

MDX-653P




Battery Conductance and
Electrical System Analyzer

*For 6 & 12-volt automotive starting batteries
and 12 & 24-volt starting/charging systems*



INSTRUCTION MANUAL


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Introduction & Overview

Safety Guidelines

Because of the possibility of personal injury, always use extreme caution when working with batteries. Follow all BCI (Battery Council International) safety recommendations.

| | |
|---|--|
| ⚠ WARNING | |
|  | Wash hands after handling. Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. |

Capabilities

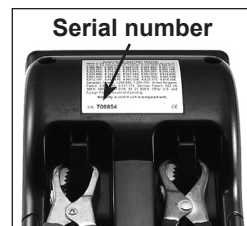
The MDX-653P Battery Conductance and Electrical System Analyzer tests 6 & 12-volt regular flooded, AGM flat plate, AGM spiral, and gel batteries, as well as 12 & 24-volt starting and charging systems for passenger cars and light trucks. It displays the test results in seconds and features a built-in printer to provide customers with a copy of the results.

Additional features include the ability to:


- test batteries rated from 100 to 2000 CCA
- detect bad cells
- protect against reverse polarity
- test discharged batteries
- test multiple rating systems (CCA, CA, MCA, JIS, EN, DIN, SAE, IEC)

Registering And Servicing Your Tester

To register, log on at www.midtronics.com/warranty and have your serial number ready. The number is at the bottom of the label on the back of the tester. If your tester needs repair, contact Midtronics Customer Service at 630.323.2800 or at CSTransHQ@midtronics.com. Servicing the tester yourself will void your warranty. See the back cover of this manual for additional warranty information.




Display and Keypad

When you first connect the MDX-653P to a battery, it functions as a voltmeter until you press .



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.

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





User Interface






- ① **▲ ▼ Up/Down Arrows**
Use these keys to choose test parameters and scroll to menu options.
- ② **Enter**
Use this button to make selections.
- ③ **← Back / Print**
Use this button to move to the previous screen or move back one space when creating custom headers. You can also use this button to printout test results using the built-in printer.
- ④ **Menu**
Use to access the Main Menu options of the tester.
For information about the options, see "Options Menu".

Options Menu

Procedure

1. Press  to access the Options Menu.
2. Use ▲ or ▼ to move to the line you want to edit.
3. Press  to edit the highlighted line.
4. Use ▲ or ▼ to select the character for that cursor location.
5. Press  to move to the next location.
6. Press  to return to the Options Menu.

| Option | Explanation |
|----------------------|--|
| VIEW / PRINT RESULTS | Press  to display the previous test result or to print the results. |
| INVENTORY MODE | Enables up to 100 batteries to be tested in succession without re-entering battery information each time. |
| EXPORT DATA | Export the last test result to an IR Reader program. (under development) |
| PERFORM TEST | Begin the Battery Test procedure. |
| LANGUAGE SELECTION | Select a language for the tester. (Default: Spanish) |
| SET ADDRESS | Enter the address to display on the top of the printout. (Limit: 8 lines, 21 characters per line) |
| TIME | Select 24-hour or AM/PM and set the time. (Default: AM/PM) |
| DATE | Select the date format as well as set the correct date. (Default: DD/MM/YYYY) |
| COUNTER | Clear or display battery and system test by results. |
| CONTRAST | Adjust the contrast setting of the tester display. (Default: 10) |
| TEMPERATURE UNITS | Select the temperature units Degrees F or Degrees C (Default: Degrees C) |
| VOLTMETER | Automatically test battery voltage when the clamps are first connected to the battery terminals. Press  to continue testing the battery. Press  to return to the menu. (Default: ON) |

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. A set of adapters is included with the tester.




IMPORTANT: Do not test at steel bolts. For OUT-OF-VEHICLE testing, 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 ¼ 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.

Connecting the Tester

- Connect the red clamp to the positive (+) terminal and the black clamp to the negative (-) terminal.
- For a proper connection, move 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 & System Test

When the tester is first connected to the battery, it functions as a voltmeter until  is pressed to start the test.



NOTE: This voltmeter function can be turned off through the Options Menu.

Scroll to each parameter using  or  and press  to select. If any messages appear during the test, see the "Test Messages" section.



1. **BAT. LOCATION:** Scroll to and select IN VEHICLE or OUT OF VEHICLE for a battery not connected to a vehicle. Following an IN VEHICLE test you will be prompted to test the starting and charging systems.




