



ME-RTR

Router Control



Owner's Manual
(for Revision 2.2 or higher)

Disclaimer of Liability

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Due to continuous improvements and product updates, the images shown in this manual may not exactly match the unit purchased.

Restrictions on Use

The ME-RTR may only be used in life-support devices or systems with the express written approval of Magnum Energy. Failure of the ME-RTR can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. If the ME-RTR fails, it is reasonable to assume that the health of the user or other persons may be endangered.

Important Product Safety Instructions

This manual contains important safety instructions to follow during the installation and operation of this product. Read all instructions and safety information contained in this manual before installing or using this product.

- All electrical work must be performed in accordance with local, state, and federal electrical codes.
- This product is designed for indoor/compartment installation. It must not be exposed to rain, snow, moisture, or liquids of any type.
- Use insulated tools to reduce the chance of electrical shock or accidental short circuits.
- Remove all jewelry such as rings, watches, bracelets, etc., when installing or performing maintenance on the inverter.
- Always disconnect the batteries or energy source prior to installing or performing maintenance on the inverter. Live power may be present at more than one point since an inverter utilizes both batteries and AC. Turning off the inverter may not reduce this risk. As long as AC power is connected, it will pass through the inverter regardless of the power switch on the inverter or the ON/OFF INVERTER button on the router.

Safety Symbols

To reduce the risk of electrical shock, fire or other safety hazard, the following safety symbols have been placed throughout this manual to indicate dangerous and important safety instructions.



WARNING: This symbol indicates that failure to take a specified action could result in physical harm to the user.



CAUTION: This symbol indicates that failure to take a specified action could result in damage to the equipment.



Info: This symbol indicates information that emphasizes or supplements important points of the main text.



Remedy: This symbol provides possible solutions for related issues.

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1.0 Overview

1.0 Overview

The ME-RTR, or “router” hereafter, has many of the same features as the ME-ARC50 advanced remote with the added functionality required to parallel Magnum MS-PAE inverter/chargers. The router is designed to easily and quickly connect the MS-PAE series inverter/charger in parallel without the need to program each inverter. The router will accommodate up to four MS-PAE inverter/chargers in parallel plus accessories.

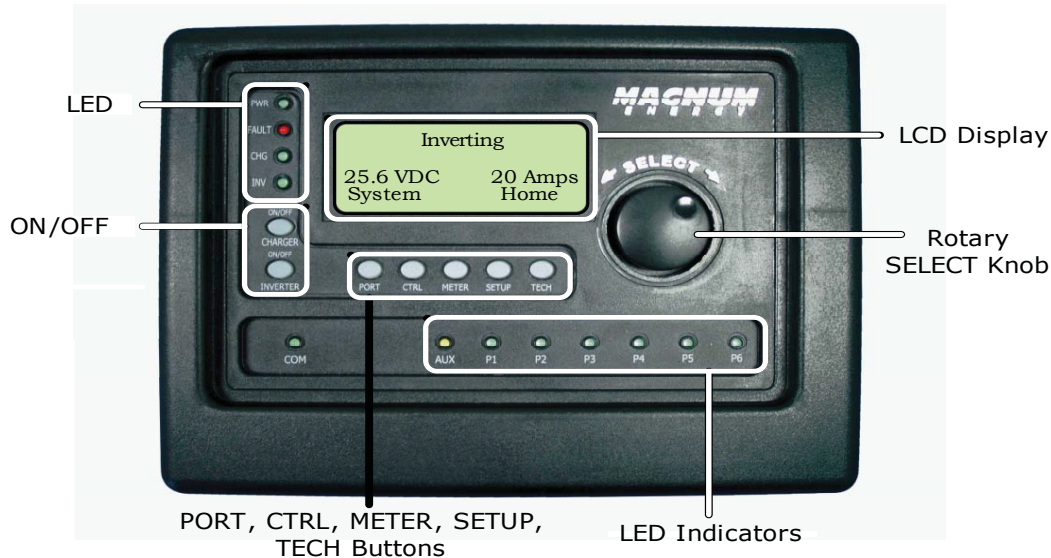


Figure 1-1, Front Panel Features

The ME-RTR is equipped with the following features:

- **LED Indicators** - The at-a-glance LEDs provide the inverter/charger, router, communication ports, and auxiliary relay statuses in a straightforward way.
- **LCD Display** - The LCD display is a 20 x 4 line (80 characters total) alphanumeric display used for setting up the inverter/charger operation, as well as viewing current status or fault messages.
- **ON/OFF Pushbuttons (x2)** - Allows all the inverters or chargers to be quickly enabled or disabled.



Info: The router's ON/OFF INVERTER and ON/OFF CHARGER buttons function normally when a ME-ARC is connected through a router in a parallel system.

- **PORT Button** - This button scrolls through the six communication and accessory ports and displays information.
- **CTRL Button** - This button is used to select inverter, charger, and AGS functions previously set up using the SETUP button.
- **METER Button** - This button is used to access the 'read only' meters for DC, AC, AGS, and BMK.
- **SETUP Button** - This button is used to access the setup menus for the inverter, charger, AGS, and BMK. The SETUP button may be password protected to keep unauthorized users from accessing the SETUP menus.

1.0 Overview

- **TECH Button** - This button is used to access technical information, fault history, and to set a password for the SETUP button.
- **Rotary Knob/SELECT Button** - The rotary encoder knob is similar to a dash radio knob and is used to quickly scroll through Ports 1-6, or to select various menu items and settings. Pressing this rotary knob allows you to select a menu item or to save a setting, once it is displayed on the LCD screen.



- | | |
|---|---|
| (A) Mounting tabs for top cover | (E) LED for Aux Relay operation |
| (B) Parallel CAT 5 jacks (x4) | (F) Mounting screw holes (x4) |
| (C) LEDs for communication (P1-P6) | (G) Aux Relay 2-wire terminal w/ removable plug |
| (D) LED for Comm (not functional, for future use) | (H) Communication ports (P1-P6) |

Figure 1-2, Router Connections Overview

2.0 Installation

2.0 Installation

Review this entire section before proceeding with the installation of your router. The more thorough you plan in the beginning, the better your router/parallel system needs will be met.



WARNING: Installations should be performed by qualified personnel, such as a licensed or certified electrician. It is the installer's responsibility to determine which safety codes apply and to ensure that all applicable installation requirements are followed. Applicable installation codes vary depending on the specific location and application.



Info: Review the Important Product Safety Information section on the front inside cover page before any installation.

2.1 Installation Guidelines

- Before connecting any wires determine the router's cable route throughout the home or vehicle/boat, both to and from the inverter.
- Always check for existing electrical, plumbing, or other areas of potential damage BEFORE drilling or cutting into walls to mount the router.
- Make sure all wires have a smooth bend radius and do not become kinked.
- If installing this router in a boat, RV, or truck ensure the conductors passing through walls, bulkheads, or other structural members are protected. This minimizes insulation damage such as chafing, which can be caused by vibration or constant rubbing.

2.2 Tools Required

Installing the router is a simple process and requires the following tools:

- Phillips screwdriver
- Level
- Drill
- Cut-out tool (knife/saw)
- Pencil
- Drill bit (7/64")

2.3 Installation Overview

The ME-RTR is required in order to parallel stack the MS-PAE Series inverter/charger. Each inverter/charger must be connected directly to the router using the supplied CAT 5 and RJ11 communication cables. DO NOT substitute for the supplied cables. The router comes with four 6 ft. CAT 5 cables and four 6 ft. RJ11 communication cables rated at 300 VAC – which is required to meet NEC/CEC codes when installing the router in a Magnum Panel system.

Each paralleled inverter/charger requires a CAT 5 high speed communication cable to be connected to the router's parallel stacking ports marked MA (Master), SL1 (Slave 1), SL2 (Slave 2), and SL3 (Slave 3). One inverter/charger will always be designated the Master, and subsequently any other connected inverter/chargers will be designated as Slaves. You can stack up to four MS-PAE Series inverter/chargers using one router.

The router must be located close to the inverter/chargers (within five feet) and acts as the system control panel. If a remote monitoring location is required, a ME-RC50 or ME-ARC50 may be connected to one of the communication ports (P1-P6) on the router, and will act as a remote on/off switch and assist in monitoring the system.

2.0 Installation



Info: It is recommended that you set up the master inverter/charger as the first unit on the left so that the CAT 5 and communication cables are connected to the inverter/chargers in order from left to right – MA (Master), SL1, SL2, and SL3. This configuration makes it easy to identify the master and slave units without having to trace the wires from the router to each inverter/charger.

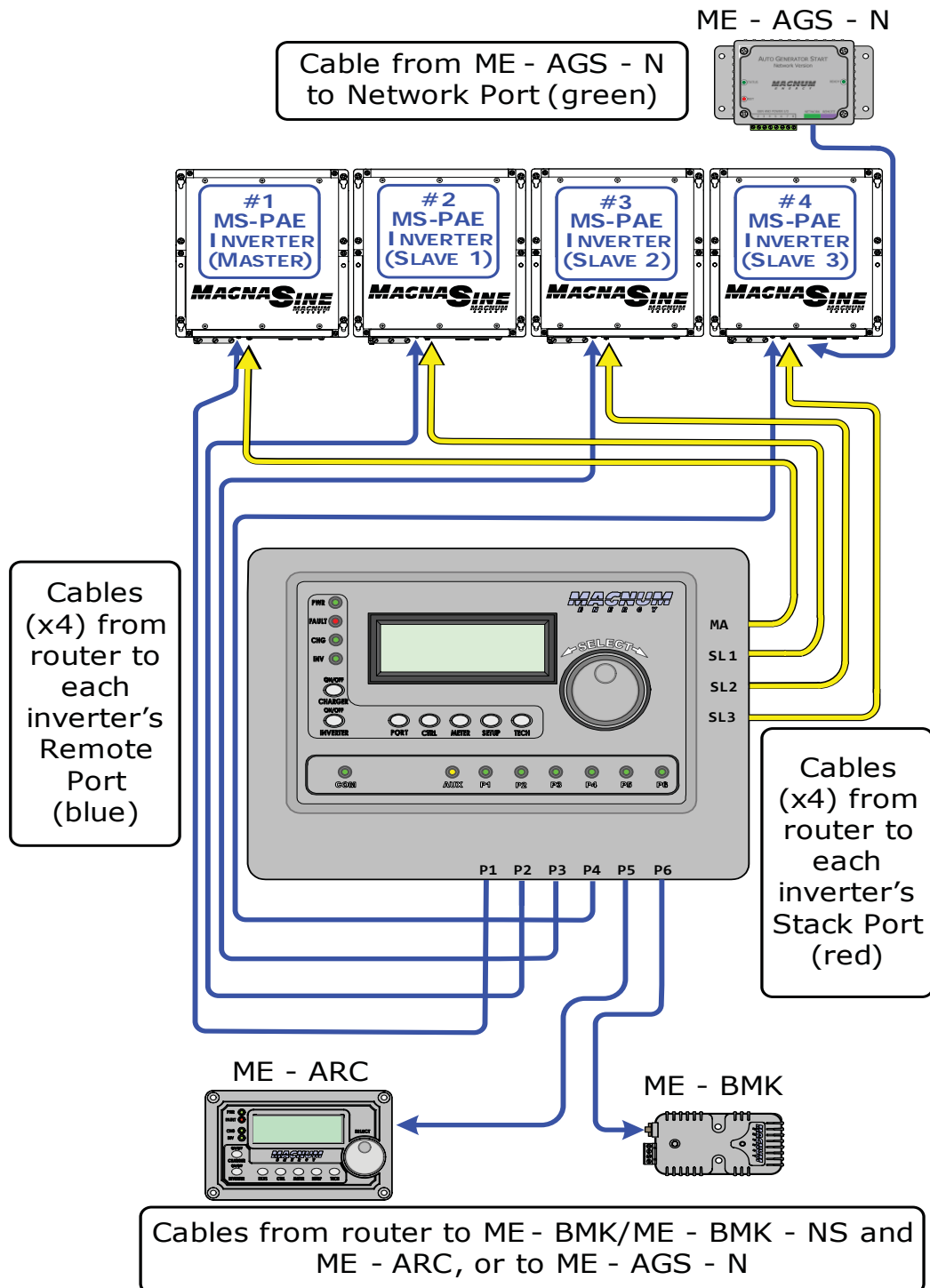


Figure 2-1, System Overview

2.0 Installation

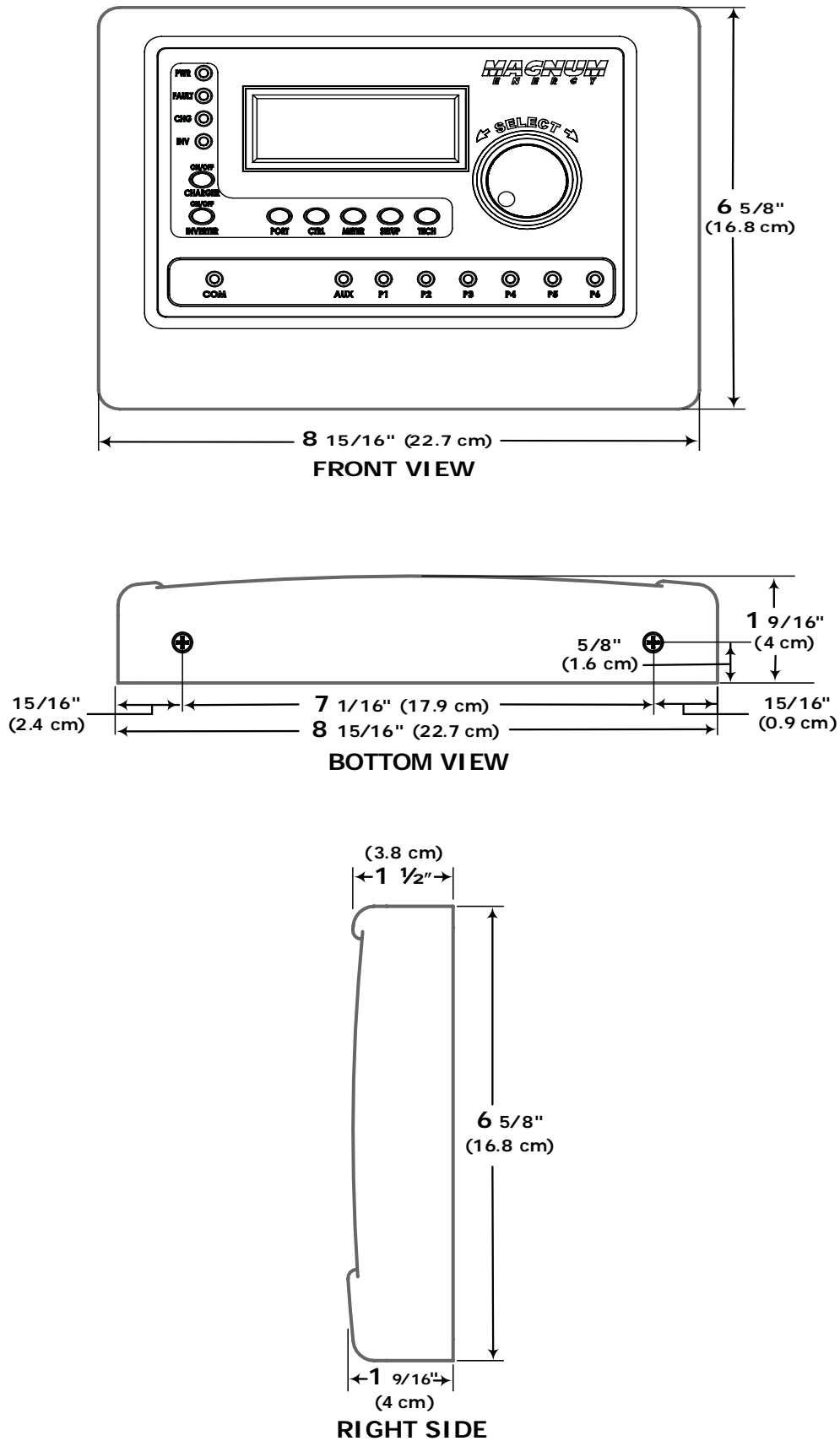


Figure 2-2, Router Dimensions

2.4 Mounting the Router

To mount the router:

1. Select an appropriate location to install the router.
2. Mount the router base to the wall using the 4 screws provided. See Figure 2-3.



Info: If the router is being installed on a Magnum Panel enclosure (MP), it can be attached to either the left or right-hand side using the bracket (ME-RTR-B) provided. Refer to the MP manual (PN: 64-0028) for information on mounting the router on a MP panel.

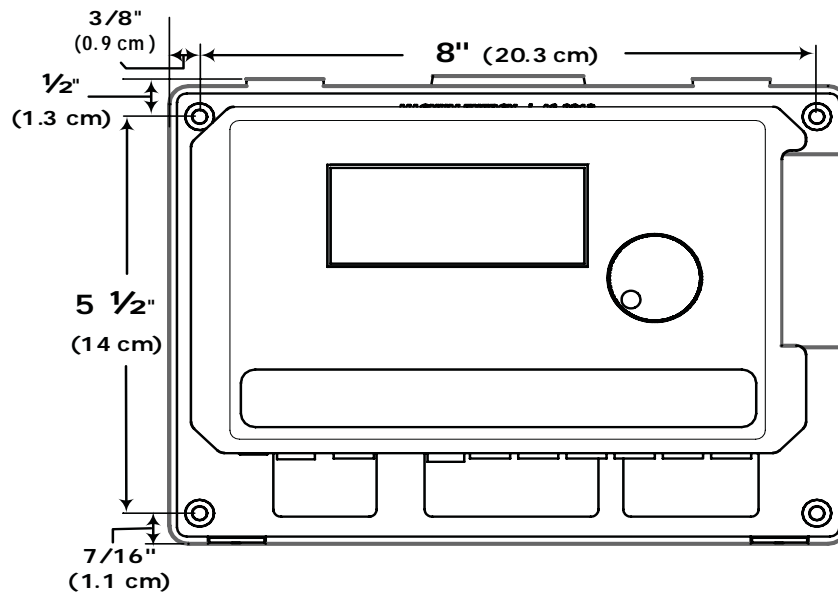


Figure 2-3, Router Mounting Holes

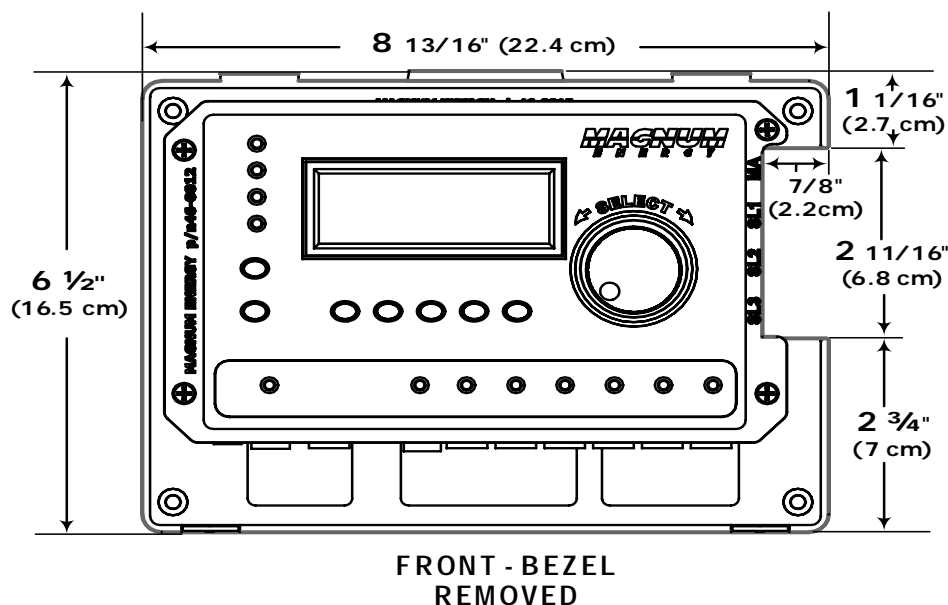


Figure 2-4, Internal Router Dimensions

2.0 Installation

2.5 Connecting the CAT 5 Parallel Stacking Cables

The router comes with four 6 ft. CAT 5 cables for parallel stacking. These cables **must** be used when installing the router. They are like standard CAT 5 cables, but are rated for 300 VAC to allow their use with the MS-PAE inverters, and they meet the electrical safety code requirements.

To connect the CAT 5 parallel stacking cables:

1. Connect a CAT 5 cable to the Stack Port on every inverter installed in parallel (see Figure 2-5).
2. Route the inverter-connected CAT 5 cables from each inverter/charger to your router. Depending on your particular setup, the cables may need to be routed through walls or the MP Panel enclosure system.
3. Connect each CAT 5 cable to its respective CAT 5 port on the router (MA, SL1, SL2, and SL3 ports for the appropriate number of inverters installed in parallel). See Figure 2-6.



Info: At least one CAT 5 cable must be plugged into the router's MA port in order for the router to operate any inverters.

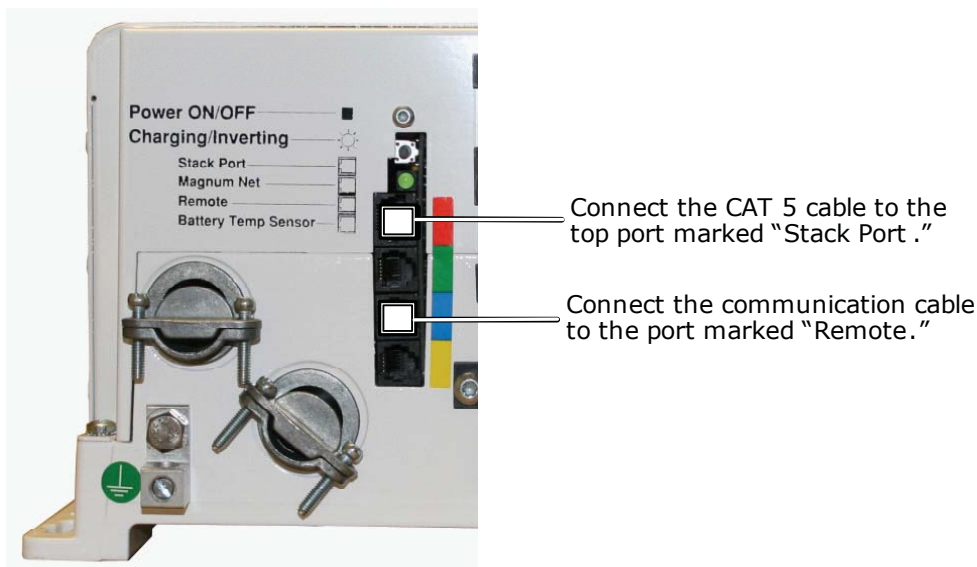


Figure 2-5, Connecting CAT 5 and Communication Cables to the Inverters

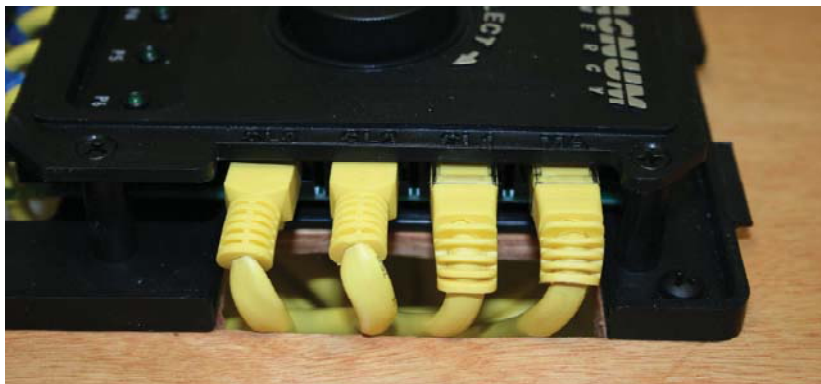


Figure 2-6, Connecting the CAT 5 Cables to the Router

2.6 Connecting the Communication Cables

To connect the communication cables:

1. Connect a communication cable to the Remote port on every inverter installed in parallel (see Figure 2-5), using the supplied remote cables.
2. Route the inverter-connected communication cables from each inverter/charger to your router. Follow the same route you used for the CAT 5 cables.
3. Connect each communication cable to its respective communication port on the router. (P1-P6 for the appropriate number of inverters installed in parallel.) Refer to Section 2.6.1 and Figures 2-7 through 2-9.
4. Connect any accessories to the remaining open communication ports on the router.



Info: It is recommended that the Master inverter be connected to remote communication *Port 1*, Slave 1 to remote communication *Port 2* etc., in order to more easily keep track of which inverter is displayed on each port.



