MIDTRONICS

DEC 2019
167-000878EN-B

EBT-965P

Battery & System 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.

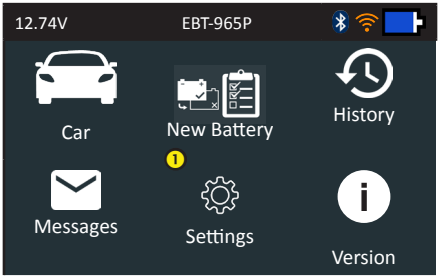
Consent to Collection and Use of Data:

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



1 Menu Bar

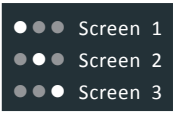
12.74V	Battery Voltage (if connected)		WiFi signal strength
	Bluetooth connectivity status		Controller internal battery status

2 Main Menu Selection Area

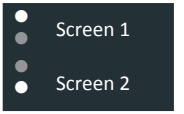
When displayed, the Screen Arrows show which **ARROW** key on the keypad to press to display other icons or screens. When displayed under a list of options, the Screen Arrows show which keypad arrow to press to highlight a character or item in a list.

Additional Screens

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



Press ◀ or ▶



Press ▲ or ▼

Main Menu Icons

Icon	Description
 Car	For testing in- and out-of-vehicle batteries for possible return.
 New Battery Test	Perform a battery test on a new 12V battery in the vehicle.
 History	Access archived test histories or search test history 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, shop information, and connected devices.
 Version	Displays information regarding the version of the software.

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.

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-Vehicle. However, for testing Out-Of-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.

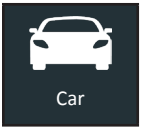
Connect the clamps to the tester: the red clamp to the positive (+) terminal and the black clamp to the negative (–) terminal. If the clamps are reversed when connected, the tester displays CLAMPS REVERSED! Reconnect the clamps.

Make sure both sides of the clamps are gripping the terminals by rocking each clamp back and forth. A poor connection will prevent testing, and the tester will display a CHECK CONNECTION message. If the message reappears after reconnecting, clean the terminals and reconnect.

Setting User Preferences

Customize the analyzer by setting preferences in the Settings (⚙) Menu, described in Chapter 7.

2 – Car



Use Car Test to test and verify the condition of customer batteries that are in- or out-of-vehicle for possible return and/or warranty claim. Press ▲◀▶▼ to return to the previous screen, select options and when necessary, ■ to enter or continue to the next step.

Battery Test

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

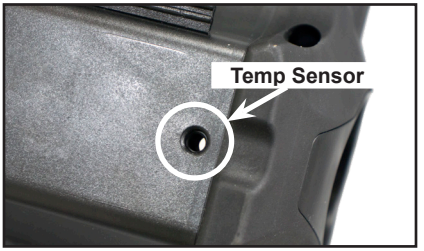
Location	Inside vehicle	Outside vehicle		
Brand/Model	Exide	Tudor		
	Fulmen	Deta		
	Sonnak	Centra		
	Other			
Battery Type	Flooded EFB GEL	AGM AGM spiral		
Battery Units	EN SAE	DIN JIS	EN2 IEC	CCA
Battery Rating	Hold down ▲ or ▼ to increase scrolling speed.			

When Exide, Tudor, Fulmen, Deta, Sonnak or Centra are selected at brand/model, the option 'rating' will change to 'P/N', which leads to the part number list.

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
DIN	Deutsche Industrie-Norm	100 to 1000
JIS	Japanese Industrial Standard test, carried out at -15°C.	A list is shown
EN2	European Norms 2. Performing a different second discharge than with EN.	100 to 3000
IEC	International Electrotechnical Commission norm. The IEC test is performed at -18°C	100 to 1000
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

