DAIHATSU

G202

CB-Engine

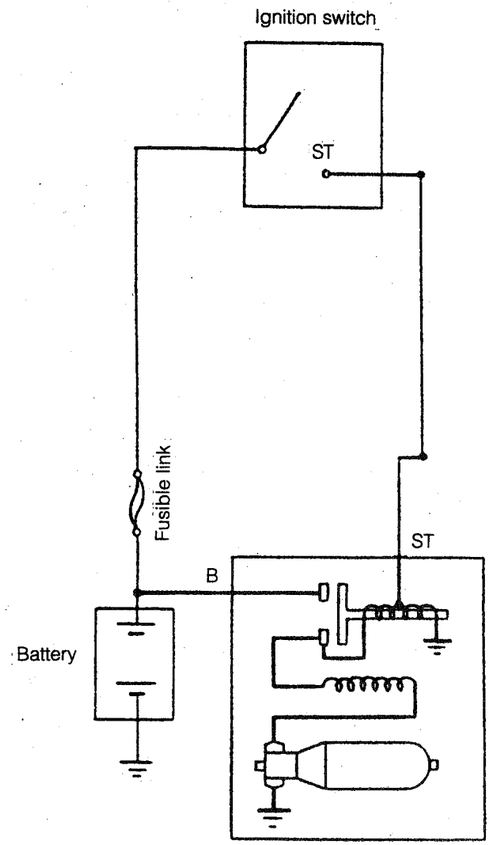
STARTING SYSTEM

ST

G2ST00001-00000

NO. 9188

STARTING SYSTEM CIRCUIT

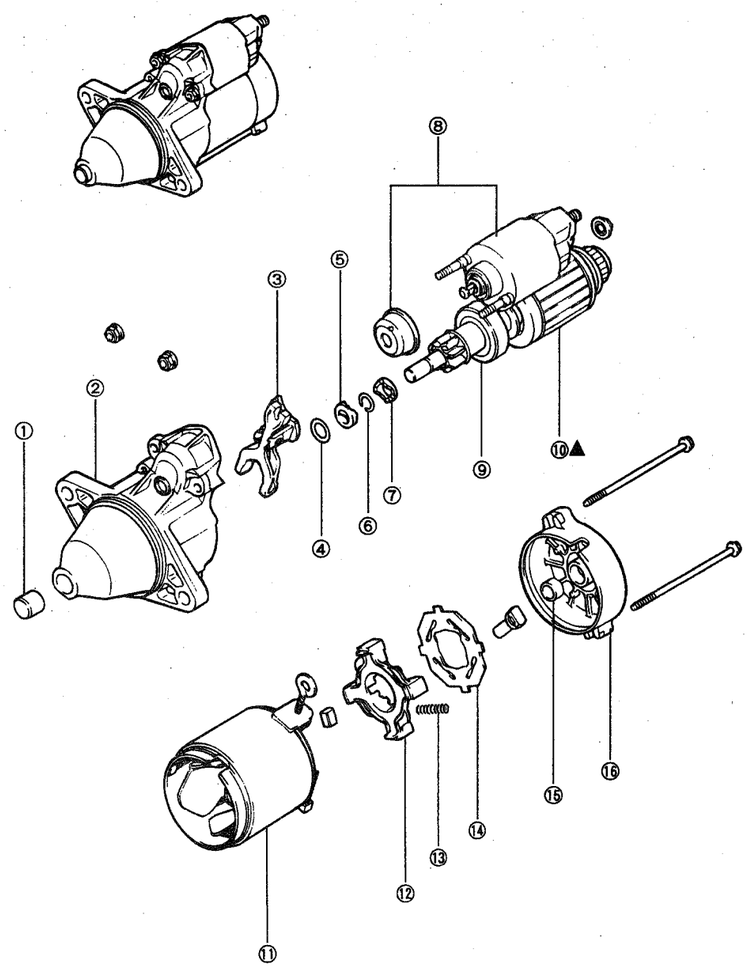


G2ST00002-99999

STARTER MOTOR

COMPONENTS

★ : Non-reusable parts
▲ : Asbestos parts



① Bearing
② Drive housing
③ Pinion drive lever
④ Washer
⑤ Stop collar
⑥ Snap ring
⑦ Stop collar
⑧ Magnet switch
⑨ Clutch
⑩ Armature
⑪ Yoke
⑫ Brush holder
⑬ Spring
⑭ Insulator
⑮ Bearing
⑯ End frame

G2ST00003-99999

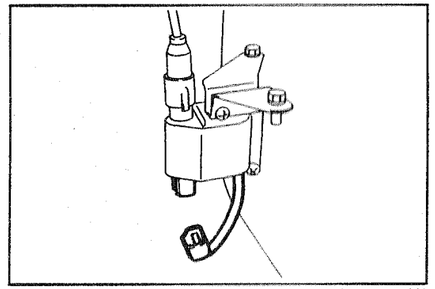
SERVICING INSTRUCTIONS OF STARTER

1. When connecting the starter terminal or battery terminal, perform positive tightening so as to avoid poor connection.
   If poor connection should exist, it presents the hazard of serious danger that a large amount of current flowing during starter operation can overheat the poor connection.
2. When removing the starter, first disconnect the negative ⊖ terminal of the battery. Then, disconnect the positive terminals (+B, ST) at the starter side. Since the battery voltage is always applied to the starter +B terminal, failure to observe this removing sequence may lead to battery short, which is extremely dangerous.
3. When installing the starter, install the starter in the clutch housing positively and be sure to tighten the attaching bolts to the specified torque. Improper installation can cause premature wear of the teeth of the pinion gear or ring gear and also can cause breakage of the clutch housing.

