## LUCAS

**Austin Marina**
**Jaguar**
**MG**
**Triumph**

### DESCRIPTION

The Lucas starter is a series wound, four-pole, four-brush motor. Two brushes are grounded and two are insulated and connected to the ends of field coils. Some models have an extended shaft which carries a conventional inertia drive. Other models incorporate a roller clutch drive on the shaft.

### APPLICATION

| Car Model | Model No. |
|---|---|
| Austin Marina | 2M100 |
| Jaguar | |
| 6 Cylinder | 3M100 |
| 12 Cylinder | M45 |
| MG | |
| Midget | M35J |
| MGB & MGB/GT | 2M100 |
| Triumph | |
| 4 Cylinder TR7 | 2M100 |
| 4 Cylinder Spitfire | M35J |
| 6 Cylinder | M418G |

### TESTING

#### PERFORMANCE TESTS

**No Load Test** – With starter on bench and using a good 12-volt battery, connect an ammeter in series to starter. Starter should rotate smoothly. See specifications for RPM, and current draw.

**Lock Test** – To perform lock test, follow instructions and procedures outlined in instruction manual furnished with tester. With starter locked in test stand, and voltage adjusted to specified figure, ammeter reading and starter torque should be as specified (see specifications).

### OVERHAUL

#### DISASSEMBLY

*NOTE – Disregard Step 1) when working on inertia drive models.*

1) Disconnect link between lower solenoid terminal and starting motor yoke. Remove nuts securing solenoid unit. Remove solenoid from drive end bracket, being careful to disengage solenoid plunger from starter drive engagement lever.

2) Remove metal band cover, hold back brush springs and remove brushes from their holders. Remove the two through bolts and remove commutator end bracket from yoke.

