

A

# SECTION STR

STR

## STARTING SYSTEM

C

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# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

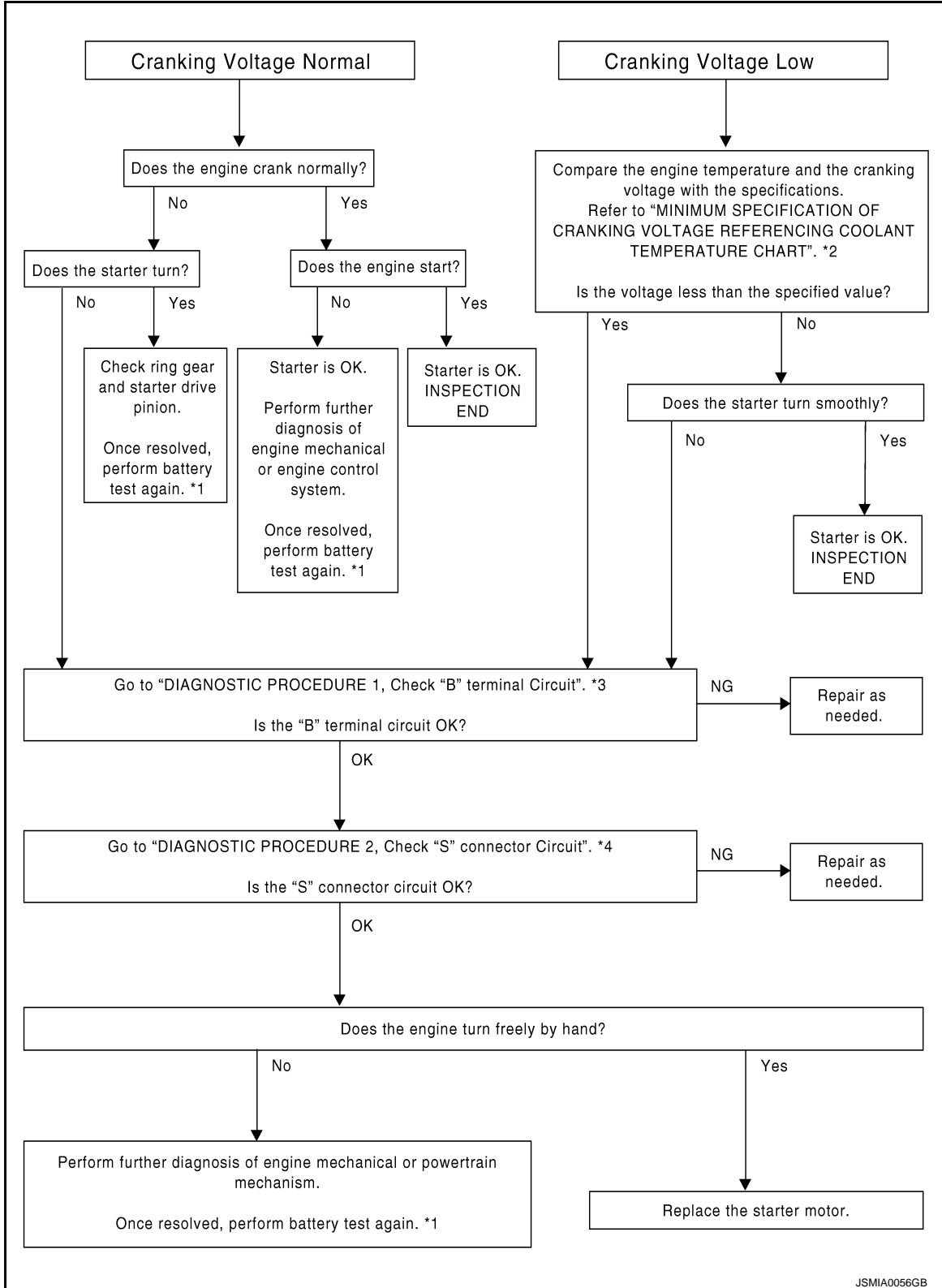
## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000006260819

#### 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-7, "Diagnosis Procedure"](#).

### Is "B" terminal circuit normal?

## DIAGNOSIS AND REPAIR WORKFLOW

### < BASIC INSPECTION >

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

### 8. "S" CONNECTOR CIRCUIT INSPECTION

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Check "S" connector circuit. Refer to [STR-8. "Diagnosis Procedure"](#).