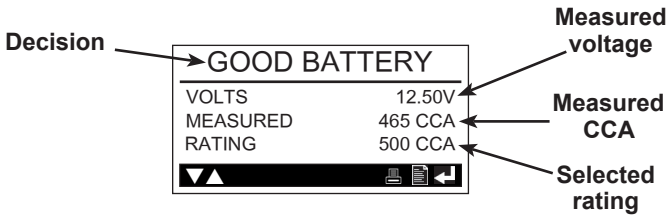
IMPORTANT: The performance of the starting and charging systems depends on the battery's condition. It is important that the battery is good and fully charged before any further system testing.

2. **POST TYPE:** (In-Vehicle only) Scroll to TOP POST, SIDE POST or JUMP START POST where applicable.
3. **APPLICATION:** Scroll to and select AUTOMOTIVE, MOTORCYCLE, MARINE, LAWN & GARDEN, GROUP 31, or COMMERCIAL -4D/8D.
4. **BATTERY TYPE:** Scroll to and select REGULAR FLOODED, AGM FLAT PLATE, AGM SPIRAL, or GEL where applicable.
5. **BATTERY STANDARD:** Scroll to and select the battery's rating system. Not all rating systems are available for each application.




| Standard | Description | Range |
|----------|--|-------------------|
| CCA | Cold Cranking Amps, as specified by SAE. The most common rating for cranking batteries at 0 °F (-17.8 °C). | 100–2000 |
| CA | Cranking Amps: Current available at 32 °F (0 °C) | 100-2000 |
| MCA | Marine Cranking Amps: Amount of current available at 32 °F (0 °C) | 100-2000 |
| JIS# | Japanese Industrial Standard, shown on a battery as a combination of numbers and letters. | 26A17 thru 245H52 |
| EN | Europa-Norm | 100–2000 |
| DIN | Deutsche Industrie-Norm | 100–1200 |
| SAE | Society of Automotive Engineers, the European labeling of CCA | 100–2000 |
| IEC | International Electrotechnical Commission | 100–1200 |

6. **BATTERY RATING:** Scroll to and select the rating units. Hold down  or  to increase the scrolling speed.


- Press  to start test. After several seconds the tester displays the decision on the battery's condition and the measured voltage. The tester also displays your selected battery rating and the rating units.



| 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 and retest. |
| 24 VOLT SYSTEM | 24-volt system detected. Disconnect batteries and test individually. |
| READY TO INSTALL | Battery has just been activated and is ready to install in vehicle (Motorcycle only) |
| NEEDS CHARGE | Fully charge battery and retest using BEFORE DELIVERY. (Motorcycle only) Failure to fully charge the battery before retesting may cause false readings. |

- Press  to proceed with the starter test,  to print the test results or  to return to the Options Menu.



NOTE: For an in-vehicle test, the display alternates between the test results and the message PRESS  FOR STARTER TEST.



IMPORTANT: The MDX-653P retains the results of the last test only. When you start a new test, the last results are overwritten.

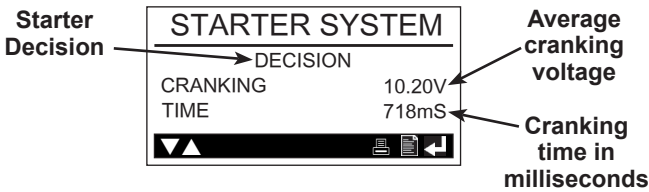
Starter System Test



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.

Once you have completed an in-vehicle test, the display alternates between the battery test results and the message PRESS FOR STARTER TEST.

1. Press to proceed with the starter test.
2. Start the engine when prompted.
3. The tester displays the decision on the starter system, cranking voltage, and cranking time in milliseconds.



| Decision | Interpretation |
|------------------|--|
| CRANKING NORMAL | The starter voltage is normal and the battery is fully charged. |
| LOW VOLTAGE | 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 | Battery must be replaced before the starting system can be tested. |
| NO START | No vehicle start detected. |
| CRANKING SKIPPED | A start was not detected. |

4. Press to proceed with the charging system test, button to print the test results, to return to the Options Menu.



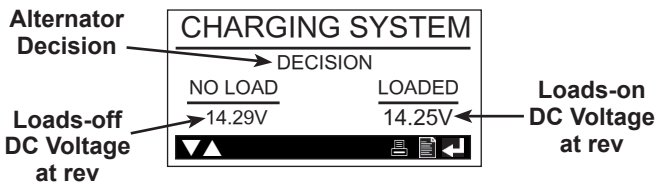
NOTE: For an in-vehicle test, the display alternates between the test results and the message PRESS FOR CHARGING TEST.

