

STR

SECTION

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:000000009722569

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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< BASIC INSPECTION >

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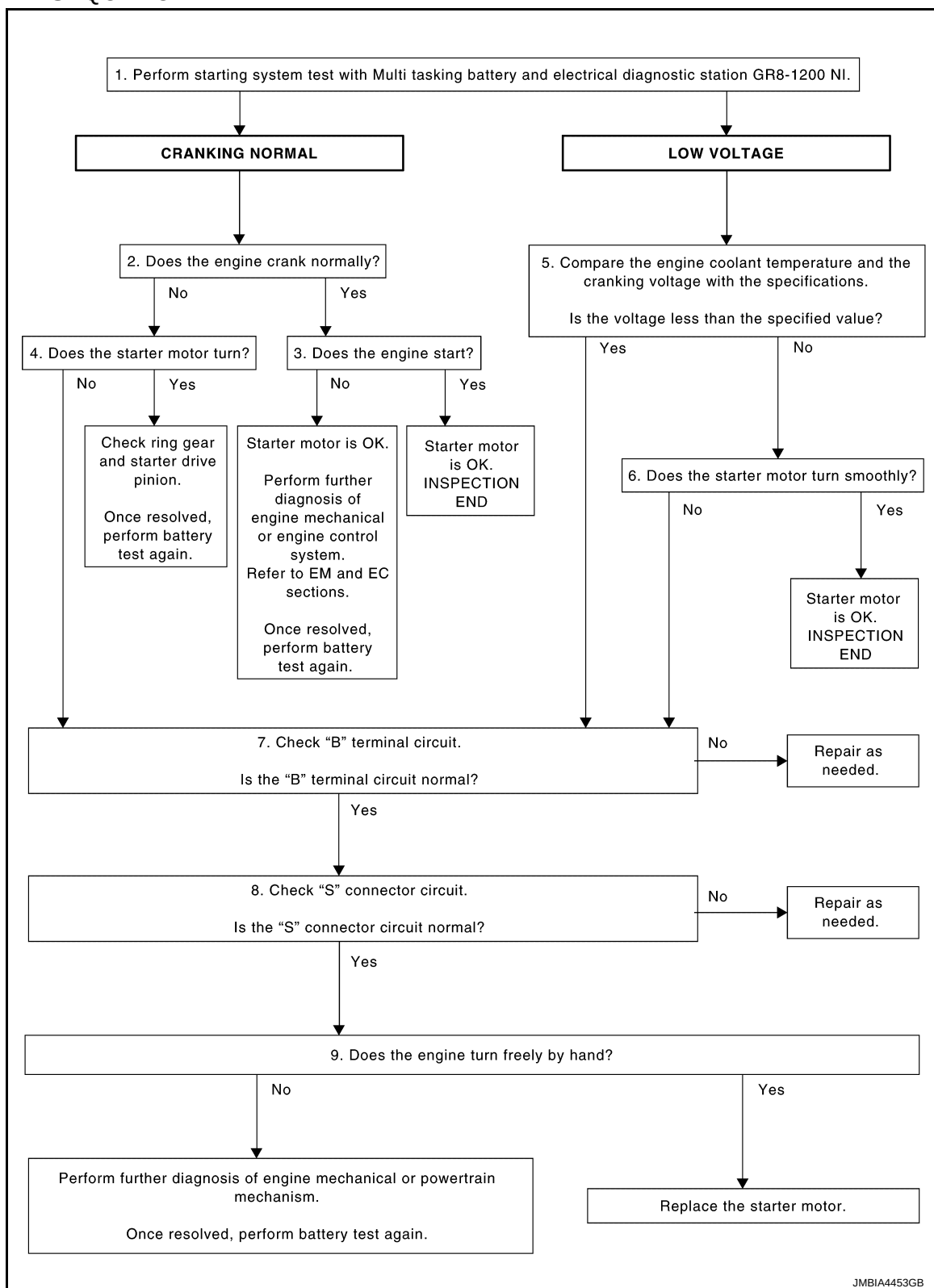
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DETAILED FLOW

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-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.

