OPERATING INSTRUCTIONS

Professional Battery-Charging-Starting System Analyzer

Safety Guidelines when Working on Vehicles

- Always wear approved eye protection.
- Always operate the vehicle in a well-ventilated area. **Do not inhale exhaust gases—they are very poisonous!**
- Always keep yourself, tools, and test equipment away from all moving or hot engine parts.
- Always make sure the vehicle is in **Park** (automatic transmission) or **Neutral** (manual transmission) and that the **parking brake** is firmly set. Block the drive wheels.
- Never lay tools on vehicle battery. You may short the terminals together, causing harm to yourself, the tools, or the battery.
- Never smoke or have open flames near vehicle. Vapors from gasoline and charging batteries are highly flammable and explosive.
- Never leave vehicle unattended while running tests.
- Always keep a fire extinguisher suitable for gasoline/electrical/chemical fires handy.
- Always turn ignition key OFF when connecting or disconnecting electrical components, unless otherwise instructed.
- Keep away from engine cooling fan. On some vehicles, the fan may start up unexpectedly.
- **Always** follow vehicle manufacturer's warnings, cautions, and service procedures.

BATTERY-CHARGING-STARTING SYSTEM ANALYZER

The Battery-Charging-Starting System Analyzer is a hand held diagnostic tool used to test 6 volt or 12 volt lead-acid type batteries from 50 to 2000 cold cranking amps (CCA). Most automotive, lawn and garden, motorcycle, marine, heavy truck, and off road equipment batteries can be tested with this unit. The Battery-Charging-Starting System Analyzer will test partially charged batteries provided enough battery charge exists to power the analyzer.

NOTE: *The battery must exhibit at least 1.0 volt for the analyzer to operate.*

User prompts on the LCD (liquid crystal display) guide the testing process. Results are displayed on the LCD when testing is complete. Test results consist of the following: Battery voltage, available power in CCAs and a battery condition indication. Comprehensive starting/charging system checks are included (starting voltage, voltage regulator and alternator performance). The battery may remain connected to the vehicle, as long as the vehicle electrical system does not interfere with testing. The power cable is detachable for easy storage or replacement.

An internal 9 volt battery supplies power to allow viewing test results from memory or enabling the print function without having to connect the analyzer to an external battery. An infrared printer interface sends test results to an available external printer for hard copy reports.

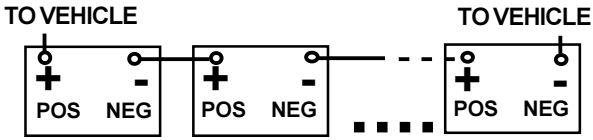
When the analyzer is using internal power, the functions available are View Test Results, Print Test Results, and Voltmeter.

The analyzer is protected from accidental reverse connection to the battery.

VEHICLE PREPARATION

Caution! ***Before Testing, Read All Safety Guidelines.***

- **Key OFF, engine OFF.**
- Disconnect all battery chargers! Battery cannot be tested while being charged.
- In all multiple battery systems, all batteries must be tested separately. Batteries connected in parallel must be disconnected. ***Only*** batteries connected in series may be tested without separating them.



Batteries in Series: All batteries are connected from the negative (-) terminal of one battery, to the positive (+) terminal of the other. Only the negative terminal of the first battery and the positive terminal of the last battery are to be connected to the vehicle. Any number of batteries may be connected in a series. However, each battery *must be tested separately*. *All other types of multiple connections* must be disconnected from each other.

- If the battery is connected to the vehicle, *remove all electrical loads*.
- Battery connections must be clean to provide good contact and proper test results.
- Install terminal stud adapters (not included) on side post batteries. Terminal stud adapters are available at most automotive parts stores.

HOOKUP

- Connect the power cable to analyzer.
- Connect the black clamp to the battery's negative (-) terminal.
- Connect the red clamp to the battery's positive (+) terminal.
- Make sure both sides of each clamp have good contact with the battery terminals. If needed, rock the clamps back and forth to improve connection.

If the analyzer does not power up, check the power cable at the analyzer and the connections to the battery, and verify that the battery has at least 1.0 volt. If the battery is below 1.0 volt, disconnect the analyzer and charge the battery.

NOTE: *Usually, if the voltage is below 1.0V, the battery is damaged and needs to be replaced.*

Follow battery charger manufacturer's instructions for proper charging procedures.

WARNING!

It Is Dangerous To Charge A Battery With A Bad Cell.

Disconnect the charger, then hookup the analyzer. If the analyzer still does not power up, the battery is not accepting charge and should be replaced.

ANALYZER SETUP

1. Select the language from the Main Menu.

The analyzer is factory set to the English language. To change languages (English, Spanish, French, German, Italian, Swedish, or Dutch), select Analyzer Setup and then Language from the menu. Use the UP/DOWN arrow keys to move the pointer to the appropriate selection and press the ✻ key to set the language.