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

Email

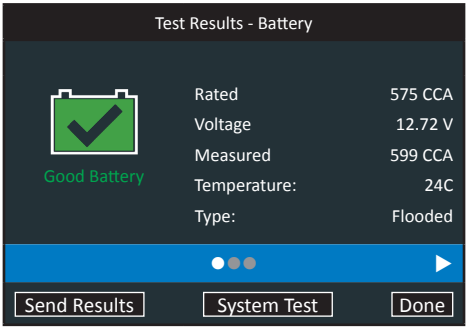
Printer

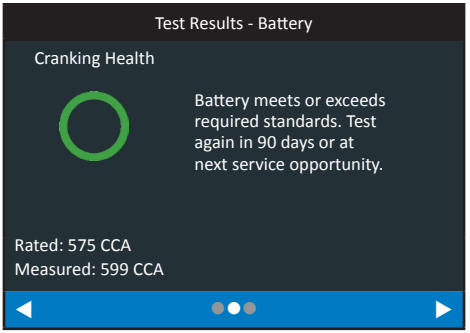
Icons are color-coded to indicate status.

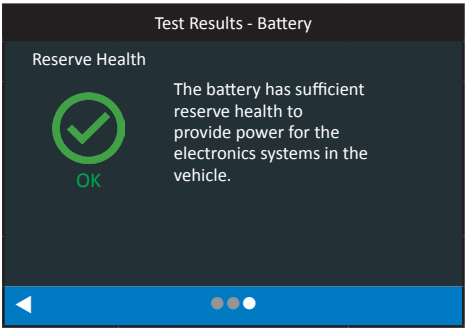
Battery Test | Starter Test | Alternator Test

Green:	All test parameters were completed and have passed.	Red:	The battery has failed the test.
Yellow:	Some test parameters may require further testing.	Gray:	Insufficent data to perform the test.

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







System Test

1. Select **System Test** displayed at the bottom of the screen to continue to the System Test.
1. Start the vehicle's engine and let it idle.
2. Ensure all accessories (High Beam headlights/ventilation blower etc.) are off and select **Next**.

   The analyzer tests the alternator output.
3. When prompted, rev and hold the engine to between 2000 to 3000 rpm.

   The analyzer tests the alternator output again.
4. When prompted Idle the engine and and select **Next**.
5. Turn on the high beam headlights and ventilation blower.
6. Select **Next**.

   The analyzer tests the alternator output.
7. When prompted, rev and hold the engine to between 2000 to 3000 rpm.

   The analyzer tests the alternator output again.
8. When prompted Idle the engine and and select **Next**.

3 – New Battery Test

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, ■ to enter or continue to the next step.

Battery Test

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

Brand/Model	Exide	Tudor		
	Fulmen	Deta		
	Sonnak	Centra		
	Other			
Battery Type	Flooded EFB GEL	AGM AGM spiral		
Battery Units	EN SAE	DIN JIS	EN2 IEC	CCA
Battery Rating	Hold down ▲ or ▼ to increase scrolling speed.			

When Exide, Tudor, Fulmen, Deta, Sonnak or Centra are selected at brand/model, the option 'rating' will change to 'P/N', which leads to the part number list.

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
DIN	Deutsche Industrie-Norm	100 to 1000
JIS	Japanese Industrial Standard test, carried out at -15°C.	A list is shown
EN2	European Norms 2. Performing a different second discharge than with EN.	100 to 3000
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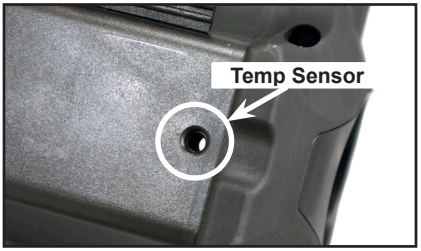
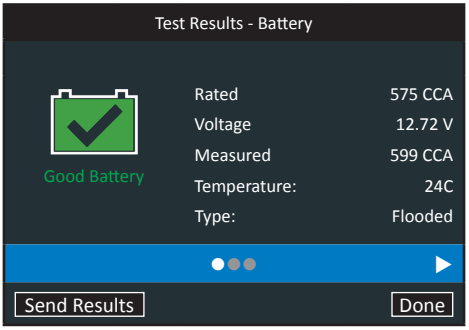
Select **Start** to advance to the next screen.

