

MOTORCRAFT

American Motors (6 Cylinder)
Ford Motor Co. (All Models)

DESCRIPTION

Four pole, four brush starter with three series of coils and one shunt coil. Shunt coil is wound around a movable pole piece which operates the integral positive engagement drive mechanism.

TESTING

STARTER CRANKING CIRCUIT TESTS

Before performing tests, remove and ground coil secondary wire (disconnect at distributor). Place transmission in neutral or park and apply parking brake. Be sure battery is fully charged. When making voltmeter connections, be sure to connect leads to battery posts or threaded terminals and not just to cable ends. See Fig. 1 for all cranking circuit tests.

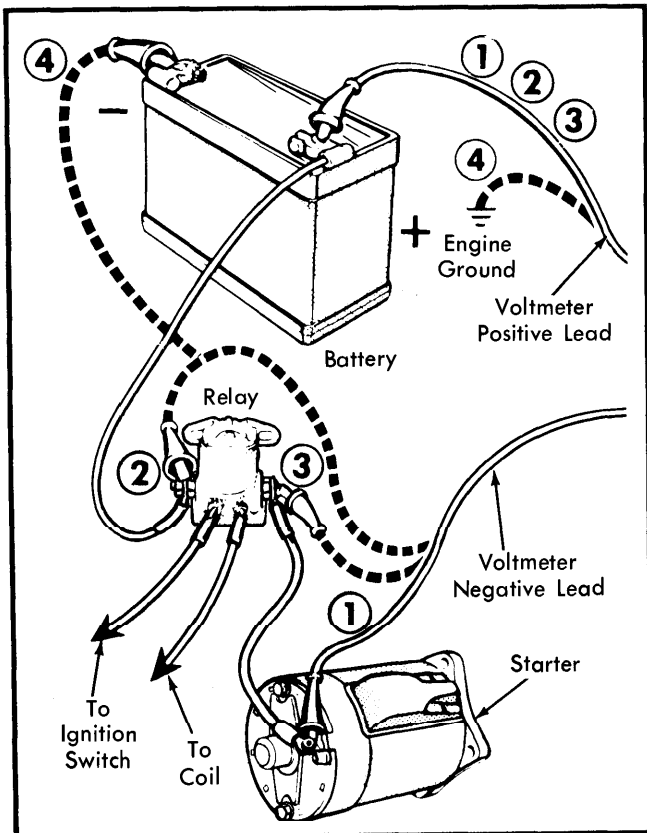


Fig. 1 Starter Cranking Circuit Test Connections

Battery-to-Starter Motor Voltage Drop (No. 1) — Connect voltmeter positive lead to battery post and negative lead to starter motor terminal. While cranking engine, note voltmeter reading. Reading should be .5 volt or less. If reading is greater, move negative lead to starter cable and retest. If voltage is now .5 or less, remove cable and clean connections, then retest at starter motor terminal. If voltage is still above specifications, test individual cables between battery and starter as follows:

Battery-to-Solenoid Voltage Drop (No. 2) — Connect voltmeter positive lead to battery positive post and negative

lead to battery terminal of solenoid. While cranking engine, note voltmeter reading. Reading should be .1 volt or less. If reading is greater, remove cable and clean connections, then retest. If reading is still greater, replace cable.

Solenoid Voltage Drop (No. 3) — Connect voltmeter positive lead to battery positive post and negative lead to starter relay (battery side). While cranking engine, note voltmeter reading. Reading should be .3 volt or less. If reading is greater, move negative lead to starter terminal at solenoid and retest. If reading is now .3 volt or less, remove and clean cable connector, then retest. If still in excess of .3 volt, replace solenoid. If battery-to-starter circuit reading (No. 1) is now greater than .5 volt, replace solenoid-to-starter cable.

Starter Motor Ground Voltage Drop (No. 4) — Connect voltmeter negative lead to negative terminal of the battery and positive lead to the engine ground. While cranking engine, note voltmeter reading. Reading should be .3 volt or less. If more, move positive lead to ground cable attaching bolt at engine and retest. If reading is now less than .3 volt, check starter motor for loose mounting bolts, corrosion, or dirt on mounting surface. If reading is now more than .3 volt, examine ground cable for bad connections or bad cable.

STARTER LOAD TEST

Make connections as shown in Fig. 2. Crank engine with ignition coil secondary wire grounded and note voltage on tester. Stop cranking engine and turn load control knob until voltage reading is exactly the same as it was during engine cranking. Read current draw on ammeter scale. If not within specifications, starter is defective and must be overhauled.