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

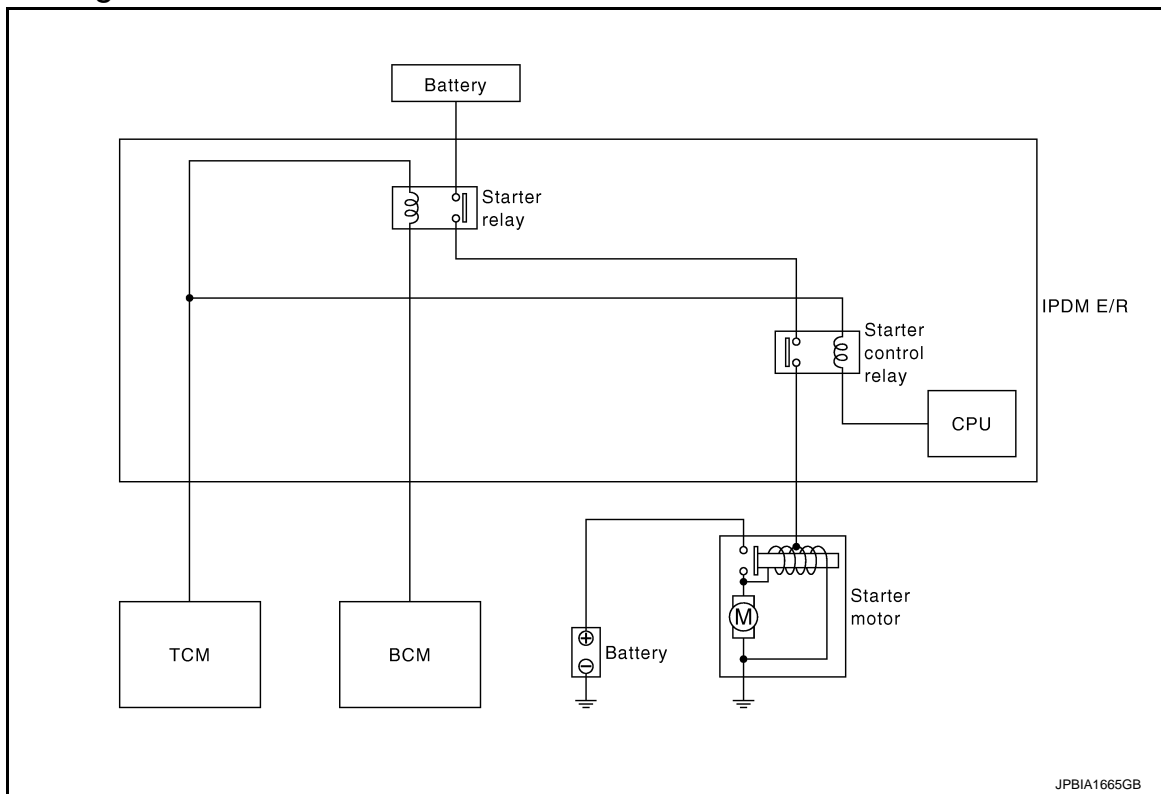
# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## SYSTEM DESCRIPTION

