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# SECTION STR

## STARTING SYSTEM

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# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

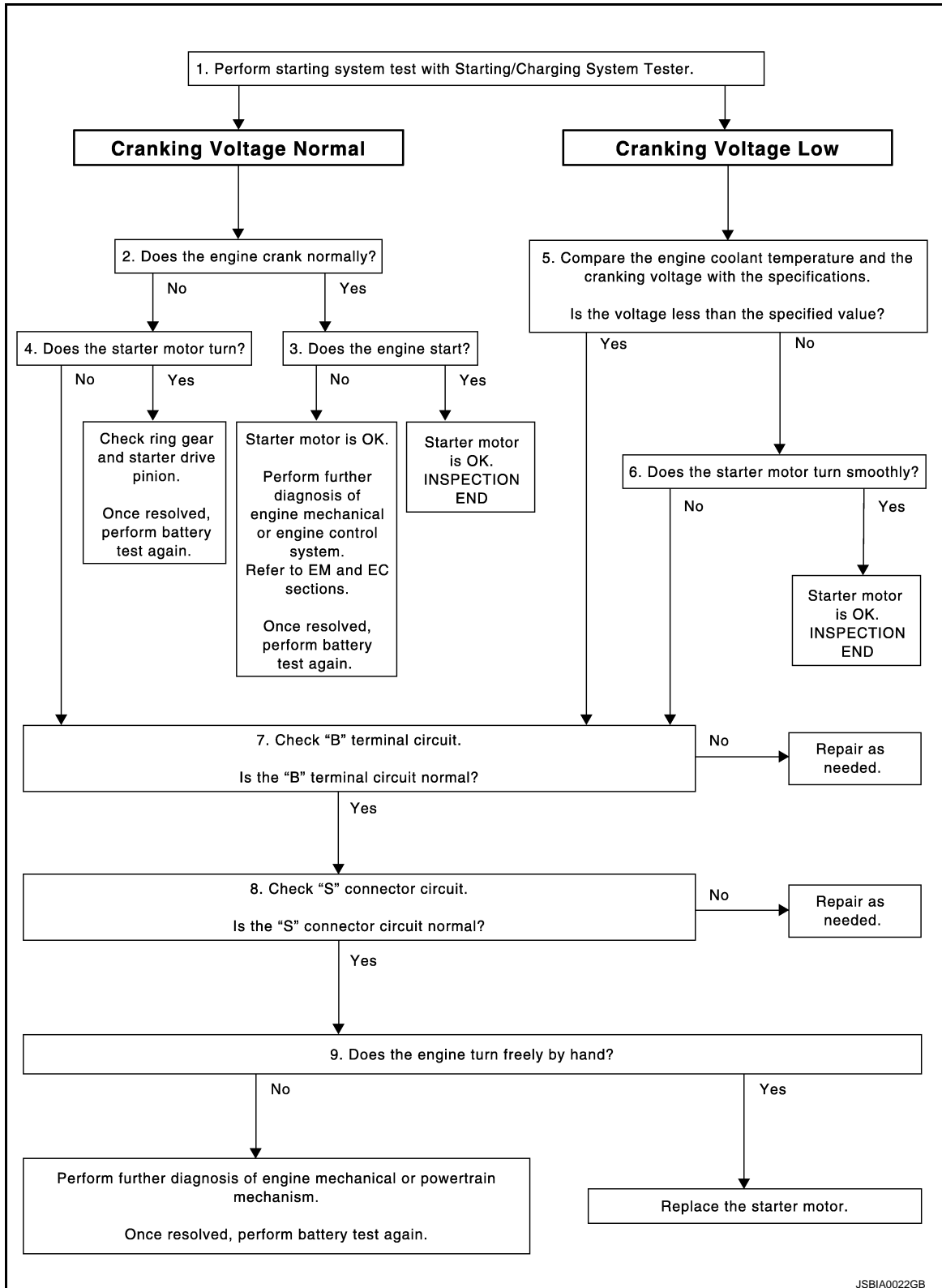
## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000005048944

#### OVERALL SEQUENCE



JSBIA0022GB

#### 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 >> Starter motor is OK. 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-10, "Diagnosis Procedure"](#).

### Is "B" terminal circuit normal?

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## DIAGNOSIS AND REPAIR WORKFLOW

### < BASIC INSPECTION >

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

### 8. "S" CONNECTOR CIRCUIT INSPECTION

---

Check "S" connector circuit. Refer to [STR-11, "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 >

