

## Solenoid Hold-in Test

See [Figure 5-10](#). With test leads still connected in the manner specified in the previous [SOLENOID PULL-IN TEST](#), **disconnect solenoid "C" terminal/battery negative test lead at battery negative end only; reconnect loose end of this test lead to battery positive, instead.** If pinion remains in pull-in position, solenoid is working properly. If pinion does not remain in pull-in position, solenoid should be replaced.

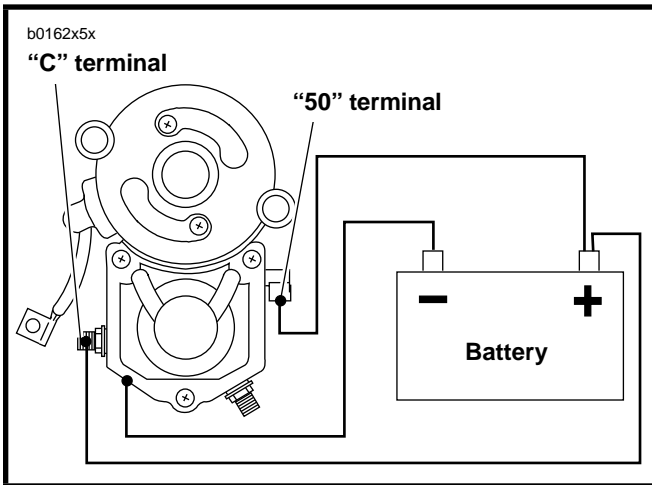


Figure 5-10. Hold-In Test

## Solenoid Return Test

See [Figure 5-11](#). With test leads still connected in the manner specified at the end of the previous [SOLENOID HOLD-IN TEST](#), **disconnect solenoid "50" terminal/battery positive test lead at either end.** If pinion returns to its original position, the solenoid is working properly. If pinion does not return to its original position, solenoid should be replaced.