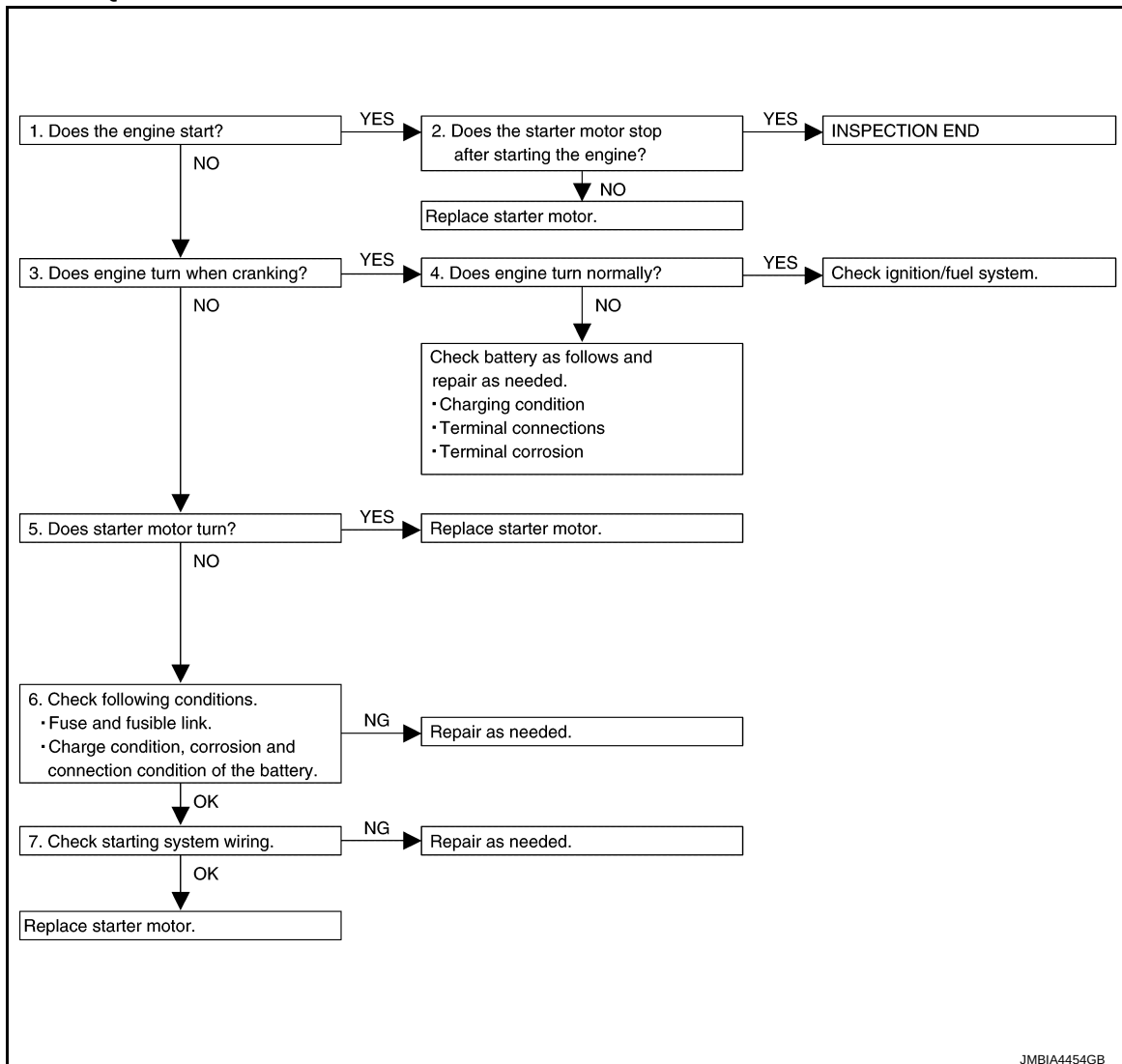
Does the engine turn freely by hand?

