



ME-ARC

Advanced Remote Control



Owner's Manual
(for Revision 3.0 or higher)

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Document Information

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From all of us at Magnum Energy –

Thank you for purchasing this ME-ARC remote.

We understand that you have many purchasing options in the marketplace, and are pleased that you have decided on a Magnum Energy product. This ARC remote was proudly assembled and tested in the United States in our Everett, Washington, facility.

At Magnum we are committed to providing you with quality products and services, and hope that your experience with us is pleasant and professional.

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Important Product Safety Instructions

This manual contains safety instructions that must be followed during the installation and operation of this product. Read all instructions and safety information contained in this manual before installing or using this product.

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: Indicates that failure to take a specified action could result in physical harm to the user.



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



Info: Indicates information that emphasizes or supplements important points of the main text.



Remedy: Provides possible solutions for related issues.

Product Safety Alerts

All electrical work must be performed in accordance with local, state, and federal electrical codes.



WARNINGS:

- All electrical work must be performed in accordance with local, state and federal electric codes.
- This product is designed for indoor/compartments 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 on some Magnum inverters. As long as AC power is connected, it will pass thru the inverter regardless of the power switch on the inverter or the ON/OFF INVERTER button on the remote.

Table of Contents

1.0 Overview	1
2.0 Installation	2
2.1 Pre-Installation	2
2.1.1 Installation Guidelines	2
2.1.2 Unpacking and Inspection	2
2.1.3 Tools Required	2
2.2 Connecting the Remote Cable	3
2.2.1 Connecting the ME-ARC to a Magnum Inverter	3
2.3 ME-ARC Remote and Bezel Dimensions	4
2.4 Mounting the ME-ARC Remote	5
2.4.1 Flush Mount Installation Procedure	5
2.4.2 Surface Mount Installation Procedure	6
2.5 Power-up Self Test	7
3.0 Setup	8
3.1 Navigating the Remote	8
3.2 Remote Feature to Inverter Compatibility	10
3.3 Remote Buttons and Menu Items	14
3.3.1 FAVS Button and Menus	14
3.3.2 CTRL (Control) Button and Menus	16
CTRL: 01 ACIn Control	17
CTRL: 02 CHG (Charge) Control	18
CTRL: 03 Gen Control	18
3.3.3 METER Button and Menus	19
METER: 01 DC Meters	20
METER: 02 AC Meters	20
METER: 03 AGS Meters	21
METER: 04 BMK Meters	21
3.3.4 SETUP Button and Menu	21
SETUP: 01 Remote Setup	22
SETUP: 02 Invert Setup	23
SETUP: 03 Charger Setup	28
SETUP: 04 AGS Setup	37
SETUP: 05 BMK Setup	37
3.3.5 TECH Button and Menus	38
TECH: 01 Temperatures	38
TECH: 02 Revisions	39
TECH: 03 Inv Model	39
TECH: 04 Fault History	39
TECH: 05 SETUP PIN	41
TECH: 06 Ext Control	42
TECH: 07 Load Defaults	43
4.0 Menu Maps: ME-ARC Remote Control	44
5.0 Operation	49
5.1 Front Panel	49
5.1.1 LED Indicators	49
5.1.2 LCD Display	49
5.1.3 ON/OFF Pushbuttons	50
5.1.4 Menu Buttons	50
5.1.5 Rotary SELECT Knob	50

Table of Contents (cont.)

5.2 Operating the Inverter/Charger.....	51
5.2.1 Inverter Mode.....	51
5.2.2 Charger Mode.....	51
5.3 System Status Messages.....	52
5.3.1 Inverter Mode Status Messages.....	52
5.3.2 Charger Mode Messages.....	53
5.3.3 Secondary Scrolling Status Messages.....	56
5.3.4 Fault Mode Messages.....	56
5.3.4.1 System Fault Messages.....	56
5.3.4.2 Stacking Fault Messages.....	59
5.3.4.3 Internal Fault Messages.....	60
5.3.5 LED Indicator Guide.....	61
6.0 Troubleshooting.....	62
6.1 Troubleshooting Tips.....	63
6.1.1 Inverter Problems.....	63
6.1.2 Charger Problems.....	63
6.2 Performing an Inverter Reset.....	64
6.3 Performing a Power Reset.....	64
7.0 Using a ME-AGS-N Module.....	65
7.1 ME-AGS-N Setup.....	65
7.2 ME-AGS-N Functional Tests.....	76
7.2.1 Remote to Generator Communications Test.....	76
7.2.1.1 Determining AGS Statuses.....	76
7.2.1.2 Starting the Generator from the Remote.....	77
7.3 ME-AGS-N Operation/Monitoring.....	77
7.3.1 Controlling the AGS.....	77
7.3.2 Monitoring the AGS.....	78
7.3.2.1 ME-ARC Remote's AGS METER Button.....	78
7.3.2.2 ME-ARC Remote's AGS TECH Button.....	80
7.4 Enabling the ME-AGS-N.....	81
7.5 Starting and Stopping the Generator.....	81
7.6 ME-AGS-N Menu Map Using the ME-ARC.....	83
7.7 ME-AGS-N Remote Status Messages.....	86
7.7.1 AGS Remote Operational Statuses.....	86
7.7.2 AGS Remote Start Statuses.....	87
7.7.3 AGS Remote Fault Statuses.....	88
7.7.4 AGS Notes.....	89
7.8 ME-AGS-N Remote Troubleshooting.....	90
7.8.1 AGS Fault Message Screen.....	90
7.8.2 Resolving Operational Statuses.....	90
7.8.3 Resolving AGS Faults Using the Remote.....	91
7.8.4 How to Clear AGS Faults.....	93
7.8.5 How to Clear AGS Fault History.....	93
8.0 Using a ME-BMK.....	94
8.1 Setting Up the BMK.....	94
8.2 Monitoring the BMK.....	95
8.3 ME-ARC Remote's BMK Menu Maps.....	98
9.0 Limited Warranty.....	99
9.1 How to Receive Repair Service.....	100

List of Figures

Figure 1-1, Front Panel Features	1
Figure 2-1, Remote Cable	3
Figure 2-2, Remote Control Connections	3
Figure 2-3, ME-ARC Remote Dimensions	4
Figure 2-4, Remote Bezel Dimensions	4
Figure 2-5, Flush Mounting the ME-ARC	5
Figure 2-6, Surface Mounting the ME-ARC using the Bezel.....	6
Figure 2-7, Power-up Self Test Screens.....	7
Figure 2-8, Self Test Set Clock Screens.....	7
Figure 3-1, Front Panel Setup Features.....	8
Figure 3-2, SETUP Menu Navigation	9
Figure 3-3, FAVS Button and Menus	15
Figure 3-4, CTRL Button and Menus	16
Figure 3-5, METER Button and Menus.....	20
Figure 3-6, SETUP Button and Menus	22
Figure 3-7, TECH Button and Menus.....	38
Figure 3-8, Inverter Fault History Menu Items	40
Figure 4-1, FAVS/CTRL/METER Button Menu Maps.....	44
Figure 4-2, SETUP Button Menu Map	45
Figure 4-3, SETUP Button Menu Map	46
Figure 4-4, SETUP/TECH Button Menu Maps	47
Figure 4-5, TECH Button Menu Map.....	48
Figure 5-1, ME-ARC Front Panel Controls and Indicators.....	49
Figure 5-2, System Status Screen (example).....	52
Figure 6-1, Performing an Inverter Reset	64
Figure 7-1, AGS Fault History Menu Items.....	80
Figure 7-2, ME-AGS-N Menu Maps using ARC Remote (Section 1)	83
Figure 7-3, ME-AGS-N Menu Maps using ARC Remote (Section 2)	84
Figure 7-4, ME-AGS-N Menu Maps using ARC Remote (Section 3)	85
Figure 7-5, ME-AGS-N Fault Message (Example)	90
Figure 8-1, ME-BMK Menu Map using ARC Remote	98

List of Tables

Table 3-1, ME-ARC Compatibility Matrix	10-13
Table 3-2, Battery Type to Charge Voltages	31
Table 3-3, Battery Amp/Hrs Capacity to Suggested Absorb Time	34
Table 3-4, Inverter/Charger Default Settings on ME-ARC.....	43
Table 5-1, LED Indicator Guide	61
Table 6-1, Remote Control Troubleshooting Guide	62
Table 7-1, ME-ARC Autostart/Autostop Matrix	65
Table 7-2, AGS Remote Operational Statuses.....	86-87
Table 7-3, AGS Remote Start Statuses.....	87
Table 7-4, AGS Remote Fault Statuses.....	88
Table 7-5, AGS Default Settings on ME-ARC	88
Table 8-1, BMK Default Settings on ME-ARC	97

1.0 Overview

The ME-ARC remote control allows you to monitor and customize the operating parameters for your Magnum inverter/charger. This remote can be used on all Magnum inverter/charger models so there is no cross-platform confusion.

The ME-ARC50 comes standard with a 50-foot, 4-conductor (twisted-pair) telephone cable and includes non-volatile memory (preserves adjustable settings, even if power to the remote or inverter is removed).



Info: This manual is for the ME-ARC with revision 3.0 or higher; see the *TECH: 02 Revisions* section on page 39 for information on how to determine your revision level.

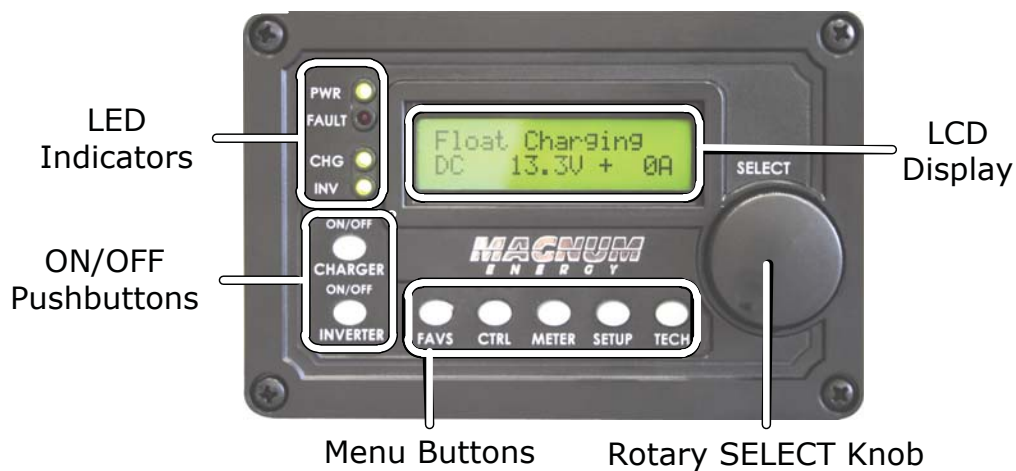


Figure 1-1, Front Panel Features

The ME-ARC is equipped with the following features:

- **LED Indicators** – The at-a-glance LEDs provide the inverter/charger status in a straightforward way.
- **LCD Display** – The LCD display is a 16 x 2 line (32 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)** – The ON/OFF pushbuttons allow the inverter or charger to be independently and quickly enabled or disabled.
- **Menu Buttons (x5)** – Allow the inverter or charger to be configured to your specific system preferences. These buttons also allow simple access to menu items that can help with monitoring and troubleshooting your inverter/charger system.
- **Rotary SELECT Knob** – The rotary encoder knob is similar to a car dash radio knob and is used to quickly scroll through and select various menu items and settings. Pushing the rotary knob allows you to select a menu item, or to save a setting once it is displayed on the LCD.

2.0 Installation

2.0 Installation

Review this section and the Important Product Safety Instructions on the front inside cover before proceeding with the installation of your remote.



WARNING: Installations should be performed by qualified personnel, such as a licensed or certified electrician. The installer determines which safety codes apply and ensures all applicable installation requirements are followed. Applicable installation codes vary depending on the specific location and application.



CAUTION: When connecting battery power to the inverter, all battery negative connections must be connected prior to the battery positive connections. When removing battery power from the inverter, the battery positive should be removed before any battery negative connections are disconnected. This prevents any communication chips/lines from becoming the DC return path to the battery—causing permanent damage to all connected accessories.

Summation: Ensure all battery negative circuits are always connected before connecting or disconnecting battery positive.

2.1 Pre-Installation

Before proceeding, read the entire Installation section to determine how best to install your ME-ARC remote. The more thorough you plan in the beginning, the better your inverter needs will be met.

2.1.1 Installation Guidelines

- Before connecting any wires determine the remote'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 remote.
- Make sure all wires have a smooth bend radius and do not become kinked.
- If installing this remote 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.

2.1.2 Unpacking and Inspection

Carefully remove the ME-ARC remote from its shipping container and inspect all contents. Verify the following items are included:

- The ME-ARC remote display
- Bezel
- 50' remote cable
- Eight #8 x 3/4 Phillips screws
- ME-ARC owner's manual

If items appear to be missing or damaged, contact your authorized Magnum Energy dealer or Magnum Energy. Save your proof-of-purchase as a record of your ownership; it is needed if the unit should require in-warranty service.

2.1.3 Tools Required

Installing the remote control is simple and requires the following tools:

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

2.2 Connecting the Remote Cable

The ME-ARC comes with a remote cable to enable communication between the inverter and the remote. The remote cable is a 50-foot, 4-conductor, round, telephony standard with 6P4C (6-position/4-conductor) connectors on each end. When the 6P4C connectors are held side by side with both of the connector tabs facing the same way, the color of the conductors in each connector is the opposite from top to bottom (as shown in Figure 2-1).

Note: The remote cable can be extended up to a length of 200 feet without data degradation.

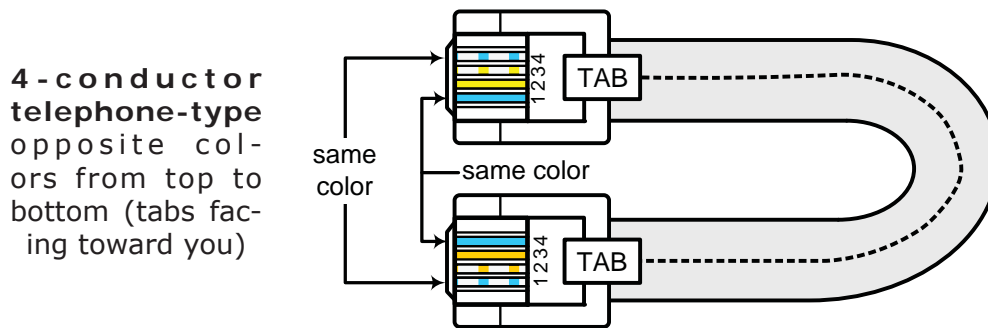


Figure 2-1, Remote Cable

2.2.1 Connecting the ME-ARC to a Magnum Inverter

One end of the remote cable plugs into the back side of the ME-ARC, and the other plugs into the REMOTE (blue) port on the Magnum inverter/charger (see Figure 2-2).

Note: Do not connect the remote cable at this time. First, locate and prepare an area to mount the remote (follow directions in Section 2.4).

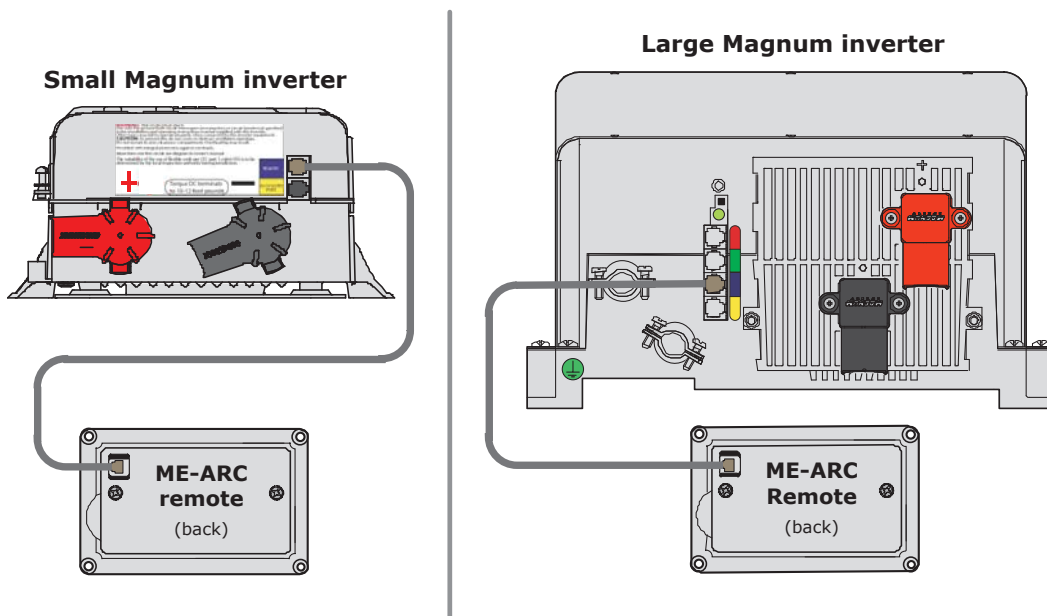


Figure 2-2, Remote Control Connections

2.0 Installation

2.3 ME-ARC Remote and Bezel Dimensions

Use the information below (Figures 2-3 and 2-4) in preparation for mounting the ME-ARC remote and the bezel (if applicable). Directions for mounting both follow in Section 2.4.

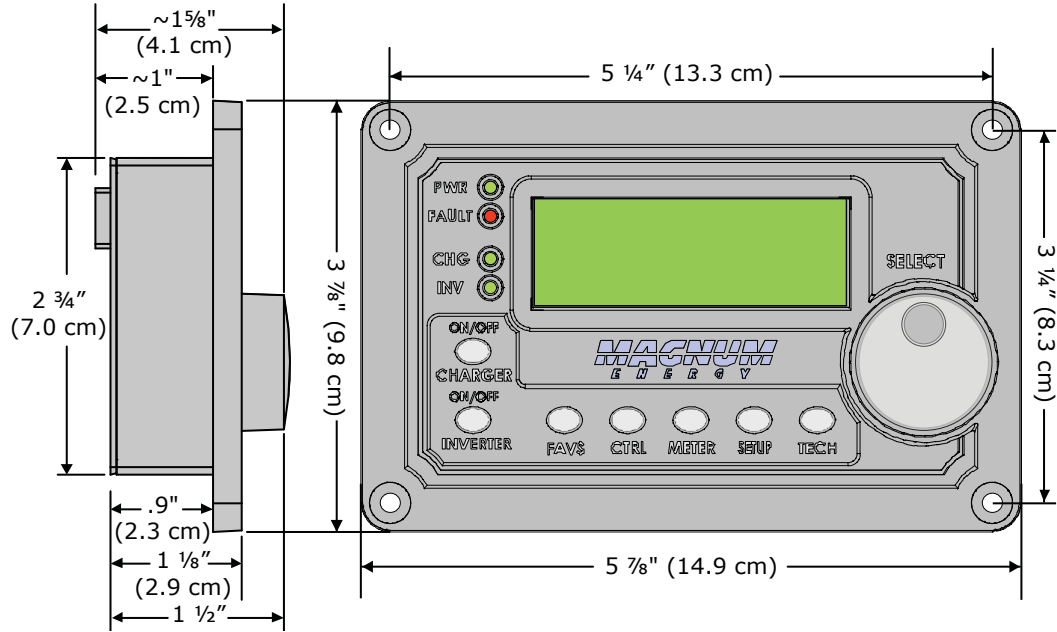


Figure 2-3, ME-ARC Remote Dimensions

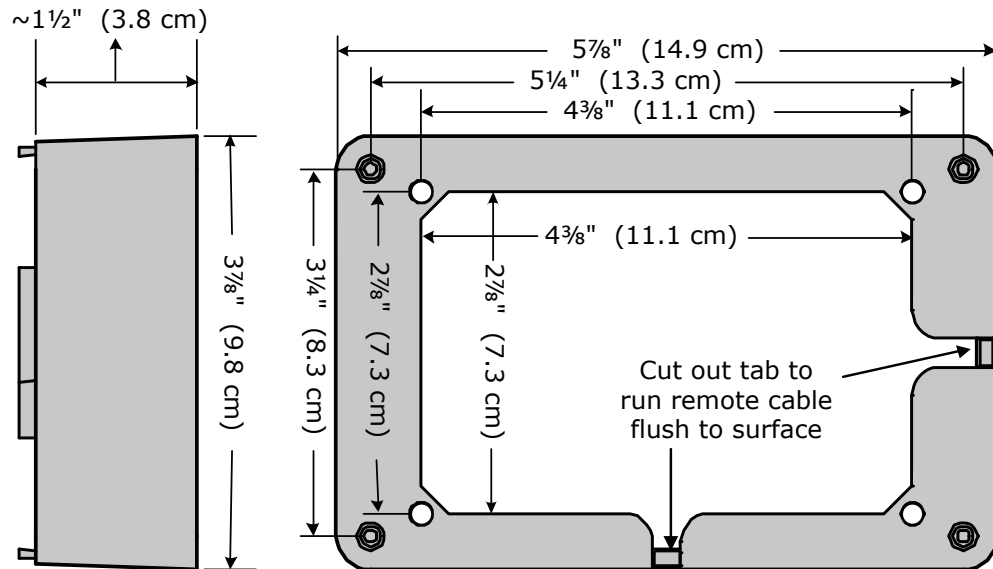


Figure 2-4, Remote Bezel Dimensions

2.4 Mounting the ME-ARC Remote

The ME-ARC can either be flush mounted (through an opening in the wall), or surface mounted using the provided bezel. Find a location that is clean, dry and protected. Allow room to access the remote's SELECT knob and to view the LEDs/display.



CAUTION: Ensure that no AC power is connected to the inverter, and then according to your inverter owner's manual correctly connect the inverter to the batteries.



CAUTION: Always check for hidden electrical wires, pipes and cables BEFORE drilling, cutting, or screwing into walls or cabinets.

2.4.1 Flush Mount Installation Procedure

To flush mount, the wall opening must have at least a 2" (5 cm) depth to allow room for the remote and the cable.

1. Cut an opening in the wall (Figure 2-5). Ensure there are no openings around the display and enough material for the screws to secure the unit.
2. Drill four pilot holes for the #8-32 screws that will attach the remote to the wall (refer to Figure 2-3 for hole locations and dimensions).
3. Route one end of the cable through the wall cutout to the inverter/charger, and then plug it into the RJ11 REMOTE port (blue label) on the inverter/charger—inverter has DC power, but is OFF. See Figure 2-2.
4. Take the other end of the remote cable and while plugging it into the back of the ME-ARC, view the remote's display to ensure the Power-up Self Test initiates (see Section 2.5).
5. If the self test is successful, secure the ME-ARC to the wall using four of the supplied Phillips screws. If the self test is unsuccessful, refer to the Troubleshooting section.

