390PT Battery Analyzer

Starting/Charging System Tester

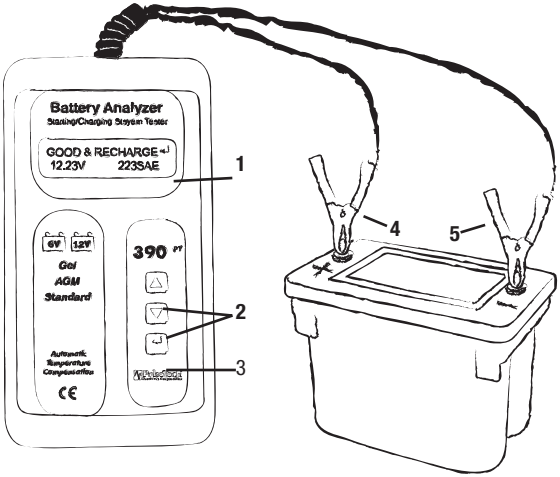
For testing 6- and 12-volt batteries and 12- and 24-volt charging systems

PulseTech™

Test Procedures / Operating Instructions

IMPORTANT:

1. For testing 6 and 12 volt batteries, and for testing 12 and 24 volt charging systems.
2. Suggested range of operation 32ºF (0ºC) to 122ºF (50ºC) in ambient temperature.



LEGEND

1. LCD Display
2. UP/DOWN Button
3. ENTER: function selection/ confirm choice
4. Positive Clamp (RED, +)
5. Negative Clamp (BLACK, -)

WARNING:

1. Working in the vicinity of a lead acid battery is dangerous. Batteries generate explosive gases during normal battery operation. For this reason, it is of utmost importance, if you have any doubt, 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.

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 protective clothing.

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.

Preparing To Test

1. Be sure area around battery is well ventilated while battery is being tested.

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 battery is damaged, do not use tester.

4. If the battery is not sealed maintenance free, 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. If necessary to remove battery from vehicle to test, always remove ground terminal from battery first. Make sure all accessories in the vehicle are off to ensure you do not cause any arcing.

Operation & Use

BATTERY TEST

1. Before you test a battery in a vehicle, turn off the ignition, all accessories and loads. Close all the vehicle doors and the trunk lid.

2. Make sure you have put a 9V battery into the battery chamber of the 390PT. If the 9V battery runs out of power, screen will show “INTERNAL BATTERY LOW”. Replace with proper 9V battery before starting the test.

Note that nothing will be seen on the display until tester is connected to a vehicle battery.

3. Make sure the battery terminals are clean. Wire brush them if necessary. Clamp the black lead to the vehicle negative battery terminal. Clamp the red lead to the vehicle positive battery terminal. Clamp onto the lead part of the terminal. Clamping onto the iron or steel part of the terminal can lead to erroneous results.

4. You will view the following screens:

SYSTEM ANALYZER	BATTERY TEST ▲\▼ ××.×× V	* Press ▲\▼ to select language or system test.
		* Press “Enter” to do battery test.
	SYSTEM TEST ▲\▼ ××.×× V	* Press ▲\▼ to select battery test or language
		* Press “Enter” to do system test.
	LANGUAGE ▲\▼ SELECT	* Press ▲\▼ to select battery test or system test.
		* Press “Enter” to set language.
	LANGUAGE ▲\▼ ENGLISH	* Press ▲\▼ to select language.
		* Press “Enter” to confirm choice & go back to battery test.

5. Press the ▲\▼ key to select battery test.
   Press «ENTER» button.

6. Press the ▲\▼ key to select the battery type:
   a. REGULAR/LIQUID
   b. AGM FLAT PLATE
   c. AGM SPIRAL
   d. VRLA/GEL
   Press «ENTER» to confirm choice.

BATTERY TYPE ▲\▼
AGM FLAT PLATE

7. Press the ▲\▼ key to select the battery rating:
   SAE (CCA), IEC, DIN or JIS
   Press «ENTER» to confirm choice.

SELECT RATING ▲\▼
SAE

8. Press the ▲\▼ key to input the battery capacity in CCA’s
   - SAE: 40~2000
   - EN: 40~2100
   - IEC: 30~1500
   - DIN: 25~1300
   - JIS: By Battery Type Number

   Press «ENTER» to begin the test.

