

# DSS-5000 HD

## Battery Diagnostic Service System

For testing 12- and 24-volt heavy-duty automotive, commercial batteries, and charging systems.



## *Users Guide*



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## Chapter 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 <b>CAUTION</b> , <b>WARNING</b> , or <b>DANGER</b> indicates instructions for avoiding hazardous conditions and personal injury.
	The wrench symbol indicates procedural notes and helpful information.

### Accessories

	A033 Lead Post Adapter Set (4)
	A401 Paper Roll-10 Pack
	A422 DSS-5000 HD Wall Charger
	A423 Printer Module
	A657 Amp Clamp (Optional*) * - For Amp Clamp-ready testers only
	A658 USB to micro-USB cable
	DSS-5003 Charging/Storage Dock
	A823 DSS-5000 HD Replacement DMM Test Cables
	A825 DSS-5000 HD 3 Meter Replacement Battery Test Cables

## Tester Components

### Controller



- ① **Carrying Handle:** For carrying the Controller and Tester Pod (when attached).
- ② **Controller Release Lever:** Press to release the Controller from the Tester Pod.
- ③ **Power Button:** Hold for 2 seconds to turn the Controller on and off independent of the Tester Pod. Flashes when the Controller is being charged.
- ④ **Touch Screen:** Primary user interface.



- ⑤ **Camera & Flashlight:** For VIN scanning and identification.
- ⑥ **Temperature Sensor:** For measuring battery temperature.



- ⑦ **Micro-USB Port:** For updating and servicing the Controller when a WiFi network is not available.
- ⑧ **Power Supply Connection**

### Tester Pod



- ① **Accessory Connector:** For connecting an optional accessory (ex. Amp Clamp / DMM Cable) to the Tester Pod.
- ② **Controller Charging Contacts:** For charging and communicating with the Controller when mounted to the Tester Pod.
- ③ **Status Indicator LEDs:**
  - ⏻ - Power is on
  - ⚡ - Clamps reversed
  - 📶 - Tester Pod is communicating with the Controller
- ④ **Clamp Storage Mounts:** Use to keep the test clamps protected when the tester is not in use.
- ⑤ **Tester Pod Internal Batteries**

### Charging Dock



- ① **Tester Pod Charging Contacts:** For charging the Tester Pod
- ② **Power Supply Connection**

## Test Preparation

### 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

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.

## ! WARNING

**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

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 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.

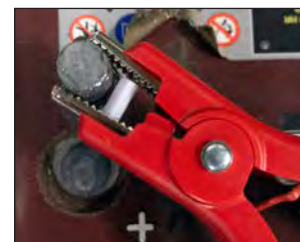
## Connecting to a Battery

## ! CAUTION

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

### Testing Individual Batteries

1. If the batteries have threaded studs, screw the negative (–) stud adapter onto the negative terminal, and the positive (+) adapter onto the positive terminal.
2. Connect the red clamp to the positive (+) terminal or adapter.
3. Connect the black clamp to the negative (–) terminal or adapter.
4. For a proper connection, rock the clamps back and forth. Both sides of the clamp must be firmly connected before testing. If the message CHECK CONNECTION appears, clean the terminals and/or reconnect the clamps



Clamp connection to stud adapter

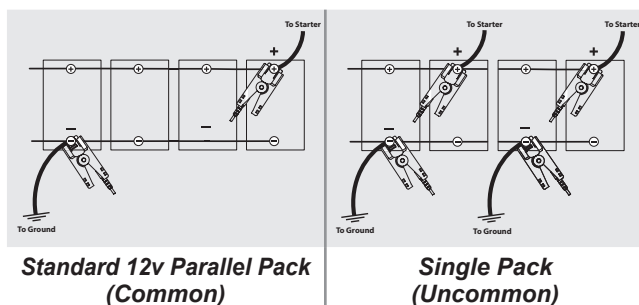


Clamp connection to stud pad

### Testing A Battery Pack

1. 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.
2. Connect the clamps to the positive (+) and negative (–) cables that lead to the starter and chassis ground as shown. If there are multiple cables, re-test for each cable connection.
3. For a proper connection, rock the clamps back and forth. Both sides of the clamp must be firmly connected before testing. If the message CHECK CONNECTION appears, clean the terminals and/or reconnect the clamps.

By design, most trucks with four batteries will have two paths for starting current directly to the starter motor to minimize voltage loss. Even though they are parallel, both cable paths need to be tested independently – the results should almost match.



### Connecting An Accessory Cable

Optional accessories such as an Amp Clamp or DMM clamps plug into the connector on the top of the Tester Pod. Rotate clockwise to lock the connector and counterclockwise to unlock.

### Setting User Preferences

Before starting your test you may want to customize the use of your analyzer by setting preferences in the Settings (⚙️) Menu. The Settings Menu is described in **Chapter 11**.

### Initial Power Up

1. Fully charge the Controller before use.
2. Press and hold the Power button to turn Controller on.
3. Upon initial power-up, the Language Settings screen is displayed. Tap **Next** to continue.

<b>System Language</b>	Select the Controller default language displayed on the screen.
<b>Test Result Language</b>	Select the Controller default language for all displayed tests and test results.
<b>Email Language</b>	Select the default standard language for the analyzer to use for all tests and results sent via email.
<b>Print Language</b>	Select the default standard language for the analyzer to use for all tests and results printed using a networked printer.

4. A Consent to collect data screen is displayed. Tap the Consent check box and then tap **Next** to continue.

5. Using the displayed keypad template, enter the new user name and password.
6. Tap **Next** to continue.



**IMPORTANT:** By default, the first user created is assigned Administrator rights. Tap Add User to add additional users. See Chapter 14: Settings to change these defaults.

7. The Date/Time Settings are displayed. Tap **Next** to continue after making any adjustments.

<b>Select Time Format:</b>	12-hour or 24-hour format
<b>Select Date Format:</b>	DD/MM/YYYY, MM/DD/YYYY, or YYYY/MM/DD
<b>Select Time Zone:</b>	Time zone offset from Greenwich Mean Time
<b>Set Date:</b>	Set the current date
<b>Set Time:</b>	Set the current time in the selected time zone

8. The Test Settings are displayed. Tap **Next** to continue after making any adjustments.

<b>Battery Rating</b>	Default: CCA (Cold Cranking Amps)
<b>Temperature Units</b>	Select Fahrenheit or Celsius
<b>Decimal Separator</b>	Select decimal point or comma

9. A list of devices connected to the tester is displayed.

To add a device, tap the plus (+) sign and follow the on-screen instructions. To unlink from a device, tap the displayed serial number to select it. Tap the trash can icon (🗑️) to delete it.



**NOTE:** A passkey number is automatically generated once the Bluetooth pairing has been established.

Tap the check box to require an Amp Clamp when performing a System Test.

10. A listing of detected Configured WiFi networks is displayed.

**To select a network:** For initial setup, no networks will be displayed here yet.

**To add a network:** Tap the plus (+) sign, then select from one of the displayed detected networks.

To manually add a network, tap the plus (+) sign again. Follow the on-screen instructions to select the Network SSID, Security, and IP Settings. Tap **Next** when finished.

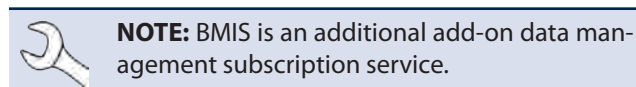
Use the on screen keypad to manually enter the Network SSID, security type, and IP settings. If necessary, enter the WiFi network password. Tap **Next** when finished.

A confirmation screen is displayed when the analyzer has successfully connected to the WiFi network.

**To delete a network:** Tap a displayed network to select it. Tap trash can icon (🗑️) to delete it.

11. The BMIS (Battery Management Information System) Account screen is displayed. Enter the Midtronics-supplied user-name and password.

Tap **Next** to connect to the BMIS database.



12. The Email Address Book screen (Admin Only) is displayed.

**To add an email address:** Tap the plus (+) sign, then use the displayed keyboard to add the address.

**To edit an email address:** Tap the pencil (✎) icon, then use the displayed keyboard to edit the address.

**To delete an email address:** Tap a displayed email address to select it. Tap trash can icon (🗑️) to delete it.

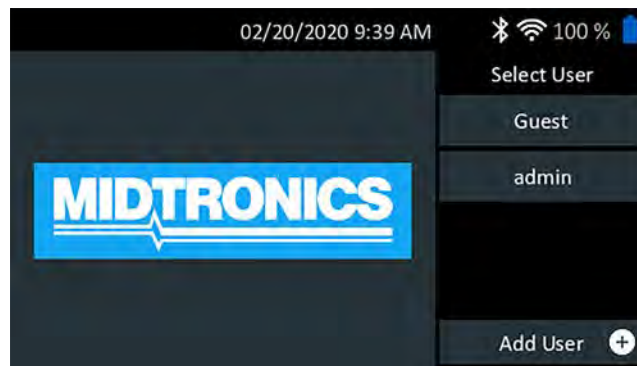
**To use the Default Email Server Settings:** Tap the gear (⚙️) icon to use the default.

13. The Shop Information screen (Admin Only) is displayed

Use the on screen keypad to enter the store name, address, and phone number. Tap **Next** to continue.

