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ESD-2010

Operator's Manual

Hand Held-Accuracy with a Pulsed 120 Amp Load

The ESD-2010 is the ultimate hand-held tester. It is the auto industry's answer to portability in a professionally accurate load tester and system analyzer.

NOTES



LIMITED WARRANTY



36 MONTHS FROM DATE OF PURCHASE

The manufacturer warrants to the consumer that this product will be free from defects in material or workmanship for a period of thirty-six (36) months from the date of original purchase.

Products that fail within this 36 month warranty period will be repaired or replaced at the manufacturer's option to the consumer, when determined by the manufacturer that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of parts and the necessary labor by the manufacturer to effect the repair or replacement of the product. In no event shall the manufacturer be responsible for special, incidental or consequential damages or costs incurred due to the failure of this product.

Improper use, accident, water damage, abuse, unauthorized repairs or alterations voids this warranty. The manufacturer disclaims any liability or consequential damages due to breach of any written or implied warranty on its test equipment.

WARRANTY AND SERVICE INFORMATION

Original purchase date will be tracked by serial #. Please contact the call center if you have a warranty question/issue. Shipper damage incurred during return shipments is not covered under this warranty. It is the responsibility of the shipper (the customer returning the Test Equipment) to package the tester properly to prevent any damage during return shipment. Repair costs for such damages will be charged back to shipper (customer returning the Test Equipment). Protect the product By shipping in original carton or add plenty of over-pack cushioning such as crumpled up newspaper.

Setup cont.

>DEFAULT BATTERY
RATING: CCA
USE +/-.
'Y' TO SELECT

Select the rating from CCA,
MCA, CA, AH.



>SET DEFAULT CCA
AS: LAST CCA.
USE+/-
Y TO SELECT

You can also select the default rating
to be the last entered CCA value or a
particular amount such as 550 CCA.

>USE TEST RESULT
NEAR END OF LIFE.
USE+/-
Y TO SELECT

Battery test results default to "Near
End of Life". To change to "Good" or
"Bad" test results only, use + or - to
change setting then use "y" to select
this third test result option.

CONGRATULATIONS!



You have purchased one of Auto Meter's hand-held
Electrical System Analyzers. It is designed to test each
component of a vehicle's electrical charging and starting
system with speed and accuracy. If you should have any
questions about your tester, testing procedures, or service
see page 24 for contact information.

ESD-2010

| | |
|--------------------------------|-----------------------------------|
| Load Test Capacity..... | 120 Amp |
| Battery sizes | 100-1600 CCA |
| Digital Back-Lit Display | 1" x 2.5" - 4 line x 16 character |
| Volt Ranges..... | Digital 0-30 |
| Cooling..... | Vented |
| Leads | Load Amp-2 1/2 ft., 6 Gauge |
| Size | 5 7/8" x 9 1/2" x 1 7/8" |
| Memory | Stores the last 150 tests |
| Internal Battery..... | 9 Volt Alkaline |
| Weight..... | 4 lbs. |

What to Expect from the ESD-2010:

Immediately recognize a bad battery and perform a complete starting and charging system analysis. The ESD-2010 is a portable full-featured menu-driven battery tester, starting, and charging system analyzer that provides quick, professional load results using Auto Meter's Digital Pulse Load. The ESD-2010 is user friendly. It tells you what to do. Detailed test results provide trustworthy advice and are displayed after each test or can be reviewed and/or printed.

Caution: The ESD-2010 grill may get hot after repeated use. Be sure to hold the unit from the side grips only. Keep hands away from the grill.

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VOLT METER

Scroll Down to Volt Meter then select Volt Meter by pressing Y



REVIEW/PRINT ↑
>VOLT METER
SETUP
ABOUT ↓

Press (Y Enter)

--VOLT METER--
VOLTS: 12.24V
RIPPLE 00.0mV

Note: If the car is running and the clamps are attached to the battery a high ripple (over 500mV) indicates bad diodes in the alternator.

