	SP10FG



Terminal No.	Color Of Wire	Signal Name [Specification]
1	SHIELD	-
2	SHIELD	-
3	SHIELD	-
4	SHIELD	-
5	SHIELD	-
6	SHIELD	-
7	SHIELD	-
8	SHIELD	-
9	SHIELD	-
10	SHIELD	-

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< DTC/CIRCUIT DIAGNOSIS >

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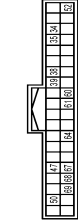
Connector No.	M15
Connector Name	WIRE TO WIRE
Connector Type	TH80MK-CS1F-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	BG	-
2	W	-
3	G	-
4	LG	-
5	W	-
6	LG	-
7	W	-
8	G	-
9	G	-
10	V	-
11	V	-
12	R	-
13	L	-
14	GR	-
15	P	-
16	W	-
17	BR	-
18	P	-
19	L	-
20	L	-
21	Y	-
22	Y	-
23	Y	-
24	R	-
25	R	-
26	R	-
27	Y	-
28	R	-
29	SB	-
30	V	-
31	V	-
32	LG	-
33	P	-
34	B	-
35	BG	-
36	G	-
37	L	-
38	Y	-
39	B	-
40	SB	-
41	V	-
42	LG	-
43	P	-
44	B	-
45	BG	-
46	G	-
47	L	-
48	L	-
49	Y	-
50	G	-
51	B	-
52	SB	-
53	V	-
54	V	-
55	W	-

64	L	-
65	GR	-
66	LG	-
67	W	-
68	Y	-
69	Y	-
70	GR	-
71	SHIELD	-
72	V	-
73	SB	-
74	SB	-

Connector No.	M121
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH46FSY-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
34	SB	TRUNK ROOM ANT-
35	V	TRUNK ROOM ANT+
36	R	REAR ROOM ANT-
37	R	REAR ROOM ANT+
38	Y	IGN RELAY (UPDM E/2) CONT
39	EG	TRUNK ROOM LAMP SW
40	R	STARTER RELAY CONT
41	BR	PUSH SW
42	SB	TRUNK LID OPENER REQUEST SW
43	G	I-KEY WARN BUZZER (ENG ROOM)
44	GR	TRUNK LID OPENER SW
45	BG	REAR RH DOOR SW
46	L	REAR LH DOOR SW

Connector No.	M123
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH46FC-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
113	EG	OPTICAL SENSOR
114	SB	STOP LAMP SW
115	SB	STOP LAMP SW 2
116	SB	DR DOOR UNLOCK SENSOR
117	SB	KEY SLOT SW
118	V	IGN F/B
119	R	PASSENGER DOOR SW
120	EG	TRUNK LID OPENER CANCEL SW
121	V	POWER WINDOW SW COMM
122	L	PUSH-BUTTON IGNITION SW ILL POWER
123	LG	LOCK IND
124	Y	RECEIVER / SENSOR GND
125	V	RECEIVER / SENSOR POWER SUPPLY
126	L	TIRE PRESSURE RECEIVER COMM
127	B	SECURITY LAMP CONT
128	B	SECURITY LAMP CONT
129	EG	COMBI SW OUTPUT 1
130	EG	COMBI SW OUTPUT 2
131	L	COMBI SW OUTPUT 3
132	SB	COMBI SW OUTPUT 4
133	GR	DRIVER DOOR SW
134	G	REAR WINDOW DEFOGGER RELAY CONT

STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000010994258

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Symptom	Reference
No normal cranking	Refer to STR-2. "Work Flow (With GR8-1200 NI)" or STR-5. "Work Flow (Without GR8-1200 NI)" .
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:000000010994259

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:

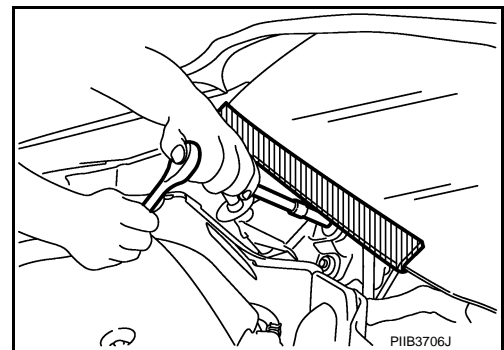
Always observe the following items for preventing accidental activation.

- 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:000000010994260

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:000000010994261

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:000000011404622

- 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.

