



CPX-900

Battery & System Tester

*For testing 12-volt automotive
batteries*

Instruction manual

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1 – Introduction

Personal Precautions



⚠ DANGER

Risk of explosive gases. Never smoke or allow a spark or flame in the vicinity of a battery.

Batteries can produce a highly explosive mix of hydrogen gas and oxygen, even when the battery is not in operation. Always work in a well-ventilated area.



WARNING

Wash hands after handling.

REQUIRED BY CALIFORNIA, PROPOSITION 65:
Battery terminals, battery clamps and associated components contain lead and lead compounds. The State of California is aware that these chemicals are carcinogenic and cause birth defects or are otherwise harmful to reproduction.

Inspect the battery for damage and check the electrolyte level. If the electrolyte level is too low, replenish it and fully charge the battery. Always use the necessary safety precautions when working with batteries to prevent severe injury or death. Follow all manufacturers' instructions and BCI (Battery Council International) safety recommendations, which include the following precautions:

- ✓ Battery acid is highly corrosive. If acid gets into your eyes, immediately flush them thoroughly with cold running water for at least 15 minutes and seek medical attention. If battery acid gets onto your skin or clothing, wash immediately with a mixture of water and baking soda.
- ✓ Always wear proper safety glasses or face shield when working with or around batteries.
- ✓ Keep hair, hands and clothing, as well as the tester cords and cables away from moving engine parts.
- ✓ Remove any jewellery or watches before you start servicing the battery.
- ✓ Use caution when working with metallic tools to prevent sparks or short circuits.
- ✓ Never lean over a battery when testing, charging, or jump starting.

Symbols Conventions

Symbol	Description
	The safety symbol indicates instructions for avoiding hazardous situations and personal injury.
	The safety symbol with the words CAUTION, WARNING, or DANGER indicates instructions for avoiding hazardous situations and personal injury.
	The wrench symbol indicates procedural notes and helpful information.

Description

The tester uses function-specific applications accessed through a series of menus and icons to guide users through the battery testing process for consistent test implementation and accuracy. These are accessed using the tester's touch screen display. Test results can be displayed on the full-colour screen, printed, or wirelessly emailed.

Consent to Collection and Use of Data:

The user of this tool consents that Midtronics may collect, store, transmit and use technical data and related information, including but not limited to technical information about this device, system and application software and accessories, which information is collected periodically to facilitate the provision of product support, product improvements, product development and other services related to the use of this device. If the choice is made to collect personal data (e.g. email addresses), the user is solely responsible for obtaining any necessary consents and agrees to indemnify Midtronics, Inc., its subsidiaries, officers, employees and agents from any and all liability related to the collection, storage and transmission of such personal data.

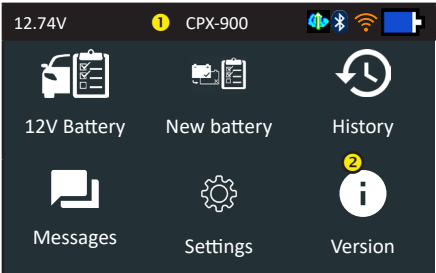
Controls & Connections



- 1 Display screen
- 2 Cooling vent
- 3 Arrow keys and power button
- 4 Micro-USB port
- 5 Thermal printer (optional)



Main Menu



1 Menu Bar

12.74V	Battery voltage: (if connected)		Internal battery controller status: Blue indicates amount of charge.
	WiFi signal strength: Orange when not connected.		Bluetooth connection status: Displayed when connected.
	BMIS connectivity "X" indicates no connection.		

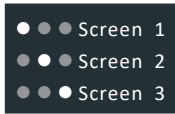
2 Main Menu Selection Area



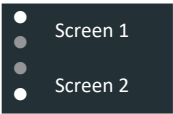
When displayed, the screen arrows show which **ARROW** key on the keypad to press to display other icons or screens. When displayed under a list of options, the screen arrows show which keypad arrow to press to highlight a character or item in a list.

Additional Screens

The dots at the bottom or side of a menu or results screen indicate additional screens are available.



