

Owner's Manual & Safety Instructions

Save This Manual Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

24a



DIGITAL BATTERY AND SYSTEM TESTER WITH PRINTER



Visit our website at: <http://www.harborfreight.com>
Email our technical support at: productsupport@harborfreight.com

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When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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⚠WARNING

Read this material before using this product. Failure to do so can result in serious injury. SAVE THIS MANUAL.

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WARNING SYMBOLS AND DEFINITIONS

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Addresses practices not related to personal injury.

IMPORTANT SAFETY INSTRUCTIONS

WARNING

Read all safety warnings and all instructions.

Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

1. Use only according to these instructions.
Improper setup can create hazards.
2. Remove personal metal items such as rings, necklaces, bracelets, and watches before testing.
3. Wear ANSI-approved safety goggles and heavy-duty work gloves during setup and use.
4. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
5. Keep work area clean and well lit.
6. Keep bystanders out of the area during setup and use.
7. Do not use when tired or when under the influence of drugs or medication.
8. This product is not a toy. Do not allow children to play with or near this item.
9. Inspect before every use; do not use if parts are loose or damaged.
10. Do not expose tester to moisture.

11. Do not smoke or have open flames near the battery. Do not operate tester near flammables such as gasoline, etc.
12. Do not connect the Tester to the battery while the engine is running. Turn the engine off before connecting.
13. Do not test a frozen battery.
14. If battery has just been charged, ventilate the area thoroughly before testing it. Be careful to avoid creating sparks.
15. Risk of fire, electric shock, or injury - Do not use any attachment not recommended by the manufacturer.
16. Do not use tester if cord is defective; take it to a qualified technician when service or repair is required.
17. Do not disassemble tester or operate it if it has been dropped, received a sharp blow, or damaged in any way; take it to a qualified technician when service or repair is required.
18. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
19. Do not test a damaged battery. Inspect battery for cracked or broken case or cover.
20. Keep corrosion from battery terminals from contact with eyes.
21. To reduce risk of explosion, do not connect both clamps directly to battery at same time. When making each connection, twist or rock clamp back and forth to ensure a good connection and minimize sparks. Do not twist or rock clamp on battery after second connection has been made.
22. 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 10 minutes and get medical attention immediately.
23. Maintain product labels and nameplates. These carry important safety information. If unreadable or missing, contact Harbor Freight Tools for a replacement.

▲SAVE THESE INSTRUCTIONS.

SYMBOLLOGY

V	Volts
	Direct Current
A	Amperes
CA	Cranking Amps
CCA	Cold Cranking Amps
MCA	Marine Cranking Amps
IR	Internal Resistance

RC	Reserve Capacity
Ah	Ampere-hours
	WARNING marking concerning Risk of Eye Injury. Wear ANSI-approved splash-resistant safety goggles.
	Read the manual before set-up and/or use.
	WARNING marking concerning Risk of Fire. Follow connection procedure.

Specifications

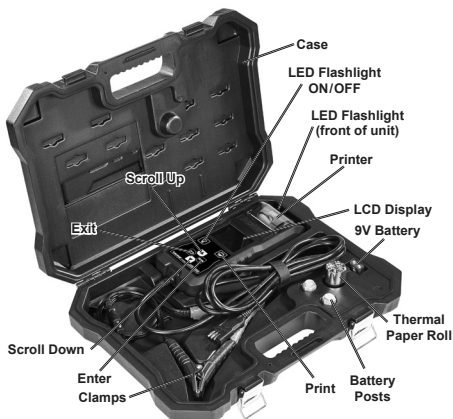
Display	LCD
Battery Voltage Application	6V/12V (Battery Test) 6V/12V/24V (System Test)
Tester Voltage Range Capacity	1.24V-30V
Battery Type	Flooded, AGM Flat, AGM Spi, GEL, EFB
Battery CCA Range	40~2000CCA
Battery AH Range	5-250Ah
Testing Metrics	Battery, Alternator/Charging, Cranking/Starting, Battery Internal Resistance, Crank Amps, Marine Crank Amps
Test Record Storage	50 records
Printer Paper	Thermal Paper, 2-1/4"W x 50'L (Ø 1-7/16")
Cable/Clamps	10', 16AWG Cable/Copper Plated Steel Clamps
Power	Battery being tested and 9V Battery

