

STR

SECTION

STARTING SYSTEM

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:000000007258393

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 Battery Service

INFOID:000000007258394

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

Service Procedure Precautions for Models with a Pop-up Roll Bar

INFOID:000000007258395

WARNING:

Always observe the following items for preventing accidental activation.

- Risk of passenger injury or death may increase if the pop-up roll bar does not deploy during a roll over collision. In order to reduce the chance of an incident where the pop-up roll bar is inoperative, all maintenance must be performed by a NISSAN or INFINITI dealer.
- Before removing and installing the pop-up roll bar component parts and harness, always turn the ignition switch OFF, disconnect the battery negative terminal, and wait for 3 minutes or more. (The purpose of this operation is to discharge electricity that is accumulated in the auxiliary power supply circuit in the air bag diagnosis sensor unit.)
- When repairing, removing, and installing a pop-up roll bar, always refer to SRS AIR BAG and SRS AIR BAG CONTROL warnings in the Service Manual.

PREPARATION

< PREPARATION >

PREPARATION

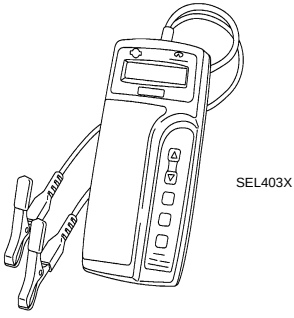
PREPARATION

Special Service Tools

INFOID:0000000006939171

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Tool number (Kent-Moore No.) Tool name	Description
— (J-44373 Model MCR620) Starting/Charging System Tester  SEL403X	Tests starting and charging systems. For operating instructions, refer to Technical Service Bulletin.

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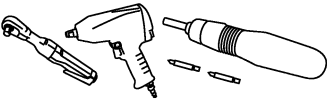
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Commercial Service Tools

INFOID:0000000006939172

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

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

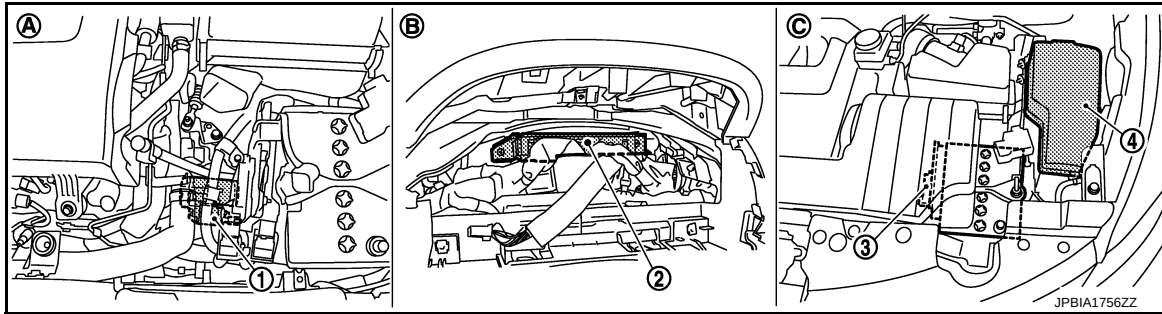
SYSTEM DESCRIPTION

COMPONENT PARTS

STARTING SYSTEM

STARTING SYSTEM : Component Parts Location

INFOID:000000006939161



1. Starter motor
 2. BCM
Refer to [BCS-4, "BODY CONTROL SYSTEM : Component Parts Location"](#)
 3. TCM
Refer to [TM-10, "CVT CONTROL SYSTEM : Component Parts Location"](#)
 4. IPDM E/R
Refer to [PCS-4, "Component Parts Location"](#)
- A. Cylinder block left side B. Behind the combination meter C. Engine room dash panel (LH)

STARTING SYSTEM : Component Description

INFOID:000000006939162

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.

