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***GR8-1202***  
**Multitasking Battery And  
Electrical Diagnostic Station**

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***INSTRUCTION MANUAL***

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## Safety Guidelines

### 1 General Safety Precautions

1. **IMPORTANT SAFETY INSTRUCTIONS. IT IS OF UTMOST IMPORTANCE THAT BEFORE USING YOUR CHARGER, YOU READ THIS MANUAL AND FOLLOW THE SAFETY AND OPERATING INSTRUCTIONS EXACTLY. SAVE THESE INSTRUCTIONS.**

#### 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.

#### CAUTION

##### **Charging a non-rechargeable battery may cause the battery to burst.**

To reduce the risk of injury, only charge rechargeable lead-acid type batteries including maintenance-free, low-maintenance, or deep-cycle 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 battery charger 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 charger.
- 1.4 Position the AC and DC leads to avoid tripping over them and prevent damage by hood, doors, or moving engine parts; protect from heat, oil, and sharp edges.
- 1.5 Do not operate the charger if it has received a sharp blow, been dropped or otherwise damaged in any way; take it to a qualified service center.
- 1.6 Do not disassemble charger; take it to a qualified service center when repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
- 1.7 To reduce risk of electric shock, unplug the charger from the AC outlet before attempting any maintenance or cleaning. Turning off the controls will not reduce this risk.

#### CAUTION

##### **Remove marine "boat" batteries and charge them on shore.**

Charging marine batteries on-board requires specially designed equipment for marine use.

- 1.8 Connect and disconnect the battery leads only when the AC supply cord is disconnected.
- 1.9 Do not overcharge the battery. (See sections 3 and 10 in the safety instructions)
- 1.10 Charge the battery in a dry, well-ventilated area.
- 1.11 Never place articles on or around the charger, or locate the charger in a way that will restrict the flow of cooling air through the cabinet.
- 1.12 An extension cord should not be used unless absolutely necessary. (See paragraph 4.3.)
- 1.13 Have a damaged cord or plug replaced immediately.
- 1.14 Do not expose the charger to rain or snow.

### 2 Personal Precautions

- 2.1 Always have someone within range of your voice to come to your aid when working around lead acid batteries.
- 2.2 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- 2.3 Wear complete eye and clothing protection, as well as rubber soled shoes. Place damp cloth over battery to protect against acid spray. When ground is very wet or covered with snow, wear rubber boots. Avoid touching eyes while working near battery.
- 2.4 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid 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 lead-acid battery, remove personal metal items such as rings, bracelets, necklaces, watches, etc. A lead-acid 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 charger's original AC cord and plug. Disconnect plug from outlet when charger is idle.

2.8 The charger is not intended to supply power to a low-voltage electrical system other than applications using rechargeable, lead-acid type batteries. Do not use the battery charger for charging dry-cell batteries commonly used with home appliances. These batteries may burst and cause personal injury and property damage.

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

### 3 Preparing To Charge The Battery

3.1 If it is necessary to remove the battery from vehicle to charge it, always remove the grounded terminal from the battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.

3.2 Be sure the area around the battery is well ventilated while the battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan.

3.3 Clean the battery terminals. Be careful to keep corrosion from coming into contact with your eyes.

3.4 Add distilled water in each cell until the battery acid reaches the level specified by the manufacturer. This helps purge excessive gas from the cells. Do not overfill. For a battery without caps, carefully follow the manufacturer's recharging instructions

3.5 Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

3.6 Determine the voltage of the battery by referring to the car owner's manual and make sure that the output voltage selector switch is set at the correct voltage. If the charger has an adjustable charge rate, charge the battery initially at lowest rate. If the charger has only one voltage, verify that the battery voltage matches the voltage of charger.

For a charger not having an output voltage selector switch, determine the voltage of the battery by referring to car owner's manual and make sure it matches the output rating of the battery charger.

### 4. Grounding & Power Cord Connections

4.1 The charger must be grounded to reduce risk of electric shock. The charger 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 charger's original AC cord and plug. Disconnect plug from outlet when charger is idle.

**IF THE PLUG DOES NOT FIT THE OUTLET, HAVE A QUALIFIED ELECTRICIAN INSTALL A PROPER OUTLET.**

4.2 This battery charger is for use on a nominal 120-volt circuit and has a grounding plug that 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

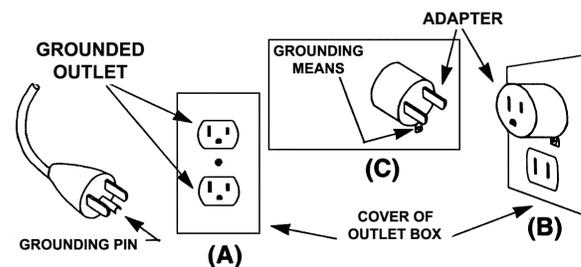


**Hazardous voltage.**

**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 APPLIANCE UNTIL THE PROPER OUTLET IS INSTALLED BY A QUALIFIED ELECTRICIAN.**



4.3 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:

- that the pins on plugs of the extension cord are the same number, size, and shape as those of the plug on the charger;
- that the extension cord is properly wired and in good electrical condition;
- that the wire size is large enough for the AC ampere rating of charger as specified in the following table.

Recommended minimum AWG* size for extension cords for battery chargers					
AC input rating amperes		AWG* size of cord			
Equal or greater than:	But less than:	Length of cord, feet (m)			
		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

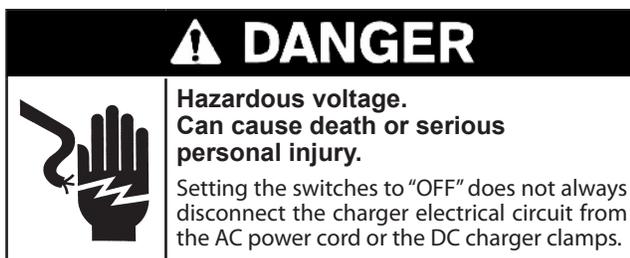
\*American Wire Gauge

## 5. Charger Location

- 5.1 Locate the charger as far away from the battery as the charger cables permit.
- 5.2 Never place the charger directly above the battery being charged; gases from the battery will corrode and damage the charger.
- 5.3 Never allow battery acid to drip on the charger when taking gravity readings or filling a battery.
- 5.4 Operate the charger only in a well-ventilated area that is free of dangerous vapors.
- 5.5 Store the charger in safe, dry location and maintain it in perfect condition.
- 5.6 Do not set the battery on top of the charger or where its acid might drip onto the charger.

## 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 and disconnect the charger clamps. Never allow the clamps to touch each other.
- 6.2 When attaching the charger clamps, be certain to make the best possible mechanical as well as electrical connection. This will tend to prevent the clamps from slipping off the connections, avoid dangerous sparking, and assure safer and more efficient charging. The clamps should be kept clean.



## 7. Installing The Battery

### ⚠ CAUTION

#### Risk of explosive gases.

A spark near the battery may cause a battery explosion. Follow these steps when the battery is installed in the vehicle to reduce the risk of explosion.

- 7.1 Before working on the vehicle, firmly apply the emergency brake and place the gear shift to NEUTRAL—shift an automatic transmission to PARK.
- 7.2 Locate the charger as far away from the battery as the charger cords permit and position the AC and DC cords to avoid stepping on or tripping over them and to prevent damage by hood, doors, or moving engine parts.
- 7.3 Stay clear of fan blades, belts, pulleys, and any other parts that can cause physical injury.
- 7.4 Turn **OFF** all vehicle loads, including door lights, and correct any defects in the vehicle's electrical system that may have caused low battery.
- 7.5 Check the polarity of the battery posts. The **POSITIVE (POS., P, +)** post usually has a larger diameter than the **NEGATIVE (NEG., N,-)** post.
- 7.6 Determine which post of the battery is grounded (connected) to the chassis. If the negative post is grounded (as in most vehicles), see paragraph 7.7. If the positive post is grounded, see paragraph 7.8.
- 7.7 For a negative-grounded vehicle, first connect the **POSITIVE (RED)** clamp from the charger to the **POSITIVE (POS., P, +)** ungrounded post of the battery. Then connect the **NEGATIVE (BLACK)** clamp to the **NEGATIVE (NEG., N,-)** post of the battery. Do not connect the clamp to the carburetor, fuel lines, or sheet-metal body parts. When disconnecting the charger, turn all switches to **OFF**, disconnect the AC cord, remove the clamp from the **NEGATIVE** battery terminal, and then remove the clamp from the **POSITIVE** battery terminal.

7.8 For positive-grounded vehicle, connect the **NEGATIVE (BLACK)** clamp from the charger to the **NEGATIVE (NEG., N, -)** ungrounded post of battery. Then connect the **POSITIVE (RED)** clamp to the **POSITIVE (POS., P, +)** post of the battery. Do not connect clamp to carburetor, fuel lines, or sheet-metal body parts.

When disconnecting the charger, turn the switches to **OFF**, disconnect the AC cord, remove the clamp from the **POSITIVE** battery terminal, and then remove the clamp from the **NEGATIVE** battery terminal.

**CAUTION: WHEN POSITIVE (+) POST OF VEHICLE BATTERY IS GROUNDED, DOUBLE CHECK POLARITY.**

8.1 Check the polarity of battery posts. **POSITIVE (POS., P, +)** post usually has larger diameter than **NEGATIVE (NEG., N, -)** post.

8.2 When disconnecting the charger, always do so in the reverse sequence of the connecting procedure; break the first connection while staying as far away from the battery as practical.

8.3 **MARINE "BOAT" BATTERIES MUST BE REMOVED AND CHARGED ON SHORE. TO SAFELY CHARGE THEM ON BOARD REQUIRES EQUIPMENT ESPECIALLY DESIGNED FOR MARINE USE.**

## 8. Connecting To The Battery

8.1 If it is necessary to remove the battery from the vehicle or equipment, always remove the grounded terminal from the battery first.

<b>⚠ DANGER</b>	
	<p><b>Risk of explosive gases. Can cause death or serious personal injury.</b></p> <p>Always work in a well-ventilated area. 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.</p>

<b>⚠ CAUTION</b>	
<p><b>Risk of explosive gases.</b></p> <p>Make sure all vehicle loads are <b>OFF</b> to prevent a possible arc..</p>	

## Chapter 1: Introduction & Overview



### Safety Reminder

For safe, efficient, and accurate charging and testing, review the safety and operating instructions in this manual before using the analyzer. In addition, follow all manufacturer instructions and BCI (Battery Council International) safety recommendations.



### Safety Precautions

Inspect the battery for damages 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:

<b>⚠ DANGER</b>	
	<p><b>Risk of explosive gases. Never smoke or allow a spark or flame in the vicinity of a battery.</b></p> <p>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..</p>

<b>⚠ CAUTION</b>
<p><b>Wash hands after handling.</b></p> <p>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.</p>

- ⇒ 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.
- ⇒ Never charge a frozen battery. Gases may form, cracking the case, and spray out battery acid.

### Conventions Used in This Manual

To help you learn how to use your GR8, the manual uses these symbols and typographical conventions:

Convention	Description
	The safety symbol indicates instructions for avoiding hazardous conditions and personal injury.
<b>CAUTION</b>	The word <b>CAUTION</b> indicates instructions for avoiding equipment damage.
	The wrench symbol indicates procedural notes and helpful information.
<b>ARROW</b>	The text for keypad buttons are in <b>Bold</b> capital letters.
CAPITAL LETTERS	The text for screen options are in regular capital letters.
<b>NEXT</b>	The text for soft keys are in <b>Bold</b> capital letters.

### Assembling the GR8

The GR8 control module, multitasking module, and mounting bracket are packaged separately. For easy assembly, follow these steps:

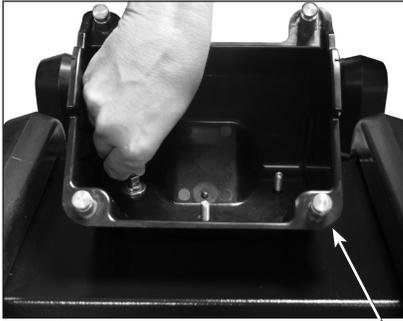
#### Attaching the Control Module

1. The hardware to attach the control module's mounting bracket to the GR8 is installed on the top of the charger. There are three bolts with one flat washer, one lock washer, and one hex nut per bolt. Remove the washers and hex nuts, and set them aside.



