MIDTRONICS

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167-000888EN-C

# CPX-900 EU

## Battery & Electrical Diagnostic Analyzer


*For testing 12-volt automotive batteries*

# *User Manual*

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# Contents

# 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 PROP. 65: 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.

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 enters your eyes, immediately flush them thoroughly with cold running water for at least 15 minutes and seek medical attention. If battery acid gets on 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 analyzer cords and cables away from moving engine parts.
- ✓ Remove any jewelry 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 conditions and personal injury. |
|  | The safety symbol with the words **CAUTION**, **WARNING, or DANGER** indicates instructions for avoiding hazardous conditions and personal injury. |
|  | The wrench symbol indicates procedural notes and helpful information. |

## Description

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

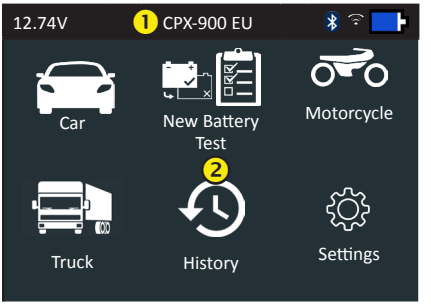
## Consent to Collection and Use of Data:

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, test results, and accessories. This inforamtion is gathered periodically to facilitate the provision of product support, product improvements, product development, and other services related to use of this battery and electrical system analyzer. The technical data and related information is in a form that does not personally identify the user.

## Controls & Connections


1. Display Screen
2. Cooling Vent
3. Arrow Key & Power Button
4. Mini-USB Port
5. Thermal Printer
6. Temperature Sensor


## Main Menu




**Truck application is only found in the CPX-900 EU HD*

**1 Menu Bar**

| | | | |
|---|---|---|---|
| 12.74V | Battery Voltage (if connected) | | WiFi signal strength |
| | Bluetooth connectivity status | | Controller internal battery status |

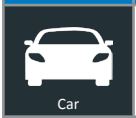
**2 Main Menu Selection Area**

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.

## Main Menu Icons

| Icon | Description |
|---|---|
|  Car | Automates battery testing for quickly testing in or outside of the vehicle using the fewest steps. |
|  New Battery Test | Automates battery testing for quickly testing cars using the fewest steps. |
|  Motorcycle | For testing motorcycle batteries before possible return. |
|  Truck | For testing truck batteries before possible return, or generating a battery pair.<br>**Truck application is only found in the CPX-900 EU HD* |
|  History | Access archived test histories or search test history by VID or by technician. |
|  Messages | Displays alerts and notifications for upcoming tests and activities including scheduled tests, tool software updates and maintenance opportunities. |
|  Settings | Setup/adjust: WiFi, printer setup, email settings, user information, default language, display and sound settings, BMIS information, shop information, and connected devices. |
|  Version | Retrieve info of the current software version. |

## *Initial Power Up*

When powered up for the first time, the tester will take approximately 8 to 10 seconds to boot up while testing the integrity of the internal software.

The LANGUAGE screen is the first to appear. It enables you to set the language for the display and printed test results. You can disable this option in the Admin Menu.

1. Use ▲ or ▼ to select the default LANGUAGE and press **NEXT** to continue.
2. Use the displayed alphanumeric keypad to enter the STORE ID#.
   To enter the number, use the **ARROW** keys to highlight the desired alphanumeric character and press **SELECT** to select it. The selected character appears in the box above.
3. Press **SAVE** to continue.
4. Repeat the same procedure to enter the Store Name, Street Address, City, State or Province, Zip Code, Country, Phone Number, email address, and website.
5. After cycling through the 14 available lines of text, your changes are saved and the Main Menu is displayed on the screen.

## *Inspecting the Battery*

Before starting the test visually inspect the battery for:

- Cracked, buckled, or leaking case. 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, and dirt or acid on the case top. Clean the case 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 ½ above the top of the plates and fully charge the battery. Do not overfill.
- Corroded or loose battery tray and hold-down fixture. Tighten or replace as needed.

## Testing Out-of-Vehicle (Battery Test)

The preferred battery test location is in the vehicle. However, if you plan to test out of the vehicle:

- Always disconnect the negative cable from the battery first and reconnect it last.
- Always use a carry tool or strap to lift and transport the battery.

**⚠ CAUTION**

**Failure to properly install lead terminal adapters, or using adapters that are dirty or worn, may cause false test results.**

When testing side-post or Group 31 batteries, always use lead terminal adapters provided with the tester—do not test at the battery's steel bolts. To avoid damage, never use a wrench to tighten the adapters more than ¼ turn.

## Testing In-Vehicle (System Test)

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 achieVIDg the rpm levels needed for the test.

The preferred test position is at the battery posts. If you must test at a remote-post location, it should have both a positive and negative post. Otherwise, you must remove the battery and perform a System Test.

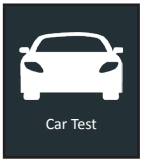
At the start of the test, place the vehicle transmission in PARK, make sure all vehicle accessory loads are off, the key is not in the ignition, and the doors are closed.