SYSTEM

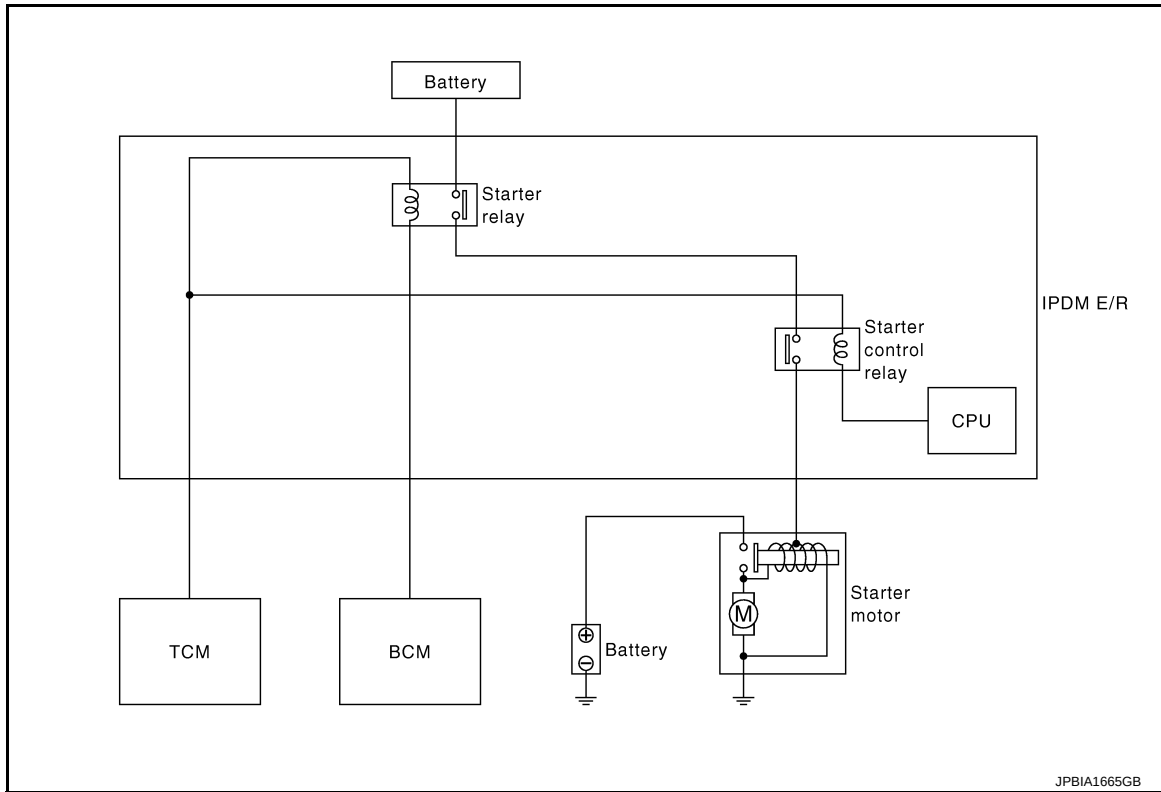
< SYSTEM DESCRIPTION >

SYSTEM

STARTING SYSTEM

STARTING SYSTEM : System Diagram

INFOID:0000000006939159



STARTING SYSTEM : System Description

INFOID:0000000006939160

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.