**Pre-installed bolts for the control module mounting bracket.**

- Center the three holes in mounting bracket over the bolts, and lower the bracket onto the charger. Reinstall the hardware in this order: the flat washer first, the lock washer next, and the hex nut last. Tighten the nuts securely.



Control Module mounting bracket

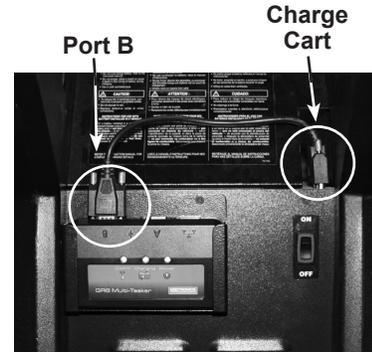
- Center the holes on the bottom of the control module with the bolts, and lower the module onto the top of the bracket. Firmly pull the module down at an angle until the bolts are inserted securely into the slots extending from the module's holes.



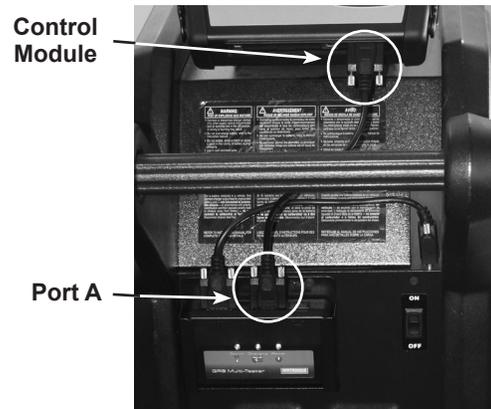
### Installing the Multitasker Module

The GR8-1202 comes with a bracket to hold the multitasker module.

- Place the multitasker module in the bracket. Connect one of the serial cables between port B of the multitasker and the cart.



- Connect the other serial cable between the control module and port A of the multitasker.

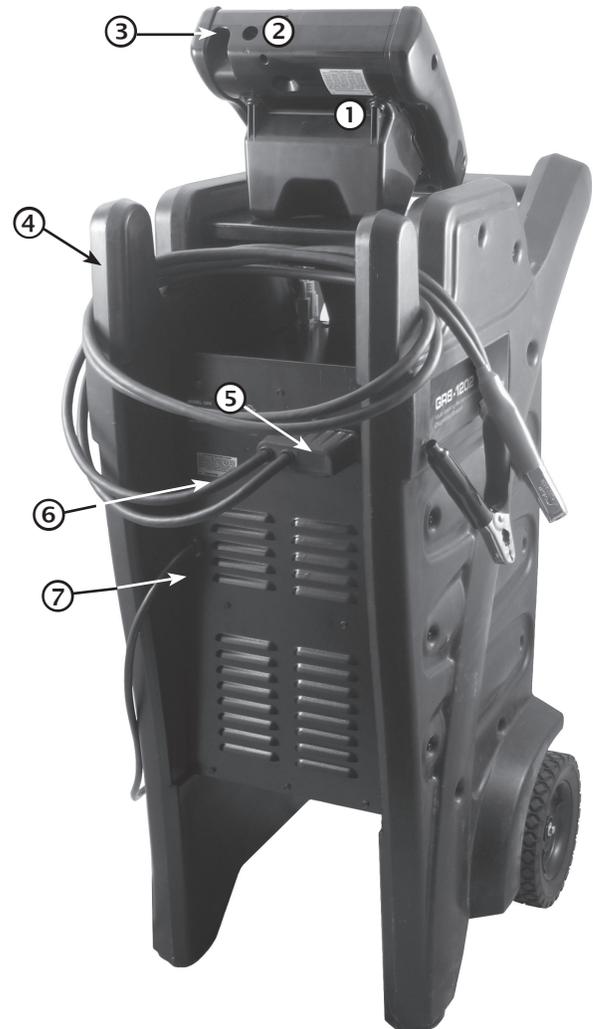


## Front of GR8



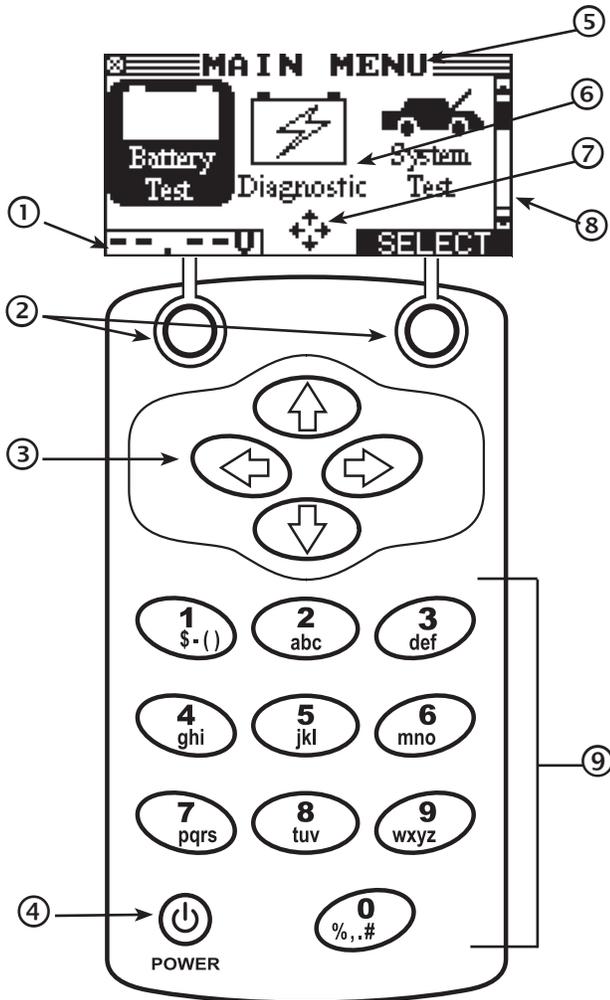
- ① **STATUS light**  
Lights in conjunction with beeping alarm to indicate transitions and warnings.
- ② **Control Module**  
Backlit graphical display and keypad for data entry.
- ③ **Data Card slot**  
For data storage and future software updates.
- ④ **Multitasker Module**  
Allows GR8 to test battery and electrical systems while charging an additional battery.
- ⑤ **ON/OFF Switch**  
Turns power on and off to the GR8.

## Back of GR8



- ① **Serial number label**  
(for control module)
- ② **Battery and System test cable connector**
- ③ **AMP Clamp Connector**  
For use with amp clamp
- ④ **Cable wrap**  
For storing cables when not in use.
- ⑤ **Charger cable connectors**
- ⑥ **Serial number label**  
(for charger)
- ⑦ **AC power cord**  
Connection to grounded nominal 120 V outlet. Display and Keypad

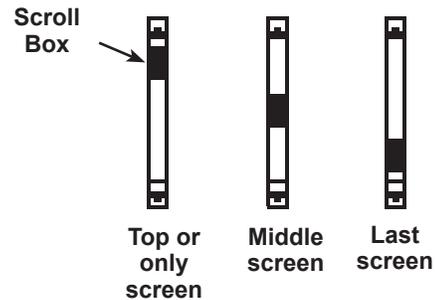
### Control Module Keypad



- ① **Voltmeter**  
When you first connect the GR8 to a battery it functions as a voltmeter. The voltage reading appears above the left soft key until you move to other menus or functions.
- ② **Soft Keys**  
Press the two soft keys to perform the functions displayed above them. These functions will change depending on the menu or test process.
- 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 **Title Bar**  
The title bar shows you the name of the current menu, test tool, utility, or function.
- ⑥ **Selection Area**  
The selection area below the **Title Bar** contains selectable items or dialog boxes that display information or require a response.

- ⑦ **Menu Screen Arrows (▲▼◀▶)**  
When displayed, the arrows show you which **ARROW** key on the keypad to press to display other icons or screens.  
  
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.

- ⑧ **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).



- ⑨ **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.

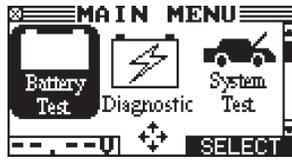
Key	Character				
①	\$	-	()	1	
②	a	b	c	2	
③	d	e	f	3	
④	g	h	i	4	
⑤	j	k	l	5	
⑥	m	n	o	6	
⑦	p	q	r	s	7
⑧	t	u	v	8	
⑨	w	x	y	z	9
⑩	%	,	.	#	0

## Data Entry Methods

Typically, the soft key below the right half of the screen confirms your choice. The soft key below the left half of the screen cancels your choice or returns you to the previous screen.

### Menu Icons

A menu icon is a graphical representation of a function you can select, such as the DC Amp Meter Test Icon in the DMM 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.

## Value Boxes

Value boxes contain items that extend above and below the selection box that contain them. To indicate that there are more values, the symbols ▲ appear to the right of the box. To select, use ▲ or ▼ to scroll to the value, or use the keypad to enter the value directly, and press the appropriate soft key. In the illustration the left directional arrow indicates that you can press ◀ to clear all or part of the entry.



## Main Menu

Icon	Description
	Tests a battery using the battery information you select in a series of screens.
	Automatically tests, charges, and provides battery decision using the information you select in a series of screens.
	Tests a battery, and the starting and charging systems.
	Tests and maintains battery voltage at 13.5 volts to provide uninterrupted reprogramming of ECMs and retain vehicle system settings.
	Makes high output current available to boost charge an in-vehicle battery and assist in starting the engine.
	Provides a timed charge that ranges from 5 to 120 minutes or a continuous charge that ends when you press the <b>STOP</b> key.
	View and print test results, total test counters, data transfer, software version and date, and GR8 serial number for the Control Module.
	Test the voltage drop of circuits.
	Test the amount of current draw on the battery when the ignition and all accessories are off.
	Digital multimeter with 4 test meters.
	Enables you to test up to 100 batteries in succession without re-entering battery information each time.
	The Setup Menu lets you customize options in the GR8 to suit your needs.
	Provides a list of topics and definitions. Also includes Midtronics Customer Service phone numbers.

### Info Menu



Selecting the Info Menu lets you view the test results for the Battery, Charger, and Cable Test. This menu also allows you to select Totals, Transfer results and view Software Version information.

Icon	Description
View Test Battery	Displays the last Battery results. Sends the results to the printer.
View Test Charger	Displays the last Charger results. Sends the results to the printer.
View Cable Test	Displays the last Cable Drop Test result. Sends the result to the printer.
View Inv. Tests	View and Print the results from the last inventory test.
Totals	Display total results from the tester or charger.
Transfer	Transfers test results and counters to an IR receiver and data card.
View Wireless	Displays wireless communication quality and channel being used.
Version	Lists the software version, version date, and serial number.

### DMM Menu



Selecting the Info Menu lets you view the test results for the Battery and Charger. This menu also allows you to select Totals, Transfer results and view Software Version information.

Icon	Description
Ohm Meter	Tests a circuit for continuity and resistance measured in ohms ( $\Omega$ ).
Diode	Tests a diode for forward voltage drop.
Scope	Voltage trace with time and frequency measurements.
DC Voltage AMP	Displays the last DC test results. Sends the results to the printer.
AC Voltage AMP	Displays the last AC test results. Sends the results to the printer.

### Setup Menu



The Setup Menu has several functions to customize the use of your GR8—from the language of the user interface to the contrast of the display.

Icon	Description
Clock	Settings to adjust the time.
Shop	Enables you to add a custom header to printed test results.
Users	Add, edit, or delete User IDs.
Info Upload	Updates Shop, Coupon, User, and Screen information on the GR8 using a data card.
Display	Settings to adjust the screen contrast and backlight time.
Coupon	Use this option to turn Coupon printing on or off.
Edit Coupon	Enables you to create a coupon at the bottom of printed test results.
Track Calls	Stores test results on the data card when enabled (ON). (Data card reader required)
Language	Sets the language of the display and printouts.
Admin	Offers additional administration options such as showing the user ID and headers for printouts.
Select	Select built-in printer or an external IR printer.
Update	Updates the GR8 software using files on an data card.
Format	Formats the data card to receive data. Also erases all data on the card.
Buzzer	Allows you to turn the buzzer OFF. Default is ON.
User Screen	User-defined questions with the answers stored in data files on the data card.
Wireless	Optimize wireless communication between the Multitasker and Control Module.