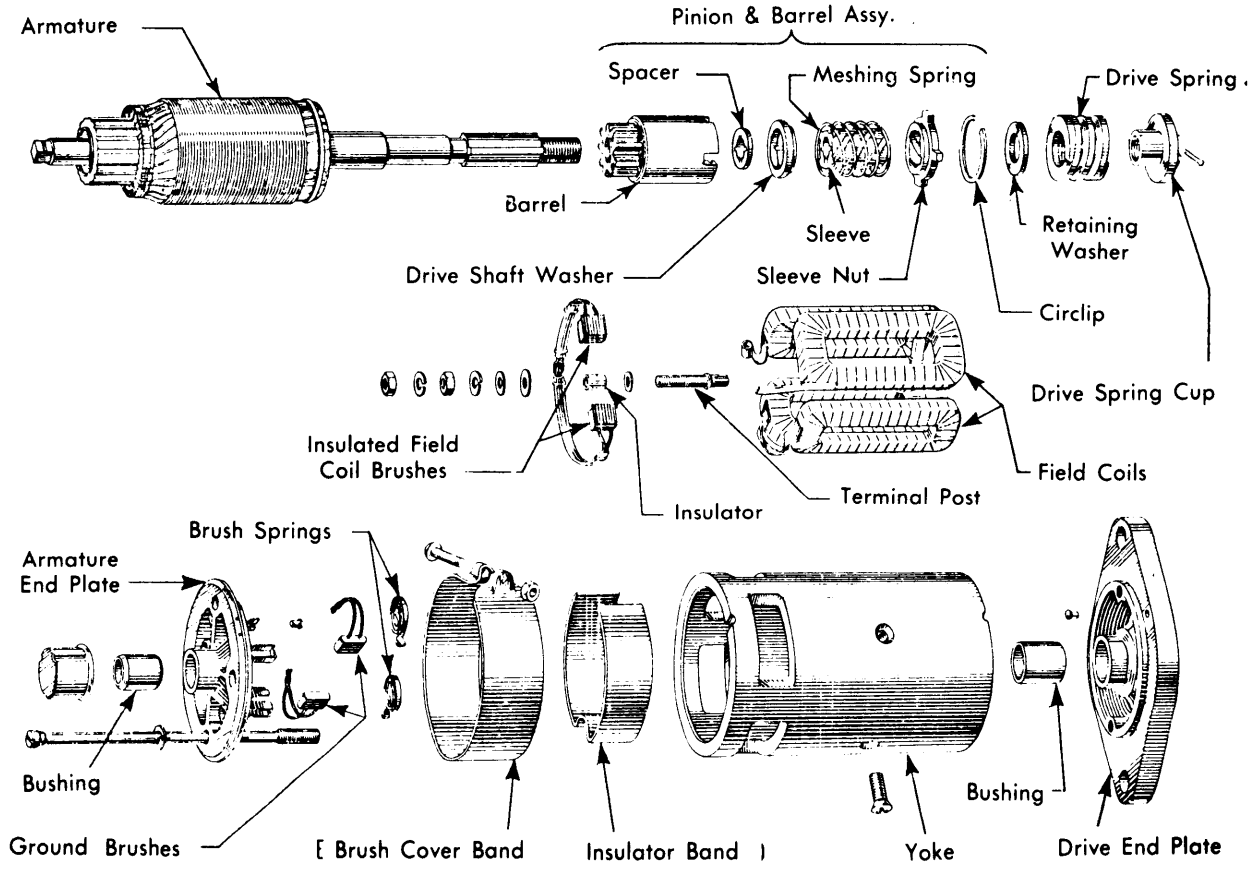


*Fig. 1 Exploded View of Lucas Inertia Starter*

## LUCAS (Cont.)

3) On inertia type starters, remove drive end bracket with armature and drive from yoke. If it is necessary to remove drive end bracket from armature, it can be removed after the drive is dismantled.

4) On all other models, extract rubber seal from drive end bracket. Remove nut securing eccentric pin on which drive engagement lever pivots and remove pin. Separate drive end bracket from armature and intermediate bracket assembly. Remove washer from end of armature shaft extension and slide assembly and engagement lever off shaft. Remove intermediate bracket retaining ring from armature shaft extension and slide bracket and brake assembly off shaft.

### PARTS REPLACEMENT & TESTING

**Armature** – Check armature for open, shorted, or grounded circuits. Check for lifted commutator segments and loose turns in armature winding. A damaged armature must always be replaced and no attempt should be made to machine armature core or to true a distorted shaft. A scored armature may indicate a bent shaft or a loose pole shoe.

**Commutator** – Clean commutator with a cloth moistened in gasoline and if this is not effective, carefully polish with a strip of fine glass paper while rotating armature. To correct a badly worn commutator, disassemble starter as previously described and remove armature from end bracket. Mount armature in a lathe and rotate at high speed, taking a light cut on commutator with a very sharp tool. Do not remove more metal than is absolutely necessary. *NOTE – Insulators, between commutator segments, must not be undercut.*

**Brushes & Springs** – Check that brushes move freely in holders by holding back brush springs and pulling gently on the flex connectors. If movement is sluggish, remove brush from holder and clean sides with a gasoline moistened cloth. Replace brushes and springs when they have reached minimum specifications in specification table.

| Starter Model | Min. Brush Length | Min. Spring Pressure |
|---|---|---|
| M35J | 3/8" | 28 ozs. |
| M418G | 5/16" | 36 ozs. |
| M45G | 5/16" | 30 ozs. |
| M45PE | 5/16" | 30 ozs. |
| 2M100 | 3/8" | 36 ozs. |
| 3M100 | 5/16" | 30 ozs. |

**Field Coils** – Check for open or grounded coils using test lamp or voltmeter and battery, connected in series. If coil is found to be defective, replace all coils as they should not be serviced individually. Mark yoke and pole shoes so shoes may be installed in original position. Remove fiber insulating washers and sleeve from field coil terminal post and remove insulating band from commutator end of yoke. Install a suitable tool (Pole Piece Expander) in starter and expand tool against pole pieces. Remove pole piece screws. Remove field coils and pole pieces from yoke. Carefully unsolder the field coil tappings from terminal post. To install, reverse removal procedure.

**Bushings** – 1) Armature shaft is supported by three bushings. Commutator and driving end brackets each carry porous bronze bushings, while intermediate bracket carries a graphite-impregnated brass bushing. Bushings which are worn to the extent that they allow excessive side play of the armature must be replaced.

2) The drive end bushing and intermediate bracket bushings can be pressed out. The commutator end bracket bushing is removed by inserting a suitable tap and withdrawing the tap with the bushing attached. New bushings are installed using a shouldered highly polished mandrel of same diameter as shaft to be fitted in the bushing. *CAUTION – Do not ream bronze bushings, as the porosity of the bushing may be altered.*

3) Before installing a new porous bronze bushing, it should be immersed in clean engine oil for 24 hours. This process can be speeded up in case of an emergency, by heating oil to 212°F (100°C) and allowing bushing to soak for two hours. Allow oil to cool before removing bushings from oil.

### REASSEMBLY

Clean all parts with a clean cloth and reassemble in the reverse order of disassembly while noting the following:

1) To facilitate installing the solenoid unit to drive end plate, ease drive assembly forward along armature shaft.