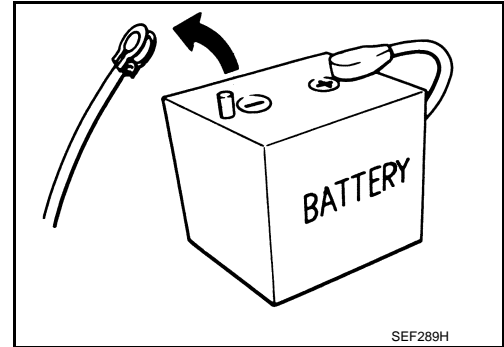
NOTE:

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 >

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PREPARATION


Special Service Tools

INFOID:000000010994262

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:000000010994263

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

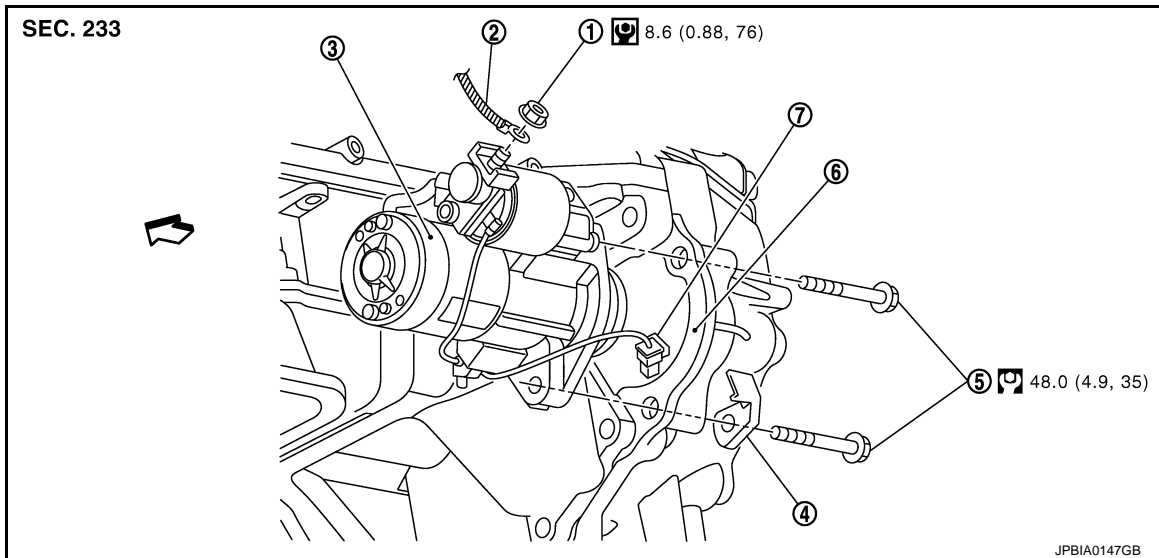
Exploded View

INFOID:000000010994264

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REMOVAL



- | | | |
|-------------------------|--------------------------------|----------------------|
| 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, ft-lb)

: N·m (kg-m, in-lb)

