

HITACHI SOLENOID-ACTUATED

General Motors "S" Model Pickups

DESCRIPTION

The starter is a 4 pole, 4 brush type direct current series wound motor. The engagement mechanism is integral with the starter, and controls switching on and off of the motor and shifting of the starter pinion.

Starter incorporates an overrunning clutch. The shift lever mechanism and solenoid plunger are enclosed in the drive housing to protect them from exposure to dirt, icing conditions and splash.

OPERATION

When the ignition switch is closed, the solenoid windings are energized. The resulting plunger and shift lever movement cause the pinion to engage the engine flywheel ring gear and the solenoid main contacts to close, so engine cranking takes place.

When the engine starts, pinion overrun protects the armature from excessive speed until the switch is opened. At this time the return spring causes the pinion to disengage.

TROUBLE SHOOTING & TESTING

STARTER MOTOR & SWITCH

Engage Switch Does Not Work When Starter Switch is Turned "ON"

1) Check circuit. If circuit is faulty, correct condition. If circuit is okay, check starter switch. If contacts in switch are defective, replace contacts. If starter switch is okay, check engage switch coil.

2) If coil is open or burned, replace coil. If coil is okay, check plunger shaft. If shaft is bent or binding, repair or replace shaft.

Pinion Gear Does Not Properly Engage Ring Gear

1) Check battery. If charge is low, recharge. If battery is okay, check pinion and ring gear teeth. If teeth are worn or damaged, replace. If gear teeth are okay, check pinion gear movement.

2) If pinion return is incorrect, adjust. If pinion gear movement is okay, check armature shaft and bearing. Correct or replace as necessary. Check for foreign material on sliding portion of shaft.

Pinion Engages Ring Gear But Engine Will Not Turn Over

1) Check battery. If charge is low, recharge. If battery is okay, check brush contact with commutator face. If brush is in poor contact with face, correct or replace. If brush contact is okay, check pinion clutch.

2) If pinion clutch is slipping, replace. If pinion clutch is okay, check armature field coil. If field coil is open, correct or replace.

Starter Does Not Stop When Starter Switch Is Turned Off

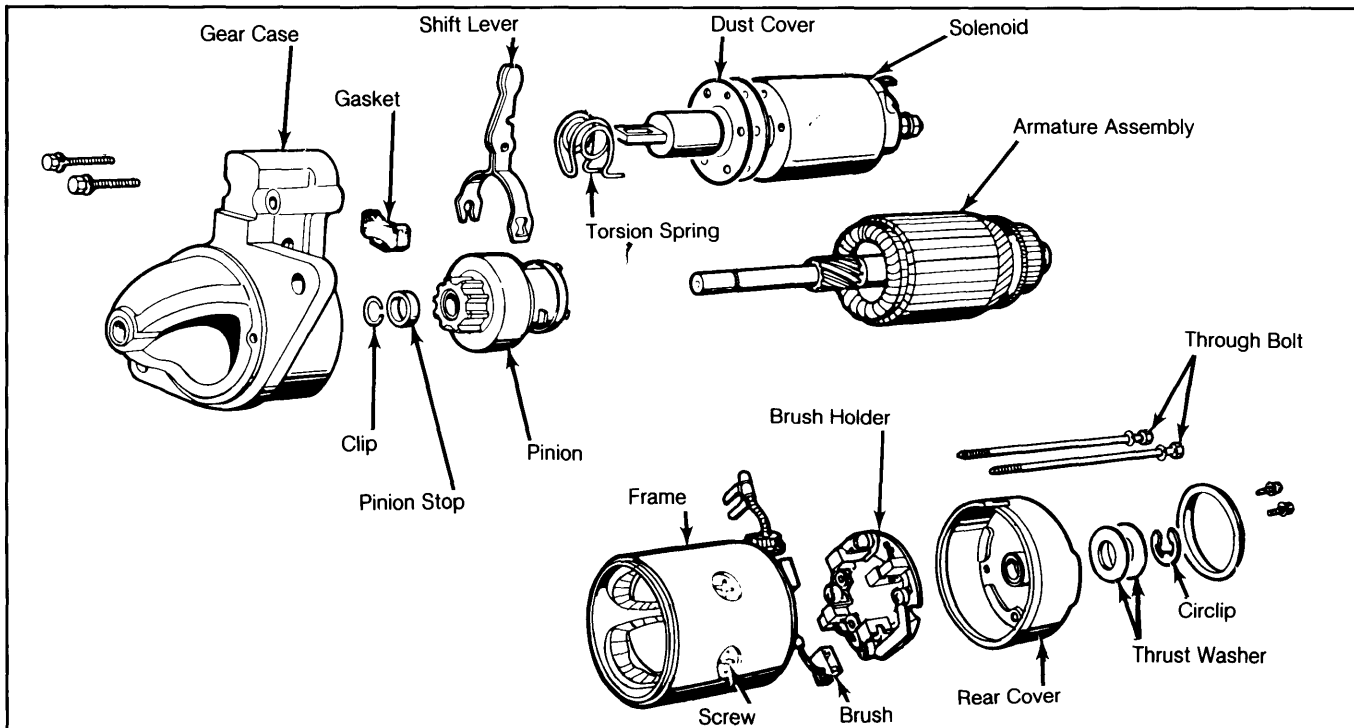
Check engage switch contact point. If contact point is siezed, replace. If okay, check starter switch. Replace if defective.

