SAFETY
- Carefully read all operating instructions before using the tester.
- Wear eye protection when working around batteries.
- Be sure each test is completed before removing lead clamps to prevent arcing and potential explosion from battery gases. Never remove bad clamps while testing. Keep sprays,, flares, or cigarettes away from test harnesses.
- Keep foot, hands, and clothing away from leads and cords away from moving blades and belts.
- Provide adequate ventilation to remove car exhaust.
- In extremely cold temperature, check for freezing electrolyte fluid before applying load. Do not attempt to load test or charge a battery under 20 degrees. Allow the battery to warm to room temperature before testing or charging.
- Warning! Never attach the unit to a battery that is connected to any other battery or on charging well. Damage may result.

CAUSE OF BATTERY FAILURE
Incorrect Applications
- Wrong size battery may have inadequate or crossing rating for original vehicle specifications.

Improper Maintenance
- Low electrolyte fluid and/or corrosion on battery connections can greatly reduce battery life and affect battery performance.
- Age of Battery: The date code on the battery indicates its 5 year old, the failure may be due to natural causes.
- Overcharging: Caused by a high voltage regulator setting in automatic charging can cause excessive gas, heat and water loss.
- Undercharging: Undercharging caused by a faulty charging system or low voltage regulation can cause lead sulfation to gradually build up and crystallize on the plates greatly reducing the battery's capacity and ability to be recharged.

BATTERY INSPECTION
Valid automotive system testing depends on all the components being in good operating condition.
- In addition, the battery MUST have sufficient charge for testing. Carefully perform the following before attempting any electrical diagnoses.

VISUAL CHECK
- Inspect battery for terminal corrosion, loose or broken posts, cracks in the case, loose hold-downs, low electrolyte level, moisture, and dirt around the terminal.
- Important Note: Always determine whether the battery must be replaced before proceeding with any test on the charging or starting system.
- Inspect belts for cracks, glazed surface and fraying. Tighten loose belts. Inspect belt tension for proper alignment.
- Inspect Starting System. Check starter, solenoid, and alternator for loose connections, loose mount and frayed or cracked wires.

LIMITED WARRANTY
Manufacture guarantees this product to be free from defects in material and workmanship for a period of 1 Year from original date of purchase (dated sales receipt required).
This warranty extends to each person who acquires lawful ownership within one year of the original retail purchase, but is void if the product has a broken meter seal, has been altered, abused or mishandled, or has been improperly packaged and damaged when returned for repair.

THE TERMS OF THIS LIMITED WARRANTY CONSTITUTE THE BUYER’S SOLE AND EXCLUSIVE REMEDY.

THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THIS EXPRESS WARRANTY. AFTER ONE YEAR FROM DATE OF PURCHASE, ALL RISK OF LOSS FROM WHATEVER REASON SHALL BE PUT UPON THE PURCHASER.

THE MANUFACTURER SHALL NOT BE LIABLE FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES. MANUFACTURER’S LIABILITY IF ANY, SHALL NEVER EXCEED THE PURCHASE PRICE OF THIS MACHINE REGARDLESS OF WHETHER LIABILITY IS BASED UPON BREACH OF WARRANTY EXPRESS OR IMPLIED, NEGLIGENCE, STRICT TORT OR ANY OTHER THEORY.

PLEASE RETURN UNIT TO THE POINT OF PURCHASE FOR ANY WARRANTY CONSIDERATIONS.
DO NOT SEND BACK TO THE MANUFACTURER.

Some states do not permit the limitation of warranties or limitation of consequential or incidental damages, so the above have other rights which vary from state to state.
OPERATING INSTRUCTIONS

Note: This page has been used for a period of time, so portions may have been removed between certain pole pieces. This will cause the tester to show a little less firing during first or second load application. This is normal and is not a malfunction of the unit. Do not continue with this due to arcing (underloading the tester).

PREPARING TO TEST

Be sure area around battery is well ventilated while battery is being tested. Gas can be forcibly blown away by using a piece of cardboard or other non-metallic material as a fan.

Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes, skin or clothing.

Inspect the battery for cracked or broken case or cover. If visible signs of damage are present, do not test battery.

When testing flooded batteries, add distilled water each day until battery and recharges level specified by the manufacturer. This helps purge excess gas from cell. Do not overfill.

Perform load tests only on batteries above 55°F(13°C).

If it is necessary to remove battery from vehicle to test, always remove ground terminal from battery first. When removing battery, make sure all accessories in the vehicle are off before removing battery. If testing the battery, make sure all accessories in the vehicle are off before removing battery. If testing the battery, make sure all accessories in the vehicle are off before removing battery.

CALCULATE BATTERY STATE OF CHARGE

Before a battery can be tested, make sure you determine its state of charge.

A hydrometer is a great tool to assess the condition of each cell, but as batteries with non-rechargeable cells, a hydrometer is your only choice to determine state of charge. The specific gravity of an open battery should be at least 1.250 in all cells. If not, charge the battery unit until 1.280 is obtained. The specific gravity readings of each battery cell in a fully charged battery should not vary more than 50 points between cells (if the variation is more than 50 points, replace the battery. It is considered a deeply discharged battery. A significant drop after charging may be required. After charging, remove battery from charger and store in a cool dry place. Rechargeing the battery will not bring the battery to 1.250 gravity; the battery should be replaced.

Keep battery terminals clean and corrosion-free. Use a wire brush to remove corrosion from battery terminals. Be careful to keep corrosion from coming in contact with eyes, skin or clothing.