G2ST00004-00000

IN-VEHICLE INSPECTION

1. Place the shift lever to the neutral position. Apply the parking brake lever.
2. Disconnect the ignition coil coupler so that the engine will not start.



G2ST00005-99999

3. Set the ignition switch to the ST position. Check to see if the engine cranks.
4. If the engine will not crank, perform the following checks.
   - Inspect the battery for damage. Charge the battery.
   - Perform harness continuity test.
5. If the starter motor still will not rotate even after the checks above have been performed, remove the starter motor and perform the unit check.

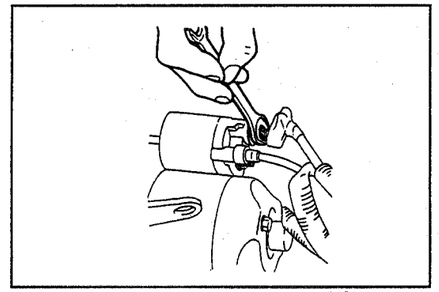
G2ST00006-00000

REMOVAL

1. Disconnect the ground cable terminal from the negative (–) terminal of the battery.

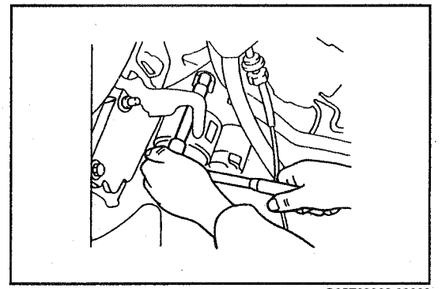
G2ST00007-00000

2. Disconnection of two wires from starter
   (1) Disconnect the wire from the battery by removing the nut.
   (2) Disconnect the terminal ST of the engine wire from the starter.



G2ST00008-99999

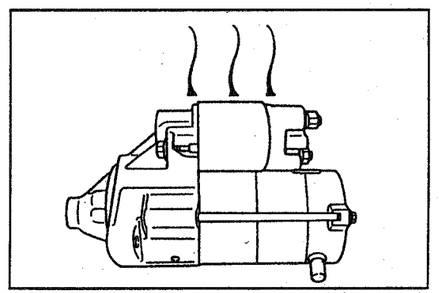
3. Removal of starter motor
   Remove the starter from the clutch housing by removing two bolts.



G2ST00009-99999

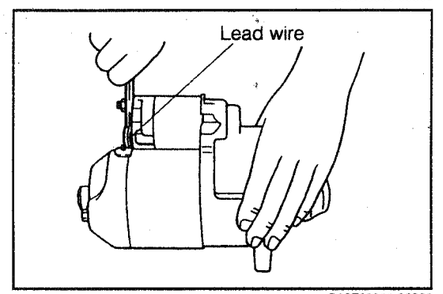
UNIT CHECK OF PLANETARY TYPE STARTER MOTOR

CAUTION:
- Each of the following tests must be performed within three to five seconds. If you fail to observe this caution and the starter should be energized for more than this duration, the coil may be burnt out.



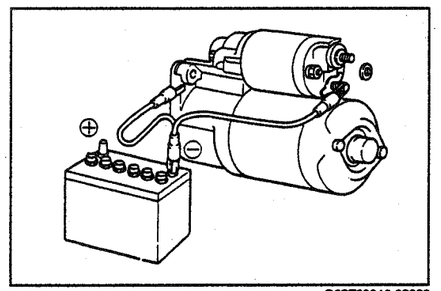
G2ST00010-99999

1. Pull-in test
   (1) Disconnect the lead wire from the magnetic switch terminal.



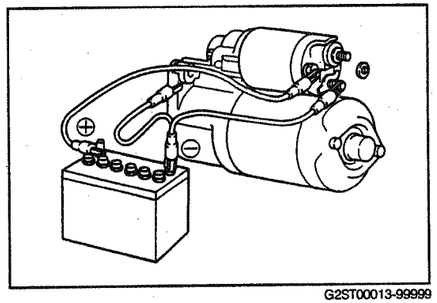
G2ST00011-99999

   (2) Connect the negative (–) terminal of the battery to the starter body and magnetic switch terminal.

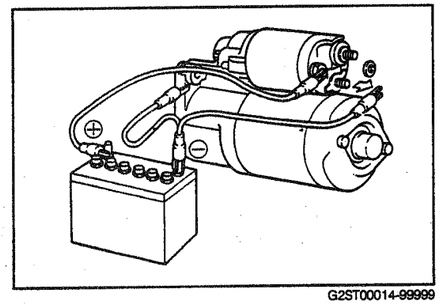


G2ST00012-99999

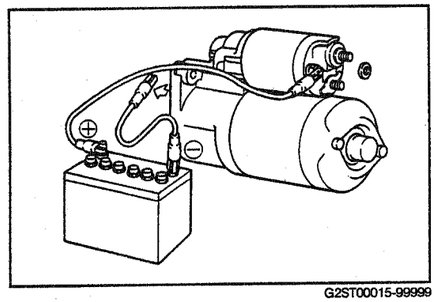
(3) Connect the positive (+) terminal to the terminal ST.
Ensure that the pinion is pushed outward.
If the drive pinion fails to move out, replace the magnetic switch.


