BOSCH & NIPPONDENSO

Chevrolet
Chevette Diesel
Chrysler Corp.
Front Wheel Drive Models

DESCRIPTION

Chrysler Corp. front wheel drive models equipped with 1.7L or 2.2L engines use either a Bosch or Nippondenso direct drive starter motor with an overrunning clutch. Chrysler Corp. models with 2.6L engines and A-470 automatic transaxles, and Chevrolet Chevette diesel models use a Nippondenso reduction gear starter motor. Although structure of the starter motors differs, the electrical wiring is similar. A solenoid is mounted on all starter motors.

TESTING (ON VEHICLE)

CHRYSLER CORP. ONLY

NOTE – *The following tests are specifically for starters used on the 1.7L and 2.2L engines. The principles, however, can be applied to the starter for the 2.6L engine.*

AMPERAGE DRAW TEST

1) Engine should be at normal operating temperature and battery should be at full charge. A voltmeter and ammeter will be required.

2) Adjust voltmeter selector to 16 volts. Connect positive voltmeter lead to positive battery terminal and negative voltmeter lead to negative battery terminal.

3) Connect positive ammeter lead to positive battery terminal and negative ammeter lead to negative battery terminal. Disconnect coil wire from distributor cap and attach to a good ground to prevent engine from starting.

4) Crank engine with a remote starter switch. Note exact reading on voltmeter. Stop cranking engine. Turn voltmeter knob until that reading is obtained on the scale.

5) Observe ammeter reading. Ammeter should indicate starter amperage draw. Specified amperage draw is 120-160 amps. for starters used on 1.7L and 2.2L engines; 150-210 amps. for starter used on 2.6L engine.

STARTER RESISTANCE TEST

1) Make sure battery is at full charge. Disconnect positive battery cable at battery. Connect an ammeter (0 to 300 scale) between disconnected lead and battery terminal.

2) Connect a 10 scale voltmeter between positive battery post and starter relay terminal on starter solenoid.

3) Crank engine over and check reading on voltmeter and ammeter. Voltage reading should not exceed .3 volt.

4) A reading higher than this indicates a high resistance caused by loose circuit connections, defective cable, burned starter relay or solenoid switch contacts.

5) If current is high and starter cranks slowly, starter is defective and should be replaced.

INSULATED CIRCUIT TEST

1) Make sure battery is at full charge. Adjust voltmeter switch to 4 volt position. Disconnect coil wire at distributor cap.

2) Connect voltmeter positive lead to positive battery terminal. Connect voltmeter negative lead to solenoid connector that connects to starter field coils.

NOTE – *It will be necessary to peel back rubber boot to gain access to connector. Also, the voltmeter will read off scale until engine is cranked over.*

3) Crank engine over with a remote starter switch. Check voltmeter reading. A voltage drop of .3 volt or less indicates voltage drop is normal.

4) If voltmeter reads more than .3 volt, high resistance is indicated in starter insulated circuit.

5) Disconnect voltmeter from solenoid connector. Reconnect to the following points and repeat test at each connection.

- Solenoid starter terminal.
- Solenoid battery terminal.
- Solenoid battery cable terminal.
- Starter relay.
- Battery cable connection.

6) A small change will occur each time a portion of the circuit is removed from test. A definite change in voltmeter reading indicates the last part eliminated in test is at fault.

STARTER GROUND CIRCUIT

1) Connect voltmeter positive lead to starter housing. Connect voltmeter negative lead to battery negative terminal. Crank engine over with a remote starter switch.

2) Voltmeter reading should not exceed .2 volt. A reading less than .2 volt indicates a voltage loss in ground cable which is normal.

3) A voltage loss of more than .2 volt indicates excessive voltage loss in starter ground circuit.

4) Disconnect voltmeter. Reconnect to the following points and repeat test at each connection.

- Starter drive housing.
- Cable terminal at engine.
- Battery cable clamp.

5) A small change will occur each time a portion of the circuit is removed from test. A definite change in voltmeter indicates last part eliminated in test is at fault.