Store Name	<input type="text" value="Midtronics"/>
Street Address	<input type="text" value="7000 Monroe"/>
Street Address 2	<input type="text"/>
City	<input type="text" value="Willowbrook"/>
State	<input type="text" value="IL"/>
Zipcode	<input type="text" value="60527"/>
Phone #	<input type="text" value="1-630-323-2800"/>

14. The login screen is displayed.

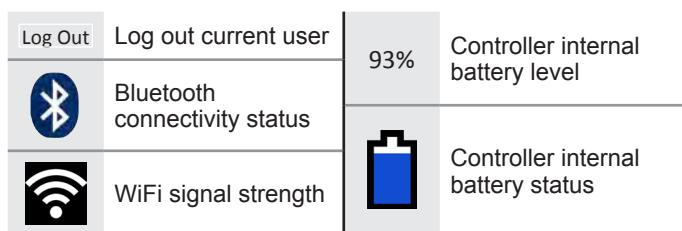


15. Tap a user name to access the Main Menu.

### Main Menu



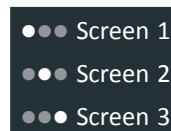
#### 1 Menu Bar



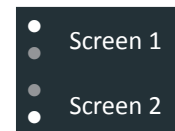
#### 2 Main Menu Selection Area

### Additional Screens

Dots at the bottom or side of a menu or results screen indicate additional screens are available. Swipe horizontally or vertically across the Controller screen to view all of the results.














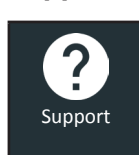
**Swipe Horizontally**



**Swipe Vertically**

## Main Menu Icons

Icon	Description
 Single Battery Test	For testing vehicles using a single 12V battery. Includes a full System Test option with or without Amp Clamp.
 Multi-Battery Test	For testing vehicles with 2 or more batteries connected in parallel. Includes a full System Test option with or without Amp Clamp.
 Out of Vehicle Test	For testing out-of-vehicle customer batteries for possible return.
 RP129 Test	Uses RP129 protocol to test each individual battery in a pack. Measures cable voltage drop between the alternator, starter and battery pack during System Test.
 Cable Drop	Tests both sides of a circuit simultaneously for voltage drop. Includes three preset and one user-defined test.
 24 Volt Test	Use to assess battery pack State Of Health and deliverable current potential in applications using two 12 volt batteries connected in series. Includes System Test with optional Amp Clamp.
 Digital Multimeter	The Digital Multimeter includes DC Volts, AC Volts, DC Amps, AC Amps, Ohms, Diode Drop, Amps Volts, and battery temperature for troubleshooting low voltage electrical circuits in a vehicle.
 History	Access archived test histories or search test history by Vehicle ID, 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. Also access to tester software version information.
 Support	Access the analyzer Self-Test and a digitized version of the Instruction Manual.

Support

Use the Support function to access built-in Self-Testing functions or to view a digitized version of the Instruction Manual.

User Manual

Tap the icon to view the analyzer's Instruction Manual on the Controller screen.

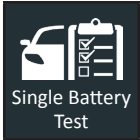
Self-Diagnostics

Use to test WiFi network and printer connections, Tester Pod diagnostics, Controller display testing, and Controller touch panel testing.



<b>WiFi Self-Diagnostics</b>	Tests connectivity to the BMIS server via the selected WiFi network
<b>WiFi Printer Self-Diagnostics</b>	Use to configure a WiFi printer
<b>Tester Pod Self-Diagnostics</b>	Check connectivity between the Controller and the Tester Pod
<b>Display Self-Diagnostics</b>	Tests Controller pixel display
<b>Touchscreen Self-Diagnostics</b>	Tests Controller touchscreen responsiveness

## Chapter 2: Single Battery Test



Use In Vehicle Test to perform Battery Tests on in-vehicle single 12V batteries. A System Test with an optional Amp Clamp is also available.



**NOTE:** An In Vehicle Test test will always associate the in-vehicle battery with the Vehicle ID of the vehicle in which it is installed.

At any time during the test tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.

### Battery Test

1. Connect the Tester Pod test clamps to the battery and remove the Controller.



**NOTE:** For any reoccurring issues with the Controller connecting to the Tester Pod, and the Tester Pod is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. On the Controller at the Main Menu tap **Single Battery Test**. The Vehicle ID screen is displayed.
3. **Vehicle ID:** Use the on-screen keypad to manually type the Vehicle ID number and tap **Next**.

The displayed digit counter will count up the alphanumeric characters as they are being entered on the keypad.

Use Manual Entry if the battery being tested is not listed. Tap > to continue to the Edit Battery Information screen.

4. The Edit Battery Information screen displays vehicle and battery information.

If the displayed information is correct, tap **Next** to begin the Battery Test. Tap on the corresponding box to edit the parameter information.



**NOTE:** If no Reserve Capacity/Amp Hours value is entered, the analyzer will use the average RC rating for a flooded Group 31 battery (180 minutes).

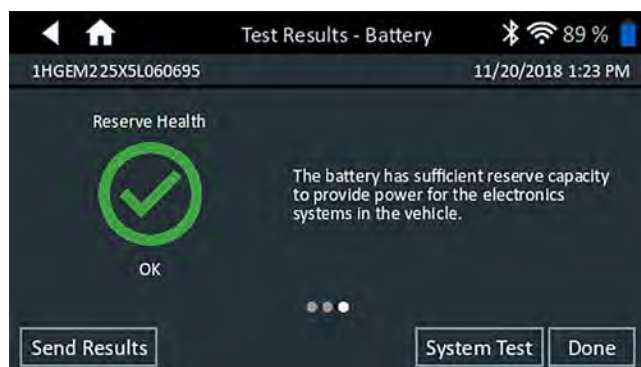


**NOTE:** See Appendix B for test parameter descriptions..

5. Align the temperature sensor on the Controller over the battery and tap **Capture**. The test begins when the temperature is successfully captured.

## Battery Test Results

The test results are displayed on the Controller screen.



**NOTE:** See Appendix A for possible test result descriptions.

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

## System Test

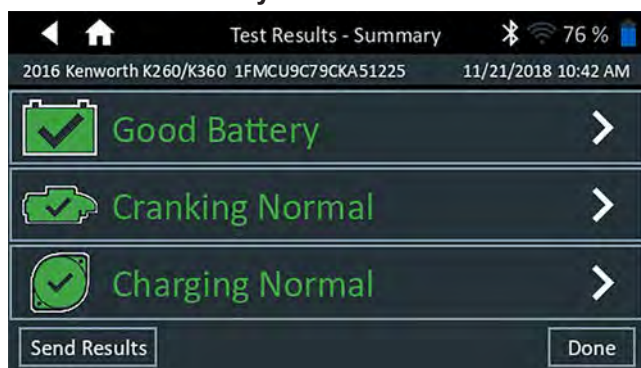
1. If available, connect the optional Amp Clamp to the Tester Pod and hold the clamp away from any cables with the jaws closed.



**NOTE:** If the Amp Clamp is not being used, begin the System Test at Step 4.

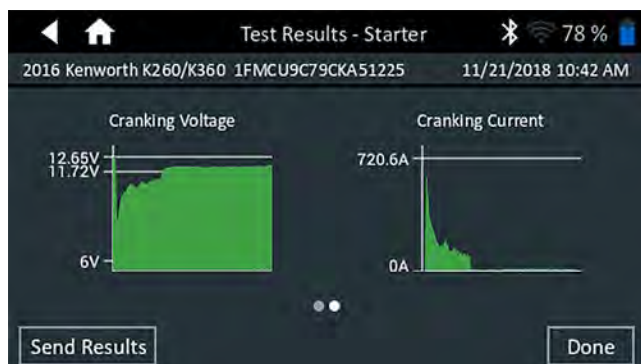
2. Tap **Next** to zero out the clamp or **Skip** if the Amp Clamp is not being used.
3. With the engine and electrical loads off, place the Amp Clamp around the negative (–) battery cable and tap **Next**.
4. Start the engine and let it idle.
5. Turn off all accessory loads such as the headlight high beams and ventilation blower fan.
6. Tap **Next**. The analyzer tests the alternator output.
7. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
8. Tap **Next**.
9. When prompted Idle the engine.
10. Turn on the high beam headlights and ventilation blower motor.
11. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
12. Tap **Next**.
13. Turn off the high beam headlights and ventilation blower motor.
14. Return the engine to idle, then shut it off.
15. Tap **Next** to display the test results.

### Test Results-Summary

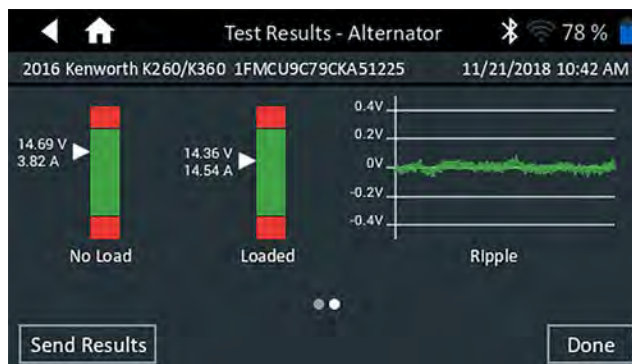
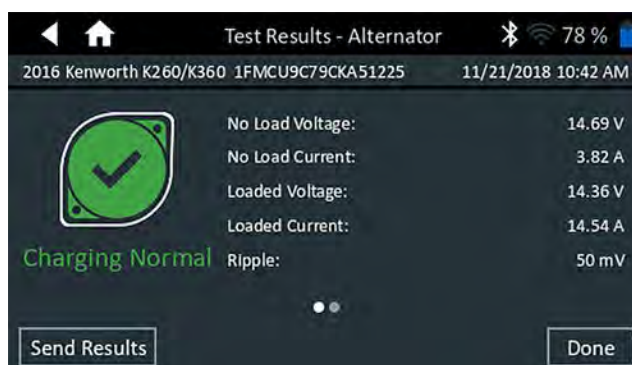


A Test Results - Summary screen is displayed following a System Test. Tap > to view detailed test results for each part of the test.

### Starter Test Results



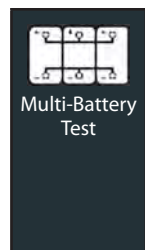
### Alternator Test Results



**NOTE:** See Appendix A for possible test result descriptions.

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

## Chapter 3: Multi-Battery Test



Use Multi-Battery Test to assess battery pack State Of Health and deliverable current potential. If the analyzer determines the pack has a low State Of Charge, each battery in the pack can be tested individually or skipped.