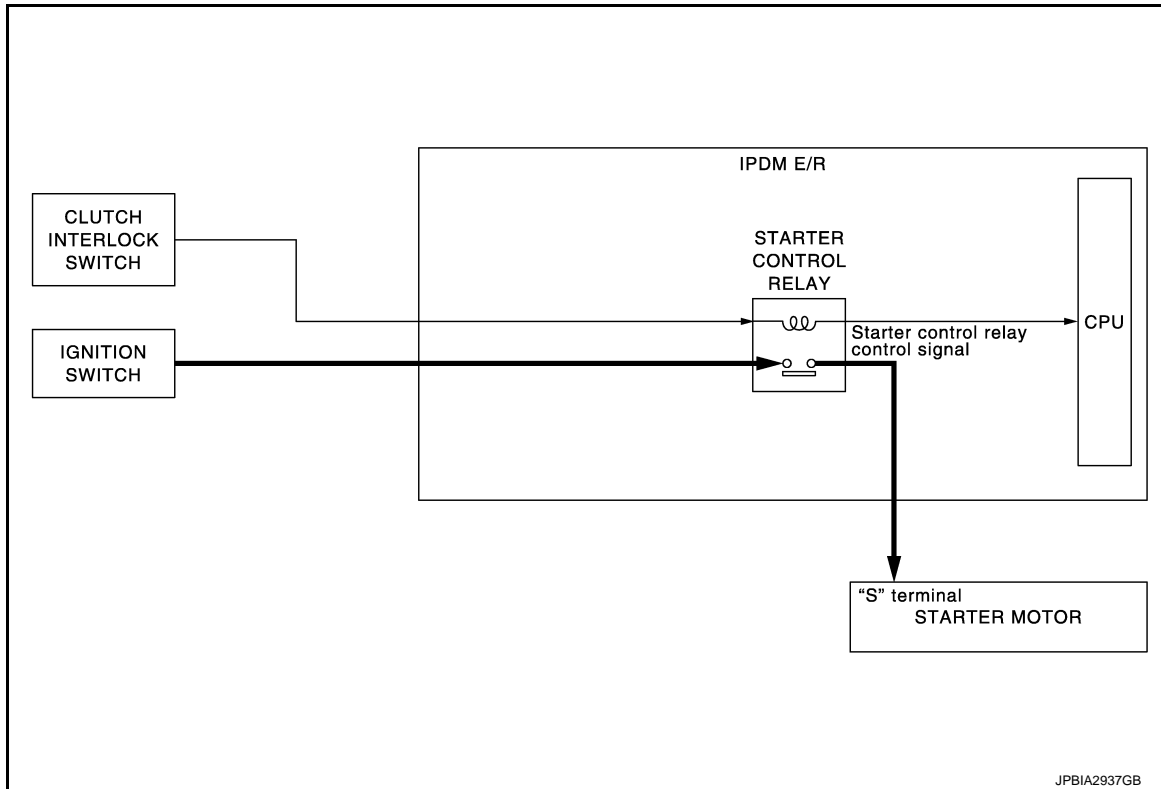
## SYSTEM DESCRIPTION

### STARTING SYSTEM

M/T

M/T : System Diagram

INFOID:000000005048945



M/T : System Description

INFOID:000000005048946

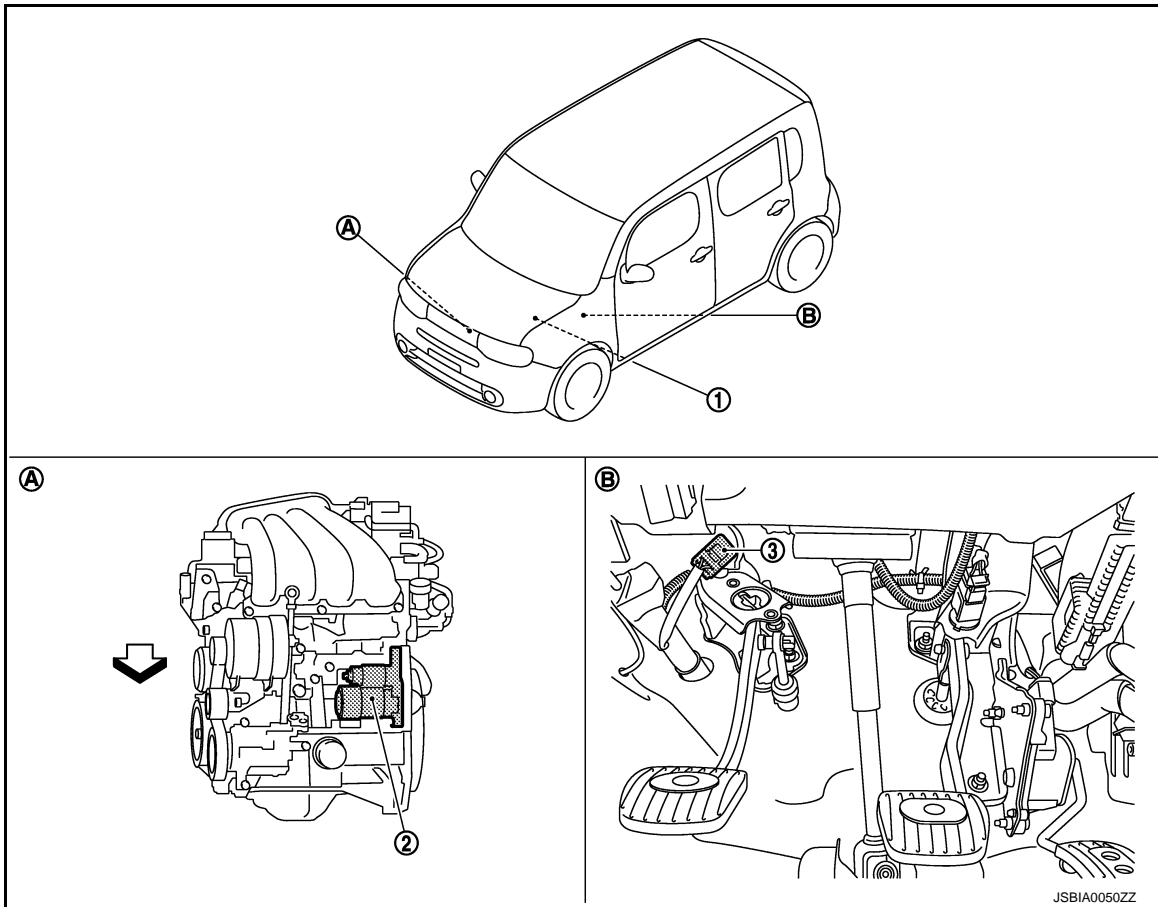
- When the clutch interlock switch is turned ON, power is supplied to starter control relay. And IPDM E/R (CPU) detect clutch interlock switch condition by the inputted signal.
- When starter operating condition is satisfied, IPDM E/R turns starter control relay ON by starter control relay control signal.
- When engine cranking condition is satisfied, then battery power is supplied to starter motor ("S" terminal) through starter control relay.

# STARTING SYSTEM

< SYSTEM DESCRIPTION >

## M/T : Component Parts Location

INFOID:000000005048947



- 1. IPDM E/R  
Refer to [PCS-6, "Component Parts Location"](#). (WITH I-KEY)  
Refer to [PCS-37, "Component Parts Location"](#). (WITHOUT I-KEY)
- 2. Starter motor
- 3. Clutch interlock switch

A. Engine                      B. Clutch pedal

↙ :Vehicle front

## M/T : Component Description

INFOID:000000005048948

Component part	Description
Clutch interlock switch	The switch turns ON and electric power is supplied to the starter control relay inside IPDM E/R when the clutch pedal is depressed.
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.