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

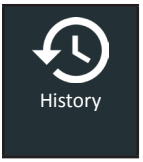


Test Results - Battery Test

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

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

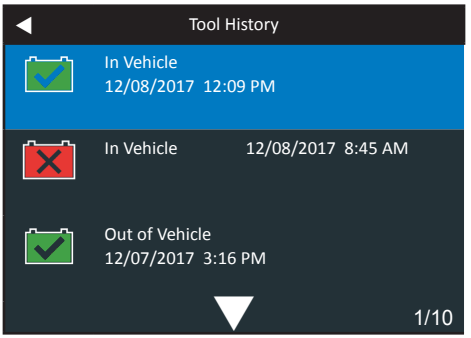
4 – History



Use History to access the tool usage history, a vehicle history based on 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, ■ to enter or continue to the next step.

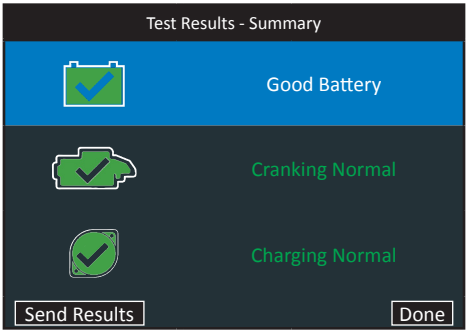
1. At the Main Menu, select **History**. The Tool History screen is displayed.



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

2. Select a vehicle record to view the results or select Search Options to search for records by test result decision.

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



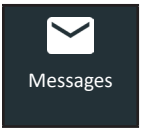
Test Results - Summary

4. 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.

5 – 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 or to return to the Main Menu.

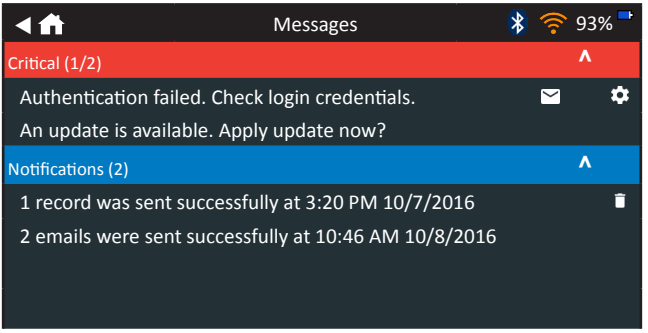
Accessing Messages

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.

2 Unread Critical Messages

2 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.

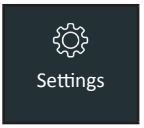
3. Tap ^ to collapse a list of messages or v to expand the list.

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.

6 – Settings



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

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

Tool

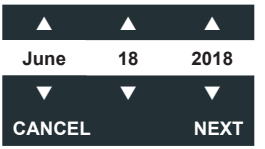
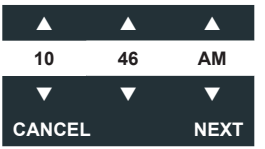
Display

Use ◀ to return to the Display menu.

Language	Select the analyzer default standard language.
Temperature Units	Select the default temperature units (Fahrenheit/Celsius) used when measuring battery temperature.
Number Separator	Select the default number display using commas or periods separators.

Date & Time

Use ◀ to return to the Display menu.

Date Format	Select Month/Day/Year (MM/DD/YYYY), or Day/Month/Year DD/MM/YYYY.
Date	Use ▲ or ▼ to advance the month, day, and year. Use ◀ or ▶ to advance left or right and move to **Cancel** or **Next**. Select **Next** to save the date or **Cancel** to exit without saving. 
Time Format	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 **Next**. Select **Next** to save the time or **Cancel** to exit without saving. 

Print Format

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

Email Format

Set the default emailaddress to send test results to. Use ◀ to return to the Display menu.

Work Order

Customize Enable	Press ■ to check/uncheck the box to enable/disable the function.
Work Order Text	Use ▲▼◀▶ to highlight characters on the displayed keyboard and press ■ to select. Select Esc to return to the Work Order Settings screen.