A System Test with an optional Amp Clamp is also available.



**NOTE:** A Multi-Battery Test will always associate the in-vehicle battery pack with the Vehicle ID of the vehicle in which it is installed.

At any time during the test tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.



**IMPORTANT:** For accurate testing, split battery packs must be electrically isolated to a maximum of four batteries per pack.

### Battery Test

1. Connect the Tester Pod test clamps to the battery and remove the Controller.



**NOTE:** For any reoccurring issues with the Controller connecting to the Tester Pod, and the Tester Pod is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. On the Controller at the Main Menu tap **Multi-Battery Test**. The Acquire Vehicle ID screen is displayed.
3. **Vehicle ID:** Use the on-screen keypad to manually type the Vehicle ID number and tap **Next**.



The displayed digit counter will count up the alphanumeric characters as they are being entered on the keypad.

Use Manual Entry if the battery being tested is not listed. Tap > to continue to the Edit Battery Information screen.

4. The Edit Battery Information screen displays vehicle and battery information based on the Vehicle ID. If the displayed information is correct, tap **Continue** to begin the Battery Test. Tap on the corresponding box to edit the parameter information.



**NOTE:** If no Reserve Capacity/Amp Hours value is entered, the analyzer will use the average RC rating for a flooded Group 31 battery (180 minutes).

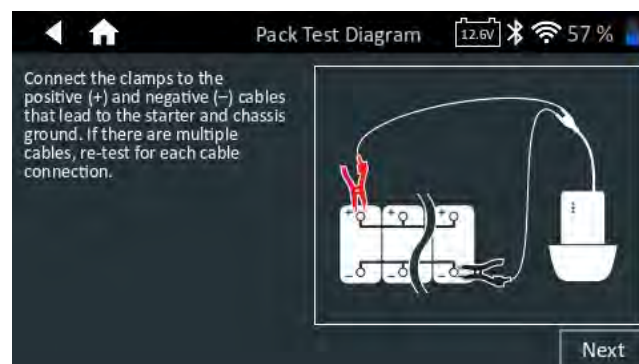


**NOTE:** See Appendix B manual for test parameter descriptions.



**NOTE:** Tap **Reset** to clear additional parameters manually entered into the Edit Battery Info screen.

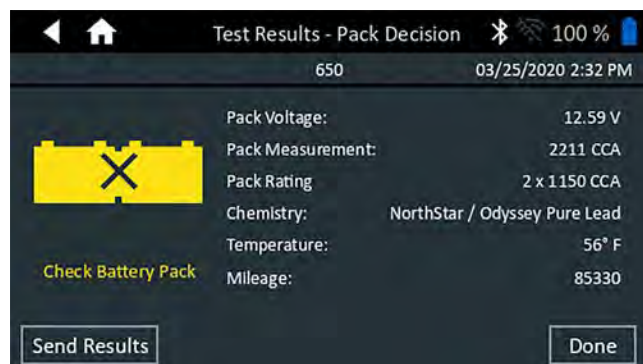
5. Connect the clamps to the positive (+) and negative (-) cables that lead to the starter and chassis ground. If there are multiple cables, re-test for each cable connection.



6. Tap **OK** to continue.
7. Align the temperature sensor on the Controller over the battery and tap **Capture**. The test begins when the temperature is successfully captured.

## Battery Test Results

The test results are displayed on the Controller screen.



**NOTE:** See Appendix A for possible test result descriptions.

1. Tap **Send Results** to print, email, or send the test results to a configured printer. To return to the Home Screen, tap **Done** or **Next** to continue.
2. For a Check Battery Pack result, the option is given to break the pack and test each battery individually. When testing individual batteries, the tester uses the parameters from the Multi-Battery Test and prompts the user through the steps of disconnecting the pack, testing each battery, and reconnecting.

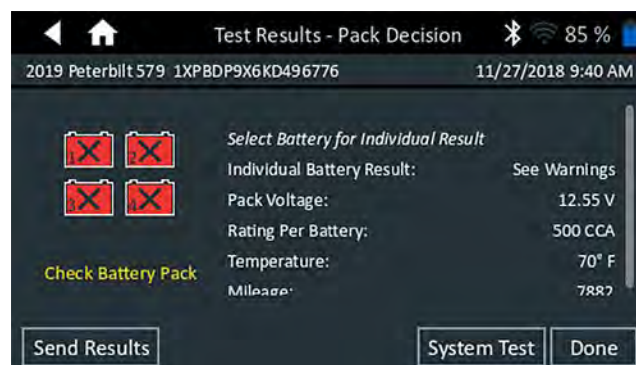


### Break Pack

1. Disconnect all the batteries in the pack and tap **Next**.
2. Connect the clamps from the Tester Pod to the first battery in the pack.
3. Tap **OK** to test the battery.
4. Repeat the process until all of the batteries in the pack have been tested.



5. After the last battery in the pack has been tested, the results of the individual battery tests are displayed.



6. Tap the individual battery icons to view the specific result for each battery.



7. Tap **Send Results** to print, email, or send the test results to a configured printer. To return to the Home Screen, tap **Done** or reconnect the pack and tap **System Test** to continue.

### System Test

1. If available, connect the optional Amp Clamp to the Tester Pod and hold the clamp away from any cables with the jaws closed.

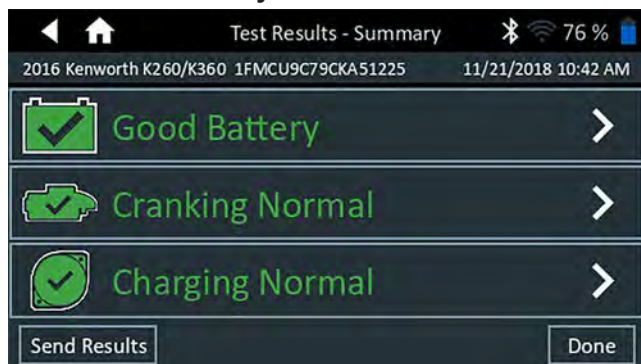


**NOTE:** If the Amp Clamp is not being used, begin the System Test at Step 4.

2. Tap **Next** to zero out the clamp or **Skip** if the Amp Clamp is not being used.
3. With the engine and electrical loads off, place the Amp Clamp around the negative (-) battery pack cable and tap **Next**.
4. Start the engine and let it idle.
5. Turn off all accessory loads such as the headlight high beams and ventilation blower fan.
6. Tap **Next**. The analyzer tests the alternator output.
7. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
8. Tap **Next**.

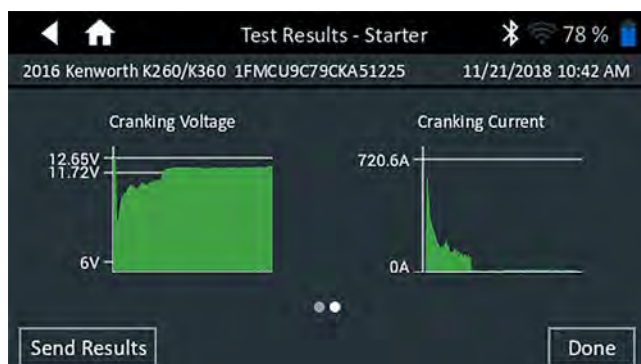
9. When prompted Idle the engine.
10. Turn on the high beam headlights and ventilation blower motor.
11. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
12. Tap **Next**.
13. Turn off the high beam headlights and ventilation blower motor.
14. Return the engine to idle, then shut it off.
15. Tap **Next** to display the test results.

### Test Results-Summary

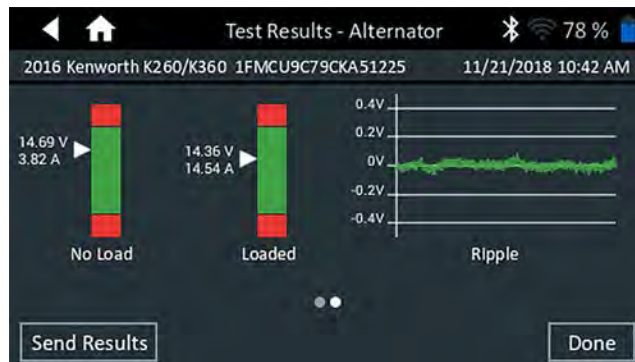
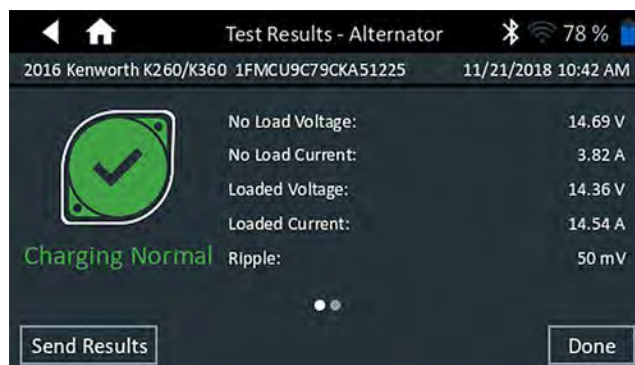


A Test Results-Summary screen is displayed following a System Test. Tap > to view detailed test results for each part of the test.

### Starter Test Results



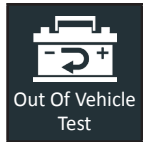
### Alternator Test Results



**NOTE:** See Appendix A for possible test result descriptions.

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

## Chapter 4: Out Of Vehicle Test



Use Out Of Vehicle Test to test and verify the condition of customer batteries that are out-of-vehicle for possible return and/or warranty claim.

At any time during the test tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.

1. Connect the Tester Pod test clamps to the battery.



**NOTE:** For any reoccurring issues with the Controller connecting to the Tester Pod, and the Tester Pod is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. At the Main Menu, tap **Out Of Vehicle Test**. The Edit Battery Information screen is displayed.

3. Enter the correct battery information for each field.



**NOTE:** See Appendix B for test parameter descriptions.

4. Align the temperature sensor on the Controller over the battery and tap **Capture**. The test begins when the temperature is successfully captured.