- 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:000000009722570

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

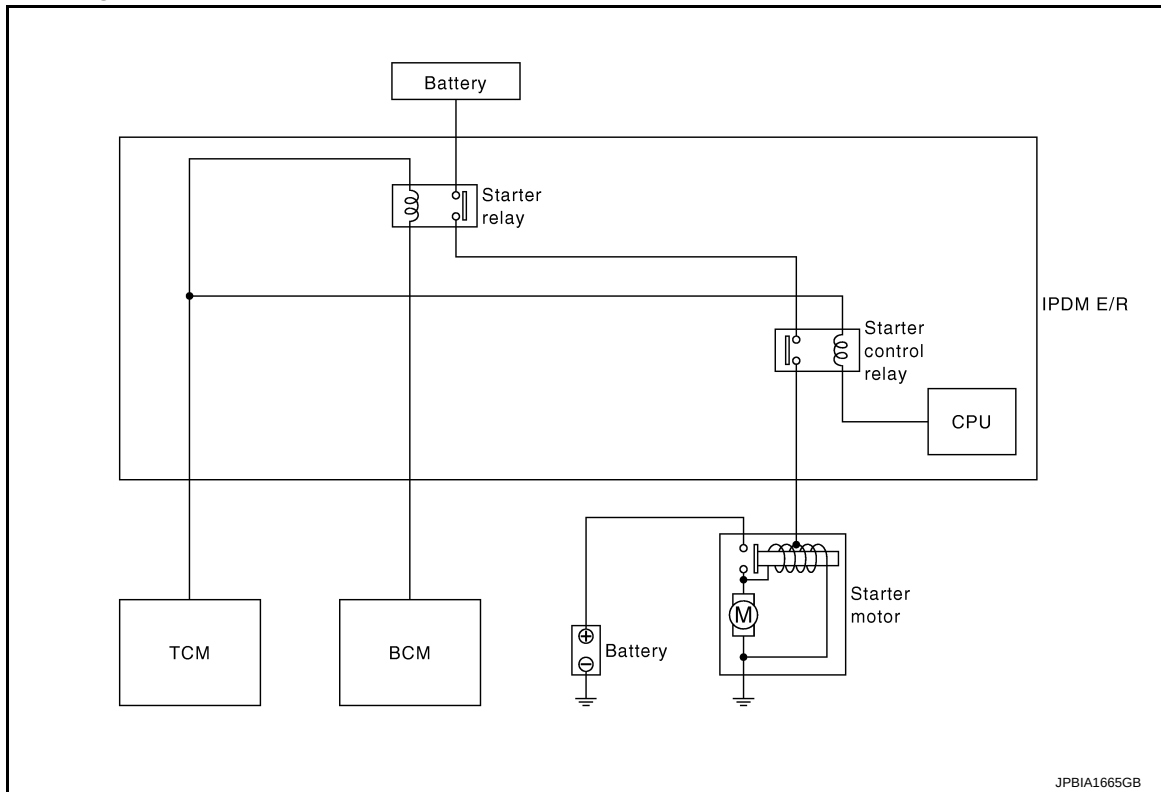
< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

STARTING SYSTEM

System Diagram

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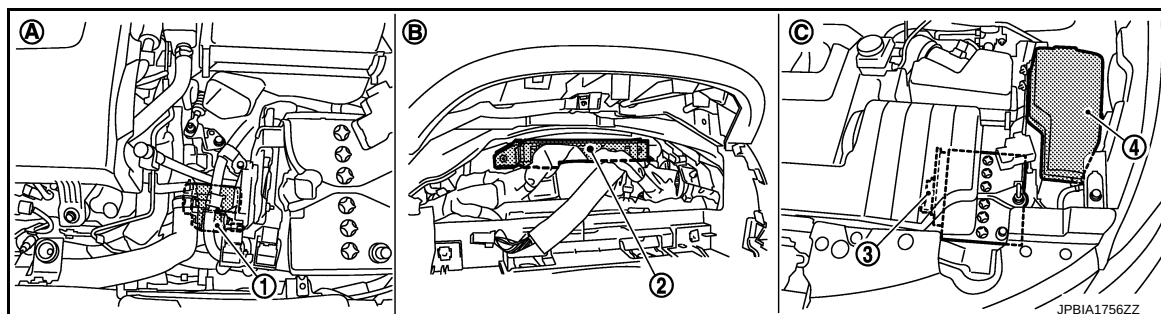
System Description

INFOID:000000009722572

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.

