

# DHC-500A2



## 500AMP CARBON PILE BATTERY TESTER

### TEST PROCEDURES / INSTRUCTIONS



**WARNING :** This unit is built with a beeper which will alarm during load test after 15 seconds. When you hear the beep, you must read voltage quickly and then turn off load immediately.

# **DHC-500A2**

## **500AMP CARBON PILE BATTERY TESTER TEST PROCEDURES / INSTRUCTIONS**

### **WARNING:**

- 1 Working in the vicinity of a lead acid battery is dangerous. Batteries generate explosive gases during normal battery operation. It is of utmost importance that each time before using your tester, you read these instructions very carefully.
- 2 To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in the vicinity of the battery. Observe cautionary markings on these items.
- 3 Do not expose the tester to rain or snow.
- 4 Do not operate tester with damaged cables-replace them immediately.
- 5 Do not operate tester if it has been damaged in any way. Take it to a qualified auto technician for repair.
- 6 **CARBON PILE LOAD IS "ON" TO PREVENT BREAKAGE OF CARBONS DURING SHIPMENT. BE SURE TO TURN LOAD "OFF" BEFORE CONNECTING TESTER TO BATTERY.**

### **PERSONAL SAFETY PRECAUTIONS:**

- 1 Someone should be within range of your voice or close enough to come to your aid when you work near a lead acid battery.
- 2 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- 3 Wear safety glasses and clothing protection.
- 4 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least ten minutes and get medical attention immediately.
- 5 NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- 6 Be extra cautious to reduce risk of dropping a metal tool onto the battery. It could spark or short-circuit the battery or other electrical parts and could cause an explosion.
- 7 Remove personal metal items such as rings, bracelets, necklaces and watches when working with a lead acid battery. It can produce a short circuit current high enough to weld a ring or the like to metal causing a severe burn.

### **IMPORTANT:**

**BOTH JAWS OF EACH CLAMP MUST FIRMLY ENGAGE BATTERY TERMINAL OR IT WILL NOT FUNCTION PROPERLY.**

## PREPARING TO TEST:

- 1 Be sure area around battery is well ventilated while battery is being tested. Gas can be forcefully blown away by using a piece of cardboard or other non-metallic material as a fan.
- 2 Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- 3 Inspect the battery for cracked or broken case or cover. If so damaged, do not use tester.
- 4 Add distilled water in each cell until battery acid reaches level specified by the manufacturer. This helps purge excessive gas from cells. Do not overfill.
- 5 Make load tests only on battery above 60°F(16°C).
- 6 If necessary to remove battery from vehicle to test, always remove earth terminal from battery first. Make sure all accessories in the vehicle are off to ensure you do not cause an arc.

## 1. CALCULATE STATE OF CHARGE

- A Before a battery can be load tested, you **MUST** determine the state of charge.
- B The hydrometer is a great tester to show condition of each cell, but on batteries with non-removable caps the voltmeter is your only choice to determine state of charge.
- C The specific gravity readings of open vent batteries should not vary more than 50 points between cells. If the variance is more than 50 points, replace the battery. The specific gravity should be at least 1.230 in all cells. If not, charge the battery until 1.230 is obtained. In case the battery is very low, a longer period of time for charging may be required. After charging, remove the surface charge from the battery. If charging the battery will not bring the charge to 1.230 then the battery should be replaced.
- D Maintenance free and sealed batteries have an indicator built into the battery cover. The color of this indicator verifies the gravity condition of the battery:
- If the green ball is visible, the battery is charged.
  - If the indicator is dark and the green ball is not visible, the battery is partially discharged.
  - If the indicator is light yellow, the battery is low on fluid and near the end of its useful life. **DO NOT ATTEMPT RECHARGING OR TESTING IF THE INDICATOR IS YELLOW.**
- E The battery must have a minimum 75% state of charge before being load tested. If battery state of charge is below 75%, load test results will **NOT** be accurate.

F It is highly recommended that maintenance free batteries should be tested with a voltmeter to determine state of charge.

|                     | Open Circuit Voltage | Approximate State-of Charge | Average Cell Specific Gravity |                     |
|---------------------|----------------------|-----------------------------|-------------------------------|---------------------|
| OKAY to Load Test { | 12.60                | 100%                        | 1.255                         | } OKAY to Load Test |
|                     | 12.40                | 75%                         | 1.225                         |                     |
| DO Not Load Test {  | 12.20                | 50%                         | 1.190                         | } DO Not Load Test  |
|                     | 12.00                | 25%                         | 1.155                         |                     |
|                     | 11.80                | 0%                          | 1.120                         |                     |

### OPEN CIRCUIT VOLTAGE TEST

- A Make sure load knob is in the OFF position.
  - B Connect tester (+) Red lead to Battery (+) terminal.
  - C Connect tester (-) Black lead to Battery (-) terminal.
  - D If voltmeter reading is less than 12.4 volts, battery must be charged and retested before continuing.
- NOTE: If battery voltage is less than 12.4 volts after charging, replace the battery.