2. Select the battery CCA standard of measurement.

The analyzer is factory set to the SAE measurement standard that rates vehicle batteries sold in the U.S. To select another battery measurement standard (SAE, DIN, IEC, EN, or BCI), select Analyzer Setup and then CCA measurement standard from the menu. Use the UP/DOWN arrow keys to move the pointer to the appropriate selection and press the ✻ key to set the CCA standard of measure.

3. Adjust the Display.

To change the contrast of the LCD screen, select Analyzer Setup and then Adjust Display from the menu. Use the UP/DOWN arrow keys to change the screen contrast and press the ✻ key to set.

4. Select °Celsius or °Fahrenheit.

The analyzer is factory set to display temperature in degrees ° F. To change temperature display, select Analyzer Setup and then choose °C/°F from the menu. Use the UP/DOWN arrow keys to move the pointer to the desired temperature units and press the ✻ key.

BATTERY TESTING

1. Select Battery Test and press ✻ key to begin testing.

The analyzer will check the battery for bad cell(s), excess voltage, and sufficient charge before running a test. If any of these checks fail, one of the following messages will be displayed and testing is stopped.

- **BAD CELL**

  Indicates that there is a shorted or defective cell in the battery and the battery needs to be replaced.

- **VOLTAGE TOO HI**

  Make sure:

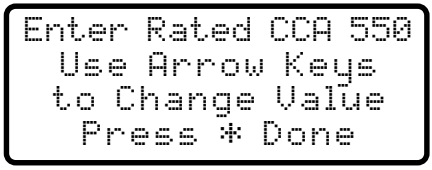
  - No battery chargers are hooked up.
  - Engine is not running.
  - You are testing a 6 or 12 volt battery.
  - Two 12 volt batteries in series (24V) are being tested individually.

- **CHARGE & RETEST**

  Indicates the battery is discharged and needs to be charged before testing. If the battery has been charged and continues to give this result, it is BAD and needs to be replaced.

2. Enter the battery CCA rating.

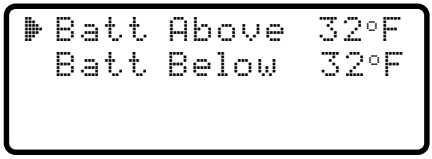
Use the UP/DOWN arrow keys to change the CCA number of the battery to be tested. *Press and hold arrow key down for rapid scrolling*. Once the correct number is displayed, press the ✻ key to continue.



NOTE: *Do not be confused by CA rating. Use the CCA rating. To convert CA or MCA (Marine) to CCA, multiply CA or MCA by 0.8.*

3. Select Test based on battery temperature.

Use the UP/DOWN arrow keys to move the pointer to the desired selection. Press ✻ key to make selection. Use **Above 32 °F** selection when battery temperature is above 32 ° F. Use **Below 32 ° F** when battery temperature is below 32 °F or lower**.**



4. Testing process.

Once the temperature range has been selected, the remaining battery tests will start automatically.

After a short period, the analyzer displays the battery condition. After displaying the battery condition test results, the analyzer determines the battery state-of-charge.

Below are the possible results and their meaning:

- **GOOD BATTERY**

  Indicates that the battery is good and ready to be returned to service.

- **GOOD-RECHARGE**

  Indicates that the battery is good but needs to be charged before returning it to service.

- **REPLACE BATTERY**

  Indicates the battery is bad and needs to be replaced. Before replacing the battery check the following:

  - Battery clamps had good connection on both sides during test. If not, correct connections and retest.
  - If the battery was hooked up to the vehicle during testing, perform the following steps:
    - Disconnect the positive and negative cables from the battery to isolate it from the vehicle
    - Clean the battery posts or terminals.
    - Connect analyzer and retest.
    - If you still get the “Replace Battery” message, then the battery is bad and needs to be replaced.

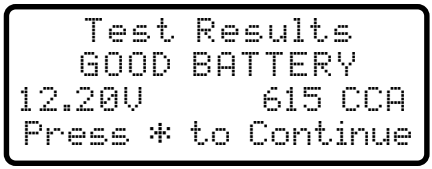
- **CHARGE & RETEST**

  Indicates the battery is discharged and needs to be charged before it can be retested. If the battery has been charged and continues to display “Charge/Retest”, it is BAD and needs to be replaced.

- **SURFACE CHARGE**

  Indicates that a surface charge exists and should be removed before retesting the battery. Turn on the vehicle headlights for 60 seconds, then off. Wait 60 seconds for battery to stabilize (some batteries may require additional time). Hook up and retest.

