MIDTRONICS

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EL-50332

EV/HEV Battery Service Tool



⚠ DANGER

Hazardous voltage.
An improper connection can result in serious injury or death.

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

INSTRUCTION MANUAL

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General Safety Guidelines

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

IT IS OF UTMOST IMPORTANCE THAT BEFORE USING YOUR EV/HEV BATTERY SERVICE TOOL, YOU READ THIS MANUAL AND FOLLOW THE SAFETY AND OPERATING INSTRUCTIONS EXACTLY.

⚠ DANGER



Hazardous voltage.
Can result in electric shock when the protective covers are removed.
Circuit boards, test points, and output voltages also may be floating above (below) chassis ground.

⚠ WARNING

This EV/HEV Battery Service Tool is designed for indoor use only.

1. Maintenance

- Periodic inspection and care are highly recommended, especially if the EV/HEV Battery Service Tool is operating in a harsh environment.
- Inspect signs of overheating, rust paint deterioration, and general condition of the unit. If corrective measures should be taken, contact Bosch for service information.
- Removal of dust, dirt, and debris from the external enclosure surfaces is encouraged and may be performed while the unit is in operation.



IMPORTANT: There are no user-serviceable parts inside the EV/HEV Battery Service Tool. At no time should personnel remove any cover.

- Ensure that the AC power line ground is connected properly to the EV/HEV Battery Service Tool input connector or chassis. Similarly, other power ground lines including those to application and maintenance equipment must be grounded properly for both personnel and equipment safety.
- Always ensure that AC input power is de-energized prior to connecting or disconnecting any cable.
- In normal operation, the operator does not have access to hazardous voltages within the chassis. However, depending on the user's application configuration, HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY may be normally generated on the output terminals. The customer/user must ensure that the output power lines are labeled properly as to the safety hazards and that any inadvertent contact with hazardous voltages is eliminated.
- This EV/HEV Battery Service Tool is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the EV/HEV Battery Service Tool by a person responsible for their safety.

⚠ CAUTION

Risk of explosive gases
Batteries generate explosive gases during normal operation, and when discharged or charged.

1.1 To reduce risk of battery explosion, follow these safety instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in the vicinity of a battery. Review cautionary marking on these products and on the engine, and on the vehicle or equipment containing the battery.

⚠ DANGER

Charging a non-rechargeable battery may cause the battery to burst.
To reduce the risk of injury, only charge rechargeable type batteries.

If you are uncertain as to the type of battery you are attempting to charge, or the correct procedure for checking the battery's state of charge, contact the seller or battery manufacturer.

1.2 Use of an attachment not recommended or sold by the EV/HEV Battery Service Tool manufacturer may result in a risk of fire, electric shock, or injury to persons.

1.3 To reduce risk of damage to the electric plug and cord, pull by the plug rather than by the cord when disconnecting the EV/HEV Battery Service Tool.

1.4 Do not operate the EV/HEV Battery Service Tool if it has received a sharp blow, been dropped or otherwise damaged in any way; contact Bosch to return the unit to Midtronics, Inc.

1.5 Do not disassemble the EV/HEV Battery Service Tool; when repair is required contact Bosch to return the unit to Midtronics Inc. (see back cover of this manual for more information). Incorrect reassembly may result in a risk of electric shock or fire.

1.6 To reduce risk of electric shock, unplug the EV/HEV Battery Service Tool from the AC outlet and auxiliary 12 VDC power cord before attempting any maintenance or cleaning. Turning off the controls will not reduce this risk.

1.7 Connect and disconnect the battery leads only when the AC supply cord and auxiliary 12 VDC power cord are disconnected.

1.8 Do not overcharge the battery (See Section 3).

1.9 Charge the battery in a dry, well-ventilated area.

1.10 Never place articles on or around the EV/HEV Battery Service Tool, or locate the EV/HEV Battery Service Tool in a way that will restrict the flow of cooling air through the cabinet.

1.11 An extension cord should not be used unless absolutely necessary. (See paragraph 3.3.)

1.12 Have a damaged cord or plug replaced immediately.

⚠ WARNING

Do not expose the EV/HEV Battery Service Tool to rain or snow.

2. Personal Precautions

2.1 Always have someone within range of your voice, or close enough to come to your aid, when working around batteries.

2.2 Have plenty of fresh water and soap nearby in case battery electrolyte contacts skin, clothing or eyes.

2.3 Wear complete eye protection, clothing protection, and wear rubber soled shoes. Place damp cloth over battery to protect against electrolyte spray. When ground is very wet or covered with snow, wear rubber boots. Avoid touching eyes while working near battery.

2.4 If battery electrolyte contacts skin or clothing, wash immediately with soap and water. If electrolyte enters the eye, immediately flush with cold running water for at least 10 minutes, and seek medical attention.

2.5 NEVER smoke or allow a spark or flame in vicinity of a battery or engine.

2.6 Be extra cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short circuit the battery or other electrical part that may cause an explosion.

2.7 Before working with a battery, remove personal metal items such as rings, bracelets, necklaces, watches, etc. A battery can produce a short circuit current high enough to weld such items causing a severe burn.

⚠ CAUTION

Non-rechargeable batteries may burst when charging causing personal injury and damage.

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

The EV/HEV Battery Service Tool is not intended to supply power to a low-voltage electrical system other than applications using rechargeable batteries.

2.8 **NEVER** charge a frozen battery; thaw it out first.

3. Grounding & Power Cord Connections

3.1 The EV/HEV Battery Service Tool must be grounded to reduce risk of electric shock. The EV/HEV Battery Service Tool is equipped with an electric cord having an equipment grounding conductor and a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠ DANGER



Hazardous voltage.
An improper connection can result in electric shock

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

IF THE PLUG DOES NOT FIT THE OUTLET, HAVE A PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN.

3.2 This EV/HEV Battery Service Tool is for use on a nominal 110-volt or 220-volt circuit (220V power cord not included).

The 110V grounding plug looks like the plug illustrated in *Figure A*. A temporary adapter, which looks like the adapter illustrated in *Figures B* and *C*, may be used to connect this plug to a two-pole receptacle as shown in *Figure B*, if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician.