System Test

Press ■ to check and uncheck the box. A checked box indicates a System Test will be included as part of an In Test. Use ◀ to return to the Tool menu.

Version

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

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

Check For Updates

Check for software updates via a connected WiFi network.

Shop Settings

Admin

Admin Enable	Press ■ to check and uncheck the box. A checked box indicates the Admin function is enabled.
Admin Pin	Use ▲▼◀▶ to select a four (4) digit Admin PIN. Select **OK** to save the PIN or **Cancel** to exit without saving. Use ◀ to return to the Shop Settings menu.

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	

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.

Users

The Users function is for enabling, adding, and editing IDs for tester users. It also allows you to delete a USER ID and its associated test total.

Enable Users	Press ■ to check and uncheck the box. A checked box indicates the Enable Users function is enabled.
Add User	(Limit 10) With the displayed alphanumeric keyboard, use ▲▼◀▶ to highlight the desired alphanumeric character. Press ■ to select that character. • Select ↑ to access the lower case and symbol character maps. • Select **?123** to access alternative characters. Once all of the alphanumeric characters have been entered, select **Save** or **Esc** to exit without saving.
Edit User	Use ▲▼ to select a user to edit (1 of 10). Use ▲▼◀▶ to highlight the desired alphanumeric character. Press ■ to select that character. • Select ↑ to access the lower case and symbol character maps. • Select **?123** to access alternative characters. Once all of the alphanumeric characters have been entered, select **Save** or **Esc** to exit without saving.
Delete User	Use ▲▼ to select a user to delete (1 of 10). Press ■. A tone sounds and a confirmation screen is displayed. Select Delete to delete the user or Cancel to exit and go back one screen.

Network

WiFi

Automatic	The tester searches for any detectable WiFi networks. A list of detected WiFi networks is then displayed on the tester screen. Press ◀ to return to the CVG3 Setup screen.
Manual	Manually enter Security, SSID, Password, Encryption, and WEP Keys. Press ◀ to return to the CVG3 Setup screen.
IP Setup	Manually enter IP Type, IP Address, Gateway, and Subnet Mask. Press ◀ to return to the CVG3 Setup screen.

7 – 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.

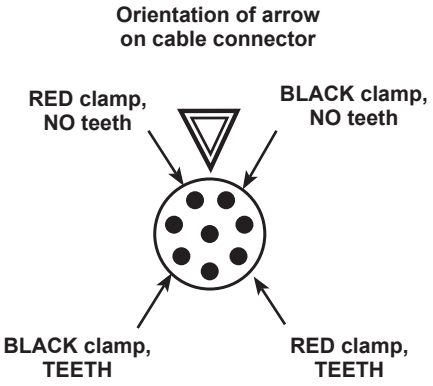
Test Procedure

You are testing the continuity of the following end points:

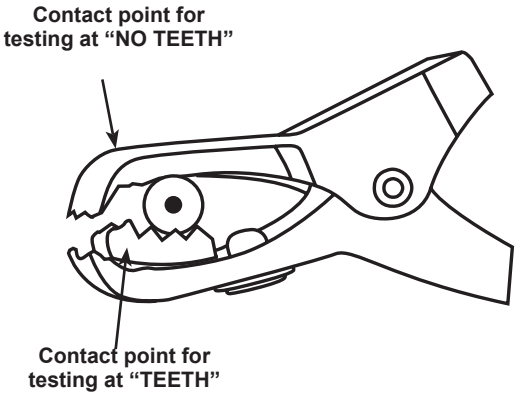
- The positive (RED clamp jaw without teeth and its corresponding pin hole.
- The positive (RED) clamp jaw with teeth and its corresponding pin hole.
- The negative (black) clamp jaw without teeth and its corresponding pin hole.
- The negative (black) clamp jaw with teeth and its corresponding pin hole.