### Battery Test Results

The test results are displayed on the Controller screen.



**NOTE:** See Appendix A for possible test result descriptions.

To send the test results to a configured printer tap **Send Results**. Tap **Done** or 🏠 to return to the Main Menu.

## Chapter 5: RP129 Test



Tests each individual battery in a battery pack and cable drop voltage. Amperage between the alternator, starter and battery pack during a starting and charging system test is also measured.



**NOTE:** A RP129 Test will always associate the in-vehicle battery pack with the Vehicle ID of the vehicle in which it is installed.

At any time during the test tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.



**IMPORTANT:** For accurate testing, split battery packs must be electrically isolated to a maximum of four batteries per pack.



**IMPORTANT:** Any batteries in the pack that are below 12.4 volts must be charged before the RP129 test can be performed

### Battery Pack Test

1. Connect the Tester Pod test clamps to the battery and remove the Controller.



**NOTE:** For issues with the Controller connecting to the Tester Pod, when it is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. On the Controller at the Main Menu tap **RP129 Test**. The RP129 Starter/Controller screen is displayed.



3. **Vehicle ID:** Use the on-screen keypad to manually type the Vehicle ID number and tap **Next**.



The displayed digit counter will count up the alphanumeric characters as they are being entered on the keypad.

Use Manual Entry if the battery being tested is not listed. Tap > to continue to the Edit Battery Information screen.

4. The Edit Battery Information screen displays vehicle and battery information. If the displayed information is correct, tap **Continue** to begin the Battery Test. Tap on the corresponding box to edit the parameter information.



**NOTE:** If no Reserve Capacity/Amp Hours value is entered, the analyzer will use the average RC rating for a flooded Group 31 battery (180 minutes).

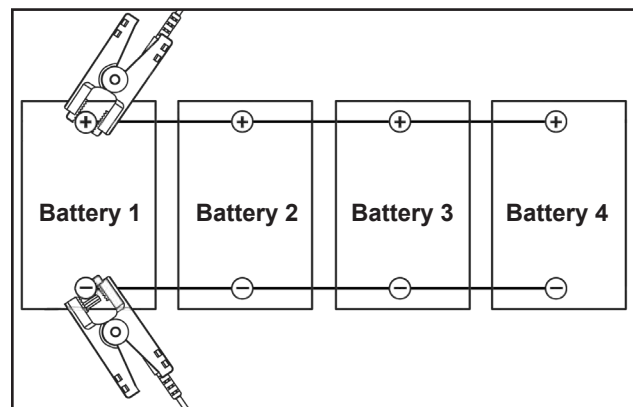


**NOTE:** See Appendix B for test parameter descriptions.

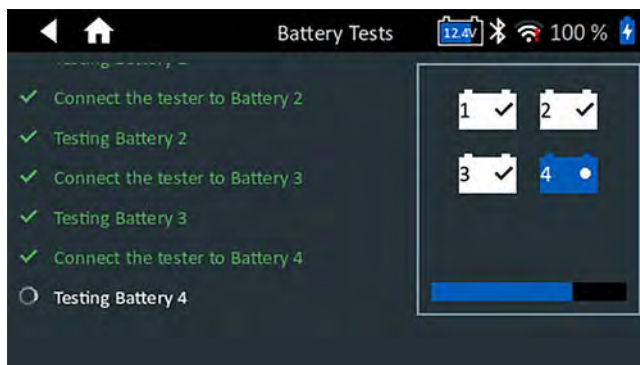


**NOTE:** Tap **Reset** to clear additional parameters manually entered into the Edit Battery Info screen.

5. Connect the clamps from the Tester Pod to the first battery in the pack.
6. Align the temperature sensor on the Controller over the battery and tap **Capture**. The test begins when the temperature is successfully captured.
7. Tap **OK** to test the battery.
8. Repeat Steps 5-7 for each individual battery.



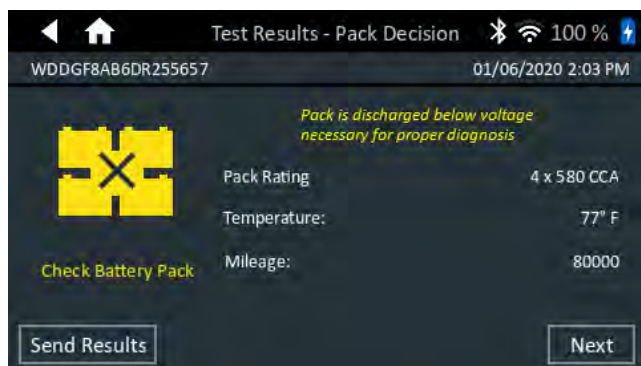
- Repeat the testing process until all batteries in the pack have been tested.
- Repeat the process for each battery in the pack. As each battery is tested, the numbered icons on the Tablet Controller will display white and display a checkmark.



After the last battery in the pack has been tested, the results of the individual battery tests are displayed.

### Check Battery Pack

Following a Check Battery Pack decision, the option is given to break the pack apart and test each individual battery.

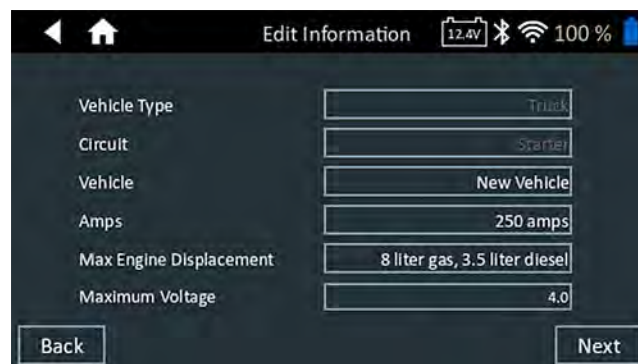


**NOTE:** If the message "Pack is discharged below voltage necessary for proper diagnosis" is displayed, the pack voltage is below 12.4 V and the RP129 test is aborted. Break the pack and individually test or charge each battery before retesting.

Follow the on-screen prompts when breaking the pack and testing each individual battery.

Tap **Next** following each step.

- Disconnect all of the batteries in the battery pack.
- Connect the clamps to the first battery in the pack.
- Once the test on the first battery is complete, remove the clamps and connect them to the second battery.



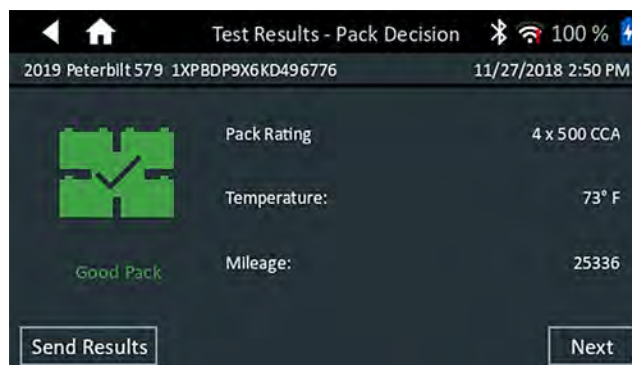
Test results are displayed when all of the batteries in the pack have been individually tested.

- Tap a numbered battery icon on the screen to see the specific results for that battery.

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

### Battery Test Results

The test results are displayed on the Controller screen.



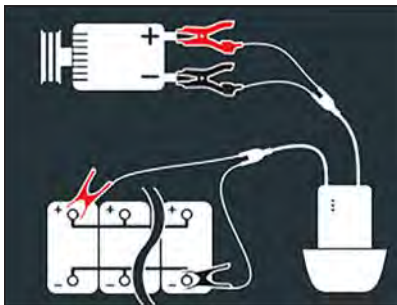
**NOTE:** See Appendix A for possible test result descriptions.

- Tap **Send Results** to print or send the test results to a configured printer or **Next** to continue.
- Edit the displayed vehicle information and tap **Next**.

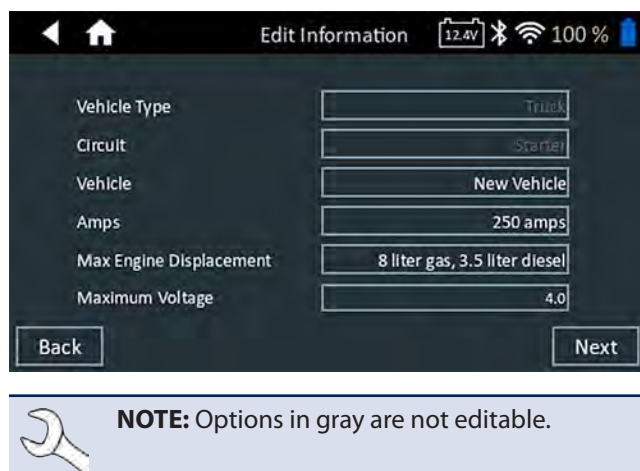


3. Connect the positive (+) main clamp from the Tester Pod to the alternator output stud (B+) and the negative (-) clamp to the alternator ground.

Connect the positive (+) DMM clamp from the Tester Pod to the positive battery terminal and the negative (-) DMM clamp to the negative battery terminal.



4. Edit the displayed vehicle information and tap **Next** to begin the System Test.

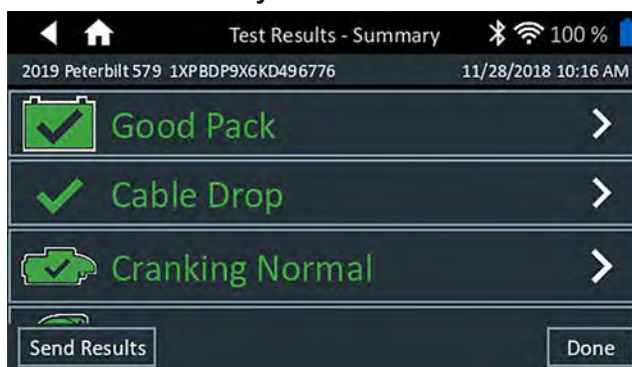


### System Test

1. Start the engine and let it idle.
2. Turn off all accessory loads such as the headlight high beams and ventilation blower fan.
3. Tap **Next**. The analyzer tests the alternator output.
4. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.

