

## MOTORCRAFT SOLENOID ACTUATED

Ford Motor Co. (460" Engine Only)

### DESCRIPTION

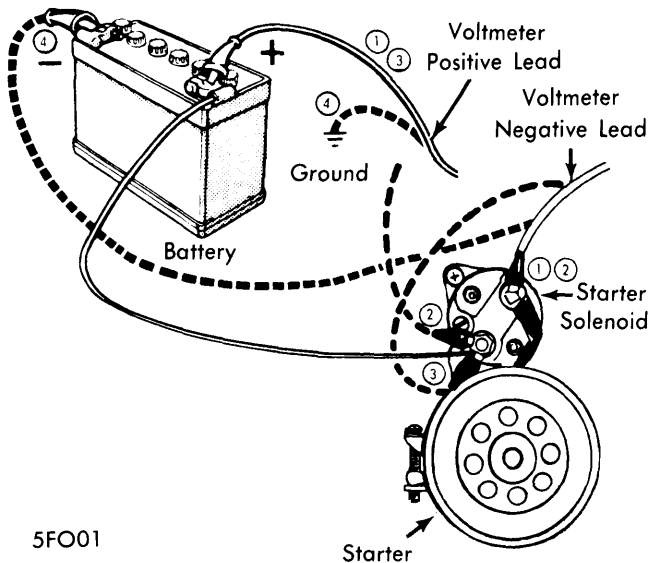
Starter motor is a four-brush, four-field, four-pole wound unit consisting of a frame and field coil assembly, armature, brush plate assembly, drive and shift lever assemblies and a drive housing and starter solenoid assembly. The frame encloses a wound armature which is supported at drive end with caged needle bearings and at commutator end with a sintered copper bearing.

### TESTING

**Starter Cranking Circuit Test** – Make each test connection as shown in illustration. While cranking engine, note voltage drop reading for each test. Disconnect and ground high tension lead from ignition coil to prevent engine from starting and make tests as follows:

- 1) With voltmeter negative lead connected to starter terminal and positive lead connected to battery positive terminal, maximum allowable voltage drop should be .5 volt.
- 2) With voltmeter negative lead connected to starter terminal and positive lead connected to battery terminal of starter solenoid, maximum allowable voltage drop should be .3 volt.
- 3) With voltmeter negative lead connected to battery terminal of starter solenoid and positive lead connected to positive terminal of battery, maximum allowable voltage drop should be .2 volt.
- 4) With voltmeter negative lead connected to negative terminal of battery and positive lead connected to engine ground, maximum allowable voltage drop should be .1 volt.

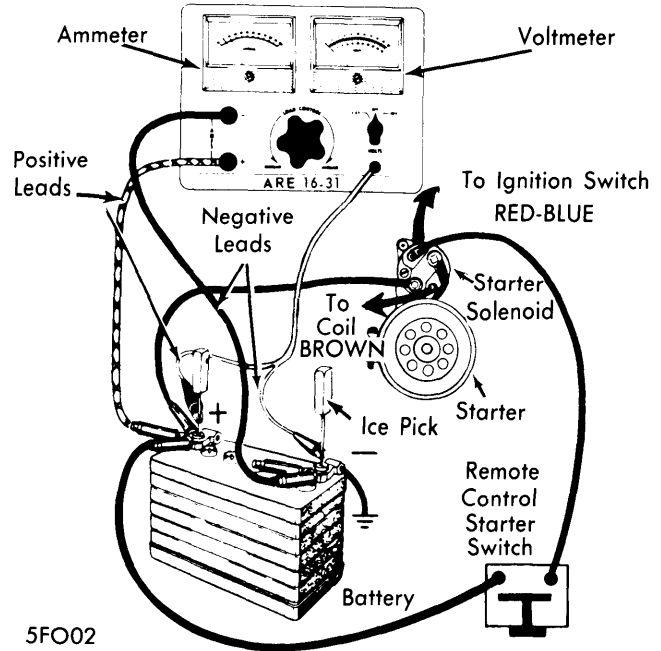
Connections For Tests 1, 2, 3, & 4



CRANKING CIRCUIT TEST CONNECTIONS

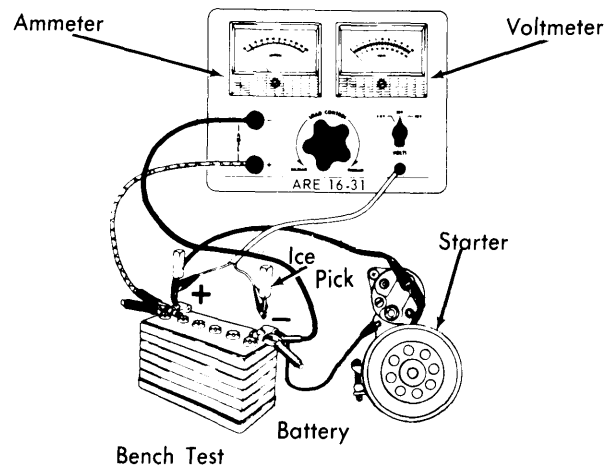
**Starter Load Test** – Make test connections as shown in illustration. Be sure no current is flowing through ammeter and that carbon pile rheostat is in maximum counterclockwise position. Crank engine with ignition off and note exact voltmeter reading. Stop cranking engine, reduce re-

sistance of carbon pile until voltmeter indicates same reading as when cranking engine. Ammeter will indicate starter current draw under load.



STARTER LOAD TEST CONNECTIONS

**Starter No-Load Test** – Make test connections as shown in illustration (starter will run at no-load). Be sure no current is flowing through ammeter (rheostat at maximum counterclockwise position). Note exact reading on voltmeter. Disconnect starter from battery and reduce resistance of rheostat until voltmeter indicates same reading as when starter was running. Ammeter will indicate starter no-load current draw.