1. Grip a pencil with the clamp as shown in the figure *Contacts for Clamp Jaws*. Do not grip the metal part of the eraser or any area that may conduct current.
2. Insert a probe tip into the hole designated "NO TEETH" for the color (BLACK or RED) of the clamp you are testing as shown in the figure "Contacts for Cable Connector."
3. Touch the toothless jaw of the clamp with the other probe tip. Wiggle the battery test cables. The resistance reading should be less than 1 Ω.
4. Repeat the test for the "TEETH" side of the circuit, this time touching the jaw with teeth. Insert

the other probe tip into the "teeth" pin hole. Wiggle the battery test cables. The resistance reading should be less than 11 Ω.



Contacts for Cable Connector



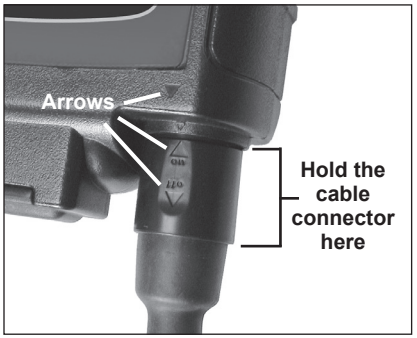
Contacts for Small Clamp

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 arrow on the cable connector with the arrows on the analyzer's housing. Hold the part of the cable connector as shown and firmly insert the connector into analyzer's six-pin 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

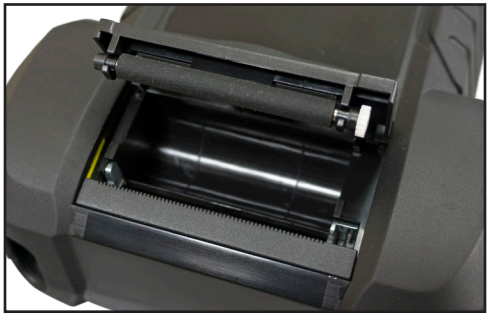
The internal printer is shipped with a roll of thermal printing paper installed in the paper compartment. The roll size is 2¼" wide by 1⅞" in diameter. Replacement rolls are available at most office supply stores.
The analyzer uses only thermal printing paper.

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:

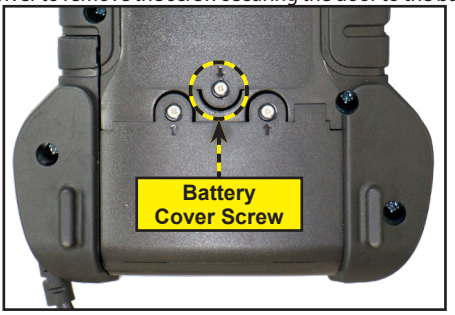
- The contrast may need to be adjusted in the Admin/Utility menu. Highlight the Display icon and press **ENTER**. Use ▲ or ▼ to scroll the contrast value to 10.
- The analyzer's internal batteries may need to be replaced.

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 EBT-965P testing process uses Conductance Profiling™ technology which determines battery cranking capability and also adds Reserve Health 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 EBT-965P provides a battery decision along with additional detailed information on battery cranking and reserve health. 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

Decision	Cranking Health	Reserve health	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 health. 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.	
 End of Life	Good	Warning	The battery shows good cranking performance but low reserve health performance. Low reserve health will compromise the battery's ability to provide power to the vehicle and hold a charge over time.	The reserve health of the battery is low. Low reserve health 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 health performance. Low reserve health 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 health performance. Low reserve health 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.	

Scan the QR code in the results with the Exide Battery Tester App.

Decision	Cranking Health	Reserve health	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 health 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.	
 End of Life	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 health. Ensure that there are no loads on the battery before attempting any retest.	
Cycling Required	Battery needs to be cycled for optimal performance.			
Rest and retest	Battery could have a surface charge, because it has recently been charged.			

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.
 End of Life	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. √ Check all alternator connections including to the battery. Clean or replace if necessary and retest. √ 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. √ Check belts to ensure the alternator is rotating with the engine running. √ 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. √ Check for loose and normal ground connections. If no connection problems are found, replace the regulator. 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. √ 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.

Decision	Action
 OPEN PHASE	Replace the alternator.
 OPEN DIODE	
 SHORTED DIODE	

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) year from date of purchase. Exide and the manufacturer will, at our option, repair the unit or replace the unit with a remanufactured tester. 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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