### STARTING SYSTEM

#### System Diagram



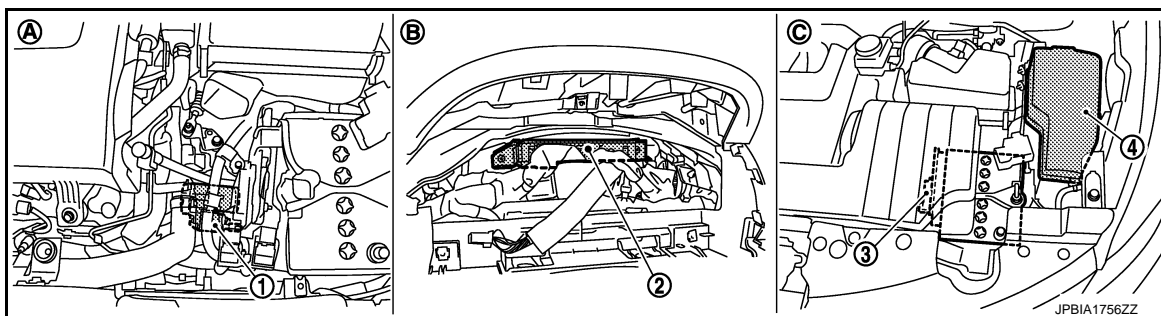
#### System Description

INFOID:0000000006260821

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:0000000006260822



- |                             |                                 |                                |
|-----------------------------|---------------------------------|--------------------------------|
| 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:000000006260823

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:000000006260824

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

#### Diagnosis Procedure

INFOID:000000006260825

#### 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
F10	2		
		Ground	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Check harness between battery and starter motor for open circuit.

#### 2. CHECK BATTERY CABLE CONNECTION STATUS (VOLTAGE DROP TEST)

1. Shift 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	When the ignition switch is in START position	Less than 0.5 V
Battery positive terminal	F10	2		

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"](#).

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

# S CONNECTOR CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## S CONNECTOR CIRCUIT

### Description

INFOID:000000006260826

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:000000006260827

#### 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.)
(+)	Terminal			
Starter motor harness connector				
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"](#).  
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-5, "Work Flow"](#) in SEC section.  
NO >> Repair the harness.



# STARTING SYSTEM

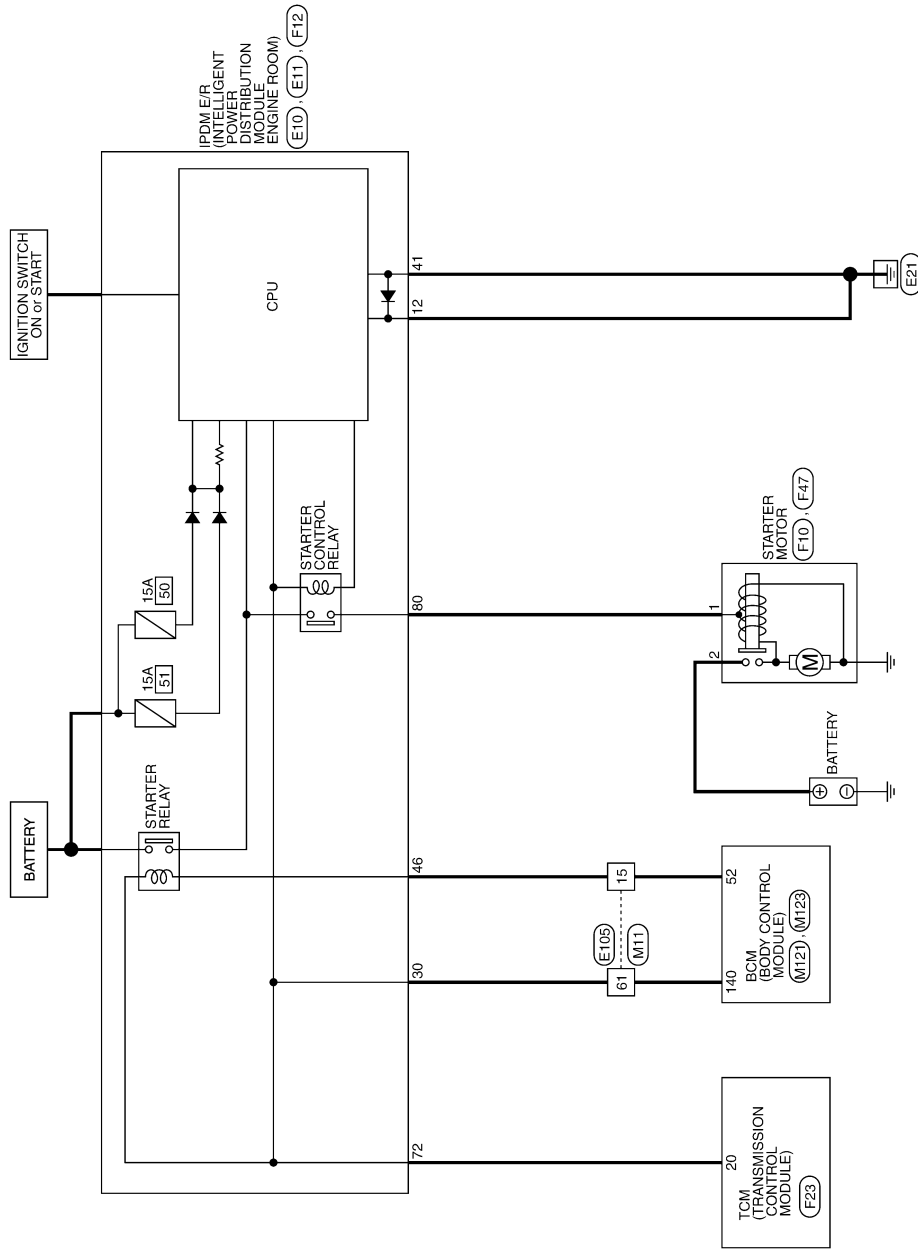
< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