Setup - Before Use:



Read the **ENTIRE** IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Functions



Operating Instructions



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Note: This Tester is powered by the battery being tested. Install the 9V battery to power the LED Flashlight and test external batteries below 6V. Connect clamps to 12V battery to access report and print.

Note: Suggested operational range -4°F (-20°C) to 122°F (50°C) ambient air temperature.

1. The battery should be rested 30 minutes before testing. Vehicle should be turned off with no accessories operating.
2. Attach clamps securely to the battery terminals, red to positive (+), black to negative (-). terminals should be cleaned prior to testing.

Note: If removing battery from vehicle, disconnect negative (-) terminal first.

3. **Non-sealed batteries:** Add distilled water in each battery cell until acid reaches manufacturer recommended levels. Do not overfill.
4. Test a single 6V or 12V battery only. Do not connect this Tester to a series of batteries or an electrical system containing more than one 6V/12V/24V battery. Do not connect to any other electrical system; damage to the Tester will result.
5. Be careful not to damage the Tester. Avoid dropping it or dropping items onto it. Do not expose to moisture or chemicals.
6. The Tester may be used continuously without overheating.

Controls

LED FLASHLIGHT (💡) **Key:** Power LED Flashlight ON and OFF.

SCROLL (▲▼) **Keys:** Select Menu Items. Input data.

EXIT (↩) **Key:** Return to Main Menu.

ENTER **Key:** Confirm Menu selection.

PRINT (🖨) **Key:** Print out test results.

Battery Posts

Battery Posts are provided to simplify connections to side post style batteries.

1. Disconnect negative (-) battery cable from negative (-) battery terminal.
2. Disconnect positive (+) battery cable from positive (+) battery terminal.
3. Thread Battery Posts into battery terminals.
4. Connect Tester cable Clamps to Battery Posts for testing.
5. Remove Battery Posts when finished testing.

LED Flashlight

Digital Tester is equipped with a LED Flashlight for additional illumination.

Press the LED Flashlight key once to turn the LED Flashlight ON, and again to turn it OFF.



Tool Setup

Unit must be connected to the battery to be tested. See Battery Replacement on page 10. Tester will display the home screen, showing battery status of the battery being tested. If the battery connection is poor, "CHECK CONNECT" will be displayed; correct battery connection. Press EXIT to leave current screen and return to previous screen without making a selection.

1. Press ENTER to enter Select Function screen.
2. Use SCROLL keys to highlight Settings; press ENTER.
3. Under Settings, there are four options; use SCROLL keys to highlight desired option and press ENTER to select the option to enter information. Press ENTER to save. Use SCROLL keys to input data for each option.
 - a. Screen Contrast - Adjust screen contrast.
 - b. Tool Information - Hardware/software version, date and time.

Note: If date and time cannot be saved, connect to a 12V external battery for a minimum of 2 hours. After 2 hours, reset time and date.

- c. Printer - Enter customer information.
- d. License - Enter customer license plate number.

Loading Printer Paper:

Note: Unit must be connected to a 12V battery to test printing after loading printer paper.

1. Open Printer Paper Cover.
2. Set Thermal Paper Roll in chamber, orientated with the Paper feeding off the bottom of the roll towards the Cutter.

Note: Printer uses standard thermal paper available from most office supply stores.

3. Feed the Paper until it begins to feed past the Cutter.
4. Close the Printer Paper Cover.
5. Connect Unit to 12V battery to access report and print.

Note: Printer will not work if 12V battery voltage drops below 7.5V.