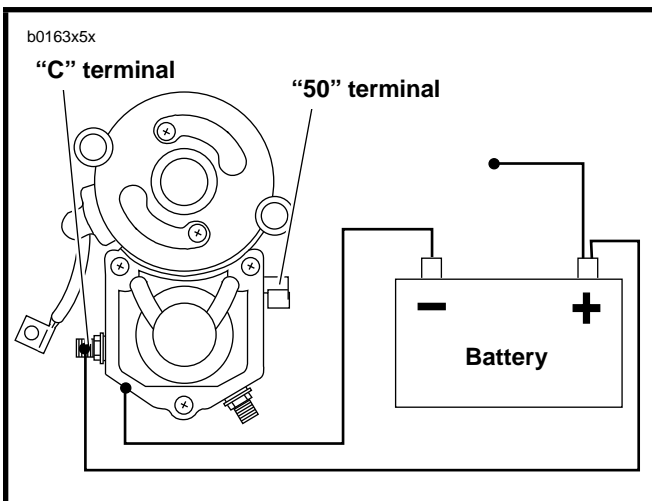


Figure 5-11. Return Test

## DISASSEMBLY, INSPECTION AND REPAIR

1. See [Figure 5-14](#). Remove field wire (22).
2. See [Figure 5-12](#). Remove thru-bolts.

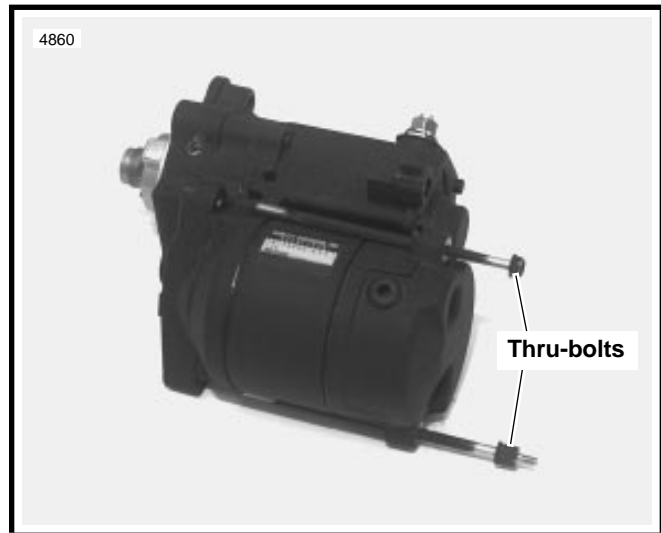


Figure 5-12. Removing the Thru-Bolts

3. See [Figure 5-13](#). Remove two end cover screws, O-rings, and end cover.

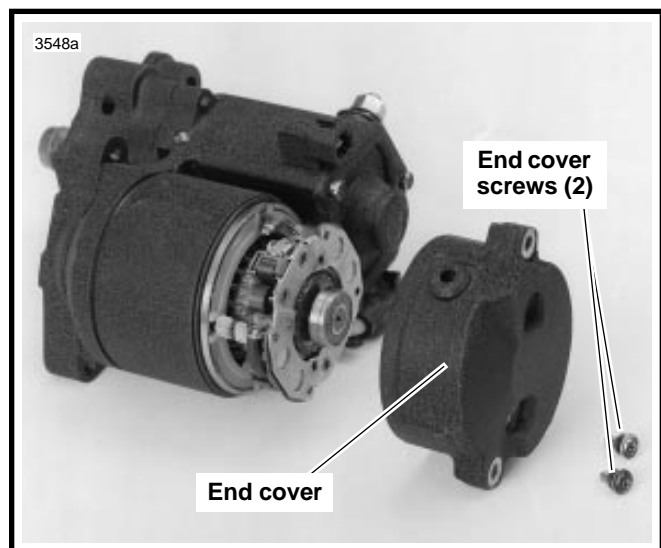


Figure 5-13. Removing End Cover

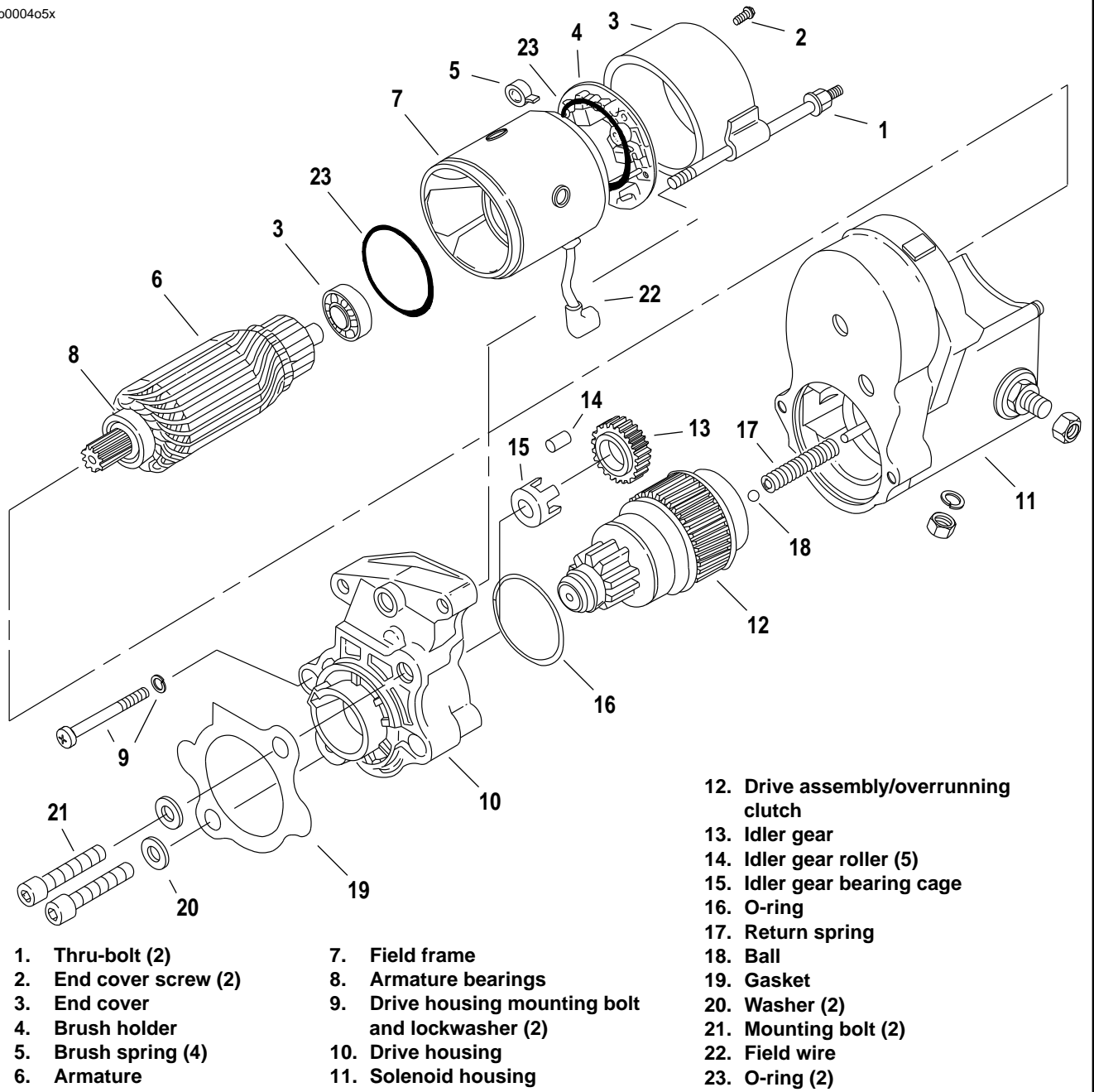


Figure 5-14. Starter Assembly

4. See [Figure 5-15](#). Use a wire hook to pull upward on brush springs, and lift brushes out of holder. Remove brush holder.
5. Check brush length. Replace all four brushes if length of any one brush is less than 0.433 in. (11.0 mm).

**Replace brushes in sets of four only.**

6. See [Figure 5-14](#). Remove armature (6) and field frame (7).
7. Place armature in lathe or truing stand and check runout of commutator. Commutators with more than 0.016 in. (0.41 mm) of runout should be replaced, or machined on a lathe. Commutators should be replaced when diameter is less than 1.141 in. (28.98 mm).