Component Parts Location

INFOID:000000009722573



- | | | |
|-----------------------------|---------------------------------|--------------------------------|
| 1. Starter motor | 2. BCM | 3. TCM |
| 4. IPDM E/R | | |
| A. Cylinder block left side | B. Behind the combination meter | C. Engine room dash panel (LH) |

STARTING SYSTEM

< SYSTEM DESCRIPTION >

Component Description

INFOID:000000009722574

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:000000009722575

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

Diagnosis Procedure

INFOID:000000009722576

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		
F10	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 the selector lever to "P" or "N" position.
2. Check voltage between battery positive terminal and starter motor "B" terminal.

Terminals			Condition	Voltage (Approx.)
(+)	(-)			
	Starter motor “B” terminal	Terminal		
Battery positive terminal	F10	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 the 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:000000009722577

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:000000009722578

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

Terminals			Condition	Voltage (Approx.)
(+)		(–)		
Starter motor har- ness connector	Terminal			
F47	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-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.	
F47	1	F12	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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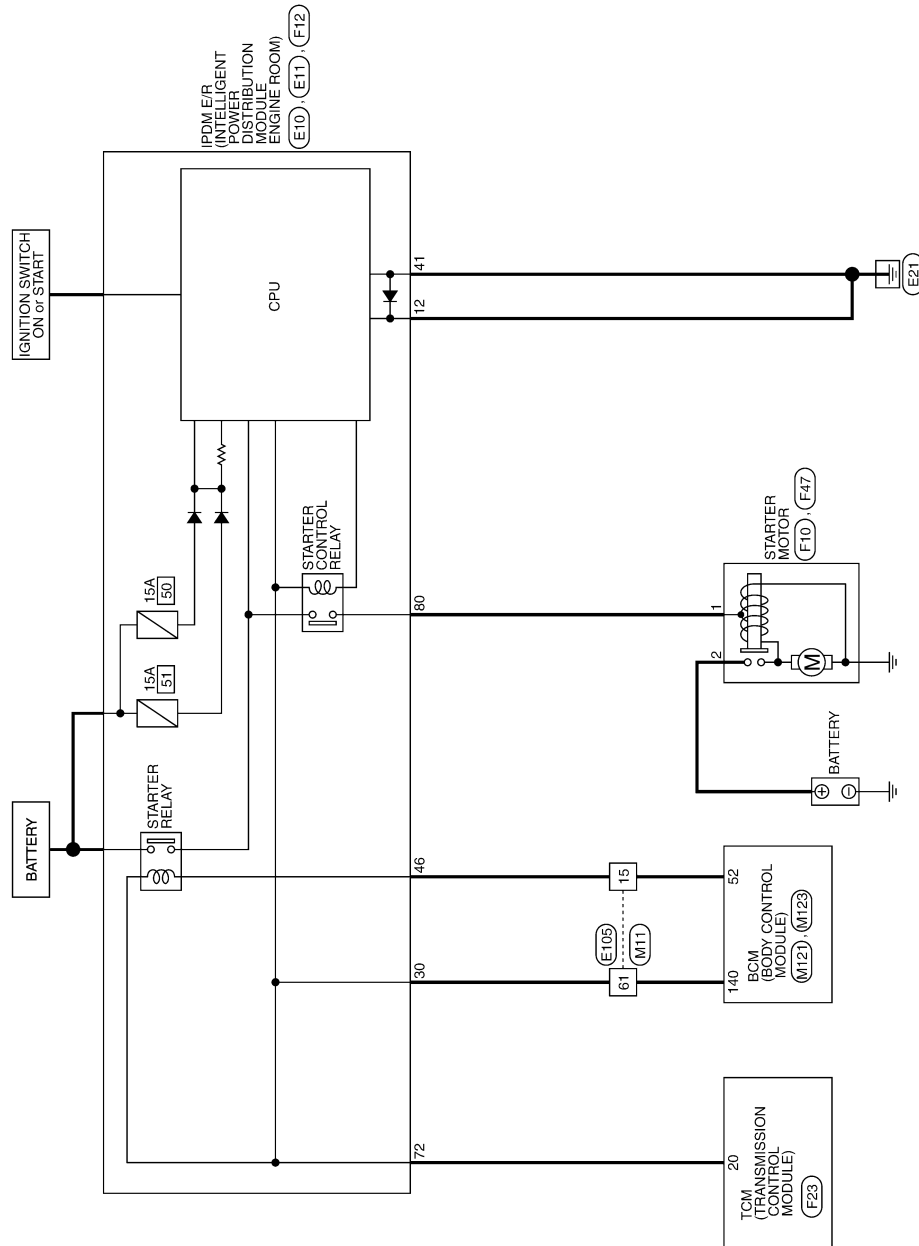
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STARTING SYSTEM