STARTING SYSTEM

< WIRING DIAGRAM >

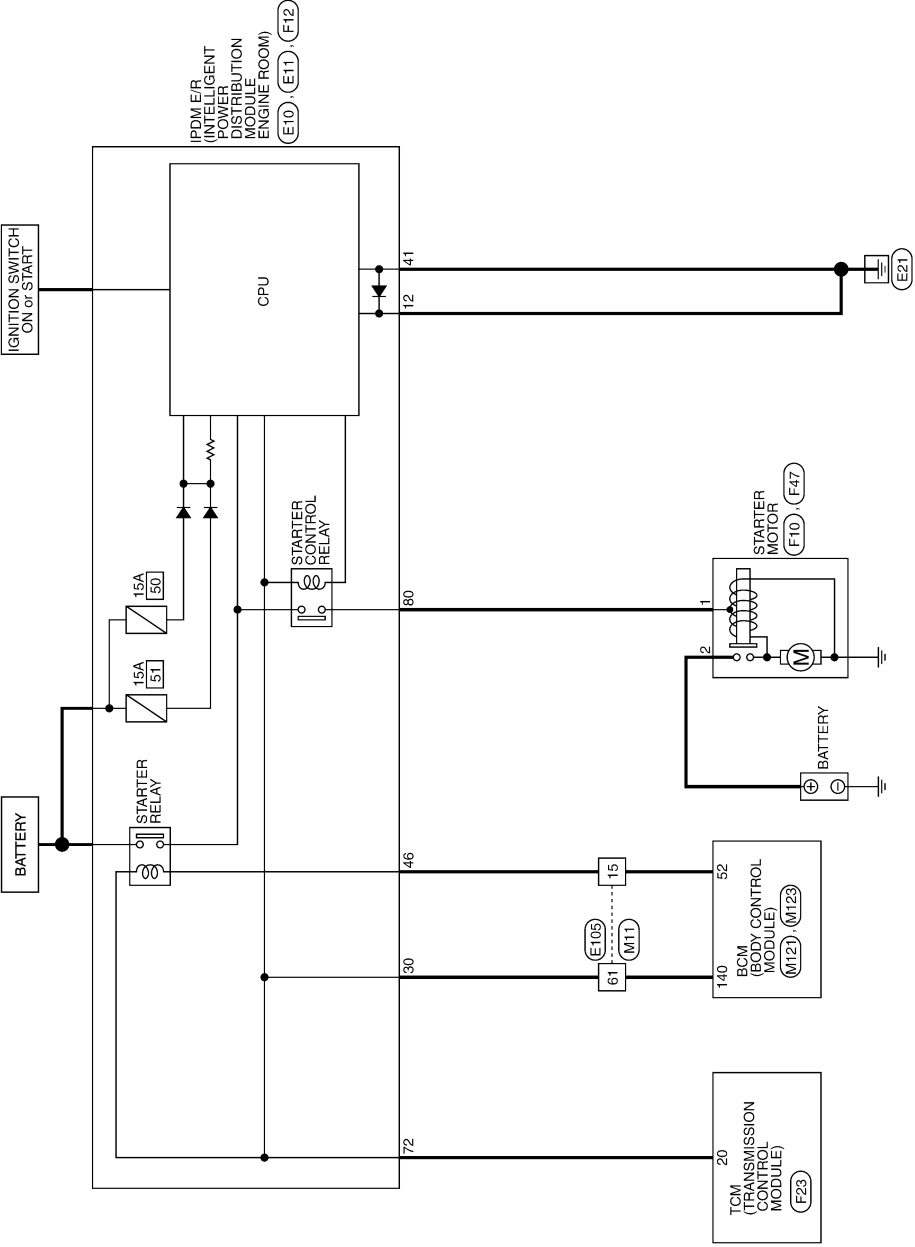
WIRING DIAGRAM

STARTING SYSTEM

Wiring Diagram

INFOID:000000006939167

STARTING SYSTEM

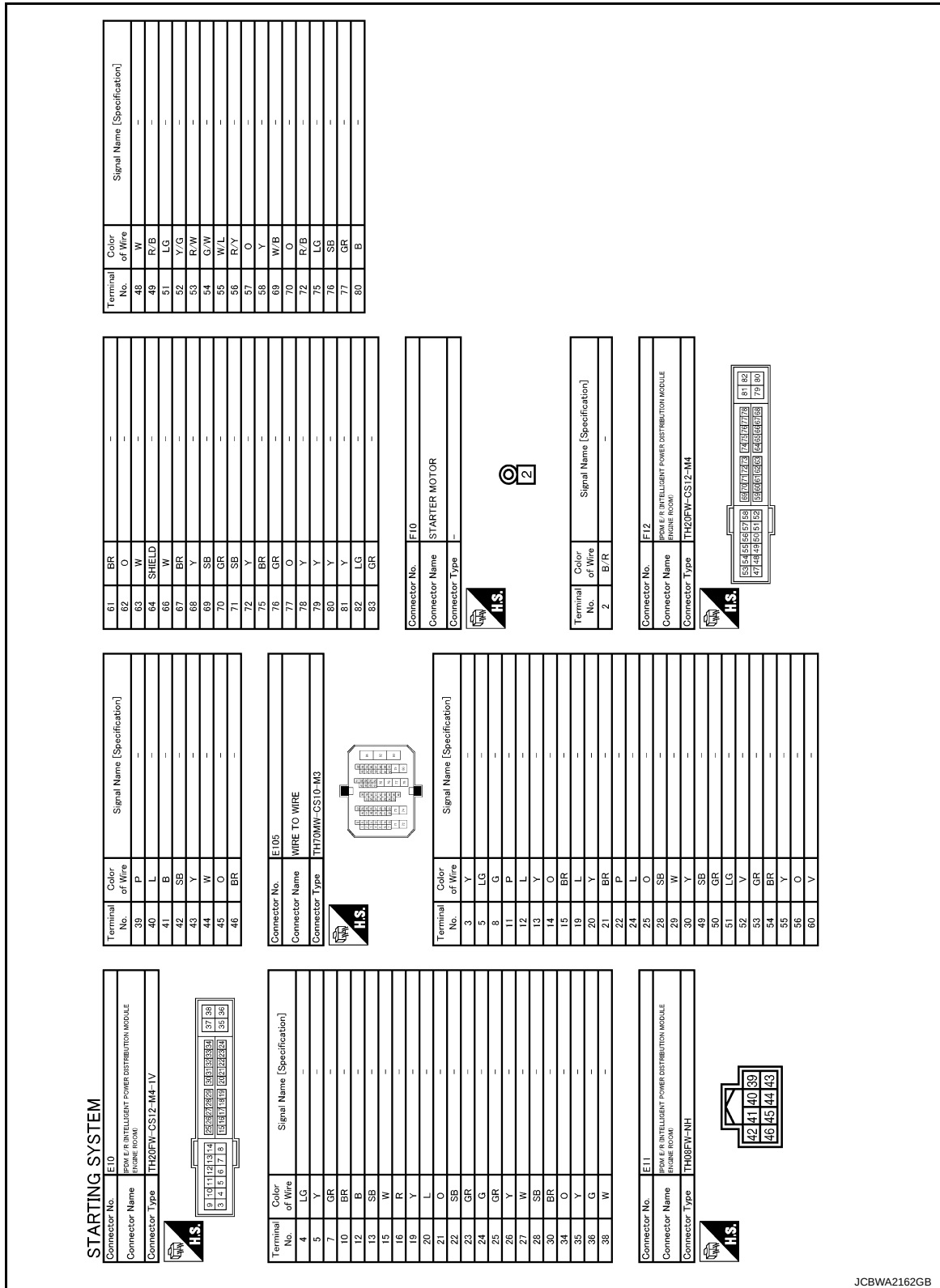


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STARTING SYSTEM

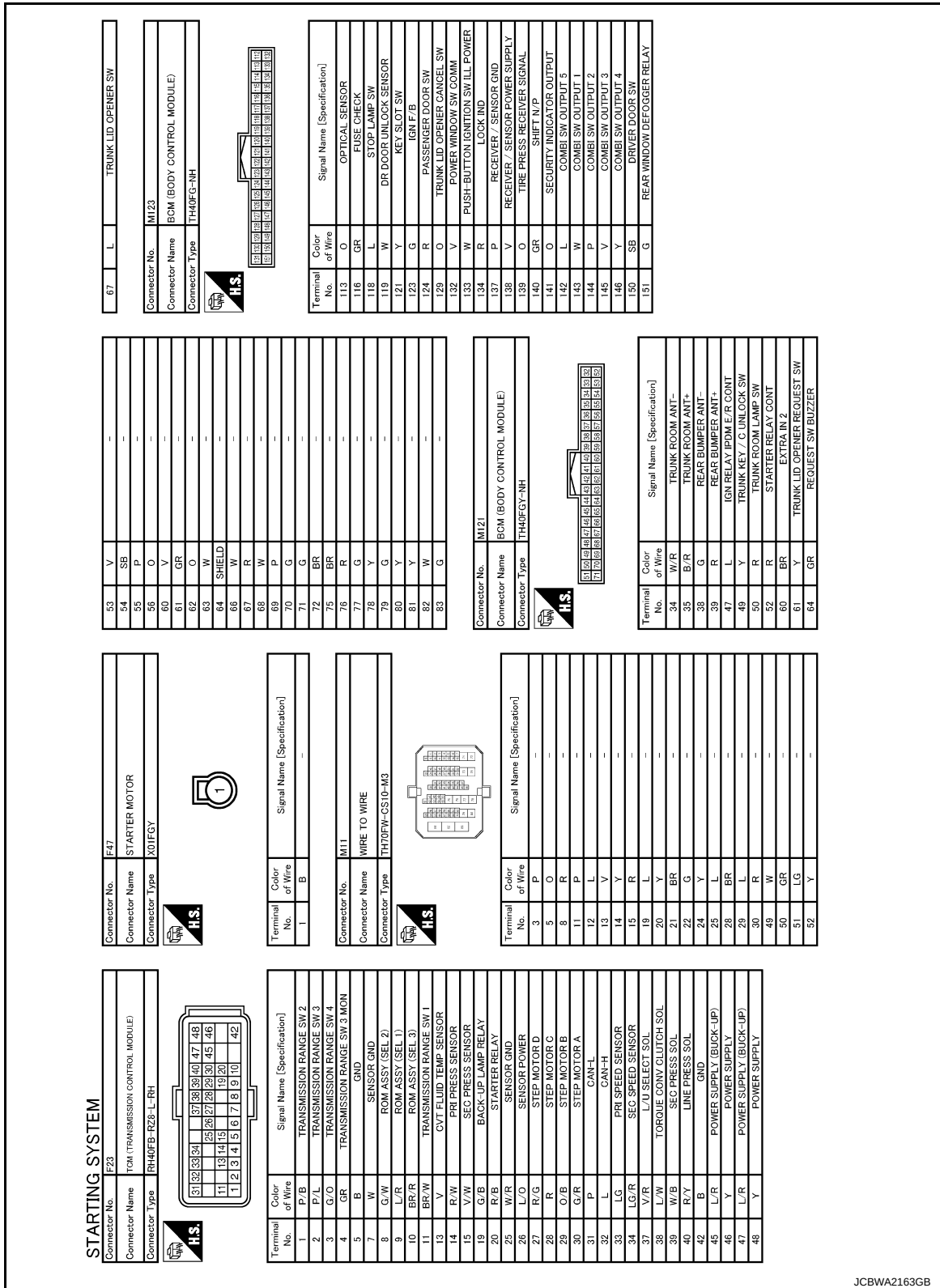
< WIRING DIAGRAM >



JCBWA2162GB

STARTING SYSTEM

< WIRING DIAGRAM >



JCBWA2163GB

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

BASIC INSPECTION

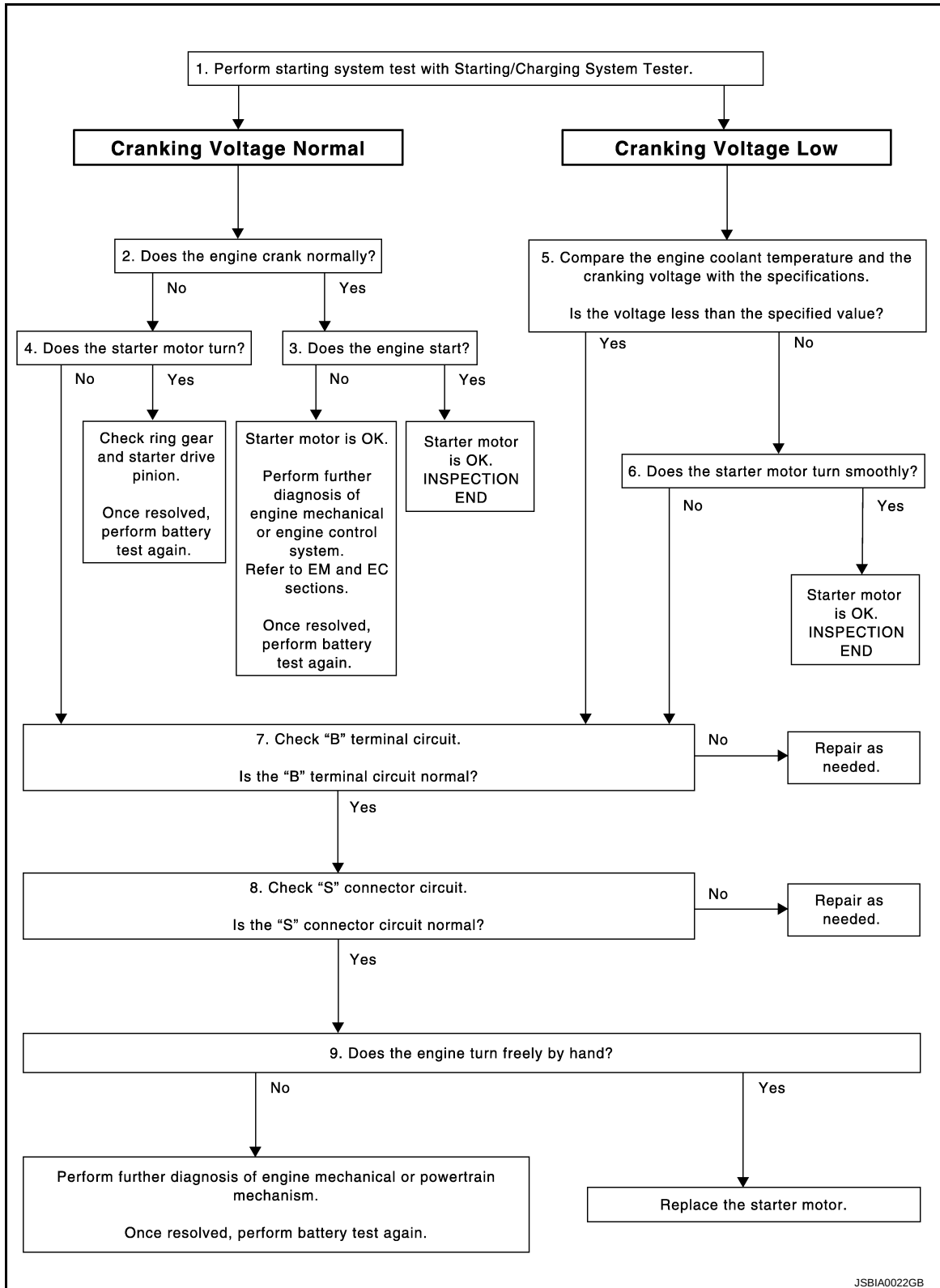
DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000006939158

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OVERALL SEQUENCE



DETAILED FLOW

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