### Wiring Diagram - STARTING SYSTEM -

INFOID:000000006260828

STARTING SYSTEM



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JCBWM1068GB

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# STARTING SYSTEM

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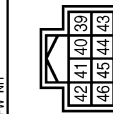
## STARTING SYSTEM

Connector No.	E10
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH02FW-CS12-M4-1V



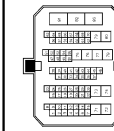
Terminal No.	Color of Wire	Signal Name [Specification]
4	LG	-
5	Y	-
7	GR	-
10	BR	-
12	B	-
13	SB	-
15	W	-
16	R	-
19	Y	-
20	L	-
21	O	-
22	SB	-
23	GR	-
24	G	-
25	GR	-
26	Y	-
27	W	-
28	SB	-
30	BR	-
34	O	-
35	P	-
36	G	-
38	GR	-

Connector No.	E11
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH08FV-NH



Terminal No.	Color of Wire	Signal Name [Specification]
38	P	-
40	L	-
41	B	-
42	SB	-
43	Y	-
44	W	-
45	O	-
46	BR	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH70MW-CS10-M3



Terminal No.	Color of Wire	Signal Name [Specification]
3	Y	-
5	LG	-
6	GR	-
8	G	-
11	P	-
12	L	-
13	Y	-
14	O	-
15	BR	-
20	Y	-
21	BR	-
22	P	-
24	L	-
25	O	-
28	SB	-
29	W	-
30	Y	-
47	P	-
48	L	-
49	SB	-
50	GR	-
51	LG	-
52	V	-
53	GR	-
54	BR	-
55	Y	-

Terminal No.	W/L
60	V
61	BR
62	O
63	LO
64	SHIELD
66	W
67	BR
68	Y
69	SB
70	GR
71	SB
72	Y
73	L
74	W
75	BR
76	GR
77	O
78	Y
78	G
78	V
80	R
81	W
82	LG
83	O

Connector No.	F10
Connector Name	STARTER MOTOR
Connector Type	-



Connector No.	F12
Connector Name	POWER INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	TH20FW-CS12-M4



Terminal No.	Color of Wire	Signal Name [Specification]
48	W	-
49	R/B	-
51	LG	-
52	Y/G	-
53	R/W	-
54	G/W	-
55	W/L	-
56	R/Y	-
57	O	-
58	Y	-
60	W/B	-
70	O	-
72	R/B	-
75	LG	-
76	SB	-
77	GR	-
80	B	-

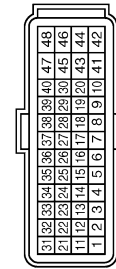
JCBWM2543GB

# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

Connector No.	F23
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	RH40FB-R28-L-RH



