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***GRX-3002P EST AMP\****

**Battery Diagnostic Station**

\* - shown with optional cart

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***INSTRUCTION MANUAL***

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# Safety Guidelines

## 1 General Safety Precautions

|   |
|---|
| <b>⚠ CAUTION</b>  |
| <b>Risk of explosive gases</b><br>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.

|   |
|---|
| <b>⚠ CAUTION</b>  |
| <b>Charging a non-rechargeable battery may cause the battery to burst.</b><br>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 to 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.

|   |
|---|
| <b>⚠ CAUTION</b>  |
| <b>Remove marine "boat" batteries and charge them on shore.</b><br>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.
- 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, or close enough 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 protection, clothing protection, and wear 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.

|  |
|--|
| <b>⚠ CAUTION</b>   |
| <b>Non-rechargeable batteries may burst when charging causing personal injury and damage.</b><br>To avoid electrical shock or burn, never alter the charger's original AC cord and plug. Disconnect plug from outlet when charger is idle. |

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.

2.8 **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 PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN.**

- 4.2 This battery charger is for use on a nominal 220-volt circuit.

**⚠ 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.

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

| 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<br>(7.6)              | 50<br>(15.2) | 100<br>(30.5) | 150<br>(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.

|   |  |
|---|--|
| <b>⚠ DANGER</b>   |  |
|  | <p><b>Hazardous voltage.</b><br/>Can cause death or serious personal injury.</p> <p>Setting the switches to "OFF" does not always disconnect the charger electrical circuit from the AC power cord or the DC charger clamps.</p> |

## 7 Installing The Battery

|  |
|--|
| <b>⚠ CAUTION</b>   |
| <p><b>Risk of explosive gases.</b></p> <p>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.</p> |

- 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 Removing 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>⚠ CAUTION</b>   |
| <p><b>Risk of explosive gases.</b></p> <p>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.</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> |



- 8.2 Check the polarity of battery posts. **POSITIVE (POS., P, +)** post usually has larger diameter than **NEGATIVE (NEG., N, -)** post.
- 8.3 Attach at least a 60 cm (24-inch), 6-gauge insulated battery cable to the negative (-) battery terminal.
- 8.4 Connect the **POSITIVE (RED)** charger clamp to the **POSITIVE (POS., P, +)** post of battery.
- 8.5 Position yourself and the free end of cable as far away from the battery as possible—do not face the battery when making the final connection—then connect the **NEGATIVE (BLACK)** charger clamp to the free end of the cable.
- 8.6 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.

### **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 manufacturers' 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.

- ✓ 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.



# Chapter 1: Before You Begin




## Disposal

Do not dispose of this device with normal domestic waste!

To comply with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must be returned to our agent, or find out about the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!

## Conventions Used In This Manual

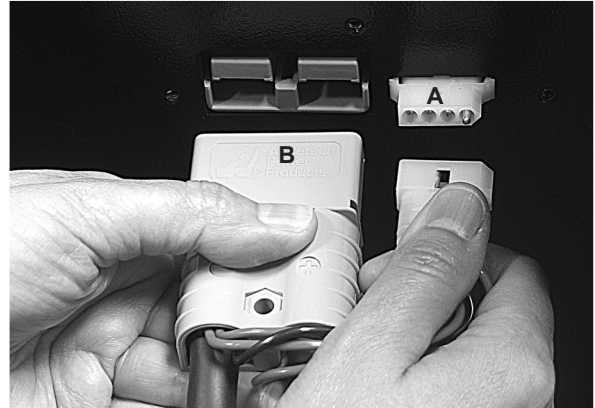
To help you learn how to use your charger the manual uses these symbols and typographical conventions:

| Convention  | Description   |
|---|---|
|    | The safety symbol indicates instructions for avoiding hazardous conditions and personal injury.   |
|    | The safety symbol with the words <b>CAUTION</b> , <b>WARNING</b> , or <b>DANGER</b> indicates instructions for avoiding hazardous conditions and personal injury. |
| <b>CAUTION</b>  | The word <b>CAUTION</b> indicates instructions for avoiding equipment damage.   |
|  | The wrench symbol indicates procedural notes and helpful information.   |
| <b>UP 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>BACK ARROW</b>   | The text for soft keys are in <b>Bold</b> capital letters.  |

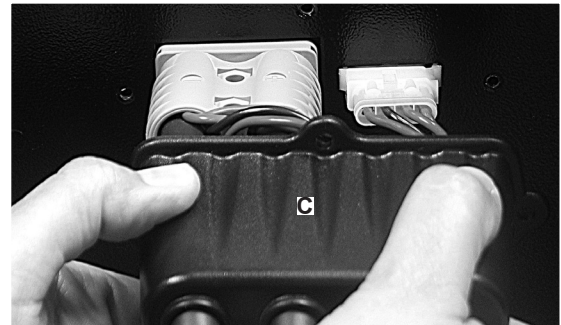
## Attaching The Charger Cables

The two connectors for the charger cables are located on the back of the unit. Three screws are included to secure the cables.

Plug the small connector into the small socket (A) on the back of the unit.



1. Plug the large connector (B) into the large socket while placing the protective cover (C) against the back of the unit.



