

### Removal/Over haul of GL1000/1100 starter motor.

I have attempted to make this list of instructions as simple as possible so that it could be understood by all. Should you have any questions or need clarification with respect to any aspect of this procedure, please do not hesitate to contact me via email at <ken.jo@shaw.ca>

To understand why the bike must be on the side stand for this procedure, you must understand that the starter is driven by a gear in a drive chain off the starter clutch. The starter is plugged into the engine casing and engages the gear that basically hangs loose in the chain that comes down from the starter clutch. After you pull out the starter, you will notice the round hole. When you look into the round hole, you will see the gear hanging in the chain in the middle of the open hole. If the bike was on the center stand, the chain would swing over and the gear would not be in the middle of the hole. Thusly, the starter will not engage the gear when you go to plug it back into the engine casing. Put the bike on the side stand and leave it there until the starter motor is back in.

1. Bike on side stand.
2. Disconnect the battery.
3. Disconnect the cable from the starter motor.
4. If the bike is equipped with floorboards, remove the one on the starter side as well as the heel/toe shifter and any connection to the shift shaft protruding from the engine.
5. If the bike is equipped with a factory shifter, remove it from the shift shaft as well as the foot peg.
6. Remove the two 8mm bolts that secure the starter motor to the engine. A ¼" drive universal on a socket works well here. Wiggle the starter out of the engine casing and away.
7. Repair the starter motor as required.
8. Reinstall in the reverse order. Put grease or vaseline on the "O" ring to aid in inserting the starter back into the casing.

The starter motor itself consists of three (3) main sections. Prior to disassembly, use a scribe or felt marker and mark the casing across the three sections to ensure that they are reassembled correctly and are oriented to each other.

1. Remove the three long bolts that hold the sections together and separate them. Be careful as there are a series of flat thrust washers on each end of the armature (located in the middle section).
2. The end cap basically performs no function other than to cover the brush plate and commutator area as well as center the armature shaft in a pressed in bushing located in the end of the cap.
3. The drive end contains the reduction gearing and if need be, can be disassembled to replace the bearing. This is extremely unlikely. The shaft should turn freely and normally only requires a cleaning and grease application. If the bearing in fact needs replacing, simply remove the "C" clips on either end, drive out the bearing and reinstall with an appropriate size replacement. Any decent auto parts / industrial supply should be able to supply the correct bearing.
4. Remove the brush plate from the end of the center section by removing the screw at the one brush connection. Before removing the brushes, note that one of them has an insulating sleeve over the braided wire. The replacement must go in the same brush holder. Remove the brushes and replace if necessary and clean the brush plate. \*\* Brake Cleaner is a good general cleaner for this entire job.
5. Remove the thrust washers from brush plate end of the armature. Count them and ensure they go back on the correct way.
6. The end of the center section that had the drive end on it has a circular plate covering it with a short splined shaft protruding through the plate. Drive the plate out by tapping the opposite end of the section on the shaft – just lightly with a rubber hammer or piece of wood to protect the shaft. Once the plate is out, remove the armature from the section. You will find more thrust washers at this end. Make sure they go back on correctly.
7. In the center of the center section there are four large Philips screws. These hold in the field coils found within the housing. Using an "impact driver", loosen the four screws that go around the circumference of the center section and remove them. Remove the 10mm nut for the battery connection and the accompanying fiber insulating washers. With the screws and nut removed, the entire field coil assembly should withdraw entirely from the housing. There will be four (4) metal plates that the screws mounted into come falling out. They are easily replaced into the field coils when you slide it back into the housing. Do not be alarmed that you suddenly have four loose metal parts.
8. With everything out of the housing, thoroughly clean everything using the Brake Cleaner. Although the cleaner will dry without leaving a film, it is suggested that the components be dried with compressed air.
9. Get some extremely fine steel wool ("000" or even "0000" is better) and gently clean the metal surfaces or bars of the armature and the commutator. Blow with compressed air.
10. Using a volt/ohmmeter, test for continuity between pairs of armature bars (the long ones). There should be continuity between the pairs around the entire circumference.

11. Check for continuity between pairs of commutator bars (the short ones), and also between the commutator bars and the armature shaft. There should be continuity between the pairs of bars but NOT to the shaft.
12. Check for continuity of the field coils. There should be from one end to the other.
13. Reinstall the field coils back into the center section and secure them with the screws. Reinstall the insulating washers and nut for the battery connection. Check for continuity from the cable terminal to the motor case and from the cable terminal to the brush wire that protrudes at the other end. There should be continuity from the terminal to the brush wire but NOT from the terminal to the casing.
14. Reinsert the armature back into the center section.
15. Reinstall the circular plate on the drive end of the center section (the thrust washers are back on I hope).
16. Reinstall the drive end with the reduction gears.
17. Reinstall the brush plate with the new brushes. (the thrust washers are back on I hope).
18. Reinstall the end cap.
19. Reinstall the three long bolts.

Test the starter by hooking jumper cables up – positive lead to the cable connector and negative lead to the starter motor casing. The starter should dance across the table or floor.

\*\*\* the modification made to the “grounding” circuit of the starter motor is not really necessary, but if you wish to provide a more precise ground connection, then an appropriate section of stranded copper wire will have to be spot welded (preferably) to the brush plate with the other end secured to the end cap via a simple nut and bolt mounted in a drilled through hole in the cap. I suggest you seal the hole with silicone to waterproof the area. Rather than spot welding, the end could be riveted securely to the brush plate. Take your pick.