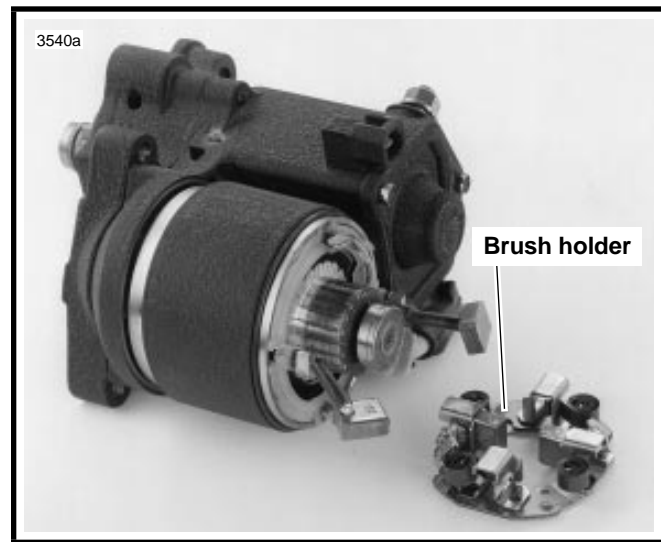


Figure 5-15. Removing Brush Holder

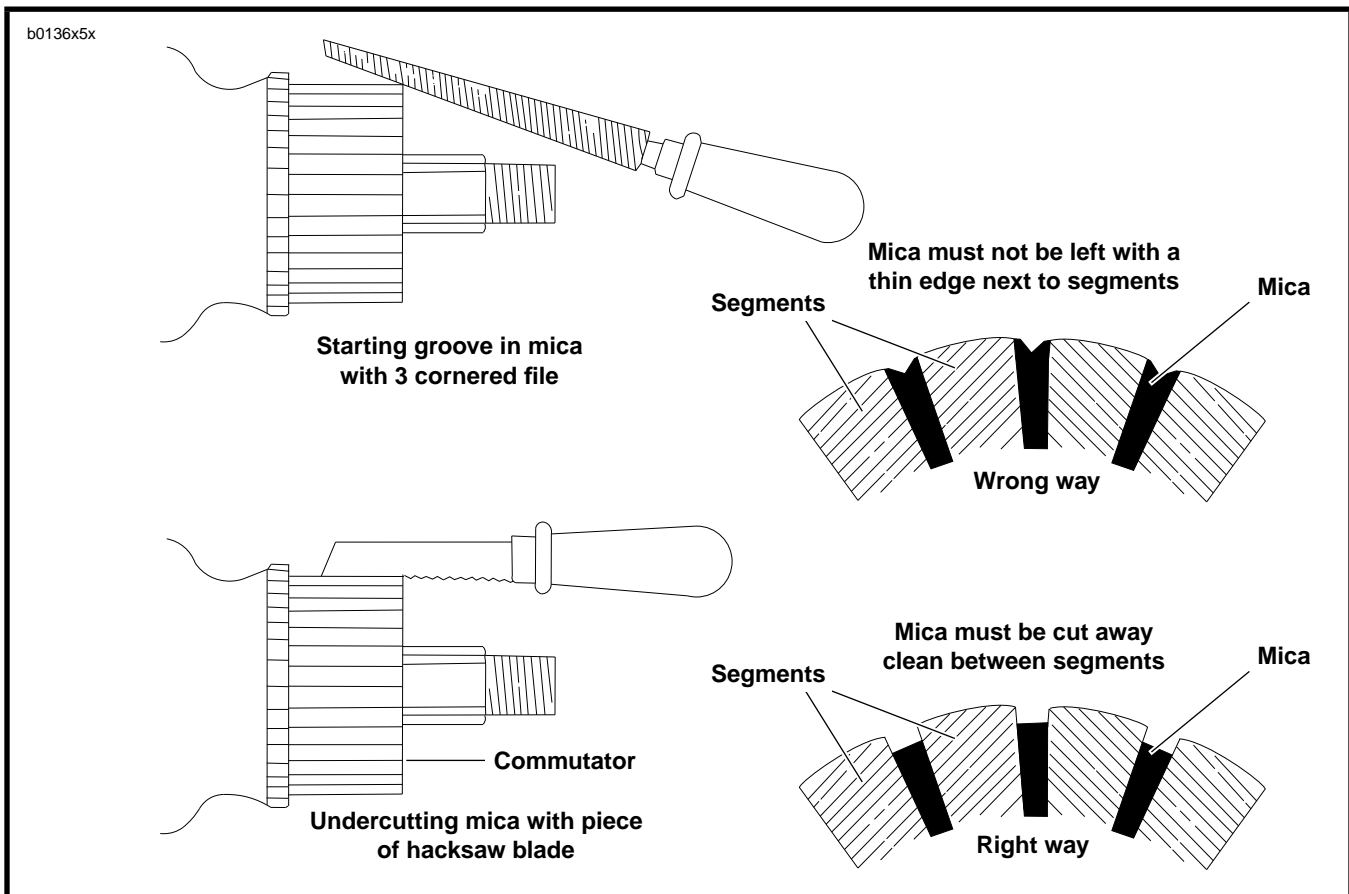


Figure 5-16. Undercutting Mica Separators

**⚠ CAUTION**

Do not use sandpaper or emery cloth to remove burrs on commutator. Otherwise, abrasive grit may remain on commutator segments; this could lead to excessive brush wear. Use only the recommended crocus cloth.

8. Check depth of mica on commutator. If undercut is less than 0.008 in. (0.20 mm), use an undercutting machine to undercut the mica to 1/32 in. (0.79 mm) deep. The slots should then be cleaned to remove any dirt or copper dust. See Figure 5-16. If an undercutting machine is not available, undercutting can be done satisfactorily using a thin hacksaw blade. After undercutting, lightly sand the commutator with crocus cloth to remove any burrs.
9. See Figure 5-17. Check for SHORTED ARMATURE with a growler. Place armature on growler. Hold a thin steel strip (hacksaw blade) against armature core and slowly turn armature. A shorted armature will cause the steel strip to vibrate and be attracted to the core. Replace armatures if shorted.

