STARTER - BOSCH/MITSUBISHI

1993 Jeep Cherokee

1993 ELECTRICAL
Chrysler Corp. Starters - Bosch & Mitsubishi

Jeep; Cherokee, Grand Cherokee, Wrangler

DESCRIPTION

Both Bosch and Mitsubishi starters are permanent-magnet type. A planetary gear train transmits power between starter motor and pinion shaft. Both starters are 12-volt units with solenoid mounted on starter housing.

TROUBLE SHOOTING

STARTER MOTOR NOISE

STARTER TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
Very high frequency whine before engine starts; engine starts ok	Excessive distance between pinion gear and flywheel/drive plate gear.	Shim starter motor toward flywheel/ drive plate.
Very high frequency whine after engine starts with ignition key released, engine starts okay.	Insufficient distance between starter motor pinion gear & flywheel/ drive plate runout can cause noise to be intermittent.	Shim starter away from flywheel/drive plate. Check flywheel drive plate for bent, unusual wear, and excess runout. Replace flywheel/ drive plate as needed.
A loud "whoop" after engine starts while starter motor is engaged.	Most probably cause is defective overrun clutch. Overrun clutch replacement normally corrects this condition.	Replace overrun clutch or drive assembly.
A "Rumble," "Growl," or "Knock" as starter motor coasts to stop after engine starts.	Most probably cause is, bent or unbalanced starter motor armature. Armature replacement normally corrects this condition.	Replace starter motor armature.

TESTING (ON-VEHICLE)

COLD CRANKING TEST

NOTE: Ensure battery is fully charged. A cold engine increases starter draw amperage.

1) Connect battery load/charging system tester to battery,

and connect remote starter switch to starter relay. Set voltmeter selector to 18-volt position. Adjust ammeter reading to zero.

2) Disconnect coil wire from distributor cap. Attach coil wire to ground to prevent engine from starting. Crank engine, and note cranking voltage and amperage. Replace or repair starter if it is not to specifications. See appropriate STARTER SPECIFICATIONS.

STARTER RELAY TEST

1) Remove starter relay from Power Distribution Center (PDC). Using an ohmmeter, check for continuity between terminals No. 30 and 87A. If no continuity exists, replace relay. See Fig. 1.

2) Check resistance between terminals No. 85 and 86. If resistance is not 70-80 ohms, replace starter relay.

3) Connect battery to terminals No. 85 and 86. Check for continuity between terminals No. 30 and 87. If no continuity exists, replace starter relay.