2008/09/23

JCBWM1068GB

STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM

Connector No.	F10
Connector Name	STARTER MOTOR
Connector Type	24340 JABSA



Connector No.	F11
Connector Name	W/L & R INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Connector Type	TH28FW-NH



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

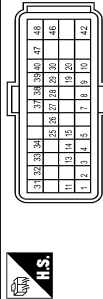
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45	SB	-
46	W	-
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49	L	-
50	BR	-
51	G	-
52	GR	-
53	B	-
54	SB	-
55	W	-
56	R	-
57	Y	-
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497	Y	-
498	L	-
499	O	-
500	BR	-
501	G	-
502	GR	-
503	B	-
504	SB	-
505	W	-

STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM

Connector No.	F23
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	TH48FC-P28-L-RH



Connector No.	F47
Connector Name	STARTER MOTOR
Connector Type	X01FCY

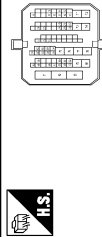


38	R	-
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40	P	-
41	P	-
42	L	-
43	W	-
44	GR	-
45	LG	-
46	Y	-
47	V	-
48	SB	-
49	P	-
50	GR	-
51	LG	-
52	Y	-
53	V	-
54	SB	-
55	P	-
56	GR	-
57	LG	-
58	Y	-
59	V	-
60	SB	-
61	P	-
62	GR	-
63	LG	-
64	Y	-
65	V	-
66	SB	-
67	P	-
68	GR	-
69	LG	-
70	Y	-
71	V	-
72	SB	-
73	P	-
74	GR	-
75	LG	-
76	Y	-
77	V	-
78	SB	-
79	P	-
80	GR	-
81	LG	-
82	Y	-
83	BG	-

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P/B	TRANSMISSION RANGE SWITCH 2
2	P/B	TRANSMISSION RANGE SWITCH 2
3	G/O	TRANSMISSION RANGE SWITCH 3
4	GR	TRANSMISSION RANGE SWITCH 3 (MONITOR)
5	B	GROUND
6	W	SENSOR GROUND
7	G/W	CLOCK (SEL 2)
8	L/R	CHIP SELECT (SEL 1)
9	L/R	DATA I/O (SEL 3)
10	BR/R	TRANSMISSION RANGE SWITCH 1
11	V	CVT FLUID TEMPERATURE SENSOR
12	R/W	PRIMARY PRESSURE SENSOR
13	V	SECONDARY PRESSURE SENSOR
14	R/W	REVERSE LAMP RELAY
15	G/B	STARTER RELAY
16	R/B	SENSOR GROUND
17	L/O	SENSOR GROUND
18	R/G	STEP MOTOR D
19	O/B	STEP MOTOR C
20	G/R	STEP MOTOR B
21	P	STEP MOTOR A
22	L	CAN-H
23	L	PRIMARY SPEED SENSOR
24	LG	SECONDARY SPEED SENSOR
25	LG	LOCK-UP SELECT SOLENOID VALVE
26	V/R	TORQUE CONVERTER CLUTCH SOLENOID VALVE
27	W/B	SECONDARY PRESSURE SOLENOID VALVE
28	R/Y	LINE PRESSURE SOLENOID VALVE
29	B	POWER SUPPLY
30	Y	POWER SUPPLY

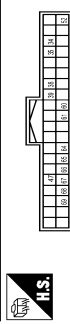
Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	B	-

