

# SECTION STR

## STARTING SYSTEM

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# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

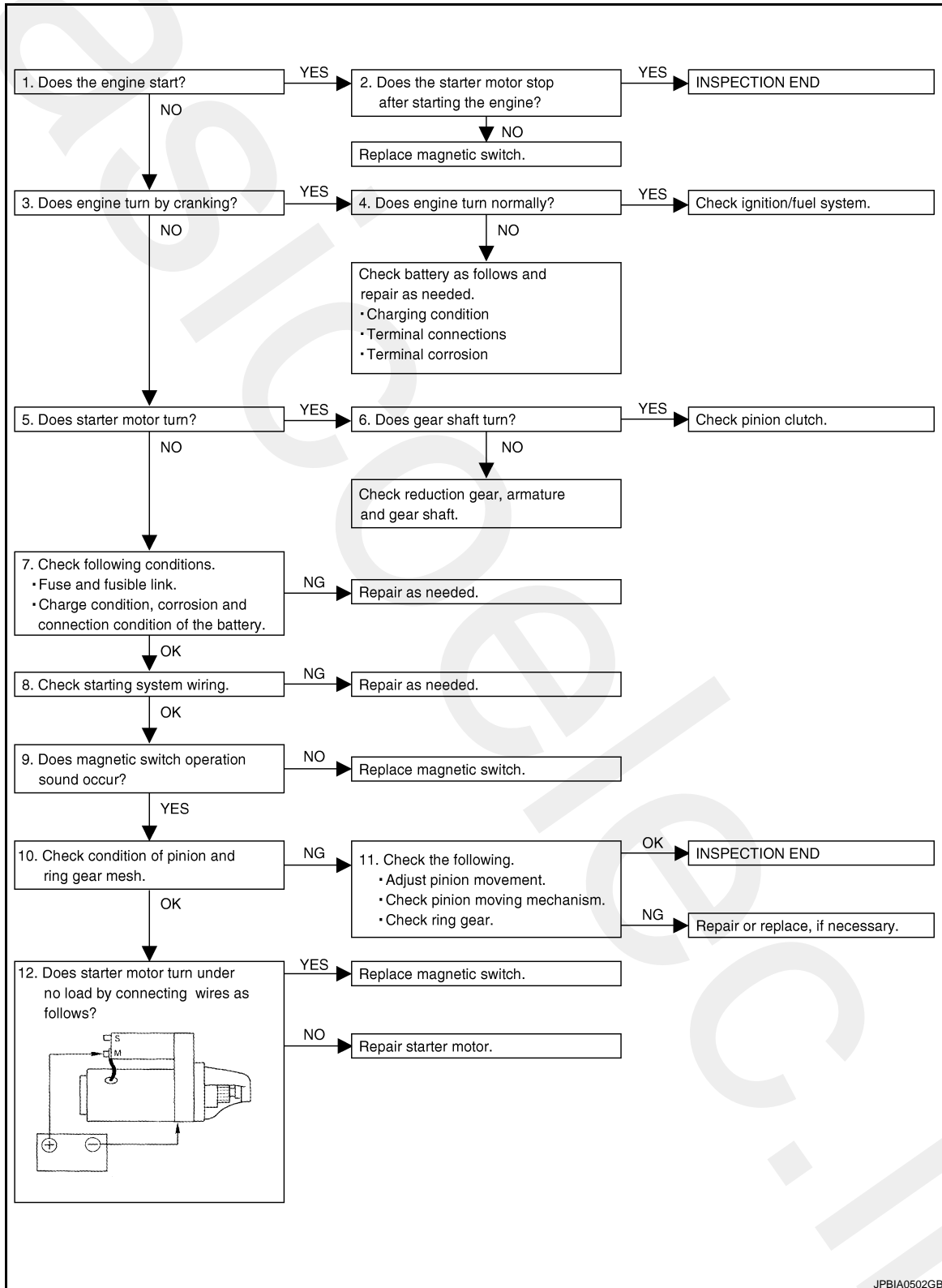
## BASIC INSPECTION

### DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000003860412

#### OVERALL SEQUENCE



JPBIA0502GB

DETAILED FLOW

# DIAGNOSIS AND REPAIR WORKFLOW

## < BASIC INSPECTION >

### 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.

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 magnetic switch.

### 3.CHECK THE ENGINE SPEED WITH CRANKING

Check that the engine turns at cranking.

#### Does engine turn by cranking?

YES >> GO TO 4.

NO >> GO TO 5.

### 4.CHECK THE ENGINE SPEED WITH CRANKING

Check that the engine speed is not low at cranking.

#### Does engine turn normally?

YES >> Check ignition/fuel system.

NO >> Check charge condition, corrosion and connection condition of the battery. Refer to [STR-2, "Work Flow"](#).

### 5.CHECK STARTER MOTOR ACTIVATION

Check that the starter motor turns at cranking.

#### Does starter motor turn?

YES >> GO TO 6.

NO >> GO TO 7.

### 6.CHECK STARTER MOTOR UNIT

1. Remove starter motor.
2. Check that the gear shaft of starter motor rotates.

#### Does gear shaft turn?

YES >> Check pinion clutch. Refer to the following.

• VQ25DE models: [STR-16, "VQ25DE : Inspection"](#)

• VQ35DE models: [STR-22, "VQ35DE : Inspection"](#)

NO >> Check reduction gear, armature and gear shaft.

### 7.CHECK POWER SUPPLY CIRCUIT

Check the following conditions.

- Fuse and fusible link
- Charge condition, corrosion and connection condition of the battery. Refer to [STR-2, "Work Flow"](#).

#### Are these inspection results normal?

YES >> GO TO 8.

NO >> Repair as needed.

### 8.CHECK STARTING SYSTEM WIRING

Check the following.

- "B" terminal circuit. Refer to [STR-8, "Diagnosis Procedure"](#).
- "S" terminal circuit. Refer to [STR-9, "Diagnosis Procedure"](#).

#### Are these inspection results normal?

YES >> GO TO 9.

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# DIAGNOSIS AND REPAIR WORKFLOW

## < BASIC INSPECTION >

---

NO >> Repair as needed.

### 9. CHECK MAGNETIC SWITCH OPERATION SOUND

---

Check that a magnetic switch operation sound can be heard when the ignition switch is set at the starting position.

Does magnetic switch operation sound occur?

YES >> GO TO 10.

NO >> Replace magnetic switch.

### 10. PINION AND RING GEAR ENGAGEMENT CHECK

---

Check condition of pinion and ring gear mesh.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

### 11. CHECK STARTER MOTOR UNIT

---

Check the following.

- Adjust pinion movement. Refer to the following.
  - VQ25DE models: [STR-16, "VQ25DE : Inspection"](#)
  - VQ35DE models: [STR-22, "VQ35DE : Inspection"](#)
- Check pinion moving mechanism.
- Check ring gear.

Are these inspection results normal?

YES >> INSPECTION END

NO >> Repair or replace, if necessary.

### 12. CHECK STARTER MOTOR UNIT

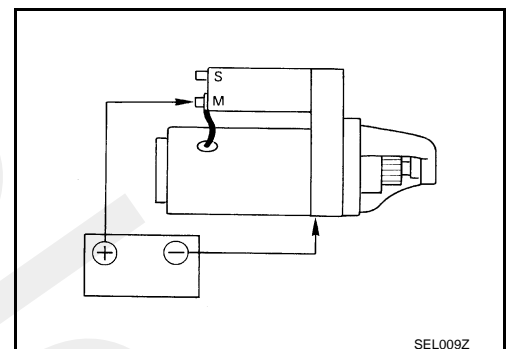
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Check that the starter motor turns when connecting the positive terminal (12 V) to starter motor terminal M and the negative terminal (ground) to starter motor body.

Does the starter motor run?

YES >> Replace magnetic switch.

NO >> Repair starter motor.