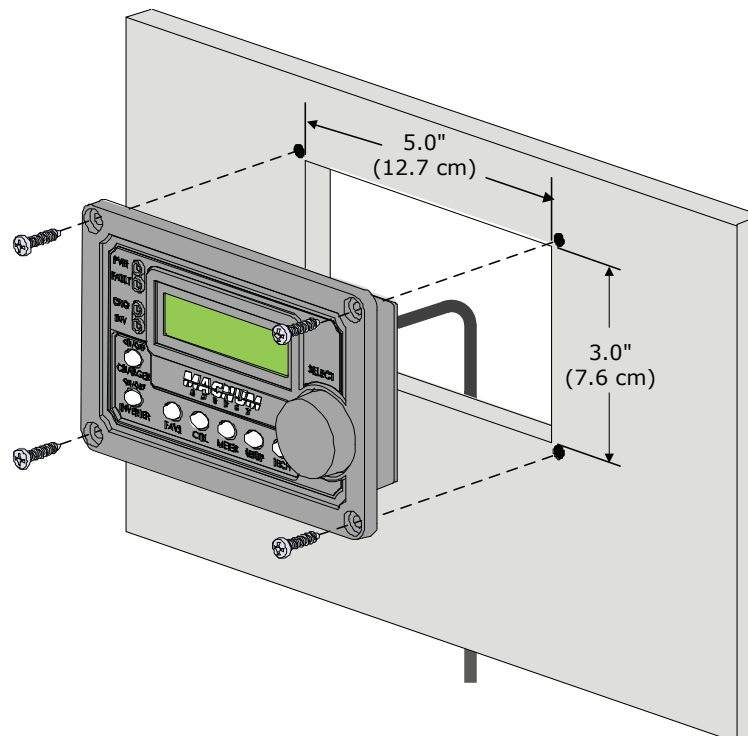


Figure 2-5, Flush Mounting the ME-ARC

2.0 Installation

2.4.2 Surface Mount Installation Procedure

To surface mount, you must use the supplied bezel (Figure 2-4).



Info: The bezel has tabs at the bottom and side that are made with thinner material (Figure 2-4). They can be cut or broken out to allow the cable to be routed downward or to the side (Figure 2-6).

1. Using the bezel as a template, mark on the wall the location of the four bezel mounting screws, and then drill pilot holes for the #8-32 screws.
2. Cut/break the appropriate tab for the planned route of the remote cable.
3. Pull the cable thru the bezel and place the bezel side with the removed tab over the cable against the wall.
4. Position the bezel over the drilled mounting holes, and then screw the bezel to the wall using the supplied Phillips screws (Figure 2-6).
5. Route the other end of the cable to the inverter/charger, and then plug it into the inverter's RJ11 REMOTE port (blue label)— inverter has DC power, but is OFF. See Figure 2-2.
6. Take the other end of the cable and while plugging it into the back of the ME-ARC, view the remote's display to ensure the Power-up Self Test initiates (see Section 2.5).
7. If the self test is successful, secure the ME-ARC to the bezel using four of the supplied Phillips screws.

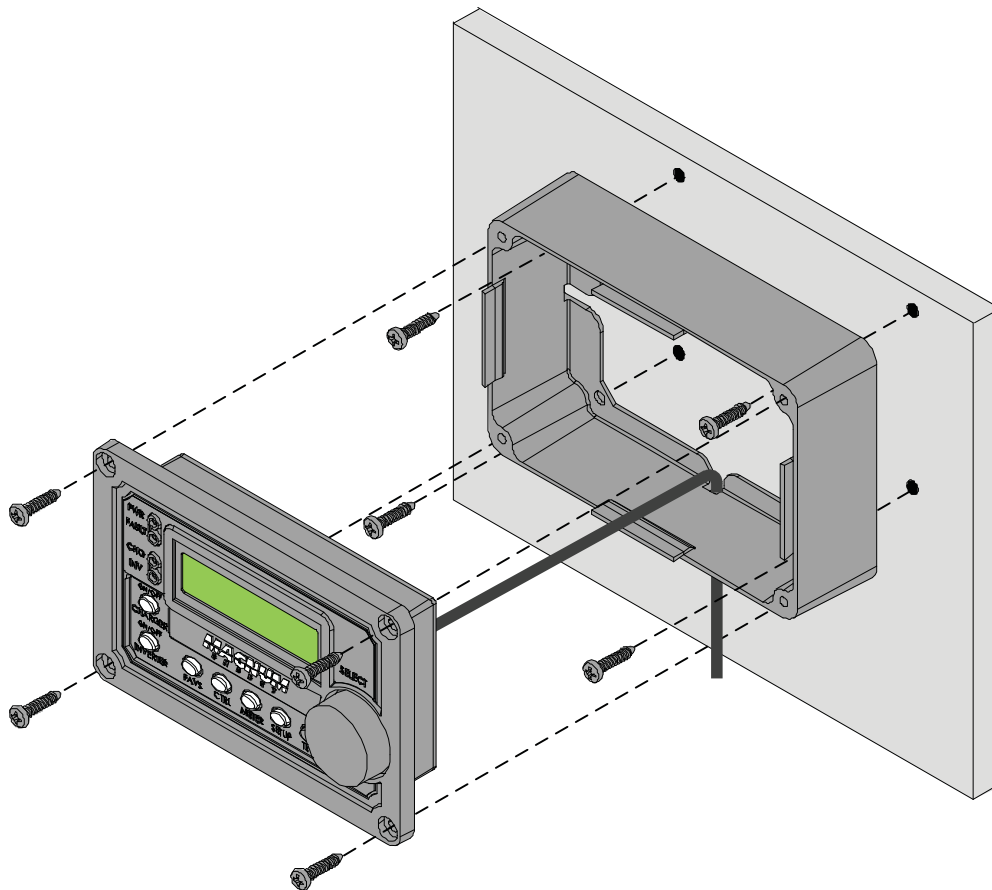


Figure 2-6, Surface Mounting the ME-ARC using the Bezel

2.5 Power-up Self Test

Info: All power to operate the remote control is provided by the inverter/charger through the remote cable.

When the ME-ARC is first connected to an inverter, a power-up self test is initialized. During the self test, the LCD automatically displays in sequence:

- "MAGNUM ENERGY Self Test", then
- "(C) 2010-2012, Connecting to...", and then
- "ME-ARC V 3.0, INV/CHG V #.#"

The remote's LEDs also change with the screens (see Figure 2-7).

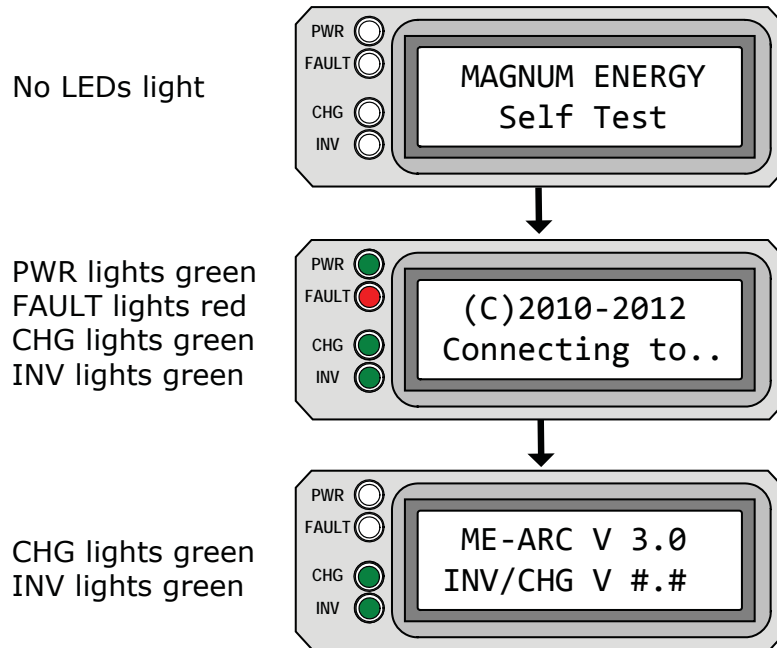


Figure 2-7, Power-up Self Test Screens

After the self test is finished the remote displays "Set Clock". Use the ME-ARC's SELECT knob to set the correct time by selecting hour, minutes, and either AM or PM (See Figure 2-8 below, and the Set Clock procedure on page 22).

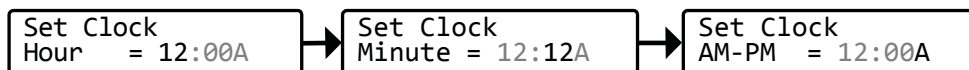


Figure 2-8, Self Test Set Clock Screens

3.0 Setup

3.0 Setup

When the remote is connected to a Magnum inverter/charger, the settings in the remote control determine the inverter/charger's operating parameters. The default settings in the remote control are adequate for most installations (see Table 3-4); however, you have the option to change some of the operating parameters. This section shows you how to navigate the remote and gives you an understanding of the function of each adjustable setting.

3.1 Navigating the Remote

The ME-ARC has menu items and adjustable settings that provide the ability to configure your inverter/charger to your specific parameters.



Info: See Figures 4-1 through 4-5 for complete maps of the inverter/charger's menu items and adjustable settings.

Familiarize yourself with the display and controls on the remote's front panel that are used to find, adjust, and save the desired settings (see Figure 3-1).

- **LCD Display** – The 2-line LCD display shows status and information 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 remote home screen to show DC voltage and current (see Figure 3-1) after five minutes if no buttons have been pressed.



Info: When the ← (left facing arrow) symbol is shown on the display, the displayed setting has been selected and will be used.

- **Menu Buttons (x5)** – These five 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.



Info: Hold down the SELECT knob for 10 seconds to refresh the LCD display.

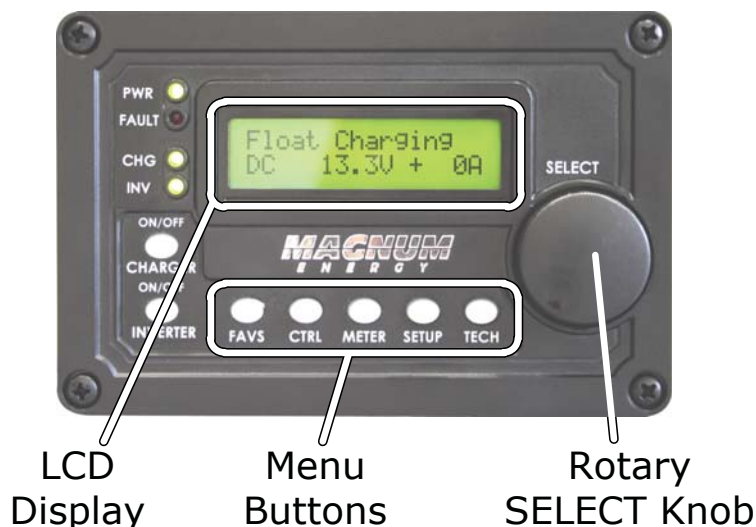


Figure 3-1, Front Panel Setup Features

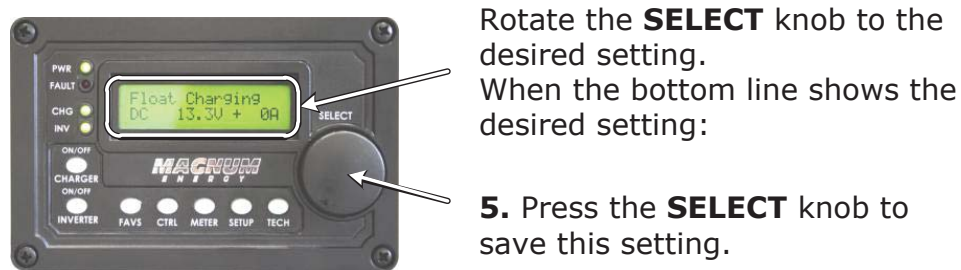
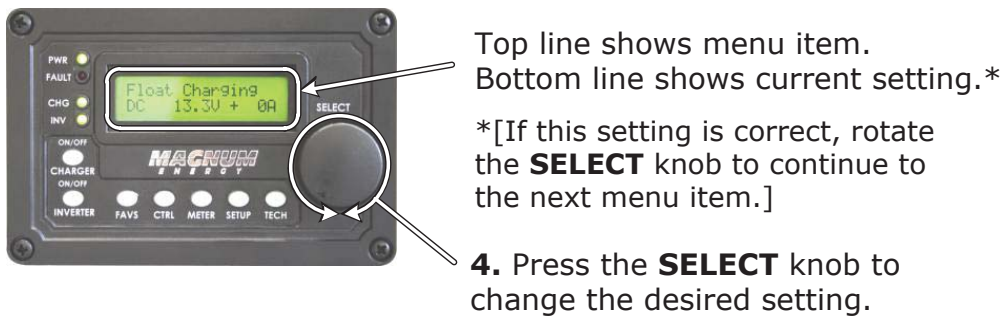
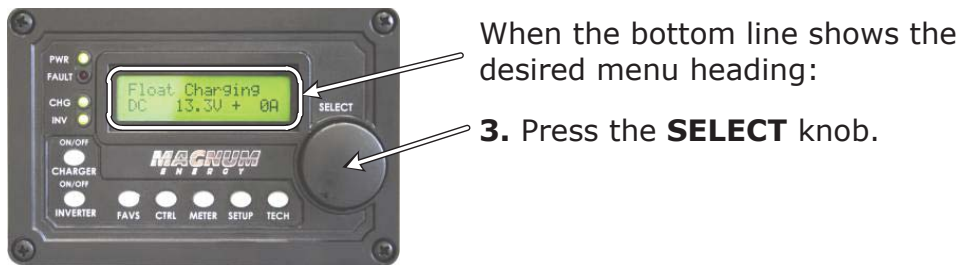
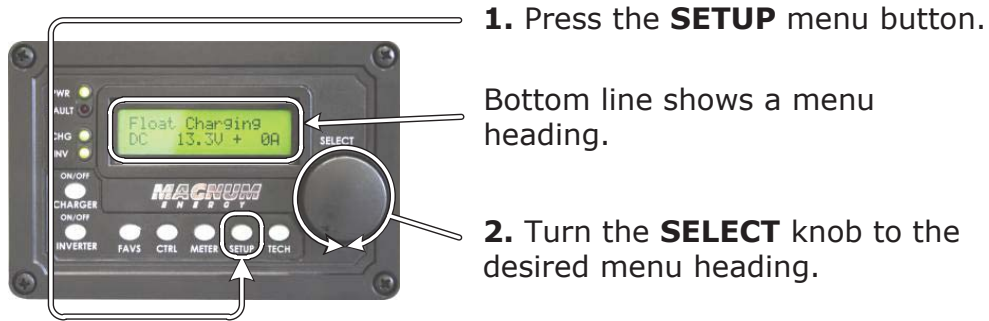


Figure 3-2, SETUP Menu Navigation

3.0 Setup

3.2 Remote Feature to Inverter Compatibility

The ME-ARC has many settings and is designed to work with the advanced features in your Magnum inverter—and/or other Magnum devices (i.e., ME-AGS-N or ME-BMK). The ME-ARC communicates with your inverter to allow the set up and enabling of these advanced features. However, when the ME-ARC is released with new software, some of the features and functionality in the remote may not be available in an inverter or networked accessory that has an earlier software level. In this case, the advanced setting is not recognized and will not function. Use the steps below to help you determine which ME-ARC (Revision 3.0) menus/features are compatible with your inverter.

1. Go to: <http://www.magnumenergy.com/Service/Compatibility.htm> to determine your inverter's compatibility level (L1, L2, L3 or L4).
2. Use Table 3-1 to determine which ME-ARC 'features/settings' you want to use and what inverter compatibility level is required (see the "Model/Level Required" column in Table 3-1).
3. If your inverter compatibility level is the same or greater than the level required, your inverter can support the device setting/feature you want.
4. If your inverter does not have the required compatibility level for a feature/setting you want, contact Magnum Energy for a software upgrade.



Info: This compatibility matrix is available online to download/print as a single page document and to enter user settings. <http://www.magnumenergy.com/Service/Compatibility.htm>.

Table 3-1, ME-ARC (Revision 3.0) Compatibility Matrix

Button	FEATURES/SETTINGS			Model/ Level Required	Default Setting
	Main Menu	Menu Heading/Item	Selections/ Adjustments Range		
CTRL	01 ACIn Control		Auto Connect	≥Level 1	Auto Connect
			VDC Connect, Time Connect, AC-In Disabled	≥Level 3 [1]	
			SOC Connect	≥Level 3 [1][6]	
	02 CHG Control [5]		Multi-Stage, Force Float, Restart Bulk	≥Level 4	Multi- Stage
03 Gen Control		OFF, ON, AUTO	≥Level 1 [7]	OFF**	
METER	01 DC Meters	01A DC Volts	Read only display	≥Level 1	Read Only
		01B DC Amps			
		01C Charge Time			
	02 AC Meters [5]	02A Output Volts	Read only display	≥Level 4	Read Only
		02B Output Hz			
		02C Load Amps			
		02D Input Amps			
		02E Inv/Chg Amps			
		02F Input AC (AC1)			
		02G Input AC2		MSH-RE Models	

Table 3-1, ME-ARC Compatibility Matrix (cont.)

Button	FEATURES/SETTINGS			Model/ Level Required	Default Setting
	Main Menu	Menu Heading/Item	Selections/ Adjustments Range		
METER	03 AGS Meters	03A AGS Status	Read only display	≥Level 1	Read Only
		03B DC Volts-AGS			
		03C Gen Run Time			
		03D AGS Temp			
		03E Since GenRun			
	04 BMK Meters	04A BMK Status	Read only display	≥Level 1	Read Only
		04B SOC			
		04C DC Volts-BMK			
		04D DC Amps-BMK			
		04E AH in/Out			
		04F Reset AH Out			
		04G Total AH Out			
		04H Minimum VDC			
	04I Maximum VDC				
SETUP	01 Re- mote Setup	01A Set Clock	Time= 12:00A- 12:00P	≥Level 1	12:00A**
		01B Contrast	0-100%		100%**
		01C Backlight	0-100%		50%**
		01D Power Save	OFF, 1-60 Minutes		15 Minute
		01E Temp Display	Fahrenheit, Celsius		Fahrenheit
	02 Invert Setup	02A Search Watts	OFF, 5-50 Watts (1-Watt increments)	≥Level 1	5 Watts
		02B LBCO Setting	9.0-12.2*VDC	≥Level 2	10.0 VDC
		02C AC In - Time	Connect Time= 12:00A-12:00P	≥Level 3 [1]	6:00A
			Disconnect Time= 12:00A-12:00P		6:00P
		02D AC In - VDC	Connect Volts= 9.0-15.9*(12V)	≥Level 3 [1]	11.0
Disconnect Volts= 9.0-15.9*(12V)	14.1				

3.0 Setup

Table 3-1, ME-ARC Compatibility Matrix (cont.)

Button	FEATURES/SETTINGS			Model/ Level Required	Default Setting	
	Main Menu	Menu Heading/ Item	Selections/ Adjustments Range			
SETUP	02 Invert Setup (cont.)	02E AC-In SOC	Connect SOC= 20-98%	≥Level 3 [6]	50%	
			Disconnect SOC= 21-100%		100%	
		02F Power Up Always	ON, OFF	≥Level 1	Always OFF	
	03 Char- ger Setup	03A AC Input Amps	AC/AC1 Input= 5-60A	≥Level 1 [1]	30A	
			AC2 Input= 5-60A	MSH-RE Models	20A	
		03B Battery Type	Custom [2]	Gel, Flooded, AGM, AGM2	≥Level 1	Flooded:
				Absorb (12.0-16.0)*	≥Level 3	14.6*
				Float (12.0-16.0)*		13.4*
				EQ (12.0-16.0)*		15.5*
		03C Max Charge Rate	0-100%	≥Level 3	100%	
		03D VAC Dropout	AC/AC1 Input= 60-100 VAC, UPS Mode	U.S. Models	80 VAC	
			AC2 Input= 60-100 VAC	MSH-RE Models	75 VAC	
				110-190 VAC, UPS Mode	Export models	150 VAC
		03E Absorb Done	Time= 0.1-25.5 Hrs	≥Level 4 [4]	2.0 Hrs	
	Amps= 0-150 ADC		≥Level 4 [5]			
	SOC= 50-100%		≥Level 4 [5] [6]			
	03F Max Charge Time	0.0-25.5 Hrs	≥Level 4 [5]	12.0 Hrs		
	03G Final Charge Stage	Multi, Float, Silent	≥Level 4 [5]	Multi		
	04 AGS Setup	04A Gen Run VDC	Start Gen Volts= 9.0-15.9*	≥Level 1	11.5	
			Start Volts Delay= 0-127 sec, 1-127 min		120 Sec	
Stop Gen Volts= 9.1- 16.0*, Float			14.4			
Stop Volts Delay=0-127 sec, 1-127 min			120 Sec			
04B Gen Run Time		OFF, ON= Start Gen Time= 12:00A-12:00P	≥Level 1	OFF		
		Stop Gen Time= 12:00A- 12:00P				
04C Gen Run Amps		Start Gen AC Amps= OFF, 5-60A	≥Level 4	OFF		
		Start Amps Delay= 0-127 sec, 1-127 min				
		Stop Gen AC Amps= 5-60A				
		Stop Amps Delay= 0-127 sec, 1-127 min				

Table 3-1, ME-ARC Compatibility Matrix (cont.)

Button	FEATURES/SETTINGS			Model/ Level Required	Default Setting
	Main Menu	Menu Heading/Item	Selections/ Adjustments Range		
SETUP	04 AGS Setup (cont.)	04D Gen Run SOC	OFF, Start Gen SOC= 20-90%	≥Level 1 [6]	OFF
			Stop Gen SOC= 21-100%		
		04E Gen Run Temp	Start=OFF, Ext Input, 65-95F (18-35C)	≥Level 1	OFF
			Time= 0.5-6.0 Hrs		
		04F Max Gen Run Time	OFF, 0.1-25.5 Hrs	≥Level 1	12.0 Hrs
		04G Quiet Time	OFF, ON= Start Quiet Time= 12:00A-12:00P	≥Level 1	OFF
			Stop Quiet Time= 12:00A- 12:00P		
			Quiet Time Topoff=OFF, 30- 120 Min		
	04H Gen Ex- ercise	Days=OFF, 1-255 days	≥Level 1	OFF	
		Run Hour/Min/AM-PM= 12:00A-12:00P			
		Run Time= 0.0-25.5 Hrs			
	04I Gen Warm- up Time	0-127 sec, 1-127 min	≥Level 1	60 Sec	
04J Gen Cooldown time	0-127 sec, 1-127 min	≥Level 1	60 Sec		
05 BMK Setup	05A Charge Eff	Auto, 50-97%	≥Level 1	Auto	
	05B AmpHour Size	200-2500 AH	≥Level 1	400 AH	

* 12-volt values shown; for 24v systems – x 2, for 48v systems – x 4.