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH70FW-CS10-M3



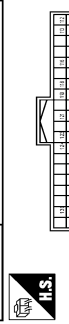
Terminal No.	Color Of Wire	Signal Name [Specification]
3	P	-
4	BR	-
5	G	-
6	G	-
7	R	-
8	P	-
9	P	-
10	L	-
11	V	-
12	Y	-
13	R	-
14	W	-
15	W	-
16	W	-
17	W	-
18	W	-
19	W	-
20	W	-
21	W	-
22	W	-
23	W	-
24	W	-
25	W	-
26	W	-
27	W	-
28	W	-
29	W	-
30	W	-

Connector No.	M121
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH48FCY-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
34	B	LUGGAGE ROOM ANT-
35	W	DOOR LOCK ANT-
36	W	DOOR LOCK ANT-
37	W	DOOR LOCK ANT-
38	BR	REAR BUMPER ANT-
39	BR	REAR BUMPER ANT-
40	W	IGN RELAY (PDM E/R) CONT
41	L	STARTER RELAY CONT
42	R	PUSH SW
43	R	BACK DOOR OPENER REQUEST SW
44	GR	I-KEY WARM BUZZER
45	O	REAR WHEEL STOP POSITION
46	Y	BACK DOOR SW
47	LG	BACK DOOR OPENER SW
48	W	REAR RH DOOR SW
49	R	REAR LH DOOR SW

Connector No.	M123
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH48FC-NH



Terminal No.	Color Of Wire	Signal Name [Specification]
112	R	RAIN SENSOR SERIAL LINK
113	P/B	OPTICAL SENSOR
116	GR	STOP LAMP SW 1
118	L	STOP LAMP SW 2
119	W	DR DOOR UNLOCK SENSOR
121	Y	KEY SLOT SW

STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

STARTING SYSTEM		10A F/B
129	G	PASSENGER DOOR SW
130	BR	REAR DEFOGGER SW
131	BR	POWER WINDOW SW COMM
132	G	PUSH-BUTTON IGNITION SW ILL POWER
133	W	LOCK IND
134	R	RECEIVER/SENSOR GND
137	P	RECEIVER/SENSOR POWER SUPPLY
138	V	TIRE PRESS RECEIVER COMM
139	O	SHIFT N/P
140	GR	SECURITY IND LAMP CONT
141	O	COMBI SW OUTPUT 5
142	L	COMBI SW OUTPUT 1
143	W	COMBI SW OUTPUT 2
144	P	COMBI SW OUTPUT 3
145	V	COMBI SW OUTPUT 4
146	Y	DRIVER DOOR SW
150	SB	REAR WINDOW DEFOGGER RELAY SW
151	G	REAR WINDOW DEFOGGER RELAY CONT

JRBWC4764GB

STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:000000009722580

A

STR

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

FOR USA AND CANADA

FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000009722581

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.

FOR USA AND CANADA : Precautions for Removing of Battery Terminal

INFOID:0000000010077085

- 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.

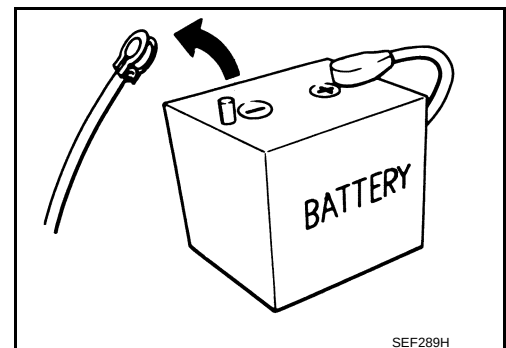
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

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

FOR MEXICO

FOR MEXICO : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and



SEF289H

PRECAUTIONS

< PRECAUTION >

"SEAT BELT PRE-TENSIONER"

INFOID:000000009722582

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "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.

FOR MEXICO : Precautions for Removing of Battery Terminal

INFOID:0000000010077086

- 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.

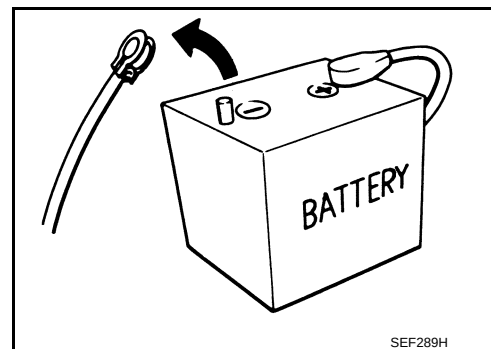
NOTE:

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.