OVERHAUL

DISASSEMBLY (CHRYSLER CORP. 1.7 & 2.2L ENGINES)

1) Disconnect field coil wire from solenoid terminal. Remove mounting screws and on all but Bosch automatic transaxle starter, work solenoid off shift fork and remove solenoid.

2) On Bosch automatic transaxle starters, slide solenoid off plunger and then work solenoid off shift fork. On Nippondenso starters, remove rubber gasket and metal plate.

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3) Remove end shield bearing cap, "C" washer, flat washer, through bolts and starter end shield. On Nippondenso, also remove spring and seal.

4) Remove both field brushes and brush plate. Slide field frame off starter over armature. On some Bosch starters, remove rubber gasket and metal plate.

5) Remove clutch shift lever pivot bolt. On Nippondenso starters and Bosch automatic transaxle starter, remove armature assembly and shift lever from drive end housing. Press collar off snap ring and remove snap ring, stop collar and clutch.

6) On Bosch manual transaxle starter, press stop collar off snap ring, remove snap ring and clutch, and remove drive end housing from armature.

DISASSEMBLY (CHRYSLER CORP. 2.6L ENGINE)

1) Remove rubber boot from field coil terminal. Remove nut and terminal from terminal stud. Remove through bolts, and then screws from starter end shield. Remove upper left solenoid screw, holding field coil wire retainer. Remove retainer.

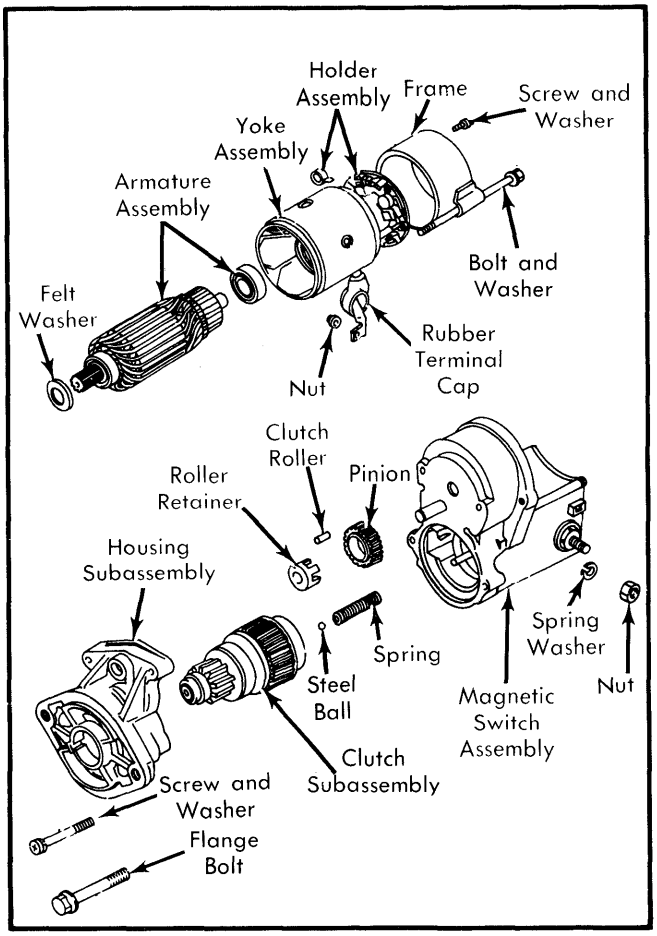

Fig. 1 Exploded View of Nippondenso Starter For Chrysler Corp. 2.6L Engine

2) Remove starter end shield. Slide field brushes from brush holders, by prying back on retaining springs. Remove brush plate and slide armature out of field frame. Remove field frame from gear housing.

3) Remove gear housing-to-solenoid screws and separate housing from solenoid, using a soft mallet if necessary. Remove reduction gear pinion roller retainer from gear housing, followed by reduction gear and clutch assembly. Remove pinion gear, pinion gear rollers, and solenoid ball and spring.

4) Remove solenoid cover screws, solenoid cover, and plunger.

