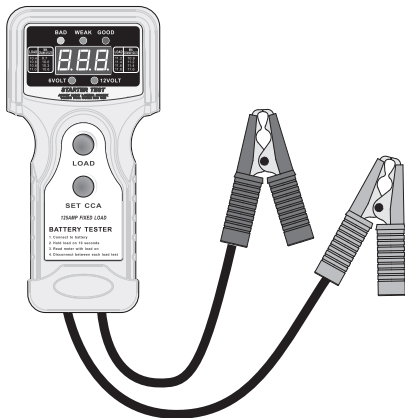


Digital Battery Tester

Users Manual



Read this manual thoroughly before use

GENERAL INSTRUCTION

This tester is designed for automotive battery load voltage test, charging voltage test and starter motor test. It is very useful and can be used in vehicle's fault diagnosis and service.

WARNING

1. Always operate the vehicle in a well-ventilated area. Do not inhale exhaust gases, they are very poisonous.
2. Never smoke or have open flames near vehicle. Vapor from gasoline and battery are highly flammable and explosive. Always keep a fire extinguisher handy.
3. Always wear approved eye protector.
4. If battery acid contacts eye accidentally, flush eye immediately with cool, clean water for at least 5 minutes and see a doctor immediately.
5. Never short battery terminals.
6. Undercharged lead-acid batteries will freeze during cold weather. Never test or charge a frozen battery.
7. Always keep yourself, tools and test equipment away from all moving or hot engine parts.
8. To avoid electric shock, do not touch any naked conductor (such as the clamp metal) with hand or skin.
9. During testing, the tester's clamps may become very hot. To avoid heat injury, do not touch the clamp metal.

10. Do not use the tester if it is damaged or operates abnormally.
11. Do not change or modify any test lead of the tester.
12. Always follow vehicle manufacturer's warnings, cautions and service procedures.

INSTRUCTION

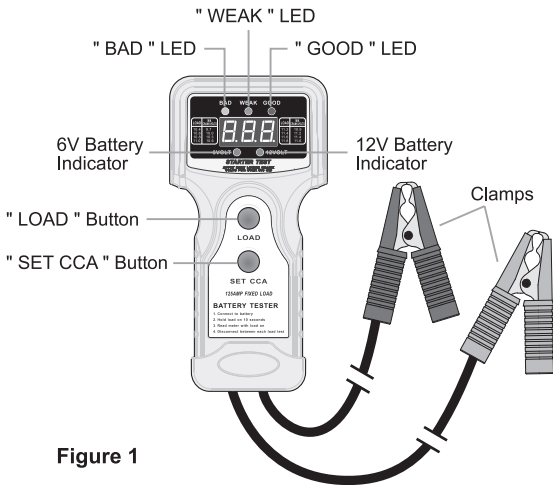


Figure 1

OPERATION INSTRUCTION

Battery Load Test

This test evaluates a battery's ability to crank an engine. The tester draws current from the battery while measuring its voltage level. The voltage level of a good battery will remain relatively steady under load, but a defective battery will show a rapid loss in voltage. Battery size (CCA rating) and temperature will affect test result - follow instruction carefully.

1. Turn off the vehicle's engine, accessories and battery test equipment.
2. Connect the black clamp to the negative battery terminal and the red clamp to the positive battery terminal. Ensure the connections are good.
3. Note the battery's CCA rating.

If the rating is not printed on the battery, use the following guidelines to estimate battery size.

Small (4 cyl) 300 CCA; Medium (6 cyl) 400 CCA;

Large (8 cyl) 500 CCA.

4. Press the **SET CCA** button repeatedly and quickly until the CCA value on the display matches your battery.

The default is 500 CCA, but you can adjust to 600, 700, 800, 900, 999 (1000), 300, 400 CCA.

At each change of CCA value, the tester will sound a short beep.

5. With the clamps connected, the tester will display the battery's state of charge. If the charge state is less than 12V (for 12V batteries) or 6V (for 6V batteries), the battery should be recharged before load test. If recharging can not bring voltage to a value higher than 12V (for 12V batteries) or 6V (for 6V batteries), the battery is defective. If the display does not show digit, check for loose or reversed clamps; otherwise the battery is defective.
6. For load test, just press the **LOAD** button and then release it. The tester sounds a long beep and then automatically does load test for 10 secs. (Therefore, it is not necessary to press the **LOAD** button for 10 secs.) If you do load test for battery with less than 12V (for 12V batteries) or 6V (for 6V batteries), the display will show " - L - ". This indicates you should recharge the battery and refer to step 5.
7. After the 10 secs load test, the tester will sound two beeps indicating load test is done. During load test, you can read load voltage on the display or the LED for status of load test. For example, good, weak or bad.
8. After reading load voltage, please refer to the **Battery Load Test Analysis** section.

Note:

1. If there is " Er1 " message at the display during load test, the tester or its relay is defective.
2. If there is " Er2 " message at the display after load test,

disconnect the tester immediately to prevent overload. In this case, please beat the area indicated in Figure 2 with a screwdriver at least three times and then re-connect to test.