G2ST00013-99999

2. Hold-in test
After the check has been performed following the same procedure as with the pull-in test, disconnect the negative terminal of the magnetic switch terminal.
Ensure that the drive pinion is held in a pushed-out state.
If the drive pinion fails to be held, replace the magnetic switch.

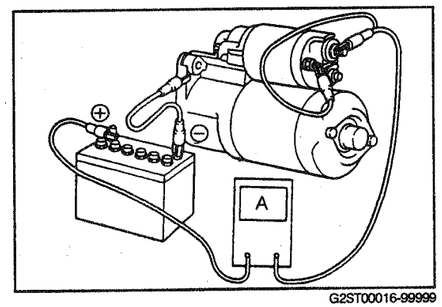

G2ST00014-99999

3. Inspection of plunger return
After the check has been performed following the same procedure as with the hold-in test, disconnect the ground terminal of the starter body. Ensure that the drive pinion is drawn into the drive housing.
If the drive pinion fails to be drawn, replace the magnetic switch.


G2ST00015-99999

4. No-load performance test
Connect the battery and an ammeter to the starter as shown in the right figure. Ensure that the starter rotates smoothly with the pinion moving out.
Measure the current the starter is drawing.
Specified Current: Less than 90A at 11.5V

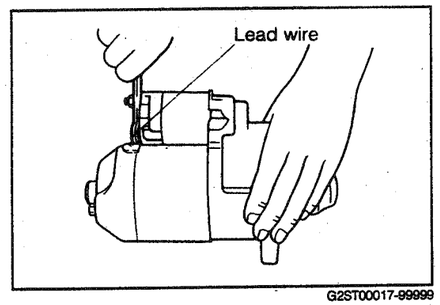
NOTE:
- **Prior to the test, be sure to connect the lead wire to the magnetic switch.**



G2ST00016-99999

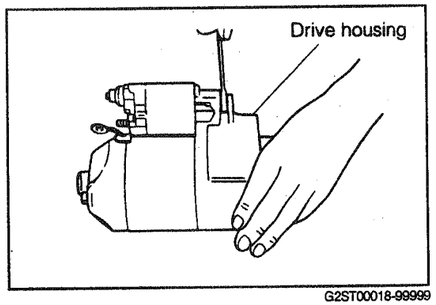
DISASSEMBLY

1. Disconnect the lead wire from the magnetic switch.



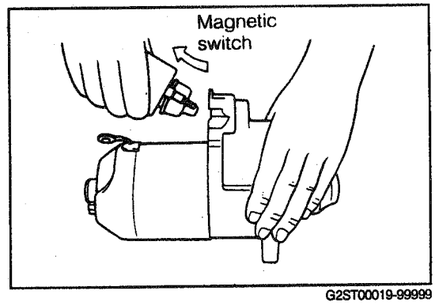
G2ST00017-99999

2. Remove the attaching nut of the magnetic switch from the drive housing.



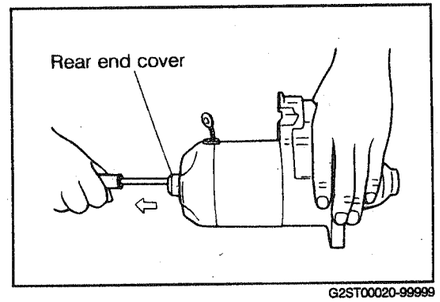
G2ST00018-99999

3. Remove the magnetic switch from the drive housing.



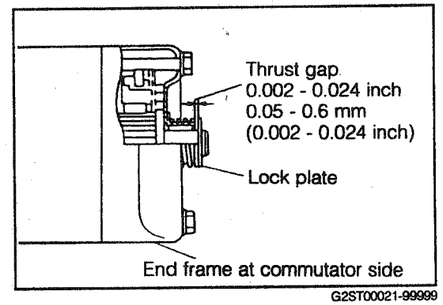
G2ST00019-99999

4. Remove the end frame cover by removing the two screws.



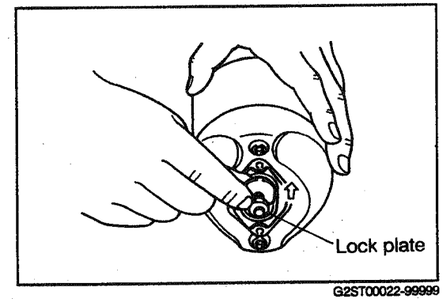
G2ST00020-99999

5. Using a thickness gauge, measure the thrust clearance of the armature shaft at a point between the lock plate and the end frame.
Thrust Clearance: 0.05 - 0.60 mm (0.002 - 0.024 inch)