## Setting User Preferences

Before starting your test you may want to customize the use of your GR8 by setting preferences in the Setup Menu under the Admin icon. This menu has settings for time, contrast, customizing printouts for the optional IR printer, and several other settings.

## Help Menu



The GR8 provides a Help Menu with a glossary of test-related definitions that you may want to review prior to testing.

This menu also provides troubleshooting information and phone numbers for Midtronics Customer Service, in case you encounter a problem and/or need technical assistance.

See Chapter 14: Maintenance & Troubleshooting for more information about the Help function.

## Multitasking

The GR8-1202 Multitasking Battery Diagnostic Station is capable of doing two jobs at once. Historically a charger or tester could only perform one function at a time. The GR8-1202 Multitasking Battery Diagnostic Station has the ability to charge or test the battery and the electrical system of a vehicle independently while a second battery is being charged.

## Wireless Multitasking

The Multitasker communicates with the control module using RF radio signals. Once a charge session has begun, the control module can be disconnected and removed to test another vehicle in the service bay—thus, acting as two tools in one. The Multitasker will control the charge session when the control module is removed. The charge session can be monitored with the control module even when it is not connected however, internal AA battery life will be reduced. Long-term monitoring of a charge session should be done while connected to the Multitasker.

## Procedure Example

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8.

The best way to utilize the multitasking feature is by first testing a battery using the Battery Test or System Test with the associated battery test cables that come from the top of the controller. If the test decision for the battery is one that requires a charge then the controller will ask you if you want to charge the battery.

Select CONTINUE, swap out the tester cables for the charging cables, and the controller will now analyze the battery for the optimal charging conditions. Once the charge process has started you can go back to the main menu and continue to run system tests while the charger is charging.

Starting with the battery test is recommended so that a good battery decision can quickly be reached. While the charger can also be used and will reach the same decision, it is designed to determine the optimum charging method for a battery and therefore will take longer before reaching a decision. The same holds true for a bad cell or other physical flaws that will cause a replace battery decision.

## 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 low, add distilled water to fill up to ½ above the top of the plates and fully charge the battery. Do not overfill.
- Corroded or loose battery tray and hold-down fixture. Tighten or replace as needed.

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

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

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

### CAUTION

**Do not test at the battery's steel bolts.**

Failure to properly install lead terminal adapters, or using adapters that are dirty or worn, may cause false test results. Always use lead terminal adapters provided with the GR8 when testing side-post or Group 31 batteries.



**IMPORTANT:** To avoid damage, never use a wrench to tighten the adapters more than ¼ turn.



**IMPORTANT:** There must be a formatted data card installed in the GR8 in order for it to work properly.

## Testing In-Vehicle (System Test)

Before starting the test, inspect the alternator drive belt. A belt that is glazed or worn, or lacks the proper tension, will prevent the engine from achieving the rpm levels needed for the test.

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

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

## Connecting to the Battery

Connect the testing clamps to the battery in accordance with all precautions and safety instructions. **Do not connect either clamp to the vehicle's chassis.**

Connect the red clamp to the positive (+) terminal and the black clamp to the negative (-) terminal.

If you connect the clamps in the wrong polarity (red to negative or black to positive), the analyzer sounds an alarm and displays CLAMPS REVERSED! Reverse the clamps and reconnect the clamps to the battery.

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

## Initial Power-up

When you turn on the charger, it will initially display the GR-1202 logo on the screen while testing the internal software integrity.

## Selecting A Language

After the logo appears, the first selection screen to appear enables you to temporarily set the language for the display and printed test results.

- Use ▲ or ▼ to select the LANGUAGE you want the tool to use as the default language and press **NEXT**, or press the corresponding number key.
  - ENGLISH
  - ESPAÑOL
  - FRANÇAIS
- Press **SAVE** to save your settings and continue to Main Menu.



## Chapter 2: Battery Test

### Test Requirements



The GR8 guides you through the steps of selecting your battery test parameters and interpreting the results. Before you start the test, review the instructions in Chapter 1: Introduction & Overview.



**NOTE:** When you start a new test, the last test results in memory are overwritten. Remember to record or print the results if you need to retain them.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the small clamps from the GR8 control module when performing a Battery Test.

If you use the **ARROW** keys to select option buttons, press **NEXT** to continue to the next step.

1. In the Main Menu select the BATTERY TEST icon.
2. Use **▲** or **▼** to select the battery LOCATION and press **NEXT** to continue, or press the corresponding number key.
  - 1  OUT OF VEHICLE
  - 2  IN VEHICLE
3. Use **▲** or **▼** to select the battery POST TYPE and press **NEXT** to continue, or press the corresponding number key. The JUMP START POST option will only appear when IN VEHICLE testing has been selected.
  1.  TOP POST
  - 2  SIDE POST
  - 3  JUMP START POST



**NOTE:** If the measured battery voltage is below 7.5 V, you will be prompted to select between a 6 and 12 volt battery.

4. Use **▲** or **▼** to select the battery APPLICATION, or press the corresponding number key and press **NEXT** to continue.
  - 1  AUTOMOTIVE
  - 2  MARINE BATTERY
  - 3  MOTORCYCLE
  - 4  GROUP 31
  - 5  COMMERCIAL – 4D/8D
  - 6  LAWN AND GARDEN
  - 7  AG/TRACTOR
5. Use **▲** or **▼** to select the BATTERY TYPE, or press the corresponding number key and press **NEXT** to continue.
  - 1  REGULAR
  - 2  AGM
  - 3  AGM/SPIRAL
  - 4  GEL



**NOTE:** The BATTERY TYPE options will vary depending on the APPLICATION selected in the previous step.

6. Use **▲** or **▼** to select the battery RATING UNITS, or press the corresponding number key and press **NEXT** to continue. The rating units and rating information required in the next step are printed on the battery label. If the information is unreadable, contact the battery manufacturer.
  - 1  CCA
  - 2  CA
  - 3  JIS
  - 4  DIN
  - 5  SAE
  - 6  IEC
  - 7  EN
  - 8  MCA

If you select JIS, the analyzer will ask for the JIS part number. Scroll to the part number. To increase your scrolling speed, hold **▲** or **▼**, or use **◀** or **▶** to move up or down four part numbers at a time.

Ratings	Description	Range
CCA	Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 °F (-17.8 °C).	100 to 3000
CA	Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000
JIS	Japanese Industrial Standard: (shown on a battery as a combination of numbers and letters.	72 numbers from 26A17 to 245H52
DIN	Deutsche Industrie-Norm	100 to 1000
SAE	European labeling of CCA	100 to 3000
IEC	International Electrotechnical Commission	100 to 1000
EN	Europa-Norm	100 to 1700
MCA	Marine Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000

- Use ▲ or ▼ to enter the BATTERY RATING, or press the corresponding number keys. Scrolling increases and decreases the units by 5. To increase your scrolling speed, hold down ▲ or ▼. Use ◀ to backspace digit by digit.



### Additional Test Requirements

For a more decisive result the analyzer may ask for additional information or further explore the battery’s condition. The following messages and instructions may appear before the analyzer displays the results.

### System Noise Detected

The analyzer has detected computer, ignition noise, or parasitic drain, and will attempt to retest. Make sure all vehicle loads are off, doors are closed, and the ignition is in the off position. The analyzer will automatically retest when it no longer detects system noise. If the message reappears:

- You may be testing too close to a noise source, such as a charger or other high-current device. If so, move away and retest.
- If you are unable to find the source of the noise, fully charge the battery and retest. If the message appears after recharging, test the battery out of the vehicle.
- Disconnect the battery cables and retest.

### Unstable Battery Detected

A battery that is weak or that has just been charged may retain enough electrical activity to be detected by the analyzer and will adversely affect the test results. A fully charged battery should stabilize quickly, after which the analyzer will automatically retest. Weak batteries should be charged and retested. If the battery is fully charged, check the clamp connections.

### Deep Scan Test

In some cases the analyzer may need to further analyze a deeply discharged battery to determine whether the battery should be replaced or if it has a chance to be recovered. It will then conduct a Dynamic Scan Test of the battery for a few seconds while displaying a battery being scanned.



### Battery Test Results

After the test, the analyzer displays a battery decision with an analysis in a series of screens. The analysis includes the battery state-of-health and state-of-charge.

Use ▲ or ▼ to scroll to each screen. To return to the Main Menu, press **END**. If you are performing a System Test, press **NEXT** to continue with the Starter System Test.



Decision	Recommended Action
GOOD BATTERY	Return the battery to service.
GOOD-RECHARGE	Fully charge the battery and return it to service.
OK - REPLACE SOON	The battery may fail under extreme climate conditions. The battery result may also mean a poor connection between the battery and the vehicle. If you tested the battery in vehicle, disconnect the battery cables and retest using the Battery Test before replacing it.
CHARGE & RETEST	Fully charge and test the battery using a Midtronics Diagnostic Charger.
REPLACE BATTERY	Disconnect the battery cables and replace the battery.
BAD CELL-REPLACE	Replace the battery. <b>WARNING: Do not charge the battery. Charging a battery with one or more bad cells could cause an explosion and serious harm to the user.</b>
SIDE POST TEST	Test data was inconclusive using the side post. Retest using side post adapters.
JUMP START POST	Data was inconclusive using the jump start post. Retest at the battery terminals.
24V	24-volt battery detected. You are attempting to test in-vehicle both batteries in a 24-volt system. Disconnect the batteries and test them individually.

### State-of-Charge

The State-of-Charge is one of several important factors that affect the battery's ability to crank an engine. It is a measure of the available capacity remaining of a battery expressed as a percentage of its original rated capacity. During testing, the GR8 accurately detects a battery's State-of-Charge and indicates this as part of the test results.

### State of Health

The battery's state of health represents its general condition, and therefore its ability to deliver the specified performance compared with a fresh battery.

Although a poor state-of-health can be the result of defects in construction, it is most often caused by normal wear, which depends on vehicle needs, climate, and operating conditions. These cause irreversible physical and chemical changes within the battery until it can no longer hold a charge and supply the power to start the car and provide auxiliary power to the electrical system. As the battery approaches end of life, its deterioration accelerates until it finally fails to start the vehicle. Before failing, the battery may start the vehicle under normal conditions but may not be able to operate in more extreme conditions. Extreme heat or cold could expose a weak battery and cause it to fail.

## Chapter 3: Diagnostic Charging



The GR8 1202 battery analyzer and diagnostic charger will determine the internal condition of a battery before attempting to apply a charge to it.

The charger applies an AC signal at a known frequency across the terminals and measures the internal conductance to determine battery health before attempting to charge.

Before you start the test, review the instructions in Chapter 1: Introduction & Overview.



**NOTE:** When you start a new test, the last test results in memory are overwritten. Remember to record or print the results if you need to retain them.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the large clamps from the GR8 charge engine when performing diagnostic charging.

Before performing a diagnostic charge on a battery installed in a vehicle, make sure all vehicle accessory loads are off, the key is not in the ignition, and the doors are closed.

Use the following procedure to perform a diagnostic charge on a battery.

1. If connected, remove the small clamps from the battery terminals.
2. Connect the large clamps from the charge engine to the battery terminals.
3. From the Main Menu, highlight the DIAGNOSTIC icon and press the **SELECT** key.
4. Use ▲ or ▼ to select the battery LOCATION and press **NEXT** to continue, or press the corresponding number key.
  - 1  OUT OF VEHICLE
  - 2  IN VEHICLE
5. Use ▲ or ▼ to select the battery POST TYPE and press **NEXT** to continue, or press the corresponding number key. The JUMP START POST option will only appear when IN VEHICLE testing has been selected.
  - 1  TOP POST
  - 2  SIDE POST
  - 3  JUMP START POST



**NOTE:** If the measured battery voltage is below 7.5 V, you will be prompted to select between a 6 and 12 volt battery.