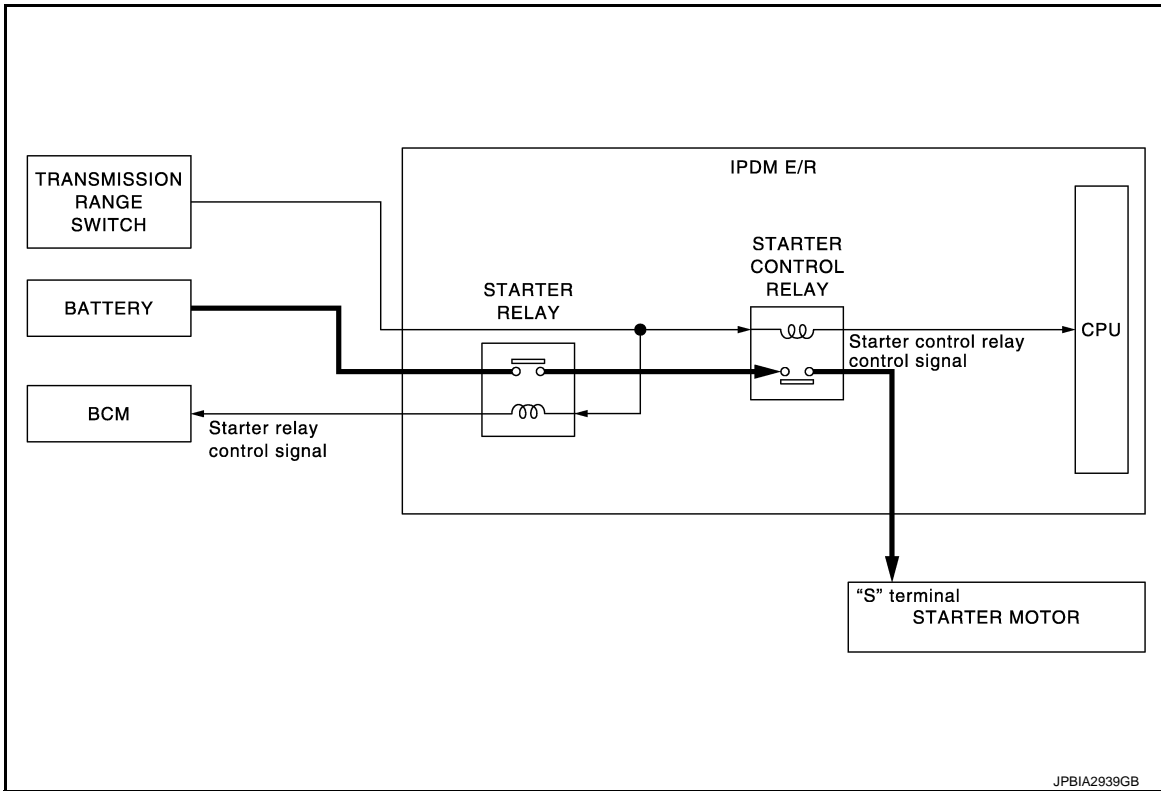
## CVT

# STARTING SYSTEM

< SYSTEM DESCRIPTION >

CVT : System Diagram (With Intelligent Key)

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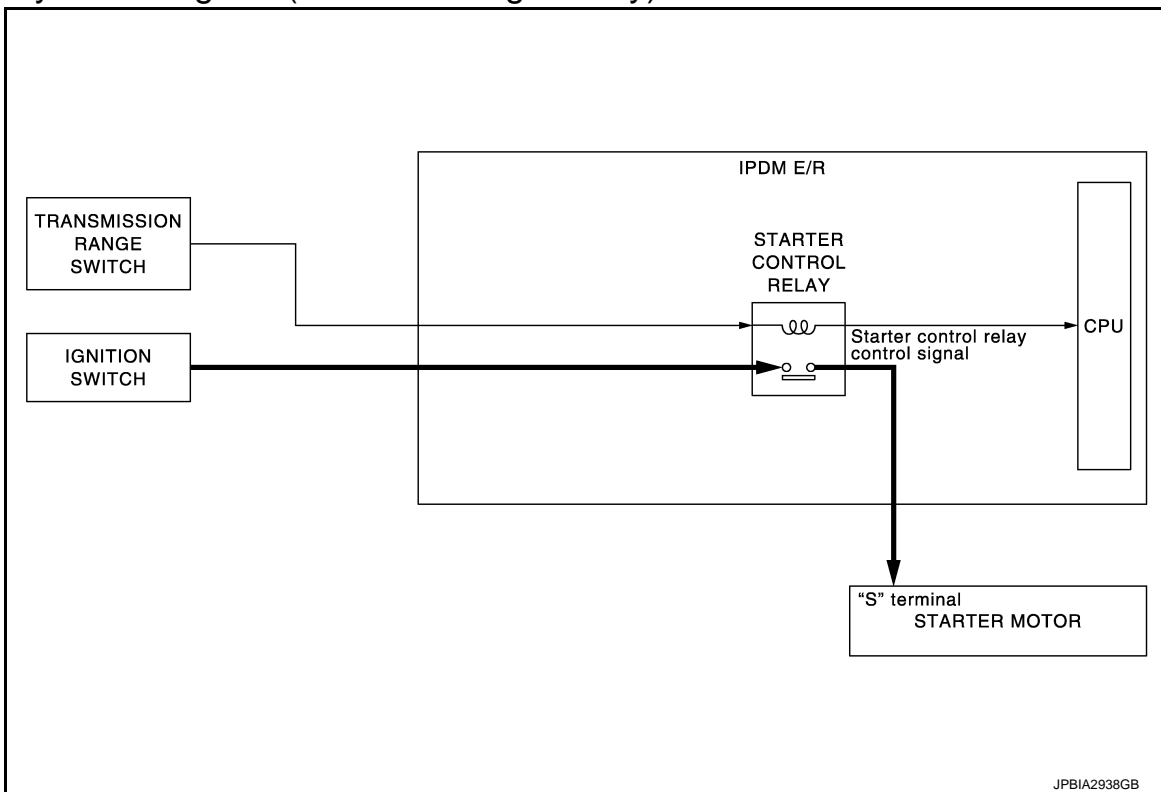
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CVT : System Diagram (Without Intelligent Key)

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CVT : System Description (With Intelligent Key)

INFOID:000000005048950

- When selector lever is P or N, power is supplied to starter relay and starter control relay by Transmission range switch. And BCM and IPDM E/R (CPU) detect selector lever P/N condition by the inputted signal.