SETUP

Scroll Down to Setup, Select setup by pressing Y

REVIEW/PRINT ↑
VOLT METER
>SETUP
ABOUT ↓

>SET LANGUAGE:
ENGLISH
USE +/-
Y TO SELECT

Choose between English or Spanish using the + and - keys to change the language. Press Y to select.

>SET TEMPERATURE
SCALE: F.
USE +/-
'Y' TO SELECT

Select the temperature in Fahrenheit or Centigrade.

Note: The ESD-2010 checks and load tests 6 volt and 12 volt Batteries and tests the starting and charging systems on 12 volt and 24 volt systems. The following examples illustrated are for a 12 volt system. The ESD-2010 automatically identifies the appropriate voltage and displays the menu selection and instructions needed for that system.

PRINTING TEST RESULTS



Connecting to the DPC-2010

Daily the ESD-2010 will need to be connected to the DPC-2010 print center to check for updates and download data. The ESD-2010 will inform the user when this needs to be done. One of the following screens will appear.

TEST MEMORY IS
NEARLY FULL.
CONNECT TO
DPC-2010

TESTER NEEDS TO
CHECK FOR UPDATES
CONNECT TO
DPC-2010

Connect the ESD-2010 to the DPC-2010 using the Mini B USB cable on the DPC-2010 (ref page 7). Plug the Mini B USB cable into the Mini B USB Port at the bottom of the ESD-2010 near where the battery cables exit the unit. The DPC-2010 will take control of the ESD-2010 and download data and check for updates and reset the anti-theft feature. Be patient, this process can take up to seven (7) minutes to complete, especially if an update is required.



SAFETY

- Carefully read all operating instructions before using the ESD-2010
- 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 gases. 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 ESD-2010 to a battery that is connected to any other tester or charging unit. Damage may result.



**Wear
Safety
Glasses**

IMPORTANT

The Gator Clamp™ side terminal feature of the clamp set is for use when testing side terminal batteries that are not installed in a vehicle. The positive (red) clamp has a black insulating cap that protects the conductive surfaces on this clamp. The negative (black) clamp has grounded surfaces and does not require an insulating cap. The insulating cap must be removed when using the side terminal connection. It is very important that this insulating cap be reinstalled after using the side terminal connection on the red clamp. Failure to replace the insulating cap on the red clamp could lead to possible arcing to vehicle ground when performing on vehicle testing.

WARNING!

TESTING OF HYBRID VEHICLES

DO NOT test the starter, alternator and/or 12 volt starting battery while it is in the vehicle.

DO NOT remove, service or test the hybrid battery pack under any circumstances.

Remove the 12 volt starting battery, starter or alternator from the vehicle prior to testing.

CAUSE OF BATTERY FAILURE

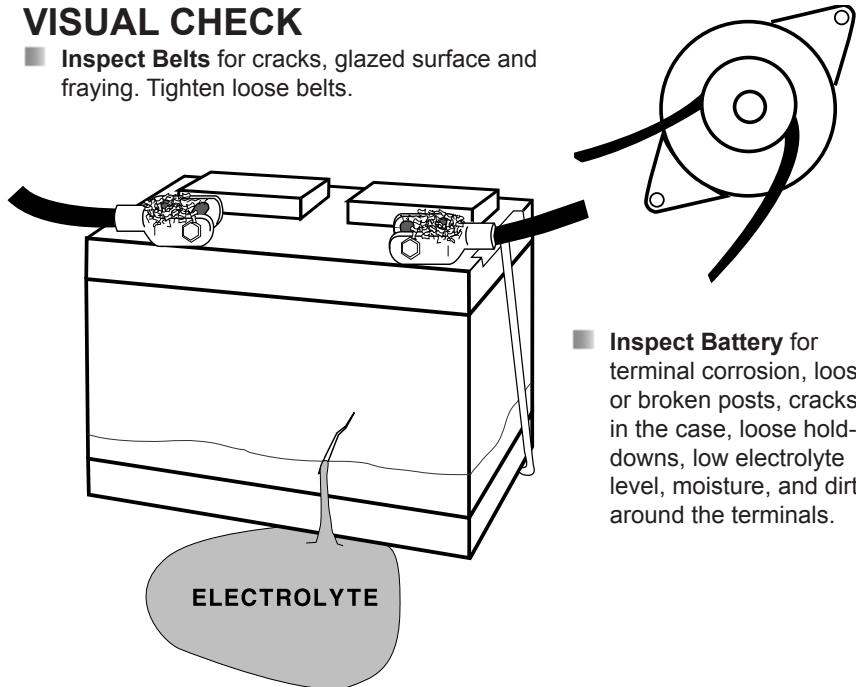
- **Incorrect Application:** Wrong size battery may have inadequate cold cranking rating for original vehicle specifications.
- **Incorrect Installation:** Loose battery hold-downs cause excessive vibration, which can result in damage to the plates.
- **Improper Maintenance:** Low electrolytic fluid 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.