Info: It is recommended that all accessories be connected directly to the router using any available communication ports (P1-P6). Except for remotes (i.e., ME-RC or ME-ARC), if there are additional accessories to connect, but all the router's communication ports are being used, the additional accessories may be connected to the Network ports on the stacked inverter/chargers. Any accessory connected directly to the Network port on an inverter/charger will display as an accessory on the router port to which the inverter/charger is connected.

Example: A ME-AGS-N connected to the Network port on the master inverter (P1) will display as *P1Acc* on the router.



Info: Multiple accessories of the same type may be connected to the system, but there are some limitations to the number of accessories. You may connect a maximum of one ME-RC or ME-ARC remote, two ME-AGS-N modules, and any number of ME-BMK/ME-BMK-NS accessories.



Info: The ME-ARC or ME-RC remote must be connected directly to the router and programmed to indicate which port the remote is monitoring. It is recommended that the ME-RC or ME-ARC is set to monitor "System" in most installations. The ME-RC or ME-ARC must not be directly connected to the Remote or Network ports on the MS -PAE inverter when the router is also connected.



Info: When used in conjunction with a router, a ME-RC or ME-ARC has limited functions. The remote control monitors the port it is designated to display, turns all parallel inverter/chargers on/off, and displays METER and TECH information. The ME-ARC does not control the inverter/chargers via the CTRL button.

2.0 Installation

2.6.1 Optional Cable Connection Routes

You can either surface mount or conceal the cable connections to the router. The cables can be flush mounted through an opening in a wall (Figure 2-7); or, if there is insufficient room behind the wall or no desire to cut into the wall, the cables can be surface mounted (Figures 2-8).



Figure 2-7, Concealed Mounted Communication Cables

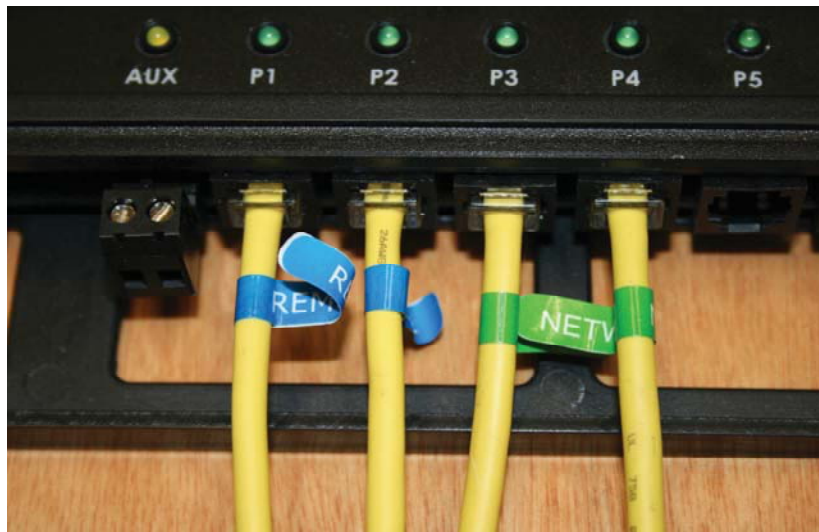


Figure 2-8, Surface Mounted Communication Cables



Info: The CAT 5 and communication cables may be installed on the mounting surface or through the wall. If the cables are installed on the surface, the router cover has cutout sections to accommodate the cables (see Figure 2-9). These cutout sections are made thinner to allow them to be easily broken or cut. Only remove those cutout sections needed for the number of cable connections you are installing.

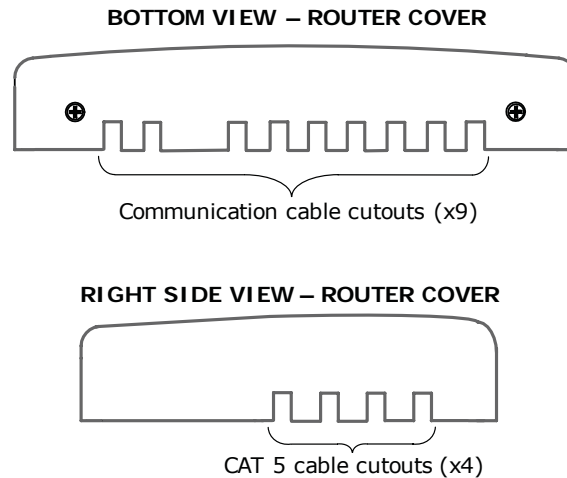


Figure 2-9, Router Cover's Cable Connection Cutouts

2.7 Wiring the Auxiliary Relay

The Aux Relay is a 2-wire dry contact relay that is either normally open or closed. The Aux Relay may be wired to any device requiring a contact closure that draws no more than 0.1 amp of current. The Aux Relay is a voltage controlled relay and may be programmed to open or close on VDC, with an adjustable delay.



CAUTION: When wiring the Aux Relay, use an inline 0.5 amp fuse to protect the relay. Damage to this relay is not covered by warranty.



2-wire dry contact terminal

Figure 2-10, Wiring the Auxiliary Relay

2.0 Installation

2.8 Installing the Router Cover

Once all the wiring is completed, you are ready to install the router cover. Tip the top of the cover down and hook it over the router top (protruding horizontal tabs on inside top of cover go under corresponding mounting tabs at top of router), and then drop the cover down (cover the router's bottom vertical tabs). Install the two flathead Phillips screws into the bottom tabs to hold the router cover in place.



Figure 2-11, Installing the Router Cover

2.9 Power-up Routine

When the router is first connected to an inverter, a power-up routine is initialized. During the power-up routine, the LCD displays "MAGNUM ENERGY ROUTER Ver x.x". The next three screens prompt you to set *HOURS*, *MINUTES*, and *AM/PM*. Once the clock has been set, the router displays the *SYSTEM HOME* screen.



Info: Pressing and holding down the METER button for three seconds takes you back to the System Home screen from any menu.

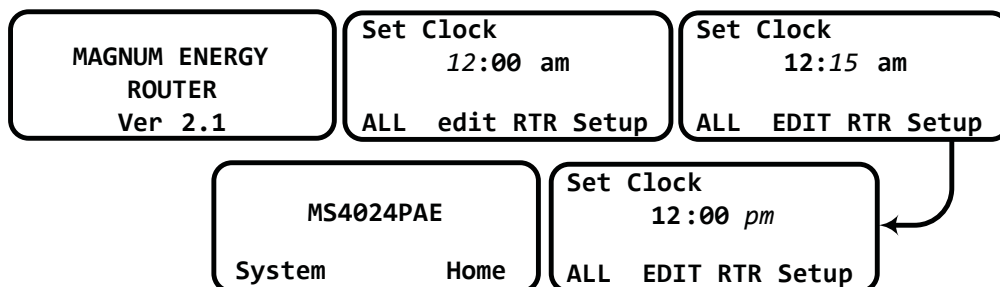


Figure 2-12, Power-up Routine

3.0 Setup

When a router is connected to a Magnum inverter/charger, the settings in the router determine the inverter/charger's operating parameters. The router's default settings are adequate for most installations; however, you have the option to change some of the operating parameters. This section shows you how to navigate the router and gives you an understanding of the function of each adjustable setting. See Figures 4-1 thru 4-9 for complete maps of the router's menu items and adjustable settings.

*** IMPORTANT ***

All settings/setup menus in the router are compatible with MS-PAE Series inverter/chargers. If you are using the router with another inverter/charger (other than the MS-PAE Series), some features and setup menus may not be compatible with your inverter and will not function. Contact Magnum Energy to determine if a particular feature/setup menu provided in the router is compatible with your inverter.

3.1 Navigating the Router

Familiarize yourself with the controls on the front panel which are used to find, adjust, and save the desired settings (refer to Figure 1-1). They are:

- **LCD Display** - The 4-line LCD display shows status and info for the inverter/charger and any attached accessories. All setup menus and faults also appear on the LCD display.



Info: The LCD display returns to the System Home screen to show system status after 5 minutes if no buttons have been pressed.



Info: When the “←” (left facing arrow) symbol is shown on the screen it indicates that the displayed setting has been selected and will be used.

- **Menu Pushbuttons (x5)** - These buttons allow simple access to menu items that can help with configuring, monitoring, and troubleshooting your inverter/charger system.

- **Rotary SELECT Knob** - This rotary knob allows you to quickly scroll through and select various menu items and settings. Pressing the knob selects the menu item to change, or saves the current selection. Refresh the LCD display by holding the rotary knob down for seven seconds.



Info: The LCD screen features a 4-line display. If there are more choices than will fit on the screen, up and down arrows are present to guide you in accessing those choices. An *up arrow* indicates you must rotate the SELECT knob counterclockwise to display the next line. A *down arrow* requires a clockwise rotation. If both an *up and down arrow* display, rotate the SELECT knob clockwise or counterclockwise to display all hidden lines.

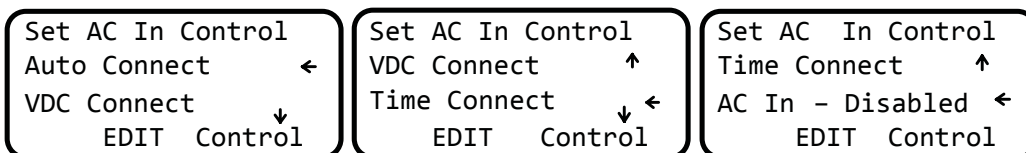


Figure 3-1, Up and Down Arrows for Hidden Lines

3.0 Setup

3.2 Router Pushbuttons and Menu Items

The five pushbuttons (PORT, CTRL, METER, SETUP, and TECH) located beneath the LCD screen allow the inverter/charger system to be configured to your specific preferences. These pushbuttons also allow you to access menu items that can help with monitoring and troubleshooting your system.

3.2.1 PORT Button

The PORT button scrolls between the six communication ports on the bottom of the router. Each parallel inverter/charger must be connected to a communication port in order to be programmed and to display status info.



Info: You must be on a Home screen menu ("*Home*" appears in bottom right corner of router's LCD display) in order for the PORT button to scroll through all the active ports. If you are not on a Home screen, pressing the PORT button will only display devices that are related to the screen you are currently viewing (only true for METER, SETUP, and TECH button menus, PORT button does not work from CTRL button menus).



Info: Pressing and holding down the METER button for 3-seconds takes you back to the System Home screen from any menu.

Any remaining open ports may be used to connect Magnum accessories such as an ME-AGS-N, ME-BMK/ME-BMK-NS, and an ME-RC or ME-ARC remote.



Info: You can connect a maximum of four inverter/chargers to a router. If the maximum number of inverter/chargers are connected, two open ports remain. If more ports are needed for accessories, the Network port on each inverter/charger may also be used for accessories.



Info: When an accessory is plugged into a communication port on the router, the PORT button displays the accessory as the corresponding port (i.e., *Port 5* would show "*ME-AGS-N*"). If an accessory is plugged into the Network port on one of the parallel inverter/chargers, the PORT button will display the accessory as "*P#Acc*" (i.e., a ME-AGS-N plugged into a parallel inverter/charger that is plugged into Port 1 would display as "*P1Acc*").

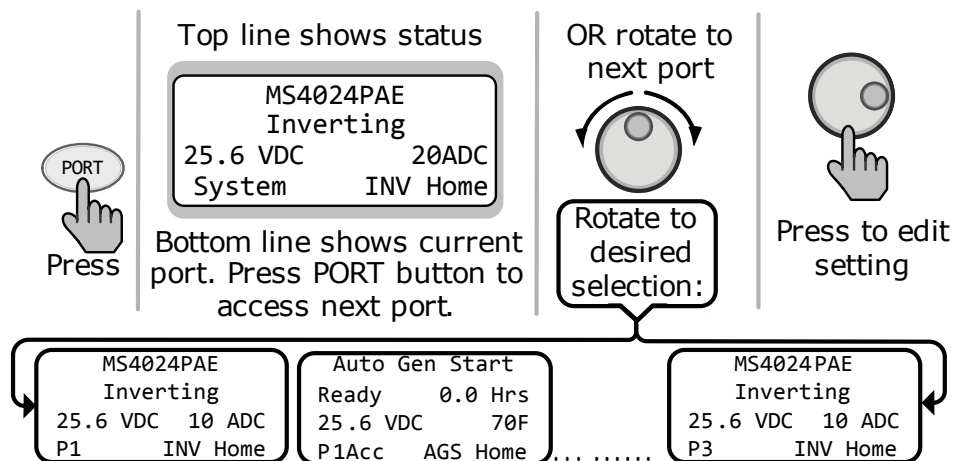


Figure 3-2, PORT Button

3.2.2 CTRL (Control) Button

The CTRL button contains the menus for *01 AC In Control*, *02 CHG Control*, and *03 Gen Control* (an AGS must be connected in order for the Gen Control menu to display). The CTRL button gives you quick control of the main functions of the inverter/charger without having to access the SETUP menus in order to change the operation of the inverter/charger or the generator. Once the settings have been programmed in the SETUP menus, the features can then be enabled using the CTRL button.

Example: The SETUP menu's *02C AC In - Time* setting is used to set what time of day (e.g., 12AM to 8AM) you want the inverter to connect to the incoming AC. Once this time is set, use the CTRL button to access the *AC In Control* menu item and select *Time Connect*. When *Time Connect* is selected, the inverter/charger will only connect to AC when the time is between 12AM and 8AM.

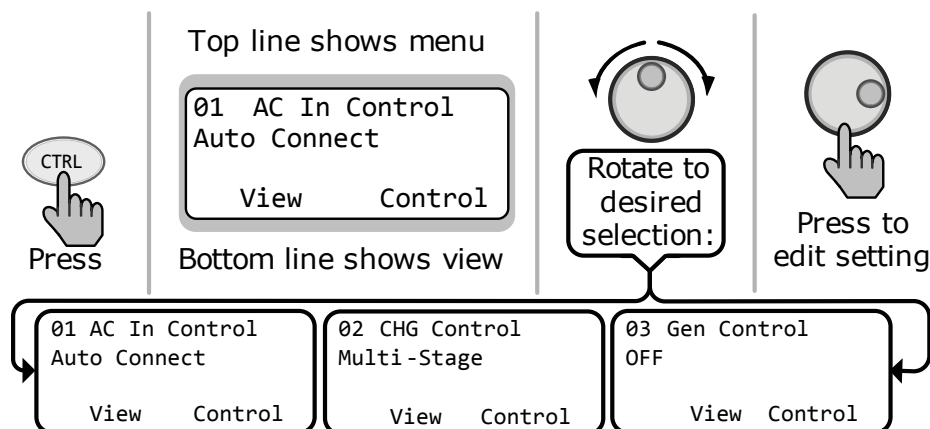
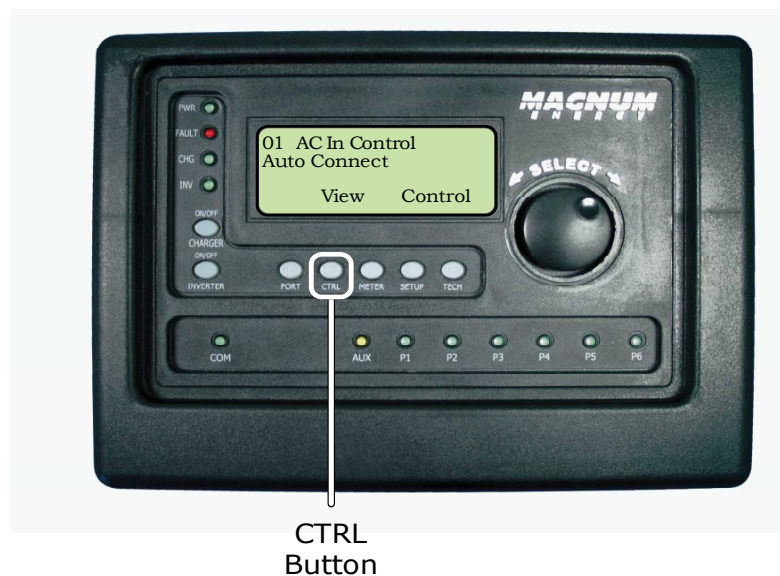


Figure 3-3, CTRL (Control) Button

3.0 Setup

01 AC In Control

The *01 AC In Control* menu has four different conditions in which the inverter/charger will connect to incoming AC power. Only one condition may be selected at any one time – multiple conditions can be enabled, but only one can be active.



Info: Before the inverter allows the AC input to connect to the AC source (grid or gen), the incoming AC must be qualified by the inverter/charger (voltage is below the high AC input requirements, above the *VAC Dropout* setting, and between 50 Hz to 70 Hz for domestic models – 40-60 Hz for export models).



Info: The top status line of the LCD display alternates the inverter/charger status with a secondary AC IN status when AC is present, but is **not** connecting as a result of a selection made in the SETUP menu.

- **Auto Connect:** Automatically connects to incoming AC power.
- **VDC Connect:** Connects to incoming AC when the DC battery voltage is below the *Set Connect Volts* setting in the *02D AC IN VDC* menu. Disconnects from incoming AC when the DC battery voltage is above the *Set Disconnect Volts* setting, also in the *02D AC IN VDC* menu.



Info: See SETUP menu 02D on page 28 for a complete explanation of the *Set Connect Volts* setting.

- **Time Connect:** Connects to incoming AC when the time of day is between the *Set Connect Time* and *Set Disconnect Time* settings per the *02C AC In - Time* menu.



Info: See SETUP menu 02C on page 27 for a complete explanation of the *Set Connect Hour/Minute/AM-PM* setting.

- **AC In - Disabled:** Disconnects incoming AC when selected. This setting will prevent incoming AC from connecting to the inverter/charger.

Example: AC is present, but *Time Connect* has been selected from the *01 AC In Control* menu, and the current time of day is 6PM. The *02C AC In-Time* menu's current setting is 2AM - 8AM. The current time of 6PM is outside the connect time, so the inverter/charger will not connect to the incoming AC until after 2AM. The primary status will display "Inverting" and the secondary status will display "Time Connect" to let you know the reason that incoming AC has not connected.

02 CHG (Charge) Control

02 CHG Control allows you to set the Charger mode to *Multi-Stage*, *Force Float*, or to *Restart Bulk*. Most of the time the charger should be left in the *Multi-Stage* setting, but to override this setting use the CTRL button and the *CHG Control* menu. The charger can be forced into the Float mode or you can start the Bulk mode using the *Force Float* or *Restart Bulk* settings from the CTRL button's *02 CHG Control* menu item.

- **Multi-Stage:** This charge profile starts in Bulk mode (maximum current). It transitions to the Absorption stage (constant voltage). When the Absorption voltage is reached (as determined by the SETUP menu's *03E Absorb Done* setting), it finally transitions to the final charge stage as selected in the SETUP menu's *03G Final Charge Stage* menu item.



Info: *Multi-Stage* must be selected in order to use the final charge stage selected in the *03G Final Charge Stage* menu.

- **Force Float:** This charge profile forces the charger to stay in the Float mode as long as AC is present and the charger is active. *Force Float* is most often used when another source of charging such as PV, wind, or hydro is available to keep the batteries at or above the float voltage. If AC is disconnected and then reconnected the charger will go directly to the Float mode, and will not initiate a Bulk or Absorption charge cycle.



CAUTION: Using the *Force Float* setting may not fully charge the batteries. Most batteries require a Bulk and Absorption charge cycle in order to fully recombine the electrolyte in the batteries and bring the specific gravity to the proper level. Be sure to check with your battery manufacturer before using this setting.



Info: If *Silent* is selected from the *03G Final Charge Stage* menu, you can override this selection with *Force Float* to temporarily float the batteries.

- **Restart Bulk:** This selection restarts the Bulk cycle from any stage in the charge cycle. The *Restart Bulk* setting is useful when a full Multi-Stage charge cycle does not bring the specific gravity of the batteries to the proper level.



Info: The *Restart Bulk* setting automatically defaults back to the *Multi-Stage* setting once the inverter/charger status displays "*Bulk Charging*".



Info: If you have to continually restart the Bulk cycle in order to bring the batteries to full charge, check the settings from the SETUP button's *03 Charger Setup* menu items to make sure the batteries are fully charged at the end of a regular Multi-Stage charge cycle. Check with your battery manufacturer for proper battery charger settings.



CAUTION: Frequently restarting the Bulk cycle may result in overcharging of the batteries.

3.0 Setup

03 Gen Control

03 Gen Control is used for controlling a standby generator that is connected to the system and using the optional ME-AGS-N module. Once the ME-AGS-N is installed in the system, the generator can be manually started and stopped, or set to start and stop automatically from the Gen Control menu.



Info: An ME-ARC must be directly connected to one of the router's communication ports in order to be used (in a remote location) to control a generator that is connected to an ME-AGS-N.



Info: When the ME-ARC is connected directly to the router, the CTRL button function of the ME-ARC is defeated. However, the ME-ARC does contain the *Gen Control* selection in its FAVS menu. This allows the generator to be controlled via the ME-ARC through the FAVS menu, but not through the CTRL menu.



Info: The ME-AGS-N must be installed in order for the *03 Gen Control* menu to control a standby generator. Refer to the ME-AGS-N manual (PN: 64-0039) for more information on controlling standby generators.

- **OFF:** The *OFF* selection will stop the generator by sending a 'stop' command from the ME-AGS-N control module (can be running from either a manual start or an autostart command). When the *OFF* setting is selected, the generator will not start automatically.



Info: If DC power is lost to the router, this menu resets to the default *OFF* position for safety.

- **ON:** The *ON* selection will start the generator by sending a 'start' command from the ME-AGS-N control module. Once the generator is started, it may be stopped by selecting *OFF* from the *03 Gen Control* menu, which sends a stop command from the ME-AGS-N.



Info: You can manually start and automatically stop a connected generator by selecting *ON* from the *Gen Control* menu, and then change the selection to *AUTO*. When the *AUTO* setting is selected after the generator has been manually started, it will use the stop setting in either the *SETUP* button's *Set Stop Gen Volts* or *Set Max Gen Run Time* menu items, whichever occurs first.



Info: The *ON* selection uses warm-up time. The *OFF* selection stops immediately and does not use the cool-down time.

- **AUTO:** This selection uses the settings in the *04 AGS Setup* menus to automatically start and stop the generator based on battery voltage, time of day, AC load on the inverter, high temperature, or battery state of charge (requires a ME-BMK/ME-BMK-NS accessory). Refer to the *04 AGS Setup* section on page 37 to set the start and stop parameters for the generator.

3.2.3 METER Button

The METER button gives you access to different meters which help determine the status of the inverter/charger and battery system.



Info: Some METER functions may not be accessible with older inverter software. If some meters do not function, check for current inverter software.



Info: Most displays automatically return to the System Home screen five minutes after the last button push. When using the METER button, the selected menus stay and do not return to the Home screen. This feature is useful for displaying commonly used meter readings.



Info: Pressing and holding down the METER button for 3 seconds takes you back to the System Home screen from any menu.



METER Button

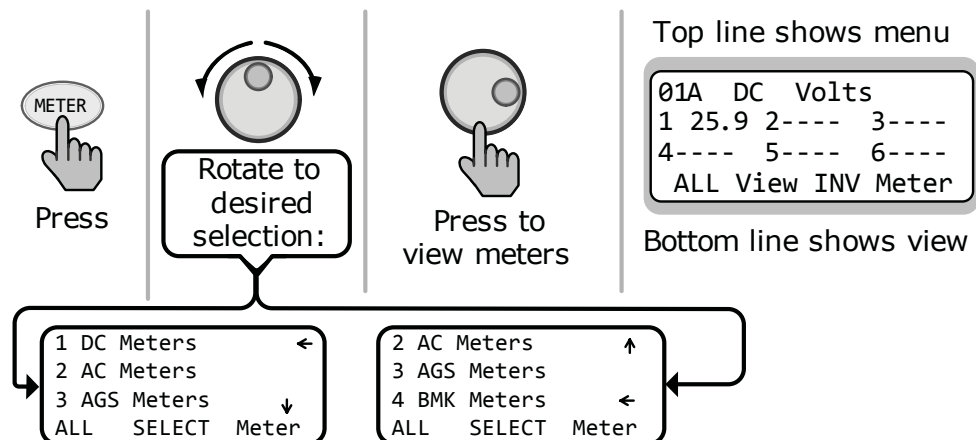


Figure 3-4, METER Button

3.0 Setup

01 DC Meters

- **01A DC Volts:** *DC Volts* provides the battery voltage. The *DC Volts* display provides the voltage from the battery bank connected to the inverter. Accuracy is $\pm 1.5\%$ with a 0.1 VDC resolution.
- **01B DC Amps:** While inverting, the *DC Amps* reading displays a negative number to show the battery current used by the inverter. If in Charge mode, this setting displays a positive number to show the amount of current delivered to the batteries. The accuracy of this display below 1 amp AC (~ 10 amps DC @ 12VDC) is not detected. When the current in or out of the batteries is greater than 1 amp AC, the display accuracy is $\pm 20\%$.
- **01C Charge Time:** This meter displays whenever the charger is in the Bulk or Absorb mode. The meter does not accumulate time when in Float, Charger Standby, Full, or Silent mode.