# STARTING SYSTEM

## < SYSTEM DESCRIPTION >

- When starter operating condition is satisfied, IPDM E/R turns starter control relay ON by starter control relay control signal.
- When engine cranking condition is satisfied, BCM turns starter relay ON by starter control relay control signal.
- Then battery power is supplied to starter motor ("S" terminal) through starter control relay and starter relay.

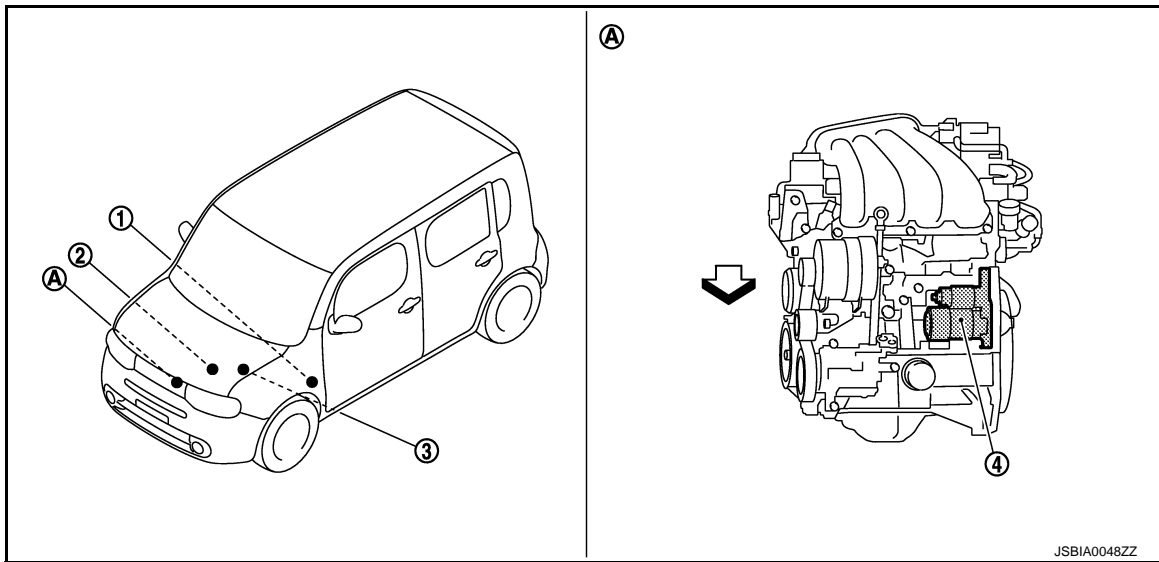
## CVT : System Description (Without Intelligent Key)

INFOID:000000005148284

- When selector lever is P or N, power is supplied to starter control relay by Transmission range switch. And IPDM E/R (CPU) detect selector lever P/N condition by the inputted signal.
- When engine cranking condition is satisfied, then battery power is supplied to starter motor ("S" terminal) through starter control relay.

## CVT : Component Parts Location

INFOID:000000005048951



1. BCM (Without Intelligent Key)  
Refer to [BCS-88, "Component Parts Location"](#).
  2. Transmission range switch  
Refer to [TM-64, "Component Parts Location"](#).
  3. IPDM E/R  
Refer to [PCS-6, "Component Parts Location"](#), (With I Key)  
Refer to [PCS-37, "Component Parts Location"](#), (Without I Key)
  4. Starter motor
- A. Engine  
↙ :Vehicle front

## CVT : Component Description (With Intelligent Key)

INFOID:000000005048952

Component part	Description
Transmission range switch	Transmission range switch 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.



# STARTING SYSTEM

< SYSTEM DESCRIPTION >

CVT : Component Description (Without Intelligent Key)

INFOID:000000005167295

A

Component part	Description
Transmission range switch	Transmission range switch supplies power to the starter relay inside IPDM E/R when the selector lever is shifted to the P or N position.
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.

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# B TERMINAL CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

## DTC/CIRCUIT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:000000005048953

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

#### Diagnosis Procedure

INFOID:000000005048954

#### 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
F11	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 CVT selector lever to "P" or "N" position. (CVT models)  
Keep depressing clutch pedal fully. (M/T models)
2. Check voltage between battery positive terminal and starter motor "B" terminal.

Terminals		Condition	Voltage (Approx.)
(+)	(-)		
	Starter motor "B" terminal	When the ignition switch is in START position	Less than 0.5 V
	Terminal		
Battery positive terminal	F11		
	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 CVT selector lever to "P" or "N" position. (CVT models)  
Keep depressing clutch pedal fully. (M/T models)
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:000000005048955

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 for CVT models or the clutch pedal is depressed for M/T models.

### Diagnosis Procedure

INFOID:000000005048956

#### 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 CVT selector lever to "P" or "N" position. (CVT models)  
Keep depressing clutch pedal fully. (M/T models)
4. Check voltage between starter motor harness connector and ground.

Terminals		(-)	Condition	Voltage (Approx.)
(+)	Terminal			
Starter motor harness connector				
F10	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.	
F10	1	E10	3	Existed

#### Is the inspection result normal?

YES >> Further inspection is necessary. Refer to [STR-2, "Work Flow"](#).

NO >> Repair the harness.