6. Use ▲ or ▼ to select the battery APPLICATION, or press the corresponding number key and press **NEXT** to continue.
  - 1  AUTOMOTIVE
  - 2  MARINE BATTERY
  - 3  MOTORCYCLE
  - 4  GROUP 31
  - 5  COMMERCIAL – 4D/8D
  - 6  LAWN AND GARDEN
  - 7  AG/TRACTOR
7. Use ▲ or ▼ to select the BATTERY TYPE, or press the corresponding number key and press **NEXT** to continue.
  - 1  REGULAR
  - 2  AGM
  - 3  AGM/SPIRAL
  - 4  GEL



**NOTE:** The BATTERY TYPE options will vary depending on the APPLICATION selected in the previous step..

8. Use ▲ or ▼ to select the battery RATING UNITS, or press the corresponding number key and press **NEXT** to continue. The rating units and rating information required in the next step are printed on the battery label. If the information is unreadable, contact the battery manufacturer.
  - 1  CCA
  - 2  CA
  - 3  JIS
  - 4  DIN
  - 5  SAE
  - 6  IEC
  - 7  EN
  - 8  MCA

If you select JIS, the analyzer will ask for the JIS part number. Scroll to the part number. To increase your scrolling speed, hold ▲ or ▼, or use ◀ or ▶ to move up or down four part numbers at a time.

Ratings	Description	Range
CCA	Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 °F (-17.8 °C).	100 to 3000
CA	Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000
JIS	Japanese Industrial Standard: (shown on a battery as a combination of numbers and letters.	72 numbers from 26A17 to 245H52
DIN	Deutsche Industrie-Norm	100 to 1000
SAE	European labeling of CCA	100 to 3000
IEC	International Electrotechnical Commission	100 to 1000
EN	Europa-Norm	100 to 1700
MCA	Marine Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000

- Using the keypad or the ▲ or ▼ keys to select the BATTERY RATING and press **NEXT** to begin the charging process.



### Charging Modes

Diagnostic Charging has four modes (Initial Analysis, Deep Scan Test, Diagnostic Mode, Top-Off Mode) that the GR8 may use to determine the State-of-Health of the battery while bringing it to a full State-of-Charge.

#### Initial Analysis

The GR8 first analyzes the battery and may make a decision: GOOD BATTERY, REPLACE BATTERY, or REPLACE-BAD CELL. For diagnostic charge analysis, progress is shown by the left to right movement of a progress bar.



#### Deep Scan Test

In some cases the GR8 may need to further analyze the battery to determine whether the battery should be replaced or it has a significant chance to be recovered. It will then conduct a Deep Scan Test of the battery for a few seconds.



After the Deep Scan Test the GR8 will either display the results or give you the option to perform the 5-Minute Discharged Battery Test. Although this test takes several minutes, it gives a more precise result for difficult-to-diagnose batteries. The decision tree of the test is shown below.

#### Diagnostic Mode

Once the GR8 determines that the battery is good, needs charging, and is safe to charge, it proceeds to Diagnostic Charge Mode. During the charging session, the GR8 provides updates of the charging voltage, charging current, remaining time to charge, charging mode, and the amount of charge replenished into the battery in amp-hours. The GR8 continues to test the battery throughout Diagnostic Mode and may determine at some point that the battery needs to be replaced.



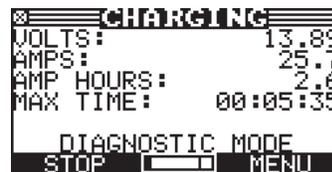
**NOTE:** The actual time needed to charge the battery may be less than the estimated time depending on the battery's charge acceptance.

When the battery requires testing, the display alternates between the CHARGING and TESTING screens. The TESTING screens represent a two-step process.

- Step 1: The GR8 applies an electrical load and tests the battery's response.



- Step 2: The GR8 measures the battery's CCA.



The Estimated time only appears when the charger is in DIAGNOSTIC mode and after the five -minute printout.

This mode occurs automatically at the end of the charge cycle to allow the charger to fill a good battery to capacity. Top-Off Mode ends when the battery's acceptance of the charge current goes below 2 amps, or when you press the **STOP** button.

#### Aborting a Charge Session

If you need to abort the charging session, press and hold the **STOP** key until the charging session is aborted. After aborting, select **NEXT** to return to the Main Menu.

### Completing a Charge Session

The charge session is complete when the proper amount of charge is put back into the battery or the remaining estimated time to charge counts down to zero.

If the GR8 finds that the battery is bad before the end of the estimated time to charge, it displays the decision REPLACE BATTERY or BAD CELL-REPLACE and the results.

If charging at the side posts or jump start posts and the test data is inconclusive, the GR8 displays the decision JUMP START POST or SIDE POST TEST. A JUMP START POST decision prompts you to test at the battery. A SIDE POST TEST decision prompts you to test using the side post adapters.

When the decision is GOOD BATTERY, the GR8 gives you the option of topping off the battery's charge level before it displays the results.

### Diagnostic Charge Results

Use ▲ or ▼ to scroll to each screen. To return to the Main Menu, press EXIT. To print, press PRINT.

### Diagnostic Charging Decisions

Battery Decision	Recommended Action
GOOD BATTERY	Return the battery to service.
OK-REPLACE SOON	The battery may fail under extreme climate conditions. The battery result may also mean a poor connection between the battery and the vehicle and the battery. If you tested the battery using the System test, disconnect the battery cables and retest using the Battery Test before replacing it.
REPLACE BATTERY	Before replacing the battery make sure battery cables and connections are clean and solid. If they are loose or corroded, clean and tighten, then retest.
BAD CELL - REPLACE	Replace the battery. This decision indicates a bad cell within the battery.   <b>WARNING: Charging a battery with a bad cell is dangerous!</b>

### Top-Off Mode

Following the Diagnostic Charge Mode process the GR8 will prompt you to stop the process or continue on in Top-Off Mode. After two minutes the GR8 will automatically enter Top-Off mode if there is no user input.

Press **STOP** to end the TOP OFF MODE and return to the Main Menu. Press **MENU** to return to the Main Menu while the TOP OFF MODE continues in the background.

## Chapter 4: System Test



The GR8 guides you through the steps of selecting the System Test parameters and interpreting the results. Before you start the test, review the instructions in Chapter 1: Introduction & Overview.



**NOTE:** When you start a new test, the last test results in memory are overwritten. Remember to record or print the results if you need to retain them.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the small clamps from the GR8 control module when performing a System Test.

If you use the **ARROW** keys to select option buttons, press **NEXT** to continue to the next step.

1. In the Main Menu select the SYSTEM TEST icon.
2. If you using the AMP CLAMP option, select AVAILABLE. If you are not using the AMP CLAMP, select NOT AVAILABLE.
  - 1  AVAILABLE
  - 2  NOT AVAILABLE

If you are using the amp clamp, plug it into the Control Module and follow the procedure for setting it to zero.



**NOTE:** Select AMP CLAMP if you want to perform a Key-Off Draw test as part of the System Test.

3. Follow the procedure outlined in Chapter 2: Battery Test.

### Starter Test

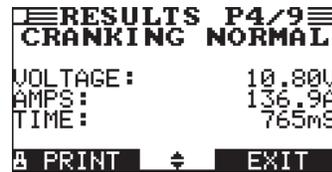
1. Following a successful battery test, start the vehicle's engine when prompted.
2. The GR8 will display 1 of 8 starter decisions with the complete results in a series of screens. Use ▲ or ▼ to scroll to each screen.

To print, press the **PRINT** key. To continue testing, press **NEXT**.



**NOTE:** In some cases, the GR8 may not detect the vehicle's starting profile and will display the options STARTED and NO START. Select STARTED, to continue with an alternator test. Select NO START to end the test process.

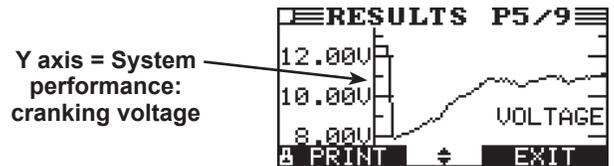
### Starter System Test Results



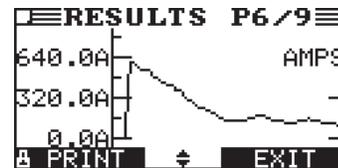
Average cranking voltage

Average cranking current if amp clamp is used

Cranking time in seconds



X axis = Time



### Starting System Decisions

Decision	Action Recommended
CRANKING NORMAL	The starter voltage is normal and the battery is fully charged.
LOW VOLTAGE	The starter voltage is low and the battery is fully charged.
CHARGE BATTERY	The starter voltage is low and the battery is discharged. Fully charge the battery and repeat the starter system test.
REPLACE BATTERY	(If the battery test result was (REPLACE or BAD CELL.) The battery must be replaced before testing the starter.
NO START	The engine didn't start and the test was aborted.
CRANKING SKIPPED	The GR8 didn't detect the vehicle's starting profile and skipped the Starter Test.
SIDE POST TEST	Test Data was inconclusive using the side post. Retest using side post adapters.
JUMP START POST	Data was inconclusive using the jump start post. Retest at the battery terminals.

## Charging System Test

When you press **NEXT** in any test result screen, the analyzer proceeds to the Charging System Test.

1. CHECKING FOR ALTERNATOR OUTPUT: The analyzer is testing for alternator voltage.
2. TURN ALL VEHICLE LOADS OFF, IDLE ENGINE: Turn off vehicle loads (blowers, interior light, radio, etc.) and idle the engine.

Press **NEXT** to continue.

3. REV ENGINE WITH LOADS OFF FOR 5 SECONDS: Rev the engine with the loads off. Gradually increase the rpm until the analyzer tells you to HOLD the rev level as the bar on the display moves to the right.



**NOTE:** Some 8-cylinder, older vehicles and pulse modulated alternators can prevent the analyzer from detecting the engine rev automatically.

4. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
5. ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. If the engine rev is not detected, select **NEXT** to skip the engine rev or **END** to end the test and return to the Main Menu.
6. TESTING ALTERNATOR AT IDLE, LOADS OFF: The analyzer will next test the engine at idle for comparison to other readings, and then test the diode ripple. Excessive ripple usually means one or more diodes have failed in the alternator or there is stator damage.
7. TURN HIGH BEAMS AND BLOWER MOTOR ON, IDLE ENGINE: After a few seconds, the analyzer will ask you to turn on the accessory loads. It will determine if the charging system is able to provide enough current for the demands of the electrical system.



**IMPORTANT:** Turn on the high-beam headlights and the blower to high. Do not use cyclical loads such as air conditioning or windshield wipers.

8. TESTING ALTERNATOR AT IDLE, LOADS ON: The analyzer will determine if the charging system is able to provide sufficient current for the demands of the vehicle's electrical system.
9. REV ENGINE WITH LOADS ON FOR 5 SECONDS: The analyzer will test the charging system with the loads on and prompt you to rev the engine. Gradually increase the rev until the analyzer tells you to HOLD the rev level as the bar on the display moves to the right.

If the engine rev is not detected, select **NEXT** to try again or **END** to end the test and return to the Main Menu.

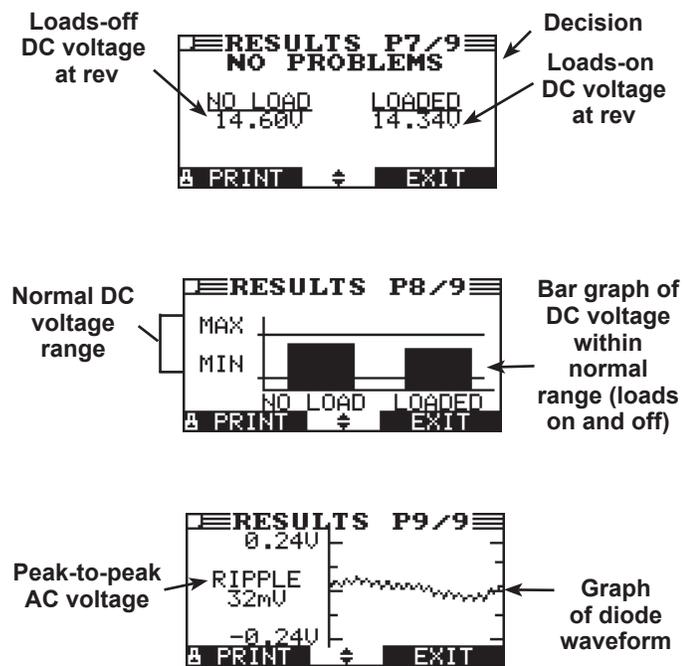
10. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
11. ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. Press **NEXT** to continue.
12. ANALYZING CHARGING SYSTEM DATA: The analyzer is completing its final analysis of the charging system data.
13. TURN OFF LOADS AND ENGINE: Press **NEXT** to display the results.