2. 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.
3. Insert the screws through the holes in the cover and and securely tighten the screws.



The installation is now complete.

## Attaching the Power Cord

Plug in the power cord on the back of the unit.

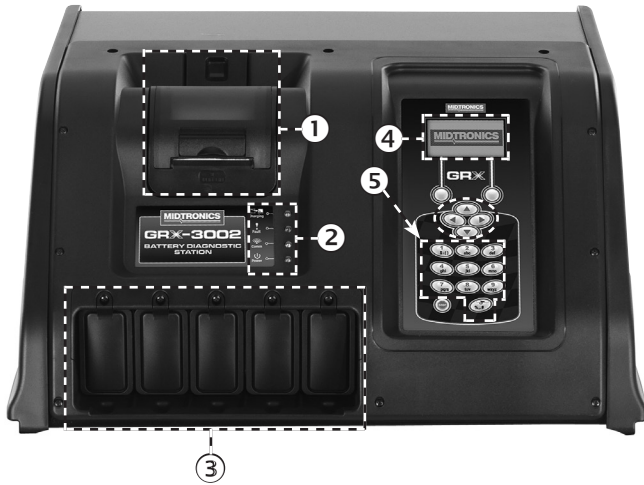
## Connecting to AC Power

Plug the charger into a dedicated, grounded nominal 16-amp or higher AC outlet. Press the power switch to the **ON** position.

## Chapter 2: Introduction

### Front View

The controls to the GRX Battery Diagnostic Station are accessible on the front panel.



- ① **Thermal printer**  
Allows you to print results after the charge cycle.
- ② **Status indicator lights**  
Lights in conjunction with beeping alarm to indicate transitions and warnings.
- ③ **Expansion plug-in module bay**  
Room for 5 expansion modules. Available are: Amp clamp, DMM probes, Zigbee, WIFI, Bluetooth, Serial connection, extra USB connection. **These are all optional and need to be ordered separately.**
- ④ **Display**  
Backlit graphical display and keypad for data entry.
- ⑤ **Alphanumeric keypad**  
Keypad for data entry and selections in the various menus.

### Side View

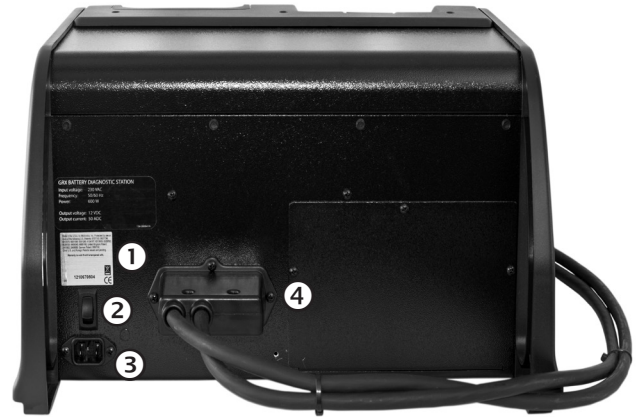
On the right side of the unit you can find an SD-type data card slot and mini USB connection.

- ① **Data Card slot**  
Available for future software updates and data storage.
- ② **USB slot**  
Hardware prepared, functionality to be defined.



### Rear View

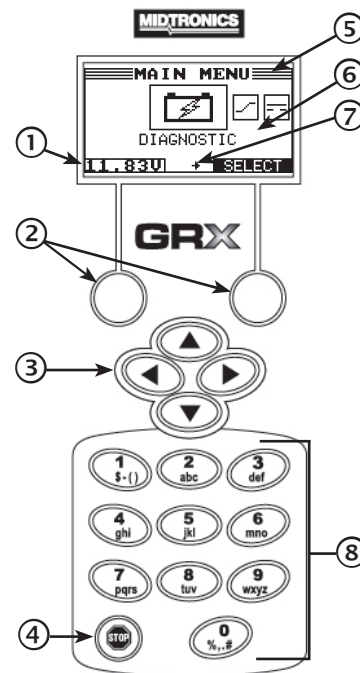
In addition to containing the outlet for the charger cables and power cord, the back of the unit is the location for the serial number label and the ON/OFF switch.



- ① **Serial Number Label**  
The serial number of the unit.
- ② **ON/OFF switch**  
Switch the unit on or off.
- ③ **AC Power cord**  
Connection 220 VAC outlet power cord.
- ④ **Charger cable with Kelvin connection**  
Connection to the battery under charge.

### Display and Keypad

The GRX Battery Diagnostic Station can be controlled with an integrated display and keypad.



- ① **Voltmeter**  
When you first connect the GRX 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**  
Pressing the two soft keys linked to the bottom of the screen will perform the functions displayed above them. The functions change depending on the menu and test process.
- ③ **ARROW (▲▼◀▶) Keys**  
Press the **ARROW (▲▼◀▶)** keys to scroll through numerical values and navigate through menus and icons.
- ④ **STOP Key**  
Press **STOP** at any time to stop the active mode.
- 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 icons or dialog boxes that display information or require a response.