DISASSEMBLY (CHEVETTE DIESEL)

1) Remove solenoid lead wire from solenoid. Remove 2 through bolts and remove solenoid. If solenoid is to be disassembled, remove torsion spring, plunger and adjusting plates.

2) Remove through bolts and rear cover. Remove 4 brushes from brush holders. Remove yoke, armature and brush holder from gear case. Remove bearing retainer. Remove pinion assembly from gear case. Dust cover and shift lever will be removed with pinion assembly.

3) Remove stopper clip from end of pinion assembly with a screwdriver. Disassemble pinion assembly.

REASSEMBLY (ALL STARTERS)

1) To reassemble, reverse disassembly procedure, except a battery cable pulling tool should be used to pull clutch stop ring over snap ring on Chrysler models. Replace brushes if worn more than 50 per cent of their original length.

2) On starters for 1.7L and 2.2L engines, inspect armature shaft bearing, pinion shaft surfaces and bushings for wear. On starters for 2.6L engines, inspect armature shaft, clutch assembly and gear drive bearings for smooth operation. Do not immerse parts in cleaning solvent.

3) On Chevette diesel starters, inspect pinion for wear. Check that clutch locks up when turned in direction of drive and rotates freely in reverse direction. Check bearing for binding and free spin.

4) After reassembly of Chevette diesel starters, the pinion jumps out as the solenoid "S" terminal is connected to the battery positive terminal and the negative terminal is connected to

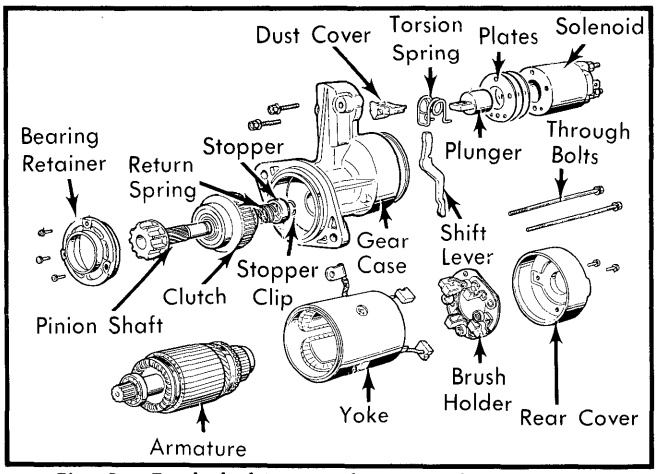

Fig. 2 Exploded View of Nippondenso Starter For Chevrolet Chevette Diesel Models

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the gear case. Check the difference between the point to which the pinion is jumped out and point to which pinion can be pulled out with fingers.

5) If gap is more than .059" (1.5 mm), an adjusting shim should be added to reduce the gap. Shims are available in .0197" (.5 mm) and .0315 (.8 mm) thicknesses.

BENCH TESTING (CHRYSLER CORP.)

STARTER NO LOAD TEST

1) Place starter in a vise. Use a fully charged 12 volt battery. Connect an ammeter (0 to 100 scale) with a carbon pile rheostat in series with battery positive terminal and starter terminal.

2) Connect a voltmeter across starter. Rotate rheostat to full resistance position. Connect battery cable from negative battery terminal to starter housing.

3) Adjust rheostat until voltage shown on voltmeter is 11 volts. Current draw should be 47 amperes at 6600 RPM for starters used on 1.7L and 2.2L engines; 85 amperes at 3700 RPM for starter used on 2.6L engine.

ARMATURE FOR SHORT CIRCUIT

Place armature in a growler and hold a thin steel blade parallel and just above core while rotating armature slowly. If armature is shorted, blade will vibrate and be attracted to the core. Replace shorted armature.

