



**Advancing
Battery Management**

MDX-300 Series



Battery & Electrical System Tester

*For 12-volt automotive starting batteries
and starting/charging systems*

INSTRUCTION MANUAL

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CAUTION

Because of the possibility of personal injury, always use extreme caution when working with batteries.

Battery posts, terminals, and related accessories contain lead and lead compounds. Wash hands after handling.

Capabilities

The Battery & Electrical System Tester tests 12-volt regular, AGM, and Gel batteries, and 12-volt starting and charging systems of passenger cars and light trucks. It displays the test results in seconds and features a built-in printer to provide customers with a copy of the results.

Additional features include the ability to:

- test batteries rated from 100 to 900 CCA
- detect bad cells
- protect against reverse polarity
- test discharged batteries
- test multiple rating systems (SAE, DIN, EN, IEC, JIS)
- provide a choice of 19 languages

Display and Keypad

When you first connect the tester to a battery, it functions as a voltmeter until you press the **ENTER** button.

IMPORTANT: If you connect the tester to a voltage source greater than 30 Vdc, you may damage the tester's circuitry.

The menu-driven display will then guide you step by step through the test process. Use the keypad buttons to scroll to and select options in the menu.



- 1 Use the **UP** and **DOWN ARROW** buttons to choose test parameters and scroll to menu options.
- 2 Use the **ENTER** button to make selections.
- 3 Use the **BACK** button to move to the previous screen or to move back one space when creating a custom header for your printed test results.

- 4 Briefly press and hold the **MENU** button to display these options:

PRINT RESULTS

VIEW RESULTS

PERFORM TEST

VOLTMETER

SET ADDRESS

LANGUAGE

Use the **ARROW** buttons to scroll up or down to options in the list, and press **ENTER** to select.

For information about the options, see “Options Menu” on page 13.

To turn off the tester when not connected to the battery, briefly press and hold the **MENU** button.

Preparations Before the Test

Before connecting the tester, clean the battery posts or side terminals with a wire brush and a mixture of baking soda and water. When testing side-post batteries, install and tighten lead terminal adapters.

IMPORTANT: Do not test at steel bolts. Failure to install terminal adapters or installing terminal adapters that are worn or dirty may result in inaccurate test results. To avoid damage, never use a wrench to tighten the adapters more than 1/4 turn.

If you are testing in the vehicle, make sure all accessory loads are off, the key is not in the ignition, and the doors are closed. If the vehicle was running before the test, turn on the headlights to remove the battery's surface charge. Let the battery rest for at least 1 minute to recover before testing.

Connecting the Tester

- Connect the red clamp to the positive (+) terminal and the black clamp to the negative (–) terminal.
- For a proper connection, rock the clamps back and forth. The tester requires that both sides of each clamp be firmly connected before testing. A poor connection will produce a CHECK CONNECTION or WIGGLE CLAMPS message. If the message appears, clean the terminals and reconnect the clamps.
- The preferred test position is at the battery terminals. If the battery is not accessible, you may test at the jumper post; however, the available power measurement may be lower than the actual value.

Battery Test

When you first connect the tester to the battery, it functions as a voltmeter until you press the **ENTER** button to start the test.

After you press **ENTER**, scroll to each parameter using the **UP** or **DOWN ARROW** button and press **ENTER** to select. If any messages appear during the test, see “Test Messages” on page 11.

1. **BAT. LOCATION:** Scroll to and select **OUT OF VEHICLE** for a battery not connected to a vehicle or **IN VEHICLE**. The in-vehicle test includes the options of testing the starting and charging systems.

IMPORTANT: The performance of the starting and charging systems depends on the battery's condition. It is important that the battery is good and fully charged before any further system testing.

BAT. AGE: Select **New Battery** or **In Service**:

New battery: Battery is fresh produced and not yet installed in a vehicle. For instance: the battery is in a warehouse waiting for delivery to a customer.

