



ATD-5489

500 Amp Carbon Pile Battery Tester
User's Manual



⚠ WARNING	
	Failure to follow instructions may cause damage or explosion, always shield eyes. Read entire instruction manual before use.

Warning: This product contains chemicals, including lead, known to the State of California to cause cancer, birth defects and other reproductive harm. Wash hands after handling.

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 load clamps to prevent arcing and potential explosion from battery gasses. Never remove load clamps while testing. Keep sparks, flames, or cigarettes away from batteries.
- Keep hair, hands, and clothing as well as tester leads and cords away from moving blades and belts.
- Provide adequate ventilation to remove car exhaust.
- In extremely cold temperatures, check for frozen electrolytic 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 tester or charging unit. Damage may result.

CAUSE OF BATTERY FAILURE

- Incorrect Application: Wrong size battery may have inadequate cold cranking rating for original vehicle specifications.
- Incorrect Installation: Loose battery hold-downs cause excessive vibration, which can result in damage to the plates.
- Improper Maintenance: Low electrolytic fluid and corrosion on battery connections can greatly reduce battery life and affect battery performance.
- Age of Battery: If the date code on the battery indicates it is fairly old, the failure may be due to natural causes.
- Overcharging: Overcharging caused by a high voltage regulator setting or incorrect battery charging can cause excessive gassing, heat and water loss.
- Undercharging: Undercharging caused by a faulty charging system or low voltage regulation can cause lead sulfate to gradually build up and crystallize on the plates greatly reducing the battery's capacity and ability to be recharged.

BATTERY INSPECTION

Valid automotive electrical 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 diagnosis.

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: A known defective 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 tensioner for proper alignment.
- Inspect Starting System. Check starter, solenoid, and alternator for loose connections, loose mounts and frayed or cracked wires.

OPERATING INSTRUCTIONS

Note: If tester has not been used for a period of time, moisture may have condensed between carbon pile discs. This will cause the tester to steam a little during first or second load application. This is normal and is not a malfunction of the tester. (Do not confuse this with heat due to overloading the tester.)

PREPARING TO TEST

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.

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 in each cell until battery acid reaches level specified by the manufacturer. This helps purge excessive gas from cells. Do not overfill.

Perform load tests only on batteries above 60°F(16°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 to ensure you do not cause an arc.

CALCULATE BATTERY STATE OF CHARGE

Before a battery can be load tested, you MUST determine its state of charge.

A hydrometer is a great tool to assess the condition of each cell, but on batteries with non-removable caps, a voltmeter is your only choice to determine state of charge. The specific gravity of an open vent battery should be at least 1.230 in all cells. If not, charge the battery until 1.230 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 variance is more than 50 points (0.050), replace the battery. In case of a deeply discharged battery, 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 or greater, then the battery should be replaced.

	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	

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.

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

OPEN CIRCUIT VOLTAGE TEST

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

1. Make sure load knob is in the OFF position.
2. Connect tester positive (+, Red) lead to battery (+) terminal.
3. Connect tester negative (-, Black) lead to battery (-) terminal
4. If voltmeter reading is less than 12.4 Volts, battery must be charged and retested before continuing. (If battery voltage is less than 12.4 Volts after charging, replace battery.)

REMOVING THE SURFACE CHARGE

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.

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

CALCULATE THE LOAD

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.

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 on half (1/2) of the Cold Cranking Amps rating. 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 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	Recommended Battery Load
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

LOAD TEST THE BATTERY

Note: 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 connecting.
2. Apply a load to the battery as determined in "CALCULATING THE LOAD."
3. Hold load for 15 seconds.
4. Read voltage at the end of the 15 seconds and turn off load.
5. Compare reading with PASS/FAIL voltage chart on side of tester, or use chart shown below to compensate for battery temperature.

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

6. 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.

CHARGING SYSTEM (ALTERNATOR/REGULATOR) TEST

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

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

1. Connect the tester the same as for battery testing.
2. Start the engine and allow it to reach normal operating temperature.
3. Run engine at 1200 to 1500RPM.
CAUTION: Stay clear of moving engine parts.
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.

Note: If you observe an out of range reading, check alternator connections, including ground connection. Also, check manufacturer specifications, as output requirement may vary by vehicle type and manufacturer (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 makes starting difficult and shortens battery life.

Note: ENGINE MUST BE AT NORMAL OPERATING TEMPERATURE FOR THIS TEST

1. Connect positive (+, red) clamp to the positive (POS, P, +) battery post. Connect negative (-, black) clamp to the negative (NEG, N, -) battery post. Rock clamps back and forth while connecting to ensure a good electrical connection.
2. Disable the ignition system so the car will not start.
3. Crank the engine and observe the lowest voltage reading during cranking.
4. A meter reading of below 9.5V indicates excessive current draw. This may be due to a failing battery, bad battery/starter connections or a failing starter motor. Or, the battery is too small for the vehicle's requirements.