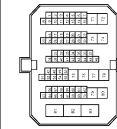
Terminal No.	Color of Wire	Signal Name [Specification]
1	P/B	INH SW 2
2	P/L	INH SW 3
3	G/O	INH SW 4
4	GR	INH SW 3 MON
5	B	GND
7	W	SENSOR GND
8	G/W	CLOCK (SEL 2)
9	L/R	CHIP SELECT (SEL 1)
10	BR/W	DATA I/O (SEL 3)
11	BR/W	INH SW 1
13	V	ATF TEMP SENSOR
14	R/W	PRI PRESS SENSOR
15	V/W	SEC PRESS SENSOR
19	G/B	REV LAMP RELAY
20	R/B	STARTER RELAY
25	R/W	SENSOR GND
26	L/O	SENSOR POWER SOURCE (6V)
27	R/G	S/M-D
28	R	S/M-C
29	O/B	S/M-B
30	G/R	S/M-A
31	P	CAN-L
32	L	CAN-H
33	LG	PRI SPEED SENSOR
34	LG/R	SEC SPEED SENSOR
37	V/R	L/U & SEL-ON/OFF SOL
38	L/W	L/U & SEL LINEAR SOL
39	W/B	SEC-LINEAR SOL
40	R/Y	PL LINEAR SOL
42	B	GND
46	Y	VIGN
47	L/R	BATT
48	Y	VIGN

Connector No.	F47
Connector Name	STARTER MOTOR
Connector Type	X01FGY



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

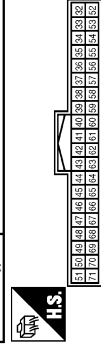
Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH70PFI-CS-D-M3



Terminal No.	Color of Wire	Signal Name [Specification]
3	P	-
5	O	-
6	G	-
8	R	-
11	P	-
12	L	-
13	V	-
14	Y	-
15	R	-
20	Y	-
21	BR	-
22	G	-
24	Y	-
25	L	-
28	BR	-
29	L	-
30	R	-
47	P	-
48	L	-
49	W	-
50	GR	-

51	LG	-
52	V	-
53	SB	-
54	SB	-
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56	SB	-
60	V	-
61	GR	-
62	O	-
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66	W	-
67	R	-
68	P	-
69	P	-
70	G	-
71	G	-
72	BR	-
73	L	-
74	W	-
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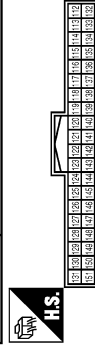
Connector No.	M121
Connector Name	BOM (BODY CONTROL MODULE)
Connector Type	TH40FGY-NH



Terminal No.	Color of Wire	Signal Name [Specification]
34	B	LUGGAGE ROOM ANT 1-
35	W	LUGGAGE ROOM ANT 1+
38	L	REAR BUMPER ANT-
39	BR	REAR BUMPER ANT+
47	L	IGN RELAY IPDM E/R/CONT
52	R	STARTER RELAY CONT
60	BR	EXTRA IN 2

61	R	BACK DOOR OPENER REQUEST SW
64	GR	REQUEST SW BUZZER
65	V	REAR WIPER STOP POSITION
66	Y	BACK DOOR SW
67	LG	BACK DOOR OPENER SW
68	W	REAR RH DOOR SW
69	R	REAR LH DOOR SW

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



Terminal No.	Color of Wire	Signal Name [Specification]
112	R	RAIN SENSOR SERIAL LINK
113	O	OPTICAL SENSOR
116	GR	FUSE CHECK
118	L	STOP LAMP SW
119	W	DR DOOR UNLOCK SENSOR
121	Y	KEY SLOT SW
123	G	IGN F/B
124	R	PASSENGER DOOR SW
130	BR	REAR DEFOGGER SW
132	G	POWER WINDOW SW COMM
133	W	PUSH-BUTTON IGNITION SW ILL POWER
134	R	LOCK IND.
137	P	RECEIVER / SENSOR GND
138	V	RECEIVER / SENSOR POWER SUPPLY
139	O	TIRE PRESS RECEIVER SIGNAL
140	GR	SHIFT N/P
141	O	SECURITY INDICATOR OUTPUT
142	L	COMBI SW OUTPUT 5
143	W	COMBI SW OUTPUT 1
144	P	COMBI SW OUTPUT 2
145	V	COMBI SW OUTPUT 3
146	Y	COMBI SW OUTPUT 4
150	SB	DRIVER DOOR SW
151	G	REAR WINDOW DEFOGGER RELAY