Press ◀ or ▶



Press ▲ or ▼

Main Menu Icons

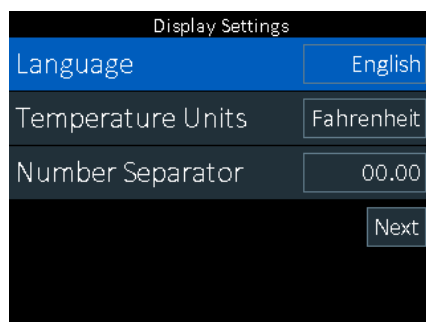
Icon	Description
 12V Battery	For testing the battery inside or outside the vehicle.
 New battery	For testing new batteries inside or outside the vehicle.
 History	Access archived test histories or search test history by VIN (if applicable) or by technician.
 Messages	Displays warnings and notifications for upcoming tool software updates.
 Settings	Setup/adjust: WiFi, printer setup, email settings, user information, default language, display and sound settings, BMIS information, and shop information.
 Version	Display the software version information.

Initial Power Up

When the tester is switched on for the first time, it takes a few moments to start up.

Display

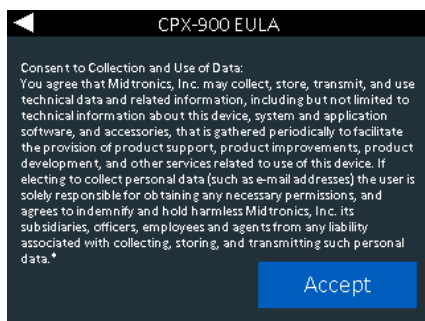
Tap **Next** to continue.



<u>Language</u>	Select the default standard language.
<u>Temperature Units</u>	You can select here the default temperature units (Fahrenheit/Celsius) to be used when measuring battery temperature.
<u>Number Separator</u>	You can select here the decimal separator (comma or full stop) used in the default number display.

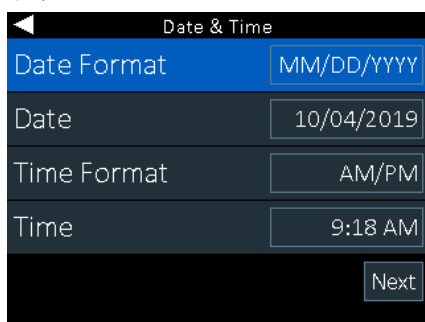
Data Collection Consent

Select **Accept** to consent to collection and use of test data.



Date & Time

Use  to return to the Display menu.



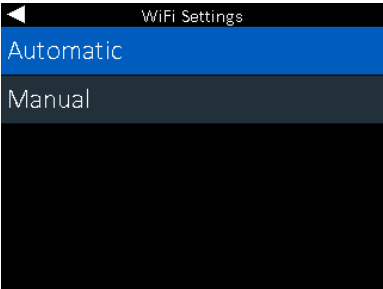
<u>Date Format</u>	Select Month/Day/Year (MM/DD/YYYY), or Day/Month/Year DD/MM/YYYY.
<u>Date</u>	Use ▲ or ▼ to advance the month, day or year. Use ◀ or ▶ to move left or right and move to Cancel or Next. Select Next to save the date or Cancel to exit without saving. ▲▲▲ June182018 ▼▼▼ CancelNext
<u>Time Format</u>	Select 12 or 24-Hour Format.
<u>Time</u>	Use ▲ or ▼ to go to the hours, minutes and AM/ PM settings. Use ◀ or ▶ to move left or right and move to Cancel or Next. Select Next to save the time or Cancel to exit without saving. ▲▲▲ 1046AM ▼▼▼ CancelNext

WiFi Settings

Set up the tool's WiFi connection. See "Network" in Chapter 5: Settings.



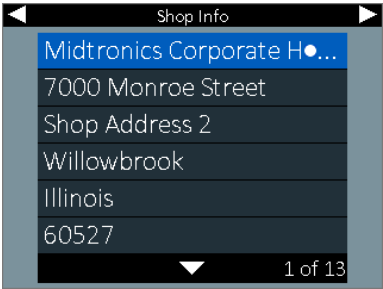
IMPORTANT: The CPX-900 will not connect to an enterprise network with a user login landing page.



<u>Automatic</u>	The tester searches for any detectable WiFi networks. Select a displayed network is then displayed on the tester's display screen.
<u>Manual</u>	Manually enter Security, SSID, Password, Encryption, and WEP Keys.

Shop Settings

Confirm the displayed shop information is correct. If the shop information is incorrect, the wrong dealer code may have been entered in the previous step.



Shop Name	Country
Shop Address	Phone Number
Shop Address 2	Email Address
Town/City	Website
Province	(Blank)
Zipcode	(Blank)
Country	

You can use ▲▼◀▶ to highlight the desired alphanumeric character on the displayed alphanumeric keypad. Select ⬆ to open the lower case and symbol character maps.