# STARTING SYSTEM

< FUNCTION DIAGNOSIS >

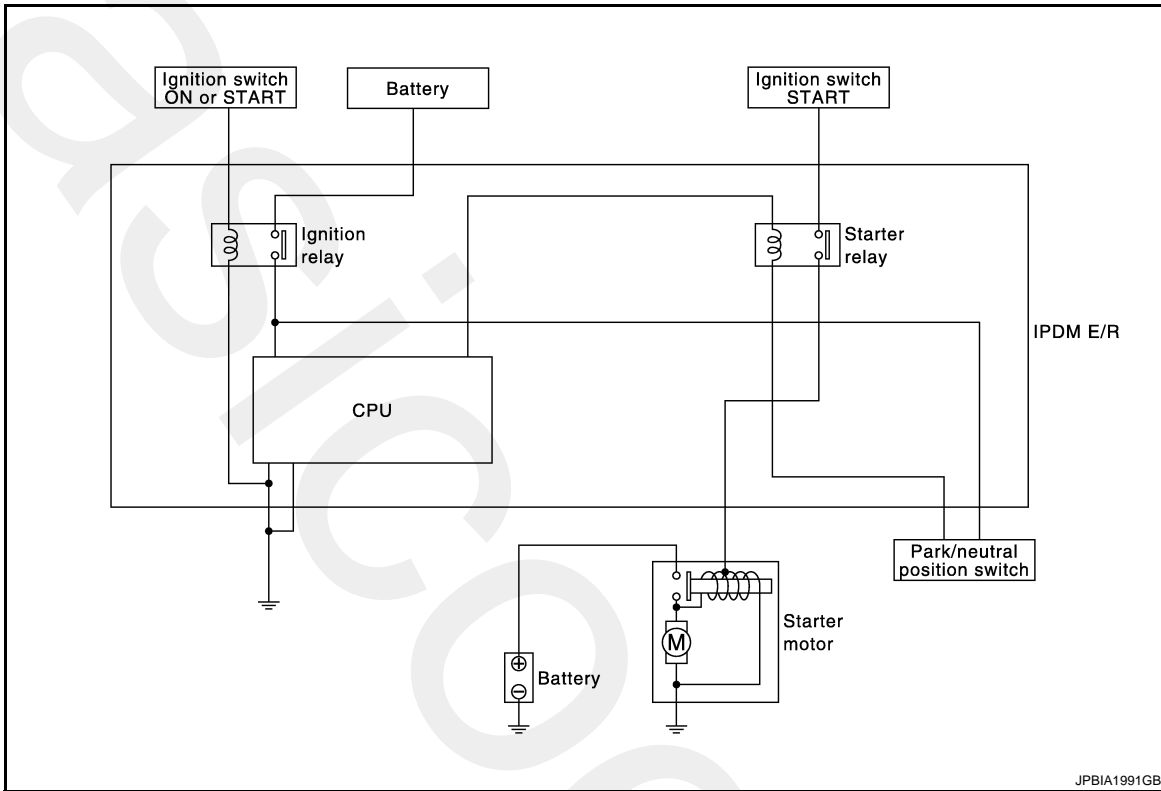
## FUNCTION DIAGNOSIS

### STARTING SYSTEM

VQ25DE

VQ25DE : System Diagram

INFOID:000000003860417



JPBIA1991GB

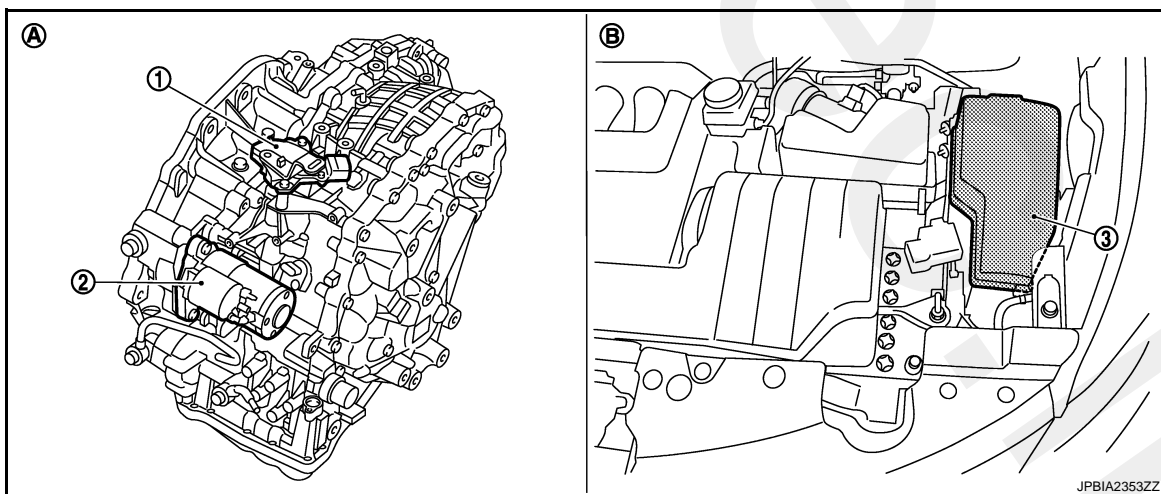
VQ25DE : System Description

INFOID:000000003860418

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.

VQ25DE : Component Parts Location

INFOID:000000003860419



JPBIA2353ZZ

# STARTING SYSTEM

## < FUNCTION DIAGNOSIS >

- |                                 |                                |             |
|---------------------------------|--------------------------------|-------------|
| 1. Park/neutral position switch | 2. Starter motor               | 3. IPDM E/R |
| A. CVT assembly                 | B. Engine room dash panel (LH) |             |

## VQ25DE : Component Description

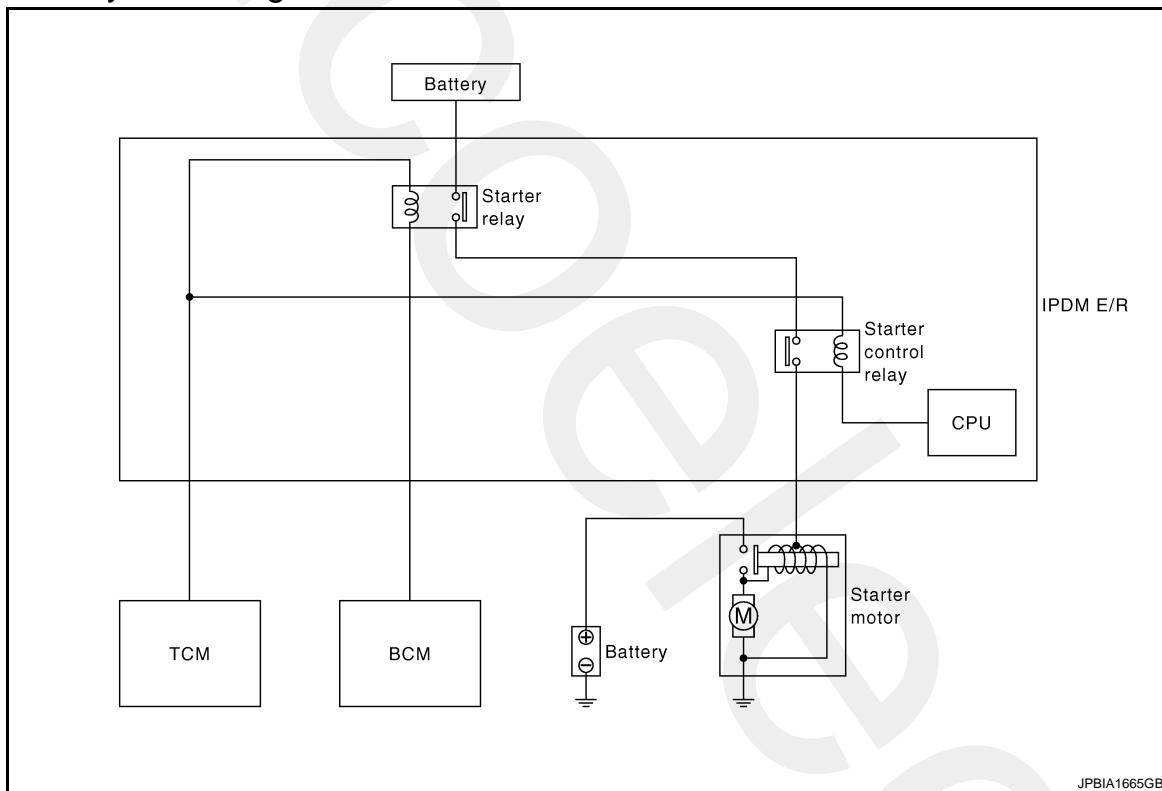
INFOID:000000003860420

Component part	Description
Park/neutral position switch	Park/neutral position 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 relay. Ignition relay inside IPDM E/R supplies power to the park/neutral position switch when ignition switch is ON or START.
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.