## Connecting To The Battery

Connect the red clamp to the positive (+) terminal and the black clamp to the negative (–) terminal. If you connect the clamps in the wrong polarity (red to negative or black to positive), the analyzer displays "CLAMPS REVERSED!" Reconnect the clamps.

To make sure both sides of the clamps are gripping the terminals, rock the each clamp back and forth. A poor connection will prevent testing, and the analyzer displays the message CHECK CONNECTION. If the message reappears after you have correctly reconnected the clamps, clean the terminals and reconnect.

# 2 – Car Test




Use Car Test to perform Battery Tests on car batteries. Using test parameters the battery can be tested both in vehicle and out of vehicle. A System Test is also available for the in vehicle test. Press ▲◀▶▼ to return to the previous screen, select options and when necessary, ☐ to enter or continue to the next step. Use **BACK** to return to the Main Menu.

## *Battery Test*

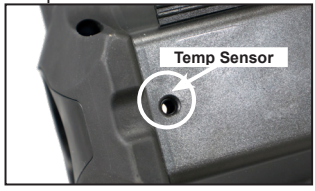
1. Battery Test Setup - Edit the displayed vehicle and battery information. After running the battery test 'In Vehicle', you'll get the option to choose to do a system test.

| Location | Inside Vehicle | Outside Vehicle |
|---|---|---|
| Battery Type | Flooded<br>EFB<br>GEL | AGM<br>AGM Spiral |
| Battery Units | EN<br>SAE<br>IEC | DIN<br>EN2<br>JIS<br>CCA |
| Battery Rating | Hold down ▲ or ▼ to increase scrolling speed. | |
| Battery AH (Ampere-hour) | Select the Battery AH with the on screen numberpad. | |
| VID | Insert the Vehicle ID number. | |

| Rating | Description | Range |
|---|---|---|
| EN | European Norms. The battery is required to meet a voltage of 7.5V after 10 seconds | 100 to 3000 |
| SAE | Society of Automotive Engineers norm. The test specifies that the battery at a temperature of –18°C will deliver a current equal to the Cold Cranking Amps for 30 seconds with the voltage staying above 7.2 volts | 100 to 3000 |
| IEC | International Electrotechnical Commission norm. The IEC test is performed at -18°C | 100 to 1000 |
| DIN | Deutsche Industrie-Norm | 100 to 1000 |
| EN2 | European Norms 2. Performing a different second discharge than with EN. | 100 to 3000 |
| JIS | Japanese Industrial Standard test, carried out at -15°C. | A list is shown |
| CCA | Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 ºF (–17.8 ºC). | 100 to 3000 |

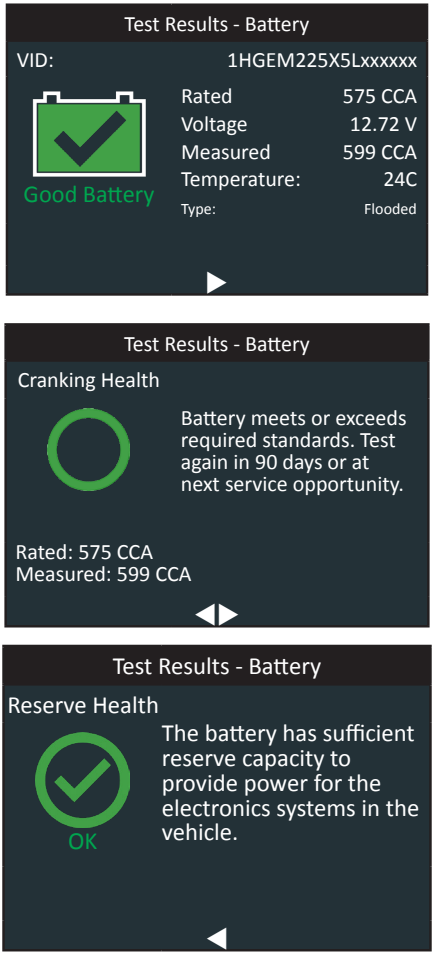
Select **Start** to advance to the next screen.

2. Temperature - Hold the tester temperature sensor over the battery being tested.




Select **Capture** to lock in the live temperature reading and begin the battery test.

### Battery Test Results




***Test Results - Battery Test***

To print or send the test results to a configured printer select **Send Results.** To return to the Home Screen, select **Done** or **System Test** to continue with the System Test.

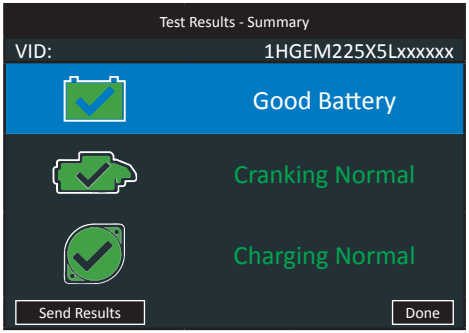
Refer to Appendix B: Decision Tables for a complete explaination of the possible test results.