In service: the Battery is already used and cycled in the vehicle

2. **BATTERY TYPE:** Scroll to and select **REGULAR** lead-acid, **AGM**, or **GEL**.
3. **STANDARD:** Scroll to and select the battery's rating system. The available rating systems and their ranges are:

| Standard | Description | Range |
|----------|--|---------|
| EN | Europa-Norm | 100–900 |
| IEC | International Electrotechnical Commission | 100–550 |
| SAE | Society of Automotive Engineers, the European labeling of CCA | 100–900 |
| DIN | Deutsche Industrie-Norm | 100–550 |
| CCA | Cold Cranking Amps, as specified by SAE. The most common rating for cranking batteries at 0 °F (–17.8 °C). | 100–900 |

4. **BAT. RATING:** Scroll to and select the rating units. They increase and decrease by five units. To increase scrolling speed, press and hold the **UP** or **DOWN ARROW** button.
5. Press **ENTER** to start the test. Within seconds the tester displays the results, which consist of a decision on the battery's condition and its measured voltage. The tester also displays your selected battery rating and the rating units.

Battery Test Results In service

| Decision | Interpretation |
|------------------|--|
| GOOD BATTERY | Return the battery to service. |
| GOOD-RECHARGE | Fully charge the battery and return it to service. |
| CHARGE & RETEST | Fully charge the battery and retest. Failure to fully charge the battery before retesting may cause inaccurate results. If CHARGE & RETEST appears again after you fully charge the battery, replace the battery. |
| REPLACE BATTERY | Replace the battery and retest. A REPLACE BATTERY result may also mean a poor connection between the battery cables and the battery. After disconnecting the battery cables, retest the battery using the out-of-vehicle test before replacing it. |
| BAD CELL-REPLACE | Replace the battery. |

Battery test results New battery

| | |
|------------|---|
| OK | Battery is ready to be installed |
| OK, CHARGE | Battery needs to be charged before installation |

If you have completed an out-of-vehicle test, the display alternates between the battery test results and the message PRESS ↵ FOR TO PRINT. Because the printer is powered by the voltage of the battery you are testing the battery voltage must be greater than 9 volts. Keep the clamps connected and press **ENTER**. For more information about the printer, see “Changing the Printer Paper” on page 16 and “Troubleshooting Printer Problems” on page 16.

To quit before printing, disconnect the clamps. Remember to print out your test results before the next test.

IMPORTANT: The tester retains the results of the last test only. When you start a new test, the last results are overwritten.

Starter System Test

If you have completed an in-vehicle test, the display alternates between the battery test results and the message PRESS ↵ FOR STARTER TEST. To continue, start the engine at the prompt.

The display alternates between the decision on the starter system and the measured voltage drop.

Starter System Test Results

| Decision | Interpretation |
|----------------------|--|
| CRANKING VOLTAGE OK | The starter voltage is normal and the battery is fully charged. |
| CRANKING VOLTAGE LOW | The starter voltage is low and the battery is fully charged. |
| CHARGE BATTERY | The starter voltage is low and the battery is discharged. Fully charge the battery and repeat the starter system test. |
| REPLACE BATTERY | If the battery test result was REPLACE or BAD CELL, the battery must be replaced before testing the starter. |

If you have completed an in-vehicle test, the display alternates between the battery test results and the message PRESS ↵ FOR CHARGING TEST. With the engine running, press **ENTER** to continue.

IMPORTANT: Before starting the test, inspect the alternator drive belt. A belt that is glazed or worn, or lacks the proper tension, will prevent the engine from achieving the rpm levels needed for the test.

Charging System Test

The display alternates between the decision on the charging system and the alternator's peak output voltage.