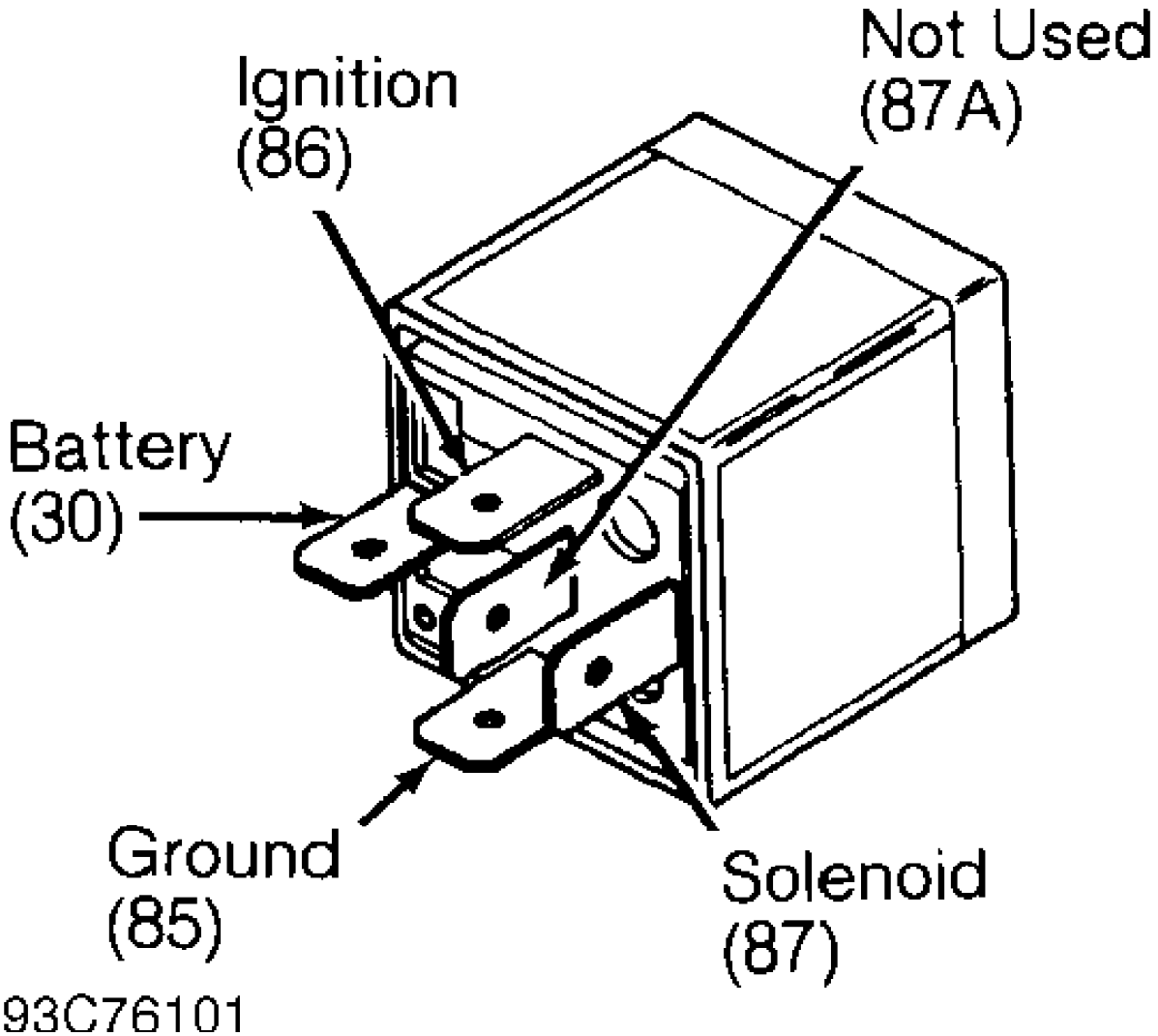

Fig. 1: Identifying Starter Relay Terminals
Courtesy of Chrysler Corp.

SOLENOID TEST

Continuity Test

1) Disconnect wire from solenoid field coil terminal (large terminal connected to starter body). Using an ohmmeter, test for continuity between field terminal and solenoid terminal (small terminal). Continuity should exist.

2) Test for continuity between solenoid terminal and solenoid housing. Continuity should exist. If continuity does not exist in either test, solenoid has open circuit. Replace solenoid.

Functional Test

1) With a fully-charged battery, connect a heavy gauge jumper wire between battery terminal and solenoid terminal wire connector at starter relay. If engine cranks, solenoid is okay.

2) If engine does not crank, check battery cable for voltage to starter solenoid BAT terminal. Jump starter relay terminals as in step 1), checking for voltage at solenoid terminal No. 50. Repair as necessary. If engine still does not crank, repair or replace starter.

BENCH TESTING

ARMATURE TEST

Short Circuit

Place armature in a growler. While rotating armature slowly, hold growler's blade parallel to and touching armature core. Blade vibrates if armature is shorted. Replace shorted armature.

Ground

Using growler or a self-powered test light, touch one lead to armature shaft and other lead to each commutator bar. See Fig. 2. If light glows at any point during procedure, armature is grounded. Replace grounded armature.