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 steps before attempting any electrical diagnosis.

VISUAL CHECK

- Inspect Belts** for cracks, glazed surface and fraying. Tighten loose belts.



- Inspect Starting System.** Check starter, solenoid, and regulator for loose connections, loose mounts and frayed or cracked wires.
- Important Note:** A damaged battery must be replaced before proceeding.



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OTHER MENU ITEMS



REVIEW TESTS

Scroll Down to Review/Print

>REVIEW/PRINT ↑
VOLT METER
SETUP
ABOUT ↓

Press (Y Enter) to select Review/Print.

The last test will be displayed.

#44 12V CHARGE ↑
PASS REGULATOR
PASS DIODES
PASS OUTPUT ↓

Press (N Esc.) to select previous test. Press (+Up) or (-Down) key to select the desired test.

ABOUT SCREEN

REVIEW/PRINT ↑
VOLT METER
SETUP
>ABOUT ↓

Scroll down to about. Press Y to select.

ESD-2010
VERSION 1.0
SER #: 17533
COPYRIGHT 07/10

The about screen shows the model number. Firmware revision and date.

Press any key to go back to the menu.

SYSTEM TEST OVERVIEW cont.

#43 12V CHARGE
FAIL REG LOW
FAIL DIODES
FAIL OUTPUT <30A

NOTE 1: If the LCD reads "FAIL OUTPUT" it is recommended you run the test again with the engine at fast idle (2,000 RPM or more.)



If Measured Output is displayed the output may be low for some systems.

CONTROLS AND FUNCTIONS



LCD:

Displays menus and test results.

KEYS:

When each key is pressed, a beep sounds to assure contact has been made.

On/Off Key:

This is the manual on/off key. The display will show "Ready to Connect!" when the unit is turned on.

Y Enter Key:

This key selects the next menu, the cursor line item and answers 'yes' to a test progression.

+Up Key:

This key moves the cursor up in order to select a menu line item and increments certain displayed values.

-Down Arrow Key:

This key moves the cursor down in order to select a menu line and decrements certain displayed values. **N Esc Key:** This key cancels a test or progression. It also returns to the previous menu.

Print Key:

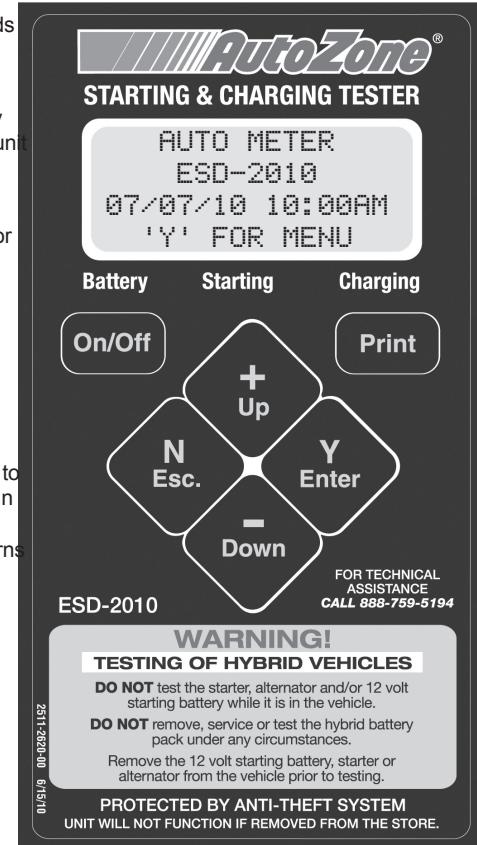
Point the ESD-2010 infrared print light towards the IR Receiver (located next to store printer) and press the print key. Continue to point the print light towards the IR Receiver until printing is completed. Test results will be printed.