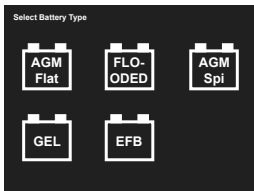
Battery Test

For testing 6V and 12V batteries ONLY.
Suggested operational range 32°F (0°C) to 122°F (50°C) ambient air temperature. Press EXIT to leave current screen and return to previous screen without making a selection.

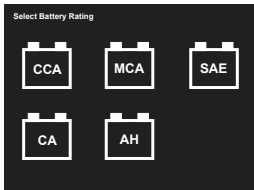
1. Press ENTER to enter Select Function screen.
2. Use SCROLL keys to highlight Battery/Electrical System Test; press ENTER.
3. Under Select Test, use SCROLL keys to highlight Battery Test option; press ENTER.
4. Under Select Voltage, use SCROLL keys to highlight 6V or 12V Battery option; press ENTER.

Note: If voltage is more than 8V/16V, a VOLTAGE HIGH message will appear. Causes and Solutions:

- a. User accidentally selected wrong battery voltage - Select correct battery voltage.
 - b. Battery voltage exceeds upper limit because tester was connected while battery was being charged - Stop charging of battery before testing.
5. Under Select Battery Type, use SCROLL keys to highlight Battery Type option; press ENTER.



6. Under Select Battery Rating, use SCROLL keys to highlight Battery Rating option; press ENTER.



7. Under Enter Current Environment, use SCROLL keys to highlight Temperature option closest to your ambient temperature; press ENTER.

8. Under Select Capacity, use SCROLL keys to input Battery Rated CCA, MCA or CA or AH value; press ENTER.

Note: CCA, SAE, CA, MCA: Minimum step size is 5 when Scrolling.

AH: Hold SCROLL keys to quickly adjust the value without releasing.

9. Under In-Vehicle Battery Test, use SCROLL keys to highlight YES or NO option; press ENTER.
 - a. **If YES was entered:** If a surface charge is detected on the battery (battery voltage $\geq$ 6.5V for 6V battery, or $\geq$ 13V for 12V battery) a warning message "SURFACE CHARGE! - Please Turn On The Lights For 10 Sec." will appear. Turn on lights for ten seconds before proceeding. Repeat this step until no surface charge is detected, and the battery test is carried out with results displayed. A surface charge gives an inaccurate high voltage reading and test result.
 - b. **If NO was entered:** Battery test is carried out with results displayed.

10. Under Test Result, the following is displayed:

- Battery (Bad, Good)
- Battery Type
- State of Health
- State of Charge
- Battery Voltage
- Internal Resistance
- Set Value
- Measured Value
- Temperature Value
- Customer License Number
- Date/Time

11. If desired, press ENTER to save test result or press PRINT key to print out test results directly.
 - a. "TEST RECORD SAVED" message is displayed after successful saved test result.
 - b. After saving test result, press ENTER to return to main menu.

Note: Tester will not print under following conditions:

- Clamp voltage lower than 7.5V when connected to external 12V battery.
- Thermal protection plate exceeds 167°F (75°C) - "Printer Temperature Is Too High" message is displayed.
- Paper too short or missing - "No Paper" message is displayed.

Electrical System Test

For testing 6V/12V/24V systems. Suggested operational range 32°F (0°C) to 122°F (50°C) ambient air temperature. Press EXIT to leave current screen and return to previous screen without making a selection.

1. Press ENTER to enter Select Function screen.
2. Use SCROLL keys to highlight Battery/Electrical System Test; press ENTER.
3. Under Select Test, use SCROLL keys to highlight Electrical System Test option; press ENTER to proceed to "Starting Test".
 - a. Follow prompts on Display to turn off head lights and accessories, then starting engine.
 - b. When the change in voltage is detected it will initiate the "Show Startup Result" message on the Display.

PASS: Battery is in good condition.
FAIL: Battery needs recharged or replaced.