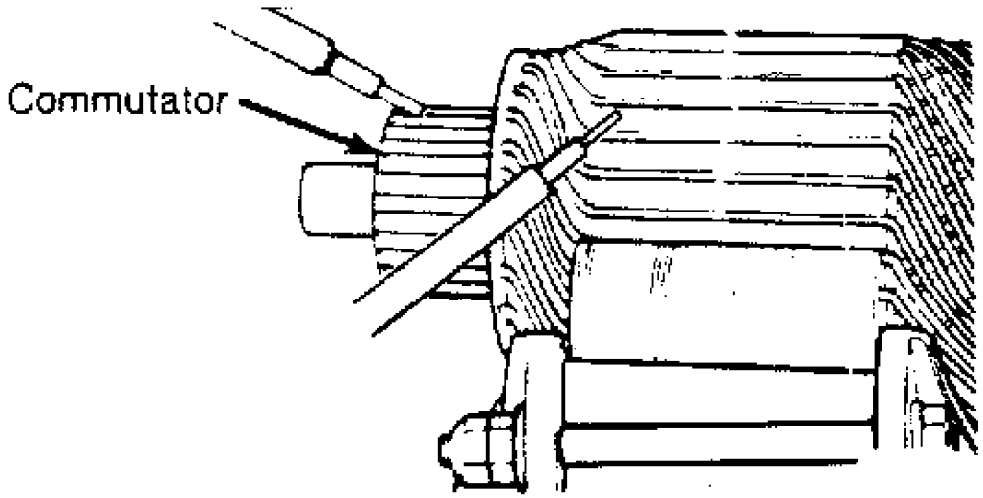

Fig. 2: Testing Starter Armature For Ground
Courtesy of Chrysler Corp.

DRIVE CLUTCH CHECK

While holding drive clutch housing, rotate pinion. Drive pinion should rotate smoothly in only one direction (pinion should engage and lock in opposite direction). If drive unit does not operate properly or if pinion is worn or burred, replace drive clutch.

REMOVAL & INSTALLATION

STARTER

Removal & Installation (2.5L)

1) Disconnect negative battery cable. Remove exhaust pipe clamp from bracket. See Fig. 3. On Cherokee with automatic transmission, remove nut and bolt from forward end of brace rod. Remove brace rod and bracket.

2) On vehicles with manual transmission, remove nut, bolt and bracket from bellhousing. On all models, disconnect battery cable and solenoid feed wire from starter solenoid. To install, reverse removal procedure.