Charging System Test

Once you have completed an in-vehicle test, the display alternates between the battery test results and the message PRESS FOR CHARGING TEST. Press to proceed with the charging test.

Following the on-screen prompts:

1. Rev the engine.
2. Turn on high beams headlights and the blower fan.
3. Rev engine with loads on.
4. Idle engine and turn off loads.
5. The Charging System decision is displayed at the end of the procedure.



| Decision | Interpretation |
|------------------|--|
| NO PROBLEMS | System is showing normal output from the alternator. |
| NO OUTPUT | No alternator output detected. ✓ Check all connections to and from the alternator, especially the connection to the battery. |
| LOW OUTPUT | Alternator not providing sufficient current to power the system's electrical loads and charge the battery. ✓ Check the belts to ensure the alternator is rotating with the engine running. ✓ Check the connections from the alternator to the battery. |
| HIGH OUTPUT | Alternator voltage output exceeds the normal limits. ✓ Make sure there are no loose connections and the ground connection is normal. |
| EXCESSIVE RIPPLE | Excessive AC ripple detected. ✓ One or more diodes in the alternator is not functioning or there is stator damage. |

6. Press to print the test results or to return to the Options Menu.


Test Messages

| Test Message | Interpretation |
|---|--|
| BAT. TEMPERATURE | Select ambient temperature above or below 32 °F (0 °C) |
| CHARGE STATE | Select before or after battery has been charged. |
| SURFACE CHARGE DETECTED | Remove the surface charge before it begins testing. Testing will resume after charge has been removed. |
| CHECK CONNECTION | One or both clamps are not making proper contact with the battery terminals. |
| ENGINE REV NOT DETECTED PRESS ↵ WHILE REVVING | Tester has not detected an increase in engine RPM. |
| REVERSE CONNECTION | Clamps are connected in the wrong polarity: positive to negative or negative to positive. |
| SYSTEM NOISE CHECK LOADS | In-vehicle testing. Tester has detected computer, ignition noise or parasitic drain. Make sure all vehicle loads are off including open doors and ignition switch. |
| UNSTABLE BATTERY | Out-of-vehicle. Weak battery, should be charged and retested. |
| WIGGLE CLAMPS | Clamps are not making good contact with battery terminals |

Error Messages




| Error Message | Interpretation |
|--|---|
| BATTERY POWER TOO LOW TO USE PRINTER. CONNECT TO FULLY CHARGED BATTERY 11.50 TO 16.00V | Battery being tested has fallen below 9 volts. Connect to a fully charged battery to use the printer. |
| CONNECT TO 12V BATTERY | Tester is not connected to the battery |
| LOW INTERNAL AA BATTERIES. REPLACE AA BATTERIES SOON! | Internal AA batteries are low and need to be replaced. See "Maintenance & Troubleshooting" section. |
| NON 12 VOLT SYSTEM DETECTED | System being tested is not 12-volts. |
| PRINTER DOOR OPEN. CLOSE DOOR AND TRY TO PRINT AGAIN | Door covering printer paper is not secure. |
| PRINTER OUT OF PAPER REPLACE WITH THERMAL PRINTER PAPER. 2.5 IN. DIA. MAX. 2.25 IN. WIDE MAX | Printer is out of thermal paper. Replace with new roll. See "Maintenance & Troubleshooting" section. |
| INVENTORY DATA MEMORY FULL PRINT RESULTS OR CLEAR MEMORY. | INVENTORY mode memory is full. Select INVENTORY mode from the Options Menu to clear the memory. |

Inventory Mode

When the tester is first connected to the battery, it functions as a voltmeter until  is pressed.



NOTE: This voltmeter function can be turned off through the Options Menu.

1. At the Menu, scroll to INVENTORY MODE and press  start the test.
2. Select ON to test, OFF, or VIEW TEST RESULTS to view and print past test results.
3. Select ADD TO MEMORY to continue with the test (Max. test: 100) or CLEAR MEMORY to erase all previous test results.
4. APPLICATION: Scroll to and select AUTOMOTIVE, MOTORCYCLE, MARINE, LAWN & GARDEN, GROUP 31, or COMMERCIAL -4D/8D.
5. BATTERY TYPE: Scroll to and select REGULAR FLOODED, AGM FLAT PLATE, AGM SPIRAL, or GEL where applicable.
6. BATTERY STANDARD: Scroll to and select the battery's rating system. Not all rating systems are available for each application.
7. BATTERY RATING: Scroll to and select the rating units. Hold down ▲ or ▼ to increase the scrolling speed.
8. VOLTAGE LIMIT: Enter the VOLTAGE LIMIT voltage (12.20 - 12.80v). Hold down ▲ or ▼ to increase the scrolling speed.
9. Press  to start test. The result is displayed on the screen and added to the tester memory.
10. When testing additional batteries in Inventory Mode, the analyzer re-starts the test automatically using the same test parameters. To change the parameters, press  and repeat steps 1 through 9.