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# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:000000006260829

Symptom	Reference
No normal cranking	Refer to <a href="#">STR-2, "Work Flow"</a> .
Starter motor does not rotate	

# 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:000000006260830

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 MEXICO

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

INFOID:000000006260831

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:**

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## PRECAUTIONS

< PRECAUTION >

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**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

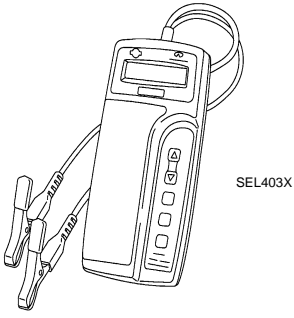
### PREPARATION

#### Special Service Tools

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

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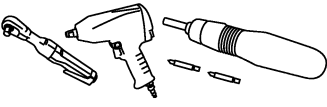
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#### Commercial Service Tools

INFOID:000000006260833

Tool name	Description
<p>Power tool</p>  <p>PIIB1407E</p>	<p>Loosening bolts, nuts and screws</p>

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# STARTER MOTOR

< REMOVAL AND INSTALLATION >

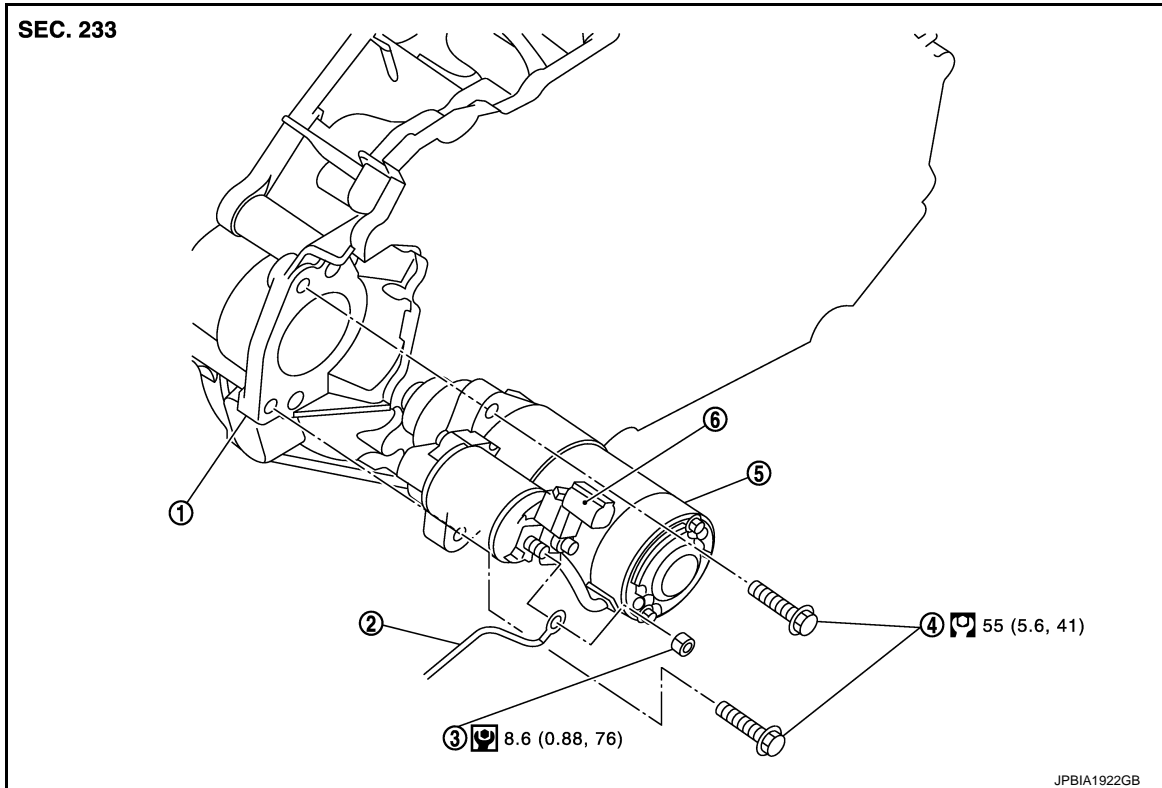
## REMOVAL AND INSTALLATION

### STARTER MOTOR

Exploded View

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#### 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

Refer to [GI-4, "Components"](#) for symbols in the figure.