** These settings return to the factory default setting when power to the remote is removed.

ME-ARC Compatibility Matrix Notes:

[1] Not available on MM/MM-E/MM-AE/MMS/MMS-E models.

[2] AC Couple Mode can be activated using Battery Type: Custom with MS-PAE Series ≥Rev 4.1.

[3] The AC meter displays are only accurate when used with MS-PAE or MSH Series inverters and aren't shown unless the inverter is ≥ Level 4.

[4] Level 2 and 3 inverters can be used, but:

- Level 2 inverters are limited from 1.0-4.5 hours,
- Level 3 inverters <Rev 4.1 are limited from 1.0-6.5 hours,
- Level 3 inverters ≥Rev 4.1 (and MMS Rev 1.5) are limited from 1.5-6.5 hours;

Any setting outside these limited ranges are not recognized and reverts to the inverter's default absorption time (2.0 hrs).

[5] Requires ≥Level 4 to display.

[6] SOC features require the ME-BMK (Battery Monitor Kit) to be installed.

[7] To manually turn generator "ON" with remote, ME-AGS-N Rev 5.2 or higher is required.

3.0 Setup

3.3 Remote Buttons and Menu Items

The five menu buttons (FAVS, CTRL, METER, SETUP, or TECH) allow the inverter/charger system to be configured to your specific preferences. These buttons also allow you to access menu items that can help with monitoring and troubleshooting your system. Refer to Figure 3-2 for an example on how to navigate the remote.

This section covers each menu button's function and its various configurable settings. This helps optimize the operation of the inverter/charger.

3.3.1 FAVS Button and Menus

The FAVS (FAVORITES) button is similar to the Favorites button on your TV remote. It enables you to store the most frequently used menu items for quick reference, or to make easy changes to the system. The menu items stored under the FAVS button should be those menus most often used.

The FAVS button has five factory-stored default menu items. You can also access these menu items using the SETUP and CTRL buttons to make changes. Before changing the default FAVS menu items, it is suggested that you thoroughly review all the menu items on the menu map (see Figures 4-1 thru 4-5) and make a short list of the items you think you will use most often. Once you decide which five items you would like to make as your favorites, determine the order in which those menus are to appear under the FAVS button. This is important since you will assign a FAVS position 1-5 for each menu item you select.

Menu items can be changed at any time under the FAVS button. Navigate to a menu item that you would like to set as a favorite, then push and hold the FAVS button for three seconds. The screen displays "Select FAV: F1" on the bottom line. Rotate the SELECT knob to select FAVS 1 through 5. Once you have decided the location for the menu item, press the SELECT knob to save the menu item at the selected FAVS location.



Info: The FAVS button can be used to store menu items that would otherwise not be accessible after a PIN has been set for the SETUP menu.



Info: Menu headings cannot be selected and stored in FAVS, only menu items (with exception of TECH menu headings). Menu headings are identified with a number. Menu items are identified by a number followed by a letter.

Example: *02 Invert Setup* is a menu heading.

Status
02 Invert Setup

Example: *02A Search Watts* is a menu item.

02A Search Watts
5 Watts

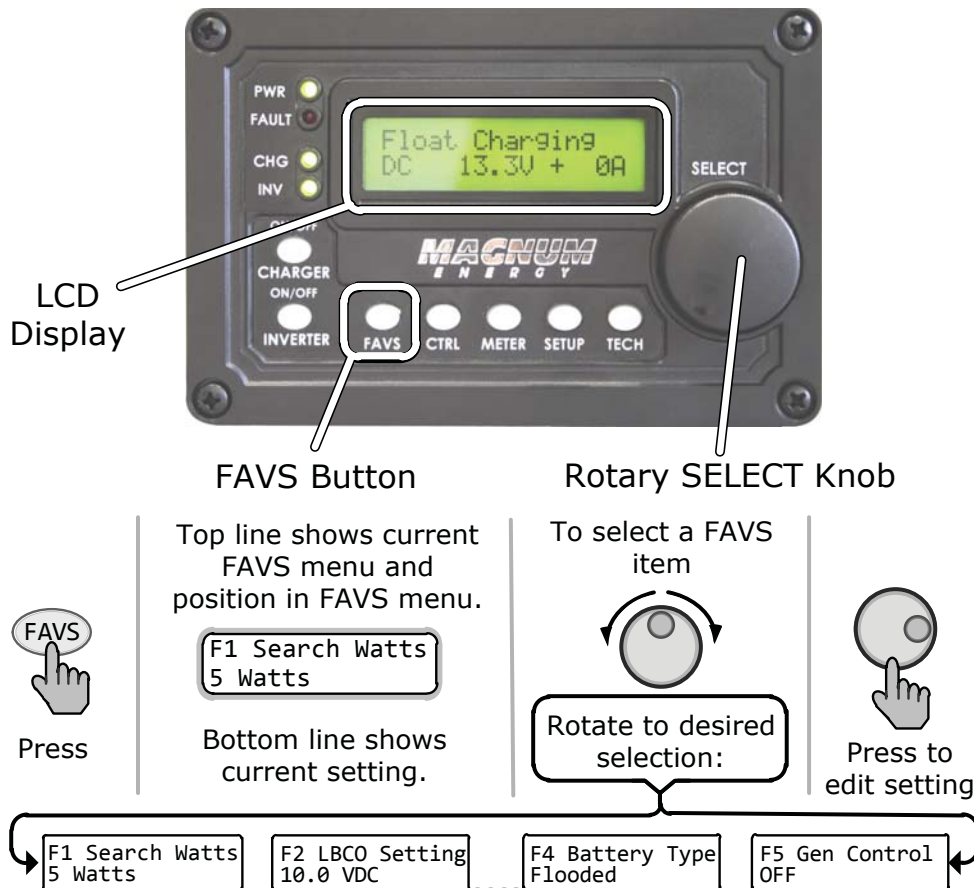


Figure 3-3, FAVS Button and Menus

FAVS Menu Default Settings:

- **FAVS: F1 Search Watts** – This is the *F1* default (FAVS #1). Refer to the SETUP button's *02A Search Watts* menu item on page 23 for information on how to adjust the *Search Watts* setting.
- **FAVS: F2 LBCO (Low Battery Cut Out) Setting** – This is the *F2* default (FAVS #2). Refer to the SETUP button's *02B LBCO Setting* menu item on page 24 for information on how to adjust the LBCO setting.
- **FAVS: F3 AC Input** – This is the *F3* default (FAVS #3). Refer to the SETUP button's *03A AC Input Amps* menu item on page 28 for information on how to adjust the *AC Input* setting.
- **FAVS: F4 Battery Type** – This is the *F4* default (FAVS #4). Refer to the SETUP button's *03B Battery Type* menu item on page 30 for information on how to set the battery type.
- **FAVS: F5 Gen Control** – This is the *F5* default (FAVS #5). Refer to the CTRL button's *03 Gen Control* menu on page 18 for information on how to use the *Gen Control* function.



Info: *F5 Gen Control* is a menu heading. It provides easy access to turn the generator on and off. If another menu item is saved in the *F5* location, the only way to bring *Gen Control* back into the *F5* location is to reset the remote to its factory defaults using the TECH button's *07 Load Defaults* menu.

3.0 Setup

3.3.2 CTRL (Control) Button and Menu

The CTRL button accesses the *01 ACIn Control*, *02 CHG Control*, and *03 Gen Control* menus. The CTRL button gives you quick control of the main functions of the inverter/charger without having to access the SETUP button's menus in order to change the operation of the inverter/charger or 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 the time is set, use the CTRL button to access the *Set ACIn 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.



Info: If a ME-ARC is connected to a parallel system with a ME-RTR, it acts like a 'display only' device with limited user controls. When the ME-ARC is directly connected to either the inverter or ME-RTR, the CTRL button function of the ME-ARC is defeated.

The ME-ARC however, does contain the *03 Gen Control* selection in the FAVS menu. The generator can be controlled via the ME-ARC through the FAVS menu, but not thru the CTRL menu.

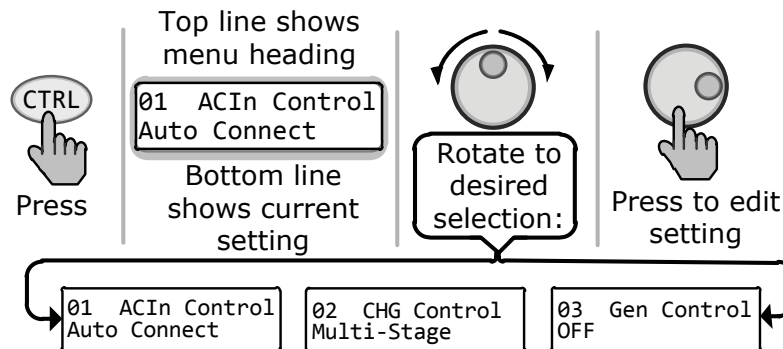
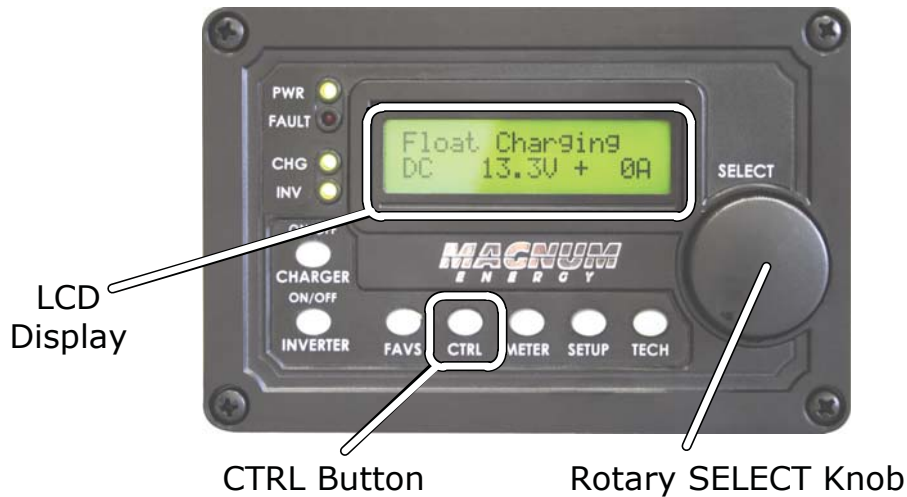


Figure 3-4, CTRL Button and Menus

CTRL: 01 ACIn Control

01 ACIn Control menu has four different conditions in which the inverter/charger will connect to an incoming AC power source. Only one 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 generator), the incoming AC must be qualified by the inverter/charger (voltage is below the high AC input requirements, above the SETUP button's *03D 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 will alternate 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.

Example: AC is present, but *Time Connect* has been selected from the *01 ACIn Control* menu and the current time of day is 6PM. The SETUP menu's *02C AC In-Time* 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.

- **Auto Connect** – Automatically connects to incoming AC power when the incoming AC is qualified by the inverter/charger (voltage is below the high AC input requirements, above the SETUP button's *03D VAC Dropout* setting, and between 50 Hz to 70 Hz for domestic models—40-60 Hz for export models).
- **VDC Connect** – Only allows the incoming AC to connect when the DC battery voltage falls below the *Set Connect Volts* setting in the SETUP menu's *02D AC In - VDC* menu item. Disconnects from incoming AC when the DC battery voltage rises above the *Set Disconnect Volts* setting, also from the *02D AC In - VDC* menu.



Info: See SETUP menu 02D on page 26 for a complete explanation of the *Set Connect/Disconnect Volts* menu settings.

- **Time Connect** – Only allows incoming AC to connect when the time of day is between the *Set Connect* and *Set Disconnect* time settings in the SETUP menu's *02C AC In - Time* menu item.



Info: See SETUP menu 02C on page 25 for a complete explanation of the *Set Connect/Disconnect* time menu settings.

- **SOC Connect** – Only allows incoming AC to connect when the battery bank State of Charge (SOC) falls below the *Set Connect SOC* setting in the SETUP menu's *02E AC In - SOC* menu item. Disconnects from incoming AC when the battery bank SOC rises above the *Set Disconnect SOC* setting, also from the *02E AC In - SOC* menu. This feature requires the optional ME-BMK (battery monitor) to be installed.



Info: See SETUP menu 02E on page 26 for a complete explanation of the *Set Connect SOC* menu settings.

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

3.0 Setup

CTRL: 02 CHG (Charge) Control

02 CHG Control enables you to set the Charge 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 *02 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.

- **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 button's *03E Absorb Done* menu), it 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 for the *Final Charge Stage* setting to be used.

- **Force Float** – This charge profile forces the charger to stay in 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 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 SETUP menu's *03G Final Charge Stage* menu item, 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 to ensure the batteries are fully charged at the end of a regular multi-stage charge cycle. Check with the battery manufacturer for proper battery charger settings.



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

CTRL: 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 AGS-N

is installed in the system, the generator can be manually started and stopped, or set to start and stop automatically from this menu.



Info: If a ME-ARC is connected directly to one of the communication ports on a router (P1-P6) it can be used in a remote location as a remote on/off switch, as well as to assist in monitoring the system and to control a generator that is connected to an ME-AGS-N.



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 Owner's Manual (PN: 64-0039) for installation information.

- **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 from the AGS). When the *OFF* setting is selected, the generator will not start automatically.



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

- **ON** – The *ON* selection starts 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: Manually start the generator by selecting *ON* from the *03 Gen Control* menu; change the selection to *AUTO* to automatically stop the generator. When the *AUTO* setting is selected after the generator has been manually started, it uses the stop setting from the SETUP button's *04A Gen Run VDC (using the Set Stop Gen Volts* setting—even if not enabled) or *04F Max Gen Run Time* menu item, whichever occurs first.



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

- **AUTO** – This selection uses the settings from the SETUP button's *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 Section 7.0 "Using an AGS Module" to set the start and stop parameters for the generator.

3.3.3 METER Button and Menus

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



Info: Depending on the inverter, some meter functions may not display or be accessible. If some meters do not display, refer to Section 3.2.



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

3.0 Setup

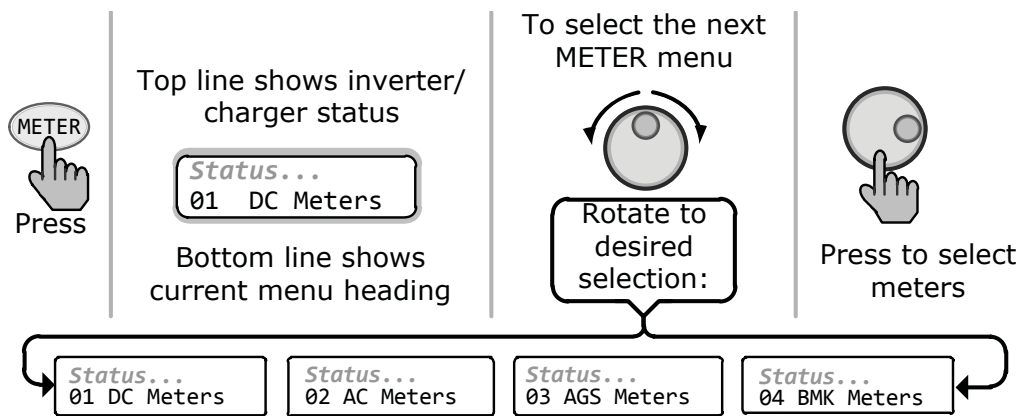


Figure 3-5, METER Button and Menus

METER: 01 DC Meters

DC Meters displays battery voltage, DC amps from the inverter/charger, and the time in Charge mode. Use these meters to monitor your battery bank.

- **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** – The *DC Amps* meter displays a negative number to show the current being removed from the battery. This meter displays a positive number to show the amount of current delivered to the batteries. This meter converts AC amps to display DC amps, so the accuracy below one amp AC (~ 10 amps DC @ 12 VDC) is not detected. When the current in or out of the batteries is greater than one amp AC, the accuracy of this meter is $\pm 20\%$.
- **01C Charge Time** – This meter displays the total time 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: The charge time is reset whenever the charge status goes to "Charging" (occurs whenever AC is connected to the inverter/charger), or if the charger initiates another Bulk Charge cycle.

METER: 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. When in Standby mode, this measures the AC voltage that is passing through the inverter from the source (e.g., grid or generator).
- **02B Output Hertz** – While inverting, this menu displays the output frequency of the inverter. When in Standby mode, 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 AC amps as measured on the inverter's AC output terminals. The reading is positive (+) if power is being pulled from the inverter to run an AC load—either using the batteries in Inverter mode, or from the AC input source in Standby mode. The reading is negative (–) to indicate power is being returned to the inverter through the AC output terminals—possible in an AC coupled installation.



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

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. This reading is always displayed as a positive (+) number.

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 is displayed as the input amps.

- **02E Inv/Chg Amps** – This menu displays the inverter or charger amps. A negative (-) amps reading indicates the inverter is powering the inverter loads and the batteries are discharging (inverter amps). A positive (+) amps reading indicates the inverter is using the AC input source to charge the batteries (charger amps).
- **02F Input AC1** – This menu displays the RMS value of the AC voltage at the inverter's AC1/HOT IN 1 and NEUTRAL terminals.
- **02G Input AC2** – This menu displays the RMS value of the AC input voltage applied to the inverter's AC2 and NEUTRAL terminals.



Info: The *02G Input AC2* menu only displays if the remote is connected to a dual source inverter/charger that has an AC1 and AC2 input such as the MSH4024E.



Info: If the *02G Input AC2* menu displays voltage (~ 50 volts), but the generator is off or nothing is connected to the AC2 input, the AC2 neutral-to-ground bond connection is not correct or connected.

METER: 03 AGS Meters

Refer to Section 7.0 for detailed information on the AGS menus that are available from the ME-ARC remote's METER button.

METER: 04 BMK Meters

Refer to Section 8.0 for detailed information on the BMK menus that are available from the ME-ARC remote's METER button.

3.3.4 SETUP Button and Menus

Pressing the SETUP button provides access to the menu items and settings that enable you to configure the ME-ARC display, inverter/charger, ME-AGS-N, and the ME-BMK. 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 *05 SETUP PIN* menu item, the first screen is the *Setup PIN* menu. The proper PIN must now be entered in order to access the SETUP menus. After five minutes from the last button push, the display automatically returns to the remote home screen and the PIN must be reentered in order to access the SETUP menus. Refer to the TECH menu's *05 SETUP PIN* menu item to set or change the PIN number.



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.

3.0 Setup

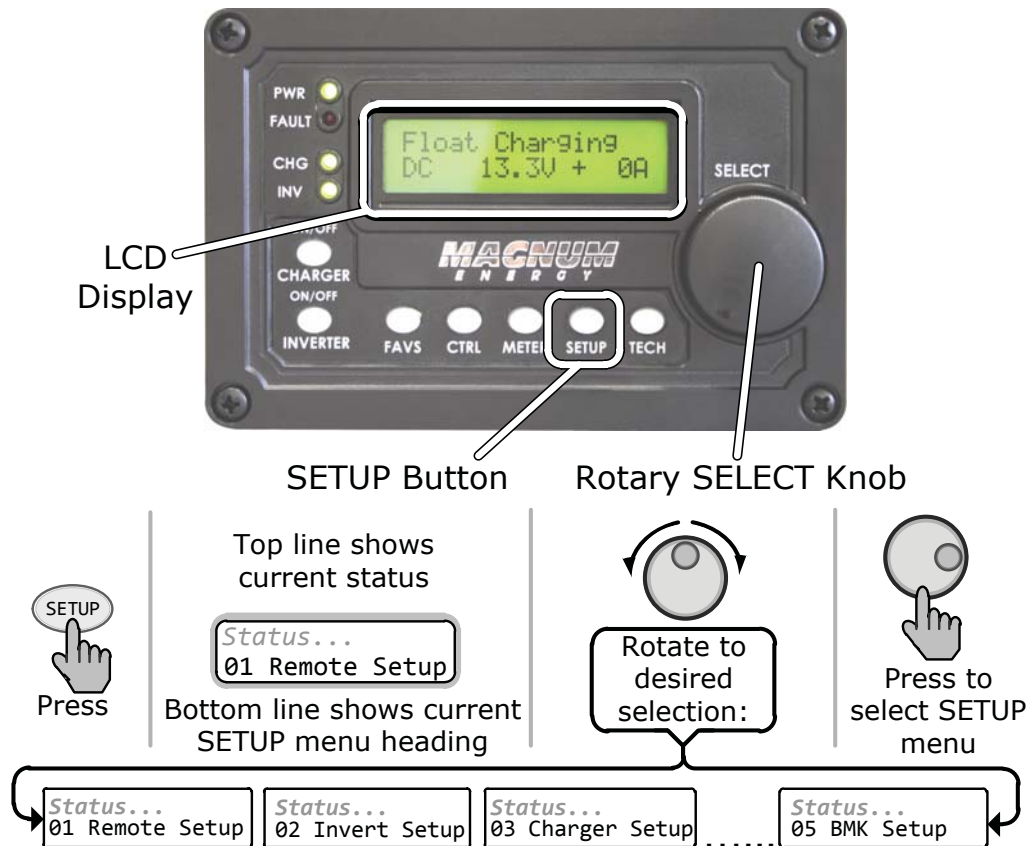


Figure 3-6, SETUP Button and Menus

SETUP: 01 Remote Setup

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

- **01A Set Clock** – The ME-ARC 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*, *4H Gen Exercise* menu items, and the *04 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 ME-ARC is disconnected from the inverter.

To set the current time:

From the *Set Clock* menu:

1. Rotate the SELECT knob to the correct 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 Contrast** – This setting enables you to adjust the contrast of the LCD screen based on the current lighting conditions and viewing angle.
Default setting: *Contrast = 100%*
Range: *0-100%*
- **01C Backlight** – This setting enables you to adjust the backlight of the LCD screen based on the current lighting conditions and viewing angle.
Default setting: *Backlight = 50%*
Range: *0-100%*
- **01D Power Save** – This setting enables you to turn off the Power Save™ feature, or to select the time that determines when the display goes into Power Save mode.
Default setting: *PwrSave = 15 minute*
Range: *OFF, 1, 5, 10, 15, 30, 45, 60 Min*

What is the Power Save feature? The Power Save feature turns off the LCD backlight and the LED's on the remote to conserve energy. The remote 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 *01D Power Save* setting). Whenever the remote goes into the Power Save mode, the LCD backlight and the LED's 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 the LED's to always be on, you will need to turn the Power Save feature off by selecting *OFF* from the *Set Power Save* menu.