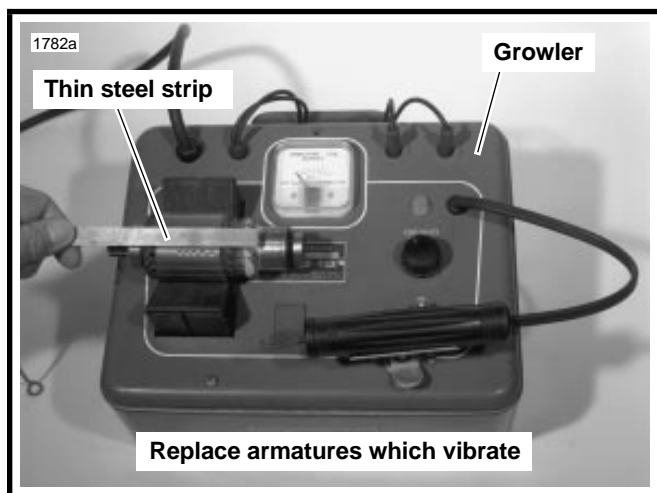


Figure 5-17. Shorted Armature Test Using Growler

10. See Figure 5-18. Check for a GROUNDED ARMATURE with an ohmmeter or continuity tester. Touch one probe to any commutator segment. Touch the other probe to the armature core. There should be no continuity (infinite ohms). If there is continuity, then the armature is grounded. Replace grounded armatures.
11. See Figure 5-19. Check for OPEN ARMATURE with an ohmmeter or continuity tester. Check for continuity between all commutator segments. There should be continuity (0 ohms) at all test points. No continuity at any test point indicates armature is open and must be replaced.
12. See Figure 5-20. Check for GROUNDED FIELD COIL with an ohmmeter or continuity tester. Touch one probe to the frame. Touch the other probe to each of the brushes attached to the field coil. There should be no continuity (infinite ohms). If there is any continuity at either brush, then the field coil(s) are grounded and the field frame must be replaced.