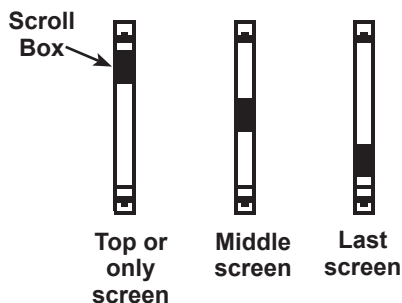
⑦ **Menu Screen Arrows**  
When displayed in menu screens, the menu screen arrows show you which **ARROW (▲▼◀▶)** on the keypad to press to display other icons or screens. The Up and Down Menu Screen Arrows, for example, indicate when to press **▲** or **▼** to display the screens above and below the current screen.

The left and right menu screen arrows tell you when to use **◀** or **▶** to select an icon.

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

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. (printer is optional)

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

### Data Entry Methods

#### 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.

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

| 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  |

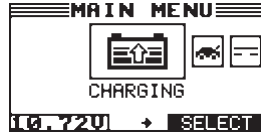
#### Alphanumeric Keys and Associated Characters

To perform a particular test or function, the GRX Battery Diagnostic Station requires different types of information. This means that the methods you use to enter information will change depending on the type of information that is requested. The types of entry methods are described below.

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

### Menu Icons

A menu icon is a graphical representation of a function you can select. 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 **SELECT**.

### 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.

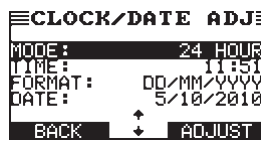


To confirm your selection, press the appropriate soft key.

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

### Scrolling Lists

A scrolling list 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 total number of items in the list.

To select an item, press ▲ or ▼ to highlight the item and press the appropriate soft key.

### 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. For example: the key number 2 on the keypad represents the digit 2 and letters A,B and C.

If you pause, the cursor moves to the right. To backspace, press ◀. Use ▶ to add a space. Use ▲ or ▼ to highlight a line for editing.

When finished, press the appropriate soft key to save your settings.

### Main Menu

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

| Icon          | Description   |
|---------------|---|
| CHARGE MENU * | Automatically tests, charges, and provides battery decision using the information you select in a series of screens. This is considered the main function of the Battery Diagnostic Station.    |
| SYSTEM TEST   | Tests the starting and charging systems. (Requires EST software.)   |
| POWER SUPPLY  | Power Supply Mode used to maintain the system at a fixed voltage to support the battery during vehicle maintenance. (programming)   |
| PRINT VIEW *  | Print/View for all statistical info and software version info.  |
| UTILITY *     | Utility Menu includes functionality to setup the charger.   |
| AMP CLAMP     | Measures magnitude and flow of the current in a circuit. The volts/amp meter simultaneously measures charging voltage and charging current. (Requires EST software, DMM Module, and Amp Clamp.) |

\*Menu icons marked with an asterisk (\*) are mapped on the following pages.

### Charge Menu

Use the Charge Menu to select Diagnostic Charging.

| Menu Icon  | Description  |
|------------|--|
| DIAGNOSTIC | Diagnostic charging makes a decision on a battery using the information you select in a series of screens. Generates a test code for Replace and Bad Cell decisions. |

### Print / View Menu

Use the Print/View Menu to select the option to view the last test results, test totals, and internal charger software information.








| Menu Icon    | Description  |
|--------------|--|
| VIEW TEST    | Displays the last test results. Sends the results to the internal printer.                       |
| TOTALS       | Displays the results of the last test performed, charger total and software version information. |
| VERSION INFO | Displays the software version, total tests from first use, & serial number.                      |



### Utility Menu



This menu allows you to set certain preferences and view options. More details can be found in Chapter 7: UTILITY.

| Menu Icon   | Description   |
|---|---|
| <br>CONFIG CHARGER | The CONFIG CHARGER menu allows you to set the following parameters:<br>DATE AND TIME, WRITE FAIL, TEMPERATURE UNITS, and POWER SUPPLY VOLTAGE |
| <br>DISPLAY        | The DISPLAY allows you to set the contrast of the LCD   |
| <br>LANGUAGE       | With the LANGUAGE menu you can select one of the four available languages   |
| <br>SHOP INFO      | Create your own address details for printouts with the SHOP INFO icon   |
| <br>COUPON         | Create advertisement text in the COUPON menu that can be printed at the bottom of the printout  |
| <br>FORMAT CARD    | With FORMAT CARD you erase all information on the data card   |
| <br>UPDATE       | With UPDATE you can install new software on the charger   |

### Initial Start Up

When you start the GRX for the first time you are asked to enter a number of settings so you can already adapt the charger to your personal liking. Among these settings are the language and date and time. This only needs to be done once, it can be changed afterwards in the Utility Menu under the CONFIG CHARGER icon.

### Language

After the logo appears, the first selection enables you to set the charger language.

- Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the language you want the charger to use..
  - ENGLISH
  - FRANÇAIS
  - ESPAÑOL

- 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.

### Date Adjust

Use ▲ or ▼, or press the corresponding numerical keys to select the date format.

- Select the format of the date.
  - DD/MM/YYYY (Day/Month/Year)
  - MM/DD/YYYY (Month/Day/Year)
- Press **NEXT** to save your setting or **BACK** to return without saving the changes.

### Date

- Use the **ARROW** keys to highlight the month, day, or year.