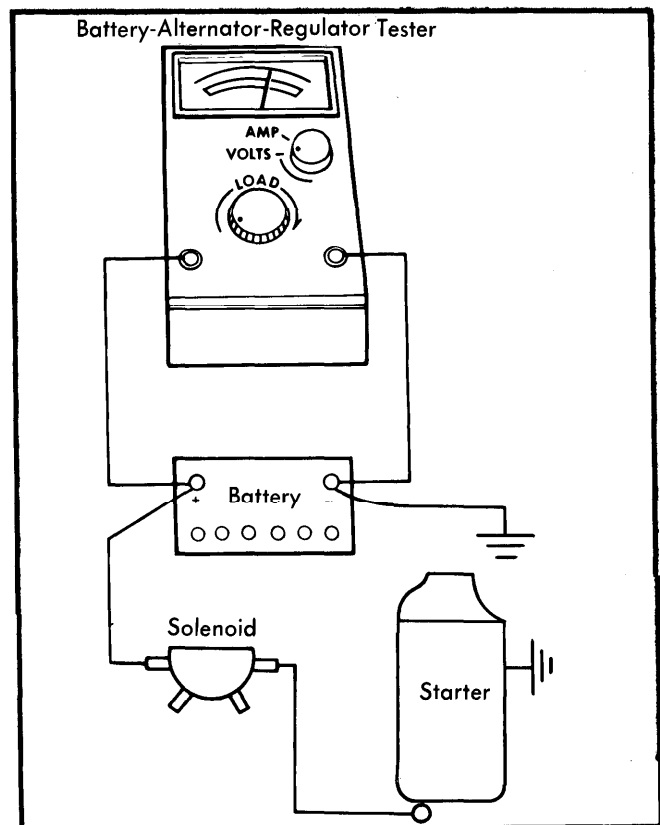


Fig. 2 Starter Load Connections

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NOTE — Do not take amperage draw reading until starter has obtained maximum RPM.

Load Test Specifications

Application	Amperes
American Motors	
6-Cylinder	180-220
Ford Motor Co.	
4" Starter	150-250
4½" Starter	150-210

STARTER NO-LOAD TEST

Make connections as shown in Fig. 3 (also connect a tachometer to starter). Operate starter motor and note voltage reading and tachometer reading. Disconnect starter from battery. Turn load control knob until voltage reading is same as when starter is connected. Read the amperage drawn. If amperage reading is less than 67 amps., starter has high electrical resistance. If starter RPM is less than 6700 (4") or 7380 (4½"), worn bushings or bent armature is indicated.

Starter No-Load Test

Application	Specifications
Voltage	12 volts
Amperage	67-85 amps.
RPM Range	6700-9356