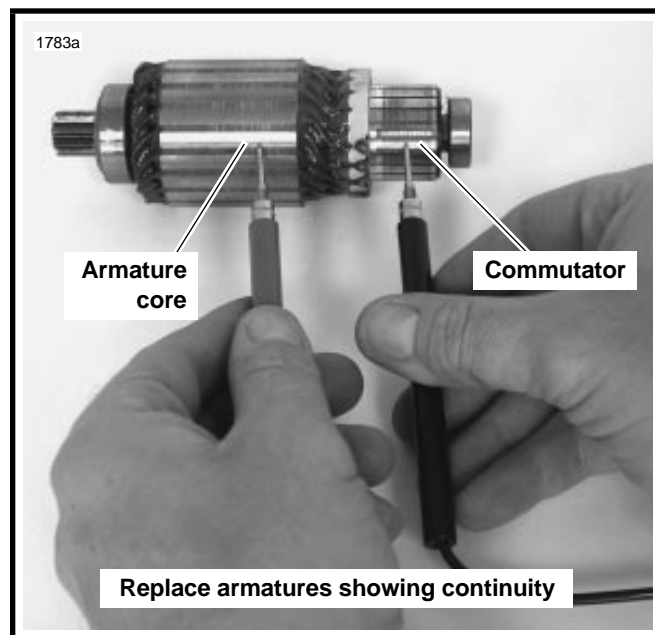


Figure 5-18. Grounded Armature Test

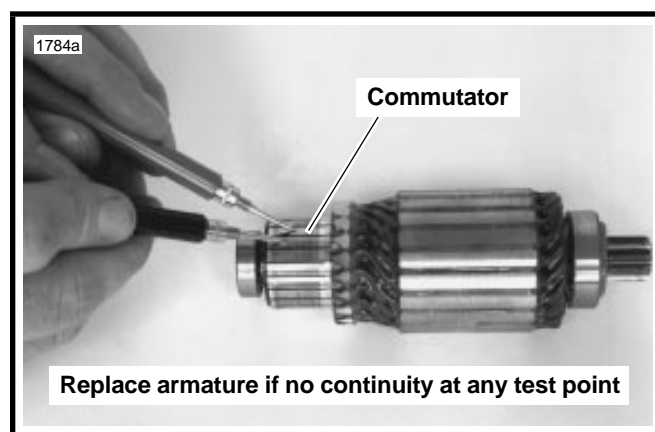


Figure 5-19. Open Armature Test

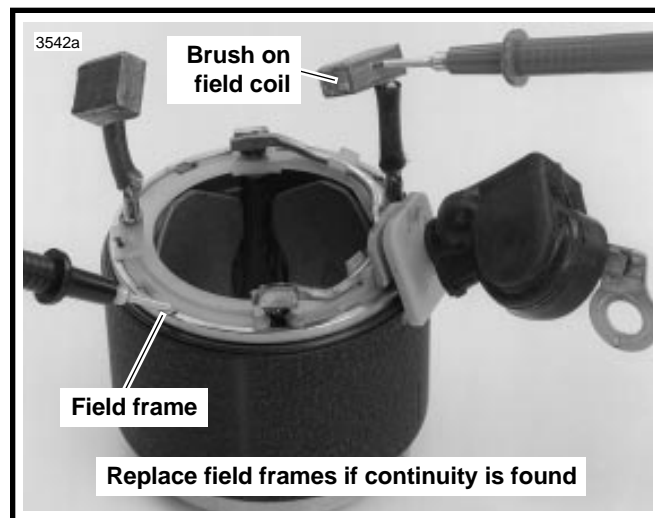
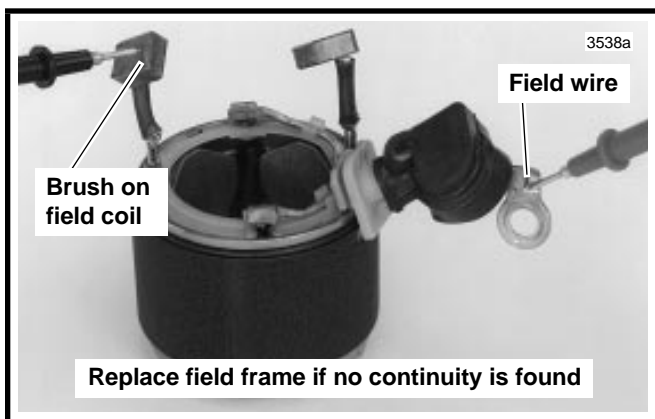
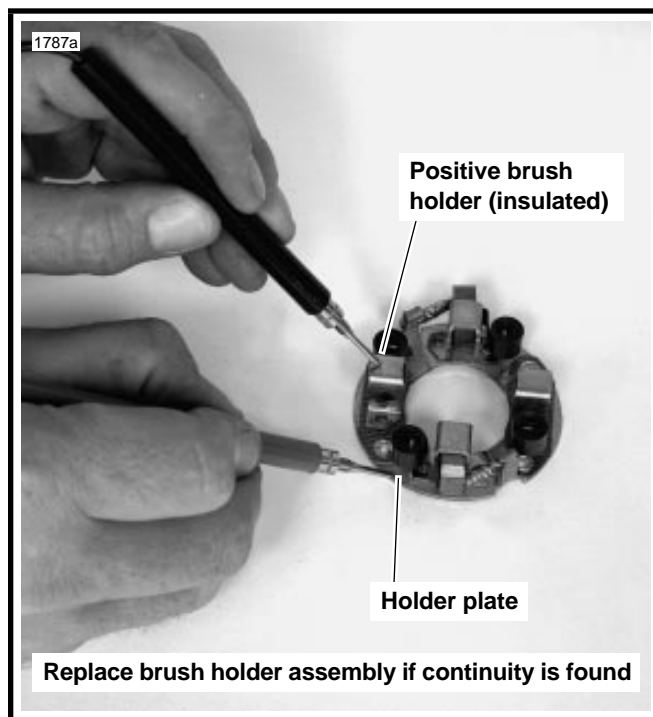


Figure 5-20. Grounded Field Test

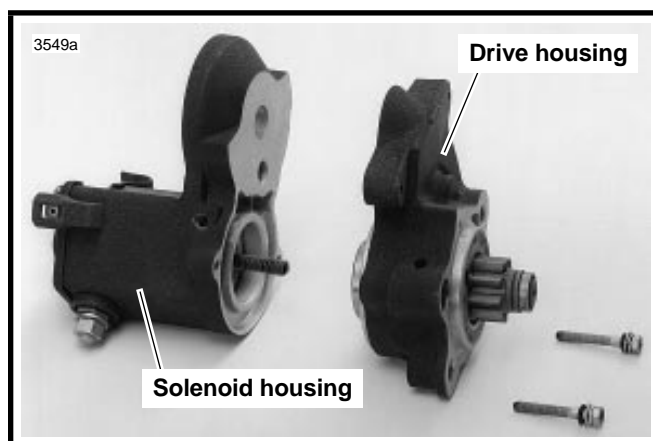


**Figure 5-21. Open Field Test**

13. See [Figure 5-21](#). Check for OPEN FIELD COILS with an ohmmeter or continuity tester. Touch one probe to the field wire. Touch the other probe to each of the brushes attached to the field coils. There should be continuity. If there is no continuity at either brush, then the field coil(s) are open and the field frame must be replaced.
14. See [Figure 5-22](#). Test BRUSH HOLDER INSULATION with an ohmmeter or continuity tester. Touch one probe to holder plate. Touch the other probe to each of the positive (insulated) brush holders. There should be no continuity (infinite ohms). If there is continuity at either brush holder, replace the brush holder assembly.
15. See [Figure 5-14](#). Check armature bearings (8) and replace if necessary.
16. See [Figure 5-23](#). Remove two drive housing mounting screws (with washers and lockwashers). Remove drive housing from solenoid housing.
17. See [Figure 5-24](#). Remove drive (1), idler gear (2), idler gear bearing (3), and O-ring (4) from drive housing (O-ring is located in drive housing groove).