## VQ35DE

## VQ35DE : System Diagram

INFOID:000000003860421



## VQ35DE : System Description

INFOID:000000003860422

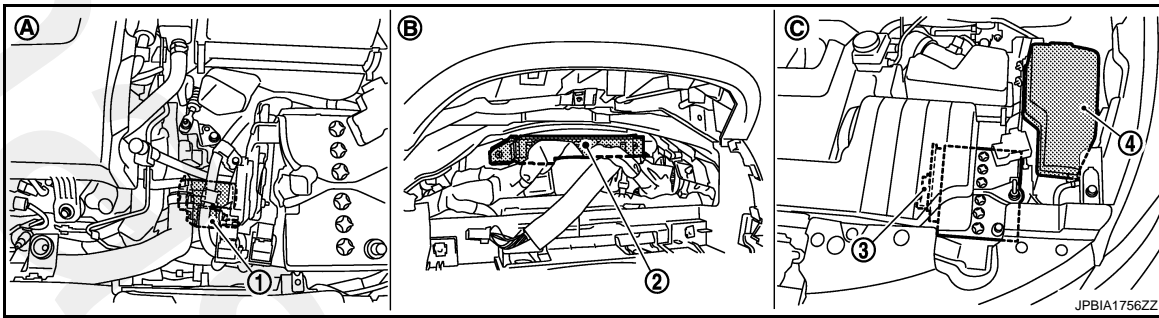
The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

# STARTING SYSTEM

< FUNCTION DIAGNOSIS >

## VQ35DE : Component Parts Location

INFOID:000000003860423



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

## VQ35DE : Component Description

INFOID:000000003860424

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.

A  
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# B TERMINAL CIRCUIT

< COMPONENT DIAGNOSIS >

## COMPONENT DIAGNOSIS

### B TERMINAL CIRCUIT

#### Description

INFOID:000000003860425

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

#### Diagnosis Procedure

INFOID:000000003860426

#### 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
F49 (VQ25DE) F10 (VQ35DE)	2	

Is the inspection result normal?

YES >> GO TO 2.

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

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

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

(+) Terminal	Terminals (-)		Condition	Voltage (Approx.)
	Starter motor "B" terminal	Terminal		
Battery positive terminal	F49 (VQ25DE) F10 (VQ35DE)	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.

(+) Terminal	(-) Terminal	Condition	Voltage (Approx.)

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 TERMINAL CIRCUIT

< COMPONENT DIAGNOSIS >

## S TERMINAL CIRCUIT

### Description

INFOID:000000003860427

The starter motor magnetic switch is supplied with power when the ignition switch is turned to START with the selector lever "P" or "N".

STR

### Diagnosis Procedure

INFOID:000000003860428

#### 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 "S" terminal.
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		
F50 (VQ25DE) F47 (VQ35DE)	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> "S" terminal 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 "S" terminal and IPDM E/R harness connector.

Starter motor "S" terminal		IPDM E/R harness connector		Continuity
Connector No.	Terminal No.	Connector No.	Terminal No.	
F50 (VQ25DE) F47 (VQ35DE)	1	E10	80	Existed

Is the inspection result normal?

- YES >> Inspect IPDM E/R and power supply circuit. Refer to [STR-2, "Work Flow"](#).  
NO >> Repair the harness.

# STARTING SYSTEM

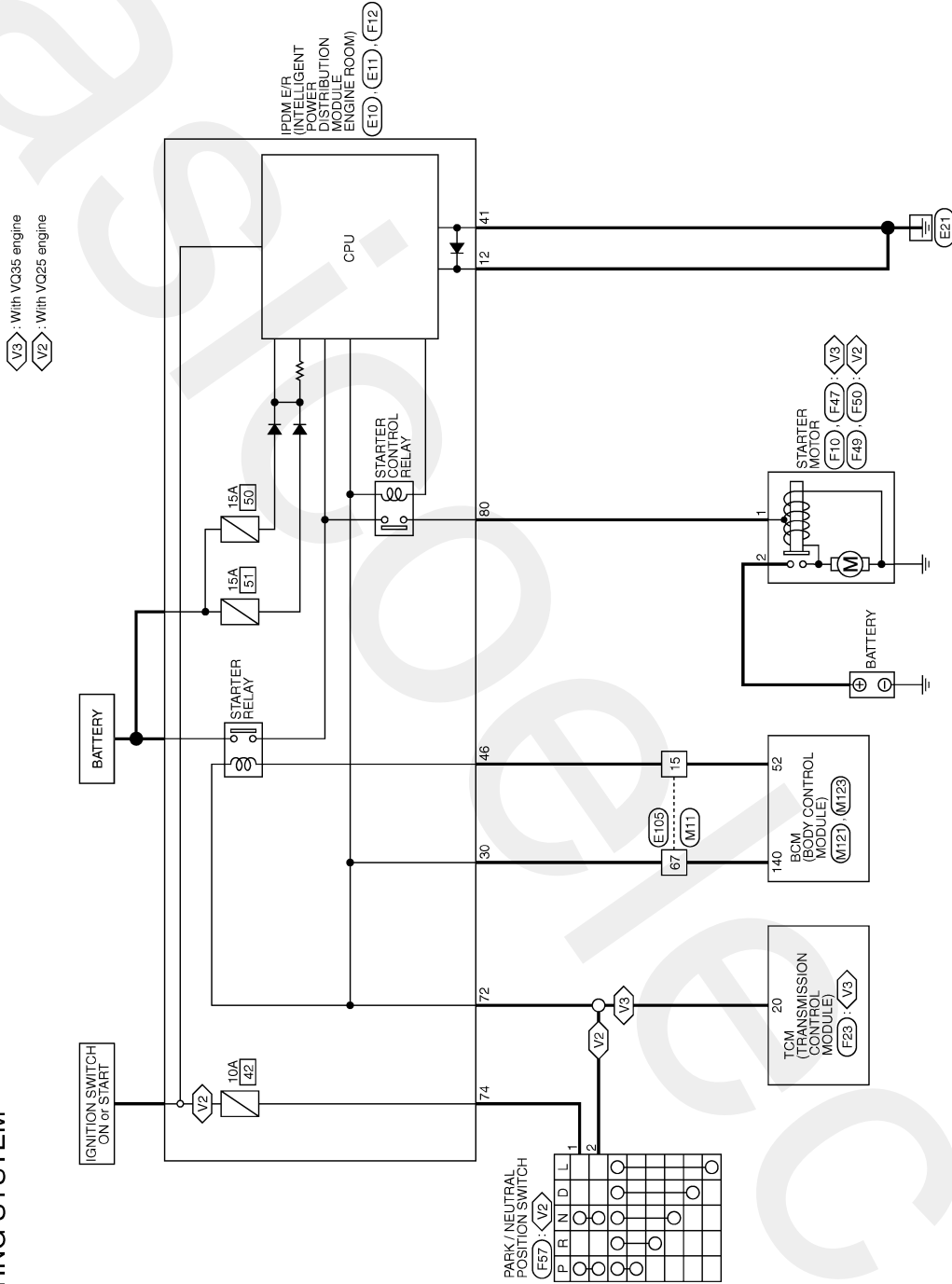
< COMPONENT DIAGNOSIS >

## STARTING SYSTEM

### Wiring Diagram - STARTING SYSTEM -

INFOID:000000003860429

### STARTING SYSTEM



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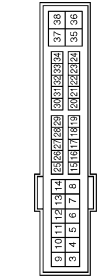
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# STARTING SYSTEM

< COMPONENT DIAGNOSIS >

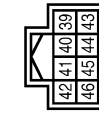
## STARTING SYSTEM

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH20FW-CS12-M4-1V




Terminal No.	Color of Wire	Signal Name [Specification]
12	B/W	
30	BR	

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH20FW-NH




Terminal No.	Color of Wire	Signal Name [Specification]
41	B	
46	BR	

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH70MW-CS19-M3



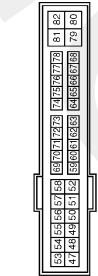
Terminal No.	Color of Wire	Signal Name [Specification]
15	BR	
67	BR	