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- Press **NEXT** to save your setting or **BACK** to return to the previous page without saving the changes.

### Clock Adjust

Use ▲ or ▼, or press the matching numerical keys to select how the clock will be displayed.

- Select the 24-hour or 12-hour (AM/PM) clock.
  - 24 HOUR
  - AM/PM
- If you used the **ARROW** keys, press **NEXT** to save your setting or **BACK** to return to the previous screen without saving the changes.

### Time

- Use ◀ or ▶ to highlight the hour, minutes, or AM or PM.

**9** : 19 AM

- Press **NEXT** to save your setting, or press **BACK** to return to the previous page.

## Set User Preferences

Later in the process you may want to customize the use of your GRX by setting your preferences in the Utility Menu. The menu has settings for the Time, Contrast and Backlight time and a utility to customize printouts for the optional printer.

## Preparing To Charge

### 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. **DO NOT CHARGE THE BATTERY.**
- Corroded, loose, or damaged cables and connections. Repair or replace as needed.
- Corrosion on the battery terminals, dirt or acid on the case top. Clean the case and terminals using a wire brush and a mixture of water and baking soda.
- Low electrolyte level. If the electrolyte level is too low, add distilled water to the level indicated by the battery manufacturer. Do not overfill.
- Corroded or loose battery terminals, tray and hold-down fixture. Tighten or replace as needed.


### Connecting The Clamps

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


Connect the clamps to the battery posts: negative (-) black clamp to the negative (-) post; positive (+) red clamp to the positive (+) post.

If the clamps are not making good contact with the battery posts, the screen displays CHECK CLAMP CONNECTIONS. Make sure that both jaws of each charging clamp come in good contact with the battery posts. If you accidentally reverse the clamp connections, the charger sounds an alarm and displays REVERSE CLAMPS.

## Chapter 3: Charge

 Automatically tests, charges, and provides battery decision using the information you select in a series of screens. This is considered the main function of the Battery Diagnostic Station.

### 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.

1. From the Main Menu, highlight the CHARGING icon and press **SELECT**.
2. Highlight the DIAGNOSTIC icon and press **NEXT**.
3. Enter the Battery Number (if applicable, 10 digit max.) and press **NEXT**.
4. Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the POST TYPE.
  - 1  TOP POST
  - 2  SIDE POST
  - 3  JUMP START POST
5. Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the BATTERY TYPE.
  - 1  REGULAR
  - 2  AGM
  - 3  SPIRAL
6. Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select a battery standard charging option.
 

|                                    |     |
|------------------------------------|-----|
| 1 <input checked="" type="radio"/> | CCA |
| 2 <input type="radio"/>            | CA  |
| 3 <input type="radio"/>            | JIS |
| 4 <input type="radio"/>            | DIN |

|                         |     |
|-------------------------|-----|
| 5 <input type="radio"/> | SAE |
| 6 <input type="radio"/> | IEC |
| 7 <input type="radio"/> | EN  |
| 8 <input type="radio"/> | MCA |

| Rating Unit | Range      |
|-------------|------------|
| CCA         | 100 - 1700 |
| DIN         | 100 - 1000 |
| IEC         | 100 - 1000 |
| EN          | 100 - 1700 |

7. Use the keypad to enter the BATTERY RATING or select the appropriate JIS number from the displayed list.



8. Use the keypad to enter the BATTERY Ah.



The Diagnostic Charge will now begin. The Diagnostic Charging mode has several individual charge cycles such as; Hard To Charge, Bulk Charge, Top-Off Mode and Extended Charge. All these modes will be performed automatically with one intention; determine the State-of-Health of the battery and bringing it to a full State-of-Charge.

### Initial Analysis

The GRX first analyzes the battery to find out its original state. Based on this the charger really starts charging. This initial test is done with both Conductance and a Load cycle and depending of the condition we also use a Deep Scan procedure.

Step 1:

The GRX tests the battery with conductance.



Step 2: If needed!

The GRX tests the battery with a Deep Scan.



Step 3:

The GRX applies a load and monitor the battery's response



**IMPORTANT:** It is important to input the correct charge parameters. If you use the wrong parameters, an inaccurate result will occur.



Step 4:

The GRX performs a final conductance test.



Once the GRX determines that the battery is healthy, needs charging, and is safe to charge, it proceeds.

During the charging session, the GRX provides updates of the charging voltage, charging current, remaining time to charge and the amount of charge replenished into the battery in amp-hours.

The GRX continues to test the battery throughout the charge cycle and may determine at some point that the battery needs to be replaced even though the remaining time to charge is not up yet.

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

Before and during the charge cycle the battery is tested with both Conductance and a Load bounce.

### Hard To Charge Mode (HTC) Mode

The GRX uses the first portion of the total charge cycle to closely monitor the acceptance of charge current and energy going in to the battery.



During this mode the charger continuously analyzes the battery to make a decision as quickly as possible.

### Bulk Charge Mode / Fill Mode

Following this HTC Mode process the GRX will continue charging in the Bulk Mode. During this charge cycle the clock will indicate how much more charge time is needed.

### Top-Off Mode

When the battery is sufficiently charged to be returned to the vehicle it will indicate this with an audible signal as well as text on the display. If the **STOP** key is not pressed the charger will continue to charge to fill the battery even more.