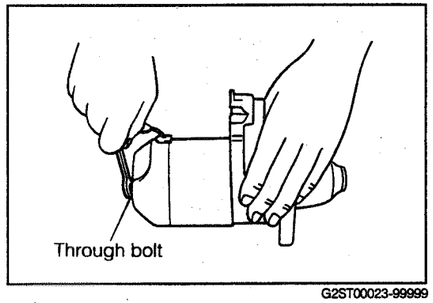
G2ST00021-99999

6. Remove the lock plate, brake spring and rubber from the commutator end frame.



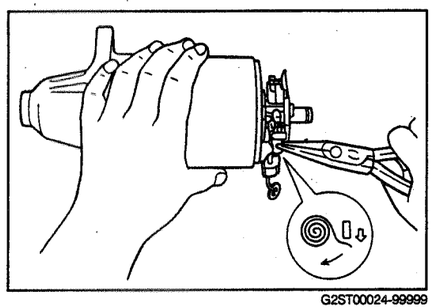
G2ST00022-99999

7. Remove the commutator end frame from the field frame by removing the two through bolts.

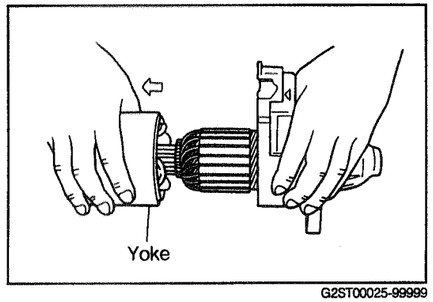


G2ST00023-99999

8. Remove the brushes from the brush holder by lifting the brush springs by means of nose pliers or the like.
   NOTE:
   - **Care must be exercised not to scratch the commutator during the removal.**

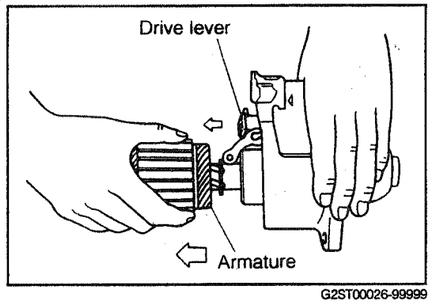

G2ST00024-99999

9. Remove the yoke from the armature.



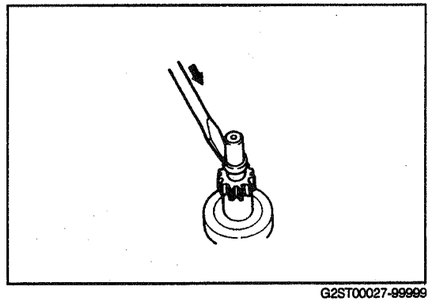
G2ST00025-99999

10. Remove the drive lever and armature from the drive housing.

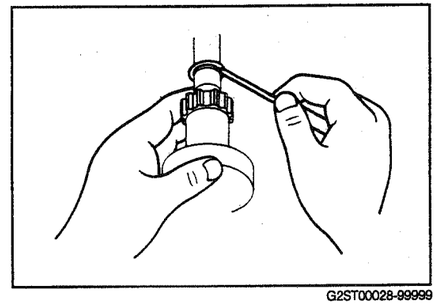


G2ST00026-99999

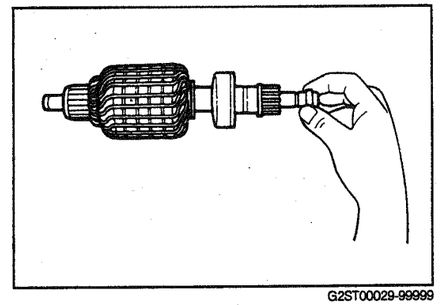
11. Remove the stop collar from the snap ring by tapping the collar with a screwdriver or the like placed on it.


G2ST00027-99999

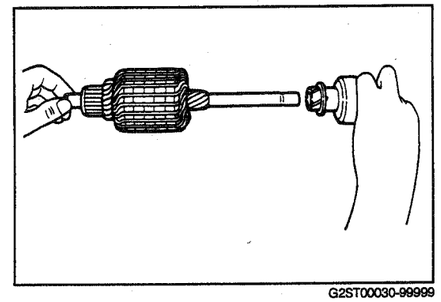
12. Remove the snap ring by prying it off with a screwdriver.


G2ST00028-99999

13. Remove the collar.


G2ST00029-99999

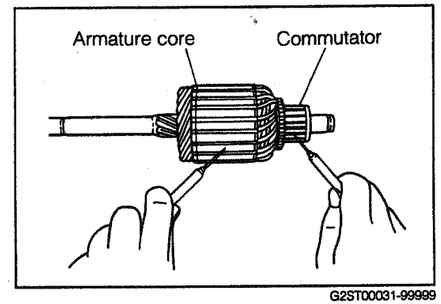
14. Remove the clutch.


G2ST00030-99999

INSPECTION OF CONVENTIONAL STARTER

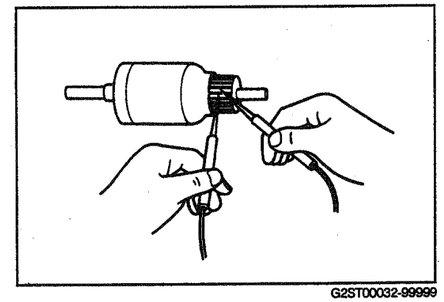
Armature coil

1. Check of armature insulation
   Ensure that no continuity exists between the commutator and the armature coil, using an ohmmeter.
   If continuity exists, replace the armature.