Connector No.	F10
Connector Name	STARTER MOTOR (WITH VQ35 ENGINE)
Connector Type	F4340-JA06A



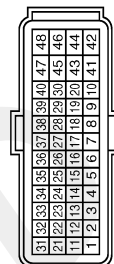
Terminal No.	Color of Wire	Signal Name [Specification]
2	B/R	

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




Terminal No.	Color of Wire	Signal Name [Specification]
72	R/B	
74	Y	
80	B/W	

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




Terminal No.	Color of Wire	Signal Name [Specification]
20	R/B	STARTER RELAY

Connector No.	F47
Connector Name	STARTER MOTOR (WITH VQ35 ENGINE)
Connector Type	X01FGY



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

Connector No.	F49
Connector Name	STARTER MOTOR (WITH VQ35 ENGINE)
Connector Type	F4340-JA06A



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

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# STARTING SYSTEM

## < COMPONENT DIAGNOSIS >

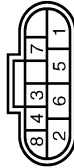
### STARTING SYSTEM

Connector No.	F50
Connector Name	STARTER MOTOR (WITH VQ25 ENGINE)
Connector Type	24340-ED023



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

Connector No.	F57
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	YD306FB-HS4



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

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH10FW-CS10-M3



Terminal No.	15	Color of Wire	R	Signal Name [Specification]	-
67	R/G	-	-	-	-

Connector No.	M121
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FG-NH



Terminal No.	52	Color of Wire	R	Signal Name [Specification]	IGN RELAY IPDM E/R CONT
--------------	----	---------------	---	-----------------------------	-------------------------

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



Terminal No.	140	Color of Wire	R/G	Signal Name [Specification]	SHIFT N/P
--------------	-----	---------------	-----	-----------------------------	-----------

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# STARTING SYSTEM

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

### STARTING SYSTEM

#### Symptom Table

INFOID:000000003860431

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

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K

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## PRECAUTIONS

< PRECAUTION >

### PRECAUTION

#### PRECAUTIONS

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

INFOID:000000003860432

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 AIRBAG" 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 AIRBAG".
- 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.

# STARTER MOTOR

< ON-VEHICLE REPAIR >

## ON-VEHICLE REPAIR

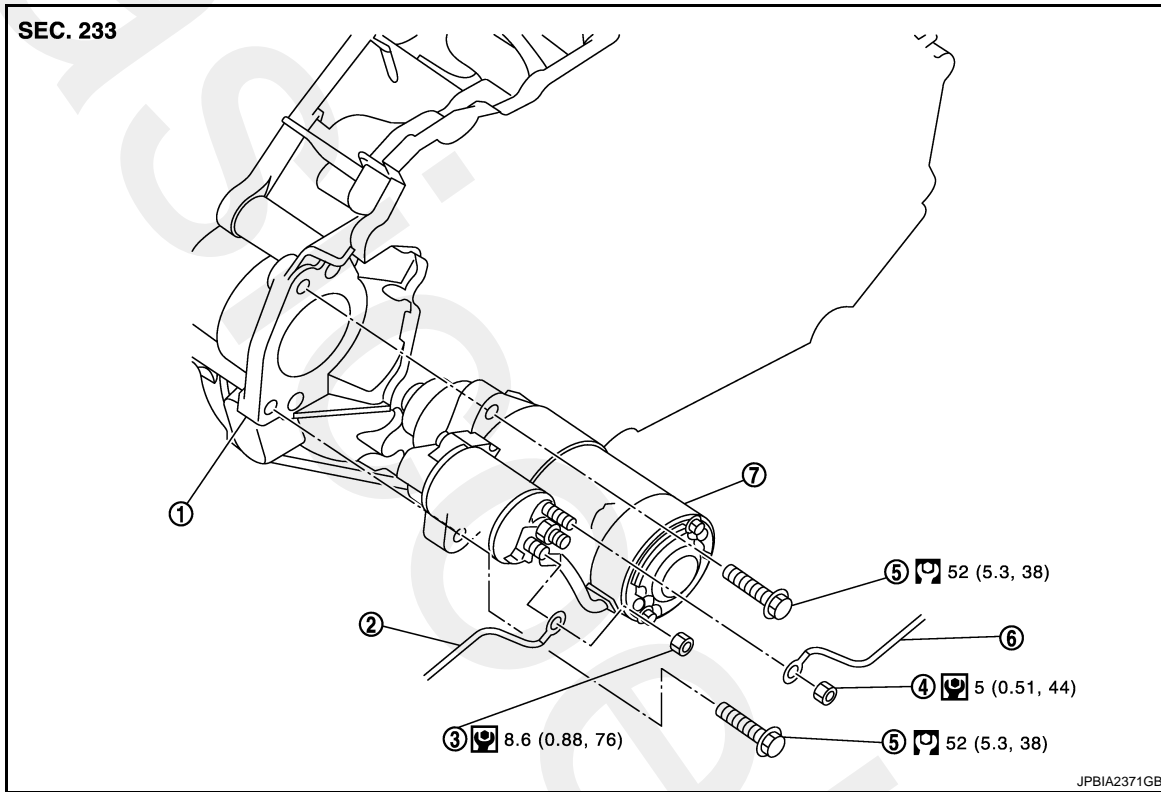
### STARTER MOTOR

VQ25DE

VQ25DE : Exploded View

INFOID:000000003860436

#### REMOVAL



- |                                   |                                |                                   |
|-----------------------------------|--------------------------------|-----------------------------------|
| 1. Converter housing              | 2. "B" terminal harness        | 3. Starter motor "B" terminal nut |
| 4. Starter motor "S" terminal nut | 5. Starter motor mounting bolt | 6. "S" terminal harness           |
| 7. Starter motor                  |                                |                                   |

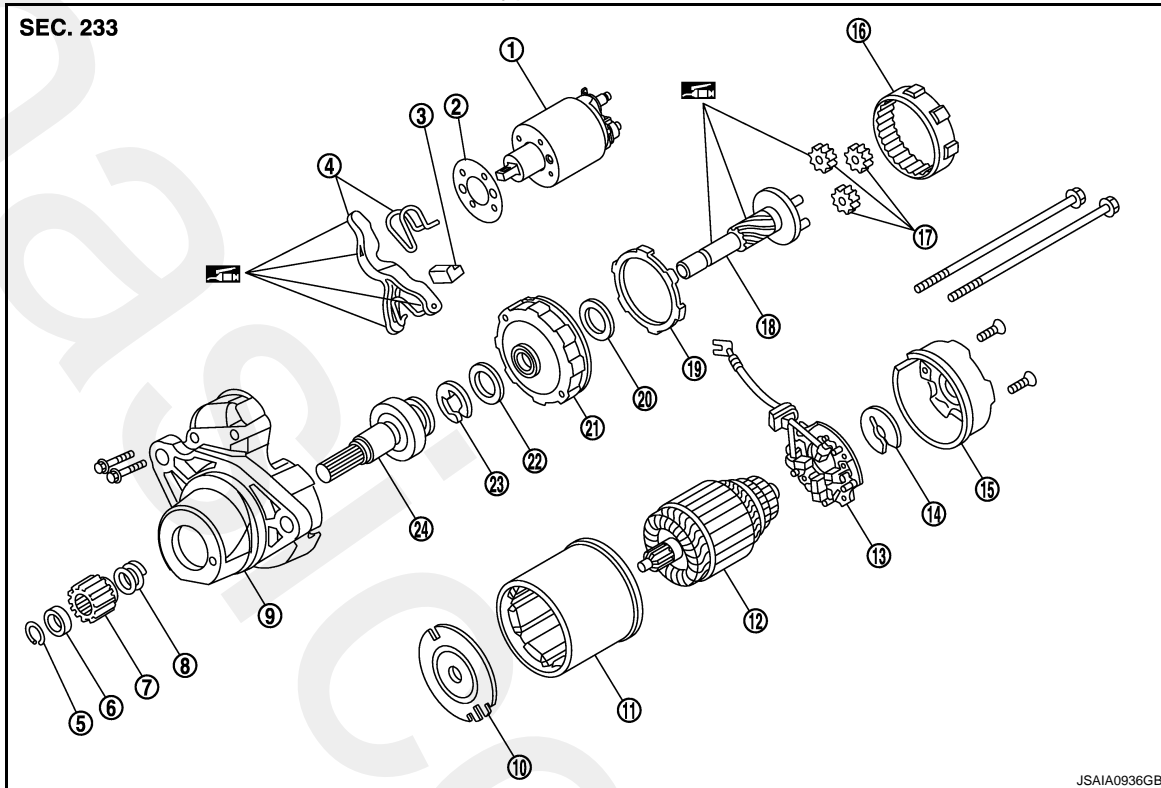
Refer to [GI-4, "Components"](#) for symbols in the figure.