- **01E 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 use your selection: the METER button's *03D AGS Temp* menu, the SETUP button's *04E Gen Run Temp* menu, and the TECH button's *01 Temperatures* menu.
Default setting: *Fahrenheit*
Range: *Fahrenheit, Celsius*

SETUP: 02 Invert Setup

The following menus are used to set up those functions that are only 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. 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: *5 Watts*
Range: *OFF, 5-50 Watts*



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.

3.0 Setup

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 5 watts) being off, then the Search Watts 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 next lower setting) of the smallest load that you plan to run. If you don't know the wattage of the smallest load, turn the switch for the load on and decrease the Search Watts setting until the load comes on and stays on.



Info: Even though the Search Watts feature is on, some connected equipment—even if they are off—may draw enough current to keep the inverter in the Inverting mode (i.e., not "Searching").

- **02B LBCO Setting** – The LBCO setting (Low Battery Cut Out) sets the DC voltage level that turns off the inverter. This helps protect the batteries from over-discharge damage. If the battery voltage drops below the LBCO set-point continuously for more than one 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 volts (48-volt models) the FAULT LED and *Low Battery* status indications will be immediate.

Default settings: *LBCO = 10.0 VDC (12v), 20.0 VDC (24v) or 40.0 VDC (48v)*

Ranges: *9.0-12.2 VDC (12v), 18.0-24.4 VDC (24v), 36.0-48.8 VDC (48v)*



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 automatically clears the low battery fault, passes the input AC power to the output, and begins charging the batteries.

Where should I set the LBCO setting? If your goal is not to discharge your batteries more than 20%*, then set the *LBCO* setting from 11.5 - 12.2 VDC (12-volt models), 23.0 - 24.4 VDC (24-volt models), or 46.0 - 48.8 VDC (48-volt models). In some applications, such as those installed in an off-grid home or when doing a lot of RV dry-camping, you may want to cycle down to 50%* by setting the LBCO from 10.0 to 11.4 VDC (12-volt models), 20.0 - 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 - 19.0 VDC (24-volt models), or 36.0 or 38.0 VDC (48-volt models) before recharging.

* *These 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 discharges the batteries; which allows 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 at ≥ 1.0 volts higher than the LBCO setting—this is to prevent the inverter from shutting down before the generator comes on.

****IMPORTANT****

1. To use the AC In Control features (*AC In-Time*, *AC In-VDC*, and *AC In-SOC*), the AC source must always be connected and available for use at the inverter's AC input—such as utility power. There is no benefit from using the AC In feature if the AC source is from a generator, because the generator power may not be available when the AC In feature becomes activated.
2. When an AC In feature (*AC In-Time*, *AC In-VOC*, *AC In-SOC*) is selected, that feature is active whether or not there is any AC power on the inverter's input. If no AC power is available, the inverter continues in Inverter mode. However, if AC power becomes available on the inverter's input after the connect setting (*Time*, *VDC*, or *SOC*) has been reached, the inverter continues to allow the incoming AC power to be connected and used until the disconnect setting is reached.
3. When using a dual source inverter/charger such as the MSH4024RE, the AC In features only work with the GRID IN (AC1) input.

- **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 outside the set times, the inverter/charger disconnects from the AC source.

Set Connect – These settings determine what time each day the inverter/charger allows the incoming AC to connect and transfer the loads from the inverter's battery power to the utility grid.

Default setting: 6:00A

Range: 12:00AM-11:59PM

Set Disconnect – These settings determine what time each day the inverter/charger disconnects any incoming AC that is connected, and resumes powering the AC loads from the inverter's battery power.

Default setting: 6:00P

Range: 12:00AM-11:59PM

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 item. Even if AC is present on the AC input terminals of the inverter/charger, it can only connect during those times previously set. The most common use of *AC In-Time* is when your local utility company offers peak rate savings (or "time of day billing"). The utility company offers the peak rate savings with a lower rate per kWh (kilo Watt hour)—usually available at night when there is less demand on the local utility grid. The AC In-Time feature may save you money by only connecting to the utility when rates are the least expensive.

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/disconnect times to coincide with the utility companies lower rates to save you money.

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

3.0 Setup

- **02D AC In-VDC** – The *AC In-VDC* settings determine when the inverter/charger automatically connects and disconnects the incoming utility power based on the inverter's battery voltage.

Set Connect Volts – This setting determines at what DC voltage the inverter/charger connects to incoming AC and transfers the loads from the inverter battery power to the utility grid. The transfer occurs only if the battery voltage remains below this setting for 10 seconds.

Default settings: 11.0 VDC (12v), 22.0 VDC (24v), or 44.0 VDC (48v)

Ranges: 9.0-16.0 VDC (12v), 18.0-32.0 VDC (24v), 36.0-64.0 VDC (48v)

Set Disconnect Volts – This setting determines at what DC voltage the inverter/charger disconnects from incoming AC and resumes powering the AC loads from the inverter's battery power.

Default settings: 14.1 VDC (12v), 28.2 VDC (24v), or 56.4 VDC (48v)

Ranges: 9.0-16.0 VDC (12v), 18.0-32.0 VDC (24v), 36.0-64.0 VDC (48v)



Info: These settings are not temperature compensated.



Info: If you have a ME-BMK battery monitor, use the AC In-SOC feature instead. The AC In-SOC feature takes temperature compensation into account and is a more accurate way to identify when your battery is discharged/charged—to determine when to transfer to/from utility power.

What is the AC In-VDC feature? This feature allows the inverter system to automatically switch between utility connected and standalone battery operation—based on the VDC voltage (i.e., battery) to the inverter. When using this feature, the inverter loads are powered from the battery and another energy source such as solar, wind, and/or hydro. In the event the energy source cannot deliver enough power, and the battery voltage drops to the *Set Connect Volts* setting, the inverter connects to the utility to continue powering the loads connected to the inverter's output and to charge the battery. Once the energy source can again deliver enough power to raise the battery voltage to the *Set Disconnect Volts* setting, the inverter disconnects from the utility and again powers the inverter loads from the battery.

Where should I set AC In-VDC? Check with your battery manufacturer to determine the correct settings for your batteries. Typically, battery manufacturers do not 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 batteries respectively. In order to protect the batteries from over-discharging, set the connect voltage setting to 12.2 VDC, 24.4 VDC, or 48.8 VDC respectively. Set the disconnect voltage setting higher than the absorb voltage setting in order to reduce cycling of the system. A setting higher than the absorb voltage requires the energy source (solar, wind, etc.) to raise the DC voltage above the charger settings. This ensures the battery gets at least an 80-85% charge (preferably 100%) before the AC is disconnected and the inverter resumes powering from the batteries.

- **02E AC In-SOC** – This setting determines when the inverter/charger automatically connects and disconnects the incoming utility power based on the State of Charge (SOC) of the inverter battery bank.

Note: This feature requires the ME-BMK battery monitor to be installed to provide SOC values to the inverter/charger.

Set Connect SOC – This setting determines at what battery SOC percentage the inverter/charger will connect to incoming AC and transfer the loads from the inverter battery power to the utility grid.

Default setting: 50% SOC

Range: 20-98%

Set Disconnect SOC – This setting determines at what battery SOC percentage the inverter/charger will disconnect from incoming AC and resume powering the AC loads from the inverter's battery power.

Default setting: 100% SOC

Range: 21-100%



Info: The transfer to/from incoming AC occurs immediately when the *Connect SOC* or *Disconnect SOC* setting is reached.



Info: The AC In-SOC feature requires a valid SOC number (0-100%). If a valid number is not displayed under the *METER/04 BMK Meters/04B SOC* menu, then the charger will immediately go to Float Charge once the Bulk Charge stage is finished.

What is the AC In-SOC feature? This feature allows the inverter/charger system to automatically switch between utility connected and standalone battery operation based on the inverter's battery SOC that is provided by the ME-BMK battery monitor. When using this feature, the inverter loads are normally powered from the battery and a solar array (or other energy source such as wind, and/or hydro). In the event the solar array cannot deliver enough power and the battery's SOC drops to the *Set Connect SOC* setting, the inverter connects to the utility to continue powering the loads connected to the inverters output and to charge the battery. Once the solar array can again deliver enough power to charge the battery to the *Set Disconnect SOC* setting, the inverter disconnects from the utility and again powers the inverter loads from the battery.

Where should I set AC In-SOC? Check with your battery manufacturer to determine the correct settings for your batteries. Typically, manufacturers do not recommend discharging the batteries below 50% to maintain the life of the battery. Set the *Disconnect SOC* value to get at least an 80-85% charge (preferably 100%) before the AC is disconnected and the inverter resumes powering from the batteries.



Info: When using AC In-SOC, ensure the *SETUP/03E Absorption Done SOC* setting is higher than the *Set Disconnect SOC* setting, or the inverter may not disconnect from the incoming AC.

Notes on using the AC In feature based on VDC or SOC:

1. The AC In-VDC or AC In-SOC feature allows you to optimize the use of the another energy source (i.e., solar, wind, and/or hydro) and only allow the use of the utility power when the energy source is not able to keep up with the load demands under normal conditions (i.e., cloudy day).
2. The energy source should be sized to meet the daily power requirements of the loads being operated under normal conditions. Otherwise, the inverter would be connected to utility power most of the time, resulting in excessive energy consumption from the utility.
3. The inverter system should not be configured for use in a utility back-up scenario, otherwise the battery may be in a highly discharged state when grid power goes down—preventing the critical loads from running during a power outage.

3.0 Setup

- **02F Power Up Always** – Allows the inverter to power up and provide AC power automatically once DC voltage is connected to the inverter.
Default setting: *OFF*
Range: *OFF, ON*

What is the Power Up Always feature? Normally, when DC power is connected to the inverter, the user is required to press the power button—on the inverter or remote—to turn the inverter on. When the Power Up Always feature is activated by selecting “ON”, the inverter is automatically turned on and starts searching or inverting—depending on the *SETUP:02 Invert Setup/02A Search Watts* setting. Once the inverter has connected to DC power and is automatically turned on, the power button—on the inverter or remote—can be used to turn the inverter on or off.

Why use the Power Up Always feature? Some customers are familiar with Uninterruptable Power Supplies (UPS) that power-up automatically when DC power is connected. The Power Up Always feature can be used by customers that want to obtain the same automatic power-up feature with which they are familiar.

SETUP: 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 from the incoming AC power. Whenever the utility or generator is connected to the inverter’s input, 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 from the incoming AC power when needed.

Setting for all models except MSH4024RE:

Set AC Input Amps – This setting determines the level in AC amps at which the inverter/charger begins to back off the battery charger to reduce the load on the incoming utility/generator power and continue powering the inverter loads.

Default setting: *30 Amps*

Ranges: *5-60 Amps*

Settings for MSH4024RE:



Info: The MSH4024RE inverter/charger has two independent AC source inputs (AC1/GRID, AC2/GEN) with independent AC input amps settings for each. The *Set AC1 Input Amps* and *Set AC2 Input Amps* menus only display if the remote is connected to a dual input source inverter/charger.

Set AC1 Input Amps – This setting determines the level in AC amps at which the MSH4024RE inverter/charger begins to back off the battery charger to reduce the load on the incoming utility/grid power (that is connected to the AC1 input) and continue powering the inverter loads. This setting also determines when the MSH4024RE inverter/charger

begins to operate in parallel with the incoming utility power to support the inverter loads (i.e., Load Support Mode¹). Typically, set to the size of the AC circuit breaker that feeds the AC1 input.

Default setting: 30 Amps

Range: 5-60 Amps

Set AC2 Input Amps – This setting determines the AC amps level at which the MSH4024RE inverter/charger begins to back off the battery charger to reduce the load on the incoming generator power (that is connected to the AC2 input) in order to continue powering the inverter loads. This setting also determines when the MSH4024RE begins to operate in parallel with the incoming generator power to support the inverter loads (i.e., Load Support Mode¹). Typically, this is set to the size of the generator's circuit breaker that feeds the inverter AC2 input, or to the maximum output amperage ability of the generator.

Default setting: 20 Amps

Range: 5-60 Amps

Where should I set AC Input Amps? This setting controls the input current differently depending on the inverter/charger model and the AC input wiring configuration. Set as described below for your particular model:

ME, MS, and RD Series: These models have two inputs (HOT IN 1 and HOT IN 2), but the current is only monitored on HOT IN 1. On these models—when wired as a dual-in configuration or as a single-in configuration with only the HOT IN 1 connected—the *AC Input Amps* setting should be set to the size of the AC circuit breaker that feeds the HOT IN 1 input. On these models, when wired as a single-in configuration with HOT IN 1 and HOT IN 2 jumped together, set the *AC Input Amps* setting to half ($\times\frac{1}{2}$) the input breaker size—as $\frac{1}{2}$ the current will pass through HOT IN 1 and the other $\frac{1}{2}$ through HOT IN 2 simultaneously.

MS-AE and MS-PAE Series: These models have two inputs (HOT IN 1 and HOT IN 2), with the current monitored on each input at the same time. On these models, since the input is from a single AC source, both of the input currents are added together and divided in half to determine the *AC Input Amps* setting. Whether the input circuit breaker is a dual-pole (120/240 VAC input) or a single-pole (120 VAC only), set the *AC Input Amps* setting to the value of only one of the breaker poles (i.e. 30A dual-pole = 30A setting, 30A single-pole = 30A setting).

MS-E, MS-PE, MSH-RE and MSH-M Series: These models may have one (AC1) or two (AC2) inputs, with the current monitored on each input separately. On these models, set the *AC Input Amps* setting to match the input AC circuit breaker size.

MM, MM-AE and MMS Series (and any export version of these models): These models do not monitor current on the input, therefore cannot benefit from the *AC Input Amps* setting or feature. On these models, the *AC Input Amps* setting may be displayed and allow selection/adjustment, but will not do anything to reduce the battery charger current.

Note¹: The MS Hybrid (MSH) Series inverter/chargers have Load Support Mode, which allows the inverter power to operate in parallel with the incoming AC power (Grid or Gen). This feature uses additional power from the inverter's battery to run loads greater than what the incoming AC power can run alone, and prioritizes the power of any external DC source (i.e., solar, wind, etc.) over the incoming AC power to run inverter loads. For more information, see the Load Support Mode section in the MSH Owner's Manual.

3.0 Setup



Info: If you are supplying two AC sources (utility and generator) to the inverter's single input through an AC transfer switch, adjust the *AC Input Amps* setting to the smaller AC circuit breaker size of the two AC sources.



Info: The *AC Input Amps* 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 circuit breaker size. For best performance, lower the *AC Input Amps* setting to 1/3 of the generator's rated capacity, and then while the generator is heavily loaded, gradually increase the setting as high as possible, but ensure the voltage level stays above the *03D VAC Dropout* setting.



CAUTION: Unless you have an MS Hybrid Series inverter/charger—which provides the Load Support feature—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.

- **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 3-2 to determine the specific charge voltage based on the battery type selected.

Default setting: *Battery Type = Flooded*

Range: *GEL, Flooded, AGM1, AGM2, Custom*



Info: The voltage settings shown in Table 3-2 are based on the Battery Temperature Sensor (BTS) 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.

- **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 *100%*. The *Max Charge = 0%* setting is available to help minimize charging while continuing to allow pass-thru 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 *Max Charge Rate* 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 owner's manual) to determine the inverter's maximum charge rate. Once you find this max charge rate, determine the percentage needed to limit the charge rate to your battery bank.

Default setting: *Max Charge = 100%*

Range: *0-100%*

Example: The maximum charge rate of your inverter/charger is 120 amps and you need to limit the charge rate to 72 amps. Choose the *Max Charge* = 60% setting (72 amps = 60% of 120 amps).



Info: If the *Maximum Charge Rate* setting is set to 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-volt models), <22 VDC (24-volt models), or <44 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.

Table 3-2, 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

Note¹: Voltage same as absorption voltage—to prevent equalization.

Note²: Specifications for Concord (Lifeline Series) AGM batteries.

Note³: Specifications for East Penn, Deka, Discover and Trojan AGM batteries.

Note⁴: 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.

3.0 Setup



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 VAC Dropout** – Selects the minimum AC voltage that must be present on the input before the inverter/charger switches from Inverter mode to Standby mode. This setting also determines the minimum AC voltage threshold where the charger disengages and the inverter (when turned on) resumes powering the AC loads from the inverter’s battery power. This protects AC loads from utility outages.

Example: If the *VAC Dropout* setting is 60, then the AC input voltage must be above 60 volts before the inverter connects and switches from Inverter mode to Standby mode. Once the AC is connected, the AC voltage must drop below 60 VAC to switch back to Inverter mode.

Settings for all models except MSH4024RE:

Set VAC Dropout – This setting determines at what AC voltage—from the HOT IN 1 to NEUT IN 1 terminals—the inverter/charger will connect to or disengage from the incoming AC.

Default setting: 80 VAC (150 VAC for export models)

Range: 60-100 VAC, UPS Mode (110-190 VAC, UPS Mode for export models)

Settings for MSH4024RE:



Info: The MSH4024RE inverter/charger has two independent AC source inputs (AC1/GRID and AC2/GEN) with independent VAC dropout settings for each input. The *Set VAC Dropout AC1* and *Set VAC Dropout AC2* menus only display if the remote is connected to a dual input source inverter/charger.

Set VAC Dropout AC1 – This setting determines what AC voltage—from the MSH4024RE inverter/charger’s AC1 to NEUTRAL terminals—the inverter/charger will connect to or disengage from the incoming AC.

Default setting: 80 VAC

Range: 60-100 VAC, UPS Mode

Set VAC Dropout AC2 – This setting determines what AC voltage—from the MSH4024RE inverter/charger’s AC2 to NEUTRAL terminals—the inverter/charger will connect to or disengage from the incoming AC.

Default setting: 75 VAC

Range: 60-100 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 determine how quickly the charger disconnects and starts inverting based of the fluctuations of the incoming AC voltage.

Dropout = 60 VAC to 100VAC (Export inverter models: Dropout = 110 VAC to 190 VAC) – Use a VAC dropout setting from 60 VAC to 100 VAC (export models use a dropout from 110 VAC to 190 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 transfer time from Standby 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 (200 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 Standby 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 models 190 VAC or less), or obtain a better voltage-regulated AC source.

- **03E Absorb Done (Time, Amps, SOC)** – This setting identifies whether time, amps, or SOC are used to determine when the second stage of battery charging (Absorption stage) is finished. The charge cycle transitions to the final charge stage (see *03G Final Charge Stage*) afterwards. Absorption is the second stage of the charge process that attempts to fully charge the batteries.



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 the Absorption stage. When using time, the battery bank size will typically determine the length of the *Absorb Done Time* setting. The larger the battery bank, the longer the absorb time needed to ensure a full charge to the batteries. 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. See Table 3-3 to help select the *Absorb Done Time* setting based on the amp-hr capacity of your battery bank.

Default setting: *Absorb Done Time* = 2.0 Hrs

Range: 0.1-25.5 Hrs



Info: The *Absorb Done Time* setting's range is dependent on the software revision of your inverter. With inverters having a revision 5.0 or greater, your available range is 0.5 to 25.5 hours. However, if your inverter revision is less than 5.0, even though you can adjust the setting from 0.5 to 25.5 hours, the available range is only from 1.0 to 6.5 hours. Any setting less than 1.0 hour or greater than 6.5 hours is not recognized, and will cause the charger to revert to the default setting of 2.0 hours. See Section 3.2 for more information.

3.0 Setup

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

Battery AmpHrs Capacity	Absorb Time	Battery AmpHrs Capacity	Absorb Time
200 to 300	1.0 Hrs	1310 to 1500	4.0 Hrs
310 to 500	1.5 Hrs	1510 to 1700	4.5 Hrs
510 to 700	2.0 Hrs	1710 to 1900	5.0 Hrs
710 to 900	2.5 Hrs	1910 to 2100	5.5 Hrs
910 to 1100	3.0 Hrs	2110 to 2300	6.0 Hrs
1110 to 1300	3.5 Hrs	2310 to 2500	6.5 Hrs

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 Absorb Charge mode, the return amps from the charger slowly decrease. When this current decreases below the *Absorb Done Amps* setting, the charger transfers from the Absorb charge cycle to the final charge stage (see *03G Final Charge Stage*).

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 drops to this level. Continuing to charge past this level may possibly overcharge the batteries. Check with your battery manufacturer to find out what the correct return amp settings are for your batteries.

Default setting: *Absorb Done Amps* = 20 ADC

Range: 0-150 ADC



Info: Setting the *Absorb Done Amps* value 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: 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 battery monitor kit (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 battery monitor is accurate to +/- .1 ADC.

Set Absorb Done (SOC) – This setting can be used if a battery monitor kit 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%*

Range: *50-100%*



Info: A ME-BMK is required in order to use the *Absorb Done SOC* setting. If the *Absorb Done SOC* setting is selected and there is no ME-BMK installed in the system, or if a valid SOC number is not displayed under the *METER/04 BMK Meters/04B SOC* menu (i.e., *Think'n*, *No Comm*, *Pwr-up Fault* are not valid SOC numbers), then the charger will immediately go to the Float Charge stage once the Bulk Charge stage is finished.



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 a safety feature that ensures abnormal conditions will not cause the charger to hold batteries at a high voltage for a prolonged period of time. This menu sets a maximum time the charger is allowed to operate in either the Bulk or Absorption Charge mode. If the charger reaches the maximum charge time setting, it will transition to the final charge stage as set in the SETUP button's *03G Final Charge Stage*.

Default setting: *Max Charge Time = 12.0 Hrs*

Range: *0.0-25.5 Hrs*

Where should I set my Max Charge Time? In order to ensure a complete charge cycle is accomplished, adjust the *Max Charge Time* setting to a time period that will normally be longer 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 hours, but the *Absorb Done Time* setting is eight hours. The charge cycle will stop after six hours as per the *Max Charge Time* setting, and not finish the *Absorb Done Time* setting of eight hours.

3.0 Setup

- **03G Final Charge Stage** – The *Final Charge Stage* setting is the stage to which the charger will transition after the absorption stage has finished—as set in the *03E Absorb Done* menu.

Default setting: *Set Final Charge Stage = Multi*

Range: *Multi, Float, Silent*



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

Set Final Charge Stage = Multi – The *Multi* setting (which is short for “Multi-Stage”), 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 (i.e., Battery Saver mode). In Full Charge mode, the charger automatically stops charging but is still on and actively monitoring the battery voltage. The charger will remain in the Full Charge stage until the battery voltage drops below 12.7 VDC for 12-volt 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: When *Multi* is selected and the charger goes to Full Charge mode, 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 stage.