PREPARATION

< PREPARATION >

PREPARATION

PREPARATION

Special Service Tools

INFOID:000000009722583

Tool number (Kent-Moore No.) Tool name	Description
— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station  AWI1A1239ZZ	Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.

Commercial Service Tools

INFOID:0000000009722584

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

STARTER MOTOR

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

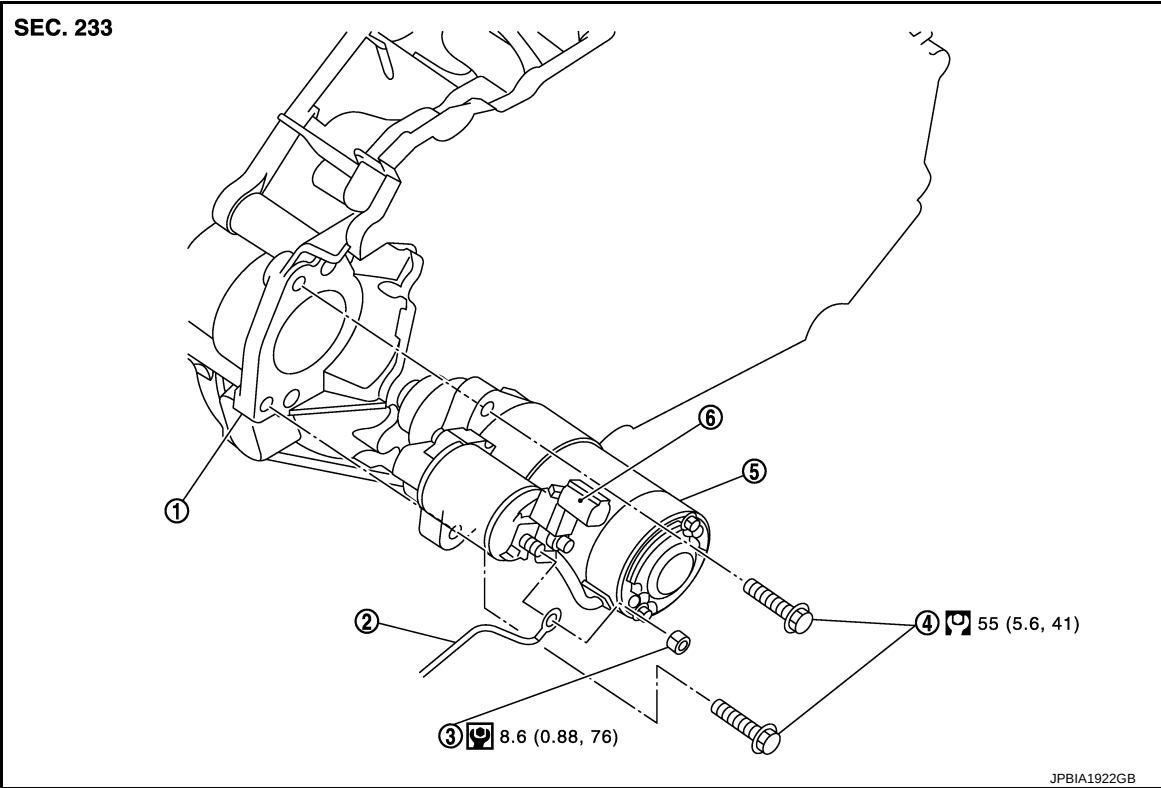
STARTER MOTOR

Exploded View

INFOID:000000009722585

STR

REMOVAL



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

 : N·m (kg-m, ft-lb)