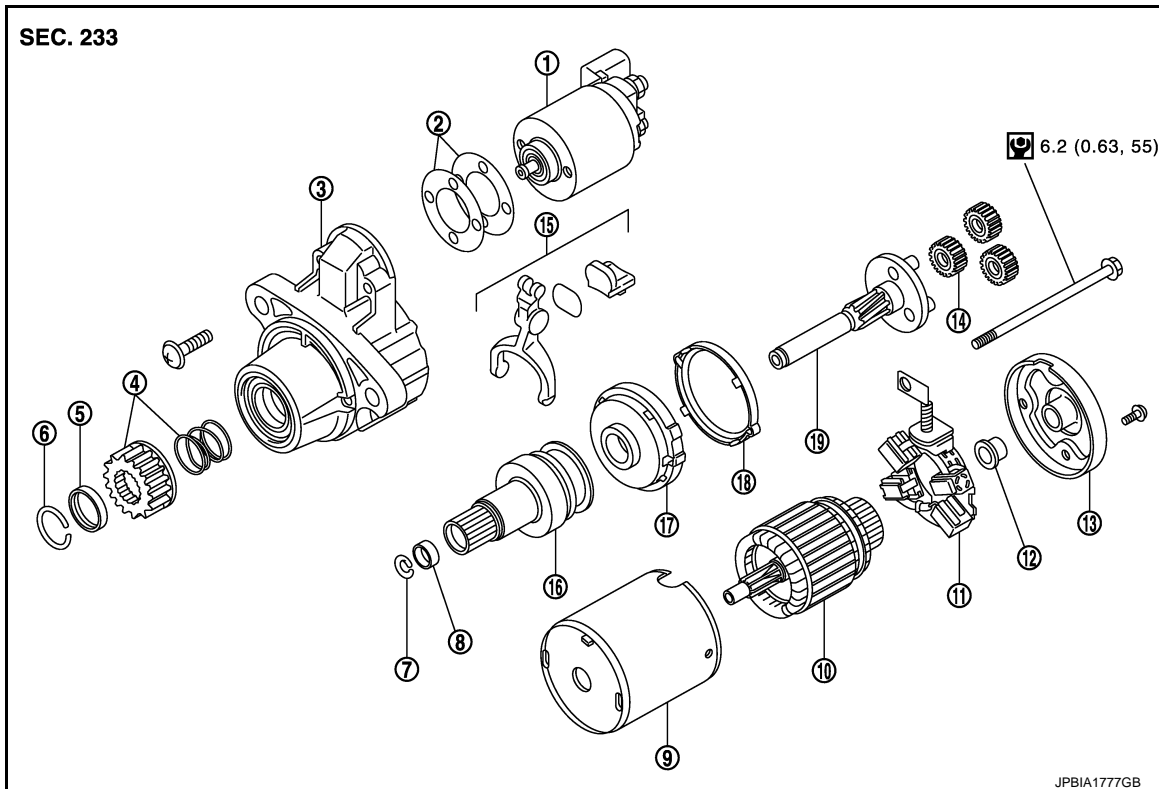
#### DISASSEMBLY

Type: M000TA0072



# STARTER MOTOR

## < REMOVAL AND INSTALLATION >



- |                             |                           |                       |
|-----------------------------|---------------------------|-----------------------|
| 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              |                           |                       |

Refer to [GI-4, "Components"](#) for symbols not described on the above.

## Removal and Installation

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### REMOVAL

1. Remove the battery Refer to [PG-118, "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.

### Inspection

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### INSPECTION AFTER DISASSEMBLY

Pinion/Clutch Check

## STARTER MOTOR

### < REMOVAL AND INSTALLATION >

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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.

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

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A

STR

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)

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