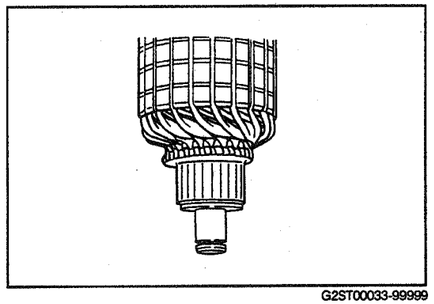
G2ST00031-99999

2. Check of commutator continuity
   Check continuity between each adjacent segment of the commutator, using an ohmmeter.
   If no continuity exists between any adjacent segments, replace the armature.


G2ST00032-99999

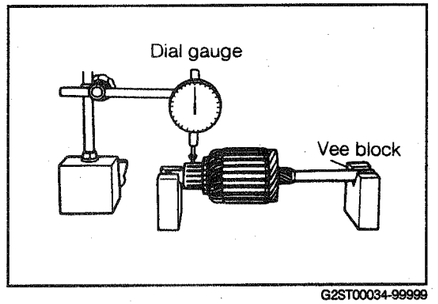
Commutator

1. Check each contact surface of the commutator segments with the brushes for burning.
   If the surfaces are dirty or burnt, correct the commutator surfaces, using abrasive paper (No. 400) or a lathe.


G2ST00033-99999

2. Check of commutator for circle runout
   Support the armature at its both ends on a Vee block.
   Check the commutator for circle runout, using a dial gauge.
   Circle Runout Limit: 0.40 mm (0.016 inch)

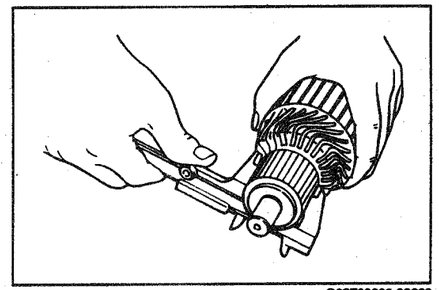
   If the circle runout exceeds the allowable limit, turn down the commutator on a lathe.
   At this point, care must be exercised to ensure that the commutator diameter is not less than the minimum requirement diameter of 27 mm (1.063 inch).



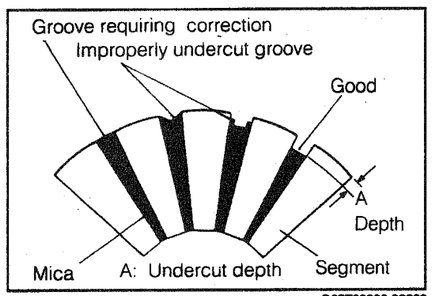
G2ST00034-99999

3. Measurement of commutator diameter
   Measure the commutator diameter by means of a micrometer or vernier calipers.
   Standard Diameter: 28 mm (1.102 inch)
   Minimum Diameter: 27 mm (1.063 inch)

   If the commutator diameter is less than the minimum diameter, replace the armature.


G2ST00035-99999

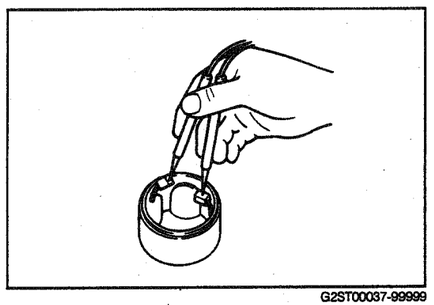
4. Check of commutator undercut
   If the depth of the insulator groove between commutator segments is less than 0.2 mm (0.0079 inch), it is necessary to undercut the insulator so that the groove depth may become 0.5 - 0.8 mm (0.020 - 0.031 inch)



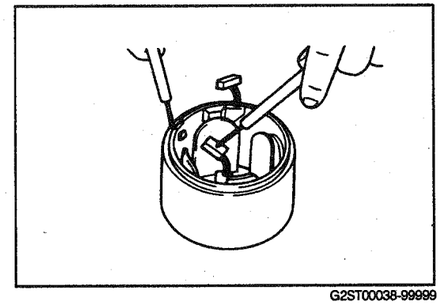
G2ST00036-99999

Yoke

1. Field coil continuity test
   Perform field coil continuity test at a point between the lead wire and the brush, using an ohmmeter.
   If no continuity exists, replace the yoke.


G2ST00037-99999

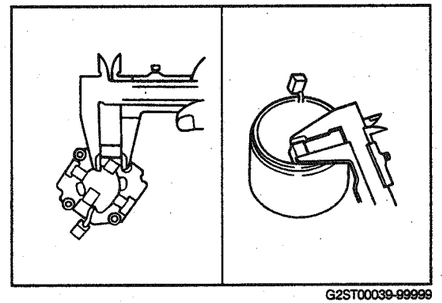
2. Field coil short test
   Perform field coil short test at a point between the brush and the yoke proper, using an ohmmeter.
   If no continuity exists, replace the yoke.