Why should I use Multi? Multi 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 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 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. Unlike Multi mode, in Float mode there is no Full Charge feature.

Why should I use the Float Charge Stage? 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*'. Once the charger enters Silent mode the battery voltage is continuously monitored. If the batteries fall to the *Set DC Volts to Rebulk* value, the charger restarts the Bulk Charge mode and then transitions to Absorb Charge mode. After the Absorb Charge mode, the charger again transitions to Silent mode. This silent to rebulk to absorb and back to silent cycle will continue as long as it is required.

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 Charge mode. This setting should be at the lowest DC volts you want the batteries to fall before starting a new bulk charge. Typically, the lowest DC volts the batteries are allowed to fall is 12.0 to 12.2 VDC (12-volt systems), 24.0 to 24.4 VDC (24-volt systems), and 48.0 to 48.8 VDC (48-volt systems) respectively.

Default setting: *Set DC Volts to ReBulk = 12.0*

Ranges: *12.0-16.0 VDC (12v), 24.0-32.0 VDC (24v), 48.0-64.0 VDC (48v)*

Why should I use the Silent Stage? 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 mode and Silent mode is that the 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.

SETUP: 04 AGS Setup

Refer to Section 7.0 for detailed information on the AGS menus that are available from the ME-ARC remote's SETUP button.

SETUP: 05 BMK Setup

Refer to Section 8.0 for detailed information on the BMK menus that are available from the ME-ARC remote's SETUP button.

3.0 Setup

3.3.5 TECH Button and Menus

The TECH menu button provides access to selections that are used to assist service technicians in troubleshooting. It provides access to system information along with a selection that allows all system settings to be returned to their original factory default values.

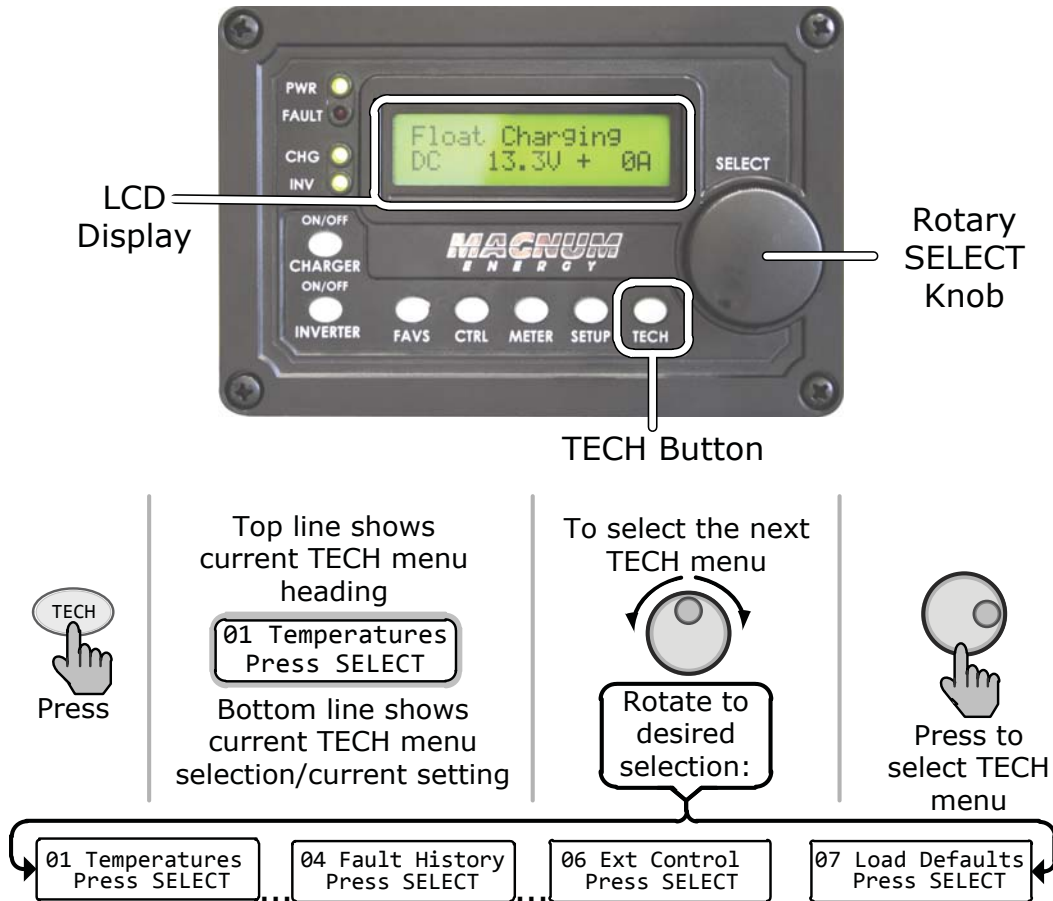


Figure 3-7, TECH Button and Menus

TECH: 01 Temperatures

Displays the various temperatures measured throughout the system. Rotate the SELECT knob to scroll through these temperature readings. The following temperature displays are available:

- **Batt Sensor** – Displays the temperature of the inverter's Battery Temp Sensor (BTS) that is connected to the battery bank.
- **Transformer** – Displays the temperature of the main power transformer inside the inverter.
- **Transistors** – Displays the temperature of the inverter's FETs (Field Effect Transistors).
- **AGS** – Displays the temperature of the AGS Temp Sensor that is plugged into the REMOTE port on the ME-AGS-N module.



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

TECH: 02 Revisions

Displays the revisions of those devices that are connected to the Magnum network. Rotate the SELECT knob to scroll through the revisions. The following devices display revisions (if connected to remote): inverter, remote, AGS-N, BMK, and router.



Info: The BMK, AGS, and the remote accessories may display a "0.0" revision. 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.

If the ME-ARC is connected to a router (ME-RTR), the router revision will be displayed, but not all functions of the ME-ARC will be available. The ME-ARC has limited functions as a second remote connected to the router. Refer to the ME-RTR Router Owner's Manual (PN: 64-0020) for a complete list of active menus when the ME-ARC is connected to the router.

TECH: 03 Inv Model

Displays the model number of the connected inverter.



Info: When the *03 Inv Model* menu item displays "Unknown", the remote is unable to determine the inverter model. This happens when the remote is connected to a later/newer inverter model not recognized by an older remote. All remote menu selections and features that are available in the inverter will function normally.



Info: When an inverter is stacked in parallel or series, there will be a stacking indication following the model number. The indication will identify the following stacking conditions: "PM" – Parallel Master; "PS" – Parallel Slave; "SM" – Series Master; "SS" – Series Slave.



Info: The revision may display "0.0" for several reasons. Either the device is not installed, there is no communication due to a bad or miswired network cable, or the device is not powered or is bad.

TECH: 04 Fault History

These menus display a history of the connected inverter and any networked AGS, and provide a way to clear all recorded fault history.



Info: All recorded fault history displays will be retained (except for the day the fault occurred), even if power is removed from the remote. If no fault history is recorded, the display shows "No Error Record".

- **04A Inv Faults** – This menu displays a history of the last nine inverter/charger faults. Information for each fault displays from the most recent fault (H1) to the earliest/past recorded faults (H2 up to H9). Refer to Figure 3-8.

3.0 Setup

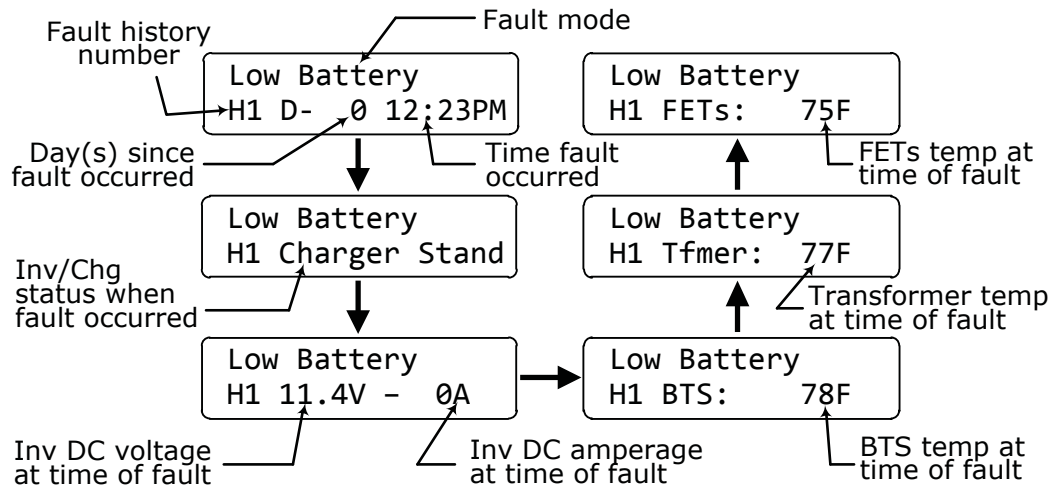


Figure 3-8, Inverter Fault History Menu Items

The top line displays the inverter fault mode. The bottom line displays the fault history number, day(s) since this fault occurred, and the time this fault occurred.

Rotate the SELECT knob to display additional readings for this fault history number (series of six screens for each fault). The following information displays (in order): status of the inverter or charger as the fault occurred, DC voltage at the time of this fault, DC amperage at the time of this fault, and temperatures of the BTS, transformer, and FETs at the time of this fault. Continue to rotate the SELECT knob to display earlier faults (as applicable).

- **04B AGS Faults** – Refer to Section 7.0 for detailed information on the AGS menus that are available using the ME-ARC remote’s TECH button.
- **04C Clear Faults** – This menu allows all recorded fault history information—for any inverter and/or AGS that is network connected—to be cleared/erased.

TECH: 05 SETUP PIN

This menu sets the password (PIN - Personal Identification Number) and locks/unlocks the ARC’s 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 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 (press SELECT) the SETUP PIN menu, “Set SETUP PIN = 0000” displays with the first “0” blinking. “0000” is the default setting when no PIN has been set.

From the *Set SETUP PIN* menu:

1. Rotate the SELECT knob to the desired number (0-9), and then press SELECT.



Info: "0000" is not a valid PIN.

2. Repeat Step 1 to set the remaining three digits until the desired PIN number displays.
3. After pressing the SELECT knob for the last digit, the PIN is set. The *Set SETUP* menu displays with the following menu options (rotate SELECT knob to view):

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.

Change PIN – Press SELECT to change the existing PIN.

3.0 Setup

Entering an Existing PIN

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

From the *Enter SETUP PIN* menu:

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



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

Changing an Existing 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 *Change PIN* menu item.

From the *Enter Setup PIN = 0**** menu:

1. Use the SELECT knob to enter the existing PIN (see above procedure).
2. Once the existing PIN is entered and you press SELECT for the last digit, the *Set SETUP* options menu appears.
3. Rotate the SELECT knob to the *Change PIN* menu option, and then press the SELECT knob. The *Set SETUP PIN* menu appears with the current PIN displayed and the first PIN digit blinking.
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 menu before setting the PIN number. Once you enter the SETUP menus in FAVS, the PIN number can be entered and the SETUP button is locked. The SETUP menus in FAVS are now accessible without having to enter the PIN number. See the FAVs button section.

Resetting/Clearing a PIN

You can override a previously entered PIN. When "PIN = 0***" displays, press and hold the SELECT knob until "PIN = 0000" displays (approximately 7 seconds). Enter a new PIN number as previously described.

TECH: 06 Ext Control

External Control is a read only menu. Magnum Energy has adopted an open protocol policy which allows certain functions of the inverter/charger to be controlled externally—such as with a third party communications device. This menu displays if any external device/software is controlling the remote. This menu is designed to help Magnum Energy tech support personnel determine if the inverter/charger is operating normally, or being controlled by a third party.

- **No Ext Control** – This menu indicates that the inverter/charger is not being controlled externally.
- **####** – When this display shows a number or a series of numbers, it indicates that one or more of the allowable functions of the inverter/charger is currently being controlled externally. The number(s) displayed can be used by Magnum technicians to determine what function(s) in the inverter/charger is being controlled.

TECH: 07 Load Defaults

This menu restores factory defaults to all ME-ARC remote settings on the inverter/charger and on any accessories that are network connected. To restore, continually press the rotary SELECT knob until the '5.0 to 0.0 seconds' countdown screen is finished and the screen displays "DEFAULTS LOADED". Refer to Table 3-4 for the remote's default values for the inverter/charger.



Info: Refer to Table 7-5 for AGS defaults, or to Table 8-1 for BMK defaults when connected to an ME-ARC.



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

Table 3-4, Inverter/Charger Default Settings on ME-ARC

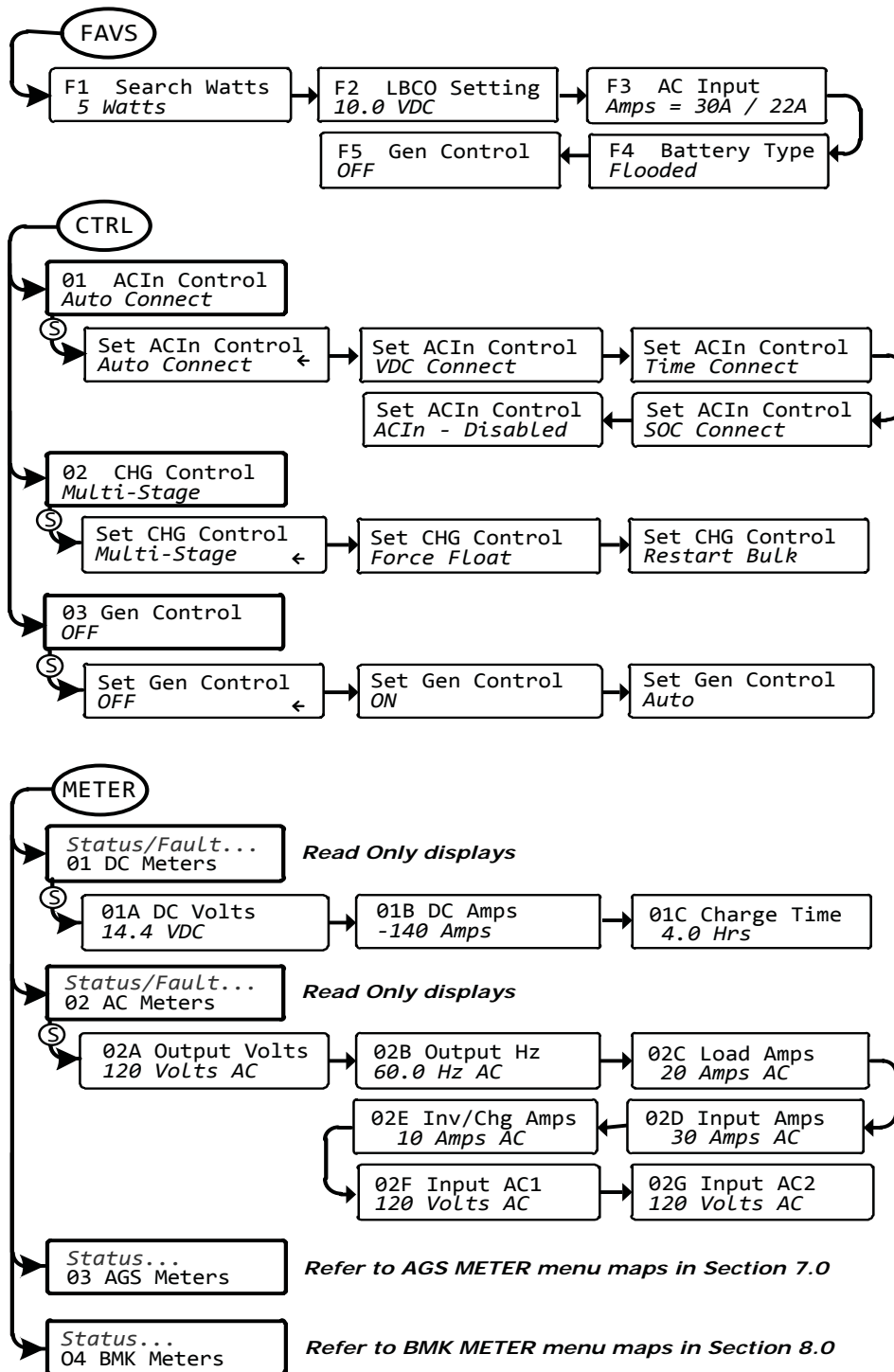
Menu Items	Default Settings
Search Watts	5 Watts
LowBatCutOut	10 VDC (12v) 20 VDC (24v) 40 VDC (48v)
AC In-Time	6:00A - 6:00P
AC In-VDC	11.0-14.1 VDC (12v) 22.0-28.2 VDC (24v) 44.0-56.4 VDC (48v)
Input Amps	30 Amps (AC1), 20 Amps (AC2)*
Battery Type	Flooded
Max Charge Rate	100%
VAC Dropout	80 VAC (AC1), 75 VAC (AC2)* (Exports – 150 VAC)
Absorb Done	Time = 2 Hrs Amps = 20 ADC SOC = 100%
Max Charge Time	12.0 Hrs
Final Charge Stage	Multi
DC Volts to ReBulk	12.0 VDC

* AC2 settings available on MSH4024RE models only.

4.0 Menu Map

4.0 Menu Maps: ME-ARC Remote Control

Figures 4-1 thru 4-5 are a complete overview of the remote and inverter/charger settings and the info displays available in the ME-ARC (except AGS and BMK menus – see Sections 7.0 and 8.0, respectively).