Charging System Test Results

| Decision | Interpretation |
|-----------------------|--|
| CHARGING VOLTAGE OK | The system is showing normal output from the alternator. No problem detected. |
| CHARGING VOLTAGE NONE | <p>The alternator is not providing charging current to the battery.</p> <p>√ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest.</p> <p style="text-align: right;"><i>continued</i></p> |

| Decision | Interpretation |
|---|---|
| CHARGING VOLTAGE NONE (continued) | <ul style="list-style-type: none"> √ Check all connections to and from the alternator, especially the connection 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. (Older vehicles use external voltage regulators, which may require only replacement of the voltage regulator.) |
| CHARGING VOLTAGE LOW | <p>The alternator is not providing enough current to power the system's electrical loads and charge the battery.</p> <ul style="list-style-type: none"> √ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping 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. |
| CHARGING VOLTAGE HIGH | <p>The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator.</p> <ul style="list-style-type: none"> √ Check to ensure there are no loose connections and that the ground connection is normal. If there are no connection problems, replace the regulator. Most alternators have a built-in regulator that requires replacing the alternator. In older vehicles that use external voltage regulators, you may need to replace only the voltage regulator. <p style="text-align: right;"><i>continued</i></p> |

| Decision | Interpretation |
|--|--|
| CHARGING VOLTAGE HIGH <i>(continued)</i> | <p>The regulator controls voltage output based on the battery voltage, under-hood temperature, and vehicle loads used. In other words, it controls the maximum voltage the system can produce based on the current needs and amount of current that can be produced by the spinning of the rotor in the alternator. The normal high limit of a typical automotive regulator is 15.0 volts ± 0.5. Refer to the manufacturer specifications for the correct limit, which may vary by vehicle type.</p> <p>A high charging rate will overcharge the battery and may decrease its life and cause it to fail. If the battery test decision is REPLACE and the charging system test shows CHARGING VOLTAGE HIGH, check the battery's electrolyte levels. A symptom of overcharging is battery fluid spewing through the vent caps, which causes low electrolyte levels and harms the battery.</p> |

Test Messages

In some cases the tester asks for additional information before completing a test. It may also warn you of a condition that prevents proper testing.

| Test Message | Interpretation |
|--|---|
| BATTERY TEMP. ABOVE or BELOW 0° C | <p>If the tester detects that the temperature of the battery may make a difference in the result, it will ask you to select if the battery temperature is above or below 0 °C. It will resume the test after you make your selection.</p> |
| BEFORE or AFTER CHARGE | <p>For a more decisive result, the tester may ask if you are testing the battery before or after charging. If the vehicle has just been driven, select BEFORE CHARGE. It will resume the test after you make your selection.</p> <p style="text-align: right;"><i>continued</i></p> |

| Test Message | Interpretation |
|--------------------------------|---|
| CONNECT TO BATTERY | Connect both clamps to the battery terminals. |
| CHECK CONNECTION | <p>One or both clamps are not making proper contact with the battery terminals. The tester requires that both sides of each clamp be firmly connected before testing.</p> <p>✓ For a proper connection, rock the clamps back and forth. If the message reappears, clean the terminals and reconnect the clamps.</p> |
| NON 12-VOLT SYSTEM DETECTED | <p>✓ You are conducting an out-of-vehicle test on a non-12-volt battery or batteries connected in series. Disconnect the batteries and test them individually.</p> |
| REVERSE CONNECTION | The clamps are connected in the wrong polarity: positive to negative or negative to positive. |
| SURFACE CHARGE DETECTED | <p>The battery will hold a surface charge if the engine has been running or after the battery has been charged. The tester may prompt you to remove the surface charge before it begins testing.</p> <p>✓ Follow the tester's instructions indicating when to turn the headlights on and off. The tester will resume testing after it detects that the surface charge is removed.</p> |
| SYSTEM NOISE/ UNSTABLE BATTERY | <p>The tester has detected computer, ignition noise, or parasitic drain, and will attempt to retest. Make sure all vehicle loads are off, the doors are closed, and the ignition is in the off position. The tester automatically retests when it no longer detects system noise. If the message reappears:</p> <p>✓ Disconnect the clamps and retest.</p> <p>✓ You may be testing too close to a noise source, such as a charger or other high-current device. If so, move away and retest.</p> <p style="text-align: right;"><i>continued</i></p> |