## *(In Vehicle test) - System Test*

1. If you have an external amp clamp avaible, put it around the negative cable. Press **Skip** or **Next**.
2. Start the vehicle's engine and let it idle.

3. Ensure all accessories (High Beam headlights/ventilation blower etc.) are off and select **Next**.
   The analyzer tests the alternator output.
4. When prompted, rev and hold the engine to between 2000 to 3000 rpm.
   The analyzer tests the alternator output again.
5. When prompted Idle the engine and and select **Next**.
6. Turn on the high beam headlights and ventilation blower.
7. Select **Next**.
   The analyzer tests the alternator output.
8. When prompted, rev and hold the engine to between 2000 to 3000 rpm.
   The analyzer tests the alternator output again.
9. When prompted Idle the engine and and select **Next**.
10. If you used an amp clamp, now insert the measured voltage. Press **Next.**

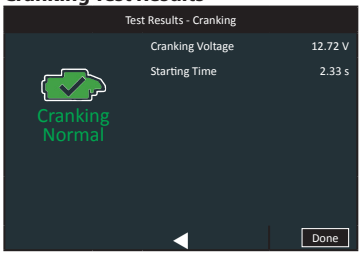
## System Test Results



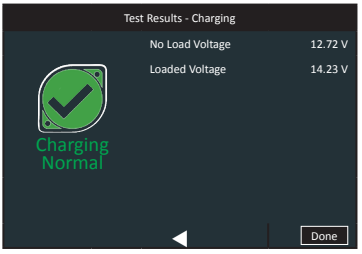

***Test Results - Summary***

The Test Results - Summary screen is displayed following a System Test. Select the Battery, Cranking, or Alternator Test to view detailed test results for each part of the test. Refer to

**Cranking Test Results**




**Alternator Test Results**



# 3 - New Battery


Use New Battery Test to test and verify the condition of customer batteries for possible return and/or warranty claim.
Press ▲◀▶▼ to return to the previous screen, select options and when necessary, **O** to enter or continue to the next step. Use **BACK** to return to the Main Menu.

## *Battery Test*

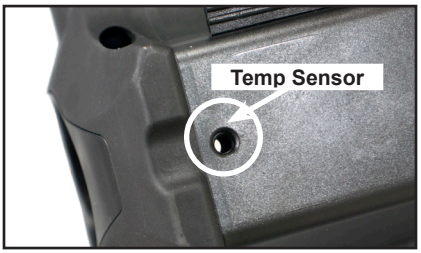
1. Battery Test Setup - Edit the displayed battery information.

| | | |
|---|---|---|
| Battery Type | Flooded<br>AGM Spiral<br>Gel | AGM<br>EFB |
| Battery Units | EN<br>SAE<br>IEC | DIN<br>EN2<br>JIS<br>CCA |
| Battery Rating | Hold down ▲ or ▼ to increase scrolling speed. | |

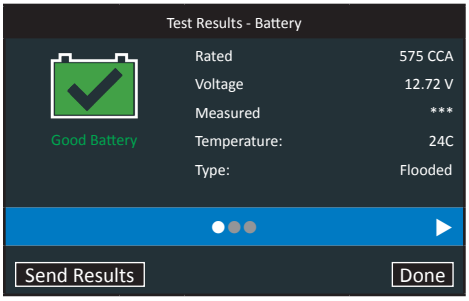
| Rating | Description | Range |
|---|---|---|
| EN | European Norms. The battery is required to meet a voltage of 7.5V after 10 seconds | 100 to 3000 |
| SAE | Society of Automotive Engineers norm. The test specifies that the battery at a temperature of –18°C will deliver a current equal to the Cold Cranking Amps for 30 seconds with the voltage staying above 7.2 volts | 100 to 3000 |
| IEC | International Electrotechnical Commission norm. The IEC test is performed at -18°C | 100 to 1000 |
| DIN | Deutsche Industrie-Norm | 100 to 1000 |
| EN2 | European Norms 2. Performing a different second discharge than with EN. | 100 to 3000 |
| JIS | Japanese Industrial Standard test, carried out at -15°C. | A list is shown |
| CCA | Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 ºF (–17.8 ºC). | 100 to 3000 |

Select **Start** to advance to the next screen.

2. Temperature - Hold the tester temperature sensor over the battery being tested.




Select **Capture** to lock in the live temperature reading and begin the battery test.




***Test Results - Battery Test***

To print or send the test results to a configured printer select **Send Results.** To return to the Home Screen, select **Done** to return to the main screen.

# 4 – Motorcyle


Use Motorcycle Test to perform Battery Tests on motorcycle batteries. Press ▲◀▶▼ to return to the previous screen, select options and when necessary, ■ to enter or continue to the next step. Use **BACK** to return to the Main Menu.