### Key-Off Draw

If an Amp Clamp was connected to the Control Module during the System Test, you will be prompted to perform a Key-Off Draw test after the vehicle's engine has been shutdown.

If you choose to perform the test, follow the procedure describe in Chapter 10: Key-Off Draw.

### Charging System Test Results



#### Diode Decisions

Diode 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.
OPEN PHASE	The analyzer has detected an open phase within the alternator. Replace the alternator.
OPEN DIODE	The analyzer has detected a open diode within the alternator. Replace the alternator.
SHORTED DIODE	The analyzer has detected an shorted diode within the alternator. Replace the alternator.

### Charging System Decisions

Charging System Decision	Action
NO PROBLEMS	The system is showing normal output from the alternator. No problem detected.
NO VOLTAGE	The alternator is not providing charging voltage to the battery. ✓ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest. ✓ Check all connections to and from the alternator, especially the connection to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest. ✓ If the belts and connections are in good working condition, replace the alternator. (Older vehicles use external voltage regulators, which may require only replacement of the voltage regulator.)
LOW VOLTAGE	The alternator is not providing enough voltage to power the system's electrical loads and charge the battery. ✓ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest. ✓ Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest.
HIGH VOLTAGE	The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. ✓ Check to ensure there are no loose connections and that the ground connection is normal. If there are no connection problems, replace the regulator. (Most alternators have a built-in regulator requiring you to replace the alternator. In older vehicles that use external voltage regulators, you may need to replace only the voltage regulator.)  The regulator controls voltage output based on the battery voltage, under-hood temperature, and vehicle loads used. In other words, it controls the maximum voltage the system can produce based on the current needs and amount of current that can be produced by the spinning of the rotor in the alternator. 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.  A high charging rate will overcharge the battery and may decrease its life and cause it to fail. If the battery test decision is REPLACE and the charging system test shows a HIGH OUTPUT, check the battery's electrolyte levels. A symptom of overcharging is battery fluid spewing through the vent caps, which causes low electrolyte levels and will harm the battery.

## Chapter 5: ECM Power Supply



The ECM Power Supply function tests and maintains battery voltage in the vehicle at 13.5 volts to allow for uninterrupted reprogramming of vehicle computers, retain vehicle system settings, or simply to maintain battery voltage.

Select the SETUP icon on the Main Menu to modify this setting.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the large clamps from the GR8 charge engine when using the ECM Power Supply mode.



**IMPORTANT:** Before starting Power Supply Mode, verify that all vehicle loads are off and the key is not in the ignition.



**NOTE:** Start the Power Supply Mode to begin the control module reprogramming process.

1. If connected, remove the small tester clamps from the battery terminals and connect the large charger clamps.
2. In the Main Menu use the **ARROW** keys to highlight the ECM POWER SUPPLY icon and press **NEXT**.
3. Use **▲** or **▼** to select the BATTERY TYPE and press **NEXT**, or press the corresponding number key.
  - 1  REGULAR
  - 2  AGM
  - 3  AGM SPIRAL

4. Before entering the ECM Power Supply function, the GR8 will test the battery to determine if it needs to be charged first.

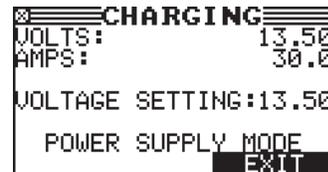


**NOTE:** If you choose to charge the battery, you will need to restart the ECM Power Supply function once the battery has been successfully charged.



**NOTE:** The GR8 tests the battery to determine if it is safe to charge. If a defective battery is detected, the GR8 will beep, the status light will flash, and a warning displayed indicating that the battery is unsafe to charge. Press **EXIT** to return to the Main Menu.

5. If the battery is safe to charge, the GR8 begins maintaining the battery voltage at 13.5 volts.



**NOTE:** Amperage fluctuates in response to the vehicle's demands. If the voltage drops below the 12.8, the GR8 displays a warning and raises the voltage to the set point.

6. When finished servicing the vehicle, press the **STOP** button or the OFF switch, unplug the power cord and disconnect the clamps.

## Chapter 6: Jump Start



This charging mode makes high output current available to boost charge an in-vehicle battery as well as assist in starting the engine. If you need to abort at any time, press the **STOP** key.

Select the SETUP icon on the Main Menu to change this setting.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the large clamps from the GR8 charge engine when performing a jump start.

1. In the Main Menu, highlight the JUMP START icon and press **NEXT**.



**NOTE:** The GR8 tests the battery to determine if it is safe to charge. If a defective battery is detected, the GR8 will beep, the status light will flash, and a warning displayed indicating that the battery is unsafe to charge. Press **EXIT** to return to the Main Menu.

2. Use **▲** or **▼** to select the BATTERY TYPE and press **NEXT**, or press the corresponding number key.

- 1  REGULAR
- 2  AGM
- 3  AGM SPIRAL



**NOTE:** The BATTERY TYPE options will vary depending on the APPLICATION selected in the previous step..

The **BACK** key returns you to the Main Menu at the start of the test and to the previous screen as you progress.



**NOTE:** If you use the **ARROW** keys to select option buttons, press **NEXT** to continue to the next step. If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed.

3. If the battery is safe to charge, the GR8 will prompt you to press **NEXT** to begin the boost charge
4. The GR8 begins boost-charging. Do not crank the engine at this time.
5. When the GR8 displays "CRANK ENGINE NOW," beeps and flashes the status light, you can crank the engine for up to five seconds.
6. When the GR8 displays "JUMP START COMPLETE," press the **STOP** key. (The alarm sounds every second until you press **STOP**.)

## Chapter 7: Manual Charging



The GR8 charges the battery based on the current limit or voltage limit, and charge duration that you select.

Select the **SETUP** icon on the Main Menu to change this setting.

### **CAUTION**

#### **Charging after the battery is fully charged can result in excessive battery temperature**

Overcharging will “gas” the battery and boil off electrolytes, shortening battery life. Monitor the battery’s State-of-Charge and temperature to avoid overcharging.

### **CAUTION**

#### **Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the large clamps from the GR8 charge engine when performing manual charging.

- In the Main Menu, highlight the **MANUAL** icon and press the **NEXT** key.
- Use **▲** or **▼** to select the battery **LOCATION** and press **NEXT** to continue, or press the corresponding number key.
  - OUT OF VEHICLE**
  - IN VEHICLE**

Press **NEXT**. The **BACK** key returns you to the Main Menu at the start of the test and to the previous screen as you progress.

- Use **▲** or **▼** to select the **BATTERY TYPE** and press **NEXT** to continue, or press the corresponding number key.
  - REGULAR**
  - AGM**
  - AGM SPIRAL**

- Use **▲** or **▼** to select the **LIMIT TYPE**, or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.
  - LIMIT CURRENT**
  - LIMIT VOLTAGE**

Press **NEXT**. The **BACK** key returns you to the Main Menu at the start of the test and to the previous screen as you progress.



**NOTE:** If you use the **ARROW** keys to select option buttons, press **NEXT** continue to the next step. If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed.

- You can set limits using **VOLTAGE** or **CURRENT**.

If your limit type is **CURRENT**, select the maximum amperage (1 to 60 amps). When in doubt, start with a low charging current.

Press **NEXT**.

**50**  **AMPS**

If your limit-type is **VOLTAGE**, select the maximum voltage. The range for Regular-type batteries is 12.7 to 15.3 V; AGM is 12.7 to 14.4 V. Press **NEXT**.

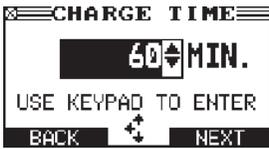
**12.40**  **VOLTAGE**

- Select a charge duration from 5 to 120 minutes. For durations longer than 120 minutes, select Continuous charging.

To select a timed charge when “CONTINUOUS” is displayed, use the key pad to enter a duration 5 and 120 minutes.

Continuous charging stops when you press the **STOP** key.

**Timed Charge Selection Screen**

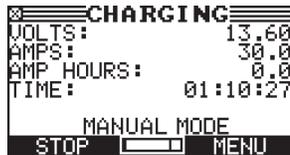


**Continuous Charge Selection Screen**



**NOTE:** The GR8 tests the battery to determine if it is safe to charge. If a defective battery is detected, the GR8 will beep, the status light will flash, and a warning displayed indicating that the battery is unsafe to charge. Press **EXIT** to return to the Main Menu.

- If the battery is safe to charge, the GR8 will begin charging at the selected levels. The illustration shows an example of the information displayed during timed charging.



**NOTE:** If Continuous charge is selected, charging time is not displayed.

- When Manual Mode ends, the GR8 displays the total charging time for Continuous and Timed Charging, the amp hours replaced, and the charging mode.

The alarm sounds every 30 seconds until you disconnect the clamps, or press **NEXT**.



## Chapter 8: Info Menu



The Info Menu has three utilities to help you print and view your test data and track the usage and history of your GR8. The Info menu also allows you to view total history and transfer information to another machine.

The Print/View Menu enables you to view and print the results of the Battery and System Tests before you perform another test and overwrite the results in memory.

### View Test Battery



VIEW TEST BATTERY gives you the option of viewing and printing the results of the Battery and System Tests. Select **PRINT** to print and **END** to return to the Main Menu key.

### View Test Charger



VIEW TEST CHARGER gives you the option of viewing and printing the results of the Charger Test. To print the results, select **PRINT**. To return to the Main Menu, press **END**.

### View Cable Test



VIEW CABLE TEST gives you the option of viewing and printing the results of the last performed Cable Drop Test. Results from previous tests are not saved and are therefore not viewable. To print the results select **PRINT**. Press **END** to return to the Main Menu.

### View Inventory Test



This report displays and prints the results for an individual battery or for all batteries tested using the Inventory Test.

### Totals



TOTALS gives you the option of viewing the results of tester and charger tests in several different ways including lifetime, user totals, last 100 performed, by decision, and by system test. Press **END** to return to the Main Menu.

1. Use ▲ or ▼ to select the battery TOTALS and press **NEXT** to continue, or press the corresponding number key.
  - 1  TESTER TOTALS
  - 2  CHARGER TOTALS

2. Use ▲ or ▼ to select the specific type of totals and press **NEXT**.
  - 1  LIFETIME
  - 2  USER TOTALS
  - 3  LAST 100 LOG
  - 4  TOTALS BY DECISION
  - 5  SYSTEM TEST (Tester Totals only)

#### Tester And Charger Totals Screens

Tester Totals	Charger Totals
<pre> ===== TESTER 3/27/12 ===== TOTAL TESTS:       17 OUT OF VEHICLE: 0 IN VEHICLE: 17 A PRINT      BACK                     </pre>	<pre> ===== CHARGER 3/27/12 ===== TOTAL TESTS:       11 A PRINT      BACK                     </pre>
<i>Lifetime Totals</i>	
<pre> ===== TESTER 3/27/12 ===== ID      TOTAL 0 UNREG 0 1 RYAN C 5 2 TOM M 9 3 GREG L 10 A PRINT  +  BACK                     </pre>	<pre> ===== CHARGER 3/27/12 ===== ID      TOTAL 0 UNREG 0 1 RYAN C 5 2 TOM M 9 3 GREG L 10 A PRINT  +  BACK                     </pre>
<i>User Totals</i>	
<pre> ===== TESTER 3/27/12 ===== # DATE ID      RESULT 1 3/14 GREG L  ND-CH 2 3/11 GREG L  ND-CH 3 3/11 GREG L  ND-CH 4 3/11 GREG L  GOOD A PRINT  +  BACK  1/17                     </pre>	<pre> ===== CHARGER 3/27/12 ===== # DATE ID      RESULT 1 3/10 GREG L  GOOD 2 3/09 TOM M   GOOD 3 3/07 RYAN C  GOOD 4 3/07 RYAN C  GOOD A PRINT  +  BACK  1/11                     </pre>
<i>Last 100 Log</i>	
<pre> ===== TESTER 3/27/12 ===== GOOD BATTERY      11 OK-REPLACE SOON  1 CHARGE &amp; RETEST   5 REPLACE BATTERY   0 BAD CELL-REPLACE  0 TOTAL             17 A PRINT      BACK                     </pre>	<pre> ===== CHARGER 3/27/12 ===== GOOD BATTERY      14 OK-REPLACE SOON  5 REPLACE BATTERY   2 BAD CELL-REPLACE  0 TOTAL             21 A PRINT      BACK                     </pre>
<i>Totals By Decision</i>	
<pre> ===== SYSTEM REPORT ===== 3/27/12 ST. NORMAL          2 ST. PROBLEM         0 CHG. NORMAL        20 CHG. PROBLEM        0 A PRINT      BACK                     </pre>	N/A
<i>System Test</i>	

3. To print the results select **PRINT**. To abort the printout press **END**.

## Transfer



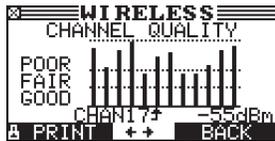
TRANSFER is an optional accessory that consists of an IR software and hardware package that will enable you to transfer test data to a PC.