After all tests are complete, the battery voltage and state-of-charge in CCA (Cold Cranking Amps) will be displayed as shown. This is the available battery power at its present temperature and state of charge.



NOTE: *A flashing asterisk (*) next to CCA reading indicates that vehicle noise was detected during an in-vehicle battery test. The engine and all accessory loads must be turned off. If the problem remains, disconnect battery from the vehicle and retest.*

If a CCA reading higher than 2000 (analyzer maximum limit) is measured, **2000** and **OVER** will alternate on the display, and if a CCA reading lower than 50 (analyzer minimum limit) is measured, **50** and **UNDER** will alternate.

A new battery, when fully charged and at 70°F (21°C), will have a CCA rating that is greater than the CCA rating on the battery label.

STARTING/CHARGING SYSTEM TESTS

These tests check the starting/charging system. The tests may be performed on 12 or 24 volt systems. The automated testing process and all test results are stored for later review or printing. The analyzer checks:

- Battery voltage during crank. A large voltage drop implies excess current draw because of a faulty starter motor or mechanical binding.
- Battery voltage during no-load idle and during fast idle under electrical load. This checks the operation of the voltage regulator.
- Voltage ripple under electrical load. This tests for faults in the alternator diodes and windings.

CAUTION! ***Before performing starting/charging system tests, perform a battery test to make sure battery is good, properly charged, and engine is warmed up.***

While running the Starting/Charging tests, use the UP/DOWN arrow keys to review the results of any of the completed tests. To repeat any test, use the UP arrow key to return to the instruction display for that test and press * to retest.

1. Select **Starting/Charging** from the menu and press the ✻ key.
2. **Starter Test** - the engine must be OFF. Press the ✻ key to continue.
3. Start engine. Pressing the ✻ key will stop the test.
4. If voltage is low, a Battery Temperature screen appears. Determine the actual battery temperature and press the UP/DOWN arrow to select temperature range and press ✻. Starter cranking voltage is displayed. Press ✻ and continue to Charging System Tests.
5. **Charging Test**, all loads off, curb idle (idling at operating temperature). Let engine idle, all loads off. Press ✻ to display results.
6. No load/Curb idle base voltage and idle voltage are displayed. Press ✻ to continue.
7. **Charging Test**, all loads off, fast idle. Leave all loads off and run engine at 2000 RPM. Press ✻ to display results.
8. No Load/Fast Idle base voltage and no load/fast idle voltage are displayed. Press ✻ to continue.
9. **Charging Test,** full load, fast idle. Turn on all accessory loads and run engine at 2000 RPM. Press ✻ to display results.
10. Full load/Fast Idle base voltage and full load/fast idle voltage are displayed. Press ✻ to continue.
11. **Alternator Ripple Test,** partial load, fast idle. Turn all loads off except headlights and idle engine at 2000 RPM. Press ✻ to display results.
12. Alternator ripple is displayed as OK or High. Press ✻ to continue.

Press ✻ to quit Starting/Charging tests or press UP arrow key to return to any of the Starting/Charging results or instruction screens. Turn headlights and engine off when finished testing.

INTERNAL BATTERY POWER

To power the analyzer from the internal 9V battery, press and hold the ON/OFF key until the display shows text, then release. If the analyzer does not power up, replace the 9V battery.

To replace the 9V battery, remove battery cover screw on the back of the analyzer and slide cover off.

If the analyzer is left ON in the 9V mode when not in use, it will shut off automatically.

NOTE: *The display backlight will not turn on when the analyzer is powered from the internal 9V battery.*

VIEW TEST RESULTS

Each time a test is performed, the old results are replaced with the new results. You can review the results and print them. The analyzer does not have to be connected to an external battery to view test results. Pressing the ON/OFF key powers the analyzer from the internal 9 volt battery. Select View Data from the Main Menu and press the ✻ key.

PRINT TEST RESULTS

The analyzer has an infrared data link output compatible with a portable thermal printer. Test results stored in memory may be printed at any time. The analyzer does not have to be connected to an external battery to print test results. Pressing the ON/OFF key powers the analyzer from the internal 9 volt battery. Select Print Data from the Main Menu, aim the infrared emitter (at the top of the analyzer) at the printer's infrared receptor, and press the ✻ key.

VOLTMETER FUNCTION

When powering the analyzer from the vehicle battery, you can read the battery voltage. Select Battery Voltage from the Main Menu and press the ✻ key.

To use the analyzer as a voltmeter when powering from the 9V battery, select Voltmeter from the Main Menu and press the ✻ key. The analyzer displays the voltage reading. For example, use the optional accessory probes to read voltage at starting/charging components.

CAUTION! ***Measuring a Voltage Greater Than 30 V_{DC} will Damage the Battery Analyzer .***