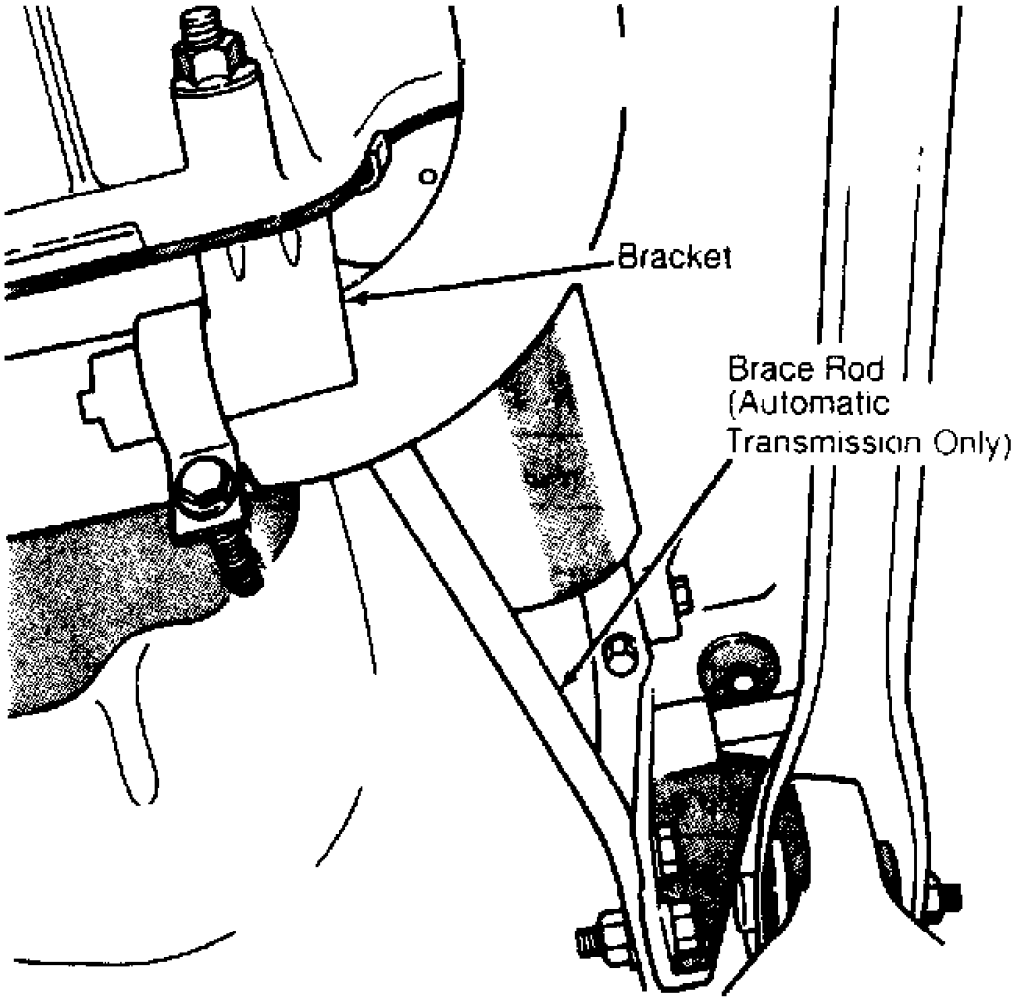

Fig. 3: Removing Engine Exhaust Clamp & Brace (2.5L)
Courtesy of Chrysler Corp.

Removal & Installation (4.0L)

Disconnect negative battery cable. Raise and support vehicle.

Disconnect starter battery cable and solenoid feed wire. Remove starter from flywheel housing. To install, reverse removal procedure.

OVERHAUL

NOTE: For exploded views of starters, see Figs. 4 and 5.

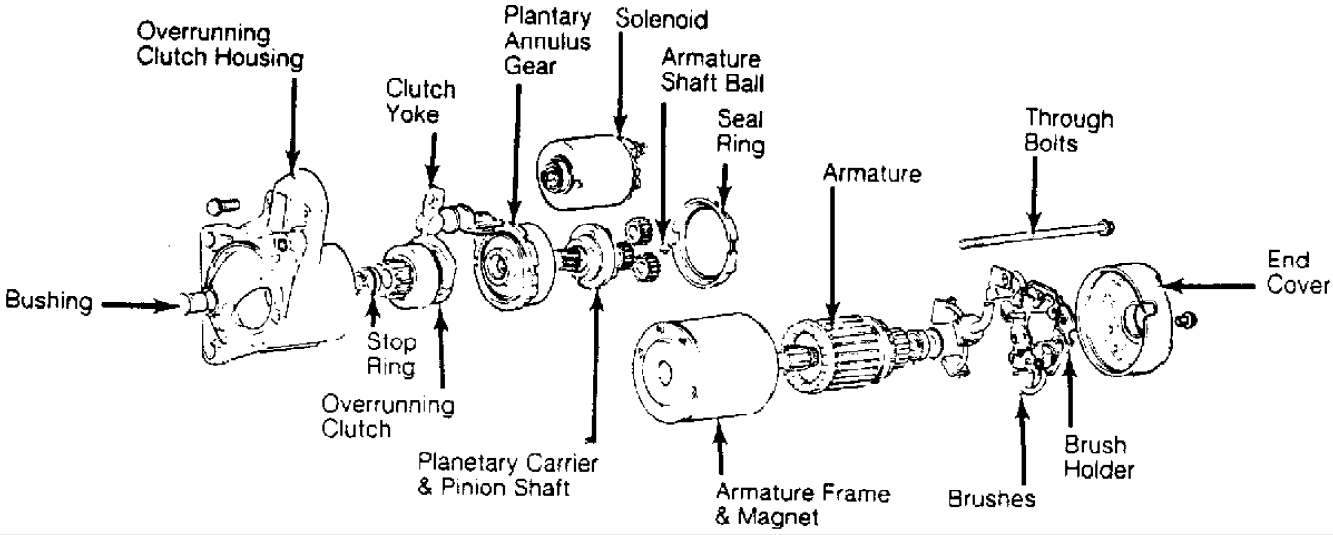

Fig. 4: Exploded View Of Mitsubishi Starter (4.0L)
Courtesy of Chrysler Corp.