#### DISASSEMBLY

# STARTER MOTOR

< ON-VEHICLE REPAIR >

Type: S114-936



- |                             |                        |                          |
|-----------------------------|------------------------|--------------------------|
| 1. Magnetic switch assembly | 2. Adjusting plate     | 3. Dust cover            |
| 4. Shift lever set          | 5. Pinion stopper clip | 6. Pinion stopper        |
| 7. Pinion                   | 8. Pinion spring       | 9. Gear case assembly    |
| 10. Center bracket (A)      | 11. Yoke assembly      | 12. Armature assembly    |
| 13. Brush holder assembly   | 14. Thrust washer      | 15. Rear cover           |
| 16. Internal gear           | 17. Planetary gear     | 18. Pinion stopper       |
| 19. Packing                 | 20. Thrust washer      | 21. Center bracket (P)   |
| 22. Thrust washer           | 23. E-ring             | 24. Clutch gear assembly |

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

## VQ25DE : Removal and Installation

INFOID:000000003860437

### REMOVAL

1. Remove the battery. Refer to [PG-109. "Removal and Installation"](#).
2. Remove the air cleaner assembly and air ducts.
3. Disconnect the following unit connectors:
  - ECM
  - IPDM E/R
4. Remove the battery tray.
5. Remove the "B" terminal nut and "S" terminal nut.
6. Remove the starter motor mounting bolts.
7. Remove the starter motor upward from the vehicle.

### INSTALLATION

Installation is in the reverse order of removal.

## VQ25DE : Inspection

INFOID:000000003860438

### MAGNETIC SWITCH

- Before starting to check, disconnect the battery cable from the negative terminal.



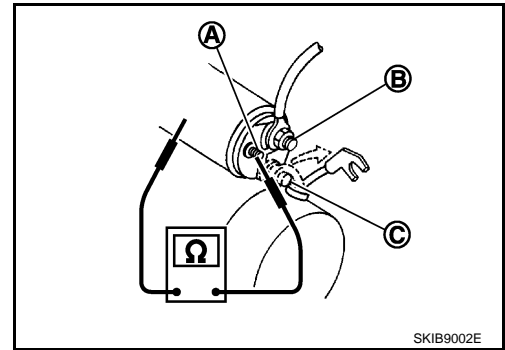
# STARTER MOTOR

## < ON-VEHICLE REPAIR >

- Disconnect "M" terminal of starter motor.
1. Continuity test (between "S" terminal and switch body)

A : "S" terminal  
B : "B" terminal  
C : "M" terminal

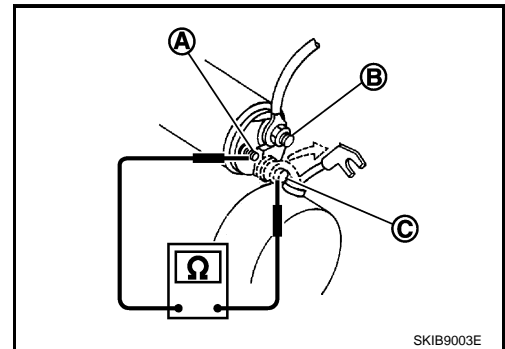
- Replace magnetic switch if continuity does not exist.



2. Continuity test (between "S" terminal and "M" terminal)

A : "S" terminal  
B : "B" terminal  
C : "M" terminal

- Replace magnetic switch if continuity does not exist.

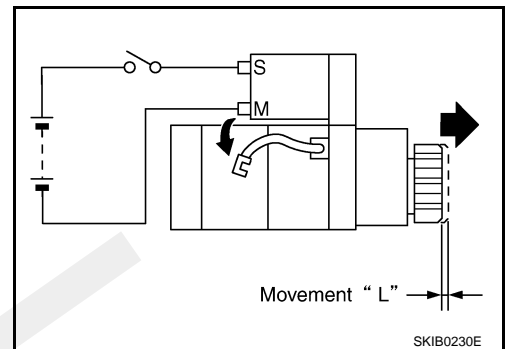


## PINION PROTRUSION LENGTH

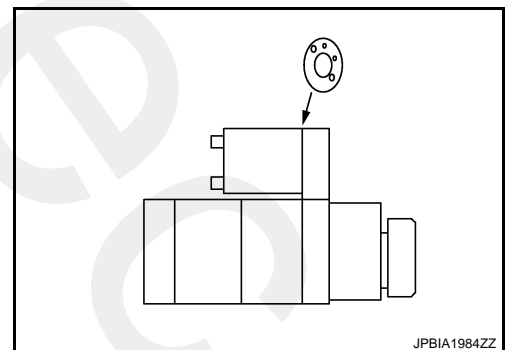
- Compare movement "L" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

**Movement "L"**

**: Refer to SDS [STR-26](#),  
["Starter Motor"](#).**



- If the measurement value is not in the specified area, adjust with the adjusting plate.



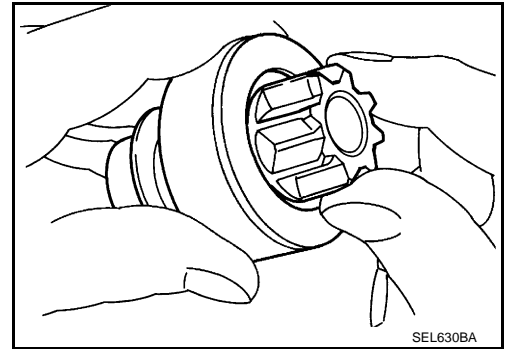
## PINION ASSEMBLY

A  
STR  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# STARTER MOTOR

## < ON-VEHICLE REPAIR >

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.
  - Replace pinion assembly if it is locked or rotated in both directions or unusual resistance is evident.



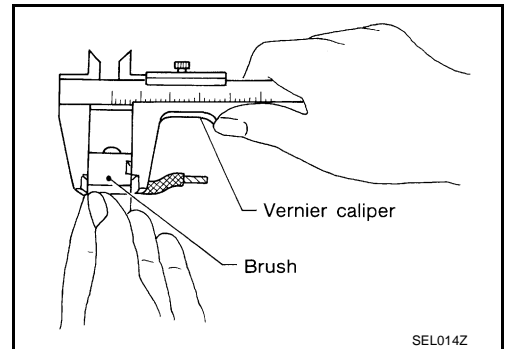
## BRUSH HOLDER ASSEMBLY

### Brush

- Check wear of brush.

**Minimum length of brush** : Refer to SDS [STR-26](#), "[Starter Motor](#)".

- Replace brush if the measurement value is less than the specified value.

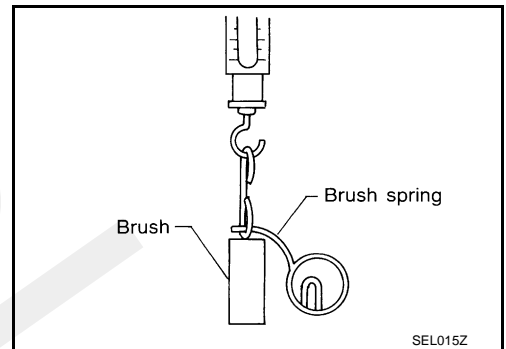


### Brush Spring

- Check brush spring tension with brush spring detached from brush.

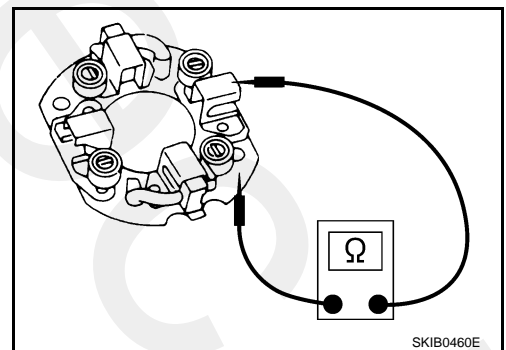
**Spring tension (with new brush)** : Refer to SDS [STR-26](#), "[Starter Motor](#)".