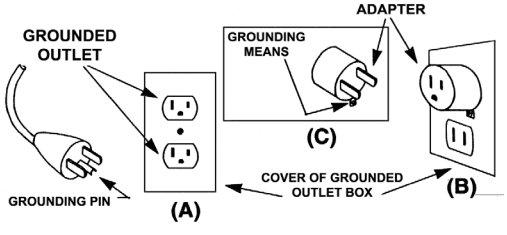
⚠ DANGER



Hazardous voltage.
An improper connection can result in electric shock

Before using an adapter be certain the center screw of the outlet plate is grounded. The rigid ear or lug extending from the adapter must be connected to a properly grounded outlet. Make certain it is grounded. If necessary, replace the original screw that secures the adapter ear or lug to the cover plate and make the ground connection to the grounded outlet.

USE OF AN ADAPTER IS NOT ALLOWED IN CANADA. IF A GROUNDING-TYPE RECEPTACLE IS NOT AVAILABLE, DO NOT USE THIS SERVICE TOOL UNTIL THE PROPER OUTLET IS INSTALLED BY A QUALIFIED ELECTRICIAN.



3.3 An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:

a. that the pins on plugs of the extension cord are the same number, size, and shape as those of the plug on the EV/HEV Battery Service Tool;

b. that the extension cord is properly wired and in good electrical condition;

c. that the wire size is large enough for the AC ampere rating of EV/HEV Battery Service Tool as specified in the table.

4. Grounding

4.1 The plugs and receptacles have dedicated grounding terminals and must be mated with plugs and receptacles having matching grounding terminals

Recommended minimum AWG size for extension cords for the EV/HEV Battery Service Tool*

AC input rating amperes		AWG* size of cord			
		Length of cord, feet (m)			
Equal or greater than:	But less than:	25 (7.6)	50 (15.2)	100 (30.5)	150 (45.6)
8	10	18	14	12	10
10	12	16	14	10	8
12	14	16	12	10	8
14	16	16	12	10	8
16	18	14	12	8	8

**American Wire Gauge*

5. EV/HEV Battery Service Tool Location

IMPORTANT: The EL-50332 GM EV/HEV Battery Service Tool is designed for indoor use only!.

It is the responsibility of the operator to provide a controlled environment for the equipment. Work tents are a common method of protecting equipment in adverse conditions.

The EV/HEV Battery Service Tool depends upon the surrounding air for cooling. The free flow of air is important as is the air temperature. The EV/HEV Battery Service Tool must be mounted so that air can freely circulate all around it.

5.1 Do not place combustible materials on or near the EV/HEV Battery Service Tool or mount the EV/HEV Battery Service Tool closer than 3 inches from any adjacent wall. The EV/HEV Battery Service Tool must never be mounted next to or above heat generating equipment.

5.2 Locate the EV/HEV Battery Service Tool as far away from the battery as the cables permit.

5.3 Never place the EV/HEV Battery Service Tool directly above the battery being charged; gases from the battery will corrode and damage the EV/HEV Battery Service Tool.

5.4 Only operate the EV/HEV Battery Service Tool in a well-ventilated area that is free of dangerous vapors.

5.5 Store the EV/HEV Battery Service Tool in safe, dry location.

6. DC Connection Precautions

6.1 All switches should be set in the OFF position and AC cord should be DISCONNECTED from electrical outlet before you connect the output cables. If the auxiliary 12 VDC input is used, it should be disconnected from the power source.

⚠ DANGER



Hazardous voltage.
Can cause death or serious personal injury.

Setting the switches to "OFF" does not always disconnect the EV/HEV Battery Service Tool electrical circuit from the AC power cord.

Chapter 1: Introduction & Overview

Safety Reminder

For safe, efficient, and accurate charging and discharging, review the safety and operating instructions in this manual before using the EV/HEV Batter Service Tool. In addition, follow all manufacturers' instructions and SAE instructions.

Safety Precautions

Always use the necessary safety precautions when working with batteries to prevent severe injury or death. Follow all manufacturers' instructions and SAE safety recommendations, which include the following 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 gases, even when the battery is not in operation. Always work in a well-ventilated area.

⚠ CAUTION

Wash hands after handling.

REQUIRED BY CALIFORNIA PROP. 65: Battery posts, terminals, and related accessories can contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

- Battery electrolyte is highly corrosive. If electrolyte enters your eyes, immediately flush them thoroughly with cold running water for at least 10 minutes and seek medical attention. If battery electrolyte 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 EV/HEV Battery Service Tool 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 charging or discharging.
- Never charge a frozen battery. Gases may form, cracking the case, and spray out battery electrolyte.

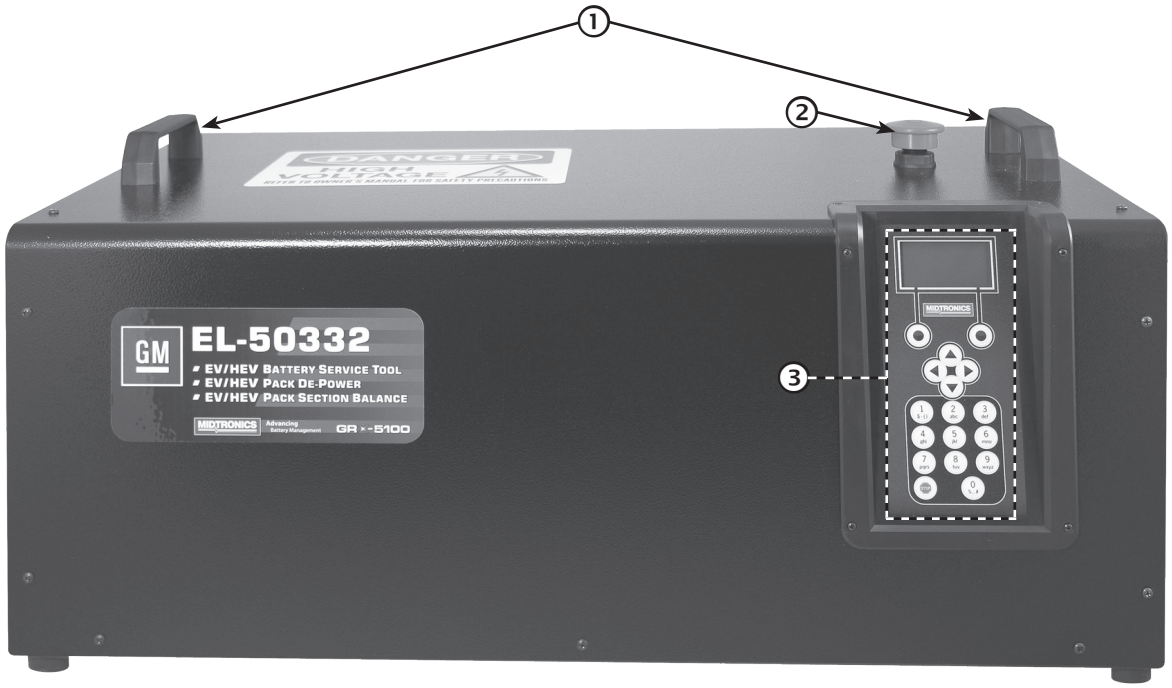
Conventions Used in This Manual

To help you learn how to use your EL-50332, the manual uses these symbols and typographical conventions:

Symbols And Typographical Conventions

Convention	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.
CAPITAL LETTERS	The text for screen options are in regular capital letters.
NEXT	The text for soft keys are in **BOLD** capital letters.

Front View

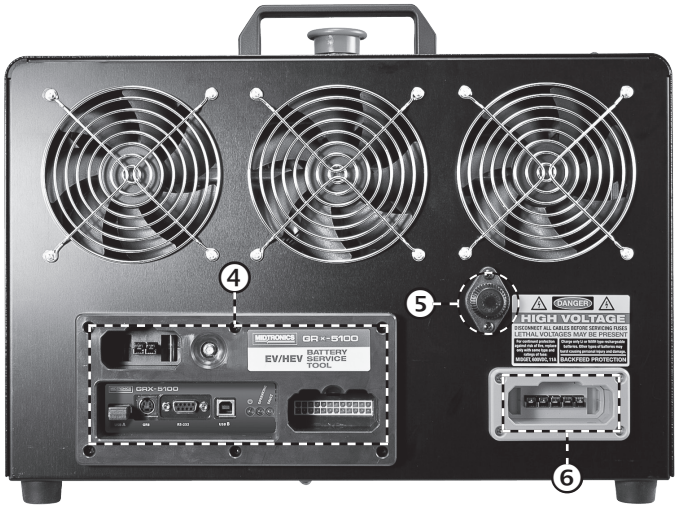


① **Lifting Handles**

② **Emergency STOP Button**

③ **Keyboard & Display**

Right End Panel

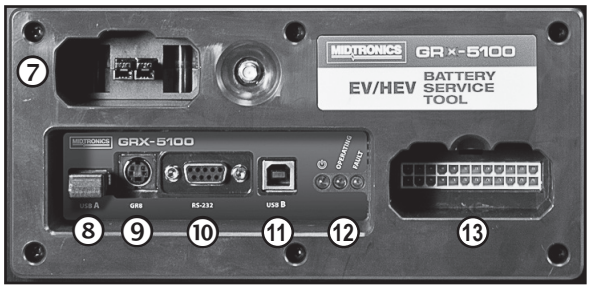


④ **Connection Panel**

⑤ **11 A Midget Fuse**

⑥ **High Voltage Cable Connection**

Connection Panel



⑦ **External 12V Auxiliary Power**

⑧ **USB-A Port**
For connecting an external USB-style jump drive.

⑨ **GR-8**
For connecting a GR8-style Control Module.

⑩ **RS-232**
For future use.

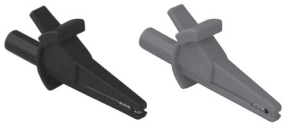
⑪ **USB-B**
For future use.

⑫ **Diagnostic Indicator LED Lights**

⑬ **VIM Low Voltage Cable Connection**
Used to connect to the low voltage battery electronic control unit based on the application.

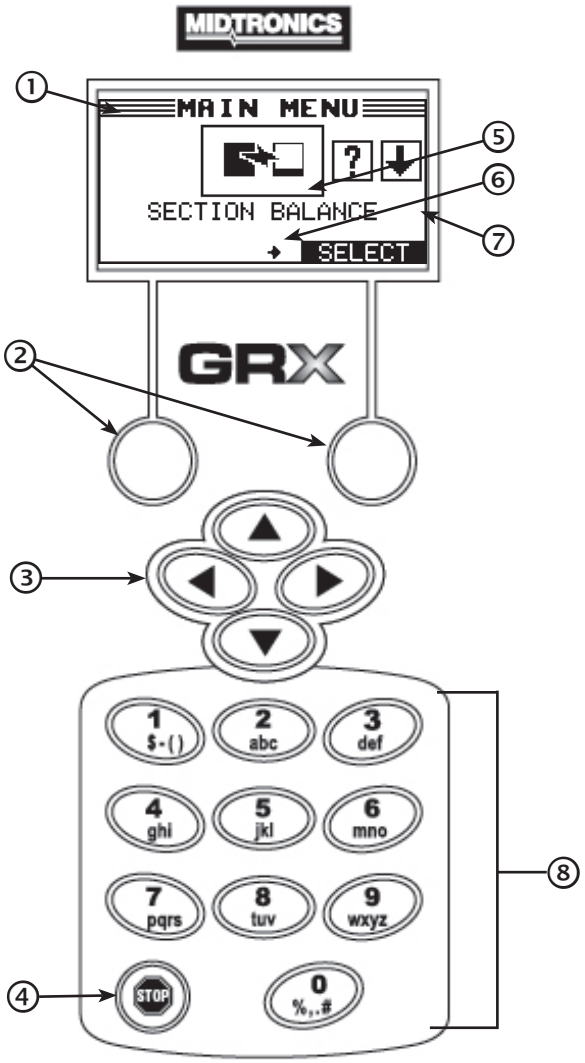
Accessories

	**Vehicle Interface Module (VIM)** EL-50332-110
	**Universal Fuse Box** EL-50332-105
	**High Voltage Interface Cable (Orange)** EL-50332-120 For connecting the EL-50332 to the Universal Fuse Box.
	**VIM Low Voltage Cable (Black)** EL-50332-125 For connecting the EL-50332 to the Vehicle Interface Module (VIM).
	**BBDU Low Voltage Interface Cable (Black)** EL-50332-135 For connecting the Vehicle Interface Module (VIM) to the hybrid battery contactor assembly connectors on an out-of-vehicle battery pack.
	**TPIM High Voltage Interface Cable (Orange)** EL-50332-115
	**APM High Voltage Interface Cable (Orange)** EL-50332-140