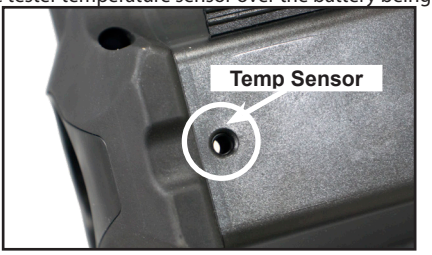
## *Battery Test*

1. Select the correct battery unit from the list.
2. Battery Test Setup - Edit the displayed vehicle and battery information (based on the VID).

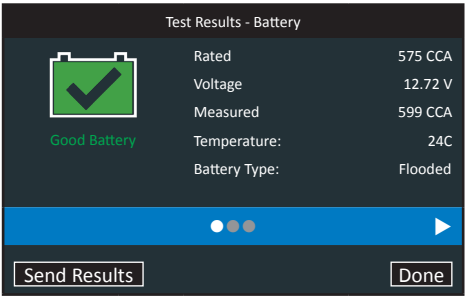
| Location | Inside Vehicle | Outside Vehicle |
|---|---|---|
| Battery Type | Flooded | AGM |
| Battery Units | A list with battery unit options is shown | |
| Battery Rating or P/N (depends on battery unit selection) | Hold down ▲ or ▼ to increase scrolling speed. | |
| VID | Insert the Vehicle ID number. | |

Select **Start** to advance to the next screen.

3. Temperature - Hold the tester temperature sensor over the battery being tested.




Select **Capture** to lock in the live temperature reading and begin the battery test.




***Test Results - Battery Test***

To print or send the test results to a configured printer select **Send Results.** To return to the Home Screen, select **Done** to return to the main screen. Refer to Appendix B: Decision Tables for a complete explaination of the possible test results.

# 5 – Truck


Use Truck Test to perform Battery Tests or Generate Pair on truck batteries.
**Truck application is only found in the CPX-900 EU HD*

Press ▲◀▶▼ to return to the previous screen, select options and when necessary, **O** to enter or continue to the next step. Use **BACK** to return to the Main Menu.

1. At the Main Menu, select **Truck**.
2. Select whether you wish to perform a **Battery Test** or **Generate Pair**.

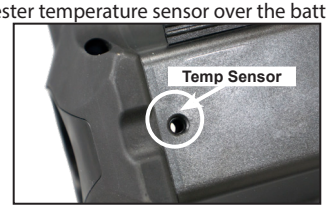
## Battery Test

3. Battery Test Setup - Edit the displayed vehicle and battery information (based on the VID).

| Location | Inside Vehicle | Outside Vehicle |
|---|---|---|
| Number of batteries | 1 | 2 |
| Battery Type | Flooded | EFB |
| | Gel | AGM |
| Battery Units | EN<br>SAE<br>IEC | DIN<br>EN2<br>JIS<br>CCA |
| Battery Rating | Hold down ▲ or ▼ to increase scrolling speed. | |
| Battery AH (Ampere-hour) | Select the Battery AH with the on screen numberpad. | |
| VID | Insert the Vehicle ID number. | |

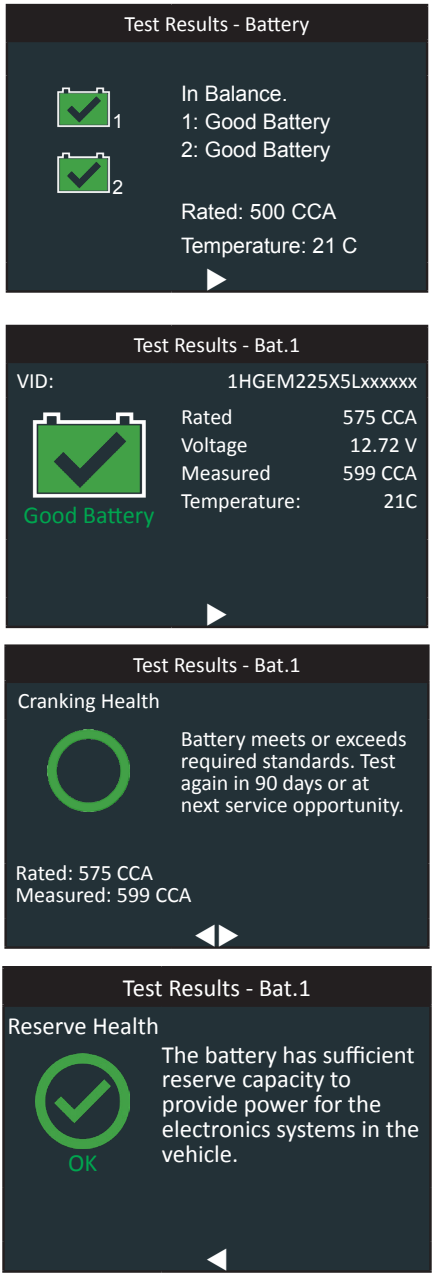
Select **Start** to advance to the next screen.

4. If you selected the option '2 batteries', you will now be requested to connect to battery 2. Press **OK**.
5. Temperature - Hold the tester temperature sensor over the battery being tested.