Info: Once the charger leaves the Absorption mode and enters the final charge stage, this timer is reset and will not accumulate until the charger reenters the Bulk or Absorption charge mode.

02 AC Meters

- **02A Output Volts:** This menu provides the AC voltage measurement at the inverter's output terminals. If inverting, this measures the inverter's output voltage. If in Charge mode, this measures the AC voltage that is passing through the inverter from the source (e.g., grid or generator).
- **02B Output Hz:** While inverting, this menu displays the output frequency of the inverter. When the incoming AC source is connected to an inverter, this meter displays the frequency of the incoming AC source (i.e. grid or generator) that is passing through the inverter to the inverter's output terminals. The frequency is shown in Hertz (Hz).
- **02C Load Amps:** This menu displays the load the inverter is running in AC amps – measured at the inverter's output terminals. This number is always displayed as a positive number.
- **02D Input Amps:** This menu displays the total AC amps being used by the inverter for charging, and any connected load at the output of the inverter.

Example: If the charger is using 20A from the AC source and the load connected to the inverter output is using 10A, the combined load on the incoming AC source is 30A. So, 30A would be displayed as the input amps.

- **02E Inv/Chg Amps:** While charging, this menu displays the amps the charger is using from the AC source. When inverting, this menu displays the current of the load the inverter is powering.



Info: The *02E Inv/Chg Amps* value is determined by subtracting the *02C Load Amps* value from the *02D AC Input Amps* value.

03 AGS Meters

- **03A AGS Status:** If there is no Automatic Generator Start (ME-AGS-N) module connected, the status will read "*No Comm*". If there is a ME-AGS-N connected, please refer to the ME-AGS-N owners manual (PN: 64-0039) for information on the status messages.



Info: These menus allow the optional ME-AGS-N (Auto Gen Start -Network version) — if installed — to display the status of the generator. Refer to the ME-AGS-N Owner's Manual (PN: 64-0039) for detailed information on the AGS and these menus.

- **03B DC Volts-AGS:** This menu displays the DC voltage measured at pins 3 and 4 of the ME-AGS-N module. This menu is useful in setting up the voltage start for the AGS, and for troubleshooting its operation.



Info: The DC voltage reading in this menu may vary from the DC voltage readings in the *01A DC Volts* and *04C DC Volts-BMK* menus. Each DC voltage reading is taken at a different place in the system, and therefore there may be wire losses or connections that make the readings differ. It is important when troubleshooting the system to read the appropriate related meter for each device. When troubleshooting the AGS, use the *03B DC Volts-AGS* menu item for verification and testing purposes.

- **03C Gen Run Time:** This menu displays the amount of time the generator has been running since the AGS auto-started the generator. This menu does not display run time when the generator has been manually started.



Info: This hour meter resets each time the generator is stopped. This is useful when trying to determine how long the generator has been running in *Auto* mode if you were not present when it started. This meter does not replace the hour meter for total hours the generator has run.

- **03D AGS Temp:** This menu displays the temperature of the AGS temp sensor (included with ME-AGS-N, but use is optional), and is helpful in determining proper placement and operation of the AGS temp sensor.
- **03E Since Gen Run:** This menu displays the number of days since the generator has last run. This menu is useful in determining if the AGS start and stop settings are set up correctly.



Info: This meter resets whenever the generator is either auto-started, exercised, or manually started. The meter reads the B+/run signal provided by the generator to the AGS module.

04 BMK Meters

These menus display the status of the battery system from the optional ME-BMK/ME-BMK-NS, if installed. Refer to the ME-BMK/ME-BMK-NS Owner's Manual (PN: 64-0013) for detailed information on the Battery Monitor Kit and these menus.

- **04A BMK SOC:** This display is the best way to monitor the actual state of the battery. The read only display shows the State of Charge (SOC) for the connected battery bank. The SOC represents the condition of the battery as a percentage of the available capacity left in the battery.

3.0 Setup

Range is 0% to 100%, where 100% represents a fully charged battery and 0% means the battery is completely discharged.

If no % displays, there are 3 status menus to determine what state the BMK is in:

Pwr-up Fault - The battery monitor faulted when it was powered-up. The fault occurred because the power-up self-test failed.

No Comm - This indicates the ME-BMK/ME-BMK-NS is not communicating with the router. The most common causes are: no ME-BMK/ME-BMK-NS installed in the system, a bad network cable, or no power to the ME-BMK/ME-BMK-NS.

Think'n - The battery monitor is connected and actively monitoring the battery system. The router displays "Think'n" (or "n'k'in some screen displays) to indicate that the SOC reference point is being calculated. After the batteries are fully charged, the display changes from "Think'n" to "100%" and begins to provide accurate SOC percentage values.

- **04B DC Volts - BMK:** This meter displays the real-time battery voltage from 07.00 to 70.00 volts (± 0.02 volts).
- **04C DC Amps - BMK:** This meter displays the real-time charge current (amps into the battery), or the discharge current (amps out of the battery). Charging is shown as a positive (+) number and discharging is shown as a negative (-) number. The range is from ± 0.1 to 999 amps, with a 1.0% accuracy.
- **04D AH In/Out:** This meter displays the amp-hours returned to or removed from the battery. When this value is positive, it represents amp-hours returned to the battery during any subsequent charging. A negative value represents amp-hours removed from a full battery. Its range is ± 32768 AH.
- **04E Resettable AHrs:** This meter displays the total amp-hours removed from the battery since it was last reset. This display can be used as a battery load indicator to help determine and monitor the battery load consumption. Its range is 0 to 6,553.50 amp-hours (0.1 amp hour resolution).
- **04F Total kAHrs Out (Total Amp-Hours Removed):** This meter displays the total amp-hours removed from the battery since the Sense Module was first connected. This display can be used as a battery service life indicator. The value is displayed in 0.1k [or 100 amp-hours ("k" equals 1000)] resolution up to a maximum of 6,553.5k amp-hours (6,553,500 amp-hours). The displayed number resets to 0.0k when the Sense Module is disconnected from power.
- **04G Minimum VDC:** This menu displays the lowest battery voltage since the last reset. The voltage shown on the display is averaged each second and is helpful when troubleshooting or detecting an over-discharge condition.
- **04H Maximum VDC:** This menu displays the highest battery voltage since the last reset. The voltage shown on the display is averaged each second, this allows you to check your charging system (battery charger, charge controller, etc.) to ensure the charging voltage has been attained. This display is also helpful when troubleshooting or detecting if an over-charge condition has occurred.

3.2.4 SETUP Button

Pressing the SETUP button provides access to the menu items and settings that enable you to configure the router display, the inverter/charger, and any connected accessory. Review each menu item to determine if you need to adjust any settings to meet your system requirements.



Info: The first screen that may appear when the SETUP button is pushed is a password screen. If the PIN has been set under the TECH button's SETUP PIN menu item, the first screen is the Set SETUP PIN menu. The proper PIN must now be entered in order to access the SETUP menus. After 5 minutes from the last button push, the display automatically returns to the System Home screen and the PIN must be reentered in order to access the SETUP menus. Refer to the TECH button's *SETUP PIN* menu item to set or change the PIN number. Refer also to Section 3.2.4.1 for more info on accessory setup.



Info: In any SETUP menu that contains a range of settings, if the first and last settings are equal (set to the same value) the function will be disabled, even if selected/enabled from the CTRL menu.



SETUP Button

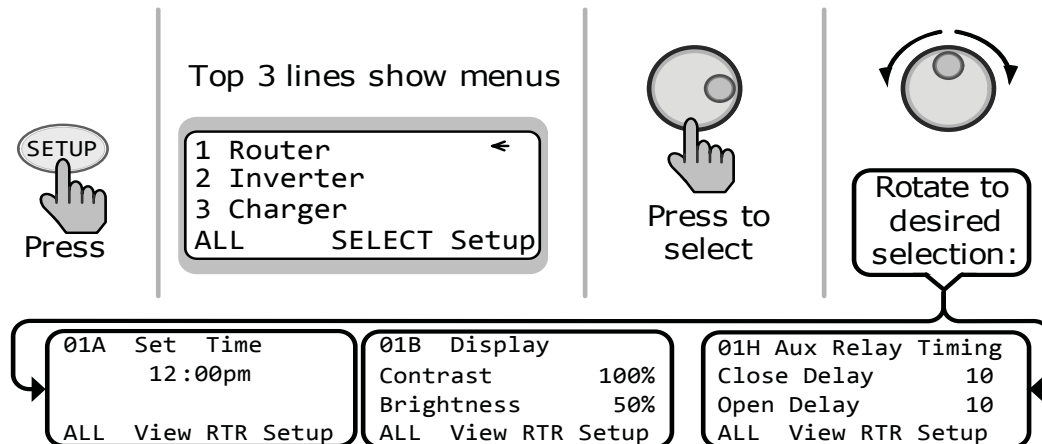


Figure 3-5, SETUP Button

3.0 Setup

01 Router Setup

The following menus are used to set up the router screen and clock.

- **01A Set Time:** The router contains a real time clock that must be set for proper operation of some features. These features are: the SETUP button's *02C AC In-Time*, *04B Gen Run Time*, *04G Quiet Time*, *04H Gen Exercise*, and the *Fault History* menu items under the TECH button.

****IMPORTANT****

It is very important that you set the time clock as it is a critical piece in effectively addressing fault issues, as well as for the proper start/stop functions of your AGS device, if installed.



Info: The clock obtains power from the inverter and will reset if the router is disconnected from the inverter.

To Set the Current Time

From the *Set Clock* menu:

1. Rotate the SELECT knob to the hour of day, and then press SELECT.
 2. Rotate the SELECT knob to the correct minute setting, and then press SELECT.
 3. Rotate the SELECT knob to the appropriate AM or PM setting, and then press SELECT.
- **01B Display:** This setting adjusts the contrast and brightness of the LCD screen based on the current lighting conditions and viewing angle.
Default settings - *Contrast = 100%*, *Brightness = 50%*
 - **01C Power Save:** This setting turns off the Power Save™ feature, or selects the time (from *off* to *60* minutes) that determines when the display goes into Power Save mode. This setting also allows the Port LEDs to be turned "*off*" or set to "*Auto*" mode. In Auto mode, the Port LEDs automatically blink whenever a device is connected to a router port.

Default setting - *PowerSave [min] = 15*, *Port LEDs = Auto*

What is the Power Save feature? The Power Save feature turns off the LCD backlight and the LEDs on the router to conserve energy. The router goes into Power Save mode if there hasn't been a button press or fault message for a period of time (this time is determined by the SETUP menu's *01C Power Save* setting). Whenever the router goes into the Power Save mode, the LCD backlight and the LEDs can be reactivated by pressing any button. If you have a fault during the Power Save mode, the LCD backlight and the FAULT LED will come on and stay on as long as the fault is present.



Info: If you want the LCD backlight and LEDs to always be on, you will need to turn the Power Save feature off by selecting *PowerSave [min] = off*.



Info: If you want the Port LEDs to always be off, you will need to set the Port LEDs to *Port LEDs = off*.

- **01D Temp Display:** This menu item selects whether to display temperatures in Fahrenheit or Celsius. Once you select either Fahrenheit or Celsius, the following menu items will appear with this selection:

03D AGS Temp, 04E Gen Run Temp, and 01 Temperatures under the TECH button.

Default setting - *Fahrenheit*

- **01E Viewing Ports:** The *Viewing Ports* menu item sets the main screen to either automatically scroll through each connected port, or requires you to manually select each port by pressing the PORT button. Adjusting the seconds allows you to select how long the Port screen is displayed before it automatically scrolls to the next screen. Range is *off-60 seconds*.

Default setting - *Auto Roll (sec) = off*

- **01F Aux Relay State:** Selections are *Open*, *Auto*, and *Close*.
Open - Manually opens the Aux Relay contacts. This setting manually controls the device connected to the Aux Relay, or tests the Aux Relay operation.
Auto - Uses the *Relay Close* and *Relay Open* settings from the *01G Aux Relay V Trip* menu, and the *Close Delay* and *Open Delay* settings in the *01H Aux Relay Timing* menu to automatically control the Aux Relay.
Closed - Manually closes the Aux Relay. This setting manually controls the device connected to the Aux Relay, or tests the Aux Relay operation.

Default setting - *Open*



Info: When the open or closed selections are made, the Aux Relay will open or close without any time delay.

- **01G Aux Relay V Trip:** This menu sets the Battery Voltage Trip point to open and close the Aux Relay contacts. Once the battery voltage reaches the trip point, the relay will open or close once the time set in the *01H Aux Relay Timing* menu item is satisfied.

Relay Close - Set this voltage to close the Aux Relay contacts. This range can be below or above the *Relay Open* setting depending on if you want the Aux Relay to be *Active Low* or *Active High*.

Range is *8-17* (12 VDC), *16-34* (24 VDC) and *32-51* (48 VDC)

Relay Open - Set this voltage to open the Aux Relay contacts. This range can be below or above the *Relay Close* setting depending on if you want the Aux Relay to be *Active Low* or *Active High*.

Range is *8-17* (12 VDC), *16-34* (24 VDC) and *32-51* (48 VDC)

Default settings - For both the *Relay Open* and *Relay Close* settings: *14* (12 VDC), *28* (24 VDC) and *56* (48 VDC).

Example - Active Low: Set the *Relay Close* voltage below the *Relay Open* voltage. If the *Relay Close* voltage is set at 12.0 VDC and the *Relay Open* voltage is set at 14.5 VDC, the relay would close when the battery voltage dropped to 12.0 VDC and open when the battery voltage rises to 14.5 VDC. This configuration might be used to control a battery exhaust fan or as a simple PV charge controller.

Example - Active High: Set the *Relay Open* voltage below the *Relay Close* voltage. If the *Relay Open* voltage is set at 12.0 VDC and the *Relay Close* voltage is set at 14.5 VDC, the relay would open when the battery voltage dropped to 12.0 VDC and close when the battery voltage rises to 14.5 VDC. This configuration might be used to control a low voltage disconnect circuit for a DC load.

3.0 Setup

- **01H Aux Relay Timing:** This setting delays the automatic closing and opening of the Aux Relay contacts after the *Relay Open* and *Relay Close* settings have been satisfied.

Close Delay - Use this setting to delay the close of the Aux Relay contact once the Voltage Trip point has been reached. This sets a hysteresis so the Aux Relay does not cycle unnecessarily. Range is *0-240 seconds*

Open Delay - Use this setting to delay the opening of the Aux Relay contact once the Voltage Trip point has been reached. This sets a hysteresis so the Aux Relay does not cycle unnecessarily. Range is *0-240 seconds*

Default settings - *Close Delay* and *Open Delay*: 10 seconds

Auxiliary (Aux) Relay

The router contains a 2-wire dry contact Aux Relay. The Aux Relay can be manually opened or closed, or is voltage driven and can be set to either close on low DC voltage and open on high DC voltage, or to close on high DC voltage and open on low DC voltage. The relay can be set to the *Auto* position where it will read the open and close voltage settings with delay times, or it can be manually either forced closed or open.

What is the Aux Relay used for? The most common use is to turn on an exhaust fan to eliminate your battery bank gasses using the VDC start and stop settings. The Aux Relay can also be used to control the coil of a current carrying relay.

How do I adjust the Aux Relay? The three menus used to adjust the Aux Relay are the *01F Aux Relay State*, *01G Aux Relay V Trip*, and *01H Aux Relay Timing* menus. These three menus are used to select the operating state of the Aux Relay (menu *01F*), the DC voltage at which the Aux Relay automatically opens and closes (menu *01G*), and the delay timing on open and closing of the Aux Relay (menu *01H*).

Aux Relay LED - The Aux Relay LED will illuminate in an amber color if the relay is active (closed) in the programmed state.

Example: The Aux Relay is set to *Auto* in menu *01F*. The *01G Aux Relay V Trip's Relay Close* setting is 12.0 VDC and the *Relay Open* setting is 14.5 VDC. The *01H Aux Relay Timing* menu's *Close Delay* and *Open Delay* settings are 10 seconds.

When the battery voltage reaches 12.0 VDC after a 10 second delay, the Aux Relay will close and the LED will illuminate amber. When the battery voltage reaches 14.5 VDC after a 10 second delay, the Aux Relay will open and the Aux Relay LED will turn off.

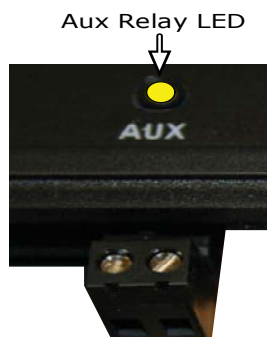


Figure 3-6, Aux Relay LED

02 Invert Setup

The following menus 02A - 02D are used to set up only the functions related to the Inverting mode of the inverter/charger.

- **02A Search Watts:** Allows you to turn off the Search Watts feature, or to adjust the power level to determine when the inverter leaves Search mode. The power level range selection is *Off, 5W to 50W*. If this feature is not needed, select *Search=Off*. When search is turned off, the inverter continuously provides full AC voltage to the loads.

Default setting - *Search = 5W*.



Info: When the Search Watts feature is active, "Searching" appears on the top line of the LCD display and the green INV LED will slowly flash.

What is the Search Watts feature? This feature is used to help save battery power by reducing the inverter's output to search pulses when there is no detectable load. If a load greater than the wattage level setting turns on while the inverter is 'searching', the inverter will start 'inverting' to provide full voltage on its output.

Should I use the Search Watts feature? If the inverter can spend a great deal of time searching (to reduce the power drain on your batteries) and you can tolerate small loads (less than five watts) being OFF, then the Search mode feature should be used. However, if some small loads (i.e., digital clocks, satellite receivers, answering machines, etc.,) are required to be on, then this feature should be turned off (*Search = Off*).

Where should I set Search Watts? The *Search Watts* setting should be adjusted to the same power level (or the next lower setting) of the smallest load that you want to run. If you don't know the wattage of the smallest load you want to run, turn the switch for the load on and decrease the *Search Watts* setting until the load comes on and stays on.

Example: You have reviewed all the loads you want to run and determined that the smallest load is a 30 watt light. Set *Search = 30W*. Whenever you turn on any load (because all the loads are greater than 30 watts), the inverter will stop searching and start inverting to deliver power to the load.

Note: Even though the Search Watts feature is on, some connected equipment may draw enough current even while turned off to keep the inverter in the Inverting mode.

- **02B LBCO Setting:** The *Low Battery Cut-Out (LBCO)* sets the DC voltage level that turns off the inverter. This helps protect the batteries from over-discharge damage. Selections are from *9.0 VDC to 12.2 VDC* (12-volt inverter models), *18.0 VDC to 24.4 VDC* (24-volt inverter models), or *36.0 to 48.8* (48-volt inverter models). If the battery voltage drops below the LBCO set-point continuously for more than 1 minute, the FAULT LED will come on, the inverter will turn off, and the display will show a 'Low Battery' status. If the battery voltage falls below 8.5 volts (12-volt models), 17.0 volts (24-volt models) or 34.0 (48-volt models), the FAULT LED and 'Low Battery' status will be immediate.

Default settings: *LBCO = 10.0 VDC* (12-volt models), *20.0 VDC* (24-volt models) or *40.0 VDC* (48-volt models).

3.0 Setup



Info: The inverter automatically begins inverting when the DC voltage increases to ≥ 12.5 VDC (12-volt models), ≥ 25.0 VDC (24-volt models), or ≥ 50.0 VDC (48-volt models). If AC power is available and connected to the inverter's input, the inverter will automatically clear the low battery fault, pass the input AC power to the output, and begin charging the batteries.

Where should I set the LBCO setting? If you want to cycle the batteries slightly but don't want to discharge them more than 20%*, then the *LBCO* setting should be set from 11.5 to 12.2 VDC (12-volt models), 23.0 to 24.4 VDC (24-volt models), or 46.0 to 48.8 (48-volt models). In some applications, such as those installed in an off-grid home or when doing a lot of dry-camping in your RV, you may want to cycle down to 50%* by setting the *LBCO* from 10.0 to 11.4 VDC (12-volt models), 20.0 to 22.8 VDC (24-volt models) or 40.0 to 45.6 VDC (48-volt models). In extreme circumstances, you have the ability to discharge the batteries to 80%* by setting the *LBCO* to 9.0 or 9.5 VDC (12-volt models), 18.0 or 19.0 VDC (24-volt models), or 36.0 or 38.0 VDC (48-volt models) before recharging.

** These discharge percentages are rough estimates; for accurate battery monitoring, a battery monitor such as Magnum's ME-BMK/ME-BMK-NS is required.*



Info: The higher the *LBCO* setting, the less the inverter will discharge the batteries; which should allow the batteries to have a longer life. The down side to a higher *LBCO* setting is that you need to charge more often to prevent the inverter from shutting off in Fault mode.



Info: If there is an ME-AGS-N installed, it should be set to start ≥ 1.0 volts higher than the *LBCO* setting – this is to prevent the inverter from shutting down before the generator comes on.

- **02C AC In-Time:** This feature allows you to connect to the local power utility at a predetermined time of day. When the current time falls within the set times, the inverter/charger connects to the AC that is connected to the AC input terminals. Once time passes outside the set times, the inverter/charger disconnects from the AC source. If your local power utility offers 'time of day billing,' this feature may save you money by only connecting to the utility when rates are the least expensive.

Default setting - 6:00A - 6:00P

What is the AC In-Time feature? This feature allows the incoming AC to connect to the inverter/charger and charge the batteries only during the time of day as set in the *02C AC In-Time* menu. Even if AC is present on the AC input terminals of the inverter/charger it will only connect during those times that were previously set up.

Should I use the AC In-Time feature? The most common use of AC In-Time is when your local utility company offers peak rate savings. Peak rate savings are when the utility company offers a lower rate per kWh (kilo Watt hour) on your power bill, usually at night when there is less demand on the local utility grid.

Where should I set AC In-Time? Check with your local utility company or installer and see if they offer lower rates at particular times of the day. If a lower rate is offered, try setting your connect time to coincide with the utility companies lower rates, this will save you money.

Example: The standard rate on your power bill is \$.10 kWh. Your utility company offers \$.08 KWH between 12:00 AM and 7:00AM. Set your connect time to coincide with the utility company's lower rates in order to save money when using utility power to charge the batteries.

- **02D AC In VDC:** The *AC In VDC* setting determines when the inverter/charger connects to incoming AC based on VDC (battery voltage). *AC In VDC* is set within a range of battery voltages; the first being the connect DC voltage at which the inverter/charger will connect to incoming AC, and the second being the disconnect DC voltage at which time the inverter will disconnect from incoming AC. This setting is used when an alternate charging source(s) is present. The alternate charging sources may be PV, wind, and/or hydro. Typically, the *AC In VDC* setting optimizes the alternate charging source(s) and only uses the grid to charge the batteries if the alternate charging source is not able to maintain the batteries above the *Set Connect Volts* setting.

Default setting - 11 - 14.1 VDC (12v), 22 - 28.2 (24v), 44 - 56.4 (48v)

What is the AC In VDC feature? This feature allows the incoming AC to connect to the inverter/charger and charge the batteries once the set voltage value in the *02D AC In VDC* menu is reached. Even if AC is present on the AC input terminals of the inverter/charger, it will only connect to incoming AC when the *Set Connect Volts* setting is reached. It will disconnect when the *Set Disconnect Volts* voltage setting is reached.

Should I use the AC In VDC feature? The most common use of *AC In VDC* is when you have an alternate source(s) of battery charging. The most common sources of alternate battery charging are PV, wind, and/or hydro. These sources are directly connected to the batteries via a charge controller. In order to optimize the alternate charge source(s), the incoming AC must be prevented from connecting to the inverter/charger or else the inverter/charger will take over charging the batteries and the alternate source will not be used.

Where should I set AC In VDC? Check with your battery manufacturer or installer in order to determine the correct settings for your batteries. Typically, battery manufacturers don't recommend discharging the batteries below 50%, which when related to a voltage setting is approximately 12.0-12.2 VDC, 24.0-24.4 VDC and 48-48.8 VDC for 12, 24 and 48 volt battery systems respectively.

Example: In order to protect the batteries from over-discharging, set the connect voltage at 12.2 VDC, 24.4 VDC, or 48.8 VDC respectively. If the alternate charge source cannot keep the battery charged, then the grid will connect at 12.2 VDC and charge the batteries. You would set the disconnect voltage at the Absorb voltage for your batteries to make sure the batteries received at least a 75-80% charge before the AC is disconnected.