2) Set pinion movement before tightening the eccentric pivot pin securing nut. After completing reassembly, connect the small center terminal on the solenoid unit by way of a switch to a 12-volt battery. Connect other side of battery to one of the solenoid studs. Close switch (throwing drive assembly forward into the engaged position) and measure the distance between the pinion and the washer on the armature shaft extension. Make this measurement with the pinion pressed lightly towards armature to take up slack in engagement linkage. Measurement should be .005-.015".

3) To adjust, turn pivot pin until the correct measurement is obtained. The arc of the adjustment is 180° and the arrow on pivot pin should be set between the arrows on the drive end bracket. Tighten pivot pin locking nut.

### STARTER PERFORMANCE SPECIFICATIONS

| Model | No Load Test ① | | Lock Test | | |
|---|---|---|---|---|---|
| | Amps. | RPM | Amps. | Volts | Torque |
| M35J | below 65 | 8000-10000 | 350-375 | 7.5 | over 7 ft. lbs. |
| M418G | below 70 | 5800-6500 | below 465 | 7.0 | over 17 ft. lbs. |
| M45G | below 70 | 5800-6500 | below 465 | 7.6 | over 22.6 ft. lbs. |
| M45PE | below 100 | 5000-7500 | below 940 | 6.5 | over 29 ft. lbs. |
| 2M100 | below 40 | 5000-7000 | below 463 | 7.0 | over 14.4 ft. lbs. |
| 3M100 | below 65 | 5000-7000 | 515-545 | 7.0 | over 16.5 ft. lbs. |

① – At 12-volts.

## LUCAS (Cont.)

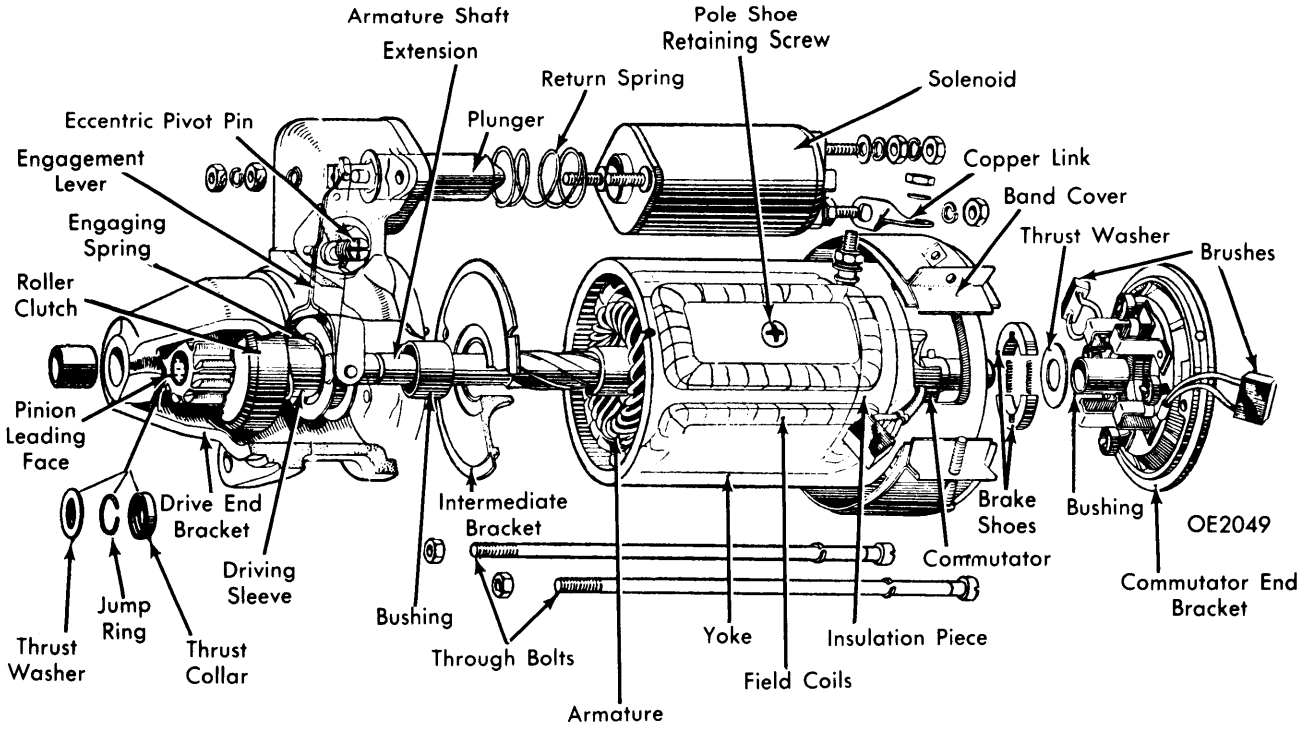


*Fig. 2 Exploded View of Lucas Pre-Engaged Starter*