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 STARTING/CHARGING SYSTEM TESTER

Perform the starting system test with Starting/Charging System Tester (SST: J-44373). For details and operating instructions, refer to Technical Service Bulletin.

Test result

CRANKING VOLTAGE NORMAL>>GO TO 2.

CRANKING VOLTAGE LOW>>GO TO 5.

CHARGE BATTERY>>Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to Technical Service Bulletin.

REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to Technical Service Bulletin. 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. 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-12, "Diagnosis Procedure"](#).

Is "B" terminal circuit normal?

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

- YES >> GO TO 8.
NO >> Repair as needed.

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8. "S" CONNECTOR CIRCUIT INSPECTION

Check "S" connector circuit. Refer to [STR-13. "Diagnosis Procedure"](#).

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Is "S" connector circuit normal?

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

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9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

Does the engine turn freely by hand?

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- YES >> Replace starter motor.
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again. Refer to Technical Service Bulletin.

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B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:000000006939163

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

Diagnosis Procedure

INFOID:000000006939164

CAUTION:

Before perform diagnosis, do the following procedure until engine cannot be started.

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-9, "Work Flow"](#).

NO >> Check the starter motor case and ground for poor continuity.

S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

S CONNECTOR CIRCUIT

Description

INFOID:000000006939165

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:000000006939166

CAUTION:

Before perform diagnosis, do the following procedure until engine cannot be started.