SET CAPACITY ▲\▼
xxxx SAE

9. Testing the battery will take a few seconds.

TESTING

10. If prompted, Press the ▲\▼ key to select battery fully charged or not.
    Press «ENTER» to confirm choice.

IS BATTERY ▲\▼
CHARGED? YES

11. When the test is completed, the display shows the actual volts and the actual CCA and/or {Press the ▲\▼ key to select: SOH (STATE OF HEALTH) or SOC (STATE OF CHARGE)}. One of six results will be displayed:

GOOD & PASS :
The battery is good & capable of holding a charge.

```
GOOD & PASS
xx.xxV      xxxxSAE
```

GOOD & RECHARGE :
The battery is good but needs to be recharged.

```
GOOD & RECHARGE
xx.xxV      xxxxSAE
```

RECHARGE & RETEST :
Battery is discharged, the battery condition cannot be determined until it is fully charged. Recharge & retest the battery.

```
RECHARGE & RETEST
xx.xxV      xxxxSAE
```

BAD & REPLACE :
The battery will not hold a charge. It should be replaced immediately.

```
BAD & REPLACE
xx.xxV      xxxxSAE
```

BAD CELL & REPLACE :
The battery has at least one cell short circuit. It should be replaced immediately.

```
BAD CELL & REPLACE
xx.xxV      xxxxSAE
```

LOAD ERROR :

```
LOAD ERROR
```

The tested battery is bigger than 2000CCA or 200AH. Or the clamps are not connected properly. Please fully charge the battery and retest after eliminating both previous potential causes for load error message. If reading is the same, the battery should be replaced immediately.

**Ask the operator if any accessories have been left on as a possible cause of battery problem. If response is Yes – charge and retest the battery. If accessories have not been left on, replace the battery, since the charging system is working and a good battery should have accepted a charge.*

At the end of step 11 your Battery only test is complete.

12. If a System Test is also to be performed - Press «ENTER» and Press the ▲\▼ key to select: System Test or remove the test clamps from the battery posts after completion of testing batteries to end test and/or start over.

SYSTEM TEST

1. Press «ENTER» button, you will view the following screen:

```
SYSTEM TEST
xx.xxV
```

2. Turn off all vehicle accessory loads such as lights, air conditioning, radio, etc. Before starting the engine.

```
TURN OFF LOADS
START ENGINE
```

3. When the engine is started, one of the three results will be displayed along with the actual reading measured.

CRANKING VOLTS NORMAL

The system is showing normal draw. Press «ENTER» to perform the charging system test.

```
CRANKING VOLTS
xx.xxV    NORMAL
```

CRANKING VOLTS LOW

The cranking voltage is below normal limits, troubleshoot the starter with manufacturers recommended procedure.

```
CRANKING VOLTS
xx.xxV    LOW
```

CRANKING VOLTS NOT DETECTED

The cranking voltage is not detected.

```
CRANKING VOLTS
NOT DETECTED
```

4. If the cranking voltage is normal, press «ENTER» to begin charging system test.

```
PRESS ENTER FOR
CHARGING TEST
```

5. Press the «ENTER» key, you will view the following screen.

```
MAKE SURE ALL
LOADS ARE OFF
```

6. Press the «ENTER» key, one of the three results will be displayed along with the actual reading measured.

LOW CHARGING VOLTS WHEN TEST AT IDLE

```
ALT. IDLE VOLTS
xx.xxV    LOW
```

The alternator is not providing sufficient current to the battery. Check the belts to ensure the alternator is rotating with engine running. If the belts are slipping or broken, replace the belts and retest. Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest. If the belts and connections are in good condition, replace the alternator.

CHARGING SYSTEM NORMAL WHEN TEST AT IDLE

The system is showing normal output from the alternator. No problem is detected.

```
ALT. IDLE VOLTS
xx.xxV    NORMAL
```

HIGH CHARGING VOLTS WHEN TEST AT IDLE

ALT. IDLE VOLTS
xx.xxV HIGH

The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. Check to ensure there is no loose connection and the ground connection is normal. If there is no connection issue, replace the regulator. Since most alternators have the regulator built-in, this may require that you replace the alternator. The normal high limit of a typical automotive regulator is 14.7 volts +/- 0.05. Check manufacturer specifications for the correct limit, as it will vary by vehicle type and manufacturer.

7. Following the charging system at idle test, press «ENTER» for the charging system with accessory loads. Turn on the blower to high (heat), high beam headlights, and rear defogger. *NOTE: Do not use cyclical loads such as air conditioning or windshield wipers.*

TURN ON LOADS'
AND PRESS ENTER

8. When testing older model diesel engines, the users need to run up the engine to 2500 rpm for 15 seconds. You will view the screen as shown:

RUN ENGINE UP TO
2500 RPM 15 SEC

9. Press «ENTER» to look for the amount of AC ripple voltage from the charging system to the battery. One of two testing results will be displayed along with the actual testing measured.