Select **Capture** to lock in the live temperature reading and begin the battery test.

## Battery Test Results



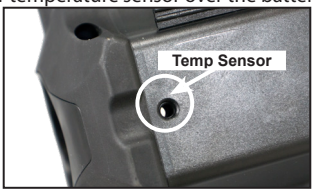

***Test Results - Battery Test***

# Generate Pair

1. Battery Test Setup - Edit the displayed vehicle and battery information (based on the VID).

| | | |
|---|---|---|
| Battery Type | Flooded | EFB |
| | Gel | AGM |
| Battery Units | EN<br>SAE<br>IEC | DIN<br>EN2<br>JIS<br>CCA |
| Battery Rating | Hold down ▲ or ▼ to increase scrolling speed. | |
| Battery AH (Ampere-hour) | Select the Battery AH with the on screen numberpad. | |

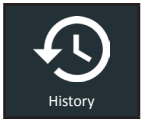
   Select **Start** to advance to the next screen.
2. After a few seconds you will be requested to connect to battery 2. Press **OK**.
3. Temperature - Hold the tester temperature sensor over the battery being tested.




   Select **Capture** to lock in the live temperature reading and begin the battery test.

### Generate Pair Results

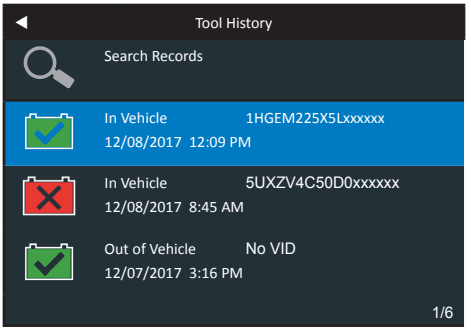
# 6 – History




Use History to access the tool usage history, a vehicle history based on VID, and user histories. The search function can also be used find test records for specific vehicles and technicians.

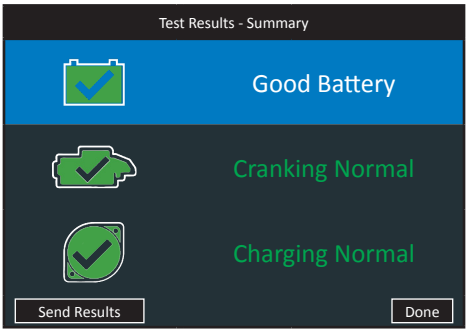
Press ▲◀▶▼ to return to the previous screen, select options and when necessary, **O** to enter or continue to the next step. Use **BACK** to return to the Main Menu.

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




For Out Of Vehicle tests, see Appendix B: Test Results Decision Tables for full screen descriptions.

2. For In Vehicle tests, the Summary screen is displayed.




***Test Results - Summary***

3. Select the Battery, Cranking, or Alternator Test to view detailed test results for each part of the test.
   For In Vehicle tests, see Appendix B: Test Results Decision Tables for full screen descriptions.

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

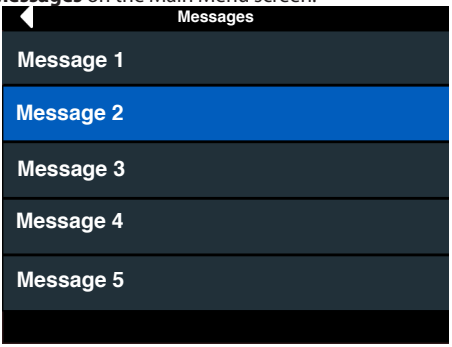
# 7 – Messages


The Messages function displays alerts and notifications for upcoming tests and activities. This includes scheduled testing as well as tool software updates and maintenance opportunities.


Tap ◀ to return to the previous screen.

## *Accessing Messages*

1. Tap **Messages** on the Main Menu screen.




2. Tap to read a message.
   Tap to perform the message action item.
   Tap to delete a message.
3. Tap ∧ to collapse a list of messages or ∨ to expand the list.

## Message Types

**Critical**: An important action cannot be performed and may require user action.
**Notifications**: Indicates an action has been performed or data has been sent.

# 8 – Settings

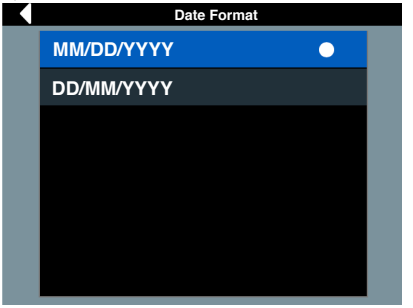
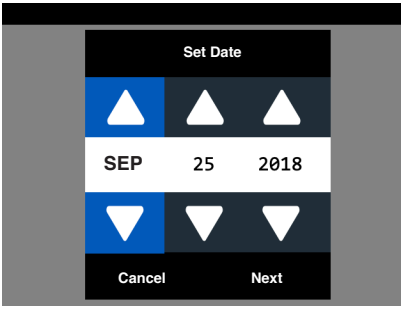

Use Setup to setup and adjust the tester display and time, shop and administrative settings, network connectivity, and BMIS settings.