	**12 Volt Auxiliary Power Cable (Black)** EL-50332-160
	**12 Volt Auxiliary To Clamps Adapter Cable (Black)** EL-50332-165
	**Sheathed High Voltage Banana Jack Cable** EL-50332-145
 *Black* *Red*	**High Voltage Alligator Clamps** EL-50332-170
	**eAssist Cable** EL-50332-130
	**Spark EV Harness** EL-50332-50
	**Spark EV OBD-II Harness** EL-50332-60
	**Spark EV HV Harness** EL-50332-55

Display and Keypad

The display and keypad work together to help you quickly find and use the right tools at the right time. The display also keeps you on track with onscreen navigation aids, directions and messages. The illustration shows how the elements on the screen relate to the keypad.



① Title Bar
The title bar shows you the name of the current menu, utility, or function.

② Soft Keys
Press the two soft keys linked to the bottom of the screen to perform the functions displayed above them. The functions change depending on the menu or test process. So it may be helpful to think of the words appearing above them as part of the keys.

③ ARROW (▲▼◀▶) Keys
Press the **ARROW** keys to scroll to numerical values and move to menus and icons.

④ POWER Key
Press the **POWER** key to turn the control module ON and OFF.

⑤ Selection Area
The selection area below the **Title Bar** contains selectable items or dialog boxes that display information or require a response.

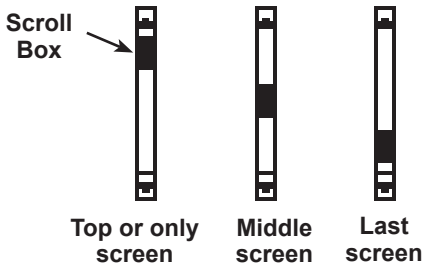
⑥ Menu Screen Arrows
When displayed in menu screens, the menu screen arrows show you which **ARROW** key on the keypad to press to display other icons or screens.

For example, the up and down arrows indicate when to press ▲ or ▼ to display the screens above and below the current screen. The left and right menu screen arrows tell you when to use ◀ or ▶ to select an icon.

When displayed under a list of options, the menu screen arrows show you which keypad arrow to press to highlight a character or item in a list.

⑦ Scroll Bar
Another navigational aid is the scroll bar on the right side of the screen. The position of its scroll box shows you whether the screen is the top (or only screen), middle, or last in a series.

Some screens also indicate the page order with a notation such as P1/3 (page 1 of 3).



⑧ Alphanumeric Keypad
In some cases, you can use the alphanumeric keypad to enter numerical test parameters instead of scrolling to them with the **ARROW** keys.

You can also use the alphanumeric keys to create and edit customer coupons and your shop contact information on printed test results, and manage User IDs.

To add a space, press ▶. To erase a space and insert a character, press ◀.

Refer to the following table for the characters associated with each alphanumeric key.

Key	Character
①	$ - ( ) 1
②	a b c 2
③	d e f 3
④	g h i 4
⑤	j k l 5
⑥	m n o 6
⑦	p q r s 7
⑧	t u v 8
⑨	w x y z 9
⓪	% , . # 0

Alphanumeric Keys and Associated Characters

Data Entry Methods

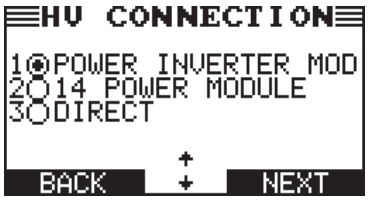
Typically, the soft key below the right half of the screen confirms your choice, although the command above it may vary. (Examples: **SELECT**, **NEXT**, and **SAVE**.) In a similar fashion, the soft key below the left half of the screen cancels your choice or returns you to the previous screen, although the word above it may also vary. (Examples: **BACK** and **CLEAR**.)

Menu Icons



A menu icon is a graphical representation of a function you can select, such as the Diagnostic Icon in the Main Menu. To select an icon, use ◀ or ▶ to highlight it. Highlighting changes the icon to a white picture on a black background. To confirm your selection, press the appropriate soft key.

Option Buttons



Some lists have option buttons before each item. To select an item, use ▲ or ▼ to move the dot to the button next to the item. To confirm your selection, press the appropriate soft key.

You can also use the alphanumeric keypad to enter the number preceding the option button of your choice. No additional keypress is needed to proceed.

Scrolling Lists



Scrolling lists contain items that extend above and below the screen. The first number above the right soft key indicates the position in the list of the highlighted item. The second number above the right soft key indicates the number of items in the list.

To select an item, use ▲ or ▼ to highlight the item, and press the appropriate soft key. To move the highlight bar up five lines at a time, press ◀**.** To move the highlight bar down five lines at a time, press ▶.

Alphanumeric Entry



Some selections require you to use the alphanumeric keypad. These "user-defined" selections have a blinking horizontal line (cursor) to the right of the last character.

Use ▲ or ▼ to highlight a line for editing. Display the character, symbol, or number you want by rapidly pressing its key as many times as needed. If you pause, the cursor moves to the right. To backspace, press ◀. Use ▶ to add a space. Use ▲ or ▼ to highlight a line for editing. When finished, press the appropriate soft key to save your settings.

Main Menu

The Main Menu is the starting point for all tools and utilities, which are depicted as icons. Some icons lead directly to the function they represent, while others are menu icons that lead to two or more options.

Menu Icon	Description
SECTION BALANCE	Charges or discharges the sections of a battery pack to a user-determined voltage selected so all of the sections are balanced.
PACK INFO	Use this function to access specific information about the connected battery pack including VIN, BPIN, MSD, and pack temperature.
DEPOWER	Discharges a battery pack or battery section down to a pre-determined voltage selected by the user.
TOOL INFO	The Tool Info option lets you view lifetime test totals. Also use to access software version information.
UTILITY	Use this function to make modifications to the EV/HEV Battery Service Tool's clock, registered users, display, temp units, default language, internal software, and warning tone. Also use to make administrative changes (password protected).

Tool Info Menu

The Tool Info menu allows you to select and view lifetime Totals and view Software Version information.