RIPPLE DETECTED NORMAL

Diodes are functioning well in the alternator / stator.

RIPPLE DETECTED
xx.xxV NORMAL

Or

NO RIPPLE DETECTED

EXCESS RIPPLE DETECTED

One or more diodes in the alternator are not functioning or there is stator damage. Check to ensure the alternator mounting is sturdy and that the belts are in good shape and functioning properly. If the mounting and belts are good, replace the alternator.

RIPPLE DETECTED
xx.xxV HIGH

10. Press the «ENTER» key to continue the charging system with accessory loads. One of the three results will be displayed along with the actual testing measured.

CHARGING SYSTEM VOLTAGE HIGH WHEN TESTED WITH ACCESSORY LOADS

The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. Check to ensure there are no loose connections and that the ground connection is normal. If there are no connection issues, replace the regulator. Since most alternators have the regulator built-in, this may require that you replace the alternator.

ALT. LOAD VOLTS
xx.xxV HIGH

CHARGING SYSTEM VOLTAGE LOW WHEN TESTING WITH ACCESSORY LOADS

ALT. LOAD VOLTS
xx.xxV LOW

The alternator is not providing sufficient current for the system's electrical loads and the charging current for the battery. Check the belts to ensure the alternator is rotating with the engine running. If the belts are slipping or broken, replace the belts and retest. Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest. If the belts and connections are in good working condition, replace the alternator.

CHARGING SYSTEM VOLTAGE NORMAL WHEN TESTED WITH ACCESSORY LOADS

ALT. LOAD VOLTS
xx.xxV NORMAL

The system is showing normal output from the alternator. No problem detected.

11. Press «ENTER» when charging system test is completed. Turn all accessory loads and engine off. Press «ENTER» to return to step 1 or remove the test clamps from the battery posts after completion of testing to end test.

GLOSSARY

What is a GEL battery?

A gel battery is a lead-acid electric storage battery that:

- is sealed using special pressure valves and should never be opened.
- is completely maintenance-free.
- uses thixotropic gelled electrolyte.
- uses a recombination reaction to prevent the escape of hydrogen and oxygen gases normally lost in a flooded lead-acid battery (particularly in deep cycle applications).
- is non-spillable and therefore can be operated in virtually any position. However, upside-down installation is not recommended.

What is an AGM battery?

An AGM battery is a lead-acid electric storage battery that:

- is sealed using special pressure valves and should never be opened.
- is completely maintenance-free.
- has all of its electrolyte absorbed in separators consisting of a sponge-like mass of matted glass fibers.
- uses a recombination reaction to prevent the escape of hydrogen and oxygen gases normally lost in a flooded lead-acid battery (particularly in deep cycle applications).
- is non-spillable, and therefore can be operated in virtually any position. However, upside-down installation is not recommended.

What is a VRLA battery?

Valve Regulated Lead Acid Battery – This type of battery is sealed and Maintenance Free. It uses special pressure valves and should never be opened. The valve(s) open when a preset pressure is realized inside the battery and lets the excess gas pressure out; the valve then resets itself. Gel and AGM Batteries are VRLA battery types.

What is a SLI battery?

These initials stand for Starting, Lighting and Ignition, which are the three basic functions which a battery has to perform on all normal vehicles. Batteries given this description will have been specifically designed for service on cars and trucks within a voltage controlled electrical system. Those SLI batteries which are intended for heavy haulage vehicles fitted with large diesel motors may often be called COMMERCIAL batteries. They have to be much more powerful and more robust than batteries intended for cars.

What is STATE OF HEALTH?

It means how much battery capacity is left (%) comparing with the marked original battery capacity.

What is STATE OF CHARGE?

It a measurement of voltage currently in the battery. Usually stated as a percent of full charge.

What is CCA (COLD CRANKING AMPS)?

This is the SAE (Society of Automotive Engineers) measurement that should be entered into the battery tester for test purposes. It is defined as the current in amperes which a new fully charged battery can deliver for 30 seconds continuously without the terminal voltage falling below 1.2 volts per cell, after it has been cooled to 0OF and held at that temperature. This rating reflects the ability of the battery to deliver engine starting currents under winter conditions.

What is AMPERE-HOUR?

The unit of measurement of electrical capacity. A current of one ampere for one hour implies the delivery or receipt of one ampere-hour of electricity. Current multiplied by time in hours equals ampere-hours.

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