## *Tool*

### Display

| | |
|---|---|
| **Language** | Use ▲ or ▼ to select the analyzer default standard language. Use ◀ to return to the Display menu. |
| **Temperature Units** | Use ▲ or ▼ to select the default temperature units (Fahrenheit/Celsius) used when measuring battery temperature. |
| **Number Separator** | Use ▲ or ▼ to select the default number display using commas or periods separators. |

### Date & Time

| | |
|---|---|
| **Date Format** | Use ▲ or ▼ to select Month/Day/Year, Day/Month/Year, or Year/Day/Month.<br>  |
| **Date** | Use ▲ or ▼ to advance the month, day, and year. Use ◀ or ▶ to advance left or right and move to **Cancel** or **OK**. Select **OK** to save the date or **Cancel** to exit without saving.<br>  |

| | |
|---|---|
| **Time Format** | Use ▲ or ▼ to select 12 or 24 Hour Format. |
| **Time** | Use ▲ or ▼ to advance the hours, minutes, and AM/PM setting. Use ◀ or ▶ to advance left or right and move to **Cancel** or **OK**. Select **OK** to save the time or **Cancel** to exit without saving. |

## Print Format

| | |
|---|---|
| **Include Shop Info** | Press ■ to check and uncheck the box. A checked box indicates the shop info will be put on the print-out. |
| **Include SoH Graph** | Press ■ to check and uncheck the box. A checked box indicates the State of Health graphic will be put on the print-out. |

## Email Format

With the displayed alphanumeric keypad, enter your preferred email address. When you press Save this email address will become the default address for sending test results.

## System Test

Press ■ to check and uncheck the box. An unchecked box indicates the tester will not give the option to do a system test after an In Vehicle test.

## Version

Use to confirm technical information for internal tester software and hardware.

| | |
|---|---|
| Config: | 192-111338A |
| Firmware: | 192-121342A |
| Flash: | 192-151343A |
| EEPROM: | 192-151344A |
| Build Date: | 10/24/2017 |
| Build Number: | 9 |
| Serial Number: | 111788888 |

## Check for Updates

Press the select button on the keypad to immediately check for software updates. It is possible to cancel an update during the first part of the update.

# *Shop Settings*

## Shop Info

Use 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 |
| City | Website |

| | |
|---|---|
| State | (Blank) |
| Zipcode | (Blank) |
| Country | (Blank) |
| Phone Number | (Blank) |
| Email Address | (Blank) |
| Website | (Blank) |

With the displayed alphanumeric keypad, use ▲▼◀▶ to highlight the desired alphanumeric character.
Select ↑ to access 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 settings*

### WiFi

| | |
|---|---|
| **WiFi** | Select WiFi specifications (WPA-PERSONAL, WPA2 PERSONAL, WEP, WPA ENTERPRISE, WPA2 ENTERPRISE)) |
| **Automatic** | The tester searches for any detectable WiFi networks. A list of detected WiFi networks is then displayed on the tester screen. |
| **Manual** | Manually enter Security, SSID, Password, Encryption, and WEP Keys. |

## *BMIS Settings*

| | | |
|---|---|---|
| **User Credentials** | Enter the Username (usually an email address) and Password | |
| **Location Settings** | Enter the Location of your workshop. | |
| **Update** | Select the tester Update Settings defaults. Press ◀ to return to the Devices screen. | |
| | Over The Air | Save Tool Configurations |
| | USB Drive | Load Tool Configurations |
| | USB PC Link | Delete Tool Configurations |
| **Devices** | Copy, load, or manually enter configurations for connected devices such as CVG3s. | |

# 9 – Maintenance & Troubleshooting

## *Tester Cables*

The test cables that come with your analyzer are consumable items. Cables are like tires in that the more you use them and the harder you drive 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

- The grease, dirt, and sulfation that build up on battery terminals are highly corrosive and can damage the clamps over time. Before connecting the clamps, ensure accurate test readings and protect the clamps by cleaning the battery case 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 back of the analyzer as shown.

### 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 analyzer may produce lower-than-expected conductance readings or fail completely.
- Never carry the analyzer by the cables. Carrying the analyzer or swinging it by the cables puts unnecessary strain on the cables and can result in premature failure. Handle the analyzer with care to get the maximum use from the product.

### Storing Test Cables

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

Because the test cables are the "tires" of the analyzer, they have a certain life expectancy and will wear out eventually. However, the abuse examples cited above are not covered under warranty. To ensure the best performance and longest life of the test cables, attach and remove them with care, and carry the analyzer 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 at 1-800-776-1995.