G2ST00038-99999

Brushes

Measurement of brush length
Measure the brush length, using vernier calipers.
Standard Length: 16 mm (0.63 inch)
Minimum Length: 10.7 mm (0.42 inch)

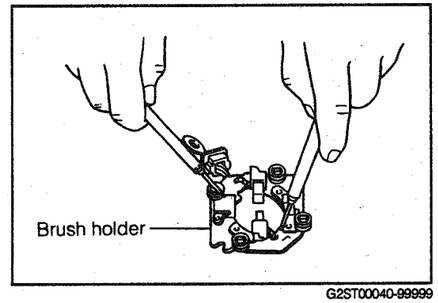
If the length is less than the minimum requirement, replace the brush holder or the yoke, as required.


G2ST00039-99999

Brush holder

Check of brush holder for insulation
Measure the insulation between the positive and negative terminals of the brush holder, using an ohmmeter.
Insulation Resistance: 100 MΩ or more

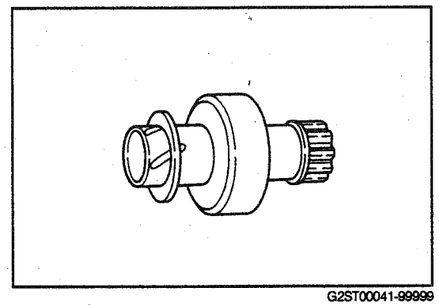
If the insulation resistance is less than the specification, replace the brush holder.



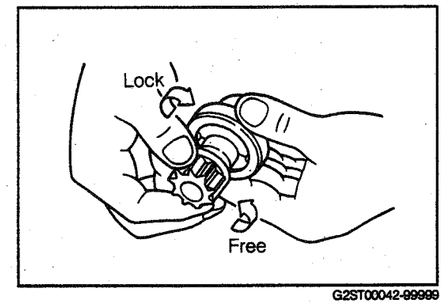
G2ST00040-99999

Clutch

1. Inspection of pinion gear and spline teeth
   Check the teeth of the pinion gear and spline for wear or damage.
   If the teeth exhibit any damage, replace the clutch. Also, inspect the flywheel ring gear for wear or damage.


G2ST00041-99999

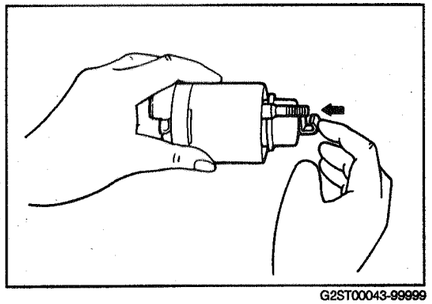
2. Check of starter clutch
   While holding the clutch, turn the pinion clockwise. Ensure that the pinion turns smoothly.
   Turn the pinion counterclockwise. Ensure that the pinion is locked.
   If the check results are unsatisfactory, replace the starter clutch.



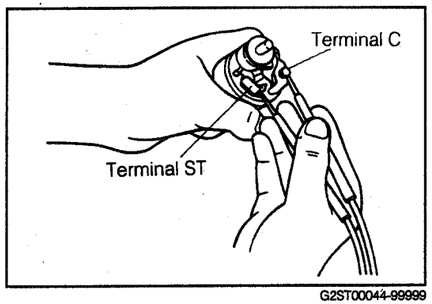
G2ST00042-99999

Magnetic switch

1. Plunger check
   Push in the plunger with your fingers and release your fingers. Ensure that the plunger returns quickly to the original position.
   If the plunger exhibits poor returning or fails to return, replace the magnetic switch.

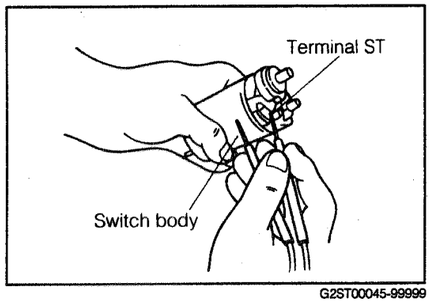

G2ST00043-99999

2. Pull-in coil open circuit test
   Using an ohmmeter, ensure that continuity exists between the terminal ST and terminal C.
   If no continuity exists, replace the magnetic switch.



G2ST00044-99999

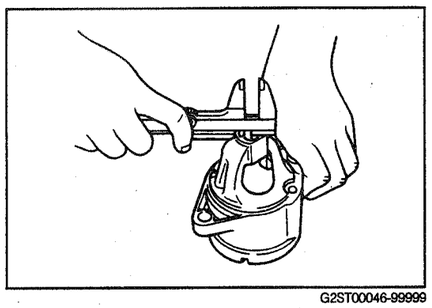
3. Hold-in coil open circuit test
   Ensure that continuity exists between the terminal ST and the switch body.
   If no continuity exists, replace the magnetic switch.



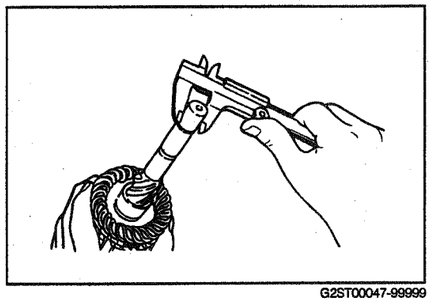
G2ST00045-99999

Check of bush-to-shaft clearance

1. Measure the inner diameters of the bushes of the drive housing and commutator end frame.


G2ST00046-99999

2. Measure the outer diameter of the armature bearing section.


G2ST00047-99999

3. Determine the clearance by subtracting the outer diameter of the armature bearing section from the inner diameter of the drive shaft.
   Clearance Limit: 0.2 mm (0.0079 inch)

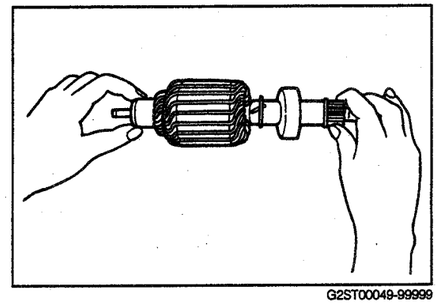
   If the clearance exceeds the limit, replace the drive housing bearing.