Once all of the alphanumeric characters have been entered, select **Save** or **Esc** to exit without saving.

Test Preparation

Inspecting the Battery

Before starting the test, take a good look at the battery and check it for:

- Cracks, dents or leaks in the casing. If you see any of these defects, replace the battery.
- Corroded, loose, or damaged cables and connections. Repair or replace them as needed.
- Corrosion on the battery terminals, dirt or acid on top of the casing. Clean the casing and terminals using a wire brush and a mixture of water and baking soda.
- Low electrolyte level. If the electrolyte level is too low, add distilled water to fill up to half-way above the top of the plates and fully charge the battery. Do not overfill.
- A corroded or loose battery tray and hold-down fixture. Tighten or replace as needed.

Testing In-Vehicle

The preferred test position is at the battery terminals. If you cannot perform the test on the battery itself, the external connection must have both a plus and a minus terminal. Otherwise, you must remove the battery and perform an out-of-vehicle test.

At the start of the test, make sure all vehicle accessory loads are off, the key is not in the ignition, and the doors are closed.

Connecting To A Battery

CAUTION

Do not connect the tester to a voltage source greater than 30V DC.

Connect the clamps to the battery: the red clamp to the positive (+) terminal and the black clamp to the negative (–) terminal. If the clamps are reversed when connected, the tester displays CLAMPS REVERSED! Reconnect the clamps.

Make sure both sides of the clamps are gripping the terminals by rocking each clamp back and forth. If the clamps are poorly connected, the battery cannot be tested. In this case, the tester displays the message CHECK CONNECTION. If the message reappears after reconnecting, clean the terminals and reconnect.

Setting User Preferences

You can set the tester's user preferences via the Settings () Menu, described in [Chapter 5](#).

2 – 12V Battery Test



The 12V battery test allows you to test the vehicle battery based on the selected model or by manually entered battery parameters.

**IMPORTANT:** To expedite the testing procedure, make sure “Auto Test” is enabled. (Chapter 5 - Settings) The testing process begins as soon as the clamps are connected.

The CPX-900 provides a final battery test result along with additional detailed information on the battery’s cranking and reserve capacities. Press ▲◀▶▼ to return to the previous screen, select options and when necessary, press ■ to enter or continue to the next step.

Battery Test

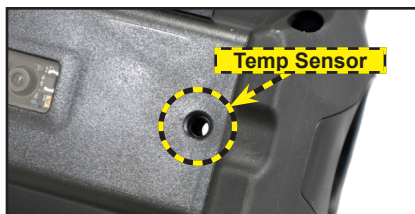
1. Connect the tester clamps to the battery terminals.
2. Auto Test - If enabled, the tool immediately begins testing the battery. (See Chapter 5 - Settings)

**NOTE:** The testing process uses Conductance Profiling™ technology to determine the battery cranking and reserve capacities. This additional analysis can take up to 60 seconds to complete.

3. Select “12V Battery” in the main menu.
4. Select the desired Mazda model or “Other” if the model is not listed.
5. Select the desired Mazda battery part number if applicable.
6. Select the battery location “In vehicle” when the battery is connected to the vehicle. “Test outside vehicle” when the battery is not connected to the vehicle.
7. Battery Type - Select the type of battery being tested.
8. Rating Units - Select the battery values for the battery being tested.

Rating	Description	Range
CCA	Cold Cranking Amps (SAE-specification): The amount of current a battery can provide at 0 °F (–17.8 °C).	100 to 3000
CA	Cranking Amps : The amount of current a battery can provide at 32 °F (0 °C).	100 to 3000
DIN	Deutsche Industrie-Norm	100 to 1000
SAE	Society of Automotive Engineers - European specification CCA	100 to 3000
IEC	International Electrotechnical Commission	100 to 1000
EN	Europa-Norm	100 to 1700
MCA	Marine Cranking Amps : The amount of current a battery can provide at 32 °F (0 °C).	100 to 3000
EN2	Europa-Norm	100 to 1700

9. Battery Rating - Enter the cold start current value of the battery being tested.
10. Battery Ah - Enter the Ah value of the battery being tested.
11. VID - Vehicle ID: Enter (part of) the VIN code or registration number
12. Battery Test Setup - Edit the displayed battery information. Select **Next** to begin testing.
13. Temperature - When prompted, hold the tester's temperature sensor 15 to 30 cm above the top of the battery being tested.