- Replace brush spring if the measurement value is less than the specified value.



### Brush Holder

1. Perform insulation test between brush holder (positive side) and its base (negative side).
  - Replace brush holder assembly if continuity does not exist.
2. Check brush to see if it moves smoothly.
  - If brush holder is bent, replace it if sliding surface is dirty, clean.



## YOKE CHECK

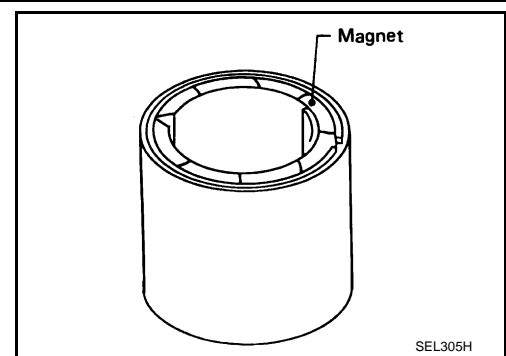
# STARTER MOTOR

## < ON-VEHICLE REPAIR >

Magnet is secured to yoke by bonding agent. Check magnet to see that it is secured to yoke and for any cracks. Replace malfunctioning parts as an assembly.

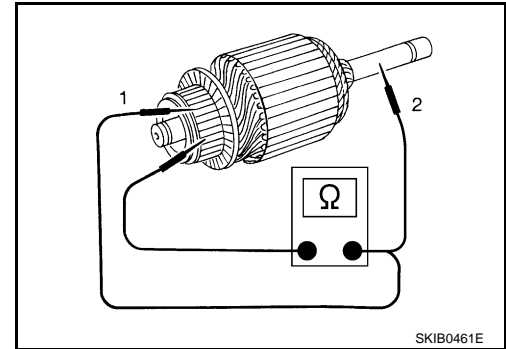
### **CAUTION:**

**Never clamp yoke in a vise or strike it with a hammer.**

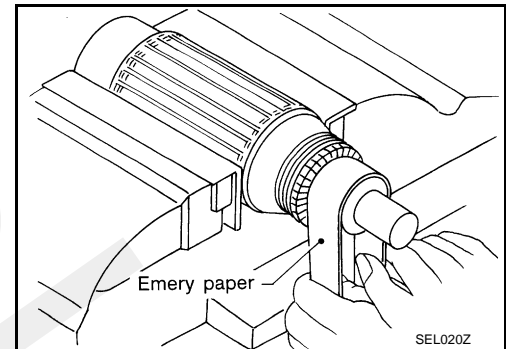


## ARMATURE CHECK

1. Continuity test (between two segments side by side)
  - Replace if continuity does not exist.
2. Insulation test (between each commutator bar and shaft)
  - Replace if continuity exists.



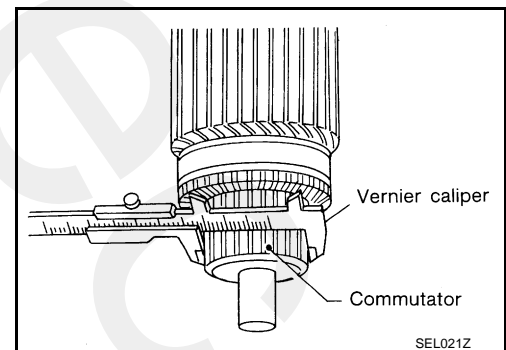
3. Check commutator surface.
  - Grind commutator with No. 500 – 600 emery paper if the surface is rough.



4. Check diameter of commutator.

**Commutator minimum diameter** : Refer to SDS [STR-26](#), "[Starter Motor](#)".

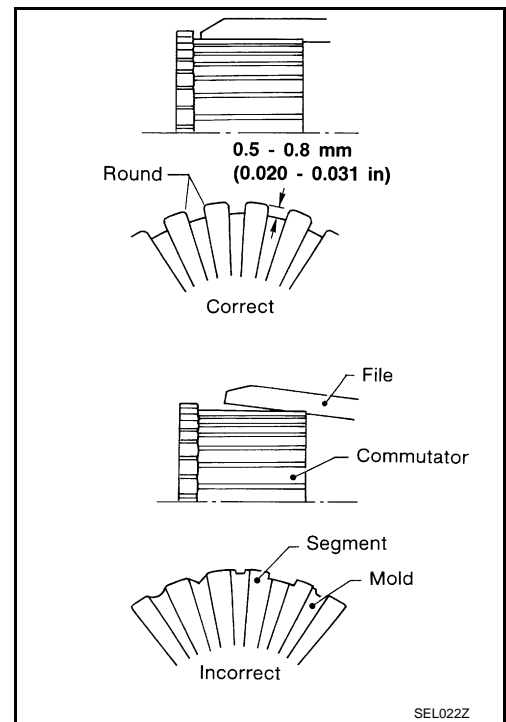
- Replace armature assembly if the measurement value is less than the specified value.



# STARTER MOTOR

## < ON-VEHICLE REPAIR >

5. Check depth of insulating mold from commutator surface.
  - Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in) if the depth is 0.2 mm (0.008 in) or less.