SETUP button menu map on the top of the next page

Figure 4-1, FAVS/CTRL/METER Button Menu Maps

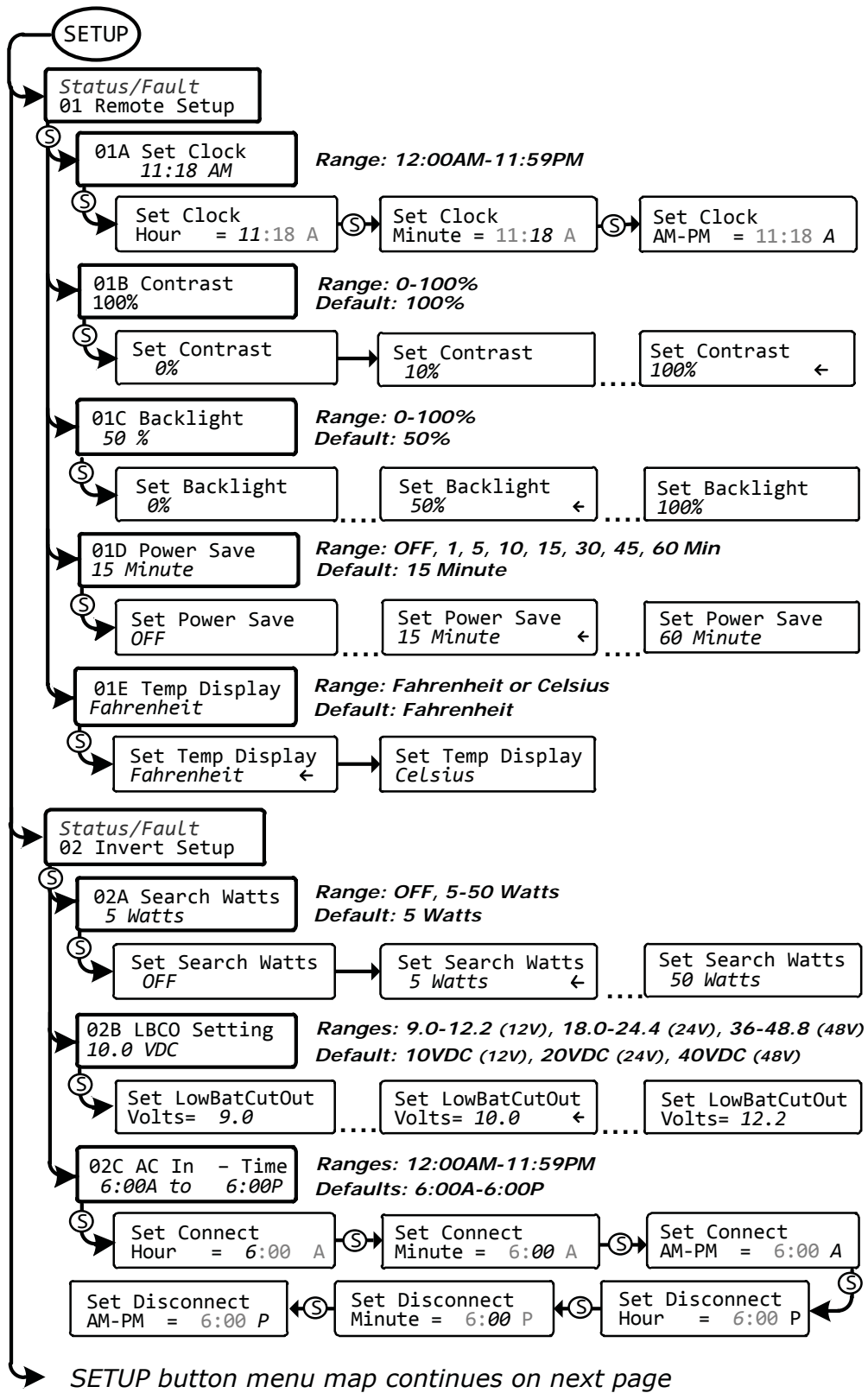


Figure 4-2, SETUP Button Menu Map

4.0 Menu Map

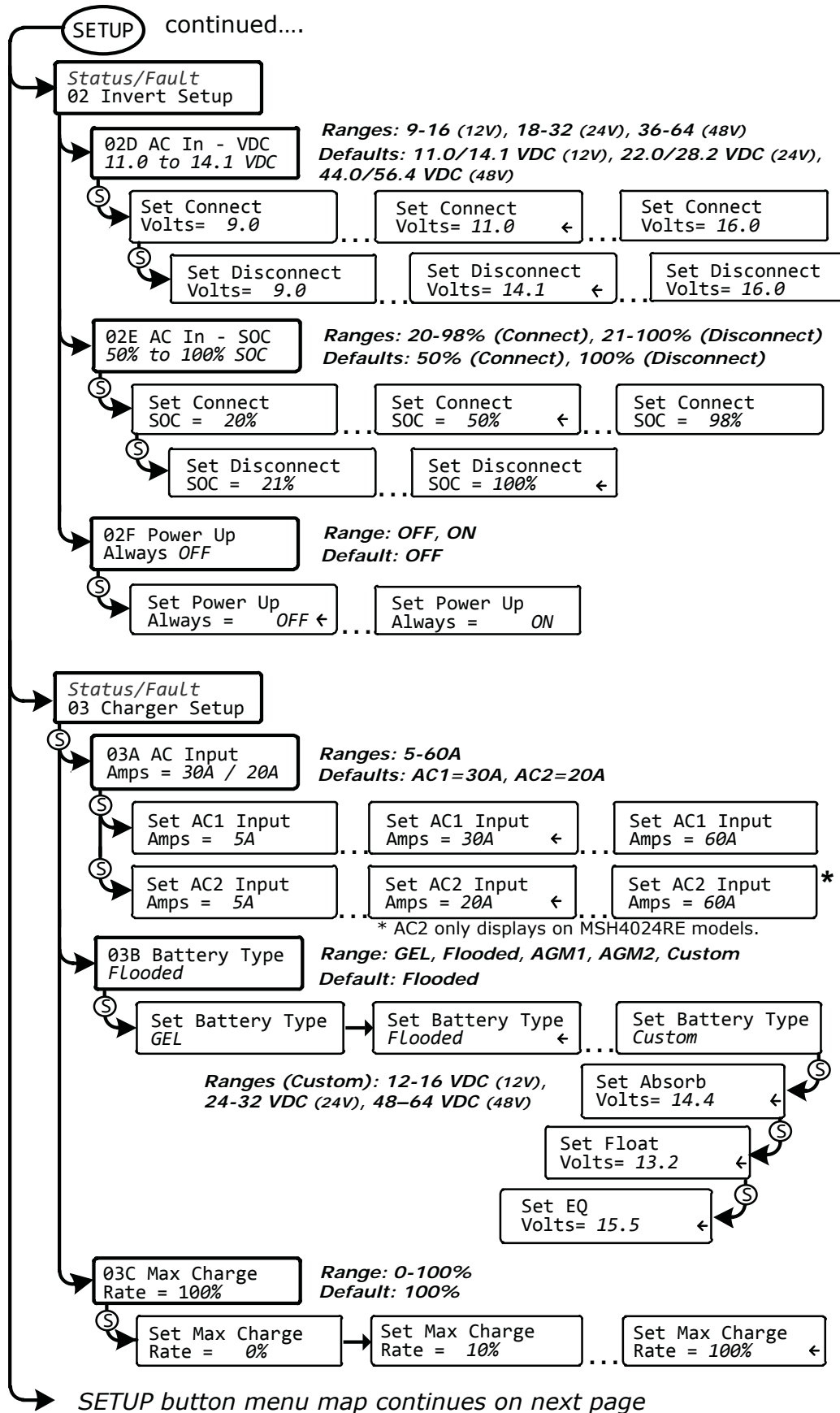


Figure 4-3, SETUP Button Menu Map

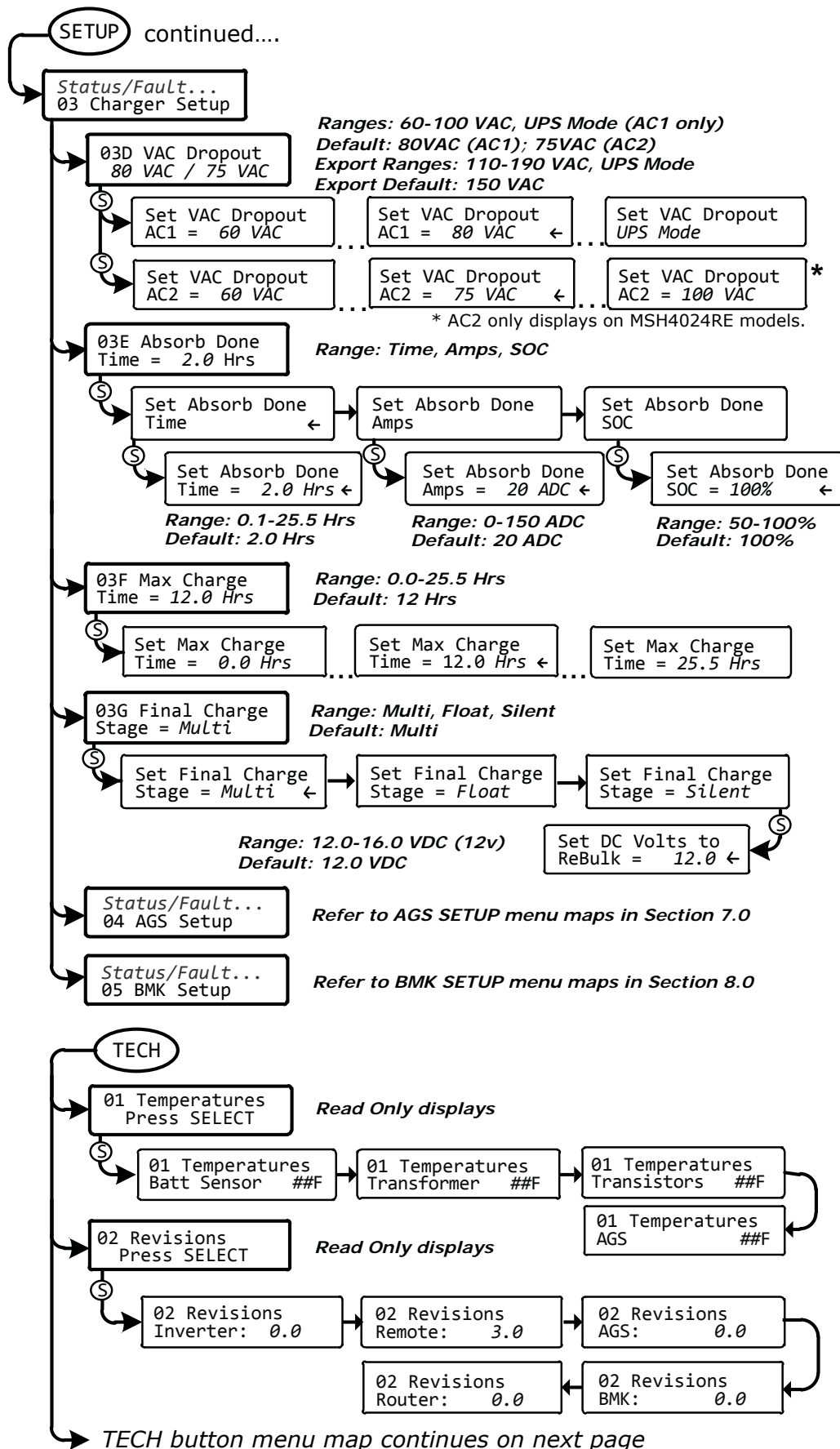
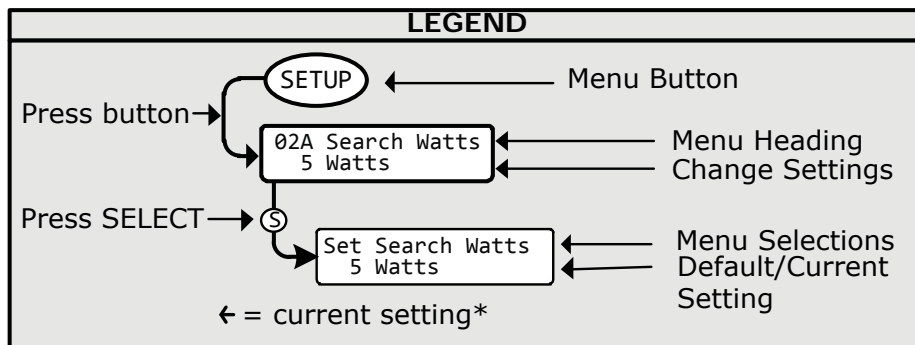
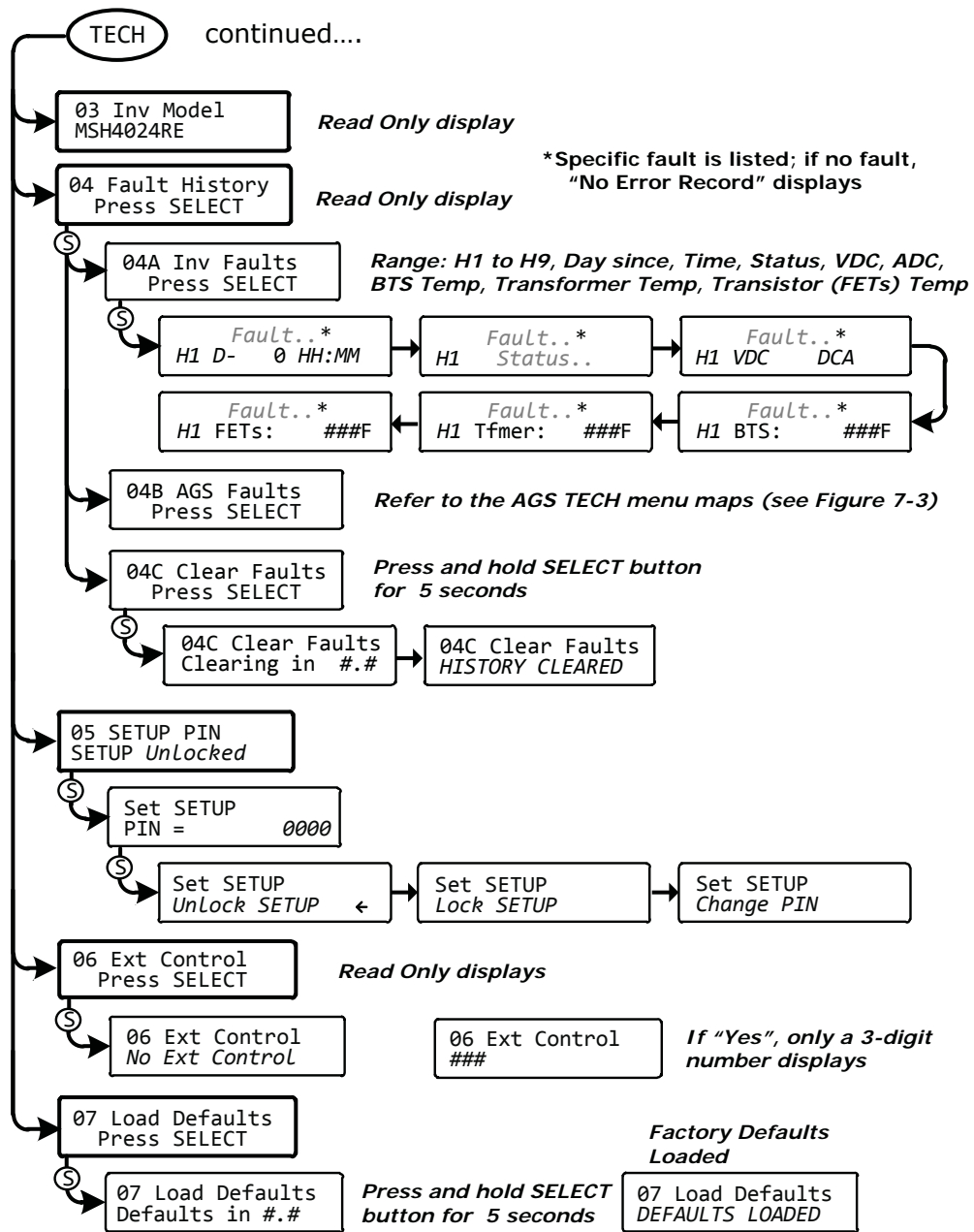


Figure 4-4, SETUP/TECH Button Menu Maps

4.0 Menu Map



* For this menu map, the arrow denotes the factory default setting

Figure 4-5, TECH Button Menu Map

5.0 Operation

This section explains how to operate the inverter/charger using the ME-ARC remote. It also provides information on the LED indicators and the LCD display that are used to show the operational status of the inverter/charger.

5.1 Front Panel

The ME-ARC's front panel contains LED indicators and a LCD display for viewing system status, buttons to control system operation, and a rotary knob that enables you to locate and select system information and settings.

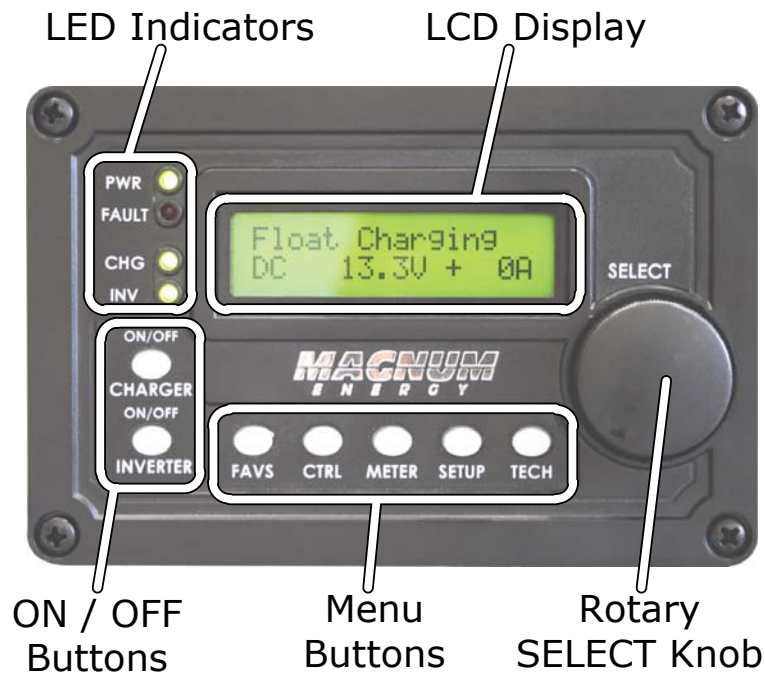


Figure 5-1, ME-ARC Front Panel Controls and Indicators

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 remote is first powered-up, all the LED's come on as it goes through a self test (See Section 2.5 for info on the Self Test). Once the self test is complete and the clock is set, the LED's and the LCD provide the operating status of the inverter/charger. See Section 5.3.5 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 the current operating status and fault conditions. This display has two 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 bottom line displays battery information when using the METER menu, displays system troubleshooting information when using the TECH menu, and displays menu items that can be configured for your specific system operation when using 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 after it is actively charging. The green CHG LED turns on and off with the button. This button is also used to initiate an Equalize charge. For more information on using the Equalize Charging feature, see “Equalizing” under Section 5.3.2.

5.1.4 Menu Buttons

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

- **FAVS** – This button allows five menu items to be stored for easy access without having to find them within the SETUP or other control buttons. The five items stored under the FAVS button become the “favorite” menus that are most often used. For more info, see Section 3.3.1.
- **CTRL** – This button accesses the *AC In Control*, *CHG Control*, and *GEN Control* menu items. The CTRL button gives you quick control of the main functions of the inverter/charger. See Section 3.3.2 for more detailed information.
- **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 3.3.3 for more detailed information.
- **SETUP** – This button allows the remote, the inverter/charger, and any connected accessory to be configured to your specific system preferences. See Section 3.3.4 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 3.3.5 for more detailed information.

5.1.5 Rotary SELECT Knob

The rotary SELECT knob is similar to a car dash radio knob, and is used to view and select various menu items and settings displayed on the LCD screen. Turn the rotary knob clockwise and counterclockwise to view the different menu items and available settings. Press the SELECT knob to select/enter a menu item or to save a setting once it is displayed on the LCD screen. Press and hold the SELECT knob for 10 seconds to refresh the LCD display.



Info: All adjustable inverter/charger settings in the ME-ARC (except for *01B Contrast*, *01C Backlight*, and *03 GEN Control*—which revert back to default) are saved in non-volatile memory. These adjustable settings are preserved until changed, even if an inverter reset is performed or power to the remote 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 owner’s manual for the particular accessory to determine if any setting 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; or, the inverter will be “searching” for a load by using very little power from the batteries, if in Searching mode. 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. This turns the green INV LED off.

Inverter Standby – The inverter is in Inverter Standby mode when it is enabled (green INV LED is on) but not actively providing power from the batteries to the inverter loads. During Inverter Standby mode, the loads connected to the inverter are powered by the external AC power; however, if a blackout or brownout condition occurs, the inverter senses these conditions and starts inverting to power the inverter’s AC loads.



CAUTION: If you have critical loads and are in Inverter Standby, do not press the ON/OFF INVERTER button to turn the inverter function off. If the green INV LED is off, inverter power will NOT be available to run your critical loads if the external AC power is interrupted.

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. When in Charge mode, the display may show: *Charging, Bulk Charging, Absorb Charging, Float Charging, Full Charge, Silent, Charger Standby, Force Float, Equalizing, Load Support VDC, and Load Support AAC.*

Charger Standby – While 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.



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 to remove sulfates that may have built up on the plates. These conditions if left unchecked, will reduce the overall capacity of the battery. To enable the Equalization charge, see page 53.



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

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 the displayed status message and the status LED's on your ME-ARC remote (Figure 5-2) to determine the inverter/charger's current operating status, and to help troubleshoot the system if a fault occurs.

There are three modes of operation for the inverter/charger:

- Inverter mode
- Charger mode
- Fault mode

Refer to the appropriate section to locate information on any particular status message.

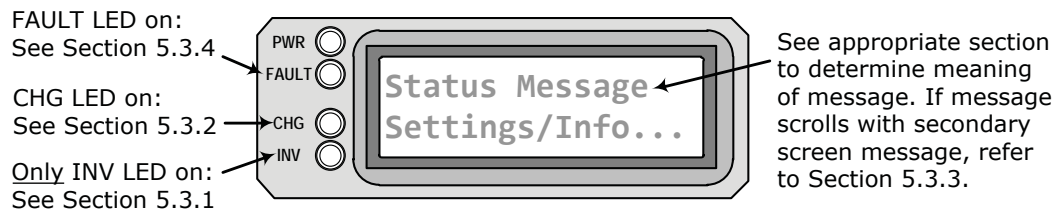


Figure 5-2, System Status Screen (example)

5.3.1 Inverter Mode Status Messages

There are several Inverter mode messages. View the top line of the LCD display and the corresponding message in this section to determine and understand the particular Inverter mode.

- **Inverting** – The inverter is providing AC voltage on its output by inverting power from the batteries.
- **Inverter Standby** – The inverter is on but not actively providing power. However, the inverter remains active and an external AC power (utility or generator) is passing through the inverter to power the AC loads.
- **No Inverter Comm** – The remote is no longer receiving any communication data via the Magnum Network.



Remedy: Reset the remote by disconnecting the remote communications cable from the inverter for five seconds, and then reconnect (see Figure 2-2). If the fault continues, first check/replace the remote cable (4-wire telephone cable).

What if the cable is not the issue?

- Try another remote display
- Reconnect the remote from the Remote port to the Network port
- The inverter may need servicing
- **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.
- **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 02 Invert Setup on page 23).

5.3.2 Charger Mode Status 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 Charger 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 *AC In Control* menu setting is actively preventing the AC from connecting.

- **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.
- **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 remains 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.
- **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.

- **Charging** – Once Charger 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).
- **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", then press and hold down the ON/OFF CHARGER button (about five 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".

5.0 Operation

During Equalize 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 Equalization 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 from the *Setup 03B Battery Type* menu.

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.

- **Float Charging** – At the end of the absorb charge time, 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.

- **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.

- **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 four 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.

- **Load Support AAC** – The inverter is in the Load Support (Amps AC) mode because the inverter load is requiring more power than the incoming AC source can provide on its own. The inverter pulls the additional current—that is needed for the loads—from the inverter batteries to keep the incoming AC current from exceeding the *SETUP: 03A AC Input Amps* setting.



Info: The *Load Support AAC* feature operates in parallel with the AC input to support the inverter loads and is only available on MSH Series inverter/chargers. It is only active when the inverter is enabled (INV LED is on).



Info: When the inverter is in Inverter Standby mode (charging and pass-thru), the current is normally a positive value. However, in Load Support AAC mode, the inverter amps reading is a negative number to indicate how much current is being provided/removed from the inverter batteries. The inverter batteries will continue to provide current to assist the AC input current until the battery reaches 0.5 volts (12-volt systems), 1.0 volts (24-volt systems), and 2.0 volts (48-volt systems) above the *SETUP: 02B LBCO* setting.

- **Load Support VDC** – The inverter/charger is in the Load Support (Volts DC) mode because an external DC source (solar, wind, etc.) is providing more current than needed—which causes the battery voltage to rise. The inverter/charger reduces the incoming AC current in an effort to keep the battery voltage from rising above the temperature-compensated *SETUP: 03B Battery Type* setting.



Info: The *Load Support VDC* feature operates in parallel with the AC input to support the inverter loads and is only available on MSH Series inverter/chargers. This feature is only active in Bulk, Absorb, Float or EQ Charge modes and when the inverter is enabled (INV LED is on); it is deactivated if the charger is in Charger Standby.

- **Silent** – This displays at the end of the 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 (from *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.

5.0 Operation

5.3.3 Secondary Scrolling Status Messages

These displays alternate with the inverter/charger status to indicate other pertinent messages.

- **AC In-Disabled** – AC power is present at the inverter’s AC input, but the inverter/charger is prevented from connecting to any incoming AC because the *AC In-Disabled* setting is selected from the *CTRL: 01 ACIn Control* menu.
- **SOC Connect** – AC power is present at the inverter’s AC input, but the battery bank State of Charge needs to reach the *Set Connect SOC* setting from the *SETUP: 02E AC IN - SOC* menu in order for the inverter/charger to connect to the incoming AC.
- **Time Connect** – AC power is present at the inverter’s AC input, but the time of day needs to fall within the *Set Connect Time* and the *Set Disconnect Time* settings per the *SETUP: 02C AC In - Time* menu in order for the inverter/charger to connect to the incoming AC.
- **VDC Connect** – AC power is present at the inverter’s AC input, but the battery voltage needs to fall below the *Set Connect Volts* setting from the *SETUP: 02D AC IN VDC* menu in order for the inverter/charger to connect to the incoming AC.
- **Gen Warm-up** – The ME-AGS-N has commanded a generator to run, but the inverter will not connect to the generator’s DC output until the generator warm-up time is complete. **Note:** Requires the optional ME-AGS-N Auto Gen Start module to be installed.

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 identify and correct the issue.



Info: Many of the faults automatically clear once the fault is resolved. 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 (Section 6.2) or power reset (Section 6.3) may be required.

5.3.4.1 System Fault Messages


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

- **AC Backfeed** – This fault message causes the inverter to shut down because AC voltage from an external AC source has been detected on the inverter’s AC output. When the unit shuts down because of this fault condition, an inverter reset or power reset will be required to resume operation (see Section 6.2 to reset the inverter).





Remedy: This fault usually occurs because the AC output wiring is connected to (or able to be connected to) the incoming AC source. When this fault happens, all system wiring should be re-checked to ensure the incoming hot and/or neutral wires are not able to be connected to the AC output.

- **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 <10 seconds, the fault will automatically clear and the unit restarts and resumes operation. However, if the overload occurs for more than 10 seconds, the unit will shut down and the fault will require a manual restart.