Menu Icon	Description
TOTALS	This report displays the total number of charges and depowerings performed by the tool.
VERSION	Lists the software version, version date, and serial number.

Utility Menu

The Setup Menu lets you customize the EV/HEV Battery Service Tool to suit your needs. Before testing, check default values to see what options you may want to change.

Menu Icon	Description
CLOCK	Settings to adjust the time.
SHOP INFO	Enables you to add a custom header to printed test results.
USERS	Add, edit, or delete your User IDs.
DISPLAY	Settings to adjust the screen contrast and backlight time.
TEMPERATURE	Allows you to select degrees in C or F for temperature measurements.
CAPACITY	Select between Amp hours or Kilowatt hours displayed.
LANGUAGE	Sets the language of the display and printouts.
ADMIN	Offers additional administration options such as showing the User ID and headers for printouts.
DEALER ID	Allows you to enter your Dealer ID number.
UPDATE	Updates the tool software using a USB-style jump drive.
BUZZER	Allows you to turn the buzzer OFF. Default is ON.

Connecting to AC Power

Plug the EL-50332 GM into a dedicated, grounded nominal 15-amp or higher AC outlet. Press the power switch to the **ON** position.

Initial Startup

Following the logo screen, the LANGUAGE selection screen appears on the display.

1. Use ▲ or ▼ and press **NEXT**, or press the corresponding number key to select your LANGUAGE preference.

   1 ⦿ ENGLISH

   2 ○ SPANISH

   3 ○ FRENCH

   4 ○ GERMAN

2. Use ▲ or ▼ to select date format and press **NEXT** to continue, or press the corresponding number key.

   1 ⦿ MM/DD/YYYY (month/day/year)

   2 ○ DD/MM/YYYY (day/month/year)

3. Adjust the date and press **NEXT** to continue.

   Use ◀ or ▶ to highlight the hour, minutes, or AM or PM. Use ▲ or ▼ to adjust the digits.

   9 / 26 / 2012

4. Use ▲ or ▼ to select 24-hour or 12-hour (AM/PM) clock and press **NEXT** to continue, or press the corresponding number key.

   1 ⦿ 24 HOUR

   2 ○ AM/PM

5. Adjust the tester time setting and press **NEXT** to continue.

   Use ◀ or ▶ to select the hour, minutes, or AM or PM. Use ▲ or ▼ to adjust the digits.

   9 : 07 AM

6. Use the keypad to type in your dealer BAC Code.

   ENTER YOUR
   BAC CODE

7. The Main Menu is now displayed on the screen.



Changing User Preferences

Before using your EL-50332, you may want to change some of the default settings. Setting preferences are located in Chapter 5: Utility Menu.

Chapter 2: Section Balance

Use this function to charge or discharge a section of a battery pack to bring it in balance with the other sections of the pack.

NOTE: Depending on the charge condition of the battery pack and the battery section being balanced, this process can take up to 8 hours to perform.

⚠ DANGER



Hazardous voltage.
An improper connection can result in electric shock

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

IMPORTANT: Make sure to properly prepare the battery pack by following all required GM guidelines Refer to your GM documentation for complete information.

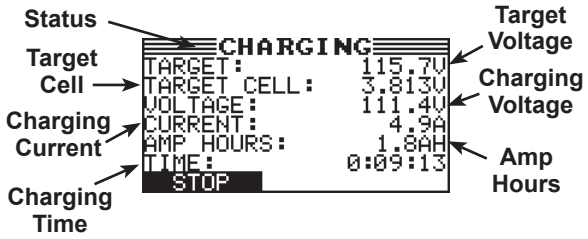
Before balancing a battery section, make sure all of the external components connected to the EL-50332 are in good working order.

1. At the Main Menu, highlight the Section Balance icon and press **SELECT**.
2. Use ▲ or ▼ to select the TYPE and press **NEXT** to continue, or press the corresponding number keys.

   The EL-50332 performs a Self-Test before advancing to the next step.
3. Use ◀ or ▶ to select the TARGET section you would like to balance and press **NEXT** to continue.
4. Make the necessary cable connections to the selected section of the battery.

   Connect the BBDU Low Voltage Interface cable from the VIM to the black and gray hybrid battery contactor assembly connectors on the battery pack.
5. Press **NEXT** to begin the section balance operation.
6. The EL-50332 detects the battery section to be balanced and then enters into a SECTION BALANCE setup mode and attempts to detect the battery section selected.

   If the detection is successful, balance process begins and the status is displayed on the screen.

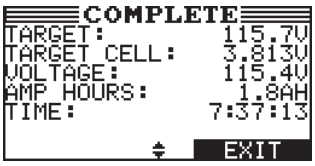


Section Balance Results

Following a successful Section Balance session, the results are written to an inserted USB jump drive.

NOTE: A Warranty Code is generated for all Section Balancing sessions anytime an error is detected. The Warranty Code is also written to the USB jump drive and displayed on the Battery Service Tool screen.

1. Once the session is complete, the results are displayed on the EL-50332 using multiple screens.
2. Use ▲ or ▼ to scroll through the screens



NOTE: If the measured voltage is already at the entered Target Voltage, no conditioning is required and the session is aborted.

3. Press **EXIT** to return to the Main Menu.

The EL-50332 can now be disconnected from the battery pack.

Chapter 3: Pack Info

Use this function to gather critical information about the battery pack being tested.

⚠ DANGER

Hazardous voltage.
An improper connection can result in electric shock

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

IMPORTANT: Make sure to properly prepare the battery pack by following all required GM guidelines Refer to your GM documentation for complete information.

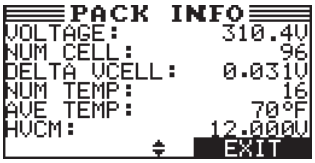
Before getting the battery pack information, make sure all of the external components connected to the EL-50332 are in good working order.