### Testing The Cable Set

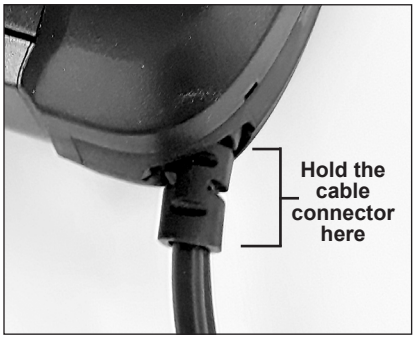
If the analyzer frequently displays CHECK CLAMP CONNECTION! there may be an intermittent open circuit along one or both of the battery test cables. You can check the circuit with a simple test. The test requires an ohmmeter and a wire or paper clip if the ohmmeter probes are too large to insert into the pin holes. You will also need to a pencil or plastic marker to keep the clamp jaws apart.

### Connecting The Battery Test Cable

**⚠ WARNING**

To prevent damage to the analyzer's circuitry, do not connect the analyzer to a voltage source greater than 30 Vdc.

To connect the battery test cable to the analyzer align the cable connector with the analyzer's housing. Hold the part of the cable connector as shown and firmly insert the connector into analyzer's receptacle. Do not twist.




To avoid damaging the battery test cable, always hold the ridged part of the cable connector (as shown in the photo) when inserting and removing the cable.

## *Printer Paper*

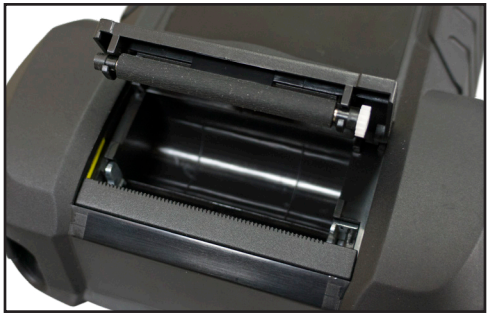
The internal printer is shipped with a roll of thermal printing paper installed in the paper compartment. The roll size is 2¼" wide by 1⅞" in diameter. Replacement rolls are available at most office supply stores.

**NOTE:** Due to production variances some paper roll diameters may be too large. Please remove paper from roll to recommended 1⅞" diameter. DO NOT force cover to close if roll is too large.

## 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 roll of paper 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.**

## *Printer Problems*

### The internal printer will not print

- The analyzer must be connected to the vehicle battery to print to the internal printer. Check the clamp connections to the battery.
- The vehicle battery may be too low to power the printer. Connect to a battery with at least 11.5 volts.
- Verify that the paper is properly installed.
- Verify that the paper sensor is clean and undamaged.

## *Display Problems*

### The display does not turn on:

- Check the connection to the battery.
- The analyzer's internal batteries may need to be replaced.

### The display flickers or is dim:

- The contrast may need to be adjusted in the Admin/Utility menu. Highlight the Display icon and press **ENTER**. Use ▲ or ▼ to scroll the contrast value to 10.
- The analyzer's internal batteries may need to be replaced.

## *Internal Batteries*

The tester uses six AA, 1.5-volt batteries (alkaline recommended) to allow testing of batteries down to 1 volt and supply power while the menu is active.

## Replacing The Internal Batteries

1. Turn the analyzer 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. Reposition the door on the battery compartment.
7. Reinsert and tighten the screw.

# Appendix: Recommended Test Procedure

The CPX-900 testing process uses Conductance Profiling™ technology which determines battery cranking capability and also adds Reserve Capacity testing. With this additional process, initial battery analysis can take up to 60 seconds to complete.

**IMPORTANT:** Always begin each test by connecting the tester clamps to the battery being tested. The testing process begins as soon as the clamps are connected.

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

# Appendix B: Test Results Decision Tables

## *Battery Test Results (Car, Motorcycle, Truck)*

| Decision | Cranking Health | Reserve Capacity | SOH Message | RC Message |
|---|---|---|---|---|
|  Good Battery | Good | Good | The battery shows good cranking performance. Test the battery again at next service opportunity. | The battery has good reserve capacity. The battery is able to provide power for the electronics systems in the vehicle. |
|  Good Recharge | Good Recharge | | The battery shows good cranking performance but low charge. Fully charge the battery for optimal performance and life. Check the starting and charging systems for causes of low charge. | |
|  Charge & Retest | Charge and Retest | | Charge the battery and retest to determine condition. | |
|  Replace Battery | Good | Warning | The battery shows good cranking performance but low reserve capacity performance. Low reserve capacity will compromise the battery's ability to provide power to the vehicle and hold a charge over time. | The reserve capacity of the battery is low. Low reserve capacity of the battery could impact the ability of the battery to provide power for the electronics systems in the vehicle. The battery should be replaced. |
| | Good Recharge | | The battery shows good cranking performance but low charge and low reserve capacity performance. Low reserve capacity will compromise the battery's ability to provide power to the vehicle and hold a charge over time. Check the starting and charging systems for causes of low charge. | |
| | Charge and Retest | | The battery shows low charge and low reserve capacity performance. Low reserve capacity will compromise the battery's ability to provide power to the vehicle and hold a charge over time. | |
| | Warning | | The battery shows low cranking performance. Replace the battery to prevent a no-start situation in your vehicle. | |
| | Warning | | The battery shows low cranking performance. Replace the battery to prevent a no-start situation in your vehicle. | |