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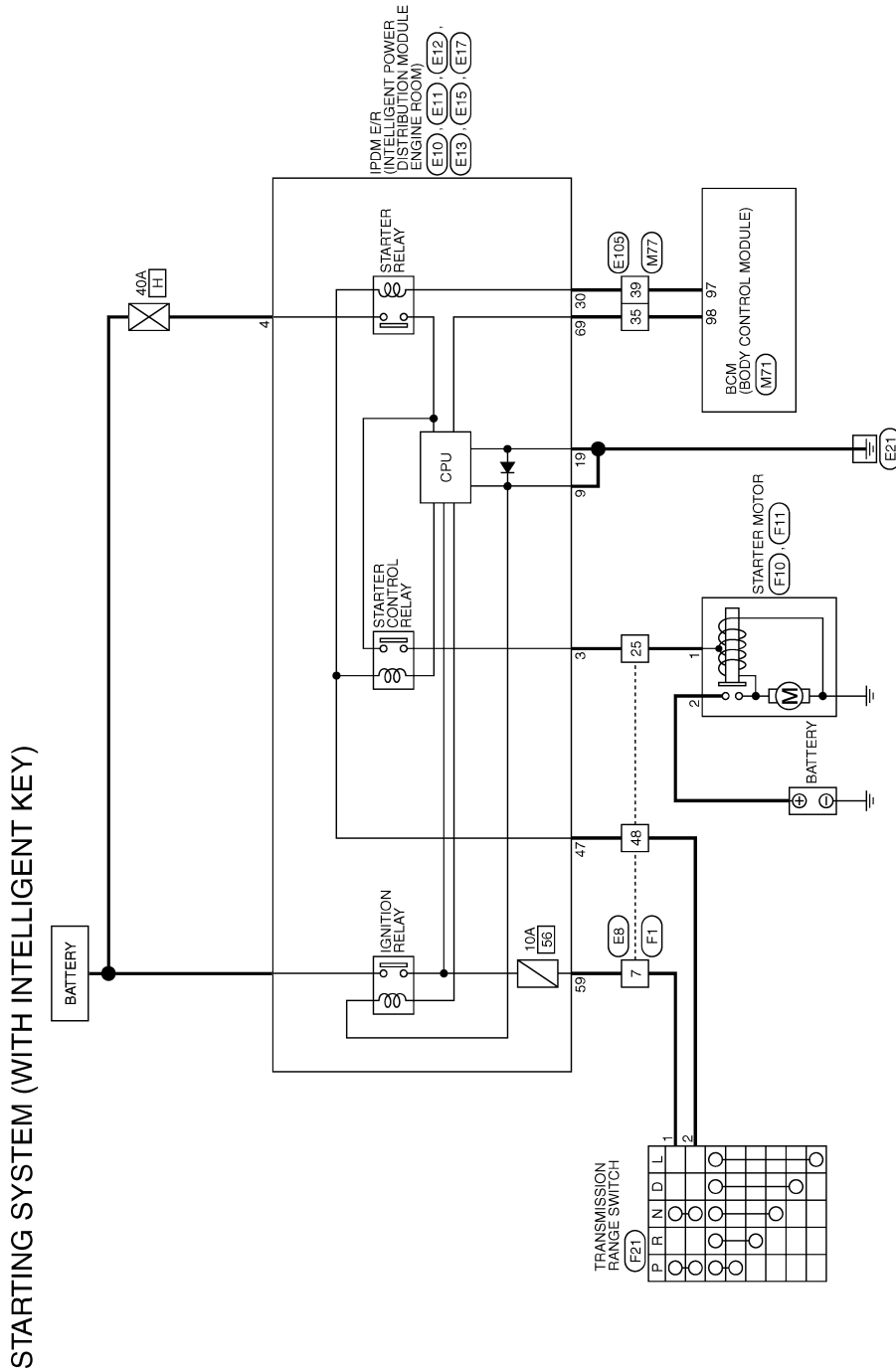
# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM

Wiring Diagram - STARTING SYSTEM (WITH INTELLIGENT KEY) -

INFOID:000000005048957



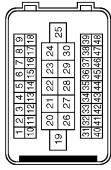


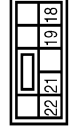


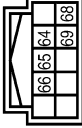

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# STARTING SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

## STARTING SYSTEM (WITH INTELLIGENT KEY)

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Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)																																																																																																																					
Connector Type	NS33FBR-CS																																																																																																																					
Terminal No.	Color of Wire	Signal Name [Specification]																																																																																																																				
19	B/W	-																																																																																																																				
Connector No.	E13																																																																																																																					
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)																																																																																																																					
Connector Type	TH12FW-NH																																																																																																																					
Terminal No.	Color of Wire	Signal Name [Specification]																																																																																																																				
30	SB	-																																																																																																																				
Connector No.	E15																																																																																																																					
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)																																																																																																																					
Connector Type	NS18FW-CS																																																																																																																					
Terminal No.	Color of Wire	Signal Name [Specification]																																																																																																																				
47	BR	-																																																																																																																				
59	Y	-																																																																																																																				
Connector No.	E17																																																																																																																					
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)																																																																																																																					
Connector Type	TH10FB-NH																																																																																																																					
Terminal No.	Color of Wire	Signal Name [Specification]																																																																																																																				
69	O	-																																																																																																																				
Connector No.	E105																																																																																																																					
Connector Name	WIRE TO WIRE																																																																																																																					
Connector Type	TH80MY-CS16-TM4																																																																																																																					
Terminal No.	Color of Wire	Signal Name [Specification]																																																																																																																				
35	Y	-																																																																																																																				
39	SB	-																																																																																																																				



JCBWM1302GB

# STARTING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >



### STARTING SYSTEM (WITH INTELLIGENT KEY)

Connector No.	F21
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	FR08FG



Terminal No.	Color of Wire	Signal Name [Specification]
1	R	
2	W	

Connector No.	F11
Connector Name	STARTER MOTOR
Connector Type	


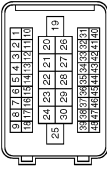
Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	

Connector No.	F10
Connector Name	STARTER MOTOR
Connector Type	



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

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	SA38FE-RS10-SJZZ



Terminal No.	Color of Wire	Signal Name [Specification]
7	V	
25	R	
48	BR	

Connector No.	M7
Connector Name	BCM (BODY CONTROL MODULE) (WITH INTELLIGENT KEY)
Connector Type	TH40FW-NH