1. At the Main Menu, use ◀ or ▶ to select the PACK INFO icon and press **SELECT** to continue.
2. Use ▲ or ▼ to select the MANUFACTURER and press **NEXT** to continue, or press the corresponding number keys.
   - 1 ⦿ ALPHEON
   - 2 ○ BUICK
   - 3 ○ CADILLAC
   - 4 ○ CHEVROLET
   - 5 ○ OPEL
   - 6 ○ VAUXHALL
3. Use ▲ or ▼ to select the MODEL and press **NEXT** to continue, or press the corresponding number keys.
4. Use ▲ or ▼ to select the COMM CONNECTION and press **NEXT** to continue, or press the corresponding number keys.
   - 1 ⦿ HYBRID POWER TRAIN CONTROL MODULE 2
   - 2 ○ HYBRID BATTERY CONTACTOR ASSEMBLY

   For eAssist only one option is displayed:
   - 1 ⦿ K59 X2 X3
5. Connect the BBDU Low Voltage Interface cable from the VIM as directed in your GM documentation.

NOTE: For eAssist, connect the black interface cable from the EL-50332 to the K59 X2 and X3 connectors on the battery pack.

6. Press **NEXT** to continue.
7. For VOLTec and BEV packs, install the Manual Service Disconnect.
8. Press **NEXT** to continue. The battery pack information is displayed on the EL-50332 screen.
9. Use ▲ or ▼ to scroll through the multiple screens.



10. Press **EXIT** to return to the Main Menu.

Chapter 4: Depower

Use this function to depower a battery pack or section of a battery pack down to a user-defined pre-determined voltage.

NOTE: Depending on the condition of the battery pack or section, this process may take 5 to 6 hours to perform.

⚠ DANGER

Hazardous voltage.
An improper connection can result in serious injury or death.

To avoid electrical shock or burn, never alter the EV/HEV Battery Service Tool's original AC cord and plug. Disconnect plug from outlet when EV/HEV Battery Service Tool is idle.

Depowering A Battery Pack

IMPORTANT: Make sure to properly prepare the battery pack by following all required GM guidelines Refer to your GM documentation for complete information.

Before de-powering a battery pack or section, make sure all of the external components connected to the EL-50332 are in good working order.

1. At the Main Menu, use ◀ or ▶ to select the DEPOWER icon and press **SELECT** to continue.
2. Use ▲ or ▼ to select the vehicle MANUFACTURER and press **NEXT** to continue, or press the corresponding number keys.
   - 1 ⦿ ALPHEON
   - 2 ○ BUICK
   - 3 ○ CADILLAC
   - 4 ○ CHEVROLET
   - 5 ○ OPEL
   - 6 ○ VAUXHALL
3. Use ▲ or ▼ to select the vehicle MODEL and press **NEXT** to continue, or press the corresponding number keys.
4. Use ▲ or ▼ to select the depower TARGET and press **NEXT** to continue, or press the corresponding number keys.
   - 1 ⦿ PACK
   - 2 ○ SECTION

NOTE: For eAssist battery pack, only the PACK option is displayed.

When PACK is selected: Use ▲ or ▼ to select the type of HV CONNECTION and press **NEXT** to continue, or press the corresponding number keys.

- 1 ⦿ POWER INVERTER MODULE
- 2 ○ 14V POWER MODULE
- 3 ○ DIRECT

⚠ DANGER

Hazardous voltage.
An improper connection can result in serious injury or death.

HV Connection 1 or 2 will close high voltage contactors and bypass vehicle safety systems. Refer to GM documentation for inspection requirements and safety precautions.

IMPORTANT: Only select the DIRECT battery pack option when connecting directly to the bus bars, bypassing the safety contactors. This function should only be used when both contactors cannot be closed.

When SECTION is selected: Use ◀ or ▶ to select the TARGET section you would like to depower and press **NEXT** to continue.

5. If PACK was selected in step 4, use ▲ or ▼ to select the COMM CONNECTION and press **NEXT** to continue, or press the corresponding number keys.
   - 1 ⦿ HYBRID POWER TRAIN CONTROL MODULE 2
   - 2 ○ HYBRID BATTERY CONTACTOR ASSEMBLY

   For eAssist only one option is displayed:
   - 1 ⦿ K59 X2 X3

6. ***For a VOLTec pack:*** Connect the orange high voltage cable from the EL-50332 as directed in your GM documentation and press **NEXT** to continue.

   For a VOLTec section: Connect to the selected section of the pack and press **NEXT** to continue.

   For a BEV pack: Connect the orange high voltage cable from the EL-50332 as directed in your GM documentation and press **NEXT** to continue.

   For a BEV section: Connect to the selected section of the pack and press **NEXT** to continue.

   For a eAssist pack: Connect to the battery pack studs and press **NEXT** to continue.

7. ***For VOLTtec:*** Connect the black interface cable from the EL-50332 as directed in your GM documentation and press **NEXT** to continue.

   For BEV: Connect the black interface cable from the EL-50332 as directed in your GM documentation and press **NEXT** to continue.

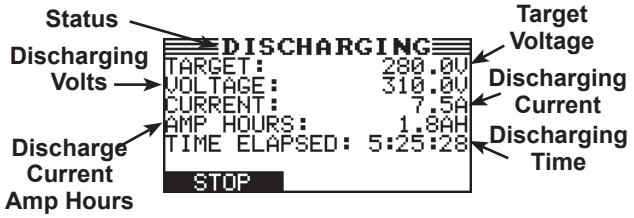
   For eAssist: Connect the black interface cable from the EL-50332 to the K59 X2 and X3 connectors on the pack and press **NEXT** to continue.

8. ***For a VOLTec pack:*** Install the Manual Service Disconnect.

   For a BEV pack: Install the Manual Service Disconnect.

   For a eAssist pack: Make sure the fused cable between the battery sections is properly connected.

9. Press **NEXT** to continue. The de-powering process will now begin. The status of the charging process is displayed on the screen.



NOTE: Press **STOP** if it becomes necessary to interrupt the Depower session.

Depower Results

Following a successful de-powering session, the results are written to an inserted USB jump drive.

NOTE: A Warranty Code is generated for all Depowering sessions including aborted sessions and anytime an error is detected. The Warranty Code is also written to the USB jump drive and displayed on the Battery Service Tool screen.

1. Once the de-powering session is complete, the results are displayed on the EL-50332 using multiple screens.
2. Use ▲ or ▼ to scroll through the screens.



NOTE: If the measured voltage is already at the Target Voltage, no conditioning is required and the session is aborted.

3. Press **EXIT** to return to the Main Menu.

The battery pack or section can now be disconnected from the EL-50332.