5. Tap **Next**.
6. When prompted Idle the engine.
7. Turn on the high beam headlights and ventilation blower motor.
8. When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
9. Tap **Next**.
10. Turn off the high beam headlights and ventilation blower motor.
11. Return the engine to idle, then shut it off.
12. Tap **Next** to display the test results.

### Test Results-Summary

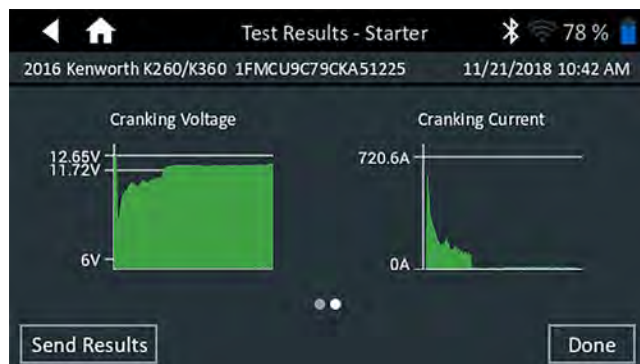


A Test Results-Summary screen is displayed following a System Test. Tap > to view detailed test results for each part of the test.

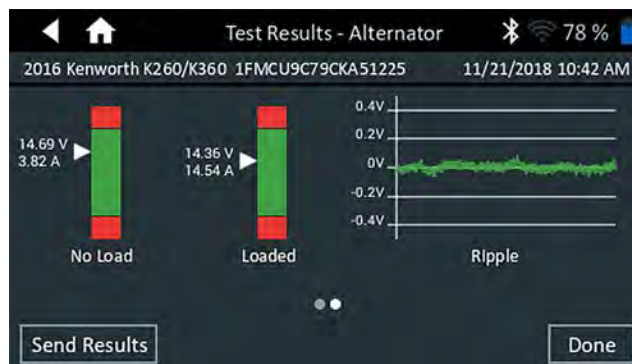
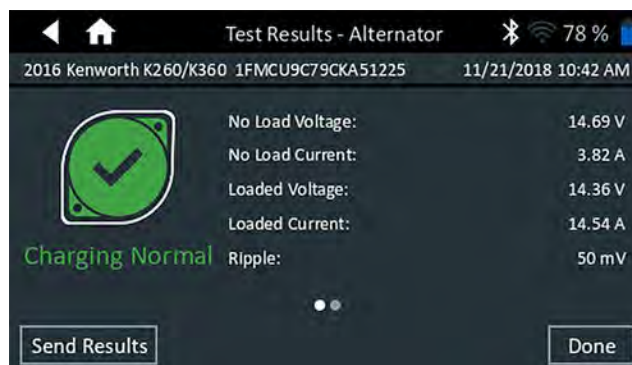
### Cable Drop Test Result



## Starter Test Results



## Alternator Test Results



**NOTE:** See Appendix A for possible test result descriptions.

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



**NOTE:** For any reoccurring printing issues, and the Tester Pod is connected to a <9.5V battery, replace the 6 AA batteries in the Tester Pod.

## Chapter 6: Cable Drop



Use Cable Drop test to determine if there are worn cables or bad connections between the battery and the alternator or starter.

At any time during the test tap ◀ to return to the previous screen

Worn cables and bad connections create resistance, causing a voltage drop across the circuit. This drop reduces current carrying capability, creating the same symptoms as a weak alternator or starter, as well as causing premature battery failure.

A signal is sent through the circuit to the component under test. The voltage drop on both sides of the circuit as well as the total voltage drop are simultaneously calculated.

1. Connect the Tester Pod battery test leads at the component's output lead (the B+ or output screw on the alternator) and the component's housing as ground.

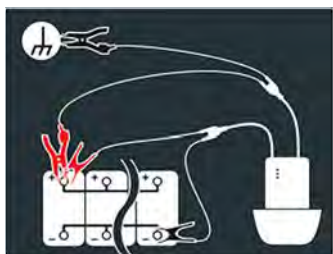


**NOTE:** For any reoccurring issues with the Controller connecting to the Tester Pod, and the Tester Pod is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. Connect the DMM test leads at the battery terminals.



**IMPORTANT:** Make sure all of the clamps are making good connections and are not connected to any painted or otherwise coated surfaces..



**NOTE:** The test requires a complete circuit. If you are testing a system with a remote solenoid, you can test from the battery to the solenoid, but not from the battery to the starter.



**IMPORTANT:** For accurate results the battery should be good and fully charged before you test..

3. Edit the vehicle information.

Vehicle Type	Truck
Circuit	Chassis
Amps	135
Maximum Voltage	0.5

Buttons: Back, Next

Vehicle Type	Truck, Auto/Van
Circuit	Chassis, Starter, Alternator, Other
Amps	Recommended Range: 100 to 500A
Maximum Voltage	Default values based on RP129 Figure 8. Maximum voltage can be edited.

4. Tap **Next** to begin the test.

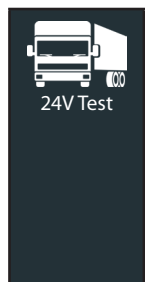
### Cable Drop Test Results

Vehicle Type	Truck
Circuit	Chassis
Amps	135 Amps
Circuit Drop	.04 V
Decision	Pass
+ Drop	.03 V
- Drop	.01 V

Buttons: Send Results, Done

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

## Chapter 7: 24 Volt Test



Use 24 Volt Test to assess battery pack State Of Health and deliverable current potential in applications using two 12 volt batteries connected in series.

If the analyzer determines the pack has a low State Of Charge, each battery in the pack can be tested individually or skipped. A System Test with an optional Amp Clamp is also available.



**NOTE:** A 24V Test will always associate the in-vehicle battery with the Vehicle ID of the vehicle in which it is installed.

At any time during the test tap ◀ to return to the previous screen or 🏠 to return to the Main Menu.

### 24V Battery Test

1. Connect the Tester Pod test clamps to the first battery and remove the Controller.



**NOTE:** For any reoccurring issues with the Controller connecting to the Tester Pod, and the Tester Pod is connected to a <9.5V battery, replace the Pod's 6 AA batteries.

2. On the Controller at the Main Menu tap **24 Volt Test**. The Acquire Vehicle ID screen is displayed.
3. **Vehicle ID:** Use the on-screen keypad to manually type the Vehicle ID number and tap **Next**.

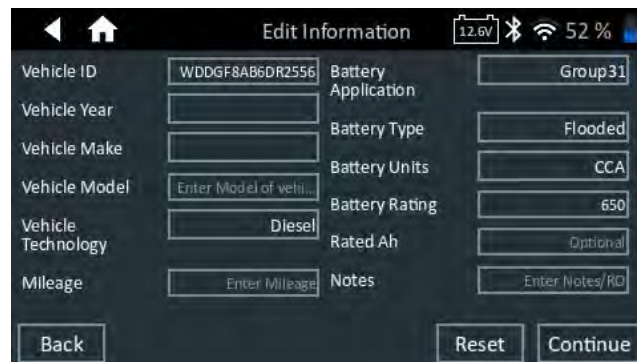


The displayed digit counter will count up the alphanumeric characters as they are being entered on the keypad.

Use Manual Entry if the battery being tested is not listed. Tap > to continue to the Edit Battery Information screen.

4. The Edit Battery Information screen displays vehicle and battery information based on the VIN.

If the displayed information is correct, tap **Continue** to begin the Battery Test. Tap on the corresponding box to edit the parameter information.



**NOTE:** If no Reserve Capacity/Amp Hours value is entered, the analyzer will use the average RC rating for a flooded Group 31 battery (180 minutes).

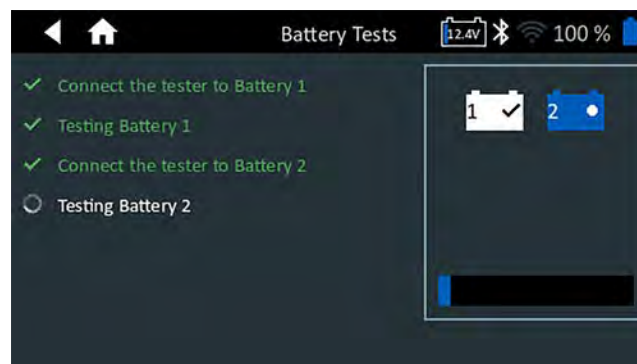


**NOTE:** See Appendix B for test parameter descriptions.

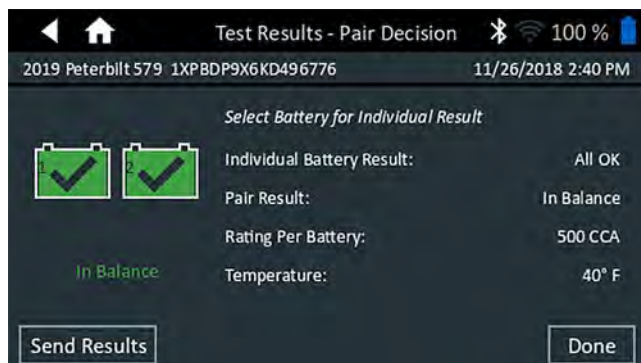


**NOTE:** Tap **Reset** to clear additional parameters manually entered into the Edit Battery Info screen.

5. Connect the clamps from the Tester Pod to the first battery in the pack.
6. Tap **OK**.
7. Align the temperature sensor on the Controller over the battery and tap **Capture**. The test begins when the temperature is successfully captured.
8. Repeat until both batteries in the pack have been tested.



- After the last battery in the pack has been tested, the results of the individual battery tests are displayed.