Terminal No.	Color of Wire	Signal Name [Specification]
35	BR	
39	L/R	

Connector No.	M7
Connector Name	BCM (BODY CONTROL MODULE) (WITH INTELLIGENT KEY)
Connector Type	TH40FW-NH

Terminal No.	Color of Wire	Signal Name [Specification]
35	BR	
39	L/R	

Connector No.	M7
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4




Terminal No.	Color of Wire	Signal Name [Specification]
35	BR	
39	L/R	

Connector No.	M7
Connector Name	BCM (BODY CONTROL MODULE) (WITH INTELLIGENT KEY)
Connector Type	TH40FW-NH




Terminal No.	Color of Wire	Signal Name [Specification]
97	L/R	STARTER RELAY COIL
98	BR	IGN RELAY (IPDM E/R) COIL

# STARTING SYSTEM

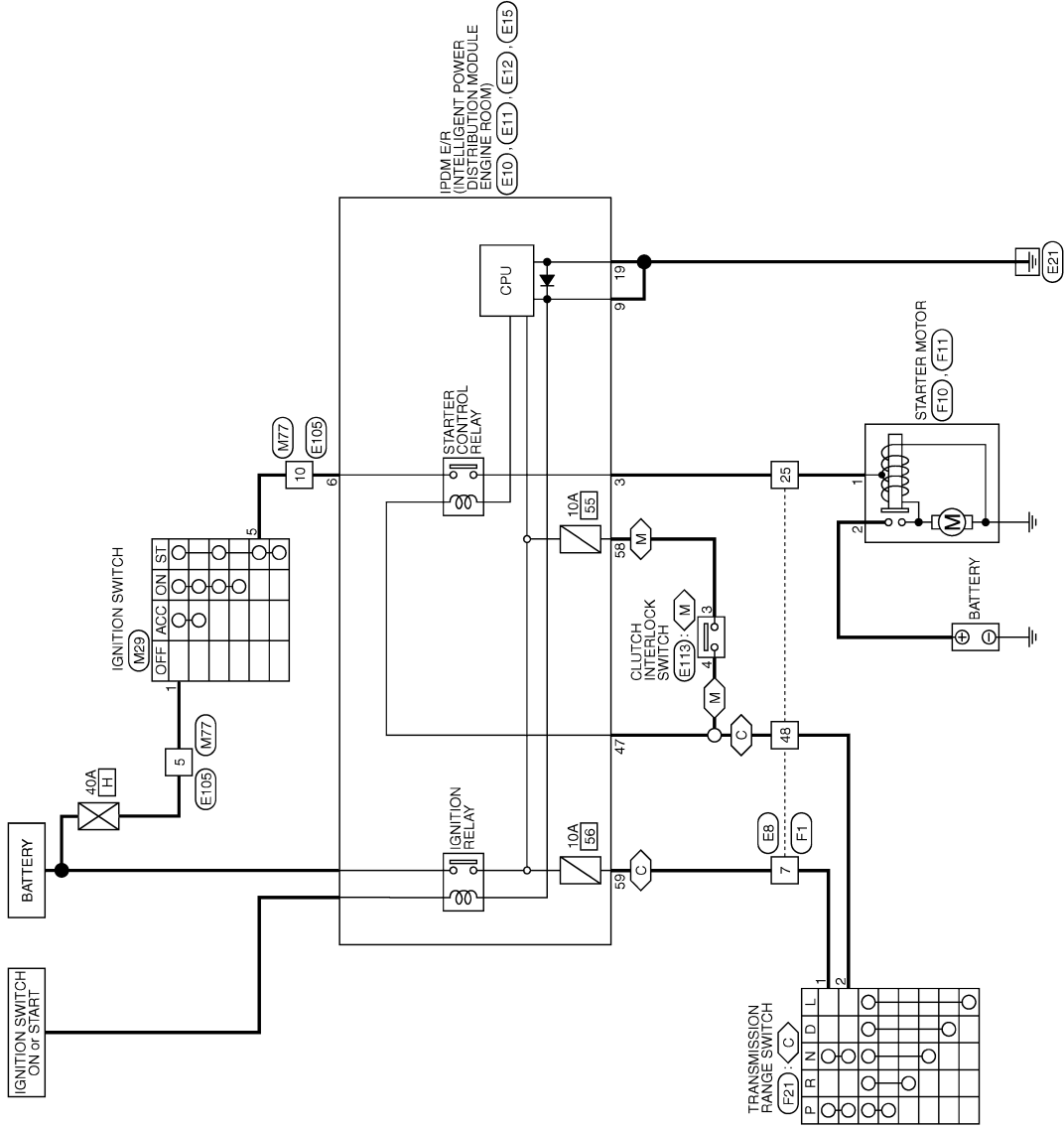
< DTC/CIRCUIT DIAGNOSIS >

## Wiring Diagram - STARTING SYSTEM (WITHOUT INTELLIGENTKEY) -

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### STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

C : With CVT  
M : With M/T



2009/02/27

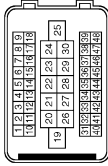





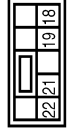



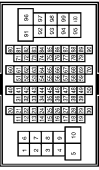



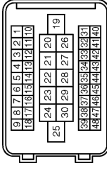

JCBWM1304GB

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# STARTING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >

### STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

Connector No. EB	WIRE TO WIRE	SAA38MB-RS10-SJZZ		Terminal No. 7	Color of Wire Y	Signal Name [Specification]	Terminal No. 19	Color of Wire B/W	Signal Name [Specification]
Connector Name	WIRE TO WIRE	SAA38MB-RS10-SJZZ		Terminal No. 25	Color of Wire BR		Terminal No. 19	Color of Wire B/W	Signal Name [Specification]
Connector Type	WIRE TO WIRE	SAA38MB-RS10-SJZZ		Terminal No. 48	Color of Wire BR		Terminal No. 19	Color of Wire B/W	Signal Name [Specification]
									
Connector No. E10	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC		Terminal No. 3	Color of Wire BR	Signal Name [Specification]	Terminal No. 9	Color of Wire B/W	Signal Name [Specification]
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC		Terminal No. 6	Color of Wire SB		Terminal No. 9	Color of Wire B/W	Signal Name [Specification]
Connector Type	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC							
									