| | |
|--|--|
| SYSTEM NOISE/ UNSTABLE BATTERY (continued) | <ul style="list-style-type: none"> √ If you are unable to find the source of the noise, fully charge the battery and retest. If the message appears after recharging, test the battery out of the vehicle. √ A battery that is weak, or that has just been charged, may retain enough electrical activity to for the tester to detect and will adversely affect the test results. A fully charged battery should stabilize quickly, after which the tester will automatically retest. Weak batteries should be charged and retested. If the battery is fully charged, check the clamp connections. |
| WIGGLE CLAMPS | <p>The clamps are not making good contact with the battery terminals.</p> <ul style="list-style-type: none"> √ Rock the clamps back and forth. If there message reappears clean the terminals and reconnect the clamps. |

Options Menu

To select the following options, press and hold the **MENU** button. Use the **UP** or **DOWN ARROW** button to scroll to an option and press **ENTER** to select.

Print Results

Select this option to print the results of the last test you performed on the battery, starter and charging system. To power the tester, connect the tester to a 12-volt battery with over 9 volts of power.

IMPORTANT: Remember to print the results before you start a new test. The previous results are overwritten by the new test results.

For information on changing the printer paper and troubleshooting, see pages 15 and 16.

View Results

Select this option to view the last performed battery, starter and charging system test.

Perform Test

Select this option to perform a battery test without first connecting to a battery.

Voltmeter

CAUTION: Connecting the tester to a voltage source greater than 30 Vdc can damage the tester's circuitry.

Select this option to view the battery voltage. Press **ENTER** to continue testing the battery. Press **BACK** to return to the menu.

Set Address

Select this option to create a header for your printed test results showing your store name, address, and phone number. There are six lines with 16 characters per line. The lines contain a default header, which is displayed two per screen that you can overwrite.

To help you edit and center your coupon use a pencil to write the information in the template below before entering it into the tester.

Header Template

| | | | | | | | | | | | | | | | |
|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Line 1 | | | | | | | | | | | | | | | |
| Line 2 | | | | | | | | | | | | | | | |
| Line 3 | | | | | | | | | | | | | | | |
| Line 4 | | | | | | | | | | | | | | | |
| Line 5 | | | | | | | | | | | | | | | |
| Line 6 | | | | | | | | | | | | | | | |

To create a header:

1. Select SET ADDRESS from the menu.
2. The cursor blinks below the character that is ready for editing. Use the **ARROW** buttons to scroll to the character that you want to edit.
3. Press the **ENTER** button to select and move to the next space.
NOTE: Insert a blank space by scrolling to the space character located between the Z and 0 (zero) characters and press **ENTER**. Press the **BACK** button to move the cursor back one space.
4. Continue until you have entered all of the information. Exit by entering the last available character.

Language

Select a language for the tester's user interface and printouts.

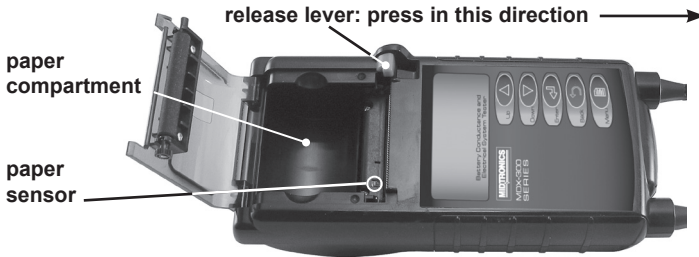
Changing the Printer Paper

The roll size is 2-1/4 inches wide by 1-7/8 inch in diameter. Replacement rolls are available at most office supply stores.

The tester uses only thermal printing paper.

To replace the paper roll:

1. Unlock the printer door by gently pressing forward on the red lever. Remove the spent roll.



2. Place a new roll of paper in the compartment, and pull the paper forward so that it extends past the serrated edge of the paper slot.



3. Close the door and make sure the lever locks securely.



NOTE: For a clean tear, pull the paper along the edge of the plastic. Do not pull the paper straight out of the printer.