- Tap the individual battery icons to view the specific result for each battery.



**NOTE:** See Appendix A for possible test result descriptions.

- Tap **Send Results** to print or send the test results to a configured printer. To return to the Home Screen, tap **Done** or reconnect the pack and tap **System Test** to continue.

## System Test

- If available, connect the optional Amp Clamp to the Tester Pod and hold the clamp away from any cables with the jaws closed.



**NOTE:** If the Amp Clamp is not being used, begin the System Test at Step 4.

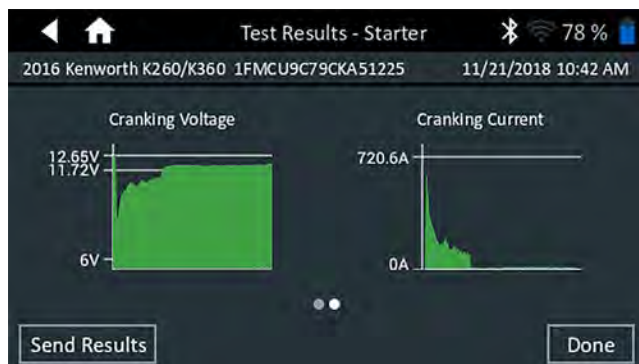
- Tap **Next** to zero out the clamp or **Skip** if the Amp Clamp is not being used.
- With the engine and electrical loads off, place the Amp Clamp around the negative (-) battery pack cable and tap **Next**.
- Start the engine and let it idle.
- Turn off all accessory loads such as the headlight high beams and ventilation blower fan.
- Tap **Next**. The analyzer tests the alternator output.
- Turn on the high beam headlights and ventilation blower motor.
- When prompted, rev the engine to between 1000 to 1250 rpm and hold it there while the analyzer tests the alternator output again.
- Tap **Next**.
- Turn off the high beam headlights and ventilation blower motor.
- Return the engine to idle, then shut it off.
- Tap **Next** to display the test results.

## Test Results-Summary

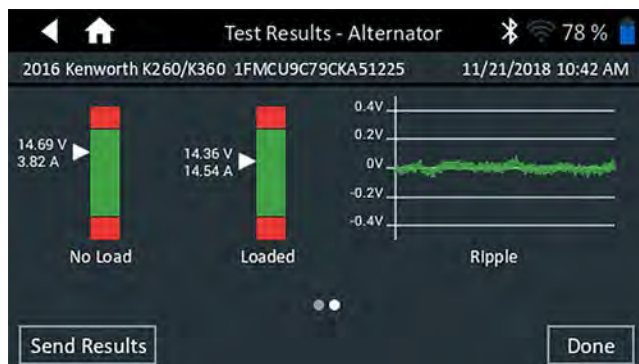
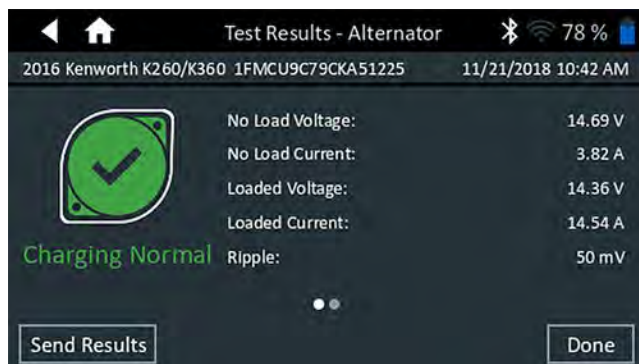


A Test Results-Summary screen is displayed following a System Test. Tap > to view detailed test results for each part of the test.

## Starter Test Results



## Alternator Test Results



**NOTE:** See Appendix A for possible test result descriptions.

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

## Chapter 8: Digital Multimeter



Use this function to troubleshoot low voltage electrical circuits in a car or truck. Electrical specifications for each function are listed at the table at the end of this chapter.

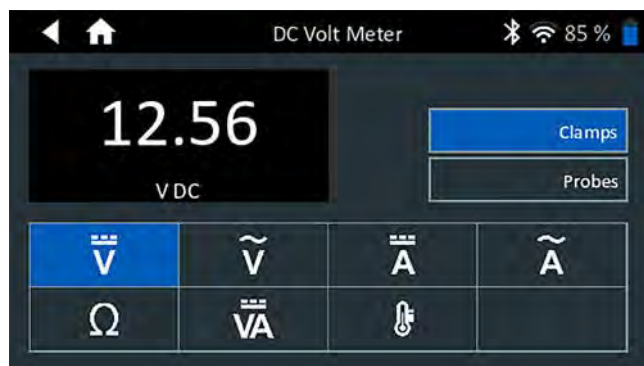
A measurement that is out of the limit displays as OL. Refer to the manufacturer specifications for the correct limits, which may vary by component or vehicle type.

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

### DC Volt Meter



The DC voltmeter measures voltage between two points in a circuit. The voltmeter is connected in parallel with the circuit.



1. Connect the DMM test lead to the accessories port on the Diagnostic Device.
2. Connect the clamps or probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
3. Tap DC Voltmeter.
4. The meter autoranges and displays the measurement.
5. Tap Back to return to the Digital Multimeter screen.

### AC Voltmeter



The AC voltmeter measures voltage between two points in a circuit. The voltmeter is connected in parallel with the circuit.



1. Connect the DMM test lead to the accessories port on the Diagnostic Device.
2. Connect the clamps or probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
3. Tap AC Voltmeter.
4. The meter autoranges and displays the measurement.
5. Tap Back to return to the Digital Multimeter screen.

### DC Ammeter



The DC Amp function measures DC magnitude and flow of the DC current in a circuit.



1. Connect the Amp Clamp lead to the accessories port on the Diagnostic Device.
2. Tap DC Ammeter.
3. Select the Amp Clamp range.
4. Follow the on screen directions to zero the Amp Clamp.
5. Place the clamp's jaws around the negative (-) cable.
6. The tester displays the measurement.
7. Tap Back to return to the Digital Multimeter screen.

## AC Ammeter



The AC Amp measures AC magnitude and flow of the AC current in a circuit.



1. Connect the Amp Clamp lead to the accessories port on the Diagnostic Device.
2. Tap AC Ammeter.
3. Select the Amp Clamp range.
4. Follow the on screen directions to zero the Amp Clamp.
5. Place the clamp's jaws around the negative (-) cable.
6. The tester displays the measurement.
7. Tap Back to return to the Digital Multimeter screen.

## Ohmmeter



The meter is connected in parallel with the circuit under test and uses the power supplied by the analyzer's internal batteries to detect open or excessive resistance.



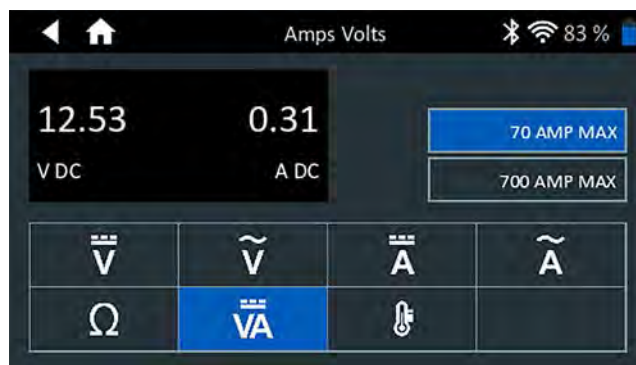
1. Connect the DMM test lead to the analyzer's accessories port.
2. Tap Ohmmeter.

3. Connect the clamps or probes in the correct polarity: red probe to positive (+); black to negative (-).
4. The meter will autorange and display the measurement.
5. When finished, press **END**.
6. Tap Back to return to the Digital Multimeter screen.

## Amps Volts



The Volts/Amp meter simultaneously measures charging voltage and charging current.

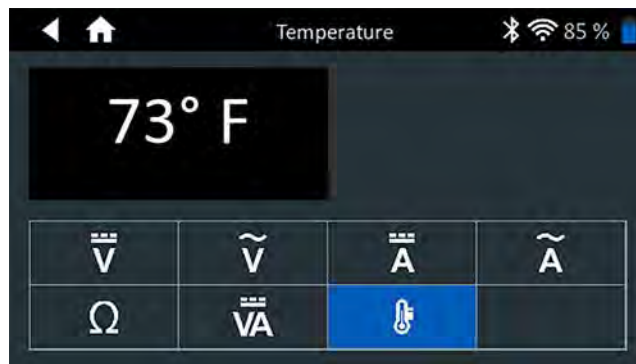


1. Connect the Amp Clamp lead to the analyzer's accessories port.
2. Tap Amps Volts.
3. Select the Amp Clamp range.
4. Follow the on screen directions to zero the Amp Clamp.
5. Place the clamp's jaws around the negative (-) cable.
6. The tester displays the measurement.
7. Tap Back to return to the Digital Multimeter screen.

## Temperature



The IR temperature sensor measures the ambient surface temperature within a range of -20 to 200 °F. The tool can be used for checking the transmission for overheating, and the temperature levels of the heater and air conditioner.



**Meter Specifications**

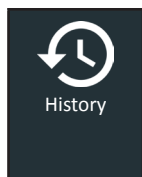
Meter	Range	Resolution	Accuracy
Vdc	0 V–30 V	0.01 V	± 1% of reading + 0.05V
Vac	0 V–20 Vac	0.01 V	± 1% of reading + 0.05V
Adc Low	0 mA–70 A	0.01 A	± 2% of reading ± 0.1A
Adc High	0 A–700 A	0.1 A	± 2% of reading ± 0.1A
Aac Low	0 A–20 A	0.01 A	± 2.5% of reading ± 0.1A
Aac High	0 A–200 A	0.1A	± 2.5% of reading ± 0.1A

Accuracies are specified from 2% to 100% of range.