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- **02E Parallel Threshold:** This setting programs when the slave inverters turn on as a result of the power being provided by the master inverter. In order to keep from overcurrenting the master inverter before the slave inverters can turn on and provide more power to run loads, the master inverter should not be allowed to reach the full output capacity. This setting is expressed in a percentage of power being provided by the master inverter.



Info: When the *Parallel Threshold* setting is reached, all connected slave inverters turn on at the same time to deliver maximum power to the loads. After approximately 30-seconds running to stabilize the AC current, the slave(s) that are not needed will shut down and the units that are still inverting will share the AC current equally.

Example: There are 3 MS4024PAE units in parallel (1- Master, Slave #1, and Slave #2) with a total capacity of 12kW and the *Parallel Threshold* default is set to 60%. The master inverter is running a 2000W load which is below the 60% threshold ($4000W \times .6 = 2400W$). A 1000W load is added so the total load on the system is now 3000W, which exceeds the *Parallel Threshold* setting of 2400W. Slave #1 and #2 inverters will turn on, delivering up to 12000W total power. Within approximately 30-seconds, the system will shut down Slave #2, and the master and Slave #1 will each run 1500W (sharing the 3000W load equalling between them). Now the 1000W load is turned off so the total system load is 2000W. Slave #1 will now turn off and the master inverter will be running the 2000W load.

Default setting - 60%

Should I use the Parallel Threshold feature? This depends on the application. Most applications set a threshold level such that the connected slave inverters come on only when they are required to power the loads. This reduces the power drain on the batteries because the slave inverters that are not actively powering the loads are in standby.

If you have a load larger than the capacity of the Master inverter and the startup current is needed very quickly, you may need to turn the threshold setting OFF. This will ensure all the stacked inverters are always on to meet the fast startup current requirements of this large load.

Where should I set Parallel Threshold? Where you set the threshold depends on your typical AC loads and how much time you would like the master inverter to run (versus the slaves). If you want the master inverter to run as much of the loads as possible before the slave(s) turn on, then set the threshold at a higher setting. If you want the slave(s) to share more of the load, then set the threshold to a lower setting.

Example: Your loads are typically under 4000W and you have a 3-inverter parallel system. You want the master to run loads up to 3000W before the slave inverters turn on. You would set the *Parallel Threshold* to 75% ($4000W \times .75 = 3000W$). The master inverter will now run any load up to 3000W before the slave inverters turn on. In this scenario, if a 5000W load was turned on the slave inverters would turn on, and then Slave #2 would turn off, and the master and Slave #1 would each run at 2500W.

03 Charger Setup

- 03A AC Input Amps:** This selection ensures that the combined current draw from the charger and the AC loads does not exceed the maximum input current that is available. Whenever the utility or generator is connected to the inverter, the current used to power the AC loads and to charge the batteries is monitored. When the total current used to power the AC loads and charge the batteries begins to approach the *AC Input Amps* setting, the current used for charging the batteries is automatically reduced. This ensures the AC loads have all the available current when needed.

Default setting - *Amps = 30 Amps*

Where should I set AC Input Amps? Set the *AC Input Amps* setting to match the current rating of the utility power or the generator's circuit breaker. If using multiple AC sources (utility and generator) through an AC transfer switch, adjust this setting to the smaller AC breaker size. This setting is dependent on the stability of the AC source. If using a generator, factors such as altitude and output voltage regulation may require a lower setting than the generator's breaker size. For best performance, lower this setting to 1/3 its rated capacity and gradually increase it while ensuring the voltage level stays above the *03D VAC Dropout* setting.



CAUTION: The *AC Input Amps* setting does not limit the current to the inverter loads. If the current from the loads on the output of the inverter are greater than the circuit breaker rating on the incoming AC source, you may experience nuisance tripping on this breaker.



Info: This setting controls the input current differently depending on the inverter/charger model and the AC input wiring configuration selected for your particular model. ME, MS and RD Series models have 2 AC inputs (HOT IN 1 and HOT IN 2). *AC Input Amps* is only monitored on HOT IN 1 on these models when wired as a dual-in/dual-out configuration. On these models, if a single-in/single-out configuration is selected and HOT IN 1 and HOT IN 2 are jumped together, then set the *AC Input Amps* setting to 1/2 the input breaker size as 1/2 the current will pass through HOT IN 1 and HOT IN 2 simultaneously.

If MS-AE or MS-PAE models are used, these models have HOT IN 1 and HOT IN 2 and the current on *both* inputs are monitored. Set *AC Input Amps* to match the input breaker size on these models.

- 03B Battery Type:** Used to select the battery type, which determines the battery charge profile and ensures the batteries are receiving the proper charge voltage. The fixed voltage selections are *GEL* (for Gel batteries), *Flooded* (for liquid lead acid batteries), *AGM 1* (for Lifeline AGM batteries), and *AGM 2* (for East Penn/Deka/Discover/Trojan AGM batteries). The *Custom* selection allows the Float, Absorb and Equalization charge voltage settings to be individually adjusted. See Table 3-1 to determine the specific charge voltage based on the battery type selected.

Default setting - *Battery Type = Flooded*

3.0 Setup



Info: The voltage settings shown in Table 3-1 are based on the Battery Temperature Sensor (BTS) having been at a temperature of 77° F (25° C), or not connected. If the BTS is connected, the actual charge voltage will increase if the temperature around the BTS is below 77° F (25° C), and decrease if higher than 77° F (25° C). This ensures the batteries receive the correct charge voltage regardless of temperature.

Table 3-1, Battery Type to Charge Voltages

Battery Type	Inverter Voltage	Absorption Voltage	Float Voltage	Equalization Voltage
GEL	12 VDC	14.1 VDC	13.6 VDC	14.1 VDC ¹
	24 VDC	28.2 VDC	27.2 VDC	28.2 VDC ¹
	48 VDC	56.4 VDC	54.4 VDC	56.4 VDC ¹
Flooded	12 VDC	14.6 VDC	13.4 VDC	15.5 VDC
	24 VDC	29.2 VDC	26.8 VDC	31.0 VDC
	48 VDC	58.4 VDC	53.6 VDC	62.0 VDC
AGM 1 ²	12 VDC	14.3 VDC	13.1 VDC	15.5 VDC
	24 VDC	28.6 VDC	26.2 VDC	31.0 VDC
	48 VDC	57.2 VDC	52.4 VDC	62.0 VDC
AGM 2 ³	12 VDC	14.5 VDC	13.5 VDC	14.5 VDC ¹
	24 VDC	29.0 VDC	27.0 VDC	29.0 VDC ¹
	48 VDC	58.0 VDC	54.0 VDC	58.0 VDC ¹
Custom ⁴	12 VDC	12.0-16.0 VDC	12.0-16.0 VDC	12.0-16.0 VDC
	24 VDC	24.0-32.0 VDC	24.0-32.0 VDC	24.0-32.0 VDC
	48 VDC	48.0-64.0 VDC	48.0-64.0 VDC	48.0-64.0 VDC

Note 1: Voltage same as absorption voltage – to prevent equalization.

Note 2: Specifications for Concord (Lifeline Series) AGM batteries.

Note 3: Specifications for East Penn, Deka, Discover and Trojan AGM batteries.

Note 4: When using the Custom setting, the EQ (Equalization) voltage adjustment cannot be set lower than the Absorb Voltage setting. Also, the EQ Voltage adjustment cannot be set higher than 2-volts (12-volt systems), 4-volts (24-volt systems), or 8-volts (48-volt systems) above the Absorb voltage setting.

- **03C Max Charge Rate:** Sets the maximum charge rate allowed to charge the batteries during Bulk, Absorption, Float, and Equalize charging. Selections are *Max Charge = 0%* up to *Max Charge = 100%*. The *Max Charge = 0%* setting is available to help minimize charging while continuing to allow pass-through power. The rest of the selections are provided to limit the charge rate to the battery bank, which helps prevent battery overheating caused by charging at too high a charge rate.

The maximum charge selections are provided as a percentage of the inverter/charger's maximum charging capability. Refer to the label on the side of the inverter or the owner's manual for the inverter/charger to determine its maximum charge rate. Once you find this maximum charge rate, determine the percentage needed to limit the charge rate to your battery bank.

Example: The charger is rated for 120 amps, and you need to limit the charge rate to 72 amps. Choose the *Max Charge = 60%* selection (72 amps = 60% of 120 amps).

Default setting - *Max Charge Rate = 100%*



Info: If the *Max Charge Rate* setting is 0%, the topology of the Magnum inverter (when connected to an AC source) will override the 0% setting and start charging if the battery voltage is <12 VDC (12 VDC models), <14 VDC (24-volt models), or <28 VDC (48-volt models).

How do I determine where to set my maximum charge rate? The maximum charge rate is generally set to a C/5* rate (C = the total amp-hour capacity of the battery bank – using the 20-hour AH rate). The C/5 rate is usually used when the objective is to charge the batteries as quickly as possible (i.e., 400 AH ÷ 5 = 80 amp maximum charge rate). A lower rate such as C/20* is used when the batteries need to be charged as slow as possible.

* C/5 or C/20 rate - charge rates are commonly expressed as a ratio of the total amp-hour (AH) capacity of the battery bank. For example, with a 400 AH battery bank (C = 400), the C/5 charge rate is 80 A (400/5 = 80 A).



CAUTION: The C/5 or C/20 charge rate settings are guidelines; they are not requirements on how you should set your battery charge rate. For specific charge rate requirements, refer to your battery manufacturer.



Info: If multiple inverter/chargers are used on a single battery bank, you must ensure that the total charge rate from all inverter/chargers is limited to the maximum charge rate needed for your battery bank. The *Max Charge Rate* setting only limits the charging on each inverter/charger individually, not on all inverter/chargers.

- **03D Low VAC Dropout:** Selects the minimum AC voltage that must be present on the input before the inverter/charger switches from Inverter mode to Charger mode.

This setting also determines the minimum AC voltage threshold where the charger disengages and the inverter (when turned on) provides AC power from the batteries. This protects AC loads from utility outages.

Example: If this value is set to 60 VAC, then the AC input voltage must be above 60 volts before the inverter will switch from Inverter mode to Charge mode.

Default setting - 80 VAC (Export inverter models 160 VAC)

Where do I set my VAC Dropout? It depends on the application and what you are using as the AC source. The settings not only look at the incoming voltage level to determine when to transfer, but also determines how quickly the charger disconnects and starts inverting based of the fluctuations of the incoming AC voltage.

Dropout = 60 VAC to 100 VAC (For export models: Dropout = 120 VAC to 200 VAC) - Use a *Low VAC Dropout* setting of 60 VAC to 100 VAC (export models: dropout from 120 VAC to 200 VAC) when the AC source may have fluctuations in RMS voltage. These settings attempt to prevent the charger from disengaging unnecessarily due to poor quality voltage and are highly recommended if using a generator for charging. The

3.0 Setup

transfer time from Charge mode to Inverter mode is >16 milliseconds when using these settings.

Dropout = UPS Mode - Use the *UPS Mode* setting when the AC source is well regulated above 105 VAC (210 VAC for export inverter models) and the inverter loads are sensitive to voltage fluctuations. This setting is intolerant of voltage fluctuations and will provide a quick transfer. The transfer time from Charge mode to Inverter mode is ≤ 16 milliseconds when using this setting. Do not use this setting if using a generator as your AC source.



Info: If you get nuisance AC disconnects, either change the setting to 100 VAC or less (export inverter models: 200 VAC or less), or obtain a better voltage regulated AC source.

- **03E Absorb Done (Time, Amps, SOC):** This setting determines whether time, amps, or SOC are used to determine when the second stage of battery charging, or Absorption Stage, is finished and transitions to the final charge stage (see *03G Final Charge Stage*). Absorption is the second stage of the charge process and the batteries will be almost fully charged.



Info: If the Absorb stage is short or terminated, the batteries may not receive a full charge. In contrast, if the Absorb stage is too long the batteries may be overcharged. Either scenario may lead to damage to the batteries. Contact your battery manufacturer to ensure the best charge settings are used for your type of batteries.

Set Absorb Done Time - *Set Absorb Done Time* is used when a specific time is determined to be the best solution for ending absorption time. When using time, the battery bank size will typically determine the length of the absorb time setting. Taking specific gravity readings of the batteries and adjusting the absorb time may be needed in order to obtain the appropriate absorb time for your battery type and battery bank size. The larger the battery bank the longer the absorb time to ensure the batteries receive a full charge, or you can use Table 3-2 to select the setting – as a general rule of thumb.

Default Setting - *Absorb Done Time = 2.0 Hrs*

Table 3-2, Battery Amp/Hrs Capacity to Suggested Absorb Time

Battery AmpHrs Capacity	Suggested Absorb Time	Battery AmpHrs Capacity	Suggested Absorb Time
200 to 300	60 minutes	1310 to 1500	240 minutes
310 to 500	90 minutes	1510 to 1700	270 minutes
510 to 700	120 minutes	1710 to 1900	300 minutes
710 to 900	150 minutes	1910 to 2100	330 minutes
910 to 1100	180 minutes	2110 to 2300	360 minutes
1110 to 1300	210 minutes	2310 to 2500	390 minutes

Set Absorb Done Amps - This setting is used when the DC amperage supplied to the batteries (i.e., return amps) is used to determine when the batteries are fully charged. During the Absorb charge mode, the return amps from the charger slowly decreases. When this current decreases below the *Absorb Done Amps* setting, the charger transfers from the Absorb charge cycle to the final charge stage (Float or Silent charge mode).

Most battery manufacturers use a specific formula to determine the return amps that indicate a full charge for their particular type of battery. The formula used by most manufacturers to absorb the batteries is $C/20$, where C =Battery Bank's Total Amp Hours. Basically, they take approximately 5% of the total battery bank size, and consider the battery totally charged when the charger's return amps drop to this level. Continuing to charge past this level may possibly overcharge the batteries. Check with your battery manufacturer in order to determine the correct return amp settings for your batteries.

Default setting - *Absorb Done Amps* = 20 ADC



Info: Setting the *Absorb Done Amps* menu item to 0 (zero) will keep the charger in the Absorb charge mode until the *03F Max Charge Time* setting is reached (if no BMK installed).



Info: When using the *Absorb Done Amps* setting the charger will stay in the Absorb charge mode for a minimum of two minutes – independent of the actual *Absorb Done Amps* setting.



Info: If DC loads are connected directly to the batteries, it is not recommended that you use the *Absorb Done Amps* setting. DC loads cause the charger to increase amperage delivered to the battery bank in order to charge the batteries, plus run the DC loads. This scenario could result in overcharging the batteries since the return amps reading will be skewed by the DC loads.



Info: It is highly suggested that you install a battery monitor if the *Absorb Done Amps* setting is used. If a battery monitor is not installed, the *Absorb Done Amps* setting relies on the METER menu's *01B DC Amps* value to determine when to transfer out of the Absorb charge mode. When a ME-BMK/ME-BMK-NS is installed, the *Absorb Done Amps* setting relies on the METER menu's *04C DC Amps – BMK* value to determine when to transfer out of the Absorb charge mode. This is the most accurate DC amperage measurement. The DC amps reading from the ME-BMK/ME-BMK-NS is accurate to +/- .1 ADC.

Set Absorb Done SOC: This setting can be used if a ME-BMK/ME-BMK-NS is installed and you want to use the SOC (State of Charge) of the battery bank to determine when the batteries are fully charged. The SOC is the best way to determine when the batteries are fully charged. The SOC also is helpful because any DC loads or other charge sources connected to the battery bank will not affect the SOC reading, and the batteries will always receive a full charge.

Default setting - *Absorb Done SOC* = 100%

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Info: A ME-BMK/ME-BMK-NS is required in order for the *Absorb Done SOC* setting to be used. If the *Absorb Done SOC* setting is selected and there is no ME-BMK/ME-BMK-NS installed in the system, then the *Absorb Done SOC* setting will be based on the value selected in the SETUP menu's *05B AmpHour Size* menu item.



Info: If the *Absorb Done SOC* setting is used when charging from a generator source, then it is recommended that a setting of less than 100% be used (usually around 90% is acceptable). This lower setting is used because running the generator past the 90% setting is sometimes considered an inefficient use of fuel. If a setting lower than 100% is used, then at least once a week the batteries should be charged to 100%, to make sure damage is not done to the batteries by not bringing them to a full charge state.

- **03F Max Charge Time:** The *Max Charge Time* setting is the maximum time the charger will operate in either the Bulk or Absorption mode. Once the charger reaches the max charge time, it will transition to the final charge stage as set in the SETUP menu's *03G Final Charge Stage*.

Default setting - *Max Charge Time* = 12.0 Hours



Info: In order to ensure a complete charge cycle is accomplished, adjust the *Max Charge Time* setting to a higher value than the settings in the following SETUP menu items; *03E Absorb Done Time*, *03E Absorb Done Amps*, and *03E Absorb Done SOC*. The *Max Charge Time* setting has priority over these menus and will stop the charge cycle once that setting is satisfied.

Example: The *Max Charge Time* setting is six hrs, but the *03E Absorb Done Time* setting is eight hrs. The charge cycle will stop after six hrs as per the *Max Charge Time* setting, and not finish the *Absorb Done Time* setting of eight hrs.

- **03G Final Charge Stage:** The *Final Charge Stage* setting is the stage the charger will transition to after the Absorption Charge stage is completed (as set in the *03E Absorb Done* menu item). There are three choices for the final charge stage: *Multi-Stage*, *Float*, and *Silent*.



Info: The *Final Charge Stage* menu item is only used when *Multi-Stage* is selected in the *02 CHG Control* menu item.

Default setting - *Set Final Charge Stage* = *Multi-Stage*

Set Final Charge Stage = Multi-Stage - The *Multi-Stage* setting transitions from the Absorption stage to Float. Once in the Float stage for four hours with no DC load on the batteries, the charger will enter the Full Charge stage. In the Full Charge mode, the charger automatically goes into a Standby mode (stops charging but is still on and active) and monitors the battery voltage. The charger will remain in the Full Charge stage until the battery voltage drops below 12.7 VDC for 12v batteries, 25.4 VDC for 24-volt batteries, and 50.8 VDC for 48-volt batteries – at which time it will return to the Float stage. These battery voltages are the fully charged voltages of a battery at rest. The charger will continue to cycle between Float and Full Charge as long as incoming AC is available.



Info: The Full Charge stage will help reduce water consumption in flooded batteries during long charge cycles. If another charge source such as PV or wind is charging the batteries above the fully charged voltage, the charger will remain in the Full Charge mode.

Why should I use the Multi-Stage? Multi-Stage is the most commonly used charge mode. It is suitable for most applications and will assure a full charge to the batteries, without overcharging. If there is another alternate charge source charging the batteries such as PV, wind or hydro, then Multi-Stage mode will use the inverter/charger to complete a full charge. The inverter/charger will transition to Full Charge mode and the alternate charge source will then maintain the battery voltage. If the alternate source is unable to maintain the voltage, the charger will enter Float mode for another four hour period. The Full Charge feature in the Multi-Stage mode also helps reduce water consumption in flooded batteries when they are left in the Charge mode for extended periods, such as in a backup power application.

Set Final Charge Stage = Float - The Float stage is a maintenance charge mode that maintains a constant voltage – while delivering up to the maximum rated current of the charger in order to power any DC loads connected to the batteries. Most 3-stage chargers finish the Charge mode in Float and remain in Float as long as an AC source is available on the input of the charger. The float voltage is determined by the battery type selected in the *03B Battery Type* menu item. Unlike Multi-Stage mode, in Float mode there is no Full Charge mode.

Why should I use the Float mode? Float mode is typically used when the charger is the only charge source connected to the batteries. This mode will maintain the batteries at the float voltage. If using flooded batteries and the charger is in float for an extended period, the water level should be checked every two to three weeks for proper levels.

Set Final Charge Stage = Silent - Silent mode stops charging once it transitions from Absorb mode to “*Silent*”. As the charger enters Silent mode it monitors the battery voltage and starts charging once the batteries fall to the *DC Volts to Rebulk* setting. Once the batteries reach this setting, the charger restarts the charge cycle in Bulk mode and then transitions to Absorb. After the Absorb cycle, the charger again transitions to Silent mode and continues this cycle.

Set DC Volts to ReBulk - When *Silent* mode is selected, you must also set the DC voltage set-point where the charger restarts the Bulk mode. This setting should be the lowest DC volts to which you will allow the batteries to fall before starting a new Bulk cycle. Typically, the lowest DC volts the batteries are allowed to fall is 12.0 to 12.2VDC, (12-volt systems) 24.0 to 24.4VDC (24-volt systems), and 48.0 to 48.8VDC (48-volt systems) respectively.

Default setting - *Set DC Volts to ReBulk = 12.0, 24.0, 48.0 VDC*

Why should I use the Silent mode? Silent mode is typically used when an alternate charge source is available and able to fully charge, or finish the charge cycle after the Absorb stage. A major difference between Multi-Stage mode and Silent is that Silent mode returns to Bulk mode instead of Float mode. In Silent mode you can also adjust the Rebulk set-point in order to allow the alternate charge source to provide more of the battery charging.

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3.2.4.1 Accessory Setup

The *AGS Setup* and *BMK Setup* menus only display if the related accessory is connected to the router's inverter/charger, or is directly connected to the router and has been assigned to one of the router's communication ports. The *REM Setup* menu only displays if the remote is connected and assigned to a communication port on the router.

Unlike the previous SETUP menu items, the accessory SETUP menus are accessed through the System Home screen and the PORT button.

To access the SETUP menus for an accessory:

Display the System Home screen (press the METER button for 3-seconds):

1. Press the PORT button until: a) you find the port (P#) to which the accessory is connected to the router; or, b) you find the port (P#Acc) to which the accessory is connected to an inverter.
2. Press the SETUP button. The accessory's SETUP menu appears.
3. Use the SELECT knob to navigate the menus and to make adjustments for that accessory.

04 AGS Setup

This menu is used to set up the functions related to the ME-AGS-N (Automatic Generator Start - Network version). These functions automatically start and stop the generator based on the following conditions:

- **04A Gen Run VDC:** Starts/stops based on battery voltage as shown on the System Home screen.
- **04B Gen Run Time:** Starts/stops based on time of day. This feature uses the router clock to determine start and stop times.
- **04C Gen Run Amps:** Starts/stops based on the AC amp load on the inverter while in Invert mode. When the AGS is connected directly to the router, the AGS starts/stops based on the total AC amp load of all the inverters in the parallel system (while inverting). When the AGS is directly connected to an inverter, the AGS starts/stops based on that inverter's AC amp load (while inverting). The AC amp load value is determined from the *02C Load Amps* menu item (METER button's *AC Meters* menu).
- **04D Gen Run SOC:** Starts/stops based on the SOC reading from the BMK. The AGS uses the SOC value as shown on the System Home screen to determine when start/stop. If multiple BMK's are installed in the system, the System Home screen will display the SOC value of the BMK that is connected to the lowest numbered port.
Example: An inverter connected to Port 2 has a BMK connected to its Network port; this BMK is designated as "P2ACC". A second BMK is connected directly to Port 3 on the router and is designated as "P3". The System Home screen will display the SOC value from the BMK designated as P2ACC.
- **04E Gen Run Temp:** Starts based on the interior temperature or the A/C thermostat as determined by the AGS temperature sensor, and stops after the Gen Run Time setting is completed.



Info: For detailed information on the ME-AGS-N and all its menus, refer to its owner's manual (PN: 64-0039).

05 BMK Setup

The ME-BMK/ME-BMK-NS (Battery Monitor Kit) accurately measures the SOC (State Of Charge), battery voltage, and the DC amps of the battery bank.



Info: For detailed information on the ME-BMK/ME-BMK-NS and all its menus, refer to it's owner's manual (PN: 64-0013).

06 REM Setup

A remote control (ME-ARC50 or ME-RC50) can be used as a second location remote in a parallel system. By plugging a remote into one of the router's communication ports it becomes a system monitor. No setup features are allowed from the remote control; all setup must be done using the router. The remote control can be plugged into any port (P1-P6), and can monitor any port to which an inverter is connected. However, it must be first assigned to that port in order to monitor it.

Default - *System* will appear as the assigned port for the remote control. *System* means the remote control will monitor the SYSTEM port.

To assign a different port, press the SELECT knob and rotate to the desired port (P1-P6). Press the SELECT knob to save the port selection.



Info: The *REM Setup* menu is only available if a remote is plugged into one of the router's communication ports (P1-P6).

3.2.5 TECH Button

The TECH menu button provides access to selections that assist service technicians in troubleshooting. It provides access to system information along with an option that allows all system settings to be returned to the original factory default values. See Figure 3-7 on the next page.