Troubleshooting the Printer

If the tester is not connected to a 12-volt battery with at least 9 volts of power or the paper sensor does not detect paper in the compartment during the print process, the tester displays one of the error messages described in the table:

| Error Message | Interpretation |
|------------------------------|---|
| INSERT PAPER THEN PRESS ↵ | <ul style="list-style-type: none"> ✓ Verify that the paper is inserted correctly. ✓ Insert a new roll of paper. ✓ Verify that the paper sensor is clean and undamaged |
| VOLTAGE TOO LOW TO PRINT | <p>To print, the tester must be properly connected to a vehicle battery having at least 9 volts.</p> <ul style="list-style-type: none"> ✓ Connect to a vehicle battery with enough voltage to enable printing. ✓ Make sure that the clamps are connected properly: red clamp to the positive (+) terminal and the black clamp to the negative (-) terminal. ✓ Check that both sides of the clamps are making contact with the terminals. |

Troubleshooting the Display

If the display does not turn on:

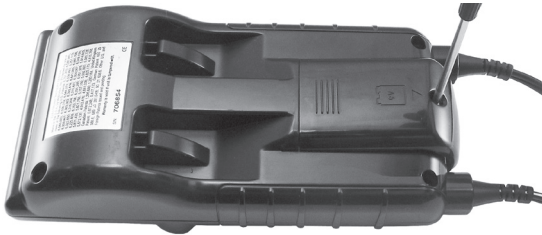
- Check the connection to the vehicle battery.
- The vehicle battery may be too low (below 1 volt) to power the analyzer. Fully charge the battery and retest.
- The analyzer's 9-volt battery may need to be replaced. Follow the directions in "Replacing the 9-Volt Battery" and replace the 9-volt battery (alkaline recommended).
- If the analyzer does not power on when you press and hold the **MENU** button, replace the 9-volt battery.

Replacing the 9-Volt Battery

The tester uses a 9-volt battery (alkaline recommended) that allows testing of 12-volt batteries discharged down to 1 volt in addition to supplying power while the option menu is active. The tester can test down to 5.5 volts when the internal 9-volt battery is not functioning.

NOTE: The tester retains setup information while you change the 9-volt battery.

1. Turn the tester face down.
2. Remove the screw securing the battery compartment cover using a small Phillips screwdriver.



3. Slide the door off as shown in the illustration.
4. Remove the discharged battery.
5. Insert a 9-volt battery as shown below, making sure the positive and negative terminals are positioned correctly.
6. Reposition the cover and tighten the screw.



slide the door in this direction
→

Specifications

Model:

- VMF-BTS 1250 V2.0

Display:

- LCD graphics display

Temperature Compensation:

- Tester-prompted

Operating Temperature:

- -18 °C to 50 °C

Test Range:

- 100–1250 SAE, 100–750 DIN, 100–1250 EN, 100–750 IEC

Built-in Printer:

- Powered by battery under test

Voltage Range:

- Tests 12-volt batteries down to 1 volt

Cable Length:

- 533.4 mm

Power Requirements:

- Uses power of battery under test or 9-volt battery

Voltmeter:

- 0 to 30 Vdc +/- 0.05 Vdc

Languages: 19**Housing Material:**

- Acid-resistant ABS plastic

Dimensions:

- 230 mm x 102 mm x 65 mm

Weight:

- 499 g

Patents

The MDX-300 series are made by Midtronics, Inc., and is protected by one or more U.S. and foreign patents. For specific patent information, contact Midtronics, Inc. at +1 630 323-2800.

Limited Warranty

This battery tester is warranted to be free of defects in materials and workmanship for a period of two (2) years from date of purchase. Midtronics will, at our option, repair the unit or replace the unit with a remanufactured tester. This limited warranty applies only to the Midtronics battery tester and does not cover any other equipment, wear and tear parts such as the cable, static damage, water damage, over-voltage, dropping the unit or damage resulting from extraneous causes including owner misuse. Midtronics is not liable for any incidental or consequential damages for breach of this warranty. The warranty is void if owner attempts to disassemble the unit, or to modify the cable assembly.

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