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 **STOP** until the charge session is aborted. After aborting, the charge data is displayed. Press **END** to return to the Main Menu.

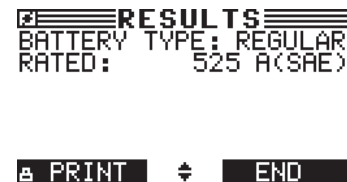
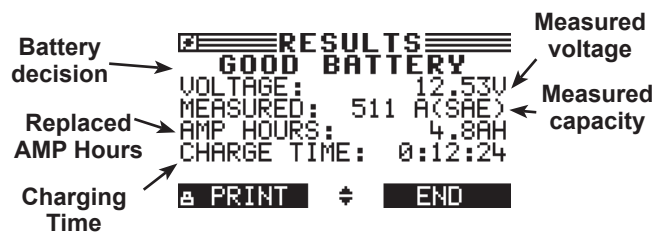
### Completing A Charge Session

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.

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

### Good Battery Decision

A Good Battery decision is displayed in two screens. Use **▲** or **▼** to scroll to each screen. To return to the Main Menu, press **EXIT**. To print, press **PRINT**.



### Replace Battery Decisions

In addition to the Battery Decision and State-Of-Health screens, a REPLACE BATTERY or BAD CELL-REPLACE decision will generate a Test Code. The results of a REPLACE BATTERY or BAD CELL-REPLACE test are then displayed in three screens. Use **▲** or **▼** to scroll to each screen. To return to the Main Menu, press **EXIT**. To print, press **PRINT**.

The charger will print out the test results including the Test Code.

```

=====RESULTS=====
REPLACE BATTERY
VOLTAGE:      12.39V
MEASURED:    ----- SAE
AMP HOURS:   7.9 AH
TIME:        00:30:05
+ [EXIT]

```

Annotations: Battery decision points to REPLACE BATTERY; Measured voltage points to 12.39V; Replaced AMP Hours points to 7.9 AH; Measured capacity points to SAE; Charging Time points to 00:30:05.

```

=====RESULTS=====
STATE OF HEALTH
+ [EXIT]

```

Annotations: Replace Range points to the left side of the arc; Good Range points to the right side of the arc.

```

=====RESULTS=====
TEST CODE
8WA0U6-DA0M00-0000008
+ [EXIT]

```

### State-of-Health (SOH)

A factor that affects a battery's ability to crank an engine is its actual condition or State-of-Health (SOH). It is a measure of the battery's condition relative to a fresh battery.

A State-of-Health problem is most often the result of normal wear-out mechanisms, which are dependant on vehicle needs, climate, and operating conditions. This results in irreversible physical and chemical changes until eventually the battery can no longer hold a charge and supply the power necessary 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 4: System Test



The System Test function tests a vehicle's battery, starter, and charging systems.



**NOTE:** The System Test function requires the EST software.

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



**NOTE:** When you start a new test, the last test results in memory are overwritten.

- In the Main Menu select the SYSTEM TEST icon and press **NEXT** to continue.
- If the DMM module is installed, use ▲ or ▼ to select Amp Clamp availability and press **NEXT** to continue, or press the corresponding number key.
  - AVAILABLE
  - NOT AVAILABLE
- Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the POST TYPE.
  - TOP POST
  - SIDE POST
  - JUMP START POST
- Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the BATTERY TYPE.
  - REGULAR
  - AGM
  - SPIRAL
- Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the STANDARD.
  - CCA                      5  EN
  - JIS
  - DIN
  - IEC

| Rating Unit | Range      |
|-------------|------------|
| CCA         | 100 - 1700 |
| DIN         | 100 - 1000 |
| IEC         | 100 - 1000 |
| EN          | 100 - 1700 |



**IMPORTANT:** It is important to input the correct charge parameters. If you use the wrong parameters, an inaccurate result will occur.

- Use the keypad to enter the BATTERY RATING or select the appropriate JIS number from the displayed list.

500  CCA

- Use the keypad to enter the BATTERY AH.

?  AH

- When prompted, start the vehicle's engine.



**NOTE:** In some cases, the GRX 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.

- CHECKING FOR ALTERNATOR OUTPUT: The analyzer is testing for alternator voltage.
- TURN ALL VEHICLE LOADS OFF, IDLE ENGINE: Turn off vehicle loads (blowers, interior light, radio, etc.) and idle the engine. Press **NEXT** to continue.
- 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 and older vehicles idle at a high level after starting, allowing the analyzer to detect the rev automatically.

- ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
- ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. Press **NEXT** to continue.
- 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.
- 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.

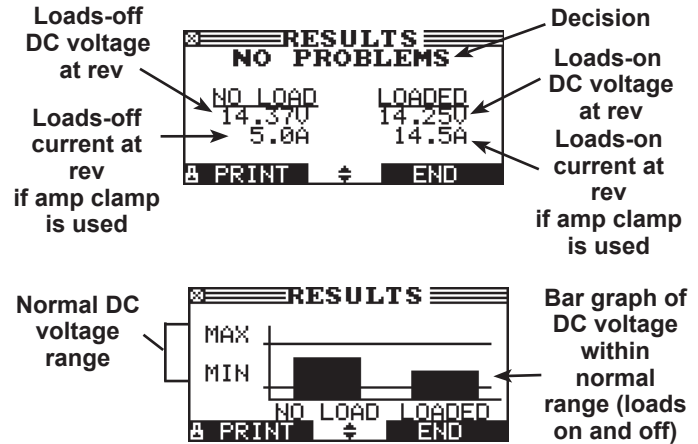


**IMPORTANT:** Turn on the high-beam headlights and the blower to high. Do not use cyclical loads such as air conditioning or windshield wipers.