3.0 Setup



TECH Button

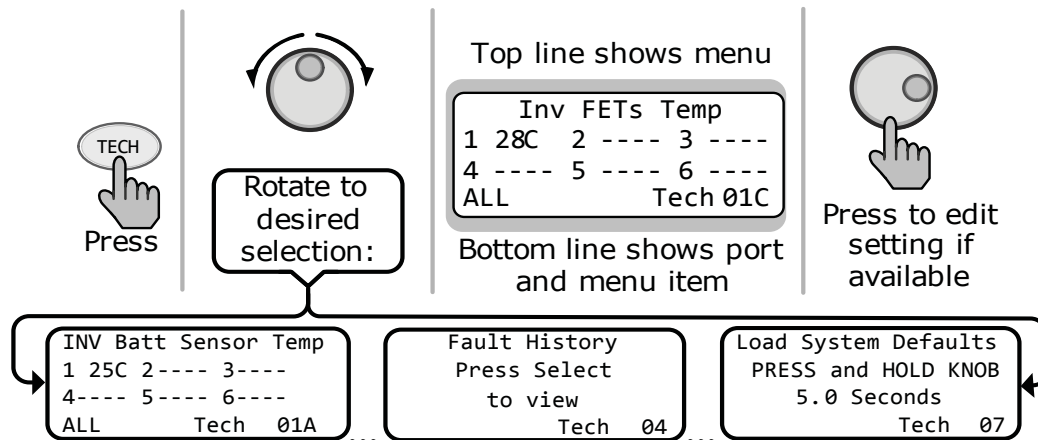


Figure 3-7, TECH Button

When pushing the TECH button from the System Home screen, temperatures of ALL the units connected to the router are displayed. The units display in the order of the PORT to which they are connected (1-6).

Temperatures displayed are:

- **INV Batt Sensor Temp (TECH 01A)** - Displays the temperature of the inverter's Battery Temperature Sensor (BTS).
- **INV Transformer Temp (TECH 01B)** - Displays the temperature of the inverter's transformer.
- **INV FETs Temp (TECH 01C)** - Displays the temperature of the inverter's Field Effect Transistors (FET).



Info: The temperatures are displayed in Celsius or Fahrenheit, as selected in SETUP menu's *01D Temp Display*.

- **Firmware Versions (TECH 02):** The *Firmware Versions* menu displays ALL the units connected to the router. The unit versions display in the order of the PORT to which they are connected (1-6).



Info: The router version will be displayed in the lower left of the screen of the TECH's *Firmware Versions* menu item.



Info: When the router is connected to inverters that are stacked in parallel or series, there will be a stacking indication following the model number. The indications will indicate the following stacking conditions: "PM"- Parallel Master; "PS"- Parallel Slave; "SM"- Series Master; "SS"- Series Slave.



Info: The BMK, AGS, and the remote accessories may display a "0.0" revision for several reasons. Either the accessory is not installed, there is no communication because of a bad or miswired network cable, the device is not powered, or the device is bad.

- **Firmware Versions (TECH 03):** The *Firmware Versions (Acc Port)* menu displays all the accessories connected to the router. The accessory versions display in the order of the port to which they are connected (1-6).
- **Fault History (TECH 04):** This menu shows a two screen display for each history of the last 9 inverter faults. Information for each fault displays from the most recent fault (H1) to the earliest fault (H2 up to H9).



Info: All recorded fault history displays will be retained (except for the day the fault occurred), even if power is removed from the router.



Info: All recorded fault history information can be cleared by going to the Fault History front screen (display shows "Fault History\Press Select to View\Tech 04"). Once this screen displays, press and hold the SELECT knob for ~ 5 seconds until the screen displays "No Faults Recorded\Tech 04".

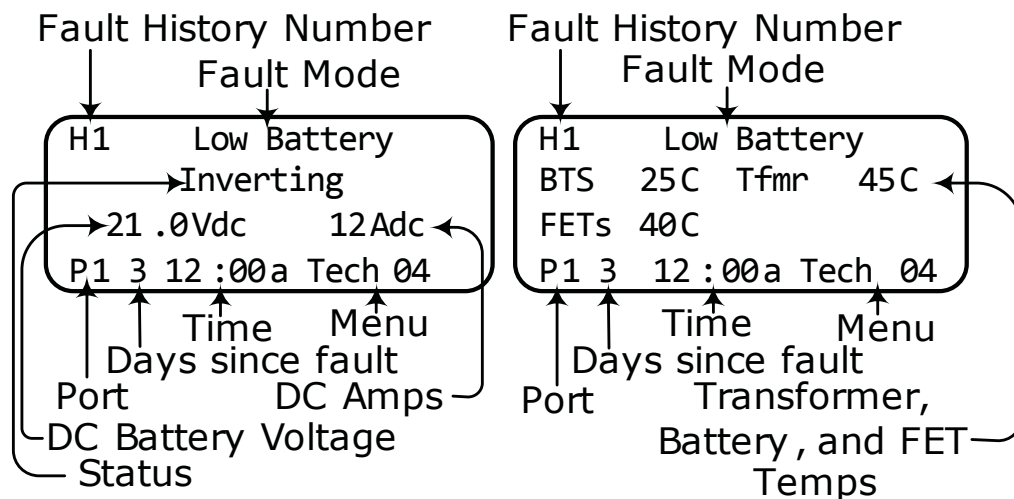


Figure 3-8, Fault History (first and second screens)

Figure 3-8 - first screen (left graphic): The top line displays the fault history number and the fault mode. The second line displays the status of the inverter/charger at the time of the fault. The third line displays DC battery voltage and amperage readings at the time of the fault. The bottom line displays the port that the fault occurred at, how many days ago the fault occurred, the time of the fault, and the menu in which it occurred.

Figure 3-8 - second screen (right graphic): The top line displays the fault history number and the fault mode. The second and third line display transformer, battery, and FETs temperatures at the time of the fault. The bottom line displays the port that the fault occurred at, how many days ago the fault occurred, the time of the fault, and the menu in which it occurred.

3.0 Setup

- **SETUP PIN (TECH 05):** This menu sets the password (PIN - Personal Identification Number) and locks/unlocks the SETUP button menus.

Why should I use the PIN feature? This feature is useful when the operation of the inverter has been set up by an experienced user or installer. Restricting access to the SETUP menus with a password can avoid any unauthorized changes to your settings by inexperienced users.

Setting a PIN

If a PIN has not been set, the SETUP menus are accessible. When you first enter the *SETUP PIN* menu, "*Set SETUP PIN, PIN = 0000*" displays. This is the default setting.

To set a PIN (unlocked SETUP button)

From the *Set SETUP PIN* menu:

1. Press the SELECT knob. The first "0" begins blinking.
2. Rotate the SELECT knob to the desired number 0-9, and then press SELECT again. **Note:** "0000" is not a valid PIN.
3. Repeat Step 2 to set the remaining 3-digits until the desired PIN displays.
4. After pressing the SELECT knob for the last digit, the PIN is set. The *Set SETUP PIN* menu displays with the following menu options:
 - **Unlock Setup** - Press SELECT to allow all users to access the SETUP button menus.
 - **Lock Setup** - Press SELECT to restrict access to the SETUP button menus to only those users with the valid PIN.
 - **Set New PIN** - Press SELECT to change the existing PIN.

Entering a Menu When the PIN is Set and Locked

When entering a menu (or pressing SETUP button) the "*Set SETUP PIN, PIN = 0****" menu displays. The correct PIN must now be entered in order to access the menu. If the incorrect PIN is entered, "*Invalid PIN*" displays. There is no limit on how many attempts can be made to enter the correct PIN number.

To enter an existing PIN

From the *Set SETUP PIN* menu:

1. Rotate the SELECT knob to the correct digit, and then press SELECT.
2. Repeat Step 1 to enter the remaining 3-digits of the correct existing PIN.
3. After pressing the SELECT knob for the last digit, access to the menu is allowed. Refer to Step 4 in the 'Setting a PIN' procedure above to lock/unlock the SETUP button menus.



Info: You can override a previously entered PIN. When "*PIN = 0****" displays, press and hold the SELECT knob until "*PIN = 0000*" displays. Enter a new PIN number as previously described.



Info: After the correct PIN has been entered you do not need to reenter it again to access another protected menu, unless 5 minutes has been passed without any button push.

Setting a new PIN

You can change your PIN at any time. However, to change an existing PIN, you must first enter that PIN in order to access the *Set New PIN* menu item.

To set a new PIN

From the *Set Setup PIN, Pin=0**** menu:

1. Use the SELECT knob to enter the existing PIN (see the 'Entering an Existing PIN' procedure on previous page).
2. Once the existing PIN is entered and you press SELECT for the last digit, the *Set SETUP PIN* menu options appear.
3. Rotate the SELECT button to the *Set New Pin* menu option, and then press the SELECT button. The *Set SETUP PIN* menu appears with the current PIN displayed.
4. Enter the new PIN (see the 'Setting a PIN' procedure on previous page).
Note: "0000" is not a valid PIN.
5. After pressing the SELECT knob for the last digit, the new PIN is set. You are returned to the *Set SETUP PIN* menu where you can lock/unlock the SETUP button menus.



Info: There may be SETUP menus you want others to have access to without giving away the PIN number. To do so, enter the desired SETUP menus in the FAVS button before setting the PIN number. Once you enter the SETUP menus in the FAVS button the PIN number can then be entered, and the SETUP button will be locked. The SETUP menus in FAVS are now accessible without having to enter the PIN number. See the FAVS button section.

- **External Control (TECH 06):** External Control is a read only menu. Magnum Energy has adopted an "open protocol" policy which allows third party firmware companies to control certain functions of the inverter/charger. This menu displays if any external device/software is controlling the router. It is designed to help support personnel determine if the inverter/charger is operating normally, or being controlled by a third party.
No - Indicates no third party network device is controlling the router.
Yes - Indicates a third party network device is currently controlling one of the allowable functions of the router. The function(s) that are being controlled by a third party will be displayed as a number. This number can be used by Magnum Tech Support to determine what code is controlling the router.
- **Load System Defaults (TECH 07):** This menu restores factory defaults to all settings on the inverter/charger and any settings on accessories that are networked. To restore, continually press the rotary SELECT knob for 5 seconds. After the default settings have been restored, the display will show "*System Defaults Have Been Restored*". Refer to the menu maps on pages 43 -51 for default values.



Info: For information on the factory default settings for any networked accessory, refer to the owner's manual for that accessory.

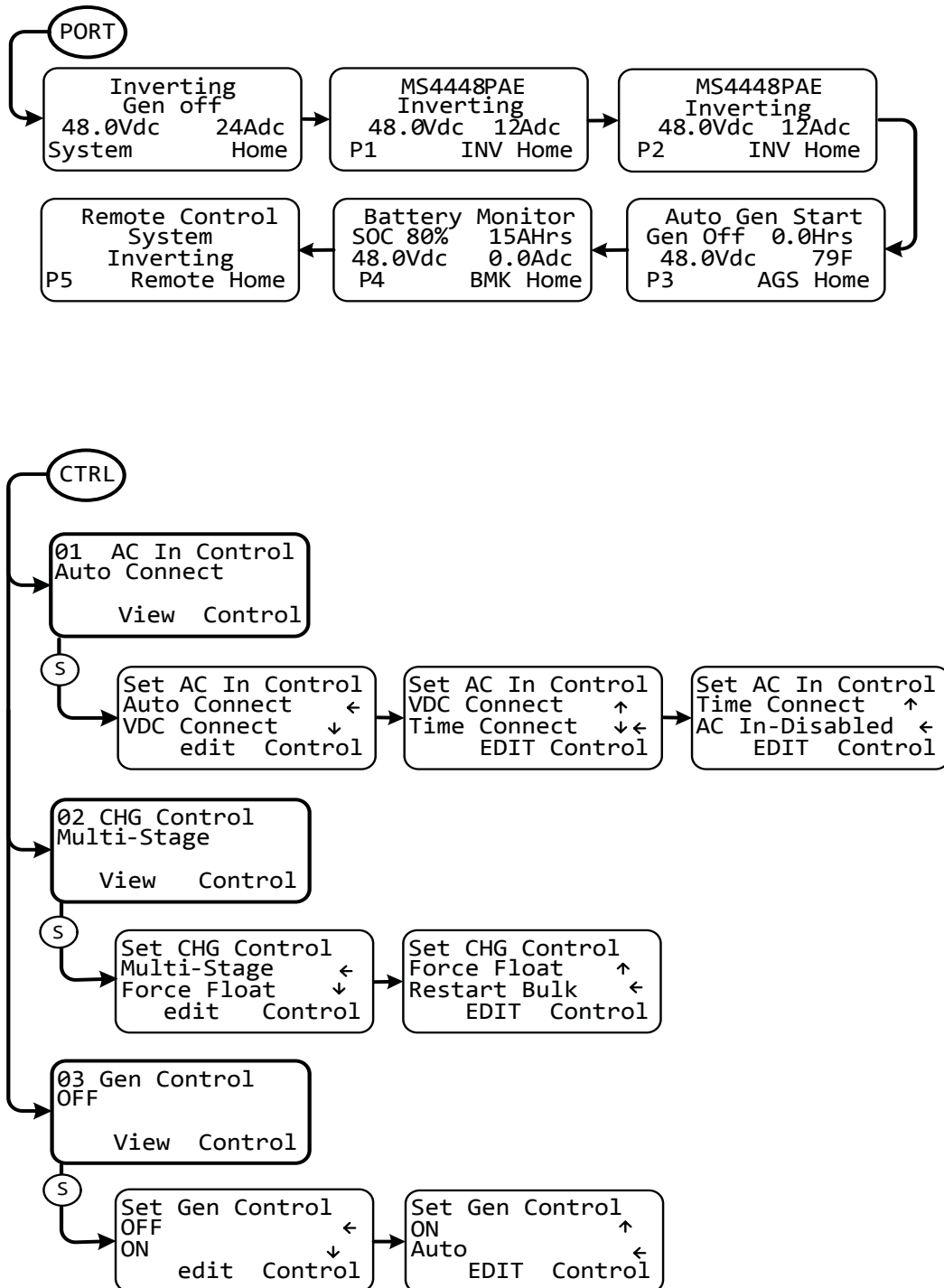


Info: If the PIN has been set and locked, it must be entered before the *Load System Defaults* menu can be used.

4.0 Menu Map

4.0 ME-RTR Menu Maps

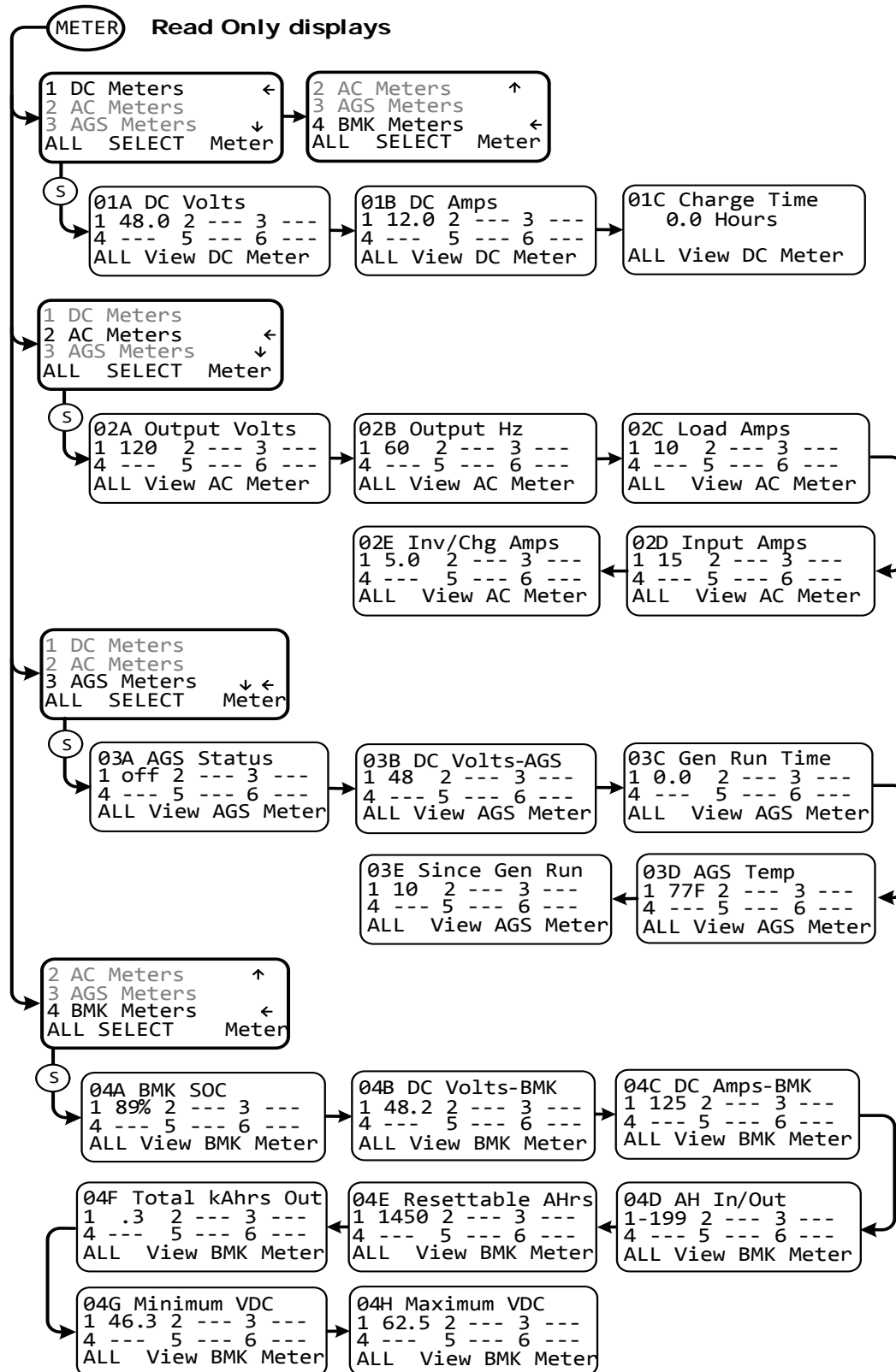
Figures 4-1 thru 4-9 are a complete overview of the settings and info displays available from the router; this should assist with menu navigation.



METER Button's Menu Map starts on the top of the next page

Figure 4-1, PORT/CTRL Button Menu Maps (Page 1 of 9)

4.0 Menu Map: ME-RTR Router Control (continued)



SETUP Button's Router Menu Map starts on the top of the next page

Figure 4-2, METER Button Menu Map (Page 2 of 9)

4.0 Menu Map

4.0 Menu Map: ME-RTR Router Control (continued)

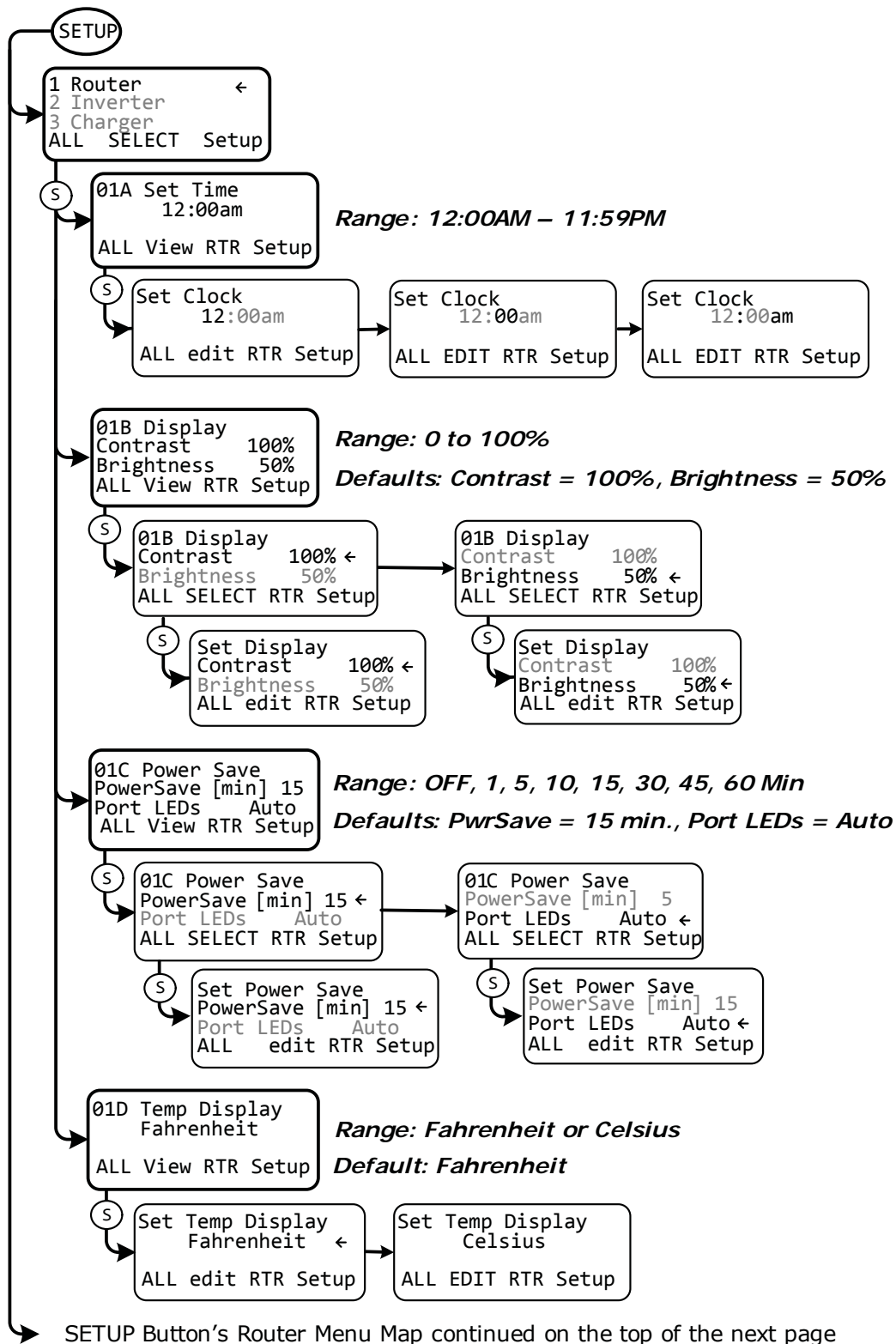


Figure 4-3, SETUP Button Menu Map - Router (Page 3 of 9)



4.0 Menu Map

4.0 Menu Map: ME-RTR Router Control (continued)

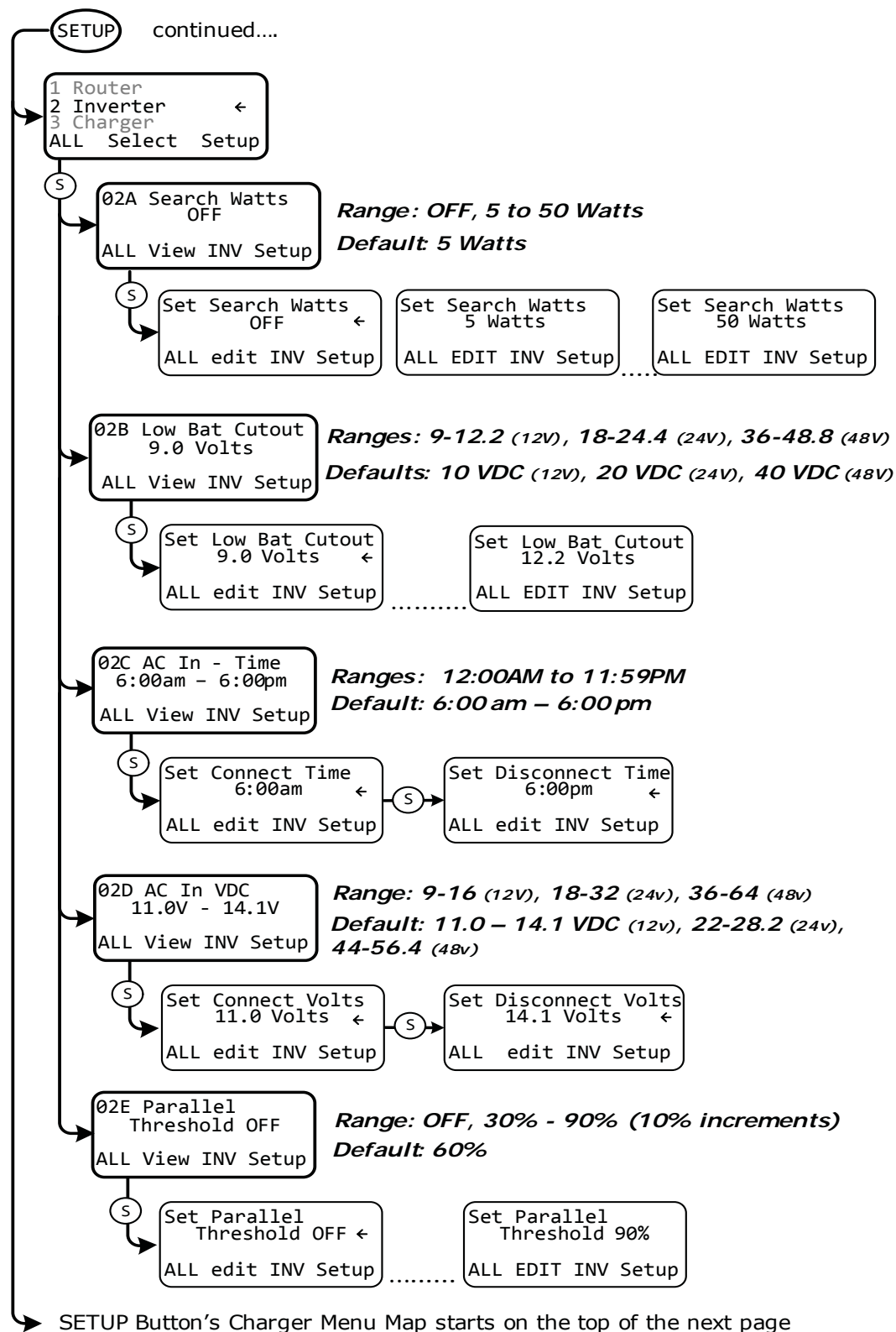


Figure 4-5, SETUP Button Menu Map - Inverter (Page 5 of 9)