Mini USB:

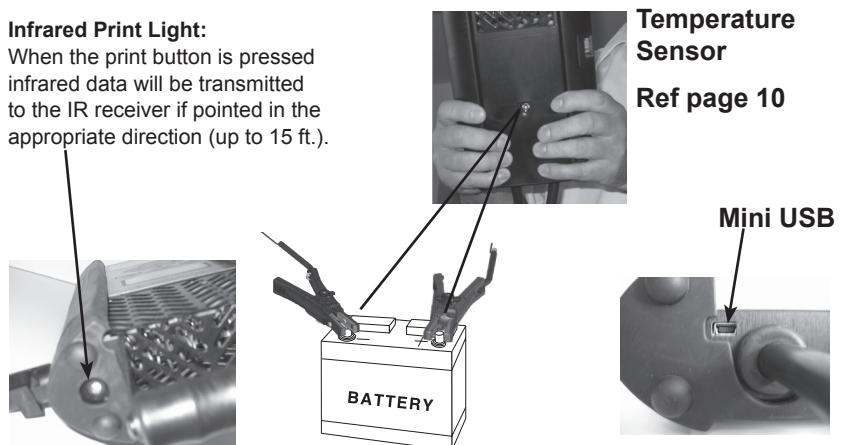
Used for tethering the DPC-2010

Infrared Print Light:

When the print button is pressed infrared data will be transmitted to the IR receiver if pointed in the appropriate direction (up to 15 ft.).



Temperature Sensor
Ref page 10



MAINTENANCE

GATOR CLAMPS™

Both jaws of each clamp must firmly engage the battery terminal. One copper jaw contains the smaller gauge wire that reads the voltage and the other jaw connects to the larger conducting wire that draws the load in each test. Electrical insulation between jaws is necessary for accurate readings. For side terminal battery connection, the threaded stud connects to the smaller gauge wire that reads the voltage, and the load pad ring connects to the larger conduction wire that draws the load in each test. Damaged clamps or loose wires will affect the readings. Keep clamps clean and in good repair.

CHECK OFTEN FOR LOOSE JAWS
OR DAMAGED INTERNAL PLASTIC
SHOULDER INSULATORS



Store clamps on posts as shown.

BATTERY CLAMP/LEAD REPLACEMENT

Over time the battery clamps will need to be replaced if any of the following are indicated:

- CCA values seem to be way off.
- If there is continuity between the copper jaws.
- If there is excessive damage or corrosion to the cables or clamps.

PROCEDURE

- Disconnect the back cover.
- Disconnect the two small wires from the PCB.
- Remove the large cables from the copper busses.
- Loosen and unthread strain relief.
- Carefully pull each wire through the strain relief bushing.
- Reverse the procedure when installing new clamps.

Caution: With cables pointing down, make sure the red clamp wires are attached to the left buss and the black clamp is attached to the right buss.

BATTERY REPLACEMENT

When the LCD indicates a low internal battery, the ESD-2010 will shut down and not operate until the 9 volt battery is replaced. Remove rubber insulator boot and then remove the back cover and replace the battery.

SYSTEM TEST OVERVIEW

This test measures the output of the charging systems under load conditions. This information provides the basis for further charging system tests. It also detects the presence of an open or shorted diode that causes an output loss of several amps and can cause the failure of other diodes.



Symptomatic Check before Proceeding:

- Battery should be in good condition and charged before testing the Charging System.
- Check warning light indications.
- Check belt condition and tension.
- Check all cables and connections.
- Check the battery for corrosion and dirty terminals.
- Does the battery have a low state of charge? (See section 2 and 3)
- Make sure all electrical items are off.
- Check for Alternator noise.