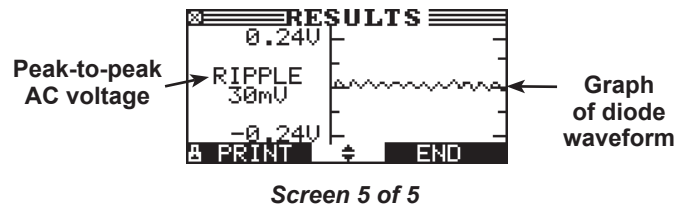
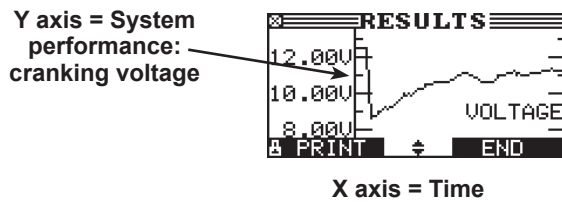
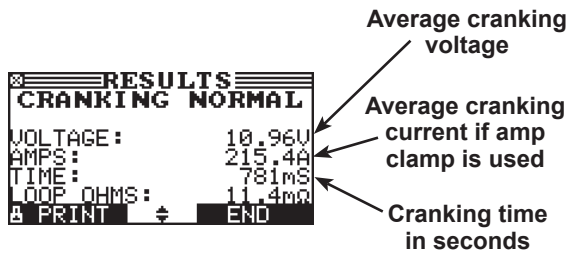
- TESTING ALTERNATOR AT IDLE, LOADS ON: The analyzer will determine if the charging system is able to provide sufficient current for the demands of the vehicle's electrical system.

17. 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.
18. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
19. ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. Press **NEXT** to continue.
20. ANALYZING CHARGING SYSTEM DATA: The analyzer is completing its final analysis of the charging system data.
21. TURN OFF LOADS AND ENGINE: Press **NEXT** to display the results.

**Test Results-Charging System**



**Test Results-Starter System**



**Charging System Decision**

| Decision         | Action   |
|------------------|--|
| CRANKING NORMAL  | The starter voltage is normal and the battery is fully charged.  |
| LOW VOLTAGE      | The starter voltage is low and the battery is fully charged.   |
| CHARGE BATTERY   | The starter voltage is low and the battery is discharged. Fully charge the battery and repeat the starter system test. |
| REPLACE BATTERY  | (If the battery test result was REPLACE or BAD CELL.) The battery must be replaced before testing the starter.         |
| NO START         | The engine didn't start and the test was aborted.  |
| CRANKING SKIPPED | The GRX 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.                                      |

| Decision     | Action   |
|--------------|--|
| NO PROBLEMS  | The system is showing normal output from the alternator. No problem detected.  |
| NO VOLTAGE   | ✓ Ensure alternator is rotating when engine is running.  |
| LOW VOLTAGE  | ✓ Check alternator connections especially to the battery. If loose or heavily corroded, clean or replace and retest.   |
| HIGH VOLTAGE | <ul style="list-style-type: none"> <li>✓ If the belts and connections are in good working condition, replace the alternator.</li> <li>✓ For REPLACE decision with a HIGH OUTPUT decision, check battery for fluid spewing through the vent caps causing low electrolyte levels and will harm the battery.</li> </ul> |

**Diode Decision**

| Decision         | Action   |
|------------------|--|
| EXCESSIVE RIPPLE | <p>One or more alternator diodes are not functioning or stator is damaged, shown by excessive AC ripple current to the battery.</p> <ul style="list-style-type: none"> <li>✓ Confirm alternator mounting is sturdy and belts are functioning properly. If okay, replace the alternator.</li> </ul> |
| OPEN PHASE       | Replace the alternator.  |
| OPEN DIODE       |  |
| SHORTED DIODE    |  |

## Chapter 5: Power Supply



The Power Supply function should be used when a vehicle comes in for regular maintenance or ECU re-flashing.

Re-flashing an ECU can take up to several hours and during that period a lot of current can be drawn from the battery. To support the battery during this process you use the power supply function.

Always make sure that when you work on the vehicle the charger is switched in to the Power Supply function so that you ensure that when the work is done the battery's state of charge is maintained at a healthy level.