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 harness connector	Terminal		
F47	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-9, "Work Flow"](#).
- 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 [SEC-59, "Work Flow"](#) in SEC section.
- NO >> Repair the harness.

STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:000000006939168

Symptom	Reference
No normal cranking	Refer to STR-9, "Work Flow" .
Starter motor does not rotate	

STARTER MOTOR

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

STARTER MOTOR

Exploded View

INFOID:000000006939173

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REMOVAL

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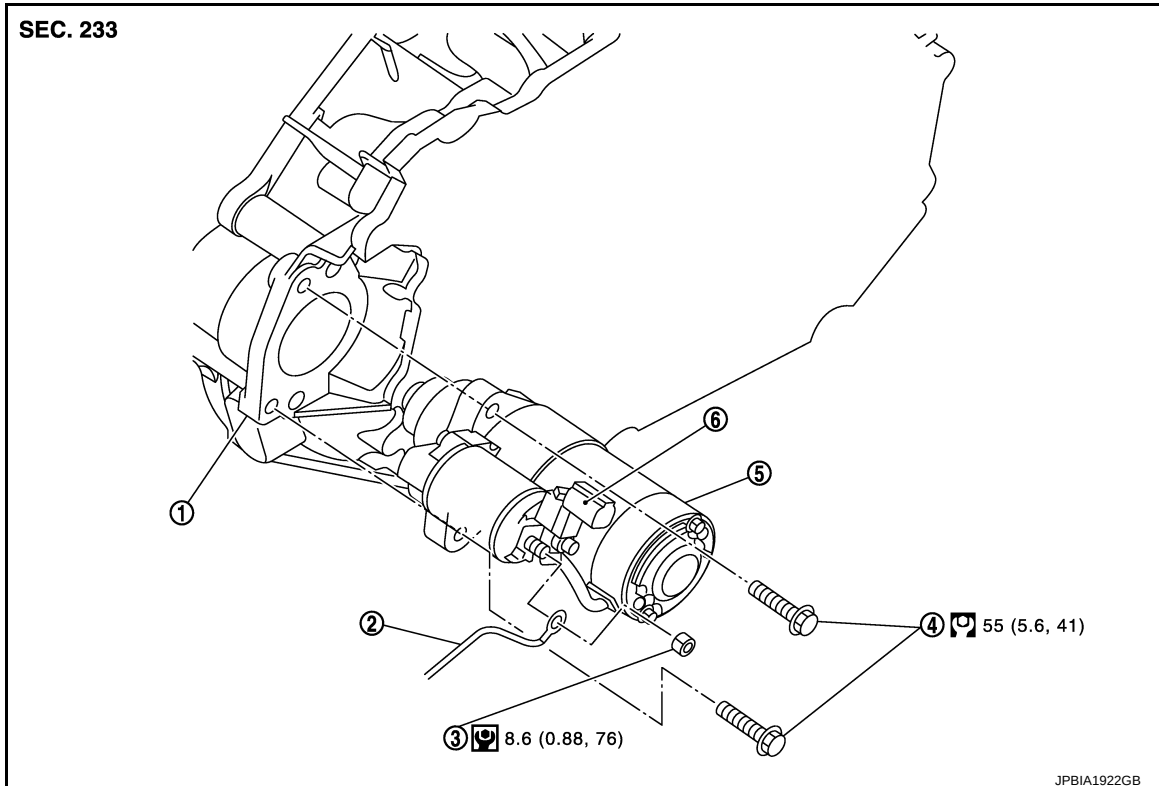
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|--------------------------------|-------------------------|---------------------|
| 1. Converter housing | 2. "B" terminal harness | 3. "B" terminal nut |
| 4. Starter motor mounting bolt | 5. Starter motor | 6. "S" connector |

: N·m (kg-m, in-lb)