Connector No. E11	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC		Terminal No. 3	Color of Wire P	Signal Name [Specification]	Terminal No. 3	Color of Wire Y	Signal Name [Specification]
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC		Terminal No. 10	Color of Wire SB		Terminal No. 3	Color of Wire Y	Signal Name [Specification]
Connector Type	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	M06FV-LC							
									
Connector No. E12	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS308FBR-CS		Terminal No. 47	Color of Wire BR	Signal Name [Specification]	Terminal No. 7	Color of Wire V	Signal Name [Specification]
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS308FBR-CS		Terminal No. 58	Color of Wire Y		Terminal No. 25	Color of Wire R	Signal Name [Specification]
Connector Type	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS308FBR-CS		Terminal No. 59	Color of Wire Y		Terminal No. 48	Color of Wire BR	Signal Name [Specification]
									
Connector No. E15	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS16FV-CS		Terminal No. 47	Color of Wire BR	Signal Name [Specification]	Terminal No. 7	Color of Wire V	Signal Name [Specification]
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS16FV-CS		Terminal No. 58	Color of Wire Y	-(With M/T)	Terminal No. 25	Color of Wire R	Signal Name [Specification]
Connector Type	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	NS16FV-CS		Terminal No. 59	Color of Wire Y		Terminal No. 48	Color of Wire BR	Signal Name [Specification]
									
Connector No. E15	WIRE TO WIRE	TH80MW-CS16-TM4		Terminal No. 5	Color of Wire P	Signal Name [Specification]	Terminal No. 3	Color of Wire Y	Signal Name [Specification]
Connector Name	WIRE TO WIRE	TH80MW-CS16-TM4		Terminal No. 10	Color of Wire SB		Terminal No. 4	Color of Wire BR	Signal Name [Specification]
Connector Type	WIRE TO WIRE	TH80MW-CS16-TM4							
									
Connector No. E113	CLUTCH INTERLOCK SWITCH	M04FV-LC		Terminal No. 3	Color of Wire Y	Signal Name [Specification]	Terminal No. 3	Color of Wire Y	Signal Name [Specification]
Connector Name	CLUTCH INTERLOCK SWITCH	M04FV-LC		Terminal No. 4	Color of Wire BR		Terminal No. 4	Color of Wire BR	Signal Name [Specification]
Connector Type	CLUTCH INTERLOCK SWITCH	M04FV-LC							
									
Connector No. F1	WIRE TO WIRE	SAA38FB-RS10-SJZZ		Terminal No. 3	Color of Wire P	Signal Name [Specification]	Terminal No. 3	Color of Wire Y	Signal Name [Specification]
Connector Name	WIRE TO WIRE	SAA38FB-RS10-SJZZ		Terminal No. 10	Color of Wire SB		Terminal No. 4	Color of Wire BR	Signal Name [Specification]
Connector Type	WIRE TO WIRE	SAA38FB-RS10-SJZZ							
									

JCBWM1305GB



# STARTING SYSTEM

## < DTC/CIRCUIT DIAGNOSIS >

### STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

Connector No.	F10
Connector Name	STARTER MOTOR
Connector Type	-



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

Connector No.	F11
Connector Name	STARTER MOTOR
Connector Type	-



Terminal No.	2	B/R	-
Color of Wire	-	-	-
Signal Name [Specification]	-	-	-

Connector No.	F21
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	FKGBFG



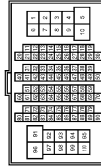
Terminal No.	1	R	-
Color of Wire	W	-	-
Signal Name [Specification]	-	-	-

Connector No.	M29
Connector Name	IGNITION SWITCH
Connector Type	MBBFV-LC



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

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH60FW-CS16-TM4



Terminal No.	5	L	-
Color of Wire	W	-	-
Signal Name [Specification]	-	-	-

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# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:000000005048958

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

# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

INFOID:000000005048959

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:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which 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 the "SRS AIR BAG".
- Do not 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:**

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT 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.

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# PREPARATION

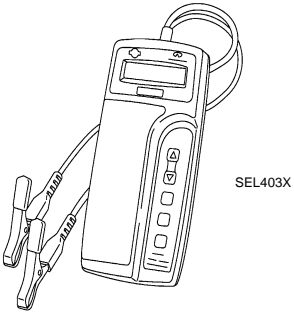
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## PREPARATION