1. In the Main Menu select the POWER SUPPLY icon and press **NEXT** to continue.
2. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the POST TYPE.
  - 1  TOP POST
  - 2  SIDE POST
  - 3  JUMP START POST
2. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the BATTERY TYPE.
  - 1  REGULAR
  - 2  AGM
  - 3  SPIRAL
3. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the STANDARD.
 

|  |                             |
|--|-----------------------------|
| 1 <input checked="" type="radio"/> CCA | 5 <input type="radio"/> SAE |
| 2 <input type="radio"/> CA             | 6 <input type="radio"/> IEC |
| 3 <input type="radio"/> JIS            | 7 <input type="radio"/> EN  |
| 4 <input type="radio"/> DIN            | 8 <input type="radio"/> MCA |

| Rating Unit | Range      |
|-------------|------------|
| CCA         | 100 - 1700 |
| DIN         | 100 - 1000 |
| IEC         | 100 - 1000 |
| EN          | 100 - 1700 |



**IMPORTANT:** It is important to input the correct charge parameters. If you use the wrong parameters, an inaccurate result will occur.

4. Use the keypad to enter the BATTERY RATING or select the appropriate JIS number from the displayed list.



5. Use the keypad to enter the BATTERY AH.



If you **SKIP** the AH value, the charger will use the default value defined under the Utility Menu. See Power Supply Voltage under the Utility Menu for more information.

The charger now enters the Power Supply mode.

The GRX will test the battery with conductance.



The next step is to apply an electrical load and test the response.



When the battery has a low state of charge the charger will ask you if you want to charge the battery first prior to starting the power supply function. It is advised to do this because ECU programming with a battery in a low state of charge can cause damage to the ECU when the battery voltage drops below a certain limit.

BATTERY MUST BE  
CHARGED BEFORE  
ENTERING THIS MODE.  
CHARGE NOW?

If **YES** is selected the battery will be charged in the Diagnostic Charge mode until it is ready. It will automatically jump back to the Power Supply screen and maintains the battery with the selected voltage threshold.

If **NO** is selected you will jump back to the **MAIN** menu.

In case of a defective battery an UNABLE TO CHARGE message will appear.

# Chapter 6: Print / View



The Print/View Menu enables you to view and print the results of the charge cycles before you perform another cycle and overwrite the results in memory.

## View Test



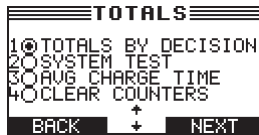
VIEW TEST gives you the option of viewing and printing the results from the last performed. To print the results, select **PRINT**.

To return to the Main Menu, press **END**.

## Totals



This gives you the option of viewing the statistical data collected for all the charge cycles in various ways or to reset the counters.



1. In the Main Menu select the POWER SUPPLY icon and press **NEXT** to continue.
2. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the TOTALS you want to view.
  - 1  TOTALS BY DECISION
  - 2  AVG CHARGE TIME
  - 3  CLEAR COUNTERS

## Totals By Decision

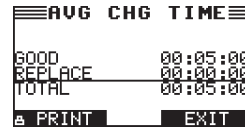
The TOTALS BY DECISION shows the total number of completed tests by battery decision since the last time the totals were reset to 0.



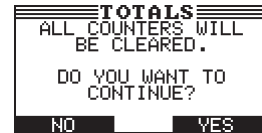
Press **EXIT** to return to the **TOTALS** menu.

## Average Charge Time

This allows you to look at all the charge cycles and the average charge time to come to a decision.



## Clear Counters

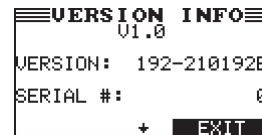


Press **YES** to clear the counters or **NO** to cancel.

## Version Info



The VERSION INFO utility displays the current software version, the software release date and the serial number of the charger.



## Chapter 7: Utility Menu



The Utility menu has several functions to customize the use of your GRX from the language of the user interface to the contrast of the display.

1. From the Main Menu, highlight the UTILITY icon and press **SELECT**.

The Utility menu is displayed on the screen.

2. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the icon for the function you want to edit and press **SELECT**.

### Config Charger



The CONFIG CHARGER option lets you make adjustments Mode, Time, Format, and Date functions of the charger.

```

DATE AND TIME
WRITE FAIL
TEMPERATURE UNITS
ENABLE BMIS
  
```

### Date and Time Menu

```

CLOCK/DATE ADJ
MODE: 24 HOUR
TIME: 11:51
FORMAT: DD/MM/YYYY
DATE: 5/10/2010
BACK  ADJUST
  
```

Use the **ARROW** keys to select one of the following items followed by **ADJUST**.

#### Mode

Use **▲** or **▼** or use the keypad to select the desired mode.

1. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select AM/PM or 24-hour mode.
  - 1  AM/PM
  - 2  24 HOUR
2. 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 keypad, no additional keypress is needed to save your selection.

#### Time

1. Use **◀** or **▶** to highlight the hour, minutes, or AM or PM. To rapidly scroll, hold down **▲** or **▼**.

```

9 : 19 PM
  
```

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

#### Format

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

1. Select the format of the date.
  - 1  MM/DD/YYYY (month/day/year)
  - 2  DD/MM/YYYY (day/month/year)
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the CLOCK ADJUST screen without saving the changes.

#### Date

1. Use the **ARROW** keys to highlight the month, day, or year. To rapidly scroll, hold down **▲** or **▼**.
 

```

12 / 11 / 2012
      
```
2. Press **SAVE** to save your setting or **BACK** to return to the menu screen without saving the changes.

#### Write Fail

After each measurement the test results are stored on the data card. In case the data cannot be stored on to the card you can select the way this is notified to the operator.