DISASSEMBLY

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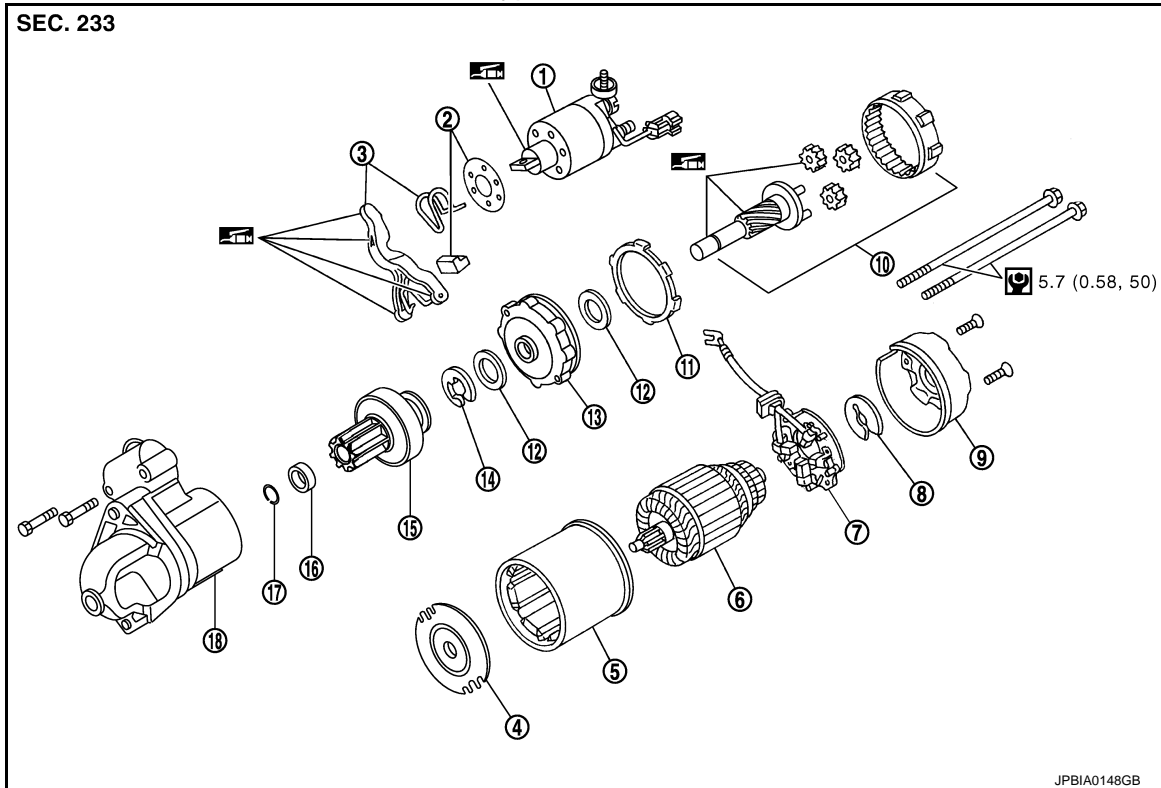
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STARTER MOTOR


< 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:

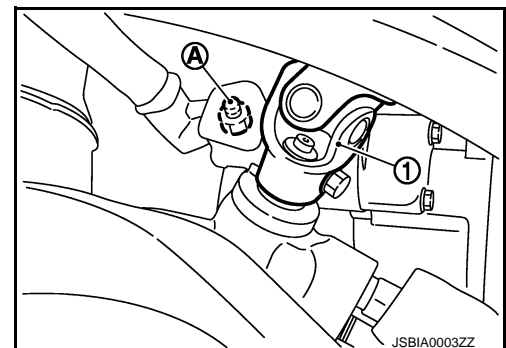
Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.

Removal and Installation

INFOID:000000010994265

REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to [PG-90, "Removal and Installation"](#).
2. Remove engine undercover, using power tools.
3. Remove road wheel and tire (Front LH), using power tools.
4. Disconnect steering lower joint (1), then remove it. Refer to [ST-19, "Exploded View"](#).
5. Remove engine mounting insulator LH mounting nut Lower. Refer to [EM-70, "2WD : Exploded View"](#).
6. Jack up the engine front side to create clearance for removing starter motor.
7. Remove "B" terminal nut (A).



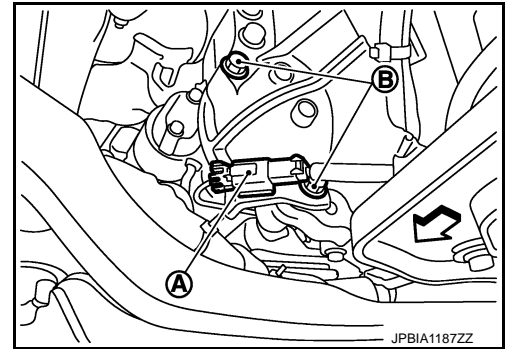
STARTER MOTOR

< REMOVAL AND INSTALLATION >

8. Disconnect "S" connector (A).

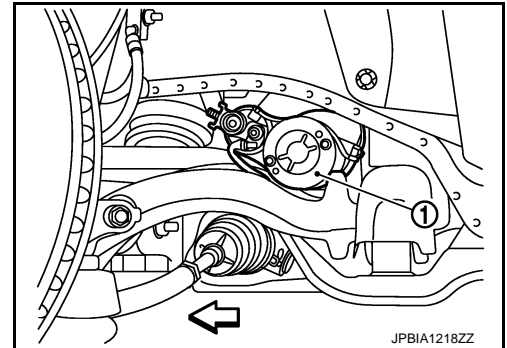
↔ : Vehicle front

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



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

↔ : Vehicle front



INSTALLATION

Install in the reverse order of removal.

CAUTION:

Be sure to tighten "B" terminal nut carefully.

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SERVICE DATA AND SPECIFICATIONS (SDS)

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SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

INFOID:0000000010994266

Type	S114-932	
	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