G2ST00048-00000

ASSEMBLY

NOTE:
- **Use high-temperature grease to lubricate the bearings and sliding parts when assembling the starter.**

1. Install the clutch on the armature shaft.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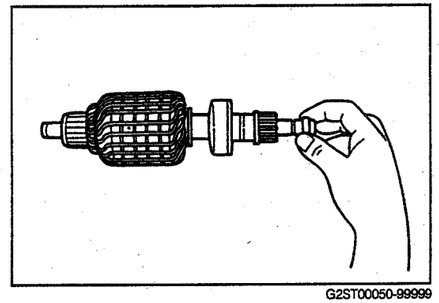
2. Install the collar on the armature shaft.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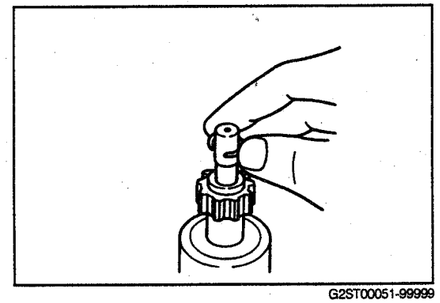
3. Fit the snap ring onto the armature shaft.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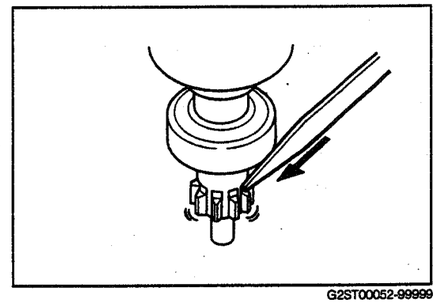
4. Tap the pinion so that collar may come onto the snap ring, using a screwdriver.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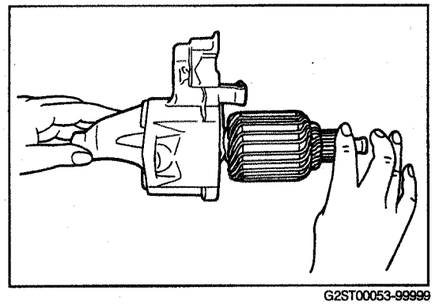
5. Install the drive lever and armature in the drive housing.
   NOTE:
   - Apply high-temperature grease to the sliding sections of the armature shaft and drive lever.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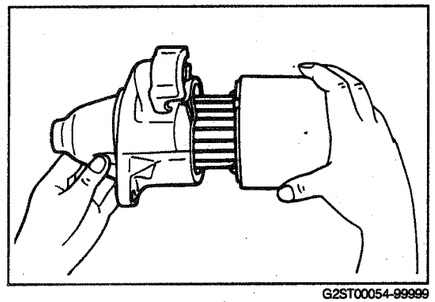
6. Install the yoke in the drive housing.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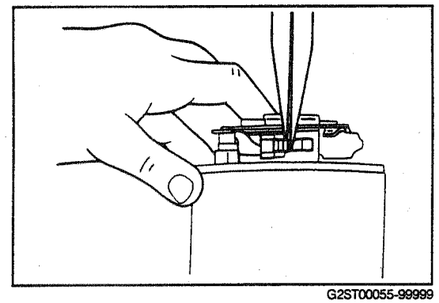
7. Install the brush holder over the armature shaft.
8. While the brush springs are held in a raised state by means of nose pliers or a piece of wire, install the brushes (four pieces) in the brush holder.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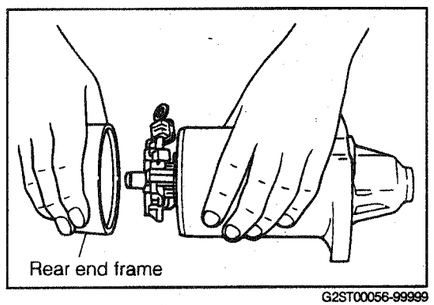
9. Attach the commutator end frame to the stator yoke assembly with the two through bolts.



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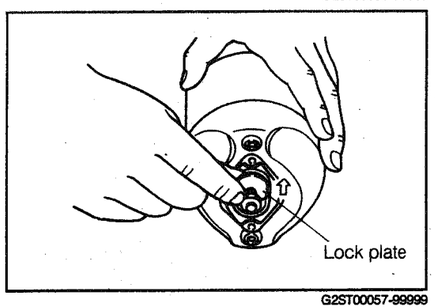
10. Install the rubber, brake spring and lock plate in this order onto the armature shaft.