## View Wireless



Displays communication quality and channel being used for wireless communication between the control head and the multitasking module. Press **BACK** to return to the Info menu.

1. Use **▲** or **▼** to highlight the VIEW WIRELESS icon and press **NEXT**. The WIRELESS screen is displayed.



2. Use the **◀** or **▶** to display the dBm for each channel.
3. To print the results select **PRINT**.
4. To abort the printout press **END**.

## Version



VERSION displays the GR8 software version, the date the software was released, and the serial number of the control module. The utility also allows you to print the information.

## Chapter 9: Cable Drop Test

### Cable Drop Test



If the test results for the starter or charging systems indicate that there may be a problem, you may want to perform the Cable Drop Test to determine if it is due to worn cables or bad connections between the battery and the alternator or starter.

Worn cables or bad connections create higher resistance, which causes a voltage drop across the circuit. The voltage drop reduces current carrying capability that displays the same symptoms as a weak alternator or starter and causes premature battery failure.

There's no need to run the engine. The Cable Drop Test uses Midtronics' conductance technology to send a signal through the circuit at the component under test. The GR8 then simultaneously calculates voltage drop on the positive (+) and negative (-) sides of any circuit as well as the total voltage drop. The amperage range for each of the four tests is 0 to 1000 A. When you change the setting from the factory defaults, the GR8 will store your setting in memory for your next test.

There are three preset tests:

- BATTERY GROUND
- STARTER CIRCUIT
- ALTERNATOR CIRCUIT

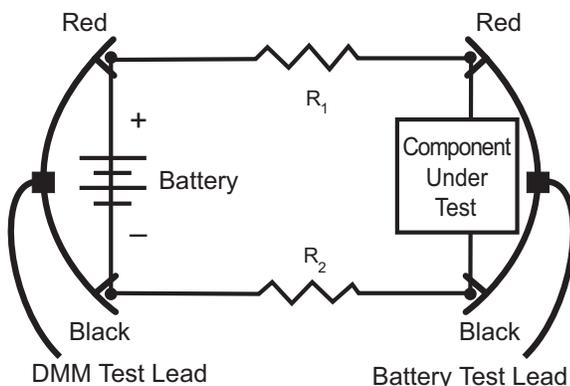
A fourth test, OTHER CIRCUIT, tests other grounds and circuits against your specified amperage capacity.

The test requires two test lead connections, as shown in the figure below.

- Battery test leads at the component's output lead (the B+ or output screw on the alternator) and the component's housing as ground.
- DMM test leads at the battery terminals



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



To begin, select the Cable Drop Test icon in the Main Menu and follow the instructions on the display.



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

### Battery Ground Test

The Battery Ground Test measures the voltage drop for the ground strap.

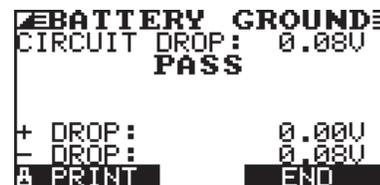
1. SELECT CIRCUIT: Use ▲ or ▼ to select BATTERY GROUND and press **NEXT** to continue, or press the corresponding number key.
  - 1  BATTERY GROUND
  - 2  STARTER CIRCUIT
  - 3  ALT CIRCUIT
  - 4  OTHER
2. SET AMPS: Use ▲ or ▼ to select the rated amperage of the starter circuit and press **NEXT** to continue, or use the numeric keypad. The default is 80 A.



3. Connect the main clamps (battery test leads) to the battery and ground: positive (+) clamp to the battery's positive post; negative (-) clamp to the vehicle chassis.
4. Connect the DMM cable to the battery posts: positive (+) clamp to the positive post; negative clamp (-) to the negative post.

For the next few seconds the GR8 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Battery Ground Test Results



If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, select **PRINT**. To return to the Main Menu, press the **END** key.

## Starter Circuit

The Starter Circuit Test measures the voltage drop of the starter circuit.

1. SELECT CIRCUIT: Use ▲ or ▼ to select STARTER CIRCUIT and press **NEXT** to continue, or press the corresponding number key.
  - 1  BATTERY GROUND
  - 2  STARTER CIRCUIT
  - 3  ALT CIRCUIT
  - 4  OTHER
2. SET AMPS: Use ▲ or ▼ to select the rated amperage of the starter circuit and press **NEXT** to continue, or use the numeric keypad. The default is 150 A.

150 A

3. Connect the positive (+) clamp of the battery test leads to the starter's battery terminal stud. Connect the negative (-) clamp to the starter's housing.
4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.

For the next few seconds the GR8 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Starter Circuit Test Results

```

┌───┐
│ STARTER CIRCUIT          │
│ CIRCUIT DROP: 0.30V     │
│ PASS                     │
│                           │
│ + DROP: 0.15V           │
│ - DROP: 0.15V           │
│ ┌───┐ ┌───┐             │
│ │ PRINT │ │ END │       │
└───┘ └───┘

```

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, select **PRINT**. To return to the Main Menu, press **END**.

## Alternator Circuit

The Alternator Circuit Test measures the voltage drop of the alternator circuit.

1. SELECT CIRCUIT: Use ▲ or ▼ to select ALT CIRCUIT and press **NEXT** to continue, or press the corresponding number key.
  - 1  BATTERY GROUND
  - 2  STARTER CIRCUIT
  - 3  ALT CIRCUIT
  - 4  OTHER
2. SET AMPS: Use ▲ or ▼ to select the rated amperage of the starter circuit and press **NEXT** to continue, or use the numeric keypad. The default is 80 A.

80 A

3. Connect the positive (+) clamp of the battery test leads to the alternator's output stud (B+). Connect the negative (-) clamp to the alternator's housing.
4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.

For the next few seconds the GR8 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Alternator Circuit Test Results

```

┌───┐
│ ALT CIRCUIT              │
│ CIRCUIT DROP: 0.30V     │
│ PASS                     │
│                           │
│ + DROP: 0.15V           │
│ - DROP: 0.15V           │
│ ┌───┐ ┌───┐             │
│ │ PRINT │ │ END │       │
└───┘ └───┘

```

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, select **PRINT**. To return to the Main Menu, press **END**.

## Other Circuit

This test enables you to measure voltage drop across other components.

1. SELECT CIRCUIT: Use ▲ or ▼ to select OTHER and press **NEXT** to continue, or press the corresponding number key.
  - 1  BATTERY GROUND
  - 2  STARTER CIRCUIT
  - 3  ALT CIRCUIT
  - 4  OTHER
2. SET AMPS: Use ▲ or ▼ to select the rated amperage of the starter circuit and press **NEXT** to continue, or use the numeric keypad. The default is 10 A.

10 A

3. Connect the positive (+) clamp of the battery test leads to the component's positive terminal (+). Connect the negative (-) clamp to the component's negative (-) terminal.
4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.

For the next few seconds the GR8 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Other Circuit Test Results

```

OTHER CIRCUIT
CIRCUIT DROP: 0.08V
PASS

+ DROP: 0.00V
- DROP: 0.08V
PRINT  END
  
```

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, select **PRINT**. To return to the Main Menu, press the **END** key.

## Chapter 10: Key Off Draw



Key Off Draw is used to determine the amount of current being pulled from the battery when the ignition and all accessories are off.

Select the SETUP icon on the Main Menu to change this setting.



**NOTE:** The Amp Clamp is required to perform a Key Off Draw test.

1. In the Main Menu, highlight the KEY OFF DRAW icon and press **NEXT**.
2. Attach the connector end of Amp Clamp cable to the top of the GR8 Control Module. Make sure the clamp itself is not around any wires before proceeding.
3. Press **NEXT** to set the Amp Clamp value to zero.
4. Turn off the engine and all electric loads. Remove any leads connected to the accessory sockets and close the vehicle's doors.
5. Place the Amp Clamp around the negative (-) battery cable making sure the arrow on the clamp is pointing away from the battery.
6. Press **NEXT** to begin testing.

7. The Key Off Draw results are displayed when the analyzer has completed the test.



Amp Range	Action
.250 - below	Acceptable Amp range
.251 - .499	Check manufacturers specifications
.500 - above	Key Off Draw is excessive

## Chapter 11: Digital Multimeter (DMM)



The digital metering functions are versatile enough to test everything from a vehicle's entire electrical system to a board-level component:

- Scope
- Ohmmeter
- Diode Drop
- DC and AC Volts/Amp



**NOTE:** The DMM function requires the optional DMM Clamps, DMM Clamps and Probes or Amp Clamp.

The DMM's infrared temperature sensor also enables you to determine the surface temperature of components before you service them or as a diagnostic aid. Specifications for each tool are listed at the end of this chapter.

Select the DMM icon to display its METERS menu. The tools in this menu are available in a series of three screens.

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.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the small clamps from the GR8 control module when using the DMM.

### Ohm Meter



**NOTE:** The Ohm Meter function requires the optional DMM Clamps, or DMM Clamps and Probes.



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

### CAUTION

Always remove power from the circuit before connecting the ohmmeter to avoid damaging the Control Module.

1. Connect the DMM test lead to the accessories port on the Control Module.
2. Select the meter's icon.
3. Connect the clamps or probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
4. The meter will autorange and display the measurement.
5. When finished, press **END**.
6. To return to the METERS menu, press **END**.

### Diode



**NOTE:** The Ohm Meter function requires the optional DMM Clamps, or DMM Clamps and Probes.



This test measures the voltage drop across components, such as diodes.

1. Connect the probes test lead to the accessories port on the Control Module.
2. Select the meter's icon.
3. Connect the probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
4. The meter will autorange and display the measurement.
5. When finished, press **END**.

## Scope



**NOTE:** The Scope function requires the optional DMM Clamps, or DMM Clamps and Probes.



SCOPE

The scope is a voltmeter that provides a graph of voltage difference as it varies over time. After you select the SCOPE icon, note the instructions in the next screen before proceeding. You'll need them after you press **NEXT**:

- Press 1 on the keypad to autoscale the time display.
- Press 3 on the keypad for the time display.
- Press 4 on the keypad for the FFT (frequency) display.

Press **NEXT** to continue.

In the time display the horizontal axis is in seconds and the vertical axis is in volts.

In the frequency display the horizontal axis is in hertz and the vertical axis is in volts.

Press the right soft key to alternate between the options to **RUN** (measure and display the signal) and **HOLD** (freeze the signal).

The scope enables you to print the voltage trace to the printer when you freeze the signal. To print, press **PRINT**.

To return to the METERS menu, press **END**.

## DC and AC Volts/Amp

The volts/amp meter simultaneously measures charging voltage and charging current.