Excessive Brush Sparking

1) Check brush contact with commutator face. If poor contact exists, correct. If contact is okay, check commutator. If commutator segment or phenol resin projects, correct or replace.

2) If soldering on commutator has loosened, correct. If commutator is okay, check armature shaft. If there is runout, replace bearing. If armature shaft is okay, check brush holder. If holder has loosened in mount, correct.

Fig. 1: Exploded View of Hitachi Starter



Starters

HITACHI SOLENOID-ACTUATED (Cont.)

OVERHAUL

DISASSEMBLY

1) Disconnect the lead from the "M" terminal of the solenoid. Remove the bolts attaching the solenoid. Remove the torsion spring from the solenoid. Remove the dust cover and remove the ring and thrust washer. See Fig. 2.

2) Remove the 2 screws and through bolts. Remove the rear cover assembly. Raise the brush spring, pull out the brush, and remove the brush holder assembly. Carefully remove the yoke from the gear case and remove the dust cover.

3) Remove the armature from the gear case together with shift lever and remove shift lever from the armature. Pull out the pinion stop clip and remove pinion stop. Remove pinion assembly.

PARTS INSPECTION & TESTING

Armature

1) Check the commutator face for roughness or burning and reface with fine sandpaper as necessary. If roughness or out of round is considerable, armature should be turned on a lathe. Mica insulators should be undercut to a depth of .020-.031" (.5-.8 mm).

2) Check for insulation between commutator coils and core using a growl tester. If the lamp of the tester comes on, coils are poorly insulated and must be replaced.

3) Make a continuity test between the segments of the commutator with growl tester. If lamp does not come on when tester leads are shorted across segments, coils are open and should be repaired or replaced.

4) Roll the armature on growl tester slowly while holding a strip of steel or a hacksaw blade over each segment of armature core. If the steel is pulled or vibrates, armature coils are shorted and must be repaired or replaced.

5) Check armature shaft for runout using a dial indicator. If beyond .0031" (.080 mm), replace. If clearance between shaft and bearing is more than .008" (.20 mm), replace bearing.

Field Coils

Measure resistance between field coils and yoke. Insulation should be 1 megohm or more. If the insulation is in poor condition, remove pole core set screws and locate parts grounded by removing the field coils one at a time. Make a continuity test between field coil terminals and correct or replace parts as necessary.

Brush and Brush Holder

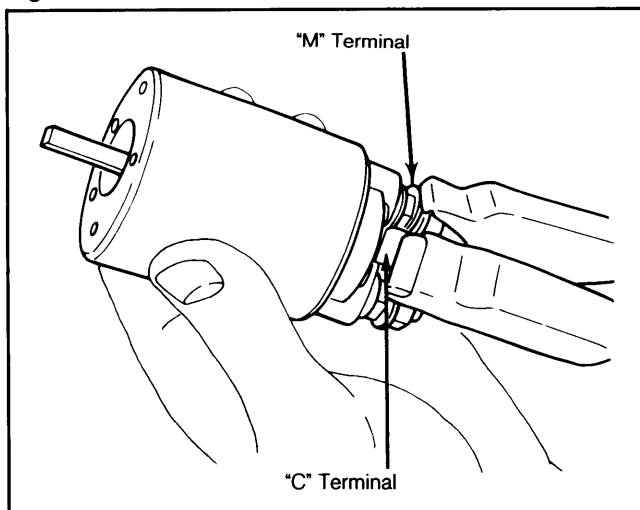
1) Check brushes for wear, cracks or broken lead. Replace parts if defective. Minimum allowable brush length is .47" (12.0 mm). Standard length is .63" (16.0 mm). Check brush springs for rusting, distortion, weakening or breakage.

2) Spring tension should be 3.53 lbs. (1.6 kg). Clean brush holder and check insulation between brush holder and set plate.

Solenoid

1) Check the points in the magnetic switch for fouling or roughness. Dress with an oil stone if necessary. Make continuity test between "C" and "M" terminals and ground. If there is no continuity, the coil is open and magnetic switch should be replaced. See Fig. 2.

Fig. 2: Solenoid Test Connections



Apply 12 volts to test plunger action.

2) Apply 12 volts between "C" and "M" terminals of switch. Solenoid is okay when plunger is pulled when power is applied and returns smoothly when power is removed.

3) Check the gap between pinion and pinion stop when pinion is fully depressed due to action of the solenoid. Adjust if necessary by installing adjusting plate between magnetic switch and case. Standard gap is .012-.098" (.30-2.50 mm).

Pinion

Check pinion gear for wear or damage. Check sliding face of pinion for scuffs and replace if necessary. Check springs for damage or weakening. Check clutch for sticking or binding and replace if necessary.

REASSEMBLY

1) Apply new grease to bearings and sliding surfaces of parts before installation. Set the shift lever to the shift lever guide on the pinion. Do not turn the armature shaft after setting shift lever.

2) Install the yoke on the gear case and dust cover by aligning the groove in the joining portion of the yoke with the corresponding projection. Install the torsion spring with adjusting plate on the magnetic switch.

3) Insert end of the shift lever into the plunger fitting hole in the magnetic switch. Set the end of the torsion spring into the groove in the intermediate part of the shift lever. To complete reassembly, reverse disassembly procedure.