Select **Capture** to record the measured battery temperature.

System Test

1. Select **System Test** at the bottom of the tester display to proceed to the system test.
2. Start the vehicle's engine and let it idle.
3. Ensure all the accessories (high beam headlights/blower etc.) are switched off and select **Next**.

The tester tests the alternator output.

4. When prompted, rev and hold the engine to between 2000 to 3000 rpm.

The tester tests the alternator output again.

5. When prompted, idle the engine and select **Next**.
6. Switch the headlights to high beam and switch on the blower.
7. Select **Next**.

The tester tests the alternator output.

8. When prompted, rev and hold the engine to between 2000 to 3000 rpm.

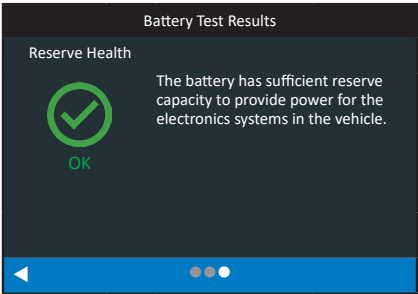
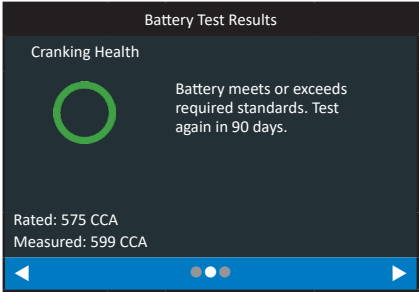
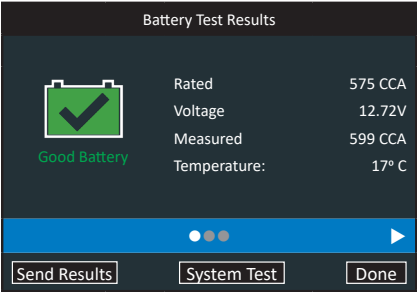
The tester tests the alternator output again.

9. When prompted, idle the engine and select **Next**.

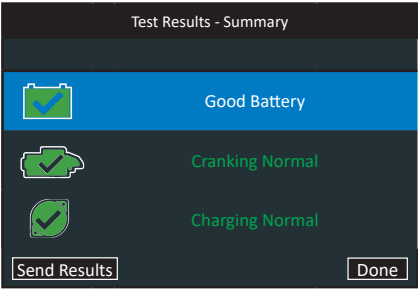
Battery Test Results

Icons are colour-coded to indicate status.

Green:	All test parameters were completed and are OK.	Red:	The battery has failed the test.
Yellow:	Some test parameters may require further testing.	Grey:	Insufficient data to perform the test.



Test Results - Battery Test



Test Results - System test

 **NOTE:** See Appendix for complete parameter descriptions.

Select **Send Results** displayed at the bottom of the tester display to send the test results to the optional built-in printer or via email. Select **Done** to return to the Main Menu.

-  Printer
-  Email

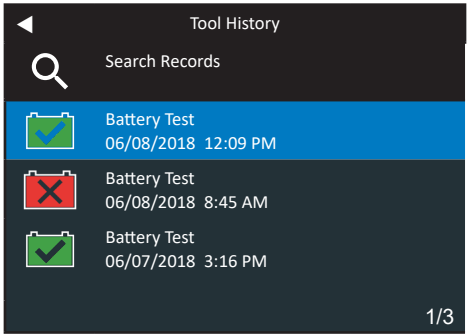
3 – History



Use History to access the tool usage history, a vehicle history based on VIN, and user histories. The search function can also be used to find test results of specific vehicles or by specific technicians.

Press ▲◀▶▼ to return to the previous screen, select options and when necessary, press ■ to enter or continue to the next step.

1. In the Main Menu, select **History**. The Tool History screen is displayed.



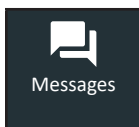
2. Select a vehicle record to view the results or select Search Options to search for records by manually entering a VIN, scanning a VIN, or by test result.
3. Select the Battery Test to view detailed test results for each part of the test.



NOTE: See "Battery Test Results" in Chapter 2 - Battery Test for test result screens and descriptions.

4. To send the test results to a configured printer or via email select **Send Results**. Select **Done** to return to the Main Menu.

4 – Messages



The Messages function displays warnings and notifications for upcoming tool software updates.

Select ◀ to return to the previous screen or 🏠 to return to the Main Menu.