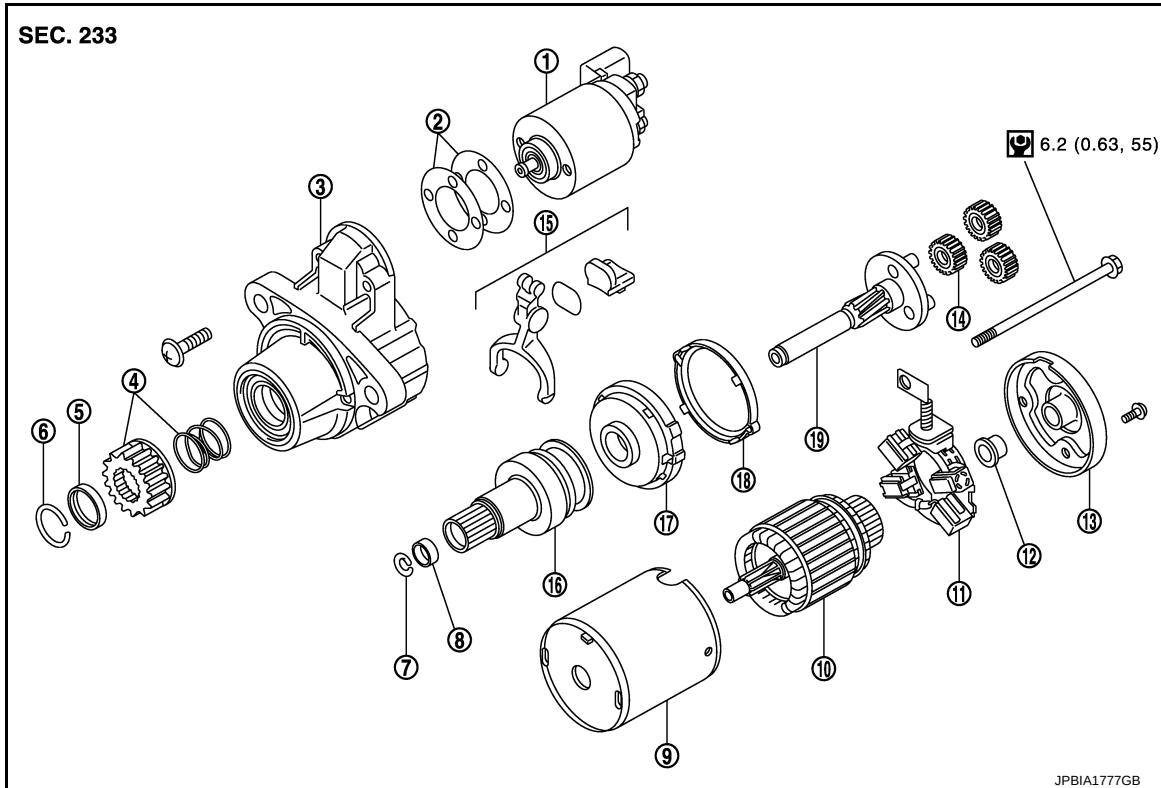
 : N·m (kg-m, in-lb)

DISASSEMBLY

STARTER MOTOR

< REMOVAL AND INSTALLATION >

Type: M000TA0073



- | | | |
|-----------------------------|---------------------------|-----------------------|
| 1. Magnetic switch assembly | 2. Dust cover kit | 3. Gear case assembly |
| 4. Pinion assembly | 5. Stopper | 6. Ring |
| 7. Ring | 8. Stopper | 9. Yoke assembly |
| 10. Armature assembly | 11. Brush holder assembly | 12. Metal |
| 13. Rear cover | 14. Gear assembly | 15. Shift lever set |
| 16. Clutch gear assembly | 17. Center bracket | 18. Packing |
| 19. Gear shaft | | |

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:000000009722586

REMOVAL

1. Remove the battery Refer to [PG-97, "Removal and Installation"](#).
2. Remove the air cleaner assembly and air ducts.
3. Disconnect the following unit connectors:
 - ECM
 - TCM
 - IPDM E/R
4. Remove the battery tray.
5. Disconnect the starter motor harness connectors.
6. Remove the starter motor mounting bolts, using power tools.
7. Remove the starter motor.

INSTALLATION

Installation is in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

INFOID:000000009722587

A

STR

Type		M000TA0073	
		MITSUBISHI make	
		Reduction gear type	
System voltage		(V)	12
No-load	Terminal voltage	(V)	11
	Current	(A)	Less than 90
	Revolution	(rpm)	More than 2,400

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