ALLOW VOLTAGE
TO STABILIZE
14.43

The ESD-2010 will allow the voltage to stabilize before starting the test bar at the bottom of the screen that shows the test progress. Be patient, it can take up to 30 seconds for the voltage to stabilize.

Allow the charging test to finish.

TESTING CHARGING
PLEASE WAIT...

Bar at the bottom of the screen will show the tests progress.

Test result will appear. The following are examples.

#43 12V CHARGE
PASS REGULATOR
PASS DIODES
PASS OUTPUT

Alternator has GOOD regulation and GOOD output.

#43 12V CHARGE
FAIL REG HIGH
PASS DIODES

High Regulation will damage the system. Replace or repair the Alternator.

SYSTEM TEST OVERVIEW cont

IF ALL CK GOOD ↑

RECOMMEND BENCH
TESTING STARTER



Use the (+ Up) and (- Down) keys to scroll through the screens. Press Y or N to go to the main menu.

If manufacturer's specifications are not available the chart below can be used as a general guideline. The amounts are in Amps.

| | | |
|-------------------------|-------------------------|-------------------------|
| 4 Cyl Gas 120-250A | 6 Cyl Gas Up to 250A | 8 Cyl Gas Up to 250A |
| 4 Cyl Dsl Up to 350A | 6 Cyl Dsl Up to 450A | 8 Cyl Dsl Up to 650A |

If the results are out of specification do the following:

- Inspect the connectors for excessive voltage drop.
- Repair or replace any defective cables or connectors.
- Retest the system.

If still out of specifications: **High** Amp reading may indicate engine is out of time or a faulty starter. Some possible causes are shorted windings, bent armature, broken housing or bad bearings.

STARTING CURRENT DRAW AND DIESEL ENGINES

There are a few points to consider in testing a starting system on a diesel engine. The ESD-2010 is designed to recognize any significant amount of draw; this includes glow plugs in small diesel engines. In heavy-duty applications consider computer and accessory draw.

- Make sure you start the engine quickly. The engine should be warm.
- Turn the ignition on and allow the glow plugs to heat up and click off before you run the Starting Test.
- Repeat the test in different ways and compare results.

After the starting system test the following screen will be displayed.

>CONTINUING WITH
CHARGING SYSTEM
TEST

1

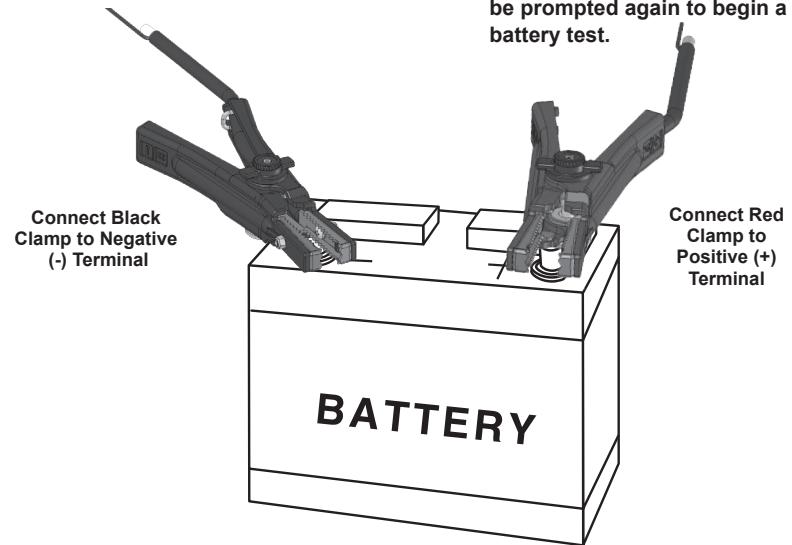
HOOK UP



Press the On/Off button: Connect the clamps as instructed on the LCD.

AUTO METER
ESD-2010
07/07/10 10:00AM
'Y' FOR MENU

Note: Go to the setup to change temp scale to centigrade. The temperature request only appears once for each battery tested. If the clamps are disconnected you will be prompted again to begin a new battery test.