 **Remedy:** This fault may occur because the connected AC loads are larger than the 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.

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

- **Dead Battery Charge** – This fault indicates that the inverter has been connected to an AC source (grid or generator) and has determined that the battery bank is either highly discharged or not connected. The inverter is attempting to close its internal relay and begin charging, but has detected less than 9 volts (12-volt models), 18 volts (24-volt models), or 36 volts (48-volt models) on the battery bank.


 **Remedy:** Check the DC voltage at the inverter's DC terminals and compare it with the DC voltage at 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.

This fault automatically clears once current is able to flow into the battery from the battery charger—this may take anywhere from a few minutes to a few hours depending on the condition of your batteries. This fault can also be cleared if the AC input is removed.

- **FET Overload** – This fault message indicates the inverter/charger was running normally, but the temperature of the FETs (Field Effect Transistors) started rising abnormally fast.

 **Remedy:** Allow the inverter to cool down, then press the remote's INVERTER ON/OFF pushbutton (manual restart) to resume operation. If the fault returns, perform an inverter reset (see Section 6.2). If the fault continues, disconnect all the inverter's AC output wires and perform a power reset (Section 6.3). If this fault does not clear after doing the power reset, the inverter will require service.

- **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 automatically clears and the inverter resumes operation when the battery voltage drops 0.3 VDC (12v models), 0.6 VDC (24v models), or 1.2 VDC (48v 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).

5.0 Operation



Info: This fault can occur whether the inverter is “inverting”, “searching” or “off”.



Remedy: This fault usually 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.

- **High Battery Temperature** – This fault message indicates the inverter/charger has shut down because the Battery Temperature Sensor (BTS) has reached a temperature greater than 54°C/129°F.



Remedy: Once the BTS has cooled down ($\leq 49^{\circ}\text{C}/120^{\circ}\text{F}$) it automatically restarts and continues operation. As a precaution, check the area where the BTS is located; if placed on a battery, ensure they are not overheated, or that the BTS hasn’t been placed in a hot area or near a hot device. If neither of these are the issue, then monitor the *Batt Sensor* display under the *TECH/01 Temperatures* menu—this reading should be above 54°C/129°F. Now remove the BTS from the inverter BTS port. If the Batt Sensor reading goes to 25°C/77°F, replace the BTS. If the reading does not go to 25°C/77°F, then inspect the BTS port for cleanliness and/or have the inverter/charger serviced.

- **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 clear this fault. Ensure only 120VAC power is connected to each of the inverter’s AC inputs.

- **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 fault will clear and automatically the inverter will 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).



Info: This fault can only occur if the inverter status is “Inverting” or “Searching.”



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

- **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 will shut 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 output 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 perform a inverter reset.

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

- **Stuck Relay** – This fault message displays when the inverter is “inverting”, but has determined that the internal AC pass-thru relay that should be open while inverting, is closed.



Remedy: The AC pass-thru relay is most likely stuck. A relay usually sticks because of damage to the contacts from trying to handle currents greater than they are rated. This is usually caused by not protecting the relay from handling high continuous currents, or by switching high current inductive loads. The internal relay contacts are rated to handle 30 amps AC continuously and should be protected with a breaker sized no larger than 30 amps. If you are connected to an AC source (grid or generator) and running large inductive loads (i.e. pumps, motors, etc.) on the inverter output, turn those particular loads off prior to removing the AC input source. This fault requires an inverter or power reset to clear.

- **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.

- **Unknown** – This fault message displays when the inverter/charger has sent a fault code that cannot be identified by the remote.



Remedy: For more information or assistance in identifying the actual fault status, contact Magnum Energy Technical Support.

5.3.4.2 Stacking Fault Messages

A fault condition may occur when multiple inverters are connected or stacked together that is not possible on a single inverter installation.

- **StackClock** – There is a stacker cable problem; or, one inverter is losing synchronization with the other inverter.



Remedy: Ensure you are using the correct stacking cable (is not a telephone/data cable, is a custom made cable). Inspect the stacker cable and reconnect at both ends (listen and make sure you hear an audible “click” from the connectors at both inverters).



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).

5.0 Operation

- **Stack Mode** – A problem with the “other” stacked inverter has been detected. Check that unit for a fault condition.



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

- **StackPhase** – Either: 1. The AC input wiring is incorrect; 2. One phase was lost from the AC input source; 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 (see 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, one of the following internal fault messages displays and the inverter shuts down to help protect itself.



Remedy: If one of the following internal faults occurs, the inverter will require an inverter or power reset to clear the fault. See Section 6 to perform an inverter or power reset. After resetting the inverter, press the ON/OFF INVERTER pushbutton on the remote to turn the inverter on and verify the fault has cleared (i.e. manual restart). If the internal fault remains or returns, the inverter will require repair at an Magnum Energy Authorized Service Center, for locations see <http://www.magnumenergy.com/Service/ServiceCenters-US.htm>.

- **Internal Bridge** – This fault message displays when the FET bridge shuts down after the inverter has been inverting—the inverter output circuit can no longer detect any AC output voltage or current.
- **Internal Charger** – This fault message displays when the FET bridge shuts down because the charger circuit is trying to provide maximum current, but is not detecting any current or voltage rise to the battery bank.
- **Internal NTC** – This fault message displays when the internal NTC (Negative Temperature Coefficient) temperature sensor suddenly causes a very large but unexpected temperature change.
- **Internal Relay** – This fault message displays when the internal AC transfer relay is not closed while charging.

5.3.5 LED Indicator Guide

Use the LEDs along with the LCD display to determine the operating status.

Table 5-1, LED Indicator Guide

LED	Status	Meaning
PWR (green)	OFF	1. Inverter is disabled; 2. Remote's in Power Save mode – press any button to activate LEDs; 3. No power to remote (check remote 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. Remote 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 low, charger is disabled to help stabilize incoming AC voltage to prevent AC disconnect.
	BLINKING, display <u>does</u> <u>not</u> 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. Remote is in Power Save mode - press any button to activate LEDs.
	ON	Inverter is enabled – 1. Supplying AC power on the output; or, 2. In Inverter 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 02A Search Watts setting).

6.0 Troubleshooting

6.0 Troubleshooting

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

Table 6-1, Remote 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 knob for 10 seconds.
LCD text display is locked-up, pushing any button has no response - may show "revision" or "connecting"	RJ11 connections on communication cable are not making a good connection.	Reset remote: 1) Disconnect remote cable from inverter for 5 seconds and reconnect; 2) Check RJ11 cable connection on back of remote (see Figure 2-2). <u>Important:</u> Ensure the RJ11 connector is pushed into the correct port. You should feel/hear a "click" when the connection is made.
	Remote 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	Remote may be in the Power Save mode.	Press any button to reactivate the remote (or turn Power Save mode Off).
Remote 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 remote port on inverter.	Check communications cable from inverter to remote; ensure: 1) it is connected to the REMOTE 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 the inverter is operating correctly without any AC power connected (can invert and power AC loads from batteries).

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 the charge (CHG) LED on remote blinking? If not, the charger does not recognize the incoming AC being within acceptable limits. Measure the input AC voltage at the inverter input terminals – should be 120 VAC +/- 20 VAC (230 VAC +/- 40 VAC for export models). Also, check that the *VAC Dropout* setting on the remote is 80 VAC or less (160 VAC or less for export models). If the CHG LED is blinking, the transfer relay should close within 20 seconds and 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 (110 VAC for export models) and check for improvements. If the cycling continues, back off the charge rate from 100% to 10% (or "OFF", if available).

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 Charge LED is on steady and the unit says "Charging":** Full charge rates are not obtained in Charging mode. Full charge rates will occur only after this mode changes to Bulk Charging, Absorb Charging, or Float Charging modes.

- **Charger not charging even though Charge LED is on steady and the unit says "Bulk Charging" (or "Absorb Charging"):** Check the DC amps meter and DC voltmeter on the ME-ARC 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 full charge rate.

- **Charger says "Float Charging" not "Bulk Charging" when the AC is first plugged in:** Check DC voltmeter on the ME-ARC display. If the battery is >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 *03C 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).

6.0 Troubleshooting

6.2 Performing an Inverter Reset

To perform an inverter reset (also known as a soft 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 perform a power reset using the procedure below. In either case, if an internal fault does not clear the inverter will require repair at a Magnum Authorized Service Center (ASC).



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 ME-ARC (except for the SETUP menu's *01B Contrast*, *01C Backlight*, and the CTRL menu's *03 Gen Control*—which revert back to default) are saved in non-volatile memory and are preserved until changed. This occurs even if an inverter reset is performed, or if all power to the remote or inverter is removed.

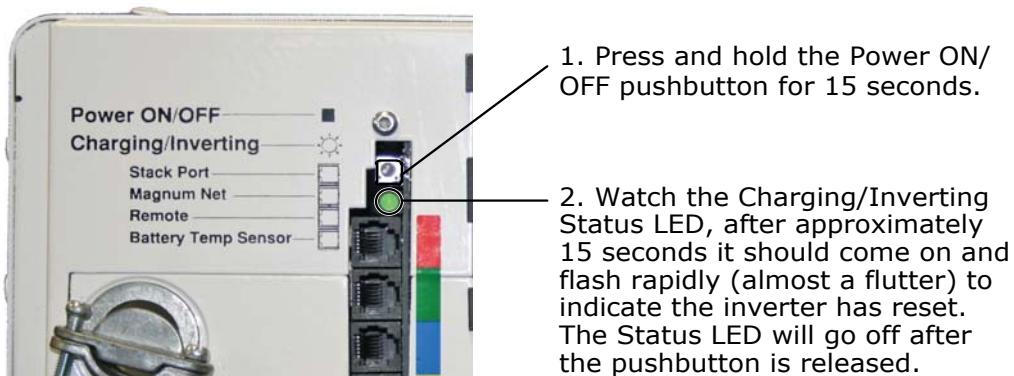


Figure 6-1, Performing an Inverter Reset

6.3 Performing a Power Reset

To perform a power reset (also known as a hard reset):

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 the inverter(s) and the remote are disconnected from all AC and DC power (the remote display will be blank).
4. After the inverter(s) has 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 Using a ME-AGS-N Module

The AGS menus under the CTRL, METER, SETUP, and TECH buttons on the ME-ARC remote allow you to customize and monitor operating parameters, and to help troubleshoot your autostart/autostop generator system. Use the mini-index below to direct you to the appropriate section.

7.1 AGS Setup	p. 65	7.4 Enabling the AGS	p.81
7.2 AGS Functional Tests	p. 76	7.5 Start/Stop Gen	p.81
7.3 AGS Operation/Monitoring	p. 77	7.6 AGS Menu Maps	p.83

7.1 ME-AGS-N Setup

Press the SETUP button on the ME-ARC remote, and then rotate the SELECT knob to the *04 AGS Setup* display. The menus available from this screen allow the generator to be automatically started and stopped based on many different conditions. From Table 7-1, determine the specific autostart and autostop conditions with which you want the generator to be automatically controlled, and then use that specific menu setting to configure the AGS.



Info: For information on using the CTRL, METER, and TECH button menus, refer to Section 7.3 "ME-AGS-N Operation/Monitoring".

Table 7-1, ME-ARC Autostart/Autostop Matrix

Autostart Condition	Autostop Condition	SETUP Menu	Page
Starts on low battery voltage (DC voltage connected to Terminals #3 and #4)	Stops on higher battery voltage	04A Gen Run VDC	66
	Stops at Float charge after a set time period (using Absorb Done Time setting)	04A Gen Run VDC (Set Stop Gen Volts = Float)	66
	Stops at Float charge after battery current requirement is low (using Absorb Done Amps)	04A Gen Run VDC (Set Stop Gen Volts = Float)	66
	Stops at Float charge using a battery SOC setting (using Absorb Done SOC setting) ²	04A Gen Run VDC (Set Stop Gen Volts = Float)	66
Starts at a set time daily	Stops at a different set time daily	04B Gen Run Time	68
Starts on high AC amps to an inverter load ¹	Stops on lower AC amps to an inverter load ¹	04C Gen Run Amps	68
Starts when the battery SOC ² is low	Stops when the battery SOC ² is higher	04D Gen Run SOC	69
Starts when temperature increases	Stops after a set time period	04E Gen Run Temp	70

Note¹: Only applicable to MS-PAE, MS-PE and MSH inverters.

Note²: Autostart/stop conditions using SOC require the ME-BMK.

7.0 Using an AGS Module

SETUP: 04A Gen Run VDC Menu

This menu starts/stops the generator based on the battery voltage as shown on the METER button's 03B DC Volts-AGS menu. This menu provides the option to start the generator when the battery voltage gets low, and to stop the generator once the battery reaches a higher voltage level, or has been fully charged and goes into the Float Charge stage. Using voltage to automatically start and stop the generator is a common method because it is considered the simplest and easiest to understand. The 04A Gen Run VDC menu also has a delay setting to minimize nuisance starts/stops and the short cycle run times of the generator.

- **Set Start Gen Volts** – This setting will start the generator when the battery voltage (on Terminals #3 & #4) decreases to or below this setting continuously for the duration of the *Set Start Volts Delay* setting.

Default setting: *Set Start Gen Volts = 11.5 VDC (12v), 23.0 VDC (24v), 46.0 VDC (48v)*

Range: *OFF, 9.0-15.9 VDC (12v), 18.0-31.8 VDC (24v), 36.0-63.6 VDC (48v)*

Where should I set Start Volts? When setting the VDC start voltage, it must be high enough to not over-discharge the battery, but also low enough to keep from nuisance starting the generator. Typically, start volts is set based on what is determined to be approximately 50% of the battery capacity. Since this is an inverter/battery system, and the battery is normally loaded, the VDC used to determine 50% battery capacity should be set lower than what is shown on typical battery voltage SOC charts (approximately 11-11.5 in a 12-volt system), which show the battery at rest (not loaded).



Info: The DC voltage the AGS uses to determine when to autostart is displayed in the *AGS: 08 AGS TECH* menu under the *AGS VDC* meter.

Example: Using a 12-volt battery as an example, a typical SOC (State of Charge) battery chart will show that 12.2 VDC is considered 50% SOC. This voltage is a battery "at rest," meaning it has no load connected and has been at rest for a minimum of 30 min. While this voltage is accurate under these at rest conditions, this same voltage with a load applied means the battery is well above 50% SOC, and should be set much lower. The larger the battery bank the less the voltage will be affected by a load applied to the battery bank. A typical start voltage setting would be between 11.0 VDC - 11.5 VDC for a 12-volt system.

- **Set Start Volts Delay** – This setting determines how long the *Start Gen Volts* parameter must be continuously maintained before the generator autostarts. This ensures the generator does not nuisance start. By setting a delay, momentary surge loads will not start the generator when the battery voltage dips due to the heavy load applied to the battery.

Default setting: *Set Start Volts Delay = 120 Seconds*

Range: *0-127 Seconds, 1-127 Minutes*

Where should I set Start Volts Delay? Determine what loads will be running when the generator needs to start. The larger the load the shorter the delay time setting. When a large load is applied to the battery bank the battery voltage drops quickly, so the delay time should be short to ensure the batteries are not over-discharged. If you are unsure what loads might be running or where to set the start delay, error on setting a shorter time such as the default of two minutes (to protect batteries from over-discharge).

7.0 Using an AGS Module

- **Set Stop Gen Volts** – This setting will stop the generator when the battery voltage (on Terminals #3 & #4) increases to or above this setting continuously for the duration of the *Set Stop Volts Delay* setting. To allow the battery bank to go through a full bulk and absorption charge, this setting should be set to *Float*.
Default setting: *Set Stop Gen Volts = 14.4 VDC (12v), 28.8 VDC (24v), 57.6 VDC (48v)*
Range: *OFF, 9.1-16.0 VDC (12v), 18.2-32.0 VDC (24v), 36.4-64.0 VDC (48v), Float*

Where should I set Stop Gen Volts? Typically, when using a generator to charge batteries, most individuals only charge the batteries to 80-85% to compromise between minimizing fuel usage and maximizing battery life. This is done by having the generator start on low battery voltage, and then stop at a higher voltage (i.e., the *Stop Gen Volts* setting). When deciding where to set the *Stop Gen Volts* setting, it must be lower than the inverter's *Absorb Voltage* setting (determined by the *SETUP: 03B Battery Type* menu). Otherwise, the charger will enter Absorption Charge mode—which is required to maintain the batteries at a constant voltage level—and the battery voltage will not reach the *Stop Gen Volts* setting, which will cause the generator to run until it is out of fuel or until it reaches the *SETUP: 04F Max Gen Run Time* setting.

Therefore, after reading this some will think that they should just set the *Stop Gen Volts* setting slightly lower than the absorption level to ensure the charger always reaches the *Stop Gen Volts* setting before it goes into the Absorption Charge mode. However, temperature changes can affect the absorb voltage setting¹ and may require you to readjust the *Stop Gen Volts* setting seasonally. If you are in a normally cold climate (<32°F), the actual absorb charge voltage will increase. So, the *Stop Gen Volts* setting should be set well above the absorb voltage setting (~.5V above for 12-volt systems). If you are normally in a hot climate (>95°F), the actual absorb charge voltage will decrease. In that case, the *Stop Gen Volts* setting should be set well below the absorb voltage setting (~.5V below for 12-volt systems).

A simpler way to charge the batteries to 80-85% and to automatically allow a temperature-compensated charge to the batteries (no seasonal adjustment required) is accomplished using the settings below:

- Set the *Stop Gen Volts* setting to *Float*
- Set the *Absorb Voltage* setting (*SETUP: 03B Battery Type*) to the voltage level at which you want the generator to turn off (normally ~ 14.5 volts for flooded batteries in a 12-volt system)
- Set the *Absorb Done Time* setting (*SETUP: 03E Absorb Done Time*) to 0.1 hours (lowest setting)

Using these settings, when the batteries reach a low voltage level the generator turns on (per the *Set Start Gen Volts* setting) and charges the battery to the temperature-compensated *Absorb Voltage* setting. After reaching the absorption voltage level, the inverter/charger goes into Absorption Charge mode and is there for only six minutes (0.1 hours) before it goes to Float Charge mode. Once the inverter/charger enters Float Charge mode, the AGS will autostop the generator.

Note¹: *When the inverter's Battery Temperature Sensor (BTS) is connected, the actual absorb charge voltage will increase or decrease to ensure correct charging as the battery temperature changes.*

7.0 Using an AGS Module



Info: Battery life will be reduced if the batteries are only charged to 80-85% regularly. It is highly recommended to charge the batteries to 100% as often as possible (~ once a week, or every other discharge cycle) in order to avoid sulfation of the battery plates. Using the *SETUP: 03E Absorb Done Time* menu, the absorption charge time can easily be changed to a longer duration to increase the batteries' state of charge.

- **Set Stop Volts Delay** – This setting determines the amount of time the generator will run after the *Stop Gen Volts* setting has been satisfied.
Default setting: *Set Stop Volts Delay = 120 Seconds*
Range: *0-127 Seconds, 1-127 Minutes*

SETUP: 04B Gen Run Time Menu

This menu starts and stops the generator based on a specific time of day. This feature uses the ME-ARC's internal clock to start and stop the generator at the selected times.



Info: Ensure the remote's clock is correct. If needed, refer to the ME-ARC owner's manual for guidance on setting the time on the remote clock.



Info: The ME-ARC clock is powered from the inverter thru the remote cable. If the ME-ARC or inverter loses power, the clock will lose the correct time and must be reset.

- **Set Gen Run Time** – This setting allows set times to be established to turn the generator on and off each day. Select *ON* to set specific times of day to start and stop the generator.
Default setting: *Set Gen Run Time = OFF*
 - **Set Start Gen Hour** – Set the hour the gen will start each day.
 - **Set Start Gen Minute** – Set the minute the gen will start each day.
 - **Set Start Gen AM-PM** – Set the time period the gen will start.
 - **Set Stop Gen Hour** – Set the hour the gen will stop each day.
 - **Set Stop Gen Minute** – Set the minute the gen will stop each day.
 - **Set Stop Gen AM-PM** – Set the time period the gen will stop.

Why should I set a specific time of day to start/stop the generator?

Starting and stopping at a particular time of day can be useful if you want to run the generator for other uses while charging the batteries. You may require the generator to run a heavy load (like a well pump or machinery) every day at the same time. You may also want the generator to run after you leave for work each day to avoid having to hear it running.

SETUP: 04C Gen Run Amps Menu

This menu starts the generator based on the amount of AC amps needed to handle the load the inverter is running. The *METER* button's *02C Load Amps* menu is used to determine how much load the inverter is currently running when in Inverter mode.



Info: The *04C Gen Run Amps* menu is only applicable to Magnum's MS-PAE, ME-PE and MSH Series inverters.

Why use Gen Run Amps? This setting is useful when there is a large load or a combination of loads that the inverter can run, but doing so quickly depletes the battery bank (motors, well pumps, A/C units, freezer, etc.).

7.0 Using an AGS Module

- **Set Start Gen AC Amps** – This setting determines when the generator would start depending on the AC amps level of the load the inverter is running. In order for the generator to autostart, the load's amps level must be maintained continuously above the *Start Gen AC Amps* setting for the duration of the *Start Amps Delay* setting.
Default setting: *Set Start Gen AC Amps = OFF*
Range: *OFF, 5-60 Amps*
- **Set Start Amps Delay** – This setting determines the amount of time that the inverter load's current must continuously remain above the *Start Gen AC Amps* setting for the AGS to initiate an autostart.
Default setting: *Set Start Amps Delay = 120 Seconds*
Range: *0-127 Seconds, 1-127 Minutes*
- **Set Stop Gen AC Amps** – This setting determines when the generator would stop depending on the drop in the AC amps needed for the load the inverter is running. In order for the generator to autostop, the load amps level must drop continuously below the *Stop Gen AC Amps* setting for the duration of the *Stop Amps Delay* time setting.
Default setting: *Set Stop Gen AC Amps = 4 Amps*
Range: *4-59 Amps*
- **Set Stop Amps Delay** – This setting determines the amount of time that the AC load must be continuously smaller than the *Stop Gen AC Amps* setting before the generator automatically stops.
Default setting: *Set Stop Amps Delay = 120 Seconds*
Range: *0-127 Seconds, 1-127 Minutes*

Where should I set Gen Run Amps? Typically, the generator should start when the AC load amps is >70-75% of the inverter AC current output rating¹. This keeps the inverter from running too large a load and also keeps the batteries from cycling unnecessarily. Set *Stop Gen AC Amps* just below the start amps to ensure the large load has turned off. Set the start delay time so surge loads don't trigger a false start, and the stop delay time is long enough to ensure the load has turned off.