4.0 Menu Map: ME-RTR Router Control (continued)

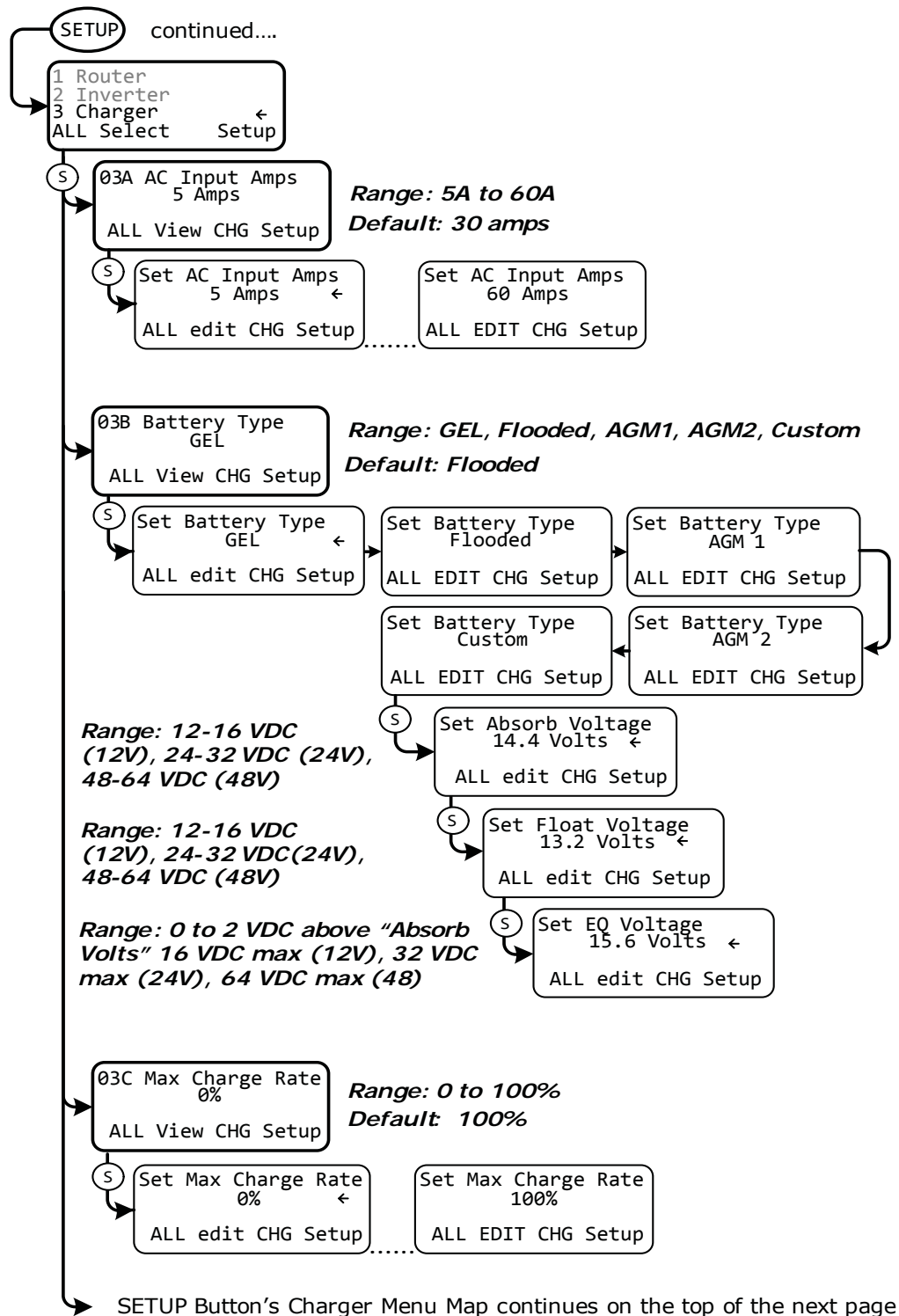
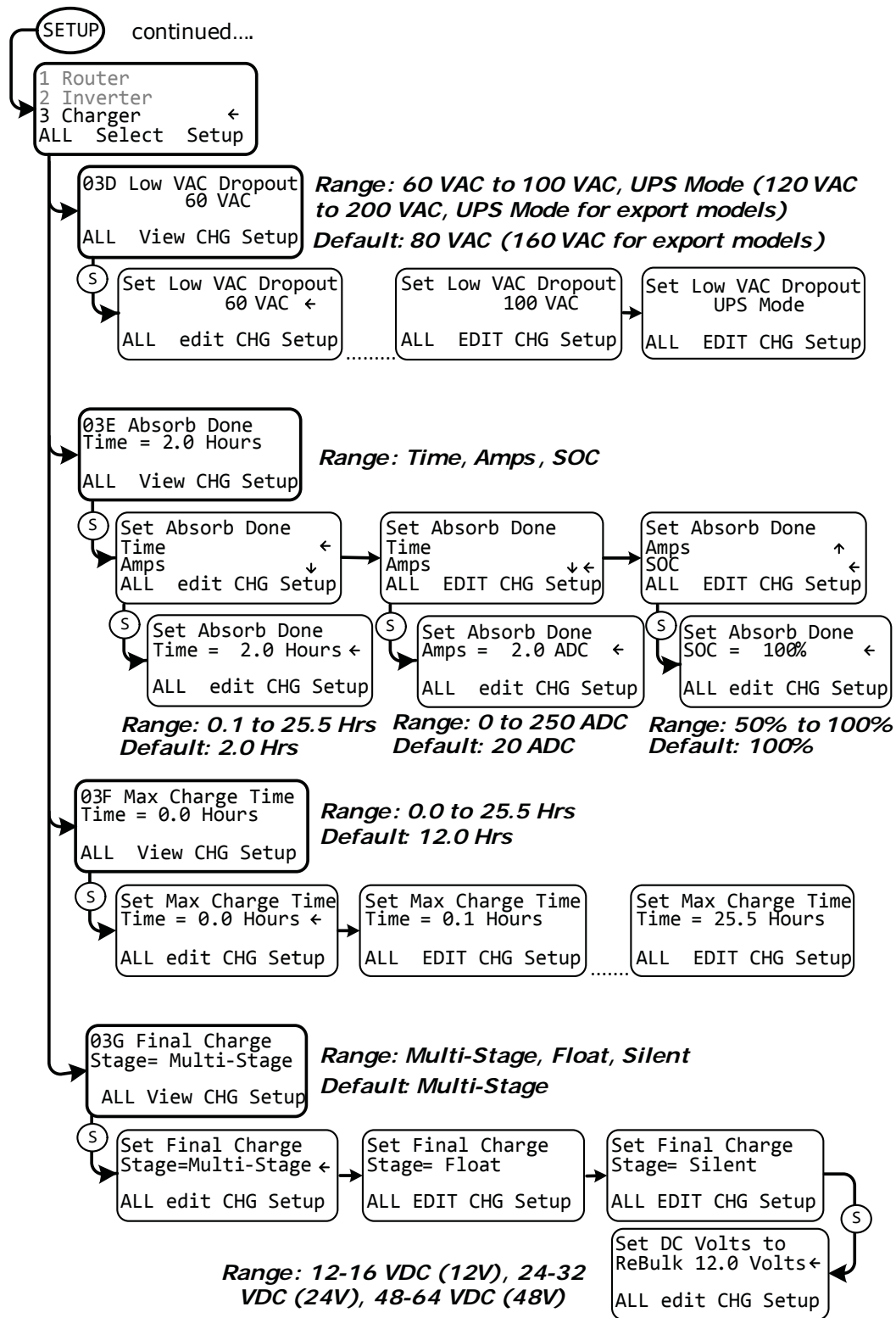


Figure 4-6, SETUP Button Menu Map - Charger (Page 6 of 9)

4.0 Menu Map

4.0 Menu Map: ME-RTR Router Control (continued)



Accessory/TECH Menu Maps start on next page

Figure 4-7, SETUP Button Menu Map - Charger (Page 7 of 9)

4.0 Menu Map: ME-RTR Router Control (continued)

Note: The accessory *SETUP* menus below (AGS, BMK, ARC remote) are accessed via the *System Home* screen and *PORT* button. Refer to procedures on pages 36-37 for these three menu items.

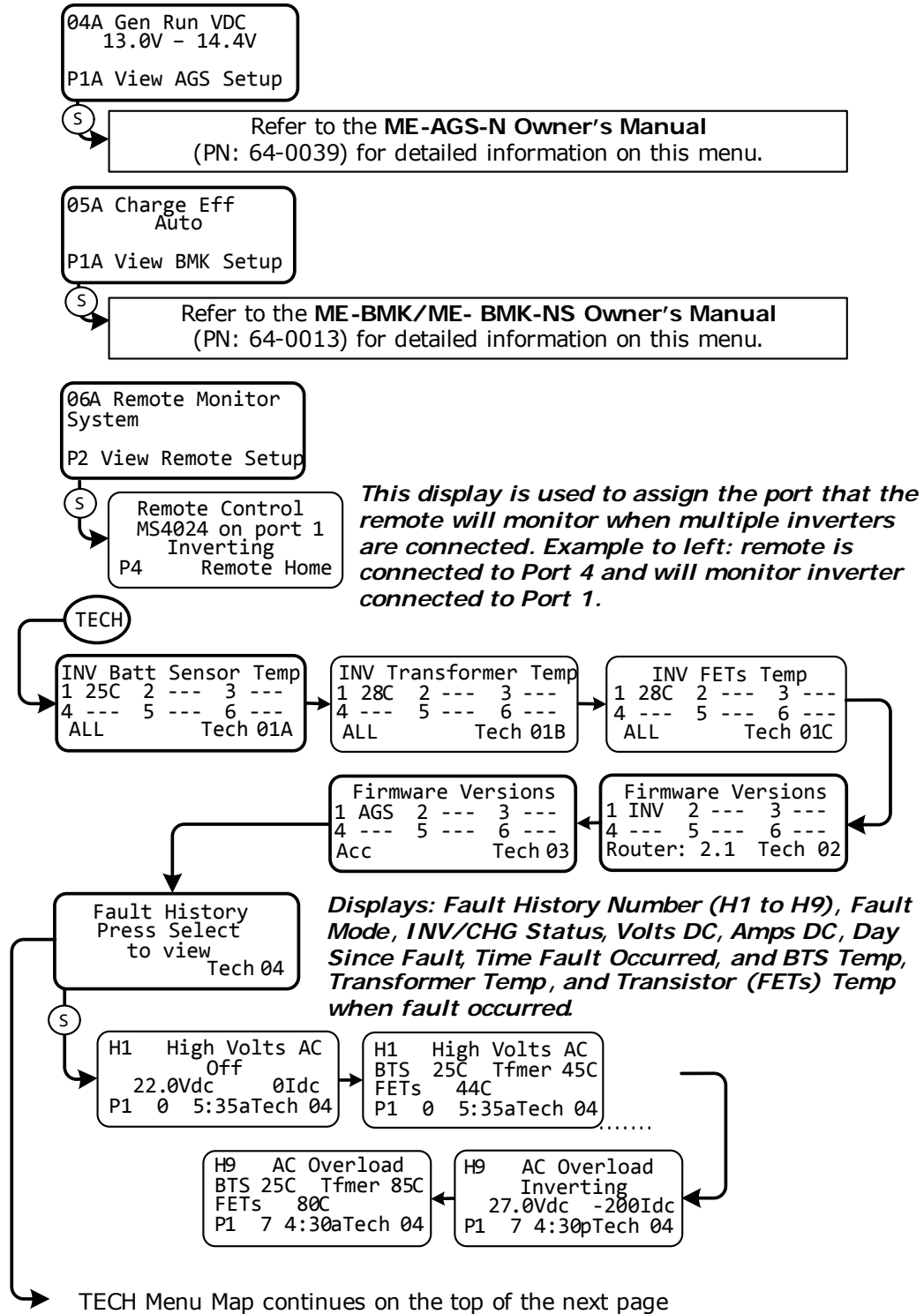


Figure 4-8, *SETUP (Accs)/TECH Menu Map (Page 8 of 9)*

4.0 Menu Map

4.0 Menu Map: ME-RTR Router Control (continued)

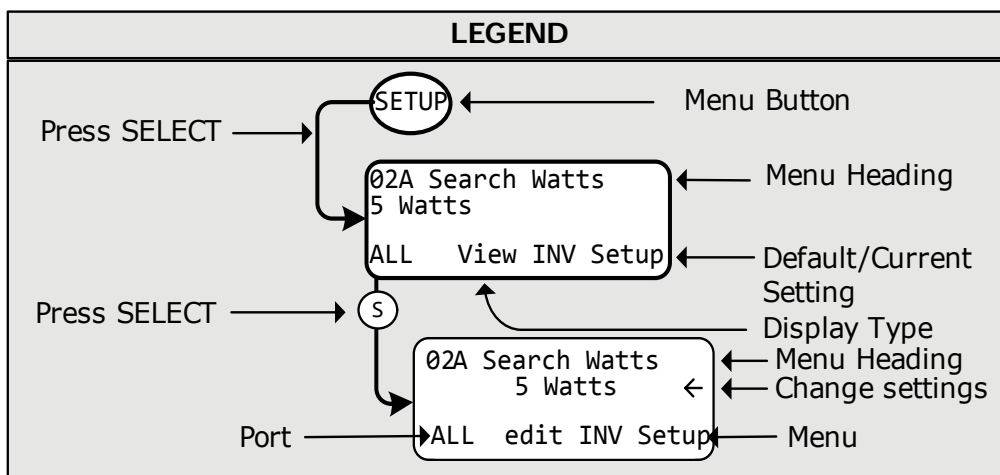
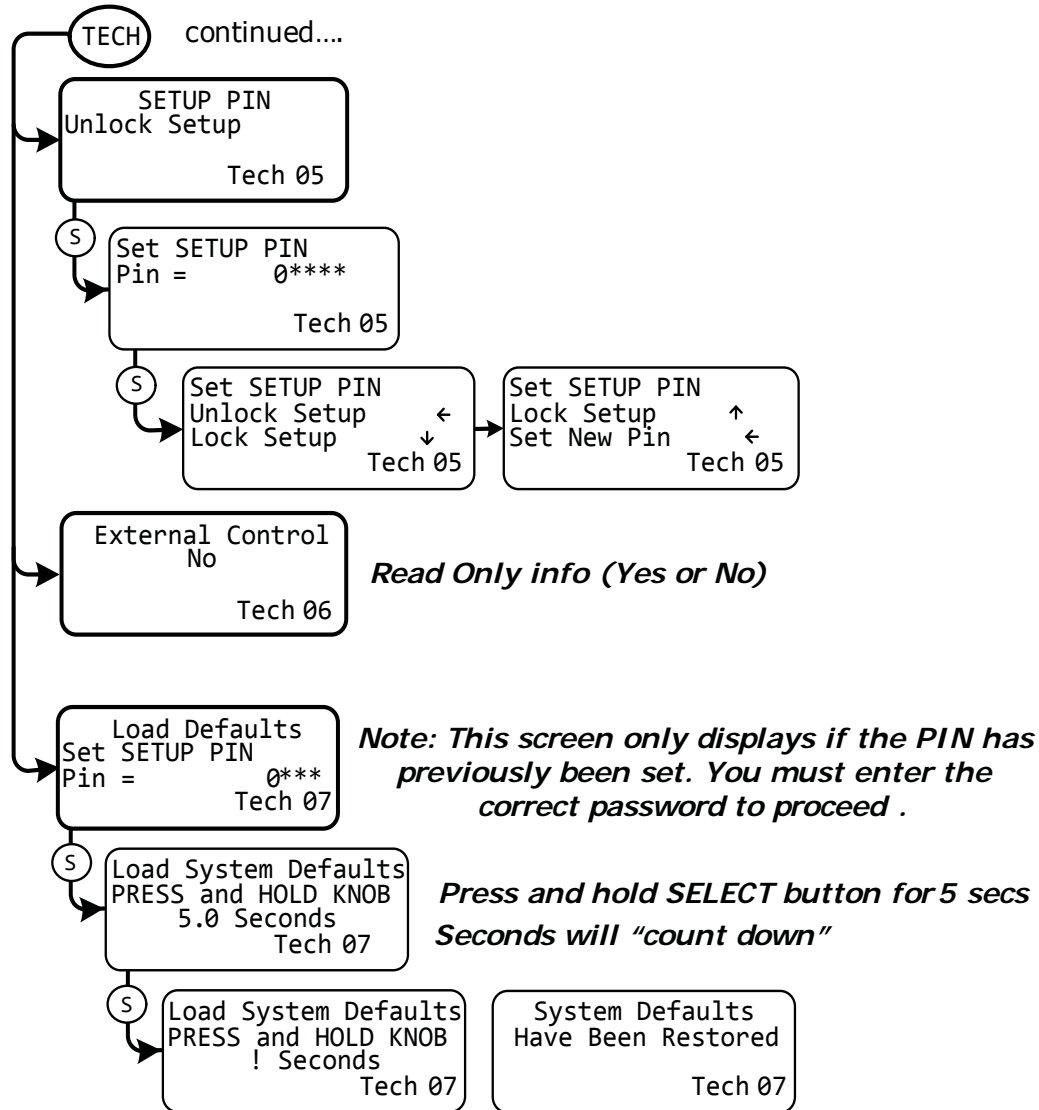


Figure 4-9, TECH Button Menu Map (Page 9 of 9)

5.0 Operation

This section explains how to operate an inverter/charger using the router. It also covers the operational statuses determined by the LED indicators and the LCD display.

5.1 Front Panel

The router front panel contains LEDs and a LCD display for viewing system status, pushbuttons to control system operation, and a rotary knob that enables you to locate and select system information and settings.

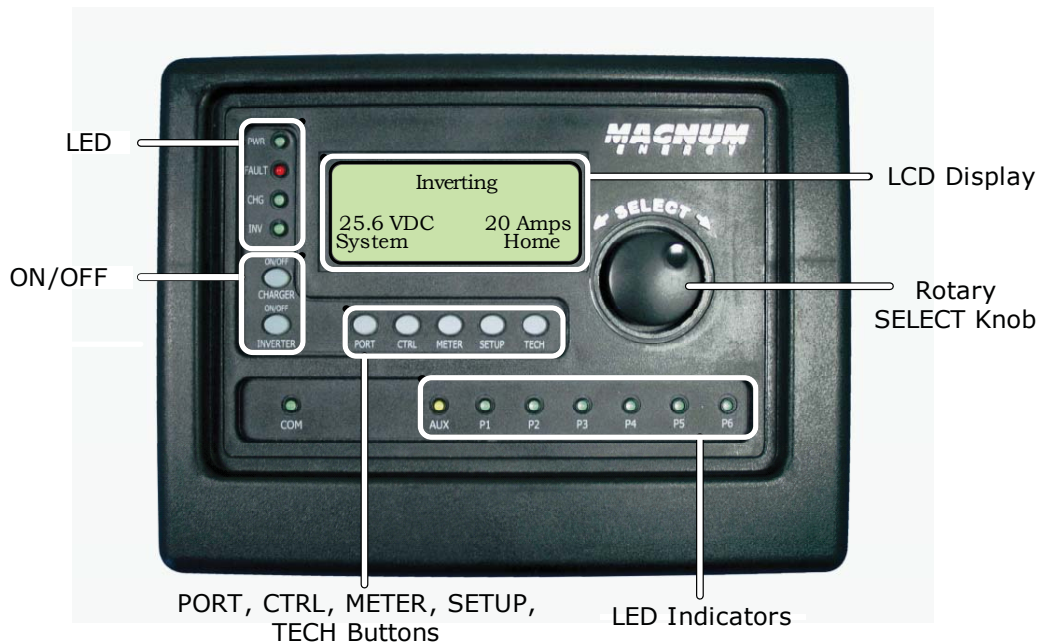


Figure 5-1, ME-RTR Front Panel Controls and Indicators

5.1.1 LED Indicators

There are four LED indicators on the front panel that light solid or blink to indicate the inverter/charger's status. When the router is first powered-up, all the LED's come on as it goes through a self-test. Once the self-test is complete, the LEDs and the LCD provide the operating status of the inverter/charger. See Section 5.3.4 for more information on the LED indicators.

5.1.2 LCD Display

The LCD display is used for setting up the system operation, as well as viewing current operating status and fault conditions. This display has four lines of alphanumeric characters and features a backlight that can be set to turn off to conserve power. The top line provides the inverter/charger status, which is detailed in this section. The second line displays battery information while using the METER menu, displays system troubleshooting information while in the TECH menu, and displays menu items that can be configured for your specific system operation while in the SETUP menu. This display automatically powers-up with the current system status on the top line and the Home screen (detailing the inverter's DC voltage and current as shown in Figure 5-1) on the bottom line.

5.0 Operation

5.1.3 ON/OFF Pushbuttons

- **ON/OFF INVERTER:** This button toggles the inverter function on and off. The green INV LED turns on and off with the button.
- **ON/OFF CHARGER:** This button toggles the charger function on and off whenever the charger is actively charging. The green CHG LED turns on and off with this button. This button is also used to initiate an Equalize charge. For more information on using the Equalize charge feature, see Section 5.2.2 and the Equalizing mode information on page 60.

5.1.4 Menu Pushbuttons

These five pushbuttons provide quick access to menu items for configuring, monitoring, and troubleshooting your inverter/charger system.

- **PORT:** This button scrolls through the active communication ports. Pressing the PORT button will skip over non-active or empty ports allowing quick access to connected devices.
- **CTRL:** This button contains the *ACIN CONTROL*, *CHG CONTROL*, and *GEN CONTROL* menus. The CTRL button gives you quick control of the main functions of the inverter/charger.



Info: If a ME-ARC50 is connected to the router, the CTRL button on the ME-ARC50 is defeated. Any desired function from the CTRL button must be accessed from the router.

- **METER:** This button provides meter information on the inverter/charger, and the ME-AGS-N and ME-BMK/ME-BMK-NS (if connected). See Section 3.2.3 for more detailed information.
- **SETUP:** This button allows the router, the inverter/charger, and any connected accessory to be configured to your specific system preferences. See Section 3.2.4 for more detailed information.
- **TECH:** This button allows you to access menu selections that can help service personnel with troubleshooting, and also allows the factory default settings for the inverter/charger and any connected accessory to be restored. See Section 3.2.5 for more detailed information.

5.1.5 Rotary SELECT Knob

The rotary SELECT knob is similar to a dash radio knob and is used to easily view and select various menu items and settings displayed on the LCD screen. Turn the rotary knob clockwise/counterclockwise to view the different menu items and the available inverter/charger, ME-AGS-N, and ME-BMK/ME-BMK-NS settings. Press the rotary knob to select a menu item or to save a setting once it is displayed on the LCD screen (hold down the SELECT knob for 10 seconds to refresh the LCD display).



Info: All adjustable inverter/charger settings in the router (except for *01B Contrast*, *01C Backlight*, and *03 AGS Control* — which revert back to default) are saved in non-volatile memory until changed — even if an inverter reset is performed or if all power to the router or inverter is removed.



CAUTION: An accessory that is networked to the inverter may have adjustable settings that revert back to default if all power to the inverter is lost. Refer to the particular accessory's owner's manual to determine if any setting for the accessory is affected.