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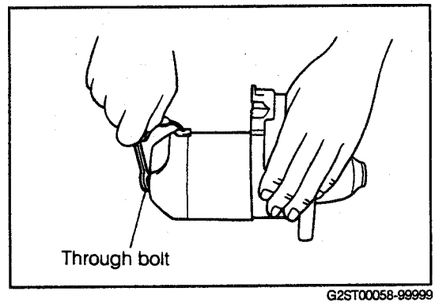
11. Install the rear end frame cover in place with the two screws.



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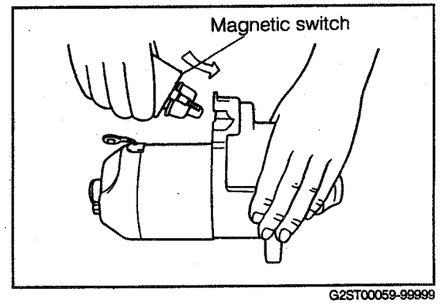
12. While hooking the magnetic switch over the drive lever, install the magnetic switch onto the drive housing. Secure the magnetic switch with the two nuts.



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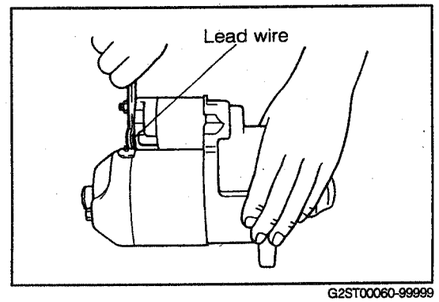
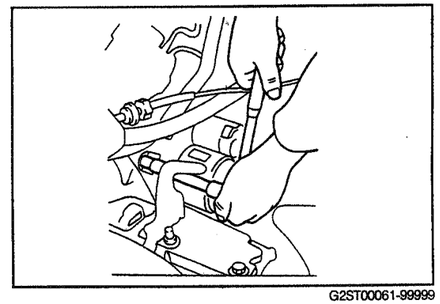
13. Connect the lead wire to the magnetic switch.



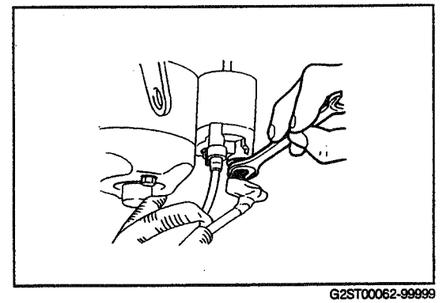
G2ST00060-99999

INSTALLATION OF STARTER MOTOR

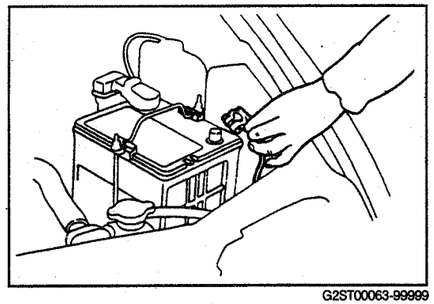
1. Installation of starter motor
   Install the starter motor in the clutch housing with the two bolts.
   Tightening Torque: 49.0 - 68.6 N·m
   (5.0 - 7.0 kgf-m, 36.2 - 50.6 ft-lb)


G2ST00061-99999

2. Connection of two wires of starter
   (1) Connect the wire from the battery to the magnetic switch.
   (2) Connect the terminal ST to the magnetic switch.


G2ST00062-99999

3. Connect the battery ground cable to the negative terminal (–) of the battery.



G2ST00063-99999

SERVICE SPECIFICATIONS

Reduction type starter motor	Rating voltage and output power	12V 0.7 kW (STD) 0.8 kW (COLD, SPEC)
	No-load characteristic at 11.5V Amperage	Less than 50A
	Brush length Standard	16.0 mm (0.63 inch)
	Minimum	10.7 mm (0.42 inch)
	Commutator Outer diameter Standard	28 mm (1.10 inch)
	Minimum	27 mm (1.06 inch)
	Undercut depth Standard	0.5 - 0.8 mm (0.020 - 0.031 inch)
	Minimum	0.2 mm (0.0079 inch)
	Maximum circle runout	0.05 mm (0.0020 inch)
		0.7 kW (STD) 0.8 kW (COLD, SPEC)

G2ST00064-00000

TROUBLE SHOOTING

Problem	Possible cause	Remedies	Page
Engine will not crank	Battery not fully charged	Check specific gravity of battery electrolyte. Charge or replace battery.	CH section
	Battery cables loose, corroded or worn	Repair or replace cables.	CH section
	Neutral start switch faulty	Adjust or replace Neutral start switch.	
	Fusible link blown	Replace fusible link.	
	Starter faulty	Repair starter.	ST–5
	Ignition switch faulty	Replace ignition switch.	
Engine cranks slowly	Battery not fully charged	Check specific gravity of battery electrolyte. Charge or replace battery.	CH section
	Battery cables loose, corroded or worn	Repair or replace cables.	
	Starter faulty	Repair starter.	ST–5
Starter keeps running	Starter faulty	Repair starter.	ST–5
	Ignition switch faulty	Replace ignition switch.	
	Short in wiring	Repair wiring.	
Starter spins – engine will not crank	Pinion gear teeth broken or faulty starter	Repair starter	ST–5
	Flywheel teeth broken	Replace flywheel.	

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