**Figure 5-22. Brush Holder Insulation Test**



**Figure 5-23. Removing Starter Drive Housing**

## ASSEMBLY

1. See [Figure 5-24](#). Clean, inspect and lubricate drive assembly components. Lubricate parts with high temperature grease, such as LUBRIPLATE 110.
2. See [Figure 5-14](#). When installing drive assembly components, open end of idler bearing cage (15) faces toward solenoid.



3. When installing drive housing (10) to solenoid housing (11), use **new** O-ring (16). Be sure to install return spring (17) and ball (18).
4. Lubricate armature bearings (8) with high temperature grease, such as LUBRIPLATE 110. Install armature (6) and field frame (7) to solenoid housing (11).
5. Install brushes and brush holder (4).
6. Install end cover (3) with end cover screws (2) and O-rings (23).
7. Install thru-bolts (1).
8. Install solenoid wire to terminal.

## INSTALLATION

1. Install starter and starter gasket from right side of motor-cycle.
2. Install positive battery cable and solenoid wire to solenoid.
3. See [Figure 5-8](#). Install the starter mounting bolts and washers. Tighten mounting bolts to 13-20 ft-lbs (17.6-27.1Nm).
4. Install primary cover. See [PRIMARY CHAIN](#) in Section 6.
5. Fill primary chaincase/transmission with proper lubricant. See [CLUTCH, TRANSMISSION FLUID](#) in Section 1.

### WARNING

**Always connect positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion resulting in personal injury.**

### CAUTION

**Hold battery cable when tightening battery terminal hardware. Failure to hold cable will cause battery damage.**

6. Connect battery cables, positive cable first. Tighten battery terminal hardware to 30-40 **in-lbs** (3.4-4.5 Nm).

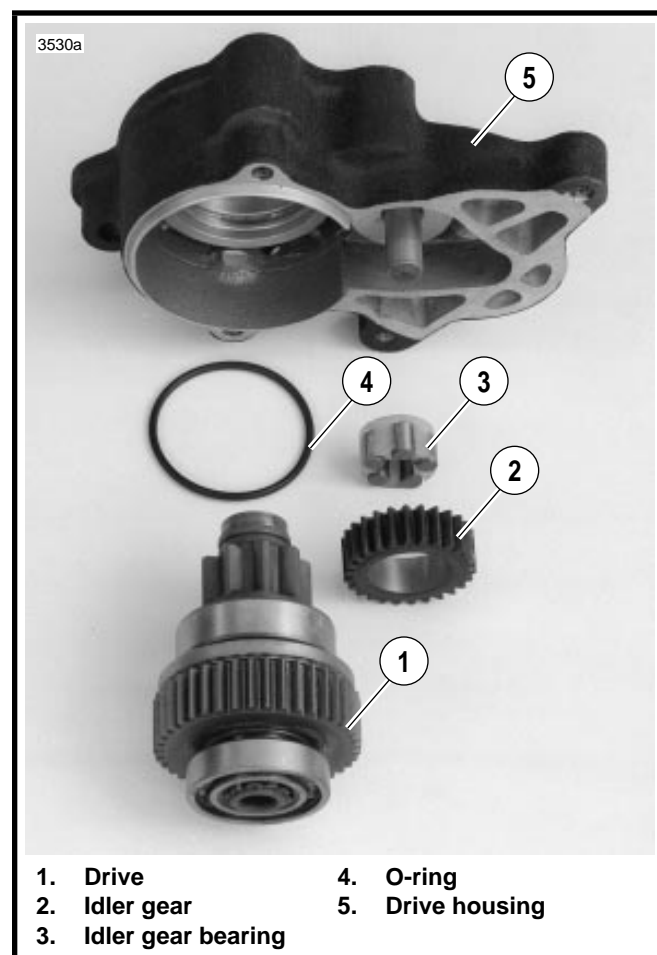


Figure 5-24. Starter Drive Assembly

# STARTER SOLENOID

## GENERAL

See [Figure 5-25](#). The starter solenoid is a switch that is designed to open and close the starting circuit electromagnetically. The switch consists of contacts and a winding around a hollow cylinder containing a movable plunger.