## 2. REMOVING THE SURFACE CHARGE

- A If your open circuit voltage reading is above 12.6 volts, remove the surface charge before load testing. Failure to do so will result in inaccurate test readings.
- B Three possible ways to remove a surface charge:
  - 1 Turn headlights (high beam) on for 3 to 5 seconds.
  - 2 Disable ignition: crank starter over for 10 to 15 seconds.
  - 3 Using a variable carbon pile load tester, load battery for 10 to 15 seconds at 150 amp load. Make sure load knob is in the OFF position before connection is made or removed.

After removing surface charge, let battery stand for 10 minutes to stabilize.

## 3. CALCULATE THE LOAD

- A Look for either the "Cold Cranking Amps" CCA rating or the "Load Test Amps" rating on the battery decal.
- B The load test amps rating should be on half (1/2) of the cold cranking amps rating.
- C If the amp hour rating is provided, load test amps should be 3 times the hour rating.
- D If the CCA rating and amp hour rating are not available, refer to battery catalog for recommended CCA rating

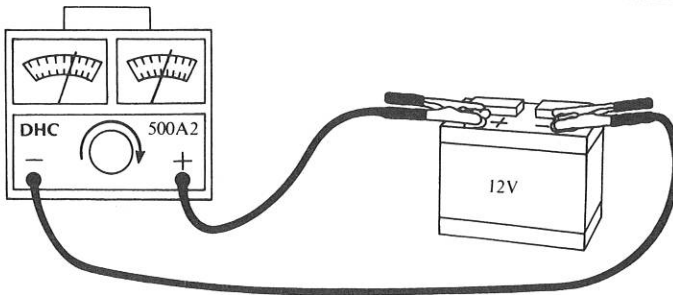
E Sometimes the rating cannot be located, in that case the engine size may be used as a guide to determine the battery's ampere rating. However, it is recommended to use the manufacturers recommendations, whenever they can be located.

| Engine Size | Cubic Inches | Cu. Centimeter | Battery load Amp Rating |
|-------------|--------------|----------------|-------------------------|
| Small       | 100 to 200   | 1600 to 2400   | 100-150 Amps            |
| Medium      | 200 to 350   | 2400 to 5600   | 125-200 Amps            |
| Large       | 350 to 500   | 5600 to 8000   | 175-300 Amps            |

#### 4. LOAD TEST THE BATTERY

- A The battery must have at least 75% state of charge before load testing.
- B The battery should not have been heavily used or tested within the last 10 minutes.
- C Connect Tester leads to battery (+) and (-) terminals. Read AMPS position. Make sure load knob is in the OFF position before connecting.
- D Apply a load to the battery equal to 1/2 of CCA rating.
- E **Hold load for 15 seconds.**
- F Read voltage at the end of the 15 seconds and then turn off load.
- G Compare reading with PASS/FAIL voltage chart on side of tester, or use chart shown as below to compensate for battery temperature.

| At Battery Temperature Of | Voltage Should Not Drop Below |
|---------------------------|-------------------------------|
| 70°F( 21°C)               | 9.6 Volts                     |
| 60°F( 16°C)               | 9.5 Volts                     |
| 50°F( 10°C)               | 9.4 Volts                     |
| 40°F( 5°C)                | 9.3 Volts                     |
| 30°F( - 1°C)              | 9.1 Volts                     |
| 20°F( - 7°C)              | 8.9 Volts                     |
| 10°F( -12°C)              | 8.7 Volts                     |
| 0°F( -18°C)               | 8.5 Volts                     |



**H** Battery is GOOD if voltage is at or ABOVE volt readings shown on chart. Battery is BAD if voltage drops BELOW volt readings shown on chart.

**WARNING**

VARIABLE LOAD CARBON PILE TESTERS PRODUCE HEAT WHEN IN USE. CARE MUST BE TAKEN TO ALLOW SUFFICIENT TIME TO COOL DOWN BETWEEN TESTS TO AVOID INJURY DUE TO HEAT BUILD UP.

NOTE: On vehicles with multiple batteries, only one battery at a time should be tested.

## **5. TESTING THE CHARGING SYSTEM (ALTERNATOR & REGULATOR TEST)**

- A** Connect the tester the same as for battery testing.
- B** Start the engine and allow it to reach normal operating temperature.
- C** Run engine at 1200 to 1500RPM. CAUTION: Stay clear of moving engine parts. Do not turn on the load switch.
- D** 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.

## **6. STARTER MOTOR TEST (12 VOLT VEHICLES)**

This test identifies excessive starter current draw, which makes starting difficult and shortens battery life. Perform battery load test. Proceed if battery is GOOD.

### **ENGINE MUST BE AT NORMAL OPERATING TEMPERATURE FOR THIS TEST**

- A** Connect negative (black) clamp to the negative (NEG, N, -) battery post. Connect positive (red) clamp to the positive (POP, P, +) battery post. Rock clamp back and forth to ensure a good electrical connection.
- B** Disable the ignition system so the car will not start.
- C** Crank the engine and note the voltage reading during cranking.
- D** A meter reading of 9 volts or less indicates excessive current draw. This may be due to bad connections or a failing starter motor; or the battery is too small for the vehicle's requirements.