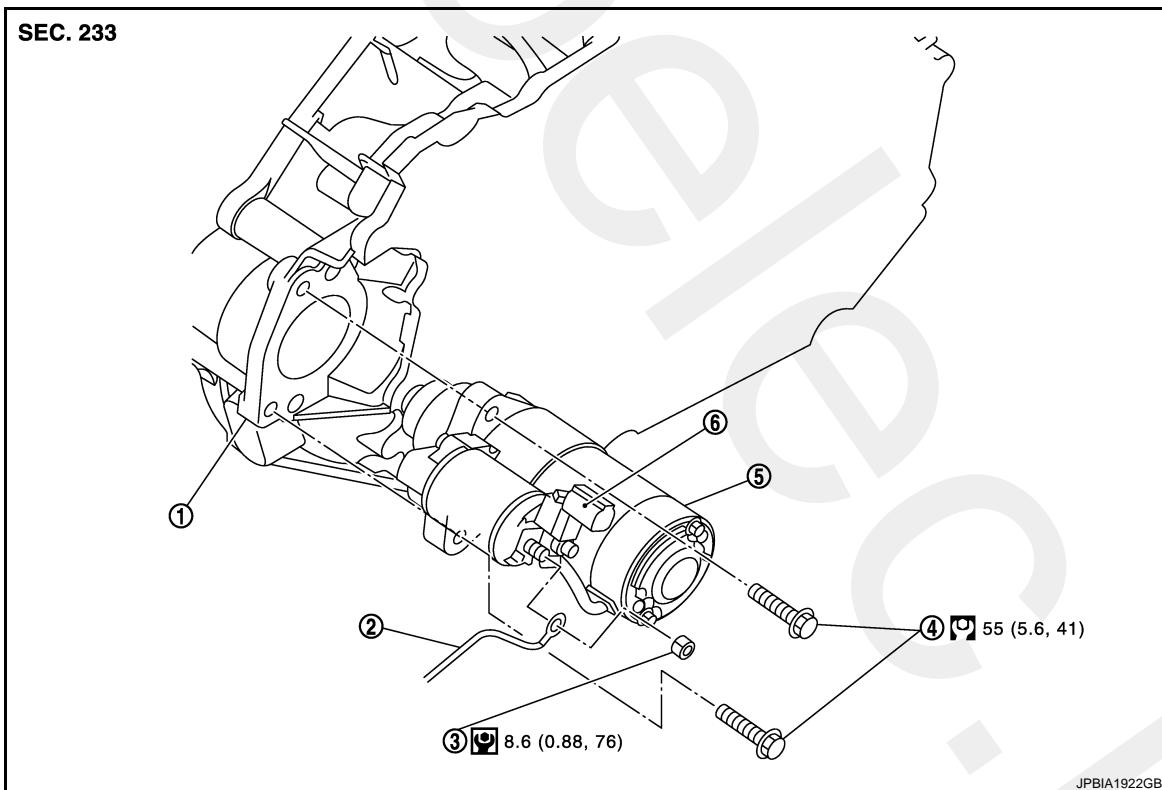


VQ35DE

VQ35DE : Exploded View

INFOID:000000003860439

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                  |

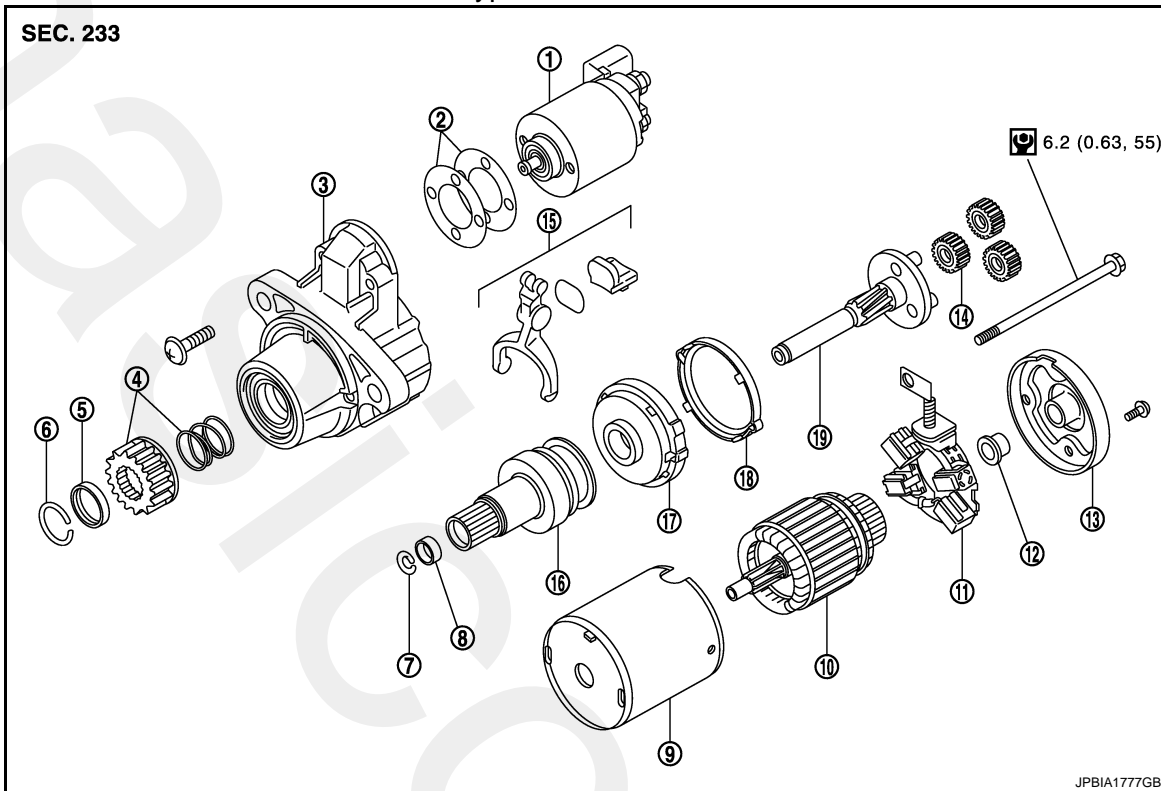
Refer to [GI-4, "Components"](#) for symbols in the figure.

# STARTER MOTOR

< ON-VEHICLE REPAIR >

## DISASSEMBLY

Type: M000TA0072



- |                             |                           |                       |
|-----------------------------|---------------------------|-----------------------|
| 1. Magnetic switch assembly | 2. Adjusting plate        | 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.

## VQ35DE : Removal and Installation

INFOID:000000003860440

### REMOVAL

1. Remove the battery. Refer to [PG-109. "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 "B" terminal nut.
7. Remove the starter motor mounting bolts.
8. Remove the starter motor upward from the vehicle.

### INSTALLATION

Installation is in the reverse order of removal.

# STARTER MOTOR

< ON-VEHICLE REPAIR >

VQ35DE : Inspection

INFOID:000000003860441

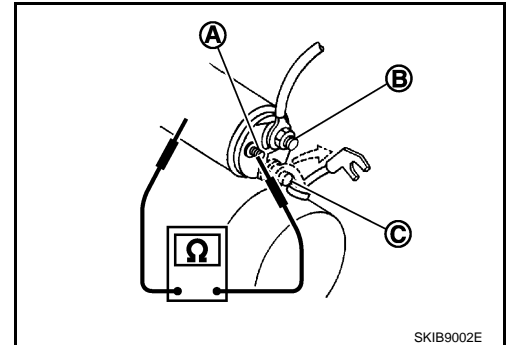
## MAGNETIC SWITCH

- Before starting to check, disconnect the battery cable from the negative terminal.
- Disconnect "M" terminal of starter motor.

### 1. Continuity test (between "S" terminal and switch body)

- A : "S" terminal
- B : "B" terminal
- C : "M" terminal

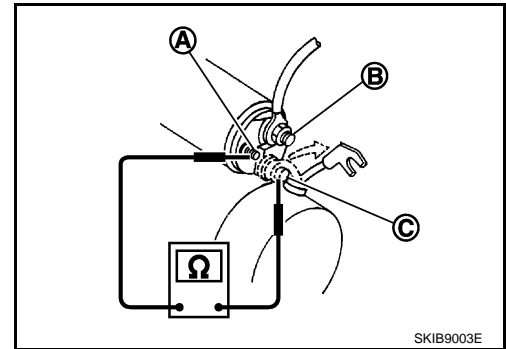
- Replace magnetic switch if continuity does not exist.



### 2. Continuity test (between "S" terminal and "M" terminal)

- A : "S" terminal
- B : "B" terminal
- C : "M" terminal

- Replace magnetic switch if continuity does not exist.

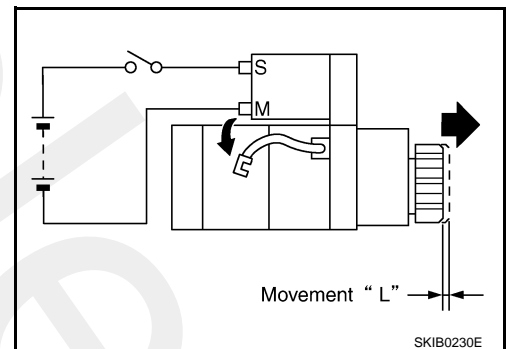


## PINION PROTRUSION LENGTH

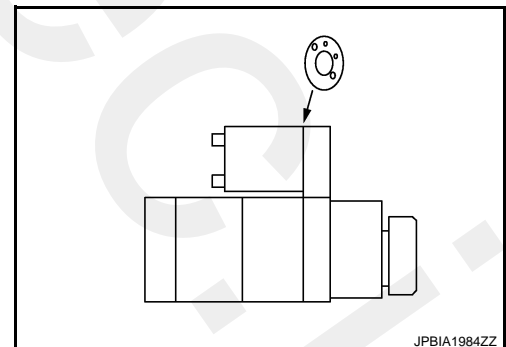
- Compare movement "L" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

**Movement "L"**

**: Refer to SDS [STR-26](#),  
["Starter Motor"](#).**



- If the measurement value is not in the specified area, adjust with the adjusting plate.

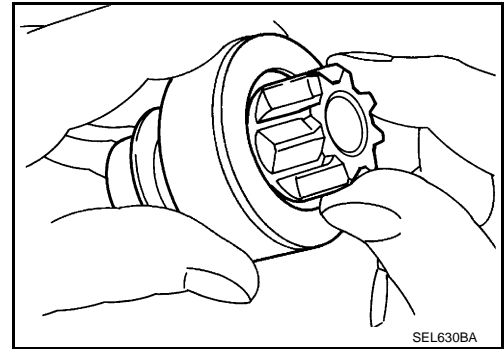


## PINION ASSEMBLY

# STARTER MOTOR

## < ON-VEHICLE REPAIR >

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.
  - Replace pinion assembly if it is locked or rotated in both directions or unusual resistance is evident.