Note: Tester will automatically detect voltage system. If external voltage < 7.75V, 6V test will initiate. If external voltage is 7.75~15.5V, 12V test will initiate. If external voltage > 15.5V, 24V test will initiate.

4. Press ENTER to proceed to "Charging Test". Follow prompts on Display to turn off head lights and accessories.
 - a. Press ENTER for next step; Charging Test results are displayed (FAIL/PASS and Alternator Idle Voltage).

PASS: Charging system is in good condition.
FAIL: Charging system voltage is low. Check drive belt for slippage. Check alternator and battery connection. If drive belts and connections are in good condition, follow manufacturer's suggestion to eliminate alternator fault.
FAIL: Charging system voltage is high. Replace alternator assembly or regulator (older vehicles). Too high charging voltage will overcharge battery and shorten its life.

- b. Press ENTER for next step. Follow prompts on Display to turn on head lights and accessories, and rev and hold engine at 2000RPM for 15 seconds during test. Press ENTER when ready.
- c. "Ripple Test Is In Progress" with a countdown timer will be displayed. At the end of the Ripple Test, results will be displayed.
- d. Press ENTER for next step; Ripple Test results are displayed (FAIL/PASS and Alternator Load Voltage).

PASS: Charging system is operating normally.
FAIL: Charging system needs inspection and repair.
- e. Press ENTER for next step. Follow prompts on Display to turn off engine.
5. Press ENTER to display first screen of Test Results.
6. Press ENTER to save or EXIT to skip to next screen of Test Results.
7. If desired, press PRINT key to print out test results directly.

Note: Tester will not print under following conditions:

- Clamp voltage lower than 7.5V when connected to external 12V battery.
 - Thermal protection plate exceeds 167°F (75°C) - "Printer Temperature Is Too High" message is displayed.
 - Paper too short or missing - "No Paper" message is displayed.
8. Press ENTER to save or EXIT to skip back to previous screen of Test Results.
 9. If Test Results are saved, "TEST RECORD SAVED" will appear in the Save Result screen. Press ENTER or EXIT to return to main menu.

Test Records

Unit must be connected to a 12V battery access report and print. Press EXIT to leave current screen and return to previous screen without making a selection. The tester is capable of storing up to 50 test records.

1. Press ENTER to enter Select Function screen.
2. Use SCROLL keys to highlight Test Records; press ENTER.
3. Under Test Records, use SCROLL keys to highlight desired option and press ENTER. Two options are displayed:
 - a. Battery Test.
 - b. Electrical System Test.
4. Under either option from previous step, use SCROLL keys to highlight desired test record and press ENTER to view those test results.

To delete:

1. Press EXIT for three seconds to access Deleting Function screen. Two options are displayed:
 - a. Delete This Record.
 - b. Delete ALL Records.
2. Under Deleting Function screen, use SCROLL keys to highlight desired option; press ENTER; the Display will offer YES and NO options.
3. Highlight and select the desired option; press ENTER; "RECORD DELETED" will be displayed.



Procedures not specifically explained in this manual must be performed only by a qualified technician.

Cleaning, Maintenance, and Lubrication

1. Wipe unit with a dry, lint-free cloth. Do not use solvents or abrasives.
2. Remove battery if not in use for long periods.
3. Store unit in a dry location.
4. Other than the battery, there are no replaceable parts on this unit. **Repairs should be done by a qualified technician.**

Battery Replacement

If the Tester display reads "POWER LOW", the battery should be replaced.

1. Turn the unit over.
2. Remove screw and back cover.



3. Pull battery out of unit and replace with the same (9V battery). Confirm battery orientation is correct.

Note: Press LED Flashlight button to confirm LED Flashlight is operable.



4. Replace cover and retighten screw.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note: Replacement parts are not available. Reference UPC 193175446701
Do not open housing; no user-serviceable parts inside.

Record Product's Serial Number Here: _____

Note: If product has no serial number, record month and year of purchase instead.

Limited 90 Day Warranty

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

