

FIGURE 20-1 A theft deterrent indicator lamp of the dash. A flashing lamp usually indicates a fault in the system, and the engine may not start.



THEFT DETERRENT INDICATOR LAMP

FIGURE 20-2 Voltmeter hookups for voltage drop testing of a solenoid-type cranking circuit.

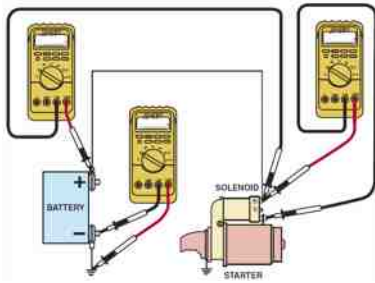


FIGURE 20-3 Voltmeter hookups for voltage drop testing of a Ford cranking circuit.

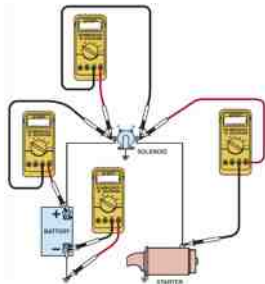


FIGURE 20-4 To test the voltage drop of the battery cable connection, place one voltmeter lead on the battery terminal and the other voltmeter lead on the cable end and crank the engine. The voltmeter will read the difference in voltage between the two leads, which should not exceed 0.20 volt (200 mV).



FIGURE 20-5 A starter amperage tester uses an amp probe around the positive or negative battery cables.

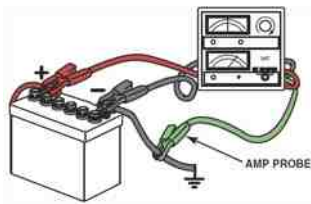


FIGURE 20-6 The starter is located under the intake manifold on this Cadillac Northstar engine.



FIGURE 20-7 An exploded view of a typical solenoid-operated starter.

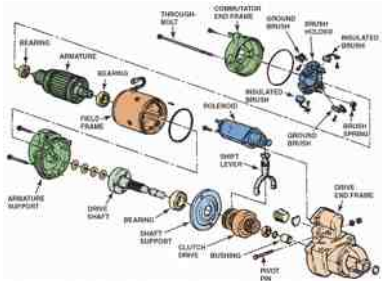


FIGURE 20-8 GM solenoid ohmmeter check. The reading between 1 and 3 (S terminal and ground) should be 0.4 to 0.6 ohm (hold-in winding). The reading between 1 and 2 (S terminal and M terminal) should be 0.2 to 0.4 ohm (pull-in winding).

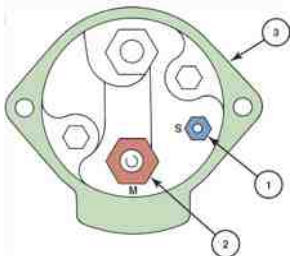


FIGURE 20-9 Measuring an armature shaft for runout using a dial indicator and V-blocks.

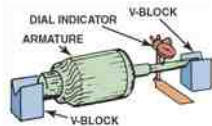


FIGURE 20-10 Replacement starter brushes should be installed so the beveled edge matches the rotation of the commutator.

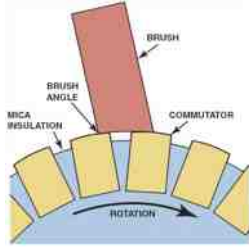
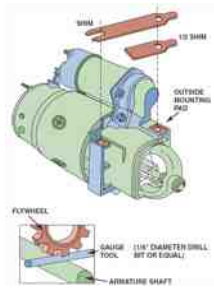


FIGURE 20-11 A shim (or half shim) may be needed to provide the proper clearance between the flywheel teeth of the engine and the pinion teeth of the starter.



STARTER OVERHAUL



- 1** This dirty and greasy starter can be restored to useful service.
- 2** The connecting wire between the solenoid and the starter is removed.

STARTER OVERHAUL



3 An old starter field housing is being used to support the drive-end housing of the starter as it is being disassembled. This rotation is using an electric impact screw to remove the solenoid fasteners.



4 A Torx driver is used to remove the solenoid attaching screws.

STARTER OVERHAUL



5 After the retaining screws have been reinserted, the solenoid can be separated from the starter motor. This retainer always replaces the solenoid.



6 The through-bolts are being removed.

STARTER OVERHAUL



7 The brush and plate is removed.



8 The structure assembly is removed from the field frame.

STARTER OVERHAUL



9 Notice that the length of a direct-drive starter armature (top) is the same length as the overall length of a gear-reduction armature (except visible in distance).



10 A light tap with a hammer dislodges the armature. Do not hit the jaws of the hands from the center of the gear reduction assembly.

STARTER OVERHAUL



11 This figure shows the planetary ring gear and planet gears.



12 A close-up of one of the planetary gears, which shows the small needle bearings on the inside.

STARTER OVERHAUL



13 The lip is removed from the shaft so the planetary gear assembly can be separated and inspected.



14 The shaft assembly is being separated from the stationary gear assembly.

STARTER OVERHAUL



15 The commutator on the armature is disassembled and the brushes may not have been making good contact with the segments.



16 All of the starter components are placed in a barrel with water-based cleanser. The armature is rotated in a lathe and the commutator is resurfaced using emery cloth.

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STARTER OVERHAUL




17 The finished commutator looks like new.




18 Starter reassembly begins by installing a new starter drive on the shaft assembly. The stop ring and stop ring retainer are then installed.

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STARTER OVERHAUL



19 The gear-reduction assembly is positioned along with the shaft fork drive lever into the cleaned drive-and-benzing.



20 After gear retainer has been installed over the gear reduction assembly, the armature is installed.

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STARTER OVERHAUL



21 New brushes are being installed into the brush holder assembly.



22 The brush end plate and the through-bolts are installed, being sure that the ground connection for the brushes is clean and tight.

STARTER OVERHAUL



23 This starter was restored to useful service by replacing the solenoid, the brushes, and the starter drive assembly plus a thorough cleaning and attention to detail in the reassembly.