CALCULATE THE LOAD

To perform load testing on a vehicle, make sure all accessories in the vehicle are off before testing battery. If testing the battery, make sure all accessories in the vehicle are off before testing battery. If testing the battery, make sure all accessories in the vehicle are off before testing battery.

1. Make sure load knob is in the OFF position.

2. Connect positive (+, red) lead to battery (+) terminal.

3. Connect tester negative (–, black) lead to the battery (-) terminal.

4. Wait until voltage shows charged and then turn off battery. (If battery voltage is less than 12.4 volts after charging, replace battery).

LOAD TEST THE BATTERY

The battery must have at least 75% state of charge before load testing, and the battery should not have been heavily used or tested within the last 10 minutes. On vehicles with multiple batteries, only one battery at a time should be tested.

1. Connect Tester leads to battery (+) and (-) terminals. Read AMPS position. Make sure load knob is in the OFF position before connection.

2. Apply a load to the battery as determined in “CALCULATE THE LOAD.”

3. Read voltage at the end of the 15 seconds and turn off load.

4. Compare reading with REGULATED voltage chart on side of tester, or use chart shown below for compensation for temperature.

<table>
<thead>
<tr>
<th>Battery Temperature</th>
<th>Voltage Should Not Drop Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°F (-18°C)</td>
<td>8.6 volts</td>
</tr>
<tr>
<td>9°F (-13°C)</td>
<td>8.9 volts</td>
</tr>
<tr>
<td>17°F (-7°C)</td>
<td>9.1 volts</td>
</tr>
<tr>
<td>21°F (-6°C)</td>
<td>9.3 volts</td>
</tr>
<tr>
<td>34°F (1°C)</td>
<td>9.5 volts</td>
</tr>
<tr>
<td>40°F (5°C)</td>
<td>9.6 volts</td>
</tr>
<tr>
<td>55°F (13°C)</td>
<td>9.6 volts</td>
</tr>
<tr>
<td>60°F (16°C)</td>
<td>9.6 volts</td>
</tr>
<tr>
<td>70°F (21°C)</td>
<td>9.6 volts</td>
</tr>
<tr>
<td>80°F (26°C)</td>
<td>9.6 volts</td>
</tr>
<tr>
<td>90°F (32°C)</td>
<td>9.6 volts</td>
</tr>
</tbody>
</table>

5. Battery is Good if Volts are at or above Volt readings shown on chart. Battery is BAD if volts drop below Volt readings shown on chart.

CHANGING SYSTEM (ALTERNA TOR/REGULATOR) TEST

This test assesses charging system output to ensure it is within the proper range, a key factor for long battery life.

1. Connect tester to battery as determined in “CALCULATE THE LOAD.”

2. Start the engine and allow it to reach normal operating temperature.

3. Run engine at 1200 to 1500RPM.

4. Read the voltmeter. A reading in the red band area indicates a problem in the charging system that will undercharge a battery; if the meter is beyond the OK area, the charging system is likely to overcharge the battery.

5. Note: Do not turn on the load switch at any point during this test.

WARNING: DANGEROUS LOAD CARBON PILE TESTS MUST NEVER BE PERFORMED ON CHARGED BATTERIES.

1. Look for either the “Cold Cranking Amps (CCA)” rating or the “Amp Hour (AHr)” rating on the battery decal.

2. If the CCA rating is provided, the load placed on the battery should be 1/2 of the Cold Cranking Amps rating. For example: 600CCA battery – load to 300A.

3. If the Amp Hour rating is provided, the load placed on the battery should be 3 times the Amp Hour rating. Example: 70 AHr battery – load to 210A.

4. If neither the CCA rating nor the Amp Hour rating are not available, refer to battery catalog for recommended CCA rating.

5. Sometimes the rating cannot be located, in that case the engine size may be used to determine if the CCA rating is greater. However, it is recommended to use the manufacturers recommendation whenever they can be located.

1. Look for either the “Cold Cranking Amps (CCA)” rating or the “Amp Hour (AHr)” rating on the battery decal.

2. Calculate the load placed on the battery to be 1/2 of the Cold Cranking Amps rating. For example: 600CCA battery – load to 300A.

3. Apply a load to the battery as determined in “CALCULATE THE LOAD.”

4. Start the engine and allow it to reach normal operating temperature.

5. Run engine at 1200 to 1500RPM.

6. Read the voltmeter. A reading in the red band area indicates a problem in the charging system that will undercharge a battery; if the meter is beyond the OK area, the charging system is likely to overcharge the battery.

7. Note: Never attempt recharging or testing if the indicator is yellow.

8. If tester has not been used for a period of time, moisture may have condensed between carbon pile discs. This is normal and is not a malfunction of the tester. (Do not confuse this with heat due to overloading the tester.)

Note: If you observe an out of range reading, check alternator connections, including ground connection. Also check manufacturer specifications, as output requirements may vary by vehicle type and model/series (confirm range is, in fact, out of range for the specific vehicle being tested).

STARTER MOTOR TEST (12 Volt Vehicles)

This test identifies excessive starter current draw, which may indicate short or a charger battery. Note: ENGINE MUST BE NORMAL OPERATING TEMPERATURE FOR THIS TEST.

1. Connect positive (+) lead to the positive (+) battery post. Connect negative (-) lead to the negative (-) battery post. Rock clamps back and forth while connecting to ensure a good electrical connection.

2. Start the engine and observe the lowest voltage reading during cranking.

3. A normal reading of 9V is indicative of excessive current draw. This may be due to a failing battery, bad battery starter connections or a failing starter motor. On the battery, it is too small for the vehicle’s requirements.