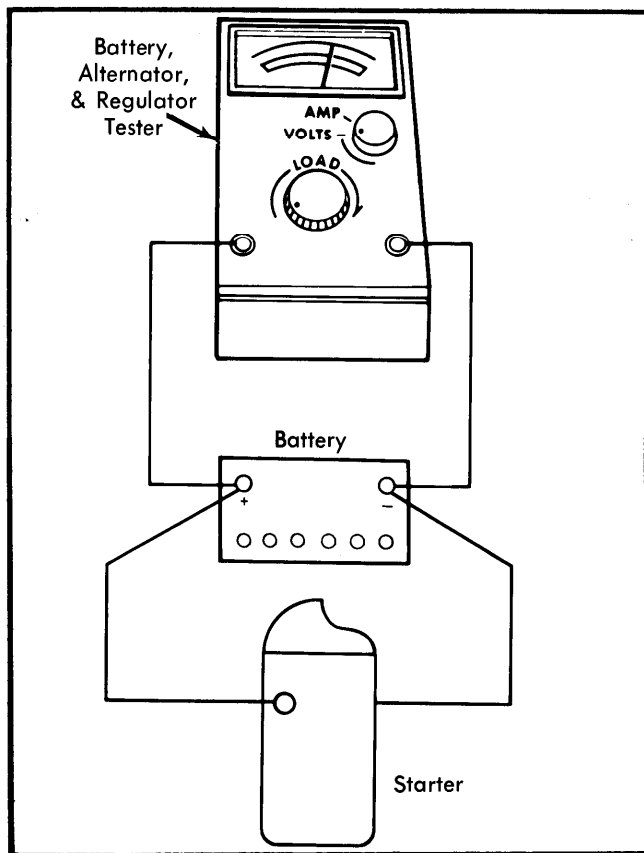


Fig. 3 Starter No-Load Test Connections

OVERHAUL

DISASSEMBLY

- 1) Remove cover screw, cover, through bolts, starter drive end housing and starter drive plunger lever return spring. Remove starter gear plunger lever pivot pin and lever and slide armature out.
- 2) Remove stop ring retainer, thrust washer and stop ring from armature shaft. Remove starter drive gear assembly. Remove brush end plate and insulator assembly. Remove brushes from plastic brush holder and lift out holder. Note location of brush holder with respect to end terminal.
- 3) Remove screws retaining ground brushes to frame. Bend up the edges of the sleeve which is inserted in frame and remove sleeve and retainer. Detach shunt field coil ground wire from copper tab riveted to frame.
- 4) Remove the three pole shoe retaining screws with tool 10044-A (or equivalent), and an arbor press. Cut the field coil connection at the switch post lead and remove pole shoes and coils from frame. Cut the positive brush leads from the field coils as close to the field connection point as possible.

CLEANING

Use a brush or compressed air to clean field coils, armature, brush end plate, drive end housing and starter drive. Wash other parts in suitable solvent.

PARTS REPLACEMENT & TESTING

Armature — Check armature for shorted coils with a growler. Test for grounded coils with a test lamp or voltmeter and battery connected in series, by touching one test probe to commutator and other test probe to core or armature shaft. If test lamp lights, or voltmeter shows any reading, coils are grounded. Commutator should be clean and smooth. If commutator is burned or out-of-round more than .005", turn down in a lathe and clean lightly with commutator paper.

Field Coil — Check for open or grounded coils with test lamp or voltmeter and battery connected in series. Make sure insulated brush leads are clear of frame, block drive coil contacts (on frame) open by inserting insulator between contacts, disconnect holding coil ground lead from frame. Touch one test

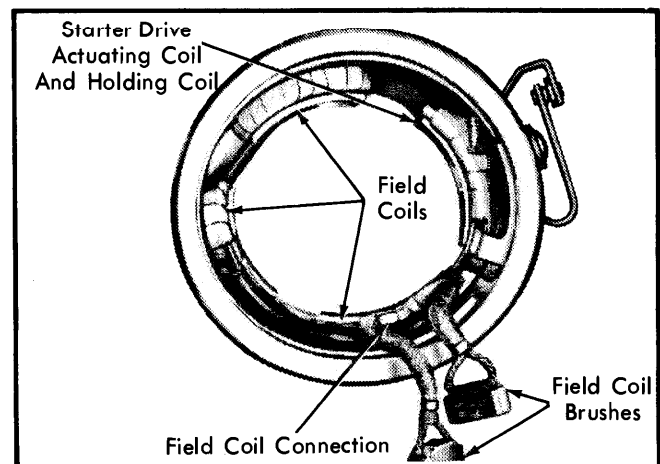


Fig. 4 Field Coil Assembly

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probe to coil lead, other probe to frame. If lamp lights or voltmeter shows a reading, coils are grounded. Test for open coils by placing one test probe to field terminal and other probe to insulated brush lead. Lamp should light or voltmeter should show reading.

Brushes & Springs — Check brush holders for broken springs and insulated brush holders for shorts-to-ground. Tighten any loose rivets. Replace brushes if worn to 1/4" length.

Brush Spring Tension

Application	Tension
4" Starter	80 ozs.
4 1/2" Starter	40-80 ozs.

REASSEMBLY

1) Position coils and pole pieces (with coil leads in terminal screw slot), install retaining screws. As screws are tightened, strike frame several times with soft faced hammer to seat and align pole shoes, then stake screws.

2) Install plunger coil sleeve and retainer and bend tabs to retain coils to frame. Position grommet on end terminal and

align into the notch in frame. Solder field coil to starter switch terminal post. Use a 300 watt iron and rosin core solder.

3) Check for continuity and grounds in assembled coils. Position the ground brushes to starter frame and install retaining screws. Apply a thin coat of Lubriplate on armature shaft splines. Install starter motor drive gear assembly to armature shaft and install new stop ring, stop ring retainer and thrust washer.

4) Install armature in starter frame. Position the starter drive gear plunger lever to frame and starter drive assembly, and install pivot pin. Fill drive end housing bearing 1/4 full with grease. Position drive end housing to frame making sure lever return spring engages tang on lever.