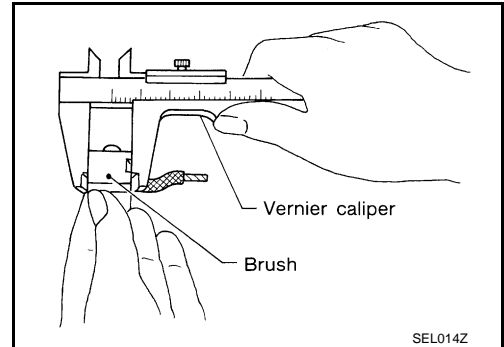
## BRUSH HOLDER ASSEMBLY

### Brush

- Check wear of brush.

**Minimum length of brush** : Refer to SDS [STR-26, "Starter Motor"](#).

- Replace brush if the measurement value is less than the specified value.

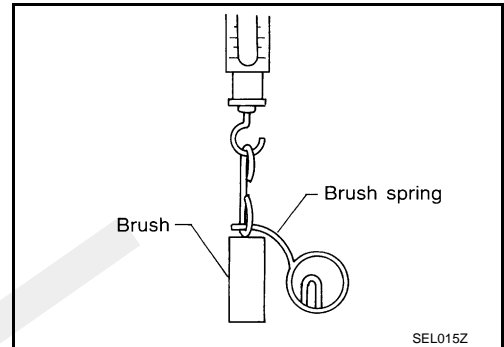


### Brush Spring

- Check brush spring tension with brush spring detached from brush.

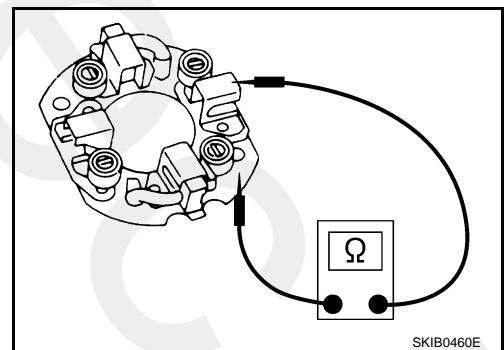
**Spring tension (with new brush)** : Refer to SDS [STR-26, "Starter Motor"](#).

- Replace brush spring if the measurement value is less than the specified value.



### Brush Holder

1. Perform insulation test between brush holder (positive side) and its base (negative side).
  - Replace brush holder assembly if continuity does not exist.
2. Check brush to see if it moves smoothly.
  - If brush holder is bent, replace it if sliding surface is dirty, clean.



## YOKE CHECK

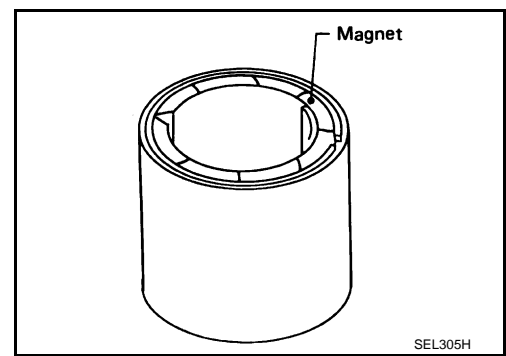
# STARTER MOTOR

## < ON-VEHICLE REPAIR >

Magnet is secured to yoke by bonding agent. Check magnet to see that it is secured to yoke and for any cracks. Replace malfunctioning parts as an assembly.

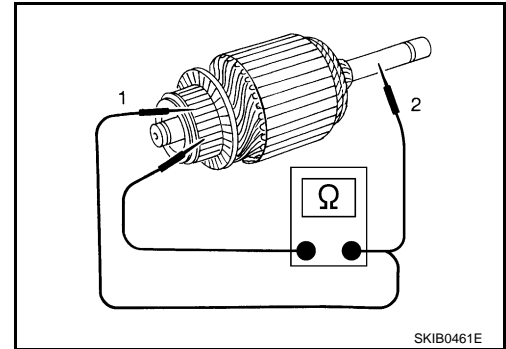
### **CAUTION:**

**Never clamp yoke in a vise or strike it with a hammer.**

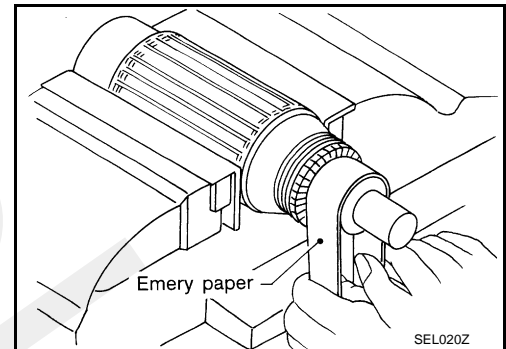


## ARMATURE CHECK

1. Continuity test (between two segments side by side)
  - Replace if continuity does not exist.
2. Insulation test (between each commutator bar and shaft)
  - Replace if continuity exists.



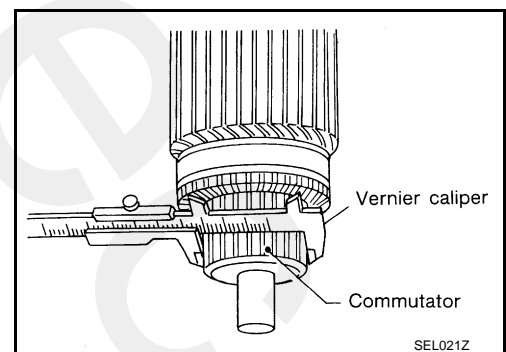
3. Check commutator surface.
  - Grind commutator with No. 500 – 600 emery paper if the surface is rough.



4. Check diameter of commutator.

**Commutator minimum diameter** : Refer to SDS [STR-26](#), "[Starter Motor](#)".

- Replace armature assembly if the measurement value is less than the specified value.

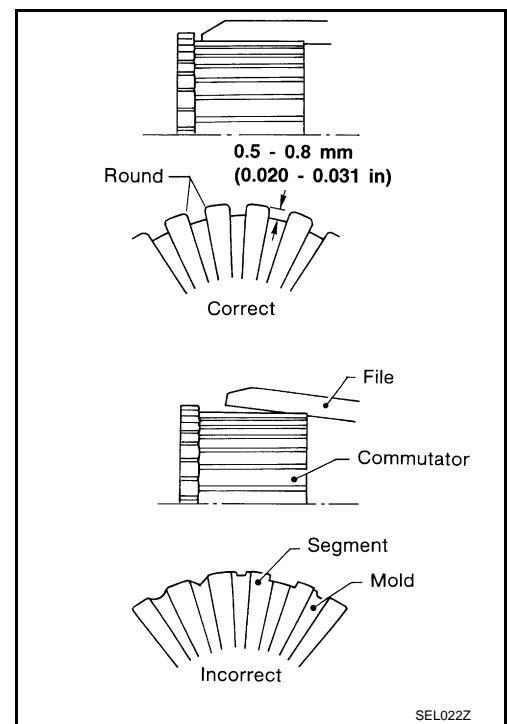




# STARTER MOTOR

## < ON-VEHICLE REPAIR >

5. Check depth of insulating mold from commutator surface.
  - Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in) if the depth is 0.2 mm (0.008 in) or less.



A

STR

C

D

E

F

G

H

I

J

K

L

M

N

O

P

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Starter Motor

INFOID:000000003860442

Applied model		VQ25DE	VQ35DE	
Type		S114-936	M000TA0072	
		HITACHI make	MITSUBISHI make	
		Reduction gear type		
System voltage	[V]	12		
No-load	Terminal voltage	[V]	11	
	Current	[A]	Less than 90	Less than 90
	Revolution	[rpm]	More than 2,700	More than 2,400
Minimum diameter of commutator	[mm (in)]	28.0 (1.102)	28.0 (1.102)	
Minimum length of brush	[mm (in)]	10.5 (0.413)	5.5 (0.217)	
Brush spring tension	[N (kg, lb)]	16.2 (1.65, 3.64)	15.0 – 20.4 (1.5 – 2.1, 3.4 – 4.6)	
Clearance between bearing metal and armature shaft	[mm (in)]	Less than 0.2 (0.008)	Less than 0.2 (0.008)	
Clearance "L" between pinion front edge and pinion stopper	[mm (in)]	—	—	
Movement "L" in height of pinion assembly	[mm (in)]	0.3 – 2.5 (0.012 – 0.098)	0.5 – 2.0 (0.020 – 0.079)	