- Use the side terminal feature on the clamp to connect battery side terminals. When testing dual post batteries always check the post to which the system is attached. If a load test is made from a post connection and the alternator is connected to side terminals a battery load test and charge can be completed, but the problem may be in the side post connections.

IMPORTANT

The Gator Clamp™ side terminal feature of the clamp set is for use when testing side terminal batteries that are not installed in a vehicle. The positive (red) clamp has a black insulating cap that protects the conductive surfaces on this clamp. The negative (black) clamp has grounded surfaces and does not require an insulating cap. The insulating cap must be removed when using the side terminal connection. It is very important that this insulating cap be reinstalled after using the side terminal connection on the red clamp. Failure to replace the insulating cap on the red clamp could lead to possible arcing to vehicle ground when performing on vehicle testing.

CONNECTION ERRORS

- If the clamps are reversed the Reversed Connection warning will be displayed on the LCD with an audible beeping.
- If one or both of the clamps are not in complete contact (both the copper and silver jaw) CHECK CONNECTIONS! will flash on the LCD.

2 BATTERY TEST

>BATTERY TEST
SYSTEM TEST
REVIEW/PRINT
VOLTMETER
↓

If any of the tests (battery test or system test) are selected and the clamps are not connected to the battery the following screen will appear.

>CONNECT CLAMPS
TO BATTERY.
RED+, BLACK-
'N' TO CANCEL

Press N to cancel, once the clamps are connected the test will proceed.

>AIM TEMP PROBE
AT BATTERY
TEMP: 70F
'Y' TO CONTINUE

AIM temperature sensor at battery case. Press 'Y' to measure and capture battery temperature. (ref page 7)

If the battery temperature is above 180°F the battery is too hot to safely test. the following screens will appear.

THE BATTERY
IS TOO HOT TO
TEST SAFELY
'Y' TO CONTINUE

THE BATTERY
NEEDS TO COOL
BEFORE TESTING
'Y' TO CONTINUE

>ENTER RATED CCA
600 USE +/-
12.50V
'Y' TO BEGIN



Select Battery Test from the main menu and then press (Y Enter).

SYSTEM TEST OVERVIEW cont



CK SOLENOID ↑
CK CABLES
CK CONNECTIONS
CK FOR CORROSION ↓

Press the (-Down) key to display the next screen. Press the (+Up) key to move to the previous screen

IF ALL CK GOOD ↑

RECOMMEND BENCH
TESTING STARTER

If the current is over 250A, the system will need more information to determine if the starter is good. The next screen will ask what type of engine you are testing.

WHAT TYPE ENGINE
ARE YOU TESTING
USE +/- DIESEL
'Y' TO CONTINUE

Use the +/- key to choose between gas and diesel.

HOW MANY CYLINDERS
DOES ENGINE HAVE
USE +/- 4
'Y' TO CONTINUE

If the engine is diesel the system will need to know the number of cylinders the engine has. Use the +/- key to choose either 4, 6 or 8.

The chart on page 16 shows the current limits for the different engine types. If the starter is likely to have a problem the following screens will appear.

#74 12V STARTING
CURRENT 680A
STARTING SYSTEM
- FAILED - ↓

CK CABLES ↑
CK CONNECTIONS
CK SHORT/GROUND
CK SOLENOID ↓

Trustworthy advice for what to do next

SYSTEM TEST OVERVIEW cont

If the battery is good and charged the following screen will be displayed.

>CONTINUING WITH
STARTING SYSTEM
TEST

PREPARING FOR
STARTING TEST

Wait for instructions before cranking engine.

>START ENGINE

'N' TO CANCEL

TESTING STARTING,
SYSTEM
PLEASE WAIT ...

If the current draw is between 75A & 250A (for gas powered engines) the starting system is likely good and the following screen will appear

#40 12V START
CURRENT 200A
STARTING SYSTEM
- PASS -

If the current is under 75A a solenoid connection or corrosion problem is likely and the following screens appear.

#73 12V START
CURRENT 60A
STARTING SYSTEM
- FAILED - ↓

Press the (-Down) key to display the next screen. Press Y or N to go to the main menu.