5.2 Operating the Inverter/Charger

5.2.1 Inverter Mode

Turning the inverter on: Press the ON/OFF INVERTER button to activate the inverter function. The inverter will either be actively “Inverting” by using power from the batteries to power the AC loads (see Figure 5-4); or, the inverter will be “Searching” for a load by using very little power from the batteries, if in Search mode (see Figure 5-3). The green INV LED is on when the inverter is actively inverting, and the green INV LED flashes while searching.

Turning the inverter off: While the inverter is actively inverting or searching, press the ON/OFF INVERTER button to switch the inverter function off; which turns the green INV LED off (see Figure 5-2).

Inverter Standby: The inverter is in standby when it is active (green INV LED is on) but not actively providing power from the batteries to the inverter loads. This can happen when an external AC power (utility/shore or generator) is passing through to power the AC loads; or, in a parallel application where the slave inverters are not actively powering a load, but ready and waiting to power the load if needed.

5.2.2 Charger Mode

Turning the charger on: The Charge mode is automatically activated and begins when acceptable AC power (utility or generator) is connected to the input of the inverter. While in Charge mode, the display shows *Charging, Bulk Charging, Absorb Charging, Float Charging, Full Charge, Charger Standby, Silent, Force Float, and Equalizing* (see Figures 5-6 thru 5-14). (When the charger is ON and actively charging, it produces DC voltage and current to charge your batteries, and the CHG LED is solid.)

Charger Standby: When the charger is actively charging, press the ON/OFF CHARGER button to switch the charger to Charger Standby. While in Charger Standby, the incoming AC is still available on the inverter’s output, but the charger is not allowed to charge. The LCD displays “*Charger Standby*” and the CHG LED flashes (see Figure 5-11).



Info: To resume charging momentarily press the ON/OFF CHARGER button, or disconnect/reconnect AC power to the inverter’s input.

Equalize charging: Equalizing is a ‘controlled overcharge’ performed after the batteries have been fully charged. It helps to mix the battery electrolyte (to reverse the buildup of stratification), and also helps to remove sulfates that may have built up on the plates. These conditions if left unchecked will reduce the overall capacity of the battery.



WARNING: Do not perform an Equalization charge without reading and following all safety precautions pertaining to charging/equalization as noted in this manual, and any equalization information in the inverter’s manual.

To enable the Equalization charge, see Figure 5-14 and follow all related information on page 60.

5.0 Operation

5.3 System Status Messages

A status message may be an operational or fault message indicating the inverter/charger's current operating status. This section will cover the inverter/charger's operating and fault modes, and the available status messages under each mode. Use these status messages and the Status LED's to determine the inverter/charger's current operating status, and to help troubleshoot the system if a fault occurs.

The System screen displays inverter/charger status messages on the top line and any accessory status messages on the second line (see Figure 5-1.1). The FAULT LED flashes to indicate that one of the ports has a fault. To determine which port has the fault, press the PORT button or rotate the SELECT knob until the FAULT LED turns solid. The fault now displays on the second line. The first line identifies if it is an inverter/charger fault or an accessory fault (see Figure 5-1.2).

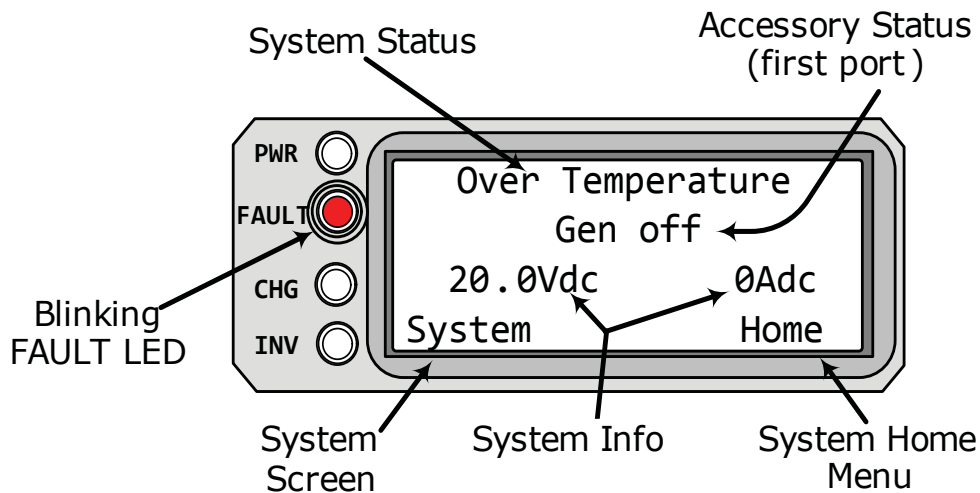


Figure 5-1.1, SYSTEM Screen Status Messages

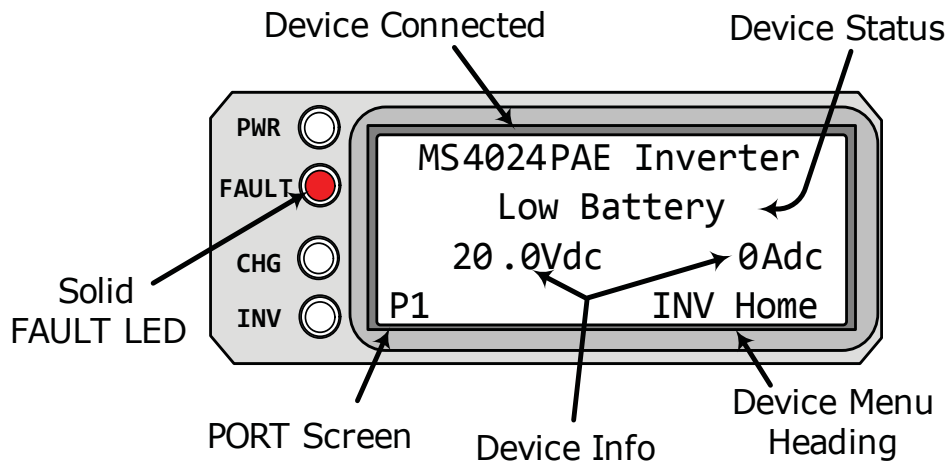


Figure 5-1.2, PORT Screen Status Messages



Info: Whenever referencing “inverter/charger” in this section, please note it is referring to **all** inverter/chargers in the stack, **not** individual inverter/chargers.

There are three operating modes of the inverter/charger system:

- Inverter Mode
- Charger Mode
- Fault Mode

5.3.1 Inverter Mode Messages

The inverter/charger will be in Inverter mode when AC power (utility or generator) is not available, or unacceptable to the inverter/charger's input. The Inverter mode messages are *Off*, *Searching*, *Inverting*, and *Inverter Standby*.

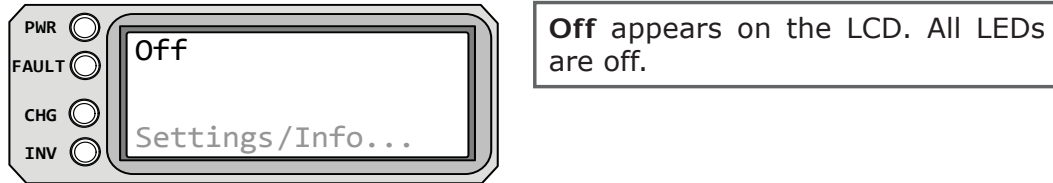


Figure 5-2, Off Mode

- **Off** - This message tells you that there is no AC available on the inverter's AC output. The inverter function is OFF and there is no utility or generator AC power sensed on its input.

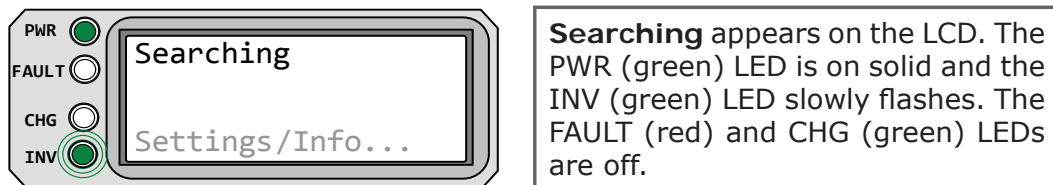


Figure 5-3, Searching Mode

- **Searching** - The inverter is in Search mode. This means the AC loads on the inverter output are less than the SETUP menu's *02A Search Watts* setting. The Search mode function is used to reduce the inverter draw from the battery, and may be turned off at any time if you want full inverter output voltage available at all times (see the 02 Invert Setup section on page 26).



Figure 5-4, Inverting Mode

- **Inverting** - The inverter is providing AC voltage on its output by inverting power from the batteries.

3.0 Setup



Inverter Standby appears on the LCD and the INV (green) LED is on solid. All other LEDs are off.

Figure 5-5, Inverter Standby Mode

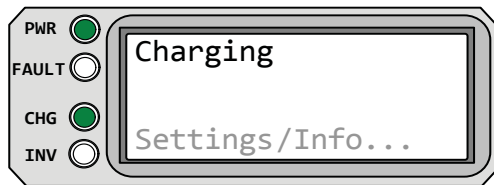
- **Inverter Standby** - The inverter is on, but not actively providing power. However, it is monitoring the power requirement of the parallel system to determine when to activate and provide power to assist the master inverter.

5.3.2 Charger Mode Messages

When AC power (utility or generator) is connected to the inverter/charger it begins to monitor the AC input for acceptable voltage. Once the AC input is accepted, the AC transfer relay (inside the inverter) closes and Charge mode begins. There are several Charger mode messages. View the top line of the LCD display and the corresponding message in this section to determine and understand the particular Charge mode.



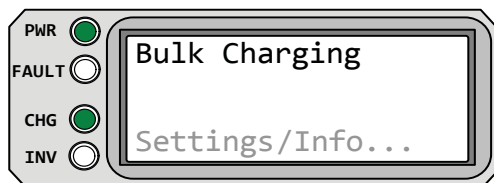
Info: The AC input becomes acceptable once: a minimum 10 second delay passes, the voltage is greater than the SETUP menu's *03D VAC Dropout* setting, and no *ACIn Control* menu setting is actively preventing the AC from connecting.



Charging appears on LCD. PWR (green) and CHG (green) LEDs are on solid. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-6, Charging Mode

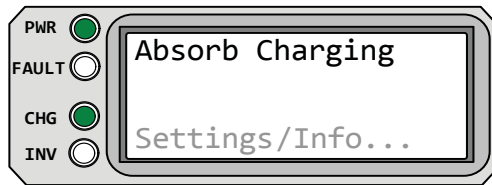
- **Charging** - Once Charge mode has been enabled, the unit will wait and display "Charging" to determine the charge routine. If the DC voltage is low (≤ 12.8 VDC / 12-volt models, ≤ 25.6 VDC / 24-volt models, or ≤ 51.2 VDC / 48-volt models), the charger will initiate Bulk Charging. If the DC voltage is high (≥ 12.9 VDC / 12-volt models, ≥ 25.6 / 24-volt models, or ≥ 51.2 / 48-volt models), the charger will skip the Bulk and Absorb charging stages and go directly to the final charge stage (Float or Silent).



Bulk Charging appears on LCD. PWR (green) is on solid. CHG (green) LED is typically on solid, but may blink slowly. FAULT (red) LED is off. INV (green) LED could be on or off.

Figure 5-7, Bulk Charging Mode

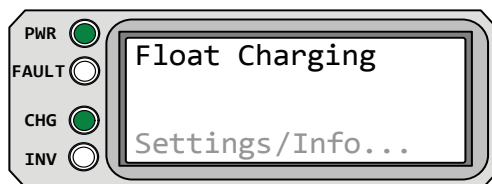
- **Bulk Charging** - The battery charger is delivering maximum current (determined by the SETUP menu's *03C Max Charge Rate* setting) to the batteries. The charger will remain in Bulk charge until the absorb voltage (determined by the SETUP menu's *03B Battery Type* setting) or the *03F Max Charge Time* setting is reached.



Absorb Charging appears on LCD. PWR (green) is on solid. CHG (green) LED is typically on solid, but may blink slowly. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-8, Absorb Charging Mode

- **Absorb Charging** - The Absorb Charge state is the constant voltage stage and begins when the absorb voltage is reached (determined by the SETUP menu's *03B Battery Type* setting) while Bulk charging. During this stage, the DC charging current decreases in order to maintain the absorb voltage setting. This charge stage continues until the *03E Absorb Done (Time, Amps, or SOC)* or *03F Max Charge Time* setting is reached.



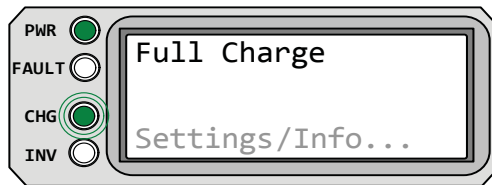
Float Charging appears on LCD. PWR (green) LED is on solid. CHG (green) LED is typically on solid, but may blink slowly. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-9, Float Charging Mode

- **Float Charging** - In Float Charging mode, the charger reduces the charge voltage and tries to maintain the batteries at the float charge voltage setting. This is determined by the SETUP menu's *03B Battery Type* setting as shown in Table 3-1.



Info: If the battery voltage falls ≤ 12.1 VDC (12-volt models), ≤ 24.2 VDC (24-volt models) or ≤ 48.4 VDC (48-volt models); the unit will initiate bulk charging.

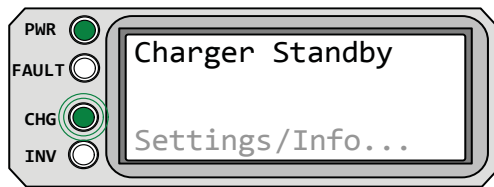


Full Charge appears on LCD. PWR (green) LED is on solid. CHG (green) LED blinks slowly. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-10, Full Charge Mode

- **Full Charge** - This status indicates that you have entered the Battery Saver™ mode. This mode maintains the batteries without overcharging, and prevents excessive loss of water in flooded batteries or drying out of GEL/AGM batteries. After four hours of float charging, the charger will turn off and "Full Charge" displays (charger is now in Battery Saver™ mode). If the battery voltage drops to ≤ 12.6 (12-volt models), ≤ 25.2 (24-volt models) or ≤ 50.4 (48-volt models), the charger will automatically initiate another 4 hours of float charging. This cycle helps to ensure the batteries are maintained and continues as long as AC power is continuously connected to the AC input. "Full Charge" only displays if *Multi-Stage* is selected from the *03G Final Charge Stage* menu.

5.0 Operation



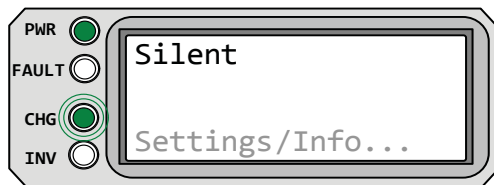
Charger Standby appears on LCD. PWR (green) LED is on solid and CHG (green) LED slowly blinks. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-11, Charger Standby Mode

- **Charger Standby** - This indicates the charger has been disabled to prevent further charging, but the AC power (from utility or generator) to the AC input is still available on the AC output. This display is shown when the ON/OFF CHARGER button is pressed while the AC power is passing through the inverter/charger.



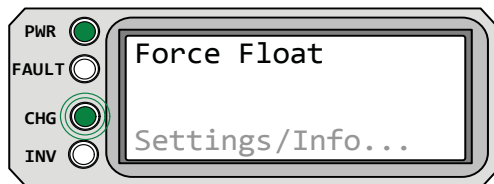
Info: Press the ON/OFF CHARGER button to enable charging again. When enabled, the charger will continue in the previous Charge mode and the CHG (green) LED will come on solid.



Silent appears on LCD. PWR (green) LED is on solid and CHG (green) LED slowly blinks. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-12, Silent Mode

- **Silent** - This displays at the end of Absorption stage if *Silent* is selected from the *03G Final Charge Stage* menu. In Silent mode, the charger is not actively charging but does monitor the battery voltage. When the battery voltage reaches the *Set DC Volts to ReBulk* setting (under the *03G Final Charge Stage* menu) the charger will restart a Bulk and Absorb charge cycle, and then transition back into Silent mode at the end of the Absorb cycle.



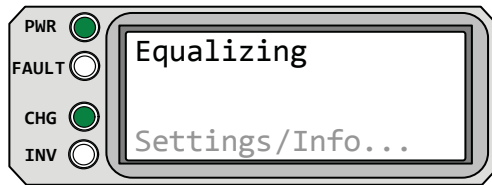
Force Float appears on LCD. PWR (green) LED is on solid and CHG (green) LED blinks slowly. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-13, Force Float Mode

- **Force Float** - This charge profile forces the charger to stay in the Float mode as long as AC is present and the charger is active. Force Float is most often used when another source of charging (such as PV, wind or hydro) is available to keep the batteries at the float voltage. If AC is disconnected and then reconnected, the charger will go directly to the Float mode and will not do a Bulk or Absorption charge cycle.



CAUTION: Using the Force Float mode may not fully charge the batteries. Most batteries require a Bulk and Absorption charge cycle in order to fully recombine the electrolyte in the batteries and bring the specific gravity to the proper level. Be sure to check with your battery manufacturer before using this setting.



Equalizing appears on LCD. PWR (green) and CHG (green) LEDs are on solid. FAULT (red) LED is off, and INV (green) LED could be on or off.

Figure 5-14, Equalizing Mode

- **Equalizing** - This display indicates that the battery charger is delivering the equalize voltage to the batteries. See Table 3-1 to determine the equalize voltage for your battery type.

Equalize charging can be enabled by the ON/OFF CHARGER button – if the SETUP menu's *03B Battery Type* setting allows. Equalization charging can only be enabled while the charger is in Float Charge or Full Charge mode. To turn on Equalize charging, ensure the LCD display reads "*Float Charging*" or "*Full Charge*", and then press and hold down the ON/OFF CHARGER button (about 5 seconds) until the LCD screen displays "*Equalizing*".

The Equalize charge will continue for four hours and then automatically stop and return to Float charging. The Equalize charge can be manually stopped by pressing and holding down the ON/OFF CHARGER button (about five seconds) until the LCD screen displays "*Float Charging*".

During Equalizing mode the batteries will begin gassing and bubbling vigorously – which consumes water. Ensure each cell has adequate distilled water levels prior to equalizing, and add water as needed after equalizing.



WARNING: Equalizing produces hydrogen and oxygen gas. To avoid explosions, ensure the battery compartment has adequate ventilation in order to dissipate this gas.



CAUTION: Ensure your batteries can be equalized. Only do so if permitted by your battery manufacturer or dealer. Performing an Equalize charge on batteries other than liquid lead acid or certain AGM types could permanently damage them. Contact your battery manufacturer for their recommendations.



CAUTION: Ensure the DC loads will not be damaged by the higher voltage applied to the batteries during the Equalize charge. If in doubt, disconnect the DC loads to prevent damage.



Info: Equalization charging is not available if *GEL* or *AGM 2* is selected as the SETUP menu's *03B Battery Type* setting.

How often should I equalize? Some experts recommend that heavily used batteries should be equalized periodically, ranging anywhere from once a month to once or twice per year. Other experts only recommend equalizing when the cells have a low specific gravity, or when the difference between any individual cell has a specific gravity reading greater than .015 after being fully charged. Contact your battery manufacturer for their recommendations.

How long should I equalize? While the batteries are gassing, monitor the specific gravity readings every hour. When the specific gravity readings no longer increase, the Equalization charge is complete and should be stopped.

5.0 Operation

5.3.3 AC In Control Status Messages

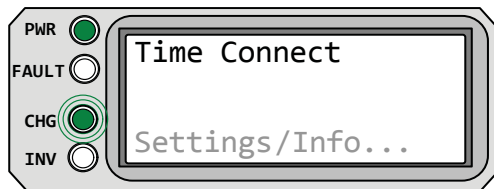
These displays alternate with the inverter/charger status to indicate that there is AC power present at the AC input, but the inverter/charger is not connecting to the incoming power.



VDC Connect appears on LCD. PWR (green) is on solid and CHG (green) is blinking.

Figure 5-15, VDC Connect Mode

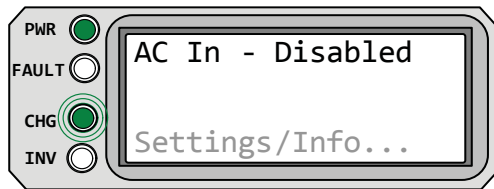
- **VDC Connect** - The DC battery voltage needs to fall below the *Set Connect Volts* setting in the *02D AC IN VDC* menu in order for the inverter/charger to reconnect to incoming AC.



Time Connect appears on LCD. PWR (green) is on solid and CHG (green) is blinking.

Figure 5-16, Time Connect Mode

- **Time Connect** - The time of day needs to fall within the *Set Connect Time* setting per the *02C AC In - Time* menu in order for the inverter/charger to reconnect to incoming AC.



AC In - Disabled appears on LCD. PWR (green) is on solid and CHG (green) is blinking.

Figure 5-17, AC In - Disabled Mode

- **AC In - Disabled** - The inverter/charger is being prevented from reconnecting to any incoming AC.

5.3.4 Fault Mode Messages

The FAULT LED comes on and a fault status is displayed when an abnormal condition is detected. Use the information in this section to determine and correct the issue.



Info: Many of the faults will automatically restart when the fault is cleared. Some will require a manual restart. This requires the ON/OFF INVERTER button on the router to be pressed and released. Finally, if the fault will not clear, an inverter reset may be required – see Section 6.2 to perform an inverter reset.

5.3.4.1 System Fault Messages

These fault messages are usually caused by some external issue that directly affects the inverter/charger system.

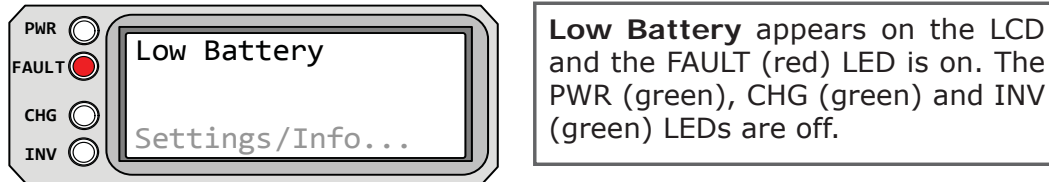


Figure 5-18, Low Battery Fault

- **Low Battery** – The inverter has turned off to prevent the batteries from being over-discharged. The fault message displays and the FAULT (red) LED illuminates when the battery voltage drops below the SETUP menu's *02B LBCO* setting for more than one minute. The inverter will automatically restart and resume operation when the battery voltage rises to ≥ 12.5 VDC (12-volt models), ≥ 25.0 VDC (24-volt models), or ≥ 50.0 VDC (48-volt models).



Remedy: This fault will also automatically restart if AC power such as utility power or a generator is connected to the inverter/charger's input and battery charging begins.



Figure 5-19, High Battery Fault

- **High Battery** – The inverter has turned off because the battery voltage is at a very high level. This fault message displays and the FAULT (red) LED turns on when the battery voltage is above the High Battery Cut-Out (HBCO) value. This fault will automatically restart and resume operation when the battery voltage drops 0.3 VDC (12-volt models), 0.6 VDC (24-volt models), or 1.2 VDC (48-volt models) below the HBCO value.



Info: The HBCO value is dependent on your inverter revision and model. Normally, the HBCO value for the ME/MM/RD Series inverters is 16 VDC (12-volt models) or 32 VDC (24-volt models); and, the HBCO value for the MS/MMS Series inverters is 17 VDC (12-volt models), 34 VDC (24-volt models), or 68 VDC (48-volt models).



Remedy: This fault usually only occurs when an external DC charging source is charging the inverter's battery bank. Turn off any other additional charging source to allow the DC voltage level to drop.

5.0 Operation



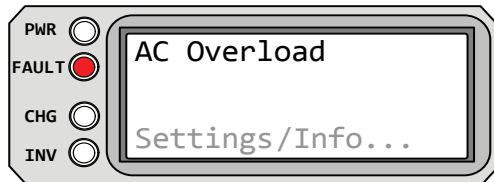
Overtemp appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-20, Overtemp Fault

- **Overtemp** – This fault message indicates the inverter/charger has shut down because the internal power components (FETs and/or Transformer) have exceeded their safe temperature operating range. When the unit has cooled down it will automatically restart and continue operation.



Remedy: If the fault occurs while inverting reduce the load on the inverter. If it occurs while charging turn down the charge rate. If this fault happens often, ensure the inverter is not in a hot area, has proper ventilation, and the cooling fans inside the inverter are working.