Chapter 5: Tool Info

The Tool Info Menu has two (2) utilities to help you track the usage and history of your EL-50332.

Totals

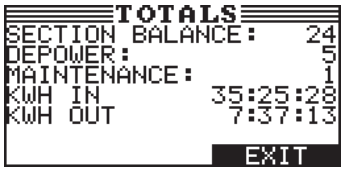
The TOTALS function counts the number of charges or de-powerings and tracks the results.

1 ⊙ LIFE TIME TOTALS

Select the Totals option you want to see and press **NEXT** to continue.

Life Time Totals

LIFE TIME TOTALS show the total number of times the tool is used to determine health and charge of battery packs and battery sections.



Version

The VERSION utility displays the important information about EL-50332 across multiple screens including software version, EEPROM, version date, tool serial number, and build number.

Use ▲ or ▼ to scroll between the screens of version information.

Chapter 6: Utility Menu

The Utility Menu has several functions that you can use to customize the EV/HEV Battery Service Tool user interface.

NOTE: If the PIN function is enabled, you will need to enter the 5-digit PIN when accessing the ADMIN function of the EV/HEV Battery Service Tool.

Clock

The CLOCK ADJUST utility has four settings. Use ▲ or ▼ to highlight the setting you want to change.

Although the date and time have been set at the factory, you may want to make adjustments based your time zone or Daylight Saving Time.

MODE :	**AM/PM**
TIME :	**9:07 AM**
FORMAT :	**DD/MM/YYYY**
DATE :	**9/26/12**

Mode

1. Use ▲ or ▼ to select the MODE and press **NEXT** to continue.
2. Use ▲ or ▼ to select 24-hour or 12-hour (AM/PM) clock and press **NEXT** to continue, or press the corresponding number key.
   - 1 ⦿ 24 HOUR
   - 2 ○ AM/PM
3. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the CLOCK ADJUST screen without saving the changes.

Time

1. Use ▲ or ▼ to select the TIME and press **NEXT** to continue.
2. Use ◀ or ▶ to select the hour, minutes, or AM or PM. Use ▲ or ▼ to adjust the digits.

9 : 07 AM

3. Press **SAVE** to save your setting, or press **BACK** to return to the CLOCK/DATE screen.

Format

1. Use ▲ or ▼ to select the FORMAT and press **NEXT** to continue.
2. Use ▲ or ▼ to select date format and press **NEXT** to continue, or press the corresponding number key.
   - 1 ⦿ MM/DD/YYYY (month/day/year)
   - 2 ○ DD/MM/YYYY (day/month/year)
3. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the CLOCK ADJUST screen without saving the changes.

Date

1. Use ▲ or ▼ to select the DATE and press **NEXT** to continue, and press **NEXT** to continue.
2. Use ◀ or ▶ to highlight the hour, minutes, or AM or PM. Use ▲ or ▼ to adjust the digits.

9 / 26 / 2012

3. Press **SAVE** to save your setting or **BACK** to return to the CLOCK ADJUST screen without saving the changes.

Shop

The SHOP INFO utility allows you to create a header for your printed test results showing your business location information. The utility's three (3) information screens contain 12 lines of text with a maximum of 17 characters per line.

Screen 1	*Screen 2*	*Screen 3*
1–YOUR SHOP NAME	**5–YOUR COUNTRY**	**9–**
2–1000 ANY STREET	**6–YOUR PHONE NUMBER**	**10–**
3–YOUR TOWN, STATE	**7–WWW.WEBSITE.CO**	**11–**
4–YOUR POSTAL CODE	**8–SHOP ID NUMBER**	**12–**

To create or overwrite a header:

1. Press ▲ or ▼ to highlight the line you want to change. The cursor will be blinking to the right of the last character in the line.
2. Press ◀ to move the cursor backward to erase a character. To move the cursor forward, press ▶.
3. Insert a character by pressing the key associated with the character as many times as needed.
4. You can center text by selecting blank spaces before and after lines of text or insert spaces between words.
5. Press **SAVE** to save your setting or **BACK** to return to the SHOP INFO screen without saving the changes.

To help you edit and center your header, use the template in the Appendix at the back of this manual to lay everything out before entering it into your tester.

Users

The USERS utility allows you to create and edit a USER ID with 1 to 7 alphanumeric characters and link it to a test counter. It also allows you to delete a USER ID and its associated test total.

Entering A New User ID

1. Use ▲ or ▼ to select ENTER NEW and press **NEXT** to continue, or press the corresponding number key.

   1 ◉ ENTER NEW

   2 ○ DELETE

   3 ○ EDIT

2. Use ▲ or ▼ to scroll to the ID placeholder you want to use. To display more placeholders, continue scrolling or use ◀ or ▶ to jump up or down through the list five lines at a time.

   1 TECH01
   2 TECH02
   3 TECH03
   4 TECH04

3. Press **NEXT** to continue.

4. To clear the default characters, press ◀ as many times as necessary. To add a space, move the cursor forward by pressing ▶.

   ENTER USER ID
   TECH01

5. Insert a character by pressing the alphanumeric key associated with the character as many times as needed. Press **SAVE**.

   ENTER USER ID
   GREG

Deleting A User ID

NOTE: You cannot delete the default USER ID placeholders (i.e., USER03).

1. Use ▲ or ▼ to select DELETE and press **NEXT** to display the list of IDs, or press the corresponding number key.

   1 ○ ENTER NEW

   2 ◉ DELETE

   3 ○ EDIT

2. Use the **ARROW** keys to select a USER ID as described in step 2 in "Entering a New User ID".

   1 GREG
   2 DAVID
   3 TECH03
   4 TECH04

3. Press **DELETE** to continue.

4. At the confirmation screen, press **YES** to confirm that you want to delete the user and return to the **DELETE** users screen.

Editing A User ID

1. Use ▲ or ▼ to select EDIT and press **NEXT** to continue, or press the corresponding number key.:

   1 ○ ENTER NEW

   2 ○ DELETE

   3 ◉ EDIT

2. Use the **ARROW** keys to select USER ID that you want to edit and press **NEXT** to continue.

   1 GREG
   2 DAVID
   3 ALEX
   4 TECH04

3. Use ▲ or ▼ to scroll to the ID placeholder you want to use. To display more placeholders, continue scrolling or use ◀ or ▶ to jump up or down through the list five lines at a time.