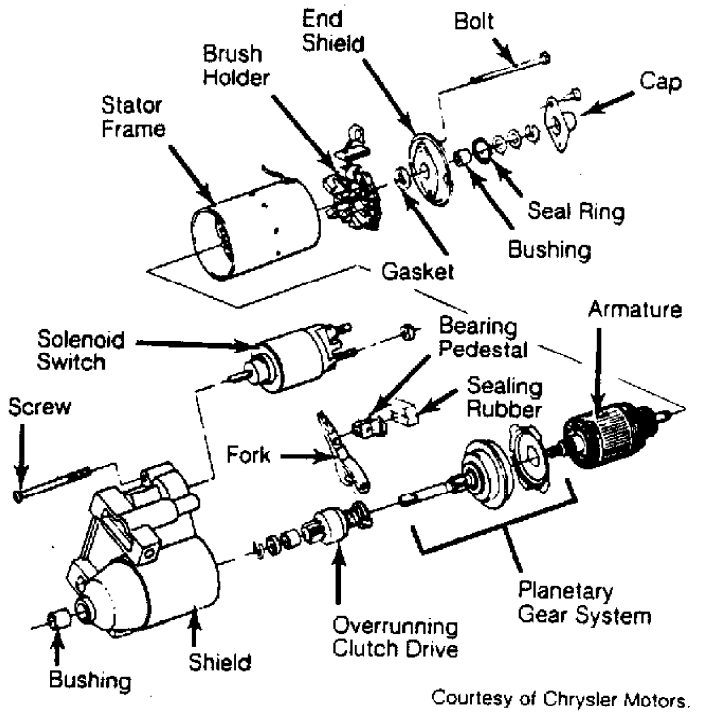

Fig. 5: Exploded View Of Bosch Starter (2.5L)
Courtesy of Chrysler Corp.

STARTER SPECIFICATIONS

BOSCH

BOSCH STARTER SPECIFICATIONS TABLE

Application	Specification
Carbon Brush Minimum Length	.314" (8.0 mm)
Commutator	
Diameter	1.23-1.27" (31.2-32.3 mm)
Runout	.0004" (.01 mm)
Armature	
Core Runout	.002" (.05 mm)
End Play	.002" (.05 mm)
Cranking Test	
Test Voltage	12.5 Volts
Minimum Voltage	9.6 Volts
Amps	160 Amps
No-Load Test @ 11.5 Volts	
Maximum Amps	75 Amps
Minimum RPM	2900 RPM
Solenoid Hold-In Test Winding Voltage	.2-2 Volts
Solenoid Pull-In Test Winding Voltage	6-7.3 Volts

MITSUBISHI

MITSUBISHI STARTER SPECIFICATIONS TABLE

Application	Specification
Carbon Brush Minimum Length	.354" (9 mm)
Commutator	
Diameter	1.118-1.161" (28.4-29.5 mm)
Runout	.001" (.03 mm)
Armature	
Core Runout	.003" (.08 mm)
End Play	.023" (.58 mm)
Cranking Test	
Test Voltage	12.5 Volts
Minimum Voltage	9.6 Volts
Amps	130
No-Load Test @ 11.5 Volts	
Maximum Amps	80 Amps
Minimum RPM	2500 RPM
Solenoid Hold-In Test Winding Voltage	3.5 Volts (Min.)
Solenoid Pull-In Test Winding Voltage	7.8 Volts (Max.)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Starter-To-Block Bolts	33 (45)