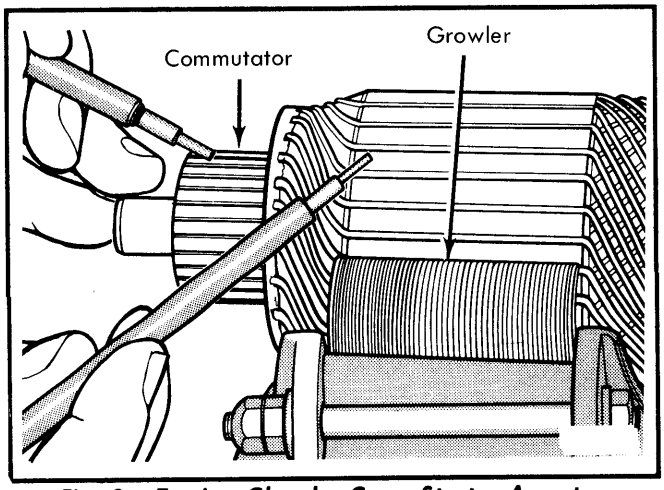

Fig. 3 Testing Chrysler Corp. Starter Armature for Grounded Condition

ARMATURE FOR GROUND

Use a test lamp and touch one lead to armature shaft and other lead to each commutator bar. If lamp lights, replace armature.

FIELD COILS FOR GROUND

1) Use test lamp and touch one probe to series field coil lead and other probe to field frame. If lamp lights, replace field coil housing assembly.

2) Touch each of brush holders with one probe, while holding other probe against brush plate. Two brush holders are grounded 180° apart and should cause test lamp to light. Other two brush holders should not cause lamp to light, as they are insulated. If these brush holders are grounded, replace brush plate assembly.

BENCH TESTING (CHEVETTE DIESEL)

ARMATURE DISTORTION

Check armature for distortion using a dial indicator. If armature is out-of-round more than .0019" (.05 mm), replace armature. If face of armature is roughened or contaminated, it can be smoothed with a piece of fine sandpaper. Check armature for run-out. If run-out exceeds .0078" (.2 mm), replace armature.

ARMATURE CONTINUITY

Check for continuity across armature and shaft using an ohmmeter. If tester indicates continuity, armature is internally grounded due to poor insulation. Check for continuity across commutator segments. If no continuity, coil is open and should be replaced.

FIELD COIL CONTINUITY

Check for continuity across field coil terminals to which brushes are connected. If no continuity, field coil is open and should be replaced. Check for continuity across field coil terminal and yoke. If continuity is indicated, field coil is grounded due to defective insulation and should be replaced.

BRUSH AND BRUSH HOLDER

Check brushes for wear. If worn to less than .24" (6 mm), replace brushes. Inspect brush springs for wear or damage. Check for continuity across insulated brush holder (positive side) and grounded brush holder (negative side). If continuity exists, brush holder is grounded and should be replaced.

SOLENOID FOR OPENS

Check for continuity across solenoid "S" terminal and coil case. If no continuity exists, shunt coil is open and should be replaced. Check for continuity across solenoid "S" and "M" terminals. If no continuity, series coils are open and should be replaced.

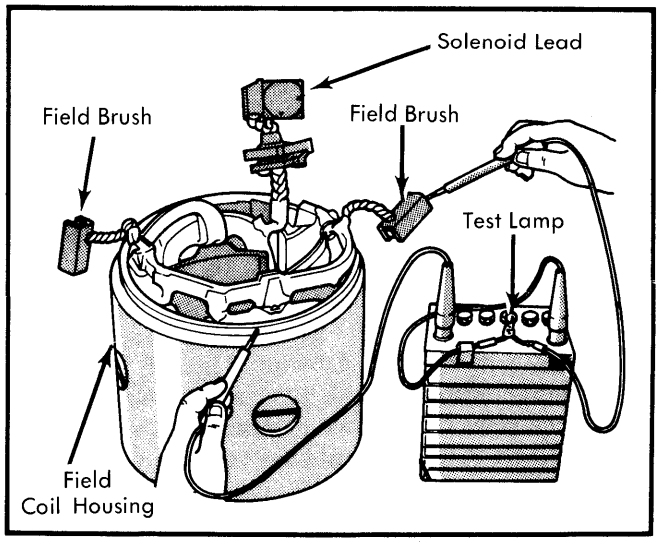

Fig. 4 Testing Field Coils For Ground on Chrysler Corp. Starters