5) Install brush holder and insert brushes and brush springs. Positive brush leads should be positioned in their respective slots to prevent potential grounding. Install brush end plate. Ensure that end plate insulator is positioned properly on end plate.

6) Install through bolts to starter frame and tighten to 55-75 INCH lbs. Install starter drive plunger lever cover and tighten retaining screw. Check starter no-load current draw.

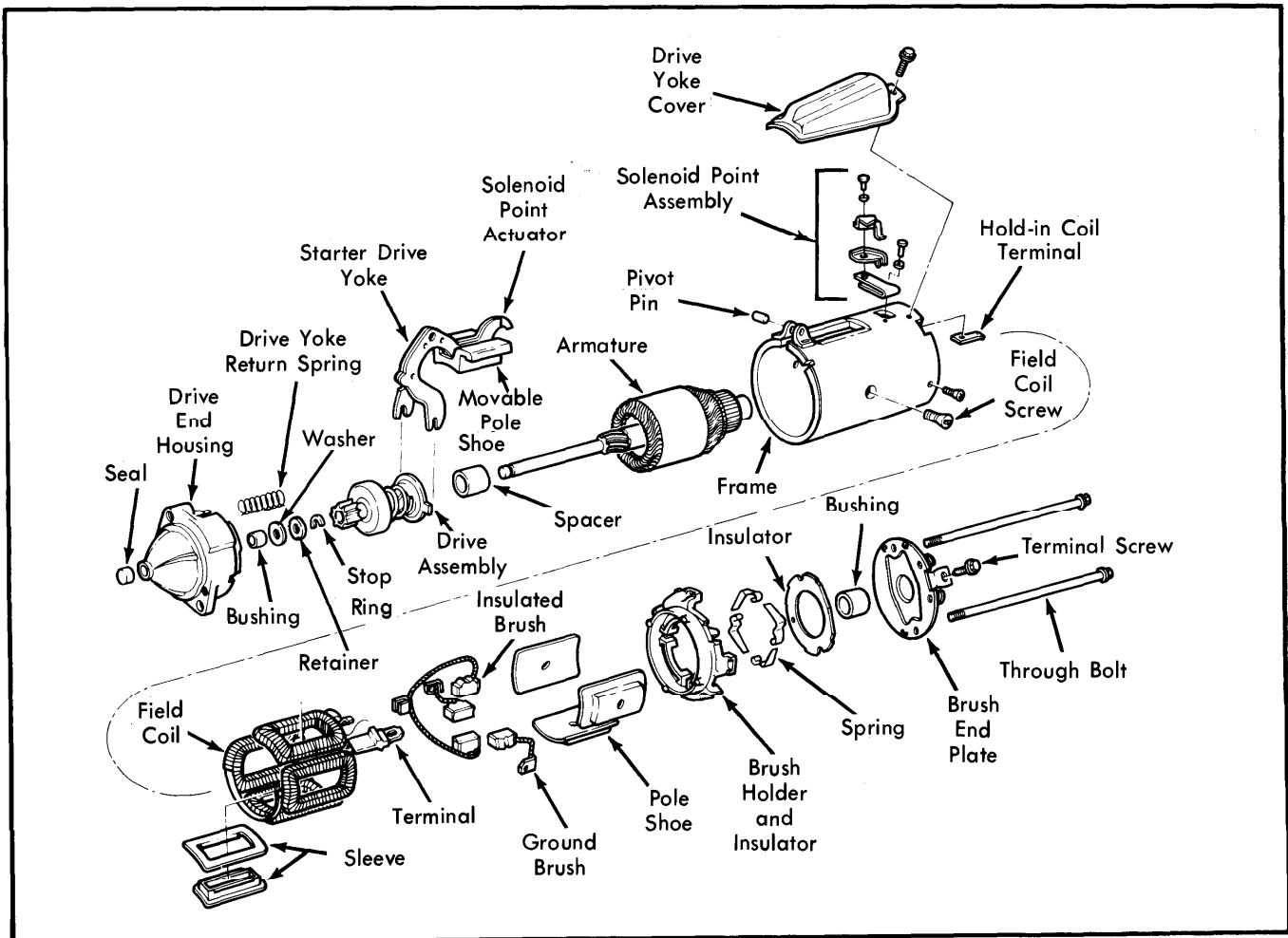


Fig. 5 Exploded View of Starter Motor Assembly