MERCURY MerCruiser service bulletin

No. 2001-11

☑ WARRANTY INFORMATION ☐ SERVICE INFORMATION

This Service Bulletin replaces Service Bulletin 99-1 and 95-20.

Testing Starter Motors

Models

All MerCruiser gas engines.

No Trouble Found or Water in Starter Motors

We receive starter motors returned for warranty that function properly when tested. The first test that should be done on an engine with a starter motor problem is to check the condition of the engine's cranking battery. If the fault is not with the battery, test the starter motor voltage as outlined in this bulletin.

We also have found either water or corrosion inside starter motors returned for warranty. Condensation will not cause the amount of damage found. Inspect all starter motor failures for signs of water damage before sending it in for warranty.

Testing the Starter Motor with a Voltmeter

Other than water damage, low voltage is the number one cause of shortening the expected life of a starter motor. Low voltage causes excessive heat to build up in the starter motor. It can also cause starter motor solenoid contact problems. Perform these tests before removing starter from the engine.

1. An analog or digital voltmeter can be used, but the digital meter is best.

NOTE: *Be sure to '0' meter before making the test and that the boat's battery is fully charged.*

2. Remove the coil wire from distributor cap and ground it so engine does not start.
3. Connect voltmeter positive (+) lead directly to the large, threaded starter motor terminal that the battery positive (+) cable is connected to.
4. Connect voltmeter negative (–) lead directly to an unpainted metal surface on starter housing.
5. Crank engine over with key switch for about 10-15 seconds and watch the voltmeter.

6. A voltmeter reading of 9.5 volts or more indicates that there is sufficient voltage being supplied to the starter to operate properly.
    a. If the starter does not function like it should, there could be a problem with the starter or the engine. Remove the spark plugs and try turning the engine over by hand to rule out the engine itself.
7. A meter reading below 9.5v indicate voltage loss between the starter motor and the battery. Example: Voltage measured at the battery posts indicates 12.5v. You measure 9v at the starter. That means there is a 3.5v drop between the battery posts and the starter. Corroded battery cables, loose or dirty connections, loose battery cable terminal crimps, under size battery cable gauge for length used in boat, painted surfaces or battery switches could be the cause for this voltage drop.

Look for cause of low voltage by using the following test.

8. Test the battery positive (+) cable first. Connect voltmeter (+) lead directly to the battery (+) post, not the battery cable ring terminal. Connect voltmeter (–) lead directly to the large, threaded starter motor terminal that the battery (+) cable is connected to.

NOTE: *Remove one voltmeter lead before starter motor is turned off or voltmeter damage may occur. The starter may produce a voltage spike that can damage a voltmeter.*

    a. Crank engine over while looking at the voltmeter.

The maximum allowed drop is 0.25v.

    b. To find the point where the resistance is highest, leave the voltmeter (+) lead on the battery post and move the voltmeter (–) lead to the battery (+) cable ring terminal, that is on the threaded starter terminal.
    c. Next, move voltmeter (–) lead to the battery cable itself that is inside the crimped battery cable ring terminal.
    d. Test each battery cable connection in this manner all the way back to the battery (+) post. If a battery switch is used, check between the battery cable ring terminal and the switch's terminal.
9. Check for voltage drop on battery negative (–) cable. Connect voltmeter (–) lead directly to the battery (–) post, not the battery cable ring terminal. Connect voltmeter (+) lead to an unpainted surface of the starter housing.

NOTE: *Remove one voltmeter lead before starter motor is turned off or voltmeter damage may occur. The starter may produce a voltage spike that can damage a voltmeter.*

    a. Crank engine over while looking at the voltmeter.

The maximum allowed drop is 0.25v.

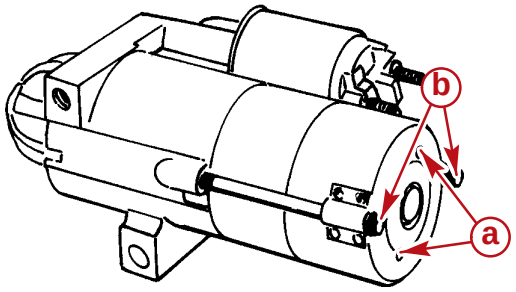
    b. To find the point where the resistance is highest, leave voltmeter (–) lead on battery (–) post and move voltmeter (+) lead to the ground stud where the battery (–) cable is connected.
    c. Then move the voltmeter (+) lead to the battery (–) cable ring terminal, that is on the ground stud.
    d. Next, move voltmeter (+) lead to the battery cable itself that is inside the crimped battery cable ring terminal.
    e. Test each battery cable connection in this manner all the way back to the battery post.
10. After testing to ensure that the starter motor is getting at least 9.5v, test the starter motor solenoid to see if it is getting at least 9.5v from the slave solenoid during cranking. Low voltage at the starter solenoid can cause intermittent operation of the solenoid contacts and shorten the life of it.

a. Connect the voltmeter (+) lead to the terminal on the starter solenoid that has the YEL/RED wire from the slave solenoid connected to it. Connect the voltmeter (–) lead to unpainted surface of the starter housing.

b. Crank engine over and watch the voltmeter. If the starter solenoid is not getting 9.5v, the YEL/RED wire or the slave solenoid could be the cause of the low voltage.

Water or Corrosion Inspection

1. Delco PG260 models only, remove the 2 short screws from the end cap and look at the threads.
   a. If they are clean and gold in color, the starter motor did not have water inside of it.
   b. If they are dirty and black or gray in color, the starter motor may have had water on the inside of it, go to step 2.
2. Remove the 2 long bolts to disassemble and inspect the inside of the starter motor.
   a. Heavy rust and corrosion inside the starter motor indicates water damage.
   b. If starter motor has little or no signs of rust or corrosion on the inside, go to step 3.
3. Remove starter solenoid. Look at condition of solenoid plunger grease.
   a. Brown or red rust colored grease or if the plunger is rusty, solenoid has been under water.
4. If no signs of rust or corrosion is found after steps 1-3, place all loose parts in a sealed plastic bag. Return starter motor and bagged parts with warranty claim.



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All Delco Starter Motors

a - Short Screws, PG260 Models Only
b - Long Screws

Replacing Starter Motors

When a starter motor is replaced, retest the voltage at the starter motor to ensure that it is getting a minimum of 9.5 volts.

If a complete starter motor is needed for warranty replacement, it must be ordered from Mercury Parts. The use of any other company's starter motor as a warranty replacement is not allowed.

Warranty

Any starter motor returned for warranty that has either a "no trouble found condition" or signs of water being on the inside of it, will have the warranty claim rejected and the part returned to the dealer.