1. Use **▲** or **▼** and press **NEXT** to continue, or press the corresponding number keys to select the option button of your choice.
  - 1  ASK (ask to continue when results not stored)
  - 2  IGNORE (not stored and operator not notified)
  - 3  FORCE (only when data card is entered)
2. Press **SAVE** to save your setting or **BACK** to return to the menu screen without saving the changes.

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



### Temperature Units

- Use ▲ or ▼ and press **NEXT** to continue, or press the corresponding number keys to select the TEMP UNITS.
  - DEGREES C
  - DEGREES F
- Press **SAVE** to save your setting or **BACK** to return to the menu 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.

### Power Supply Voltage



This function lets you adjust the voltage used by the charger when it is in Power Supply mode.

- Use ▲ or ▼ to select the required POWER SUPPLY VOLTAGE.



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

### Display



The DISPLAY option allows you to adjust the contrast of the text on the display.

#### Contrast Level

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

- Press ▲ or ▼ to change the contrast.



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

### Language



The LANGUAGE utility allows you to select a language for the display and printouts. To set your preference:

- Use ▲ or ▼ or use the keypad to move the dot to the option button of your choice.
  - ENGLISH
  - FRANÇAIS
  - ESPAÑOL
- 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.

### Shop



The SHOP utility allows you to create a header for your printed test results showing your business location information.

Its three information screens contain 8 lines of text with a maximum of 17 characters per line.

| Screen 1            | Screen 2            | Screen 3 |
|---------------------|---------------------|----------|
| 1-YOUR SHOP NAME __ | 5-YOUR COUNTRY __   | 9-       |
| 2-1000 ANY STREET   | 6-YOUR PHONE NUMBER | 10-      |
| 3-YOUR TOWN, STATE  | 7-WWW.WEBSITE.COM   | 11-      |
| 4-YOUR POSTAL CODE  | 8-                  | 12-      |

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

To create or overwrite a header:

- Press ▲ or ▼ to highlight the line you want to change. The cursor will be blinking to the right of the last character in the line. (The cursor won't be 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 ▶. If you pause momentarily, the cursor will automatically move to the right.



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

## Coupon



The COUPON utility allows you to print one of the three custom coupons or messages created in the EDIT COUPON utility. You also have the option of having no coupon print.

1. Use ▲ or ▼ or press the corresponding number key select the desired option.
  - 1  COUPON 1
  - 2  COUPON 2
  - 3  COUPON 3
  - 4  NO COUPON PRINTED
2. If you used the **ARROW** keys, press **SAVE** to save your setting or **BACK** to return to the COUPON SELECT screen without saving the changes.

If you use the keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.
3. Press **SAVE** to save your setting or **BACK** to return to the SHOP INFO screen without saving the changes.

## Format Card



Select this utility to format a data card to receive data or erase all data on the card. The charger will warn you before formatting the disk and ask you if you want to continue. When a new blank data card is used you always have to use this function before the tester can write to the card.

## Update



As software updates become available you'll be able to use this utility to update the charger software using files on an SD-type data card. The use of a special formatted disk is required for this action.

The software needs to be placed on the SD-type card and the card needs to be inserted in the dedicated slot.

When finished the charger will prompt you to remove the card and reboot.

## Chapter 8: Amp Clamp



Measures magnitude and flow of the current in a circuit. The volts/amp meter simultaneously measures charging voltage and charging current. **Requires EST software, DMM Module, and Amp Clamp.**

1. Connect the amp clamp to the analyzer's accessories port.
2. Select the Amp Clamp icon.
3. Select the amp clamp range and press **NEXT** to continue. The meter will zero out.
  - 1  70 AMP MAX.
  - 2  700 AMP MAX.
4. Place the clamp around the negative (-) cable.
5. The tester displays the measurement.
6. To return to the METERS menu, press **END**.

## Appendix

### Shop And Header Templates

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

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

### Printer Problems

#### The internal printer will not print

- Verify that the paper is properly installed.

#### Changing Printer Paper

Replacement rolls of thermal printing paper (2¼" x 17/8") are available at most office supply stores.

1. Unlatch printer door.
2. Remove the spent roll.
3. Insert new roll with paper feeding from the bottom of roll.
4. Pull paper past the serrated edge of the paper slot.
5. Close and latch door. **Do not pull the paper straight out of the printer.**

### Display Problems

#### The display does not turn on

- Confirm power cord is plugged in power switch is **ON**.

#### The display is dim

- Contrast needs to be adjusted (Utility Menu/Display Icon).

### Warning Messages

| Message                                | Action   |
|--|--|
| <b>Reverse Connection</b>              | Reconnect the clamps correctly.  |
| <b>Check Clamp Connection</b>          | Make sure the clamps and battery terminals are clean and both sides of the clamps are gripping the terminals. A poor connection will prevent charging.                                     |
| <b>Frozen Battery</b>                  | Thaw the battery and try to charge it later.<br><b>Never charging a frozen battery!</b>  |
| <b>Battery Temperature Above Limit</b> | The charger monitors the temperature in the clamps during any process. If the temperature goes above the programmed limit the process needs to be stopped to prevent any unsafe condition. |



## 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.

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