Accessing Messages



A number is displayed next to the Messages icon when the tester has received any critical messages.

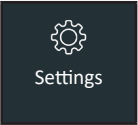


Unread critical messages



Read critical messages

5 – Settings



Use Settings to setup and adjust the tester’s display and time, shop and administrative settings, network connectivity and BMIS settings.

Press ▲◀▶▼ to return to the previous screen, select options and when necessary, press ■ to enter or continue to the next step.

Tool

Display

Use ◀ to return to the Display menu.

<u>Language</u>	Select the default standard language.
<u>Temperature Units</u>	You can select here the default temperature units (Fahrenheit/Celsius) to be used when measuring battery temperature.
<u>Number Separator</u>	You can select here the decimal separator (comma or full stop) used in the default number display.

Date & Time

Use ◀ to return to the Display menu.

<u>Date Format</u>	Select Month/Day/Year (MM/DD/YYYY), or Day/Month/Year DD/MM/YYYY.
<u>Date</u>	Use ▲ or ▼ to advance the month, day or year. Use ◀ or ▶ to move left or right and move to Cancel or Next. Select Next to save the date or Cancel to exit without saving. ▲▲▲ June182018 ▼▼▼ CancelNext
<u>Time Format</u>	Select 12 or 24-Hour Format.
<u>Time</u>	Use ▲ or ▼ to go to the hours, minutes and AM/PM settings. Use ◀ or ▶ to move left or right and move to Cancel or Next. Select Next to save the time or Cancel to exit without saving. ▲▲▲ 1046AM ▼▼▼ CancelNext

Print Format

Change the default settings to include Shop Info and State Of Health (SoH) information on test result printouts. Use  to return to the Display menu.

Include Shop Info

Press  to check and uncheck the box. A checked box indicates the shop information will be included on printed test results.

Include SoH Graph

Press  to check and uncheck the box. A checked box indicates the State Of Health (SoH) screen will be included on printed test results.

Auto Test

Press  to check and uncheck the box. A checked box indicates the tester will immediately begin testing a battery as soon as it is connected. Use  to return to the Tool menu.

**NOTE:** To expedite the testing procedure, make sure “Auto Test” is enabled.

Version

Allows you to confirm technical information for the tester’s internal software and hardware.

Config:	Build Number:
Firmware:	Serial Number:
Flash:	MAC ID:
EEPROM:	FCC ID:
Build Date:	

Shop Info

Allows you to enter information about the shop in which the tester will be used.

Shop Name	Country
Shop Address	Phone Number
Shop Address 2	Email Address
Town/City	Website
Province	(Blank)
Zipcode	(Blank)
Country	(Blank)

You can use     to highlight the desired alphanumeric character on the displayed alphanumeric keypad.

Select  to open the lower case and symbol character maps.

Once all of the alphanumeric characters have been entered, select **Save** or **Esc** to exit without saving.

Network

WiFi

Automatic

The tester searches for any detectable WiFi networks. A list of detected WiFi networks is then displayed on the tester's display. Highlight a displayed network and press  to connect. Press  to return to the WiFi Settings screen.

Manual

Manually enter Security, SSID, Password, Encryption, and WEP Keys. Select **Connect**.

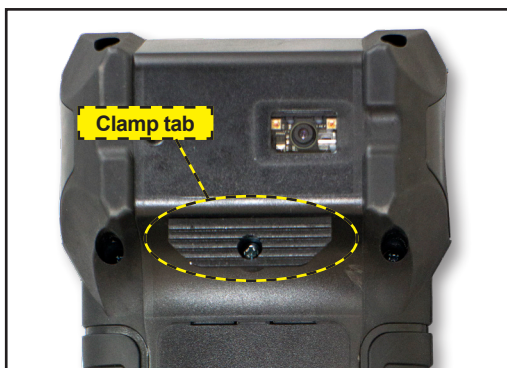
6 – Maintenance & Troubleshooting

Tester Cables

The test cables that come with your tester are wear and tear items. Cables are like tires: the more you use them, the shorter their useful life. Here are a few things you can do to protect your test cables from damage and premature wear:

Cleaning Clamps

- Grease, dirt and sulphate accumulate over time on battery terminals. These substances are highly corrosive and can damage clamps over time. Before connecting the clamps, ensure accurate test readings and protect the clamps by cleaning the battery casing and terminals using a wire brush and a mixture of water and baking soda.
- Periodically clean the clamps using a mixture of baking soda and water, or a mild hand-soap, and a small bristle brush.
- To protect the clamps from oil and dirt, clip them to the clamp tab on the back of the tester.