**NOTE:** The Volts/Amp function requires the optional Amp Clamp

1. Connect the amp clamp lead to the Control Module accessories port.
2. Select the meter's icon.
3. Select the amp clamp range.
  - 1  70 AMP MAX.
  - 2  700 AMP MAX.

Press **NEXT** to continue.

4. The meter will zero itself and display the amperage and voltage measurements.
5. Place the clamp's jaws around the negative (-) cable.
6. Connect the battery test cable to the GR8.
7. Connect the battery test clamps in the correct polarity: red clamp or probe to positive (+); black to negative (-).
8. The GR8 will display the measurement.
9. To return to the METERS menu, press **END**.

## Multimeter Specifications

The accuracy specification is defined as  $\pm (n\% \text{ reading} + [\text{count} * \text{resolution}])$  at 77 °F.

### Vdc

Range	Resolution	Accuracy	Overload Protection
0–60 V	0.01 V	0.05% + 2	120 Vrms

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

### Vac

Range	Resolution	Accuracy	Overload Protection
0–24 Vac rms	0.01 Vac	0.1% + 3	120 Vrms

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

### Adc

Range	Resolution	Accuracy	Overload Protection
0–70 A	0.01 A	$\pm 3\%$ of reading $\pm 1$ A	1000 Arms
0–700 A	0.1 A	$\pm 3\%$ of reading $\pm 1$ A	1000 Arms

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

### Aac

Range	Resolution	Accuracy	Overload Protection
0–70 A	0.01 A	$\pm 3\%$ of reading $\pm 1$ A	1000 Arms
0–700 A	0.1A	$\pm 3\%$ of reading $\pm 1$ A	1000 Arms

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

### Ohm

Range	Resolution	Accuracy	Overload Protection
10 $\Omega$ –2 M $\Omega$	1 $\Omega$	2.0% + 4	120 Vrms

### Continuity

Range	Resolution	Accuracy	Overload Protection
< 10 $\Omega$	1 $\Omega$	2.0% + 4	120 Vrms

### Diode

Range	Resolution	Accuracy	Overload Protection
0–1.5 V	0.01 V	0.05% + 2	120 Vrms

### Temperature

Range	Resolution	Accuracy	Overload Protection
-20–200 °F	1 °F	1.0% + 5	-----

## Chapter 12: Inventory Test



Use the Inventory Test in the Main Menu to quickly check batteries in inventory. The test can verify up to 100 batteries in succession using the user-specified battery rating along with the minimum voltage limit.

This test differs from the Battery Test in that the decision is either "Good" or "Needs Charge". Neither decision indicates a battery is bad, but that the measured voltage and CCA fall in or out of the entered parameters.

### CAUTION

**Do not connect both sets of clamps to the same battery at the same time.**

Connecting both sets of clamps to the same battery at the same time may damage the GR8. Only use the small clamps from the GR8 control module when performing Inventory Test.



**NOTE:** The Inventory Test option does not produce a test code.

### Selecting Test Parameters

1. Select the Inventory Test icon in the Main Menu.
2. The tester displays the total number of Inventory Tests completed out of 100. To clear the results from memory and reset the total to 0, simultaneously press ◀ and ▶. Press **NEXT** to continue.



**IMPORTANT:** Be sure to monitor the number of tests performed and be ready to print the results as the number approaches 100. When the limit is reached you will no longer be able to test until you clear all results from memory.

3. Enter the information required in steps 4 through 7 in the Battery Test section of this manual.
4. Enter the BATTERY RATING voltage (between 12.20 - 12.80v).
5. For the next few seconds the tester evaluates the battery, writes the results to the data card, and displays the results starting from the last battery tested. To view a previous result for a battery, use ▲ or ▼ to scroll to the screen showing the battery that was tested.

```

=====
BATTERY 1
=====
CHARGE BATTERY
RATING:      675 CCA
MEASURED:    603 CCA
VOLTAGE:     12,36V
MIN. VOLTS:  12,40V
=====
PRINT  ↕  END
=====
BATTERY 2
=====
GOOD
RATING:      675 CCA
MEASURED:    603 CCA
VOLTAGE:     12,33V
MIN. VOLTS:  12,20V
=====
PRINT  ↕  END
=====

```

Example of displayed results for a test of two batteries

6. To continue testing, connect to the next battery. The analyzer starts the test automatically using the same parameters. To test another type of battery press **END**, then follow steps 1 through 3 above.

### Printing Test Results

1. To print the test results for an individual battery, use ▲ or ▼ to scroll to the screen showing the battery that was tested. Select **PRINT**.
2. Select option 1 to print the screen result of the selected battery. Select option 2 to print the results of all the batteries listed by the order in which they were tested.

Press **PRINT** to print the results.

- 1  INVENTORY BATTERY
- 2  INVENTORY SUMMARY

### Clearing Test Results

The analyzer will not be able to continue inventory testing until you clear all tests from its memory.



**NOTE:** To retain a record, use **PRINT** to print the results.

To clear the results and reset the counter to 0:

1. Press **EXIT** to return to the Main Menu.
2. Select the Inventory Battery Test icon.
3. In the INVENTORY STAT screen press ◀ and ▶ simultaneously to clear the results and reset the counter to 0.

## Chapter 13: Setup

### 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 :                             MM/DD/YYYY
DATE :                               11/29/2012
  
```

### Mode

- Use ▲ or ▼ to highlight the MODE function and press **ADJUST** to continue.
- Use ▲ or ▼ to select the CLOCK ADJUST and press **NEXT** to continue, or press the corresponding number key.
  - 24 HOUR
  - AM/PM
- 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.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

### Time

- Use ▲ or ▼ to highlight the TIME function and press **ADJUST**.
- Use ◀ or ▶ to highlight the hour, minutes, or AM or PM. To rapidly scroll, hold down ▲ or ▼.

```

9 : 19 PM
  
```

- Press **SAVE** to save your setting, or press **BACK** to return to the CLOCK ADJUST screen.

### Format

- Use ▲ or ▼ to highlight the FORMAT function and press **ADJUST** to continue.
- Use ▲ or ▼ to select the DATE ADJUST and press **NEXT** to continue, or press the corresponding number key.
  - MM/DD/YYYY (month/day/year)
  - DD/MM/YYYY (day/month/year)

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

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

### Date

- Use ◀ or ▶ to highlight the month, day, or year. To rapidly scroll, hold down ▲ or ▼.
 

```

3 / 28 / 2012
  
```
- Press **SAVE** to save your setting or **BACK** to return to the CLOCK ADJUST screen without saving the changes.

### Shop



When the Admin option 3-PRINT HEADER is selected, the SHOP INFO utility allows you to create a header for your printed test results. Its three information screens contain 12 lines of text with a maximum of 17 characters per line.

Header information can be manually created or uploaded from a data card.

To manually create or overwrite a header:

- Select MANUAL EDIT and press **NEXT**.
- Press ▲ or ▼ to highlight the line you want to change. The cursor blinks to the right of the last character in the line. (The cursor is not visible if all character spaces are filled.)
- To erase a character, press ◀.
- Insert a character by pressing the alphanumeric key associated with the character as many times as needed. You can center text by inserting blank spaces with the ▶ key. If you pause momentarily, the cursor will automatically move to the right.



**IMPORTANT:** Be sure to erase any default characters on unused lines by pressing ◀.

- Press **SAVE** to save your setting or **BACK** to return to the SHOP INFO screen without saving the changes.

```

Screen 1                               Screen 2
1-YOUR SHOP NAME _                     5-YOUR COUNTRY _
2-1000 ANY ST.                          6-YOUR PHONE NUMBER
3-YOUR TOWN, STATE                       7-WWW.WEBSITE.COM
4-YOUR POSTAL CODE                       8-
  
```

Use the template in the Appendix of this manual to edit and center your header.

## 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.

Default setting for USER ID is off. Select the ADMIN icon to turn this feature on.

### Entering A New User ID

- Use ▲ or ▼ to highlight ENTER NEW and press **NEXT** to continue, or press the corresponding number key.
  - ENTER NEW
  - DELETE
  - EDIT
- Use ▲ or ▼ to scroll to the ID placeholder you want to use. Scrolling past the first line displays the previous screen. Scrolling past the fourth line displays the next screen. To display more placeholders, continue scrolling or use ◀ or ▶ to jump up or down through the list five lines at a time.

```

1 USER01
2 USER02
3 USER03
4 USER04

```

Press **NEXT** to continue.

- To clear the default characters, press ◀. To add a space, move the cursor forward by pressing ▶.

```

ENTER USER ID
USER01

```

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

```

ENTER USER ID
MARK

```

### Deleting A User ID



**NOTE:** You cannot delete placeholder USER IDs (i.e., USER03).

- Use ▲ or ▼ to highlight DELETE and press **NEXT** to continue, or press the corresponding number key.
  - ENTER NEW
  - DELETE
  - EDIT

- Use ▲ or ▼ to scroll to the ID placeholder you want to use. Scrolling past the first line displays the previous screen. Scrolling past the fourth line displays the next screen. To display more placeholders, continue scrolling or use ◀ or ▶ to jump up or down through the list five lines at a time.

```

1 MARK
2 GARY
3 USER03
4 USER04

```

Press **DELETE** to remove the ID and continue.

### Editing A User ID

- Use ▲ or ▼ to highlight EDIT and press **NEXT** to continue, or press the corresponding number key.
  - ENTER NEW
  - DELETE
  - EDIT
- Use ▲ or ▼ to scroll to the ID placeholder you want to use. Scrolling past the first line displays the previous screen. Scrolling past the fourth line displays the next screen. To display more placeholders, continue scrolling or use ◀ or ▶ to jump up or down through the list five lines at a time.