AC Overload appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-21, AC Overload Fault

- **AC Overload** - This fault message displays when the AC load on the inverter/charger's output has exceeded the inverter's AC current protection limits. If the overload condition lasts for less than 10 seconds, the unit will automatically restart and resume operation. However, if the overload occurs for more than 10 seconds, the unit will shut down and require a manual restart.



Remedy: This fault occurs because the connected AC loads are larger than inverter's output capacity, there is a wiring short on the output, or the output wires are incorrectly installed. Once the AC loads are reduced or the output wiring is corrected, the inverter can be restarted after a manual restart.



High Volts AC appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-22, High Volts AC Fault

- **High Volts AC** - This fault causes the AC input to be disabled because a very high AC voltage (>150 VAC; or >300 volts for export inverters) has been detected on the AC input.



Remedy: Remove all AC power from the inverter's AC input for at least 15 minutes to automatically restart this fault. Ensure only 120VAC power is connected to each of the inverter's AC inputs.

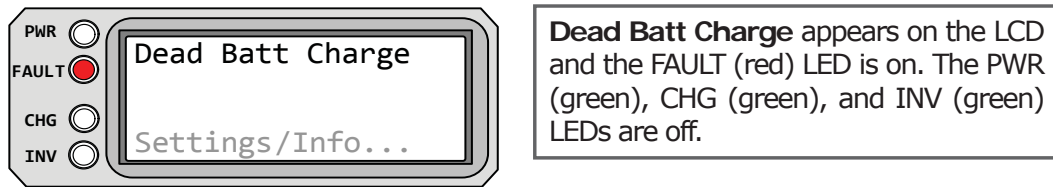


Figure 5-23, Dead Battery Charge Fault

- **Dead Battery Charge** – This fault indicates a discharged battery bank or one that is disconnected from the inverter. The unit is attempting to enter Charge mode, but has detected less than 7 volts (12-volt models), 14 volts (for 24-volt models) or 28 volts (for 48-volt models) on the battery bank. This fault will continue until current is able to flow into the battery from the battery charger. Once this happens, the fault will automatically reset.



Remedy: Check DC voltage on the inverter's DC terminals and compare it with the DC voltage on the battery bank. These two voltages should be very close (<0.5 VDC difference). If not, check to ensure all connections are tight and the fuse/circuit breaker between the inverter and battery bank is good.

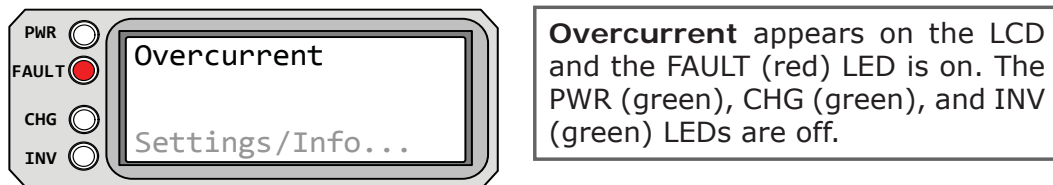


Figure 5-24, Overcurrent Fault

- **Overcurrent** - This fault may be the result of an excessive AC load and causes the inverter to shut down to protect internal power components. If the overload condition lasts for less than 10 seconds, the unit automatically restarts and resumes operation. However, if the overcurrent condition occurs for more than 10 seconds, the unit shuts down and requires a manual restart.



Remedy: This fault usually occurs because the connected AC loads are larger than the inverter's output capacity, there is a wiring short on the AC output, or the wires are incorrectly wired. Once the AC loads are reduced or the output wiring is corrected, manually restart the inverter to resume operation. If this fault condition continues after all of these recommendations, perform a inverter reset (see Section 6.2).

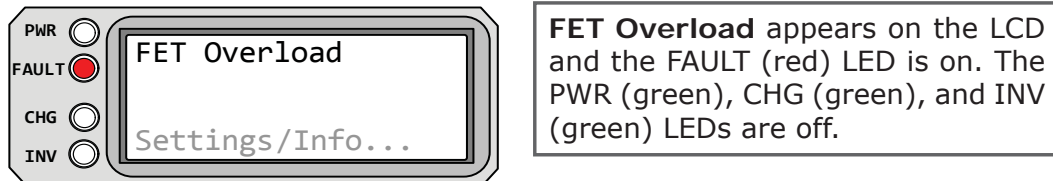


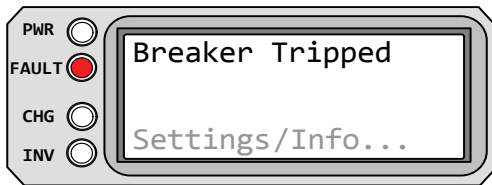
Figure 5-25, FET Overload Fault

- **FET Overload** - This fault message indicates the inverter/charger has shut down because the internal FETs (Field Effect Transistors) have quickly exceeded a safe operating temperature. When the FETs cool, the unit requires a manual restart to resume operation.

5.0 Operation



Remedy: If the fault continues, disconnect all the inverter's AC output wires and reset the inverter (see Section 6.2). If the fault does not clear after the reset, the inverter may require service.



Breaker Tripped appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-26, Breaker Tripped Fault

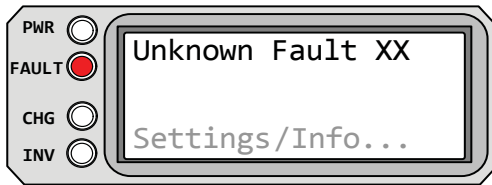
- **Breaker Tripped** - The AC input breaker on the inverter/charger has opened due to excess current flow thru the inverter to the AC loads.



Remedy: After reducing the AC loads, push in the inverter's AC input circuit breaker to reset and resume operation.



Info: While in Charger mode, the inverter's AC input breaker could nuisance trip if the loads on the inverter's output exceeds the current rating of the inverter's input circuit breaker.



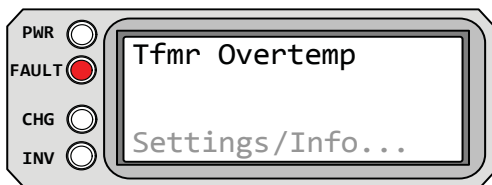
Unknown Fault appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-27, Unknown Fault xx

- **Unknown Fault** - This fault message displays when the inverter/charger has sent a fault code that cannot be determined by the router.



Remedy: Call the Technical Support department at Magnum Energy for assistance in determining and understanding the actual fault status.



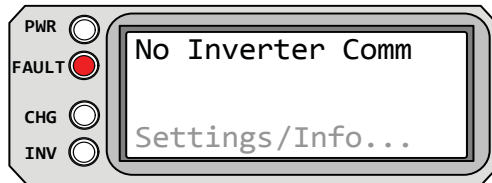
Tfmr Overtemp appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-28, Tfmr Overtemp Fault

- **Tfmr Overtemp** - This fault message displays when the transformer causes the inverter to shut down to protect the internal power transformer from damage. Once the transformer cools down, the inverter automatically restarts and resumes operation.



Remedy: If the fault occurs while inverting, reduce the load on the inverter. If while charging, turn down the charge rate. If this fault occurs often, ensure the inverter is in a cool location, has adequate ventilation, and the internal cooling fans are operational.



No Inverter Comm appears on the LCD. The FAULT (red), PWR (green), CHG (green), and INV (green) LEDs are normally off.

Figure 5-29, No Inverter Comm Fault

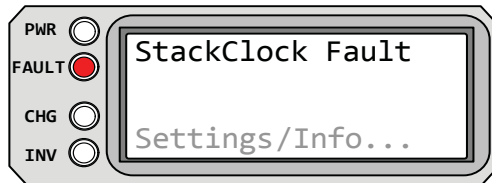
- **No Inverter Comm** - This fault message indicates that the router is no longer receiving any communication data via the Magnum Network.



Remedy: Reset the router by disconnecting the router communications cable from the inverter for five seconds, and then reconnect (see Figure 2-5). If the fault continues check/replace the router cable.

5.3.4.2 Stacking Fault Messages

A fault condition may occur when multiple inverters are stacked in parallel — using the router — that is not possible on a single inverter installation. Refer to the following fault messages to help troubleshoot the inverters.



StackClock Fault appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green) and INV (green) LEDs are off.

Figure 5-30, StackClock Fault

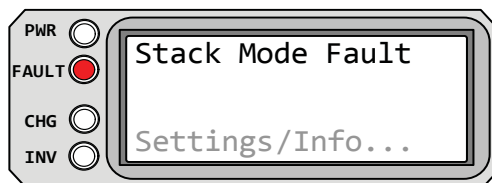
- **StackClock Fault** - 1. There is a stacker cable problem; or, 2. One inverter is losing synchronization with the other inverter.



Remedy: Ensure you are using the CAT 5 cables supplied with the router for parallel stacking. Check to make sure you hear an audible “click” when plugging in the CAT 5 cables.



Info: This fault has been known to occur when a Magnum Energy accessory is plugged into the Stack Port, but the installation is not using multiple inverters in a stacked configuration. If this occurs, perform an inverter reset (see Section 6.2).



Stack Mode Fault appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

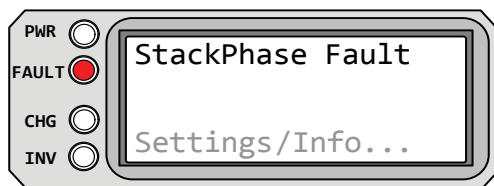
Figure 5-31, Stack Mode Fault

- **Stack Mode Fault** - This unit has detected a problem with the “other” stacked inverter, check that unit for a fault condition.



Remedy: This fault will automatically clear when the fault with the other inverter is corrected.

5.0 Operation



StackPhase Fault appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-32, StackPhase Fault

- **StackPhase Fault** - 1. The AC input wiring is incorrect; or, 2. One phase was lost from the AC input source; or, 3. One of the inverter's internal transfer relays is bad; or, 4. The inverter's AC input circuit breaker may be open.



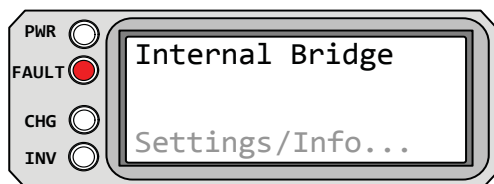
Remedy: If this fault doesn't clear after checking these four recommendations, perform an inverter reset (Section 6.2).

5.3.4.3 Internal Fault Messages

The inverter continually monitors several internal components. If a condition inside the inverter occurs that does not allow proper operation, the inverter shuts down to protect itself. To clear these "internal" faults, the inverter will require an inverter reset.



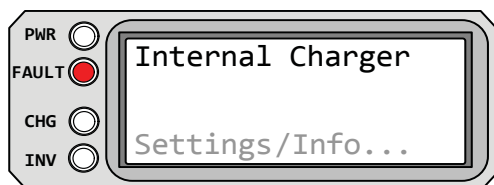
Remedy: Perform an inverter reset (see Section 6-2). After resetting the inverter, press the ON/OFF INVERTER button to turn the inverter on and verify the fault has cleared. If the internal fault remains, the inverter will require repair at an authorized service facility.



Internal Bridge appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-33, Internal Bridge Fault

- **Internal Bridge** - This fault message displays and the inverter shuts down because the internal power-bridge protection circuit has been activated.



Internal Charger appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green), and INV (green) LEDs are off.

Figure 5-34, Internal Charger Fault

- **Internal Charger** - This fault message displays and the inverter shuts down because the internal charger protection circuit has been activated.



Figure 5-35, Internal NTC Fault

- **Internal NTC** - This fault message displays and the inverter shuts down because the internal NTC (temperature sensor) circuit has been activated.

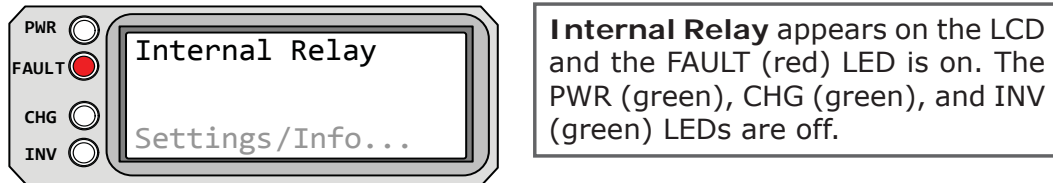


Figure 5-36, Internal Relay Fault

- **Internal Relay** - This fault message displays and the inverter shuts down because the internal AC transfer relay protection circuit has been activated.

5.0 Operation

5.3.5 LED Indicator Guide

The router provides the following LEDs (along with the LCD display) to assist you in determining the operating status of your inverter/charger.

Table 5-1, LED Indicator Guide

LED	Status	Meaning
PWR (green)	OFF	1. Inverter is disabled; 2. Router's in Power Save mode - press any button to activate LEDs; 3. No power to router (check router cable or power to inverter); or, 4. No AC power at the inverter's AC output terminals.
	ON	AC power is available from inverter, utility, or generator at the inverter's AC output terminals.
FAULT (red)	OFF	Normal operation.
	ON	A fault condition has been detected. Check the LCD display to find and correct the cause.
CHG (green)	OFF	1. Router is in Power Save mode - press any button to activate LEDs; or, 2. Charger off - no utility or AC generator present.
	ON	Bulk, Absorb, Float or Equalize charge mode (see the LCD display to determine charge status).
	BLINKING, display says "Charger Standby"	The charger is in Charger Standby mode. This occurs when the ON/OFF CHARGER button is pressed to disable the charger.
	BLINKING, display says "Full Charge" or "Silent"	The charger is in Battery Saver mode. This mode monitors battery voltage level and only charges if the battery voltage decreases to a low level. Silent mode will automatically start charging when the ReBulk setting is reached.
	BLINKING, display shows a charging status (i.e., Bulk, Absorb, Float)	The charger current is automatically decreased because: 1. Charger Back-off - the inverter's internal temperature is getting hot, current is decreased to reduce/maintain temperature; or, 2. Low AC Input Voltage - the input AC voltage is <85 VAC, charger is disabled to help stabilize incoming AC voltage to prevent AC disconnect.
	BLINKING, display does not show any charge status	The inverter is detecting AC voltage (from utility or an AC generator) on the inverter's AC input terminals.
INV (green)	OFF	1. Inverter is disabled; or, 2. Router is in Power Save mode - press any button to activate LED's.
	ON	Inverter is enabled - 1. Supplying AC power on the output; or, 2. In Standby (if both INV and CHG LEDs are on); the inverter will automatically supply AC power to the loads if utility or generator power is lost.
	BLINKING	Inverter is in Search mode (the AC load is below the SETUP menu's <i>02A Search Watts</i> setting).

6.0 Troubleshooting

The router may not be functioning correctly, use the following table to help find solutions.

Table 6-1, Router Control Troubleshooting Guide

Symptom	Possible Cause	Solution
Display shows unrecognizable letters or symbols.	Static electricity may have been discharged into the LCD display.	Refresh Display: Press and hold the SELECT button for 10 seconds.
LCD text display is locked-up, pressing any button has no response - may show "revision" or "connecting".	RJ11 connections on communication cable are not making a good connection.	Reset router: 1) Disconnect router cable from inverter for 5 seconds and reconnect; 2) Check RJ11 cable connection on back of router (see Figure 2-3). Important: Ensure the RJ11 connector is pushed into the correct port. You should feel/hear "click" when the connection is made.
	Router not getting sufficient power from inverter.	Ensure inverter batteries are connected and inverter is operating correctly. Inverter should be able to invert and power AC loads from batteries (ensure no AC power is connected to the inverter AC inputs).
LEDs and backlight are off.	Router is in Power Save mode.	Press any button to reactivate router (or turn Power Save mode to <i>Off</i>).
Router is non-functional (no lights, no text on LCD display, and no response when pressing any button).	Communication cable bad or not correctly connected to router port on inverter.	Check communications cable from inverter to router, ensure: 1) It is connected to the Router port, 2) The correct communications cable is used (a 4-conductor telephone cable may be substituted to determine if cable is good).
	Inverter is not connected to batteries.	Ensure inverter batteries are connected and inverter is operating correctly without any AC power connected (can invert and power AC loads from batteries).

6.0 Troubleshooting

6.1 Troubleshooting Tips

6.1.1 Inverter Problems

- **Inverter turned on, green LED on inverter blinking, no output:** Inverter is in Search mode. Either defeat Search mode, if not needed, or turn on loads greater than the Search Watts setting.

6.1.2 Charger Problems

- **Unit won't transfer to Charge mode with AC applied:** Is charge (CHG) LED on router blinking? If not, then the charger does not recognize the incoming AC as being within acceptable limits. Measure the input AC voltage at the inverter input terminals, it should be 120VAC +/- 20 VAC (230VAC +/- 40 VAC for export models). Also, check that the *VAC Dropout* setting on the router is 80 VAC or less (export models: 160 VAC or less). If the CHG LED is blinking, the transfer relay should be closing within 20 seconds, and the unit should begin charging. If the LED is on solid, the relay should be closed, and the charger should begin charging.

- **Transfer relay closes, then opens and continues to cycle:** AC voltage is too low, or has transients that drop the AC voltage momentarily. Change the *VAC Dropout* setting to 60 VAC (120VAC for export models) and check for improvements. If the cycling continues, back off the Charge Rate from 100% to 10%.

This cycling may also be caused if the AC output of the inverter is connected to the inverter's AC input, check for proper input and output AC wiring.

- **Charger not charging even though CHG LED is on steady and the unit says "Charging":** Full charge rates are not obtained in Charging mode, only after this mode changes to Bulk Charging, Absorb Charging, or Float Charging modes.

- **Charger not charging even though CHG LED is on steady and the unit says "Bulk Charging" (or "Absorb Charging"):** Check the DC amps meter and DC voltmeter on the router display. It should be 80% or more of rated charge current if the battery voltage is under 14.0 VDC (28.0 VDC on 24-volt models or 48.0 VDC for 48-volt models). If not, check the *03C Max Charge Rate* setting and verify the setting is 80% or greater. Still low charge rate? Check the *03A AC Input Amps* setting. If no AC loads are being passed through the inverter, the *03A Input Amps* setting must be 15 amps (25 amps for 3kW unit) or greater to receive the full charge rate.

- **Charger says "Float Charging" not "Bulk Charging" when the AC is first plugged in:** Check DC voltmeter on the router display. If the battery is over 13.0 VDC (26.0 VDC for 24-volt models or 52.0 VDC for 48-volt models) then the battery was already charged and the charger automatically goes to Float Charging to keep from overcharging the batteries. Try the *Restart Bulk* setting from the *02 CHG Control* menu.

- **Charge amps are lower than expected, or is 0 amps DC:** Measure input AC voltage and increase if the input voltage is under 90 VAC. The charge rate is reduced to keep the input voltage above 90 VAC. Also, check the *03A Input Amps* and the *03B Max Charge Rate* settings to determine if the current is being limited.

- **Charger output voltage is different than expected:** Check the Battery Temperature Sensor (BTS) temperature. If the BTS is installed, the charge voltage settings will increase if the temperature around the BTS is below 77° F (25° C) and decrease if the temperature around the BTS is higher than 77° F (25° C).

6.2 Performing an Inverter Reset

Press and hold the Power ON/OFF button (see Figure 6-1) for approximately fifteen (15) seconds until the Charging/Inverting Status LED comes on and flashes rapidly. Once the rapid flashing has begun, release the Power ON/OFF button. The Status LED will go off after the button is released.

After the inverter reset is completed, press the Power ON/OFF button to turn the inverter ON.

Some older inverter models do not allow an inverter reset. If the inverter reset fails you will need to power-down the inverter using the procedure below. In either case, if an internal fault does not clear the inverter will require repair at an authorized service facility.



Info: The Power ON/OFF button is a small momentary type switch which operates by lightly pressing and releasing.



Info: All adjustable inverter/charger settings in the router (except Setup 01B Contrast, 01C Backlight, and 03 Gen Control - which revert back to default) are saved in non-volatile memory and are preserved until changed - even if an inverter reset is performed or if all power to the router or inverter is removed.

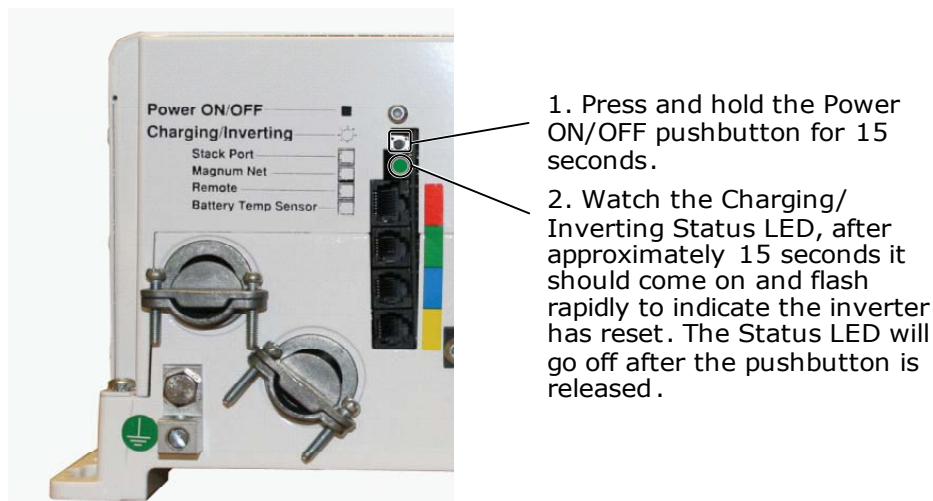


Figure 6-1, Performing an Inverter Reset

6.3 Powering Down the Inverter

To power-down the inverter:

1. Remove all AC power (utility or generator power) to the inverter.
2. Open all the inverter DC disconnects (or disconnect the positive battery cable to the inverter).
3. Ensure all inverters and the router are disconnected from all AC and DC power (the router display will be blank).
4. After the inverters have been disconnected from all power for 30 seconds, reconnect the inverter DC disconnects (or reconnect the positive battery cable) and resume operation.



Info: If DC disconnects are not used, there may be a momentary spark when the positive battery cable is connected to the inverter's terminal. This is normal and indicates that the inverter's internal capacitors are being charged.

7.0 Warranty and Service Info

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7.1 Limited Warranty

Magnum Energy, Inc., warrants the ME-RTR to be free from defects in material and workmanship that result in product failure during normal usage, according to the following terms and conditions:

1. The limited warranty for this product extends for a maximum of 12 months from the product's original date of purchase.
2. The limited warranty extends to the original purchaser of the product and is not assignable or transferable to any subsequent purchaser.
3. During the limited warranty period, Magnum Energy will repair, or replace at Magnum Energy's option, any defective parts, or any parts that will not properly operate for their intended use with factory new or remanufactured replacement items if such repair or replacement is needed because of product malfunction or failure during normal usage. The limited warranty does not cover defects in appearance, cosmetic, decorative or structural parts or any non-operative parts. Magnum Energy's limit of liability under the limited warranty shall be the actual cash value of the product at the time the original purchaser returns the product for repair, determined by the price paid by the original purchaser. Magnum Energy shall not be liable for any other losses or damages.
4. Upon request from Magnum Energy, the original purchaser must prove the product's original date of purchase by a dated bill of sale, itemized receipt.
5. The original purchaser shall return the product prepaid to Magnum Energy in Everett, WA. After the completion of service under this limited warranty, Magnum Energy will return the product prepaid to the original purchaser via a Magnum-selected non-expedited surface freight within the contiguous United States and Canada; this excludes Alaska and Hawaii.
6. If Magnum repairs or replaces a product, its warranty continues for the remaining portion of the original warranty period or 90 days from the date of the return shipment to the original purchaser, whichever is greater. All replaced products and parts removed from repaired products become the property of Magnum Energy.
7. This limited warranty is voided if:
 - the product has been modified without authorization
 - the serial number (if serialized) has been altered or removed
 - the product has been damaged through abuse, neglect, accident, high voltage or corrosion
 - the product was not installed and operated according to the owner's manual

BEFORE RETURNING ANY UNIT, CONTACT MAGNUM ENERGY FOR A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER.

7.2 How to Receive Repair Service

If your product requires warranty service or repair, contact either:

1. An Authorized Service Center, as listed on the Magnum Energy website at <http://www.magnumenergy.com/ServiceCenters.htm>, or
2. Magnum Energy, Inc. at:

Telephone: 425-353-8833

Fax: 425-353-8390

Email: warranty@magnumenergy.com

If returning your product directly to Magnum Energy for repair, you must:

- return the unit in the original, or equivalent, shipping container.
- receive a Return Materials Authorization (RMA) number from the factory prior to the return of the Product to Magnum Energy for repair.
- place RMA numbers clearly on the shipping container or on the packing slip.

When sending your product for service, please ensure it is properly packaged.

Damage due to inadequate packaging is not covered under warranty.

We recommend sending the Product by traceable or insured service.