Handling Test Cables

- Always connect and disconnect the clamps to the battery by opening and closing the clamps. Never pull on the test cables to remove the battery clamps. Pulling can damage the Y-junction, the cables, and the clamps to the extent that the tester may produce lower-than-expected conductance readings or fail completely.
- Never carry the tester by the cables. Carrying the tester or swinging it by the cables puts unnecessary strain on the cables and can result in premature failure. Handle the tester with care to get the maximum use from the product.

Storing Test Cables

- Never wrap the cables around the tester; this puts unnecessary strain on the test cables.

Because the test cables are the “tires” of the tester, they have a certain life expectancy and will wear out eventually. However, the above examples of misuse are not covered by the warranty. To ensure the best performance and longest life of the test cables, attach and remove them with care, and carry the tester and cables together.

If an inspection or a change in test results indicate that the test cables need to be replaced, call Midtronics Customer Service via www.europe.midtronics.com/customer-support

Printer Paper

The internal printer is delivered with a roll of thermal print paper with a width of 57.1 mm and a diameter of 47.6 mm. Replacement rolls are available through Midtronics or online office supply websites.



NOTE: Due to production variances some paper roll diameters may be too large. In this case, remove paper from the roll until it is no thicker than the recommended 47.6 mm. **DO NOT FORCE** to close the cover if the roll is too large.



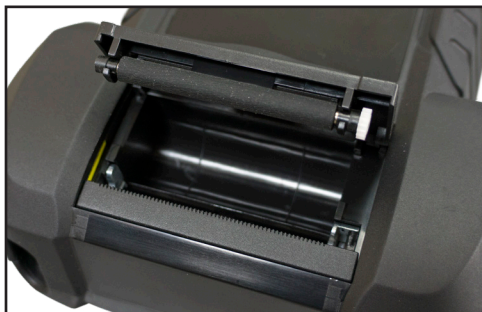
NOTE: The tester uses only thermal printing paper.

Replacing The Paper Roll

1. Unlock the printer door by gently lifting up on the release.



2. Lift the printer door and remove the spent roll.



3. Place a new paper roll in the compartment. The paper feeds from the bottom of the roll.
4. Pull the paper forward so that it extends past the serrated edge of the paper slot.
5. Close the door and make sure the lever locks securely. For a clean tear, pull the paper along the serrated edge. **Do not pull the paper straight out of the printer.**

Replacing The Internal Batteries

1. Turn the tester face down.
2. Use a Phillips screwdriver to remove the screw securing the door to the battery compartment.



3. Lift the door at the tab and place it aside.



4. Remove the discharged batteries.
5. Insert new batteries as shown. Make sure the positive and negative terminals are positioned correctly.
6. Replace the door on the battery compartment.
7. Reinsert and tighten the screw.

Appendix: Test Results Decision Tables

Battery Test Results

Decision	Cranking Health	Reserve Capacity	Description
 Good Battery	Good Battery	Good Battery	Battery meets or exceeds required standards.
	Good Battery	Unknown reserve	Battery meets or exceeds required standards.
 Good - Recharge	Good - Recharge	Good Battery	Battery is good, but is low in charge. Fully charge the battery for optimal performance and life. Check for causes of the low charge level.
		Unknown reserve	
 Charge & Retest	Charge & Retest	Unknown reserve	Battery must be charged to determine condition.
		Charge & Retest	
 Replace Battery	Bad cell Replace Short	Replace Battery	Battery fails to meet industry accepted standards.
	Charge & Retest	Replace Battery	Battery is low in charge, and shows low reserve capacity. Low reserve capacity will compromise the battery's ability to provide system current and hold a charge.
	Good Battery	Replace Battery	Battery is sufficiently good for cranking the engine, but has little reserve capacity. Low reserve capacity will compromise the battery's ability to power for vehicle systems and hold a charge.
	Good - Recharge	Replace Battery	
	Replace Battery	Good Battery	
	Replace Battery	Replace Battery	
	Replace Battery	Unknown reserve	
 Bad Cell, replace.	Bad cell Replace Short	Good Battery	Battery fails to meet industry accepted standards.
	Bad cell Replace Short	Unknown reserve	

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 two (2) years from the date of purchase. Midtronics will, at its discretion, 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 voltage 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 beyond the scope of this warranty. The warranty is void if owner attempts to disassemble the unit or to modify the cable assembly.



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