4. Press **NEXT** to continue.

5. To clear the default characters, press ◀ as many times as necessary. To add a space, move the cursor forward by pressing ▶.

6. Insert a character by pressing the alphanumeric key associated with the character as many times as needed.

7. Press **SAVE** to save the changes and return to the Utility Menu.

Display

The DISPLAY utility allows you to adjust the contrast of the text on the display and the backlight time.

The contrast level is 0 (lightest) to 10 (darkest). To change it:

1. Press ▲ or ▼ to adjust the LCD contrast, or use the corresponding number keys.

   8 (1-10)

2. Press **SAVE** to save your setting or **BACK** to return to the LCD OPTIONS screen without saving the changes.

Temperature

The TEMPERATURE utility allows you to set the units of measurement to either Fahrenheit or Celsius. To set your preference:

1. Use ▲ or ▼ to select the TEMPERATURE units, or press the corresponding number key.
   - 1 ⦿ CELSIUS
   - 2 ○ FAHRENHEIT
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Admin Menu without saving the changes.

Capacity

The CAPACITY function lets you select the units of battery capacity between Kilowatt hours and Amp hours.

1. Use ▲ or ▼ to select the battery CAPACITY units, or press the corresponding number key.
   - 1 ⦿ AMP HOURS
   - 2 ○ KILOWATT HOURS
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Utility Menu without saving the changes.

Language

The LANGUAGE utility allows you to select a language for the display and printouts. You can override the selection when the EL-50332 displays the language option after you turn it on or print results.

1. Use ▲ or ▼ to select the LANGUAGE you want to use, or press the corresponding number key.
   - 1 ⦿ ENGLISH
   - 2 ○ SPANISH
   - 3 ○ FRENCH
   - 4 ○ GERMAN
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Admin Menu without saving the changes.

Admin

Select the ADMIN icon to display a list of administrative functions:

- 1 ⦿ OPTIONS
- 2 ○ CLEAR TEST TOTALS
- 3 ○ RESET DEFAULTS
- 4 ○ CHANGE ADMIN PIN

Options

In the OPTIONS section there are three functions that allow you to control user access to the Main Menu and Admin Menu.

1 – USER ID
Select this setting to enable (ON) or disable (OFF) the USER ID login screen.

2 – UNREG. USER
Select this setting to enable (ON) or disable (OFF) unregistered login access to the EL-50332.

3 – PIN
Select this setting to enable or disable the ADMIN PIN number.

Each option is easily enabled or disabled by turning it ON or OFF. To save your settings after each selection, press **SAVE**.

To return to the administrative functions list without saving, press **BACK**.

Clear Test Totals

This function allows you to clear the test totals by User ID and battery test decision. The EV/HEV Battery Service Tool verifies that you want the counter reset to 0 before it continues.

NOTE: This will not clear the lifetime test total available in the VERSION information screen.

Reset Defaults

This function allows you to reset Administrative options to their original settings. It will clear all registered users.

Option	Default Settings
1 – USER ID	ON
2 – UNREG. USER	OFF
3 – PIN	Not Available

Change Admin Pin

This function allows you to enter a new 5-digit Admin Pin.

Dealer ID

Use the DEALER ID function to enter the BAC Code for your dealership into the EL-50332.

1. Use the keypad to type in your dealer BAC Code.

ENTER YOUR
BAC CODE

1. Use the keypad to re-enter your dealer BAC Code.

RE-ENTER YOUR
BAC CODE

2. Press **SAVE** to save your setting or **BACK** to return to the Utility Menu without saving the changes.

Update

When software updates become available, use this utility to update the EL-50332 using a USB-style jump drive inserted into the USB-A port.

When performing an update, the EL-50332 will first check the inserted USB drive. Next the version information of the currently loaded software and the new version information found on the drive is displayed on the screen.

Buzzer

The BUZZER utility allows you to enable or disable the warning tone that alerts you if the clamps are connected improperly and or there are other errors.

1. Use ▲ or ▼ to select the BUZZER option you want, or press the corresponding number key.

   1 ○ OFF

   2 ⊙ ON

2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Utility Menu without saving the changes.

Chapter 7: Error Messages

The table below will help you troubleshoot test messages. If troubleshooting does not solve the problem, call Bosch at 1-800-345-2233.

Possible Error Messages

Hardware Error

This error can be generated by damaged or improperly connected cables. To clear the error, turn off the EL-50332, re-seat the cable connections, and power the EL-50332 back up.

If the error message reappears contact Bosch for service.

Communication Error

Indicates an internal communication problem in the EV/HEV Battery Service Tool.

Internal Temperature Sensor Failure

Contact Bosch for service.

Incorrect Voltage Detected

The voltage of the battery is out of range.

Voltage Matches Target Voltage

The measured voltage of the battery module is already at the entered Target Voltage. No additional conditioning is required.

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 customer service or technical support, contact Bosch at 1-800-345-2233.
Have your model and serial numbers ready. This first step is critical as we will trouble-shoot the problem(s) over the phone, and many perceived problems are in fact resolved during this step. If the problem cannot be resolved, then the CS Agent will issue you a Return Material Authorization or RMA. This number becomes your tracking number. The final step is to return the unit to Midtronics freight prepaid (you pay), to the attention of the RMA number obtained.

In USA:
Midtronics, Inc.
Attn: RMA # xxxxx (this is the RMA number that you must obtain from Midtronics)
7000 Monroe St.
Willowbrook, IL 60527

In Canada:
Midtronics c/o FTN (FTN is Fed-ex Trade Networks –this is NOT a Midtronics facility)
Attn: RMA # xxxxx (this is the RMA number that you must obtain from Midtronics)
7075 Ordan Drive
Mississauga, ON L5T1K6

Midtronics will service the unit and reship the next scheduled business day following receipt (in most cases), using the same type carrier and service as received. If Midtronics determines that the failure was caused by misuse, alteration, accident, or abnormal condition of operation or handling, purchaser will be billed for the repaired product and it will be returned freight prepaid with shipping & handling charges added to the invoice. Midtronics products beyond the warranty period are subject to the repair charges in place at that time. Optional re-manufacturing service is available to return our products to like-new condition. Out-of-warranty repairs carry a 3-month warranty. Re-manufactured units purchased from Midtronics are covered by a 6-month warranty.

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