## DISASSEMBLY

1. See [Figure 5-25](#). Remove screws (1) and clip (2).
2. Remove cover (3) and gasket (4). Discard gasket.
3. Remove plunger (5) from solenoid housing (6).

## ASSEMBLY

1. See [Figure 5-25](#). Replace wire connection hardware as necessary.
2. Install plunger (5) in solenoid housing (6).
3. Install **new** gasket (4) onto cover (3).
4. Position cover with gasket onto solenoid housing. Install clip (2) and screws (1).

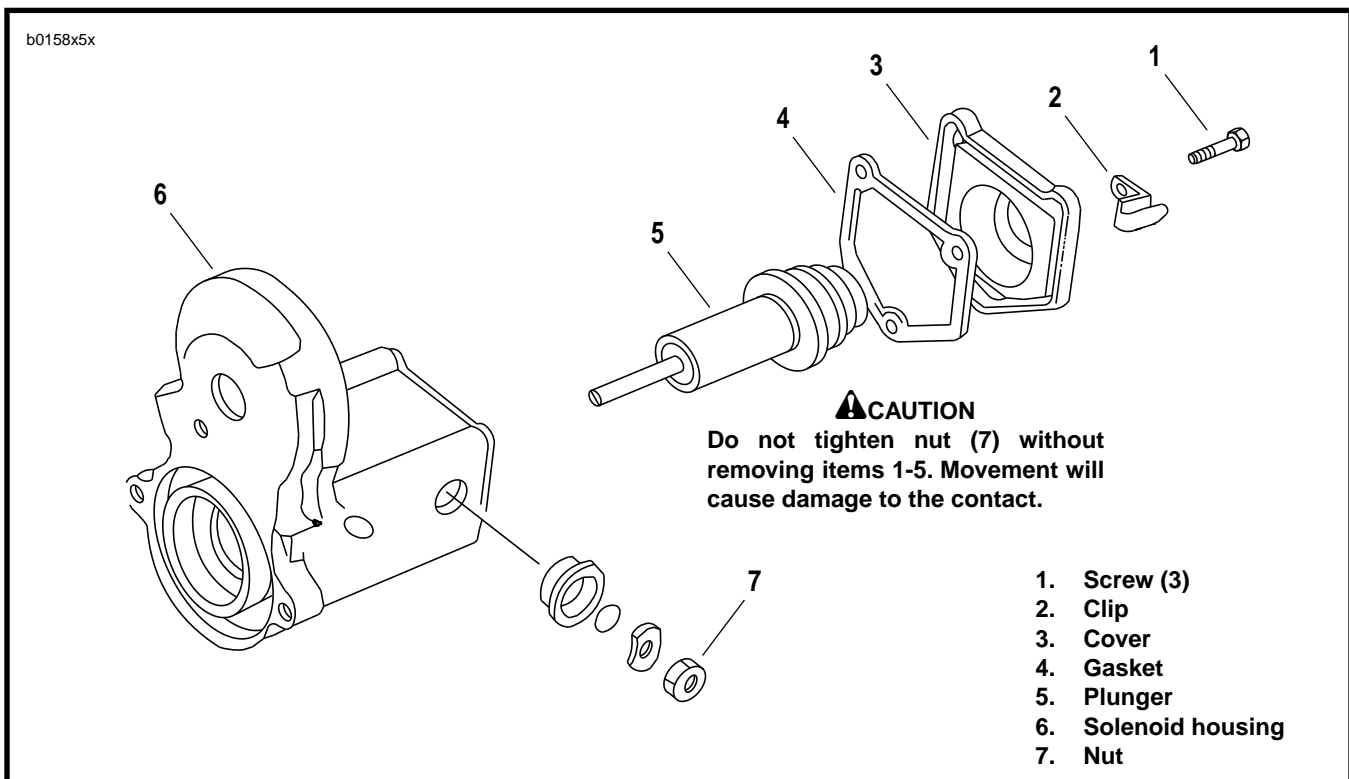


Figure 5-25. Starter Solenoid