HITACHI

International Harvester
6 Cly. Diesel Models

DESCRIPTION

The starter is a 12 volt model using an overrunning clutch and producing high starting torque. The overrunning clutch is connected to the magnetic switch plunger by a shift lever. Brushes and springs are retained inside the yoke assembly by holders.

Starter Application

Application	Part No.
SD33 Diesel Engine	S13-04K

TESTING

STARTER NO LOAD TEST

Connect a voltmeter, an ammeter and a tachometer to starter *(see Fig. 1)*. The no load voltage should be 12 volts and the no load current should be less than 80 amperes with the starter speed more than 4500 RPM. If not to specifications, disassemble and overhaul starter motor.

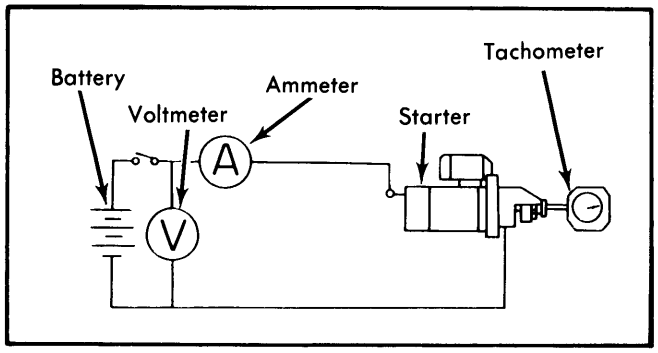

Fig. 1 Connections for Starter No Load Test

LOCKED RESISTANCE TEST

Mount starter motor in a test bench and follow manufacturer's instructions. With a locked terminal voltage of 5 volts, the current should be less than 1050 amperes and the torque should be 22.4 ft. lbs. If not to specifications, disassemble and overhaul the starter motor.

OVERHAUL

DISASSEMBLY

1) Remove nut and separate connector to magnetic switch. Remove two screws attaching switch assembly, then remove cotter pin and shift lever pin. Remove magnetic switch assembly and dust seal. Remove four screws in rear cover and four through bolts. Carefully pry rear cover assembly from main body of starter.

2) Remove brush and field coil terminal screws. Use a wire to lift brush spring and remove brush holder. Remove yoke assembly from case, then separate case and armature by tapping case with a wooden mallet. Remove shift lever.

3) Remove overrunning clutch washer and retainer clip, then remove clutch assembly from armature. Carefully apply pressure to advance sleeve using a press, then remove clip. Remove advance sleeve from armature shaft. Remove spring washer, pressure equalizer, and center bearing assembly from armature. Remove two thrust washers from front of armature shaft and two thrust washers from rear of armature shaft.

PARTS REPLACEMENT & TESTING

Armature – 1) Test armature for shorted coils with a growler. Check for grounded coils with a 110 volt test lamp. Place one lead on armature shaft and other lead on commutator. Lamp should not light. If lamp lights, armature is grounded and should be replaced.

2) To check for opens use the test leads and voltmeter attached to growler. Measure voltage between adjacent segments of commutator. If all points have the same reading, armature is good. A zero reading indicates an open while a low reading indicates poor coil insulation.

3) Check the armature shaft for bend using V-blocks and dial indicator. If bend exceeds .004", replace armature. Measure armature shaft at commutator end, at center bearing shoulder, and at overrunning clutch end. If wear exceeds .004" from specifications, armature requires replacement. Measure inside diameter of bushings and if clearance between shaft and bushing is excessive, replace bushings.

4) Check commutator for wear or out-of-round. If commutator is out-of-round .016" or more, rework commutator. Minimum diameter after rework is 1.575". If mica undercut is less than .008", recut to a depth of .020-.031". Bevel sharp segment corners after undercutting is completed.

Brushes & Springs – Replace brushes if worn to length less than specifications, or if oil-soaked. Check brush spring tension and replace springs if weak or distorted.

Field Coils – Disconnect field coil ground terminal and connect a continuity tester across field coil terminals. A lack of continuity indicates an open field coil. Connect a ohmmeter between field coil terminals and yoke or core. Reading should be infinite.

SPECIFICATIONS

Armature Shaft Diameter	
Commutator End	.622"
Center Bearing Shoulder	1.011"
Overrunning Clutch End	.543"
Bushing Clearance	.08"
Center Bearing Clearance	.018"
Brush Length Minimum	.512"
Brush Spring Tension	62 ozs.
Pinion-to-Stopper Clearance	.008-.059"

HITACHI (Cont.)

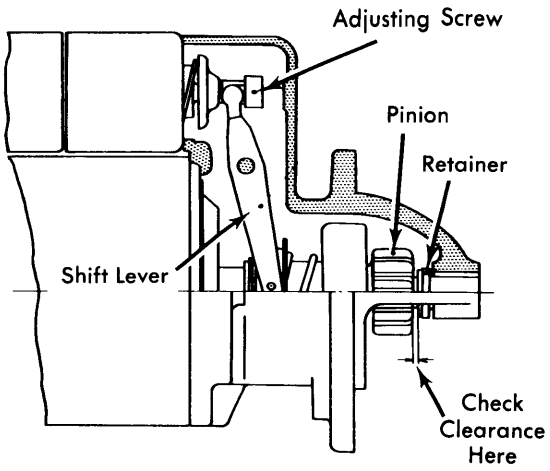

Fig. 2 Checking the Pinion Clearance

Pinion Clearance – Connect an electrical source of 6 volts to starter motor. *CAUTION – Do not use more than 6 volts or motor will operate.* After energizing magnetic switch, push pinion away from stop retainer and use feeler gauge to check clearance between overrunning clutch and retainer. If clearance is not within specifications, readjust by turning the adjusting screw *(see Fig. 2).*

REASSEMBLY

To reassemble, reverse disassembly procedure while noting the following: Lubricate armature shaft with silicone lubricant or several drops of SAE 10 engine oil. Ensure brush springs are properly positioned in holder and against brushes. Shift lever must be positioned in groove of overrunning clutch. Check overrunning clutch-to-retainer clearance.