```

1 MARK
2 GARY
3 GREG
4 USER04

```

Press **SELECT** to continue.

- Edit the selected User ID.
- Press **SAVE** to save your changes.

### Info Upload



Using a data card loaded into the Control Module, the INFO UPLOAD utility updates Shop, Coupon, User, and Screen information on the GR8.

## Display



Display

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

### Contrast Level

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

1. Press ▲ or ▼ to highlight the option.

**CONTRAST LEVEL      10**

2. Press **ADJUST** to display the option's numerical scroll box.

**9    (1-10)**

3. Press ▲ or ▼ to select your preference, or the corresponding numerical keys. To erase a character, press ◀.
4. Press **SAVE** to save your setting or **BACK** to return to the LCD OPTIONS screen without saving the changes.

## Coupon



Coupon

The COUPON utility allows you to enable and disable the custom coupons or message created in the EDIT COUPON utility. You also have the option of having no coupon print.

1. Use ▲ or ▼ to select the COUPON SELECT option and press **NEXT** to continue, or press the corresponding number key.
  - 1  NO USER COUPON PRINTED
  - 2  USER COUPON
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Setup Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

## Edit Coupon



Edit Coupon

The EDIT COUPON utility allows you to create and store a promotional coupon or message on the printed test results you give to your customers.

The utility's two information screens contain eight lines of text with a maximum of 17 characters per line. To enable and disable the inclusion of the text on your test results, use the COUPON utility.

To create and edit a coupon, see the procedure under "Shop" in this chapter for using the keypad to enter and backspace over characters.

To help you edit and center your coupon, use a pencil to write the information in the template in the Appendix of this manual.

## Track Calls



Track Calls

The TRACK CALLS utility stores the test results and test codes by date as an .xml (Extensible Markup Language) file in a folder named "XML" on the data card. This utility requires a standard data card reader (not included) to read or transfer the file to a PC.



**NOTE:** To avoid corrupting the file, copy rather than move the file to your PC.

The default is OFF. To set your preference:

1. Use ▲ or ▼ to select the TRACKING and press **NEXT** to continue, or press the corresponding number key.
  - 1  TRACKING OFF
  - 2  TRACKING ON
2. If you have used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Setup Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.



**NOTE:** Over time disk access slows as the data card reaches its capacity. To free up card space, transfer the files to a PC and reformat the card to permanently erase data no longer needed.

## Language



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

To set your preference:

- Use **▲** or **▼** to select the LANGUAGE option and press **NEXT** to continue, or press the corresponding number key.
  - ENGLISH
  - ESPAÑOL
  - FRANÇAIS
- If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the Setup Menu without saving the changes.

## Admin



This section explains how to use the Admin Menu to control User ID access to the tester. It also describes functions that clear test totals and restore settings to factory defaults.

Use **▲** or **▼** to select an ADMIN option and press **NEXT** to continue, or press the corresponding number key:

- OPTIONS
- ENABLE BMIS
- CLEAR TEST TOTALS
- RESET DEFAULTS

## Options

In the OPTIONS section there are four functions that allow you to control user access to the Main Menu and Setup Menu. 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**.

### 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 Battery Diagnostic Station.

### 3 – PRINT HEADER

Select this setting to enable or disable printing of the header you created using the Shop Utility.

### 4 – DATE CODE

Enable this setting to require a battery date code be entered for all batteries being tested.

### 5 – CARD MESSAGE

Enable this option to require a Start Up Data Card Message.

### 6, 7, 8 – SCREEN INPUT

Select this setting to enable (ON) to display user-defined text fields (Default is off).

## Clear Test Totals

This function allows you to clear the test totals by User ID and battery test decision. The Battery Diagnostic Station 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	ON
3 – PRINT HEADER	ON

## Select



Use this option to print test results using the printer built into the Control Module, an external IR printer or disable the printer function completely.

## Update



When software updates become available for the Battery Diagnostic Station, this utility walks you through the quick process of updating the Battery Diagnostic Station software using a data card.

## Format



Select this utility to format an data card to receive data or erase all data on the card. The charger will warn you before formatting the disk and ask if you want to continue.

## Buzzer



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

- Use ▲ or ▼ to select a BUZZER option and press **NEXT** to continue, or press the corresponding number key:
  - OFF
  - ON
- Press **SAVE** to save your setting or **BACK** to return to the Setup Menu without saving the changes.

## User Screen



This utility allows you to customize screen information. Data may be entered manually or using a data card. To use a data card, insert the data card in to the data slot and select Data Card. Data will be uploaded automatically and tester will return to Setup Menu.

- Select the input screen by pressing ▲ or ▼ as many times as needed:
  - INPUT SCREEN 1
  - INPUT SCREEN 2
  - INPUT SCREEN 3

Press **NEXT** to continue.

- Use ▲ or ▼ to scroll to the method for data entry you want to use.
  - MANUAL EDIT
  - DATA CARD

Press **NEXT** to continue.

- Insert a character by pressing ▲ or ▼ as many times as needed. To add a space, move the cursor forward by pressing ►.

ENTER SCREEN TITLE

Press **NEXT** to continue.

- Use ▲ or ▼ to move to the line you want to edit.

SCREEN OPTIONS

1 - 1

2 - 2

3 - 3

4 -

Press **SELECT** to continue.

- Use ◀ or ▶ to move the cursor. Use the keypad to enter the desired alphanumeric characters on each line.

1 - USER OPTION LINE 1

2 -

3 -

4 -

Press **SAVE** to continue.

## Wireless



Scans for interference and recommends the best channel for wireless communication. Make sure the Control Module is connected to the Charge Engine before running the scan.

## Chapter 14: Maintenance / Troubleshooting

### Help



The Help Menu has four functions to aid in the use of your analyzer including: Terms/Definitions, Troubleshooting and Service Info.

### Terms/Definitions

The TERMS/DEFINITIONS option provides definitions for several terms used by the GR8-1202 battery diagnostic station. To use this feature:

- In the Help Menu, select the TERMS/DEFINITIONS option and press **ENTER**.
  - TERMS/DEFINITIONS
  - TROUBLESHOOTING
  - SERVICE INFO.
- Use **▲** or **▼** or use the keypad to highlight the term of your choice.

1 - REGULAR

2 - AGM

3 - AGM SPIRAL

4 - GEL

Press **ENTER** to view the definition.

- Use **▲** or **▼** to scroll through and read the full text definition.
- Press **BACK** to return to the list of terms.

### Troubleshooting

The TROUBLESHOOTING option provides guidance to common questions or issues that may arise in using the station.

- In the Help Menu, use **▼** to select the TROUBLESHOOTING option and press **ENTER** to continue.

1 - PRINTER HELP

2 - CABLE PROBLEMS

- Use **▲** or **▼** to read the full text description.  
Press **BACK** to return to the previous screen.

### Service Info

The SERVICE INFO option lists contact phone numbers for technical assistance and service issues.

### Test Messages

The table below will help you troubleshoot test messages. If troubleshooting does not solve the problem, call Midtronics Customer Service at 1-630-323-2800.

Message	Explanation
System Noise Detected	<p>The GR8 has detected computer, ignition noise, or parasitic drain, and will attempt to retest. Make sure all vehicle loads are off, doors are closed, and the ignition is in the off position. The GR8 will automatically retest when it no longer detects system noise. If the message reappears:</p> <ul style="list-style-type: none"> <li>You may be testing too close to a noise source, such as a charger or other high-current device. If so, move away and retest.</li> <li>If you are unable to find the source of the noise, fully charge the battery and retest. If the message appears after recharging, test the battery out of the vehicle.</li> <li>Disconnect the battery cables and retest.</li> </ul>
Unstable Battery Detected	<p>A battery that is weak, or that has just been charged, may retain enough electrical activity to be detected by the GR8 and will adversely affect the test results. A fully charged battery should stabilize quickly, after which the GR8 will automatically retest. Weak batteries should be charged and retested. If the battery is fully charged, check the clamp connections.</p>

### Replacing the Paper Roll

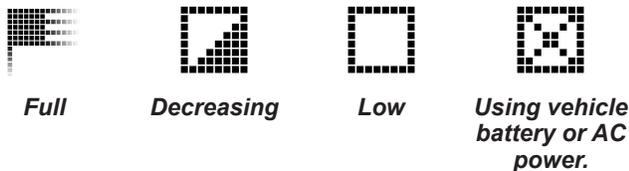
The printer uses thermal paper in a roll with the dimensions 2.25 in x 85 ft. (57 mm x 25.9 m). Replacement rolls can usually be purchased through many office supply stores.

### Control Module Internal Batteries

The Control Module 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.

#### Battery Power Indicator

The square in the upper left corner of the display indicates the charge level of the battery pack. The square is black when the battery pack is fully charged. It gradually changes to white as the charge level declines. The Control Module will display a warning message when the internal batteries need to be replaced.



#### Replacing the Internal Batteries

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



3. Press on the ridges above the arrow on the battery compartment cover.
4. Slide the door in the direction of the arrow and remove the door.



5. Remove the discharged batteries.
6. Insert new batteries as shown. Make sure the positive and negative terminals are positioned correctly.
7. Insert the door's tabs into the slots on the Control Module and slide the door closed.
8. Re-insert and tighten the screw.

#### Test Cable Maintenance

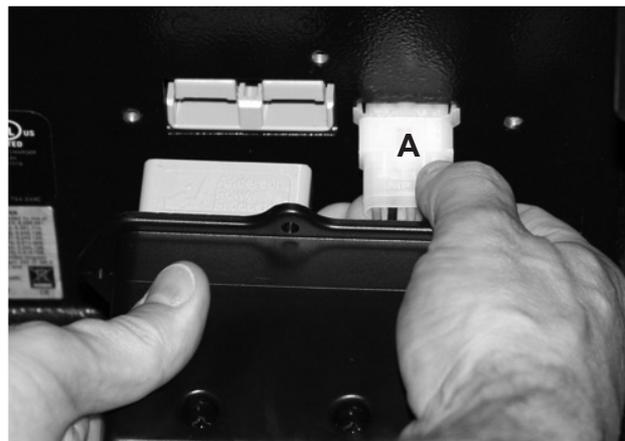
Here are a few things you can do to protect your test cables from damage and premature wear:

- 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.
- Clean the battery terminals. If stud adapters are required, fasten them with the proper tool. Do not use the battery clamps to tighten adapters.
- Never remove the clamps from a battery to abort an active charging session. Always press the red **STOP** button before removing the clamps.
- Do not leave the clamps laying in battery acid.
- Hang the clamps on the cable wrap on the back of the GR8 when not in use.

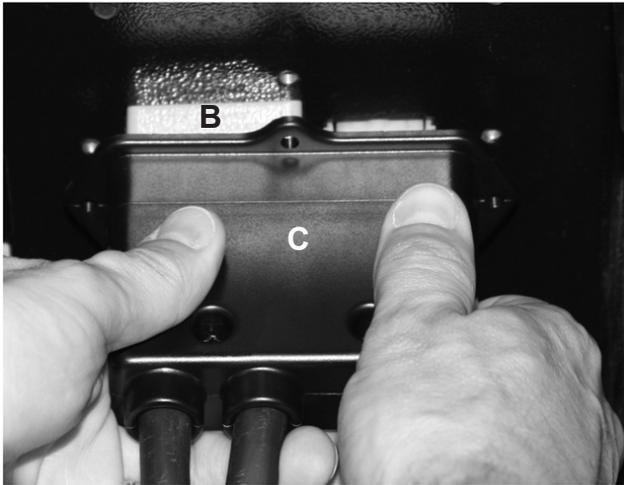
#### Attaching the Charger Cables

The connector for the charger cables is located on the back of the GR8. Three (3) screws are included to secure the cables. To attach the cables:

1. Plug the small connector into the small socket (A) on the back of the Battery Diagnostic Station.



- Plug the large connector (B) into the large socket while placing the protective cover (C) against the back of the Diagnostic Station.
- Insert the screws through the holes in the cover (circled) and Diagnostic Station sheet metal and securely tighten the screws with a #2 Phillips head screwdriver.



The installation is now complete.

### Error Messages

The table below will help you troubleshoot test messages. If troubleshooting does not solve the problem, call Midtronics Customer Service at 1-630-323-2800.

MESSAGE	Option	EXPLANATION
VOLTAGE OUT OF RANGE! VALID RANGE 0 TO 16 VOLTS	Attention light flashes at 0.5 second intervals.	Tool detects incorrect voltage in battery test.
INVALID NUMERIC ENTRY	Less than 100 CCA or invalid date entry can cause this error. Attention light flashes at .5 second intervals.	Any edit box entry that exceeds the limits.
INTERNAL MEMORY ERROR! CALL MIDTRONICS CUSTOMER SERVICE 1-630-323-2800	Attention light flashes at 0.5 second intervals	Upon power up the tool detects a checksum error
REVERSE CONNECTION! CHECK POLARITY OF CLAMPS.	At power up or when reverse connection is made. For charger this can only occur at main menu or in a charger test screen	Tool will return to state that threw the error if the connection becomes valid. For charger both the bridge and Control Module will sound a steady tone until the error is corrected.
CONNECT RED CLAMP TO BATTERY POSITIVE (+) POST, CONNECT BLACK CLAMP TO BATTERY NEGATIVE (-) POST!	Clamp not connected Attention light flashes at 0.5 second intervals	Tool will return to state that threw the error if the connection becomes valid
CHARGER FAULT! CHECK CLAMPS! CHECK SERIAL CABLE!	Attention light flashes at 0.5 second intervals	Charger reported a fatal error.
BATTERY POWER TOO LOW TO USE PRINTER. CONNECT TO FULLY CHARGED BATTERY TO PRINT RESULTS. 11.50V TO 16.00V	Does not print and display this message if clamps are not connected	Screen will be displayed for 3 seconds and then tool will return to viewing screen where print initiated from.
CHARGER ERROR IS CHARGER TURNED ON? ARE CABLES CONNECTED?	This occurs if the bridge cannot talk to the charger.	Make sure the charger is turned and the cables are connected. Also make sure the Multitasker module is receiving power and is properly connected between the Control Module and the charger.

# Appendix

## Header Template

To help you edit and center your header, use a pencil to write the information in the template below before entering it into the GR8.

Line 1																	
Line 2																	
Line 3																	
Line 4																	
Line 5																	
Line 6																	
Line 7																	
Line 8																	

## Coupon Template

To help you edit and center your header, use a pencil to write the information in the template below before entering it into the GR8.

Line 1																	
Line 2																	
Line 3																	
Line 4																	
Line 5																	
Line 6																	
Line 7																	
Line 8																	







## 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 Midtronics at 1-630-323-2800. 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

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.



[www.midtronics.com](http://www.midtronics.com)

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