### PREPARATION

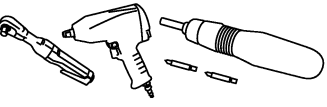
#### Special Service Tools

INFOID:000000005048961

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>

#### Commercial Service Tools

INFOID:000000005048962

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

# STARTER MOTOR

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### STARTER MOTOR

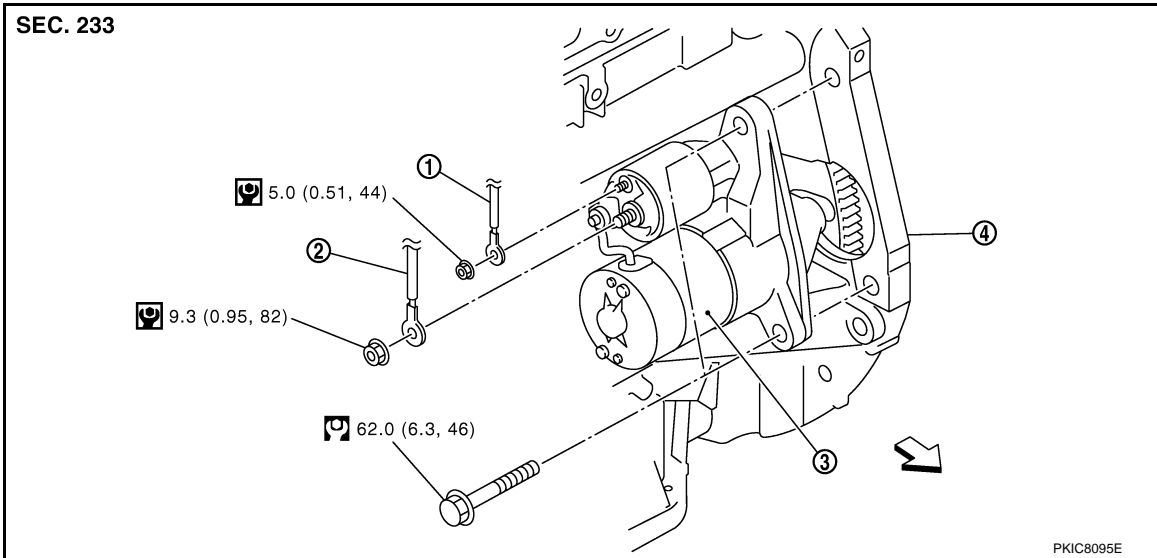
Exploded View

INFOID:000000005048971

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#### REMOVAL



1. "S" terminal harness

2. "B" terminal harness

3. Starter motor

4. Cylinder block

⇨: Vehicle front

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

#### DISASSEMBLY

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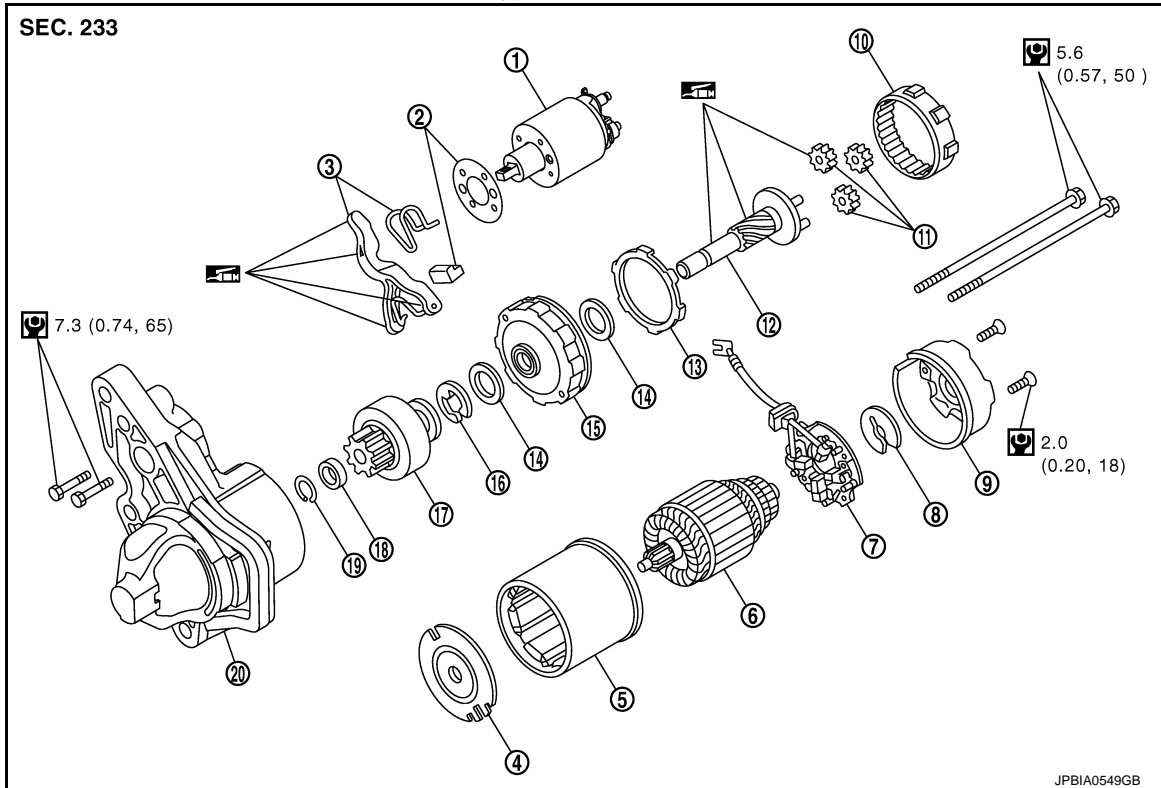
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# STARTER MOTOR

< REMOVAL AND INSTALLATION >

Type: S114-902



- |                             |                        |                        |
|-----------------------------|------------------------|------------------------|
| 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. Internal gear           | 11. Planetary gear     | 12. Pinion shaft       |
| 13. Packing                 | 14. Thrust washer      | 15. Center bracket (P) |
| 16. E-ring                  | 17. Pinion assembly    | 18. Pinion stopper     |
| 19. Pinion stopper clip     | 20. Gear case assembly |                        |

 : High-temperature grease point

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

## NOTE:

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

## Removal and Installation

INFOID:000000005048972

### REMOVAL

1. Disconnect the battery cable from the negative terminal.
2. Remove air duct (inlet). Refer to [EM-24, "Exploded View"](#).
3. Remove radiator reservoir tank.
4. Disconnect oil pressure switch connector.
5. Remove "B" terminal nut and "B" terminal harness.
6. Remove "S" terminal nut and "S" terminal harness.
7. Remove starter motor mounting bolts.
8. Remove starter motor upward from the vehicle.

### INSTALLATION

Install in the reverse order of removal.

#### CAUTION:

**Be sure to tighten "B" terminal nut carefully.**

# STARTER MOTOR

< REMOVAL AND INSTALLATION >

## Inspection

INFOID:000000005048966

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### INSPECTION AFTER DISASSEMBLY

#### Pinion/Clutch Check

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)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Starter Motor

INFOID:000000005048967

Type	S114-902		
	HITACHI make		
	Reduction gear type		
System voltage	[V]	12	
No-load	Terminal voltage	[V]	11
	Current	[A]	Less than 110
	Revolution	[rpm]	More than 3,000
Minimum diameter of commutator	[mm (in)]	28.0 (1.102)	
Minimum length of brush	[mm (in)]	10.5 (0.413)	
Brush spring tension	[N (kg, lb)]	16.2 (1.65, 3.6)	
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)]	0.3 - 2.5 (0.012 – 0.098)	