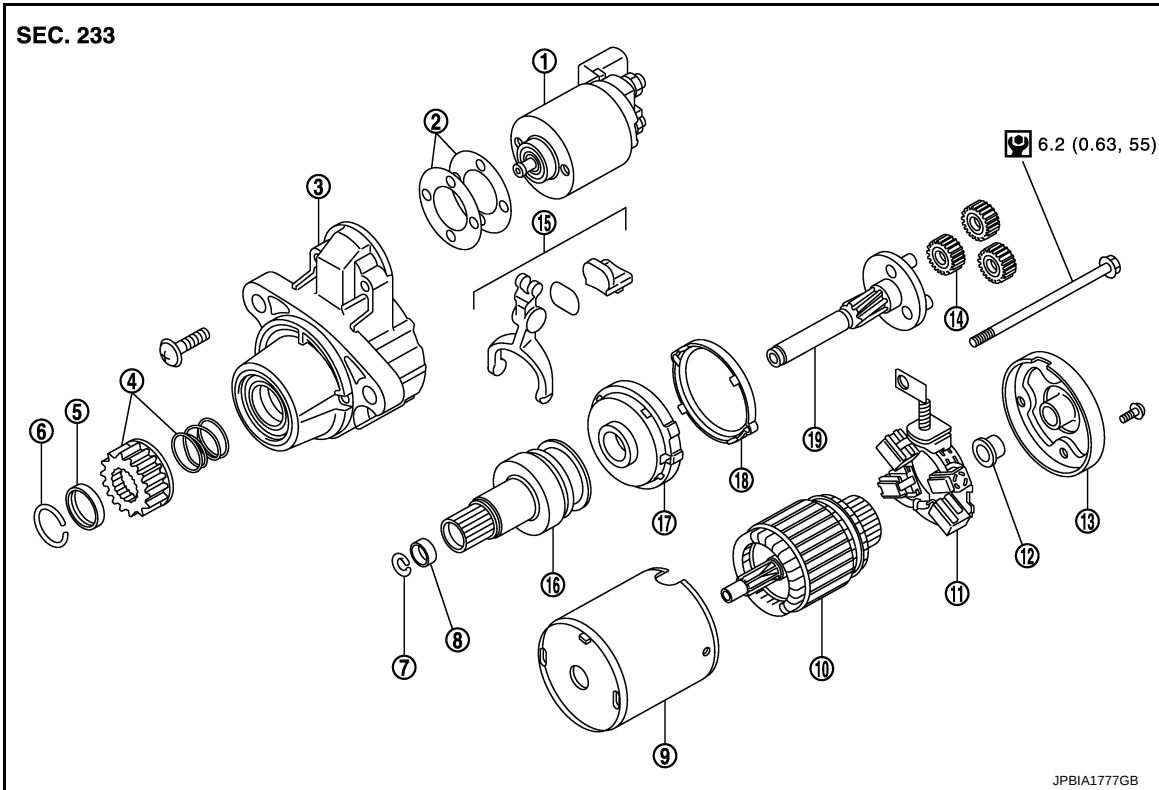
: N·m (kg-m, ft-lb)

DISASSEMBLY

STARTER MOTOR

< REMOVAL AND INSTALLATION >

Type: M000TA0072



- | | | |
|-----------------------------|---------------------------|-----------------------|
| 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:000000006939174

REMOVAL

1. Remove the battery Refer to [PG-112, "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

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

CAUTION:

Be careful to tighten "B" terminal nut to the specified torque.

STARTER MOTOR

< REMOVAL AND INSTALLATION >

Inspection

INFOID:000000006939175

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INSPECTION AFTER DISASSEMBLY

Pinion/Clutch Check

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- 1. Inspect pinion teeth.
 - Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
- 2. Inspect reduction gear teeth.
 - Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
- 3. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
 - If it locks or rotates in both directions, or unusual resistance is evident, replace.

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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:000000006939176

Type		M000TA0072
		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
Minimum diameter of commutator [mm (in)]		28.0 (1.102)
Minimum length of brush [mm (in)]		5.5 (0.217)
Brush spring tension [N (kg, lb)]		15.0 - 20.4 (1.5 - 3.4)
Clearance between bearing metal and armature shaft [mm (in)]		Less than 0.2 (0.008)
Clearance between pinion front edge and pinion stopper [mm (in)]		0.5 - 2.0 (0.020 - 0.079)