Maintenance & Troubleshooting

Changing The Cable Assembly

1. Identify the circled screw.



2. Remove the screw.



3. Grasp the housing and firmly pull the cable assembly from housing.



4. To attach a new cable, align the cable and tester housings and push together. Insert the screw and tighten.

Changing The Printer Paper

The IR printer only uses thermal paper in a roll with the dimensions 2.25 in x 85 ft (57 mm x 25.9 m). You can purchase replacement rolls at most office supply stores.

If you have difficulty obtaining paper please contact Midtronics customer service at 1-630-323-2800.

To replace the paper roll:

1. Unlock the printer door by gently pressing 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.



paper feeds from underneath the roll

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


Printer Troubleshooting

If the MDX-653P is not connected to a 12-volt battery with at least 11.5 volts of power or the paper sensor does not detect paper in the compartment during the print process, the tester displays one of error messages described in the table:

| Error Message | Interpretation |
|--|---|
| PRINTER OUT OF PAPER REPLACE WITH THERMAL PRINTER PAPER. 2.5 IN. DIA. MAX 2.25 IN. WIDE MAX | <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. |
| BATTERY POWER TOO LOW TO USE PRINTER. CONNECT TO FULLY CHARGED BATTERY. 11.50 V TO 16.00 V | <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. |
| PRINTER DOOR OPEN CLOSE DOOR AND TRY TO PRINT AGAIN | <ul style="list-style-type: none"> ✓ Check that the door covering the printer paper is properly closed and latched. |

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 AA batteries may need to be replaced. (alkaline recommended).
- If the analyzer does not power on when you press and hold , replace the AA batteries.

Replacing the Battery

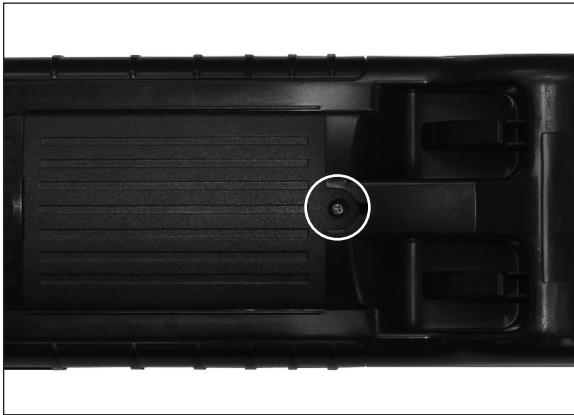
The MDX-653P can test down to 5.5 volts when the unit's internal batteries are not functioning. The tester displays LOW INTERNAL AA BATTERIES, REPLACE AA BATTERIES SOON! when the internal AA batteries need to be replaced.



NOTE: Setup information will be retained while you change the internal batteries.

Use the following procedure to remove and replace the internal AA batteries.

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



3. Lift the door off and remove the discharged battery.
4. Insert fresh AA batteries making sure the positive and negative terminals are positioned correctly.
5. Reposition the cover and tighten the screw.

PATENTS

This product is 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

Midtronics products are warranted to be free of defects in materials and workmanship for a period of one (1) year from date of purchase. Midtronics will, at our option, repair or replace the unit with a re-manufactured unit. This limited warranty applies only to Midtronics products, and does not cover any other equipment, static damage, water damage, overvoltage damage, 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.

SERVICE

To obtain service, contact Midtronics at 1-630-323-2800 or at CSTransHQ@midtronics.com. Have your model and serial numbers ready. This first step is critical as we will trouble-shoot the problem(s) over the phone, and many perceived problems are in fact resolved during this step. If the problem cannot be resolved, then the CS Agent will issue you a Return Material Authorization or RMA. This number becomes your tracking number. The final step is to return the unit to Midtronics freight prepaid (you pay), to the attention of the RMA number obtained.

In USA:

Midtronics, Inc.

Attn: RMA # xxxxx (this is the RMA number that you must obtain from Midtronics)

7000 Monroe St.

Willowbrook, IL 60527

If Midtronics determines that the failure was caused by misuse, alteration, accident, or abnormal condition of operation or handling, purchaser will be billed for the repaired product and it will be returned freight prepaid with shipping & handling charges added to the invoice. Midtronics products beyond the warranty period are subject to the repair charges in place at that time.



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