| Decision | Cranking Health | Reserve Capacity | SOH Message | RC Message |
|---|---|---|---|---|
|  Good Battery | Good | No Test | The battery shows good cranking performance. Test the battery again at next service opportunity. | System conditions have prevented a test of the battery reserve capacity in this vehicle. Before attempting any retest, ensure that all vehicle accessory loads are off, the key is not in the ignition, and the doors are closed. |
|  Good Recharge | Good Recharge | | The battery shows good cranking performance but low charge. Fully charge the battery for optimal performance and life. Check the starting and charging systems for causes of low charge. | |
|  Charge & Retest | Charge & Retest | | Charge the battery and retest to determine condition. | |
|  Replace Battery | Warning | | The battery shows low cranking performance. Replace the battery to prevent a no-start situation in your vehicle. | |
| | Warning | | The battery shows low cranking performance. Replace the battery to prevent a no-start situation in your vehicle. | |
| No Test | No Test | No Test | Conditions have prevented a test of the battery reserve capacity. Ensure that there are no loads on the battery before attempting any retest. | |

## *Generate Pair*

When one of both batteries are not in good condition, the generating pair will be stopped and the battery needs to be charged or replaced. (**Truck application is only found in the CPX-900 EU HD)*

| | |
|---|---|
| Pack In Balance | The truck battery pair is in balance and can be returned to service. |
| Pack Out of Balance | The truck battery pair is out of balance and cannot be returned to service.Possible one or both batteries need to be charged or replaced. |
| Pack Replace | One or both of the batteries need to be replaced. |
| Pack Charge | One or both of the batteries need to be charged, before they can be paired in Generate Pair. |

## *Starter Test Results*

| Decision | Action |
|---|---|
|  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 | If the battery test result was (REPLACE or BAD CELL.) The battery must be replaced before testing the starter. |
|  Low Current | The starter voltage is high but the cranking amps are low. |
|  No Start | The engine didn't start and the test was aborted or the vehicle's starting profile was not detected and the Starter Test was skipped. |

## *Alternator Test Results*

| Decision | Action |
|---|---|
|  CHARGING NORMAL | The output from the alternator is normal. |
|  NO OUTPUT | No output detected. Check belts to ensure alternator is rotating when engine is running.<br>√ Check all alternator connections including to the battery. Clean or replace if necessary and retest.<br>√ If the belts and connections are in good working condition, replace alternator or external voltage regulator. |
|  LOW OUTPUT | Alternator not providing enough current to power electrical loads and charge the battery.<br>√ Check belts to ensure the alternator is rotating with the engine running.<br>√ Check alternator connections to and from the battery. If loose or heavily corroded, clean or replace the cable and retest. |
|  HIGH OUTPUT | Alternator voltage to the battery exceeds normal limits of a functioning regulator.<br>√ Check for loose and normal ground connections. If no connection problems are found, replace the regulator.<br>The normal high limit of a typical automotive regulator is 14.5 volts +/–0.5. Refer to the manufacturer specifications for the correct limit, which may vary by vehicle type. |

## *Diode Test Results*

| Decision | Action |
|---|---|
|  EXCESSIVE RIPPLE | One or more diodes in the alternator are not functioning or there is stator damage, which is shown by an excessive amount of AC ripple current supplied to the battery.<br>√ Make sure the alternator mounting is sturdy and that the belts are in good shape and functioning properly. If the mounting and belts are good, replace the alternator. |
|  OPEN PHASE | Replace the alternator. |
|  OPEN DIODE | |
|  SHORTED DIODE | |

## *New Battery Test Results*

| Decision | SOH Message |
|---|---|
|  Good Battery | The battery shows good cranking performance. Test the battery again at next service opportunity. |
|  Good Recharge | The battery shows good cranking performance but low charge. Fully charge the battery for optimal performance and life. Check the starting and charging systems for causes of low charge. |
|  Charge & Retest | Charge the battery and retest to determine condition. |
|  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-ofvehicle test before replacing it. |
|  Bad cell - Replace | Replace the battery and retest. |
| 24V 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) |

| Decision | SOH Message |
|---|---|
| Needs Charge | Fully charge battery and retest using BEFORE DELIVERY. (Motorcycle only)<br>Failure to fully charge the battery before retesting may cause false readings. |
| Cycling Required | Battery needs to be cycled for optimal performance. |
| Rest & Retest | Battery could have a surface charge, because it has recently been charged. |

## *Amp clamp*

During a system test you are requested to use an external amp clamp and insert the measured current in the tester.

| | |
|---|---|
| Pass | The measured current is considerend good. |
| No pass | The measured current is not considered good. Check whether the amp clamp is properly connected. |

## 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 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 battery testers and does not cover any other equipment, static damage, water damage, overvoltage, 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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