Meter	Range	Resolution	Accuracy
Ohm	0Ω–1MΩ	1Ω	± 3.5% of reading ± 1Ω
Temperature	-30°C to 70°C	1°C	± 1°C

**Accuracy specification defined as  
± (n% reading + [count \* resolution]) at 77 °F.**

## Chapter 9: History



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

At the Main Menu, tap **History**. By default the Tool History screen is displayed.



	Tool History		User History
	Vehicle History		Totals

### Tool History



Use Tool History to view test total history as well as in vehicle and out of vehicle test totals. Individual test results are also displayed.

Tap > to view individual test details. Tap  $\Sigma$  to view Total By Test Decision, Total By Test Type, and Total By Date And Location. Tap **Done** to return to the Tool History screen.

#### Totals By Test Decision

The totals are displayed by possible results for all battery chemistries and potential test results.

Good Battery	Charge & Retest
Good Recharge	Replace Battery
Aborted	

#### Totals By Test Type

Displays test totals by test type.

RP129 Test	24 Volt Test
Multi-Battery Test	Out of Vehicle Test
Cable Drop	

#### Totals By Date And Location

Displays test totals by time interval. Also displays the number of tests performed in and out of vehicle.

Last 7 Days	In Vehicle
Last 30 Days	Out Vehicle
Last 90 Days	

### Vehicle History



Vehicle History displays test totals conducted on specific vehicles based on Vehicle ID. It is also possible to enter a Vehicle ID to search for test records for a specific vehicle by tapping the displayed buttons.

Tap on the records displayed on the right side of the screen to view the individual test results.

#### Vehicle Select Option

Tap Q to select vehicle search option.

**Manual Vehicle ID Lookup:** Use the on-screen keypad to manually type the Vehicle ID and tap **Next**.

**Search:** Search records by Vehicle Year, Make, and Model.

### User History



User History displays test totals for the user that is currently logged in to the analyzer.

Tap > to view individual test details.

Tap  $\Sigma$  to view Total By Test Decision, Total By Test Type, and Total By Date And Location.

#### Totals By Test Decision

The totals are displayed by possible results for all battery chemistries and potential test results.

Good Battery	Charge & Retest
Good Recharge	Replace Battery
Aborted	

#### Totals By Test Type

Displays test totals by test type.

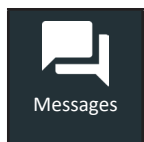
Cable Drop	Multi-Battery Test
RP129 Test	

#### Totals By Date And Location

Displays test totals by time interval. Also displays the number of tests performed in and out of vehicle.

Last 7 Days	In Vehicle
Last 30 Days	Out Vehicle
Last 90 Days	

## Chapter 10: 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.



Mark Read Or Unread



Delete Notification



Perform Message Action

Tap ◀ 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 analyzer has received any critical messages. The number does not include non-critical Notifications.

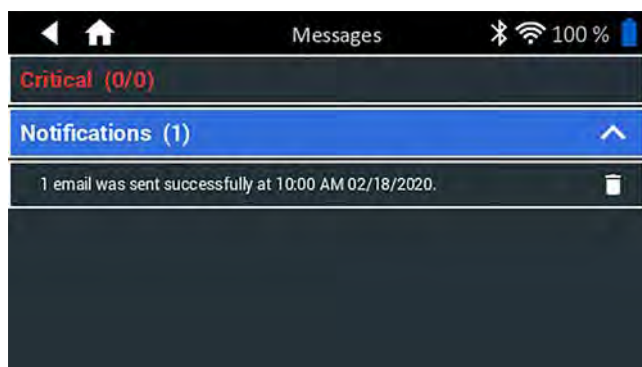


Unread Critical Messages



Read Critical 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 v 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.

## Chapter 11: Settings



Settings

Use the Setup options to setup and adjust WiFi, printer setup and selection, email settings, user information, default language, display settings, sound settings, BMIS login information, shop information, user management, connected accessories, and device information.

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

### WiFi



Use WiFi to view, add, and delete wireless networks.

Tap on the WiFi icon to display a list of detected and configured WiFi networks. A + indicates the selected network



Add Network



Delete Selected Network



Connect Highlighted Network



Refresh Network List

### Adding A Network

1. Tap + to add a WiFi network.  
A list of detected wireless networks is displayed.
2. Tap > to access the network Security and IP Settings.

Security	None WEP WPA/WPA2 PSK
IP Address	DHCP Static

3. Tap ⌂ to configure the selected network.
4. Once the network has been successfully configured, tap ⌂ to return to the list of available configured networks. A + indicates the selected network.

### Deleting A Network

1. Tap a displayed network.
2. Tap 🗑 to delete the network and tap Yes to confirm.

### Printer Settings



The Printer Setup function detects and displays a list of connected and available WiFi and Bluetooth printers.



**NOTE:** WiFi network communication must be successfully established before a printer or printers can be detected and setup.

Tap on the Printer icon to display a list of available printers on the configured WiFi and Bluetooth networks.



Edit Printer Settings



Printer Setup



Delete Selected Network



Configured Printers



Print Test Page

### Adding A WiFi Printer (Admin Only)

1. Tap ⚙ to access the Printer Setup functions.
2. Tap + to add a WiFi printer.

Make sure the printer is on and connected to the same wireless network as the analyzer.

3. Tap ⌂ to add the printer to the list of eligible printers.
4. Tap > to connect to the selected printer. A message is displayed when the configuration is successful.
5. Tap > to return to the printer list.

### Adding A Bluetooth Printer (Admin Only)

1. Tap the + sign to add a Bluetooth printer.
2. Make sure the printer(s) is on.
3. Tap ⌂ to add the printer to the list of eligible printers.
4. Tap > to connect to the selected printer.
5. When prompted, enter the device PIN and tap ⌂ . A message is displayed when the pairing is successful.
6. Tap > to return to the printer list.

### Deleting A Printer (Admin Only)

1. Tap ⚙ to access the Printer Setup functions.
2. Tap a displayed printer.
3. Tap 🗑 to delete the printer and tap Yes to confirm.

**Email**

Displays all entered email addresses. Addresses can be added, edited, and deleted (Admin Only). Entered email accounts are added to the email address book. Frequently used email addresses can be selected from the displayed address list rather than being re-typed each time.



Add Address



Server Settings



Edit Address



Address Book




Delete Selected Address




Send Test Email


**Add Address (Admin Only)**

1. Tap  to add an email address.
2. Use the displayed keypad to enter the contact name and email address.
3. Tap Add to add the address to the email list or Cancel to exit and return to the email list.

**Edit Address (Admin Only)**





1. Select a displayed email address by tapping it.
2. Tap  to edit the address.
3. Use the displayed keypad to edit the contact name and email address.
4. Tap Add to add the address to the email list or Cancel to exit and return to the email list.

**Deleting An Address (Admin Only)**

1. Select the email address by tapping it.
2. Tap  to delete the address and tap Yes to confirm or Cancel to exit and return to the email list.

**Server Settings**

Enter and edit the email settings for sending outgoing email.

1. Tap  to access the email sever settings.
2. Tap  to enter or modify existing server settings including Host, Port, Login, Password, SMTP Authorization, Enable TLS, and From Email Address information.
3. Tap  to clear all server settings.
4. Tap  to return to the email Address Book.

**User Settings (Admin Only)**

Modify Usernames and Passwords.



Edit Users



Delete Users







User Settings



User Management

**User Management (Admin Only)**

1. Tap  to access User Management functions.
1. Tap  to display the current logged in Admin user.
2. Select a displayed user by tapping it.
3. Tap  to edit the Username, Password, and User Type (Standard or Admin).
4. Tap X when complete to return to the User Management screen.
5. Tap  to delete the selected user and Yes to confirm.

**Language Settings**

Use the Language & Input function to select the default system language used by the tool. User defaults also include Test Results, Email, and Print languages.

**System Language**

Select the default standard language for the Controller.

**Test Result Language**

Select the default language for all tests and results displayed on the Controller.

**Email Language**

Select the default standard language for all tests and results sent via email.

**Print Language**

Select the default standard language for all tests and results printed using a networked printer.

## Display



Adjust the Controller display including the Brightness, Sleep Time, and Dim Time. Auto Brightness can also be turned on and off.

### Brightness

Adjust the display Brightness by tapping and holding the slider, then moving it right or left to make the screen brighter or darker.

### Auto Brightness

Enable and disable Auto Brightness by taping on the check box.

### Sleep Time

Adjust the amount of elapsed time before the Controller goes into a power saving (Sleep) mode. Default = 2 minutes.

### Dim Time

Adjust the amount of elapsed time before the Controller goes into a power saving (Dim) mode. Default = 1 minute.

## BMIS Login (Admin Only)



Enter and edit BMIS Login and Password information. Log into a BMIS account.

Login

Zone3@yourshop.com

Password

.....

## Shop Information (Admin Only)



Access default Shop Information including Store Name, address, and phone number. Also access battery test defaults including rating, temperature units, and decimal separator. Use also to adjust the tester date and time settings.



Settings Home



Date/Time Settings



Test Settings



Create MDCA Log File

## Shop Information

Use the on screen keypad to enter the store name, address, and phone number.

Store Name	Midtronics
Street Address	7000 Monroe
Street Address 2	
City	Willowbrook
State	IL
Zipcode	60527
Phone #	1-630-323-2800

## Test Settings

1. Tap to access the test setting defaults. Tap the boxes or icons to change the values.

Battery Rating	CCA
Temperature Units	° F
Decimal Separator	00.00
Create MDCA Log File	

### Battery Rating

Default battery rating units used when testing batteries.

### Temperature Units

Default temperature units used when measuring battery temperature.

### Decimal Separator

Default number display using commas or periods separators.

### Create MDCA Log File

The MDCA function is used by Midtronics technical support.