BATTERY TEST (cont.)



CHOOSE BATT TYPE
STARTING STANDRD
USE +/-
'Y' TO CONTINUE

Press the (+Up) or (-Down) key to cycle through the battery types.

Press 'Y' when it matches the type of battery you are testing.

BATTERY TYPE OPTIONS:

STARTING STANDRD

OPTIMA RED

OPTIMA YELLOW

OPTIMA BLUE

STARTING AGM

DEEP CYCLE AGM

DEEP CYCLE STANDRD

SUMMARY SCREEN

STARTING STANDRD
BATTERY TEMP 70°F
RATED CCA = 600
'N' OR 'Y'

Confirm that the inputs are correct. Press "Y" if they are correct. The test will start. Press "N" to re-enter battery type, temp, and rating.

If the reading is below 7.2 Volts you will get the following:

>IS THIS A 6V
BATTERY?
'N' OR 'Y'

REMOVING SURFACE
CHARGE...
PLEASE WAIT...

Surface charge removed if detected.

TESTING BATTERY
PLEASE WAIT...
S#22010 T#32

Bar at the bottom of the screen will show the tests progress.

Wait for test results.

BATTERY TEST (cont.)

After the Digital Pulse Load Test is completed results similar to one of the following sample screens will appear.

#32 12V BATTERY
GOOD BATTERY.
12.84V CHG 100%

Battery passes testing. Return to service.

#33 12V BATTERY
BAD BATTERY
12.45V CHG 75%
REPLACE NOW

Battery did not have sufficient remaining capacity to pass tests. Battery should be replaced immediately.

#34 12V BATTERY
GOOD NEEDS CHARG
12.24V CHG 50%
CK START-CHG SYS

Charge battery and place into service.

#35 12V BATTERY
CHARGE REQUIRED
12.06V CHG 25%
ADOL TEST REQ'D

Battery did not have a sufficient charge for a Digital Pulse Load Test. Charge required.

#36 12V BATTERY
GOOD BATTERY
12.80V CHG 100%
NEAR END OF LIFE

Battery passes testing but is near it's end of life. Battery should be replaced soon. Extreme temperatures/weather may cause battery to fail.



3

SYSTEM TEST OVERVIEW



The System Test will test the vehicle battery, starting system, and charging systems in a quick logical order. Since a bad or discharged battery will greatly affect the measurements done during the starting system and charging system test, the ESD-2010 will only allow those tests to be done after the battery has been determined to be good and charged. The Starting Test measures the amount of current needed to crank the engine and provides the initial information to diagnose and/or further test the starting system if necessary.

Symptomatic Check before Proceeding:

- Check all cables and connections.
- Check the battery for corrosion and dirty terminals.
- Check starter/solenoid for visual defects.
- Check the ignition switch and any magnetic switches for loose or bad wiring, loose mounting, or connections and sticking contacts.
- Check for starter/solenoid noise. The type of noise or the lack thereof can help in diagnosing the problem.
- Does the solenoid click, but the starter does not turn? Does the starter turn, but not engage the flywheel? Is the starter sluggish?

Note: A remote starter switch can be used to bypass the ignition switch and crank the engine from under the hood. This way the sounds of the starter can be heard.

SYSTEM TEST

Press (N Esc.) to return to main menu. Select **System Test** then press (Y Enter).

BATTERY TEST
>SYSTEM TEST
REVIEW/PRINT
VOLTMETER

Use the (+Up) and (-Down) to move cursor to the desired test

A battery test as described in Section 2 will be performed first. If the battery is found to be bad the following screen will be displayed.

REPLACE BATTERY
AND RERUN
SYSTEM TEST
'Y' TO CONTINUE

Replace battery with a known good, fully charged battery and then rerun the system test. Pressing 'Y' will return to the main menu.

If the battery is good but needs a charge the following screen will be displayed.

CHARGE BATTERY
AND RERUN
SYSTEM TEST
'Y' TO CONTINUE

Charge the battery and rerun the system test. Pressing 'Y' will return to the main menu.