STARTER NO-LOAD TEST CONNECTIONS

F5O03

## MOTORCRAFT SOLENOID ACTUATED (Cont.)

**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 burned, or out-of-round more than .005", turn down in a lathe and sand lightly with 00 sandpaper.

**Field Coils** – Check for open or grounded coils with test lamp or voltmeter and battery connected in series.

**Brushes & Springs** – Check brush holders for broken springs and check insulated brush holders for shorts to ground. Tighten any loose rivets. Replace brushes if worn to ¼" in length.

### SPECIFICATIONS

**Cranking Amperage Draw** – 180-210 amperes with a normal cranking speed of 140-170 RPM.

**Brush Spring Tension** – 40 oz.

**No-Load Current Draw** – 70 amps.

### OVERHAUL

**CAUTION** – Solenoid actuated starters used with starter relays require use of a special solenoid connector link (see starter illustration). When servicing starters, reinstall link if used. If link is not reinstalled on starters with starter relays, starter will not crank. If link is installed on starters without starter relays, starter will begin to crank as soon as the battery is connected.

### DISASSEMBLY

1) Disconnect copper strap from starter terminal on solenoid, remove retaining screws and solenoid from drive housing. Loosen retaining screw and slide brush cover band back on starter frame for access to brushes. Remove commutator brushes from holders (hold each spring away from brush with suitable hook while sliding brush out of holder).

2) Remove through bolts, separate drive end housing, starter frame and end plate assemblies. Remove solenoid plunger and shift fork assembly. **NOTE** – If either plunger or fork is to be replaced, separate by removing roll pin. Remove armature and drive assembly from frame. Remove drive stop ring and slide drive assembly off armature shaft. Remove drive stop ring retainer from housing.

### CLEANING

Use a brush or compressed air to clean drive, field coils, armature, commutator, armature shaft front end plate, and rear end housing. Wash all other parts in solvent and dry.

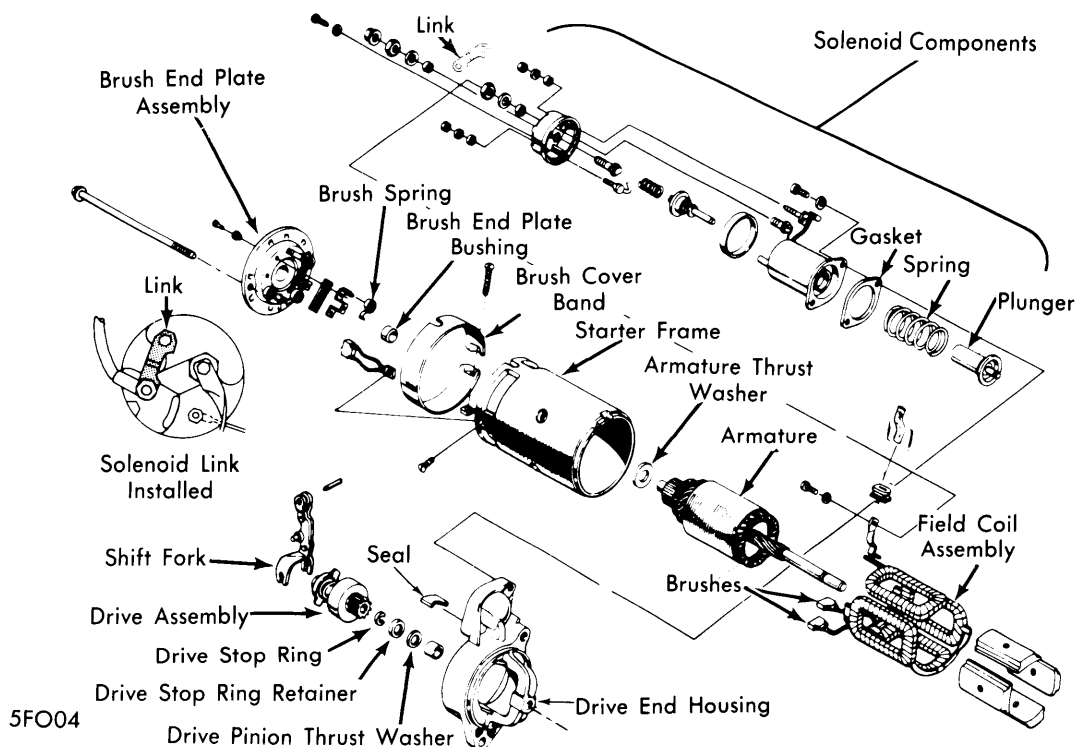
### REASSEMBLY

1) Place small amount of lubriplate on armature shaft splines. Install drive assembly on armature shaft and install new stop ring. Lubriplate shift lever pivot pin. Position solenoid plunger and shift lever assembly in drive housing. Install new retainer in drive housing. Lubriplate drive end of armature shaft. Place armature and drive assembly into drive housing, making sure shift lever tangs properly engage drive assembly.

2) Lubriplate commutator end of armature shaft. Position frame and field assembly to drive housing marking sure they are properly indexed. Position brush plate assembly to frame assembly. Install through bolts and torque to 45-85 inch Lbs. Install brushes in their holders. Center brush springs. Press insulated brush leads away from all other interior components (to prevent shorts).

3) Position rubber gasket between solenoid mounting and upper outside surface of frame. Position starter solenoid with metal gasket and spring, position heat shield (if used) and install solenoid mounting screws. Connect copper strap to starter terminal on solenoid. Position cover band and tighten retaining screw.

**NOTE** – A metal heat shield should be on starter solenoid to protect it from exhaust system heat. When servicing starter, always reinstall shield or if missing, install a new shield.



SOLENOID ACTUATED STARTER