2. Tap to return to the Shop Information screen.

## Date/Time Settings

1. Tap to access the Date/Time setting defaults.

Select Time Format	12 Hour
Select Date Format	10/18/2016
Select Time Zone	EST
Set Date	
Set Time	

### Select Time Format

12 or 24 Hour Format

### Select Date Format

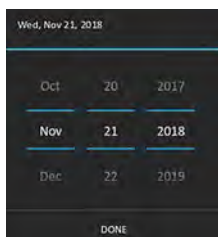
Month/Day/Year, Day/Month/Year, or Year/Day/Month

### Select Time Zone

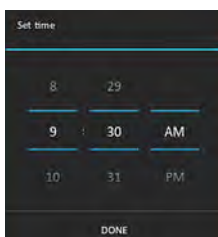
Time zone in which the analyzer will be operated.

**Set Date**

Tap ▲ or ▼ to enter the month, day, and year. Tap Set to save the date or Cancel to exit without saving.

**Set Time**

Tap ▲ or ▼ to enter the hours, minutes, and AM/PM. Tap Set to save the date or Cancel to exit without saving.



2. Tap 🏠 to return to the Shop Information screen.

**Device List**

Displays connected and linked accessory devices. Additional devices can also be detected and linked to the analyzer.



Add



Refresh



Delete Paired Device



Enabled



**NOTE:** For any reoccurring bluetooth pairing issues, replace the 6 AA batteries in the Tester Pod.

**Add Tester Pod**

1. Tap + to add a device.
2. Move the device to be linked within 30 feet of the Controller, turn on the device, then tap ⌂.
3. A list of detected devices is displayed. Tap > next to the desired device to select it. If the desired device is not displayed, tap ↻ to refresh the list.



**NOTE:** A passkey number is automatically generated once the Bluetooth pairing has been established.

A confirmation message is displayed when the device has been successfully linked.

4. Tap ⌂ to return to the Device List screen.

**Deleting A Diagnostic Base**

1. Tap 🗑️ next to the base to be deleted.
2. Tap Yes to delete.

**Version Information**

Use Version Information to display WiFi connection data, as well as DSS Controller and Diagnostic Device, software version information.



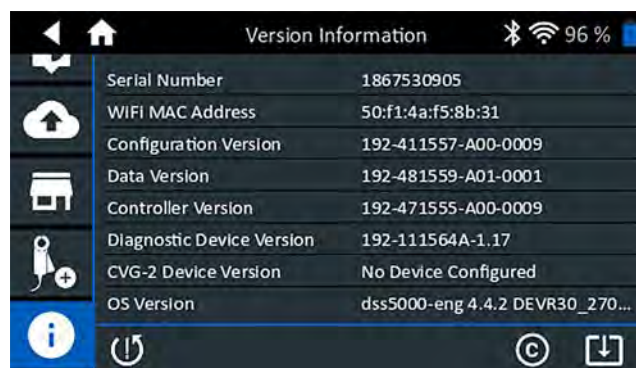
Factory Reset



Check For Updates



Legal Information

**Factory Preset**

Use this function to return the tool to the original as built configuration including all history and test settings.



**IMPORTANT:** All previous modifications to the original settings will be overwritten.

**Legal Information**

Displays software attribution information via the Midtronics website. The analyzer must be connected to the Internet.

**Check for Updates**

Use this function to check via the internet connection for any updates to the tester software.

## Appendix A: Test Result Descriptions

### Battery Test Results

Reserve Capacity	Conductance Result	Overall Result	State Of Health Message	Reserve Capacity Message
Good	Good	Good Battery	Battery meets or exceeds required standards. Test again in 90 days or at next service opportunity.	The battery has sufficient reserve capacity to provide power for the electronics systems in the vehicle.
Good	Good-Recharge	Good-Recharge	Battery is good, but low on charge. Fully charge the battery for optimal performance and life. Check for causes of low charge.	
Good	Charge & Retest	Charge & Retest	Battery requires charge to determine condition.	
Good	Replace Battery	Replace Battery	Battery fails to meet industry accepted standards.	
Good	Bad Cell-Short Replace	Bad Cell-Short Replace	Battery fails to meet industry accepted standards.	
Warning	Good	Replace Battery	Battery is good for cranking purpose but shows low reserve capacity. Low reserve capacity will compromise the battery's ability to provide system current and hold a charge.	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, such as console screen, entertainment systems, power seats, etc. Recommend replacing the battery.
Warning	Good-Recharge	Replace Battery	Battery is good for cranking purpose but shows low reserve capacity. Low reserve capacity will compromise the battery's ability to provide system current and hold a charge.	
Warning	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.	
Warning	Replace Battery	Replace Battery	Battery fails to meet industry accepted standards.	
Warning	Bad Cell-Short Replace	Replace Battery	Battery fails to meet industry accepted standards.	
No Test	Good	Good Battery	Battery meets or exceeds required standards. Test again in 90 days or 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.
No Test	Good-Recharge	Good-Recharge	Battery is good, but low on charge. Fully charge the battery for optimal performance and life. Check for causes of low charge.	
No Test	Charge & Retest	Charge & Retest	Battery requires charge to determine condition.	
No Test	Replace Battery	Replace Battery	Battery fails to meet industry accepted standards.	
No Test	Bad Cell-Short Replace	Bad Cell-Short Replace	Battery fails to meet industry accepted standards.	

**Pack Test**

Decision	Recommended Action
Good Pack	All of the batteries in the pack have tested good and the battery pack can be returned to service.
Check Battery Pack	One or more of the batteries in the battery pack need to be retested. Break the battery pack electrical connections and test each battery individually. Replace any failed batteries within the pack following standard company policy.

**System Test Results****Starter Test**

Decision	Action
Cranking Normal	The starter voltage is normal 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.
Low Voltage	The starter voltage is low and the battery is fully charged.
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****Test Results - Alternator**

Decision	Action
Charging Normal	The output from the alternator is normal.
No Output	<p>No output detected. Check belts to ensure alternator is rotating when engine is running.</p> <ul style="list-style-type: none"> <li>✓ Check all alternator connections including to the battery. Clean or replace if necessary and retest.</li> <li>✓ If the belts and connections are in good working condition, replace alternator or external voltage regulator.</li> </ul>
Low Output	<p>Alternator not providing enough current to power electrical loads and charge the battery.</p> <ul style="list-style-type: none"> <li>✓ Check belts to ensure the alternator is rotating with the engine running.</li> <li>✓ Check alternator connections to and from the battery. If loose or heavily corroded, clean or replace the cable and retest.</li> </ul>
High Output	<p>Alternator voltage to the battery exceeds normal limits of a functioning regulator.</p> <ul style="list-style-type: none"> <li>✓ Check for loose and normal ground connections. If no connection problems are found, replace the regulator.</li> </ul> <p>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.</p>

**Test Results - Diode**

Decision	Action
Excessive Ripple	<p>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.</p> <ul style="list-style-type: none"> <li>✓ 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.</li> </ul>
Open Phase	Replace the alternator.
Open Diode	
Shorted Diode	

## Appendix B: Test Parameters

<b>VIN</b>	A unique code, including a serial number, used to identify individual motor vehicles, motorcycles, scooters and mopeds, as defined in ISO 3833.		
<b>Vehicle Year</b>	Model year that a vehicle was manufactured.		
<b>Vehicle Make</b>	Vehicle manufacturer		
<b>Vehicle Model</b>	Vehicle name or number		
<b>Vehicle Technology</b>	Hybrid, Gasoline, Electric, Start-Stop, Hybrid Start-Stop, Diesel		
<b>Mileage</b>	Mileage of vehicle being tested		
<b>Pack</b>	Single or dual battery pack		
<b>Alt Remote Sense</b>	Vehicle remote option to detect voltage at the alternator rather than the battery pack		
<b>Battery Application</b>	Automotive, Marine, Powersports, Group 31, Commercial 4D/8D, Lawn and Garden		
<b>Battery Type</b>	Flooded, AGM (Absorbed Glass Mat), AGM Spiral, Gel, Enhanced Flooded, NorthStar Odyssey Pure Lead		
<b>Battery Units</b>	CCA	Cold Cranking Amps: Battery current at 0 °F (–17.8 °C).	100 to 3000
	CA	Cranking Amps: Battery current at 32°F (0 °C).	100 to 3000
	JIS	Japanese Industrial Standard: Usually printed on battery label.	26A17 to 245H52
	DIN(A)	Deutsches Institut für Normung	100 to 1000
	SAE(A)	European labeling of CCA	100 to 3000
	IEC(A)	International Electrotechnical Commission	100 to 1000
	EN(A)	Europa-Norm	100 to 1700
	EN2(A)	Europa-Norm	100 to 1700
<b>Battery Rating</b>	Enter the Battery Rating Units value.		
<b>RC/Ah</b>	Test Reserve Capacity or Amp Hours		
<b>Reserve Capacity/ Amp Hours</b>	Enter numeric value for Reserve Capacity or Amp Hour value		
<b>Notes</b>	Enter specific job notes or RO number		
<b>Num of Batteries</b>	Enter a numeric value for the number of batteries in the pack being tested.		



**NOTE:** If no Reserve Capacity/Amp Hours value is entered, the analyzer will use the average RC rating for a flooded Group 31 battery (180 minutes).





## 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 the Midtronics office in your region (see address block below). Have your model number and serial numbers at hand. This first step is critical as Midtronics will troubleshoot the problem(s) over the phone, and many problem(s) are resolved during this step. If the problem cannot be resolved, the Customer Service Agent will issue a Return Material Authorization (RMA) number and provide instructions on where to ship your equipment. The RMA number becomes your tracking number when communicating with Midtronics. The final step is to pack the equipment to avoid damage in transit and return the equipment freight prepaid (you pay), to the attention of the RMA number and the address provided by the Customer Service Agent.

Midtronics or its designee will repair and return the unit using the same shipping service level as received. If it is determined 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 the shipping & handling charges added to the invoice. Midtronics' products beyond the warranty period are subject to the repair charges in place at that time. Out-of-warranty repairs carry a 6-month warranty.



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