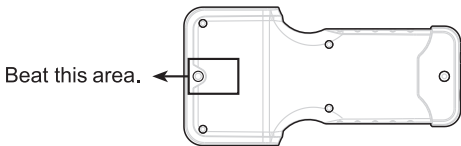


Figure 2

3. After you have performed the load test five times successively, the display will show " OL " if you press the " **LOAD** " button once more. In this condition, you should disconnect the clamps from the battery under test and then reconnect them again; otherwise the tester will not work.
4. If you perform the test too many times within a short time, the internal circuit of the tester will heat. To avoid damage to the tester, allow the tester to cool down before you proceed.

Cold Temperature Effects

Because of the chemical nature of the battery, it will test lower when cold than when warm. For most accurate results, this effect should be compensated for when the battery's internal temperature is below 40°F (4.4°C). Assume the battery's internal temperature to be the day's high-low average temperature. See Figure 3.

Example: If rated capacity is 800 CCA and internal temperature is approximately 35°F (1.7°C), assume test capacity to be 560 CCA. (800 CCA x 70% (at 35°F) = 560 CCA)

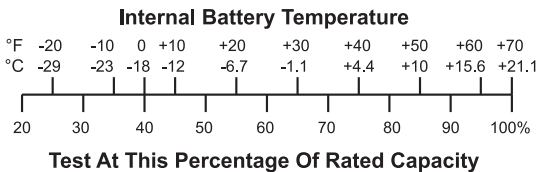


Figure 3

Battery Load Test Analysis

Tester Indication During Load Test	Battery Condition
The " GOOD " LED lights.	Battery capacity is ok. Battery may or may not be fully charged, check specific gravity of the battery fluid to determine the state of charge. If the battery is not fully charged, check for electrical drain or possible system fault. Recharge battery to full charge level.
The " WEAK " LED or " BAD " LED lights, but reading remains steady.	Battery capacity is not satisfactory. Battery may be either defective or not fully charged. Check specific gravity of battery fluid to determine which condition exists. If charging can not bring specific gravity to that of full charge level, battery should be replaced.
The " WEAK " LED or " BAD " LED lights, but displayed voltage is falling.	Battery may be defective or very run down. After the 10 secs load test ends, note the voltage reading on the display. Voltage recovery to 12V/6V or above within seconds indicates defective battery. Slow voltage recovery indicates run down condition. For best results, check specific gravity.

Charging Voltage Test (for 12V system only)

This test enables the user to measure the output voltage of the alternator/regulator and check for undercharging or overcharging, which leads to poor battery performance and short life.

Note : Engine must be at normal operating temperature.

1. Turn off the vehicle's engine, accessories and battery test equipment.
2. Connect the black clamp to the negative battery terminal and the red clamp to the positive battery terminal. Ensure the connections are good.
3. Operate the engine at a fast idle (approx. 1500RPM).
4. Do not operate the **LOAD** button.
5. Read the voltage reading on the display and compare results with expected results given in manufacturer's handbook. The following table is given as a guide:

Test Result	Analysis and Action
Displayed voltage is less than 13.5V.	The voltage is not sufficient, please check alternator.
Displayed voltage is between 13.5V and 15V.	Okey
Displayed voltage is higher than 15V.	The voltage is excessive, please check regulator.

6. Turn on headlights and blower motor to high, repeat step 5.

Starter Motor Test (for 12V system only)

This test identifies excessive starter current draw, which makes starting difficult and shortens battery life.

Note: Before starter motor test, you must perform battery load test (see the **Battery Load Test** section). Only if the battery proves good in the load test can you proceed to the starter motor test. Note the load voltage obtained in the load test.

ENGINE MUST BE AT NORMAL OPERATING TEMPERATURE.

1. Turn off the vehicle's engine, accessories and battery test equipment.
2. Connect the black clamp to the negative battery terminal and the red clamp to the positive battery terminal. Ensure the connections are good.
3. Apply the load voltage obtained in the load test to the **Starter Test Table.**

For engines with less than 300 inches of cubic displacement (CID), use the next lower minimum cranking voltage. For example, if the load voltage is 11V, use 10.3V as minimum cranking voltage.

Starter Test Table

Load Voltage	10.4V	10.6V	10.8V	11.0V	11.2V	11.4V	11.6 V	11.8V
Min Cranking Voltage	9.7V	10.0V	10.3V	10.6V	10.9V	11.2V	11.4V	11.6V

4. Disable the ignition system so the car will not start, crank the engine and note the voltage reading on the display during cranking.
5. If cranking voltage of step 4 is below the minimum cranking voltage of this engine, the starter current draw is excessive. A displayed voltage of less than 9V indicates excessive current draw, which may damage the battery. Excessive current draw in this situation may be caused by bad connection, failing starter motor or the battery is insufficient for the vehicle's requirements.

NOTE

1. To ensure a good connection, clean battery terminals with a solution of water and baking soda.
2. Clean the tester after each use. clean the case with soft cloth, wipe off any battery acid that may have come in contact with clamp to prevent corrosion.

DECLARATION

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the instrument for any special application.

DISPOSAL OF THIS ARTICLE

Dear Customer,

If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.