Amps Start/Stop Example: In this scenario, most AC loads typically do not exceed 20A when in Inverter mode. When a freezer or well pump starts, the load exceeds 30A so the battery voltage starts to drop quickly. Instead of cycling the batteries to a low voltage, set *Start Gen AC Amps* to 25A with a 60-second delay (using *Set Start Amps Delay* menu). Set the *Stop Gen AC Amps* menu to 20A with a 60-second delay (using *Set Stop Amps Delay* menu). After 60 seconds of detecting a larger than 25A load on the inverter, the generator autostarts and powers the loads and recharges the batteries. Once the AC amps load drops below 20A for 60 seconds, the gen will turn off.

SETUP: 04D Gen Run SOC Menu



Info: This feature requires the optional ME-BMK (Battery Monitor Kit). Refer to your ME-BMK owner's manual to operate.

This menu starts and stops the generator based on the SOC (State of Charge) reading from the attached battery monitor (see ME-BMK owner's manual) as shown on the METER button's *04A BMK SOC* display. This is considered the best overall method for using AGS settings to start and stop your generator.

Note¹ – For a 4000 watt inverter, set *Start Gen AC Amps* at 25A.

7.0 Using an AGS Module

The BMK already uses voltage, time, and current to determine the true SOC of the batteries, so little guesswork is needed to determine the settings.

- **Set Start Gen SOC** – This menu is used to set the SOC level for auto-starting the generator.
Default setting: *Set Start Gen SOC = OFF*
Range: *OFF, 20-90%*
- **Set Stop Gen SOC** – This menu is used to set the SOC level for autostopping the generator.
Default setting: *Set Stop Gen SOC = 90%*
Range: *21-100%*



Info: There is no start or stop delay time needed since the ME-BMK already displays an accurate state of charge of the batteries.

Where should I set Gen Run SOC? Most battery manufacturers recommend that for optimum life, deep-cycle batteries should not be discharged below 50% SOC. The ME-BMK determines the battery's SOC by using a DC shunt to measure the flow of current in and out of the battery. The SOC meter gives you an accurate reading of remaining capacity in the battery bank. Set the *Start Gen SOC* level to 50%, or to 60% if you do not want to discharge the batteries quite as much. When considering the *Stop Gen SOC* setting, keep in mind that running the generator past 90% SOC delivers very little current to get that last 10% into the batteries. Thus, it is common to stop the generator at 90% to save fuel and run time on the generator. However, if the SOC stop setting is less than 100%, the batteries should be charged to 100% as often as possible (~ once a week, or every other discharge cycle) in order to avoid sulfation of the battery plates.

SETUP: 04E Gen Run Temp Menu

This menu allows you to set and enable a temperature value that will automatically start the generator—typically to power an air conditioner for cooling—based on an increase in temp, or by using an A/C thermostat control.



Info: The optional ME-PT1 or ME-PT2 pigtail adapters can be used to connect an A/C or relay control circuit. For more information, refer to the instruction sheet for each pigtail adapter (part number 64-0025 for ME-PT1 instructions, or 64-0026 for ME-PT2 instructions).



Info: This temperature autostart feature requires that the AGS's remote temp sensor cable or an optional ME-PT1 or ME-PT2 pigtail adapter be connected to the AGS's REMOTE port. When using the remote temperature sensor, the location of the temperature sensor determines the area being monitored for temperature.

- **Set Gen Run Temp Start** – This menu is used to enable and set the temperature that triggers a generator autostart.
65F - 95F (18C - 35C) – These settings determine the rising temperature value that triggers a generator temperature autostart.
Ext Input – This setting is used when an optional pigtail adapter (ME-PT1, or ME-PT2) is used. When an AGS pigtail adapter is connected to the AGS's REMOTE port, an external command—either from a thermostat connection on an air conditioner control circuit or an external relay control circuit—is recognized and causes the generator to start.
Default setting: *Set Gen Run Temp Start = OFF*
Range: *OFF, Ext Input, 65-95F or 18-35C*



Info: If the temperature start feature is not needed, ensure this setting is set to the *OFF* position.

- **Set Gen Run Temp Time** – This menu sets the amount of time the generator runs after a temperature autostart.

Default setting: *Set Gen Run Temp Time = 2.0 Hrs*

Range: *0.5-25.5 Hrs*

When the temperature around the remote temp sensor (per the *METER: 03D AGS Temp* display) increases to the *Gen Run Temp Start* setting, the generator immediately starts and runs based on the *Gen Run Temp Time* setting. When this run time period is finished, the temp sensor reading is checked. If the temperature sensor (or thermostat control if using the optional pigtail adapter) reading is below the *Gen Run Temp Start* setting, the generator will autostop. If the temperature sensor (or thermostat control) reading is above the *Gen Run Temp Start* setting, the generator will continue to run for a second run time period. At the end of this second run time period, the temperature sensor reading (or thermostat control) is checked again. This cycle continues as long as the *CTRL: 03 Gen Control* menu is set to *AUTO*, or the *SETUP: 04F Max Gen Run Time* setting is reached, whichever occurs first.

Why should I use Gen Run Temp? Typically, in a mobile application such as in an RV or on a boat where the air conditioning (A/C) unit is too much power for the inverter to run from the batteries, this feature is used to start a generator to run the A/C unit. Many RV and marine customers travel with pets and they do not want to leave the pets inside on a hot day. With this feature, you could set the A/C unit to turn on and leave. Whenever the inside temperature rises to the start setting, the generator autostarts to provide power to the A/C unit. This would keep the area cool and comfortable—plus, while the generator is on, the inverter batteries are being charged.

Where should I set Gen Run Temp Start? If using this feature to power an A/C unit, the *Gen Run Temp Start* setting should be slightly above the temperature setting of the thermostat controlling the air conditioner unit. Once the *Gen Run Temp Start* setting is reached, the gen starts providing power to the A/C unit. The reason the *Gen Run Temp Start* is set above the A/C unit's thermostat setting is to ensure the A/C unit runs when the generator starts. If the *Gen Run Temp Start* setting is below that of the A/C unit's thermostat setting, the generator runs but the A/C unit is not calling for a run period or cooling. In other words, your generator is running but the power is not being used by the A/C unit—resulting in wasted fuel and run time.



Info: If using the temperature autostart feature to start a generator that is powering two air conditioners, it is suggested that the second air conditioner's thermostat be set 2° to 5° higher than the first air conditioner. This staggered setting allows the first air conditioner to start and run in an effort to keep the coach cool. If the temperature continues to rise inside the coach, the second air conditioner turns on.

How long should I set the Gen Run Temp Time? When using the temperature autostart feature, the generator autostarts and runs until the *Gen Run Temp Time* setting or the *SETUP: 04F Max Gen Run Time* setting is reached, whichever occurs first. This means you could set the time to the lowest time setting (*0.5 Hrs*), knowing the generator will attempt to run until the temperature setting is met.

7.0 Using an AGS Module

SETUP: 04F Max Gen Run Time Menu

This menu is used to set the maximum time the generator will run if the generator has been started by one of the AGS's autostart settings.

- **Set Max Gen Run Time** – Set this to the maximum amount of time you want the generator to run once it has been autostarted.

Default setting: *Set Max Gen Run Time = 12.0 Hrs*

Range: *OFF*, 0.1-25.5 Hrs*

** The Max Gen Run Time setting can only be turned off using a ME-AGS-N with Rev \geq 5.2.*

Why should I use Max Gen Run Time? This setting is used to ensure the generator does not run longer than desired after an autostart. Setting a max run time ensures the generator stops if the autostop setting cannot be satisfied. For example, if the fuel capacity of your generator is five hours, set the *Max Gen Run Time* setting to *4.5 hours* to ensure it does not run out of fuel.



Info: When the generator autostarts from one of the autostart settings, it will autostop when the autostop parameter for that particular setting has been satisfied. For example, if the generator starts due to the *04A Gen Run VDC* menu's autostart setting, it then stops once it satisfies the *Stop Gen Volts* autostop setting. However, the *Max Gen Run Time* setting overrides any autostop setting. If the generator stops because the *Max Gen Run Time* setting has been reached, the *Fault MaxRun* status will occur. If this happens, you may have to increase the *Max Gen Run Time* setting or adjust the autostop setting to finish sooner. If multiple autostart settings are set in the *04 AGS Setup* menus and a *Fault MaxRun* status occurs, refer to the METER button's *03A AGS Status* menu to identify which condition autostarted the generator. This way you will know which auto condition is running longer than the *Max Gen Run Time* setting.



Info: The *Max Gen Run Time* menu uses the METER button's *03C Gen Run Time* display to determine the generator's run time.



Info: If the generator is stopped due to the *Max Gen Run Time* parameter being met, the status becomes *Fault MaxRn* and the generator will not autostart again until you clear the fault.

SETUP: 04G Quiet Time Menu

This menu is used to enable the Quiet Time feature, and to set the period of time each day in which the generator is not allowed to automatically run. The Quiet Time start setting will prevent the generator from starting even if one of the start parameters is met. If any autostart parameter in the *04 AGS Setup* menus has been met and the generator is running when the Quiet Time start setting is reached, the generator will turn off. The generator will not try to autostart until the Quiet Time stop setting has been reached and an autostart condition is once again satisfied.



The ME-ARC contains a real time clock that must be set for proper operation of the *SETUP: 04G Quiet Time Menu* feature.

- **Set Quiet Time** – Set to *On* (allows you to set the start and stop times).
Default setting: *Set Quiet Time = OFF*
Range: *OFF, ON, [daily start and stop time settings (12:00AM-12:00PM)]*

7.0 Using an AGS Module

- **Set Start Quiet Hour** – Set the hour for Quiet Time to start.
- **Set Start Quiet Minute** – Set the minute for Quiet Time to start.
- **Set Start Quiet AM-PM** – Set AM or PM for the start of Quiet Time.
- **Set Stop Quiet Hour** – Set the hour for Quiet Time to stop.
- **Set Stop Quiet Minute** – Set the minute for Quiet Time to stop.
- **Set Stop Quiet AM-PM** – Set AM or PM for the stop of Quiet Time.

Why should I use Quiet Time? Quiet Time is used when there are park rules or local regulations that prevent generators from running (sleep hrs.). If there are no local rules or regulations, you may not want to use Quiet Time – which would allow the generator to run at any time in a 24-hour period.

Where should I set Quiet Time? Set the Quiet Time start and stop settings to coincide with local noise requirements, or for a specific time period that you do not want the generator to automatically run each day.

- **Set Quiet Time Topoff** – This menu sets the time the generator will autostart and run before Quiet Time starts. The generator will only start on *Quiet Time Topoff* if the battery voltage (or battery SOC¹) start parameter is within a specified range.

Default setting: *Set Quiet Time Topoff = OFF*

Range: *OFF, 30-120 Minutes*

What is Quiet Time Topoff and why should I use it? The Topoff feature helps ensure the batteries have enough charge to last (i.e., prevent the inverter from shutting down from a low battery condition) through the entire Quiet Time period. When the Topoff feature is enabled by setting a time, the battery voltage (or battery SOC¹) is monitored just before the start of Quiet Time; and if required, the generator will automatically start to charge the batteries. This Quiet Time Topoff menu allows you to set a time at which the generator will autostart before Quiet Time starts. This applies whenever the start parameters are close to starting the generator at the start of Quiet Time. If the battery voltage is within 0.3 volts² or less of reaching the *04A Gen Run VDC* start parameter, the generator will autostart. The Quiet Time Topoff feature will also autostart the generator if the battery's SOC is within 4% or less of reaching the *04D Gen Run SOC* start parameter¹.

Scenario example (Topoff based on battery voltage): The *04A Gen Run VDC* menu is set to start at 11.5 VDC, Quiet Time is set to start at 10PM, and the *Quiet Time Topoff* setting is 60 min. At 9PM, the battery voltage reaches 11.8 VDC; because the Quiet Time Topoff feature is enabled (60 min.), the generator autostarts to allow the batteries to charge for 60 minutes before Quiet Time turns the generator off.

Scenario example (Topoff based on battery SOC¹): The *04D Gen Run SOC* menu is set to start at 60%, Quiet Time is set to start at 10PM, and the *Quiet Time Topoff* setting is 120 min. At 8PM, the battery SOC reaches 64%; because the Quiet Time Topoff feature is enabled (120 min.), the generator autostarts to allow the batteries to charge for 120 minutes before Quiet Time turns the generator off.

Note¹: *Generator autostarting based on Quiet Time Topoff using battery SOC (State of Charge) parameters requires the optional Battery Monitor Kit (ME-BMK or ME-BMK-NS) to be installed and enabled.*

Note²: *This voltage is scaled depending on your battery system; ≤0.3 for 12-volt systems, ≤0.6 for 24-volt systems, and ≤1.2 for 48-volt systems.*

7.0 Using an AGS Module

Where should I set Quiet Time Topoff? Normally, setting *Quiet Time Topoff* to 30 or 60 minutes is a good idea. In cases where the DC or inverter loads are unusually high or the SOC autostart setting is low—which may cause the batteries to be heavily discharged during the Quiet Time period—increase *Quiet Time Topoff* to 90 or 120 minutes; this ensures the batteries receive the maximum charge time before Quiet Time shuts the generator off.



Info: When the generator starts on Quiet Time Topoff, it will continue running until it reaches the Quiet Time start parameter even if the VDC or SOC autostop parameter is reached.

SETUP: 04H Gen Exercise Menu

This menu allows the generator to run (or “exercise”) after it has not been operated for a period of time. The generator is automatically started at a pre-selected time whenever it exceeds a set number of days without running. Once the start command is initiated, the generator starts and runs to help it remain operational and to allow the generator’s starting battery to be charged.



Info: The ME-ARC contains a real time clock that must be set for proper operation of the *SETUP: 04H Gen Exercise* menu feature.

- **Set Gen Exercise Days** – This menu sets the maximum number of days the generator is allowed to sit without running. If the generator has not run in this number of days, the exercise parameters will start the generator. The *Set Gen Exercise Days* setting must be between 1-255 days in order to enable the Gen Exercise feature.

Default setting: *Set Gen Exercise Days = OFF*

Range: *OFF, 1-255 Days*

- **Set Exercise Run Hour** – Set the hour the generator will start.
- **Set Exercise Run Minute** – Set the minute the generator will start.
- **Set Exercise Run AM-PM** – Set AM-PM when the generator starts.
- **Set Exercise Run Time** – Set how long the generator will run for the exercise period.

Default setting: *Set Exercise Run Time = 1.0 Hrs*

Range: *0.0-25.5 Hrs*

Why should I use the Gen Exercise feature? Most generators are very dependable and provide years of service if properly maintained. Exercising your generator is one of the most overlooked aspects of routine maintenance, yet its the simplest to perform. Regularly exercising your generator keeps engine seals and components lubricated, prevents oxidation of electrical contacts, uses up fuel before it deteriorates, heats up the generator windings to eliminate moisture buildup, helps ensure the generator’s starting battery is maintained at an optimal state of charge, and, in general, helps provide reliable engine starting. If long periods of time elapse without using your generator (remains connected to external AC power), or if you only use your generator a few days out of the year, enabling the Gen Exercise feature is recommended. However, if you run your generator frequently throughout the year, you may not need to use the Gen Exercise feature.

How often and how long should I exercise my generator? To maximize reliability and minimize repairs, it is important to exercise your generator at least once a month. This applies to both gas and diesel generators. When generators sit unused for as little as 30 days moisture can build up, and may damage your generator. Also, the fuel in gasoline-powered generators can

begin to break down into gums and varnishes that clog the fuel system. Fuel varnishing results in hard starting and surging—a surging generator may not settle at a stable operating speed. Always check with your generator’s manufacturer to determine how to properly exercise your generator. Generally, it is recommended that you run the generator every month for two hours under at least half the rated load. For example, with a 5,000 watt generator, turn on a load(s) that is about 2,500 watts, and let it run continuously for two hours. It is always best to run the generator for longer periods of time rather than for multiple short periods.

How does this Gen Exercise feature work? The Gen Exercise feature allows the generator to autostart at a pre-selected time whenever it has not run for a set number of days.

Once the Gen Exercise feature is enabled (by setting how many days to wait before exercising the gen under *Set Gen Exercise Days*), the generator will start and begin exercising only after two conditions are met. First, the generator must not have run for a set number of days (i.e., the Days Since Run timer value must be equal to or greater than the *Gen Exercise Days* setting). Second, the generator’s exercise time of day (i.e., *Exercise Run Hour/Minute/AM-PM* settings) must occur.



Info: When the generator starts and runs based on the gen exercise criteria, the generator power passes thru the inverter to the inverter loads — if the inverter is enabled to accept AC power on its input—and also charges the inverter batteries (if the charger is enabled).



Info: The Gen Exercise feature identifies the number of days since the generator has last run by using the Days Since Run timer which is shown under the *METER: 03E Since Gen Run* display.

Example of a Gen Exercise Scenario:

Under *SETUP: 04H Gen Exercise Menu*, set to:

Set Gen Exercise Days = 3,

Set Gen Exercise Run Hour, Minute and AM-PM = 8:30A,

Set Gen Exercise Run Time = 1.0 Hrs

Under *CTRL: 03 Gen Control*, set to *AUTO*.

First required condition: The Days Since Run timer must have accumulated up to at least three days (*Set Gen Exercise Days = 3*). On Day 1, the generator was manually started and stopped at 2:00PM. The stop time (2:00 PM) is the starting point for the Days Since Run timer to begin counting days—the Days Since Run timer displays “0 days”. On Day 2 at 2:00 PM, 24 hours have accumulated since the generator has last run—the Days Since Run timer displays “1 day”. On Day 3 at 2:00 PM, 48 hours have accumulated since the generator last ran—the Days Since Run timer displays “2 days”. On Day 4 (third day since the generator was manually started) at 2:00PM, 72 hours (or three days) have now accumulated since the generator has last run—the Days Since Run timer now displays “3 days”. The first required condition—which is how many days must pass before the generator hasn’t run—has been met.

Second required condition: The remote clock must now go to 8:30 AM (*Set Gen Exercise Run Hour, Minute, and AM-PM = 8:30A*) before the generator can autostart. On Day 5 at 8:30AM (Days Since Run timer displays “3 days”), the second required condition is met and the generator automatically starts and runs for one hour (*Set Gen Exercise Run Time = 1.0 Hrs*).

7.0 Using an AGS Module

SETUP: 04I Gen Warm-up Time Menu

This menu allows the generator to run (i.e., warm up) before it connects to the inverter/charger, or powers the battery charger and any pass-thru loads. Most generators need to warm up before a load is supplied.

- **Set Gen Warm-up Time** – This setting is the amount of time the generator is allowed to warm up before connecting to the inverter/charger.
Default setting: *Set Gen Warm-up Time = 60 sec.*
Range: *0-127 Seconds, 1-127 Minutes*

Where should I set Gen Warm-up Time? Check with your generator manufacturer. Typically, smaller generators (~2-3KW) need at least 60 seconds before applying a load; larger generators require a longer warm-up time.

SETUP: 04J Gen Cooldown Time

This menu allows the generator to continue to run after it disconnects from the inverter/charger and prior to autostopping (i.e., cooldown). Allowing the generator to cool down after the load is disconnected helps to prolong generator engine life.

- **Set Gen Cooldown Time** – This setting is the amount of time the generator is allowed to cool down after it disconnects from the inverter/charger.
Default setting: *Set Gen Cooldown Time = 60 sec.*
Range: *0-127 Seconds, 1-127 Minutes*

Where should I set Gen Cooldown Time? Check with your generator manufacturer. Most generators need at least 60 seconds to cool down after being disconnected from a load.



Info: The warm-up and cooldown features prevent the generator from connecting to the inverter's AC input. Since the inverter has only a single-source input, it cannot distinguish between grid or generator input. So, during warm-up or cooldown, the inverter will prevent any AC input from connecting. When either warm-up or cooldown is activated, it will disconnect any AC source connected to the inverter's AC input (i.e., grid or generator) until the time period (warm-up or cooldown) is over.

7.2 ME-AGS-N Functional Tests

Once you have used the ME-ARC to establish all the autostart/autostop settings you need, perform the following tests to verify that the AGS system is functioning correctly and there is communication between the remote/inverter and the ME-AGS-N.

7.2.1 Remote to Generator Communication Test

This section describes using the ME-ARC remote to start the generator and to determine the current AGS status.

7.2.1.1 Determining AGS Status

Use your remote control to determine the AGS's status by pressing the METER button until the bottom line displays "01 DC Meters", rotate the SELECT knob to the 03 AGS Meters menu, and then press the SELECT knob (top line shows 03A AGS Status and the bottom line displays the current status of the AGS, i.e., Ready). An AGS status of Off or Ready indicates the remote/inverter is correctly communicating with the AGS. If the AGS status displayed is not Off or Ready, then refer to Section 7.8.2 "Resolving Operational Statuses" or Section 7.8.3 "ME-AGS-N Faults using your Remote" for assistance before continuing.

7.2.1.2 Starting the Generator from the Remote

To confirm that the generator will turn on and run from the remote, first ensure the AGS status is *Off* or *Ready* (see Section 7.2.1.1). Then:

1. Press the CTRL button, and then rotate the SELECT knob to the *03 Gen Control* menu.
2. Press the SELECT knob, and then rotate it to the *ON* setting.
3. Press the SELECT knob to activate the generator test.

Once the generator starts, it should run until you change the *03 Gen Control* menu to *OFF* (before turning off). After two minutes, view the STATUS LED and ensure it turns solid green (a solid green STATUS LED means the generator has started successfully and is providing the gen run sense signal to the AGS module).

Note: If the generator attempted to start but did not run, continue to wait, the AGS will attempt to start the generator three more times.

If your AGS/generator system started (may attempt autostart x4), ran, and the STATUS LED came on and stayed on (not blinking), then the wiring from the AGS to the generator is correct. You are now ready to enable the AGS by setting the *03 Gen Control* setting in your remote to *AUTO* (see Section 7.3.1).



Info: The AGS attempts to start the generator four times. If after four attempts the generator fails to start, the STATUS LED turns red—indicating a fault.

If a generator fault displays or the AGS module's STATUS LED shows a fault condition (solid red LED indication), refer to Section 7.8 for assistance.

7.3 ME-AGS-N Operation/Monitoring

This section provides the menus under the ME-ARC's CTRL, METER, and TECH buttons that determine how to control and operate the generator. The section also includes menus that are used to help monitor the AGS and the generator's starting and running conditions.

7.3.1 Controlling the AGS

The AGS uses the *CTRL: 03 Gen Control* menu to activate the generator either manually or automatically. Press the CTRL button on the ME-ARC remote and rotate the SELECT knob to the *03 Gen Control* menu.

CTRL: 03 Gen Control

This menu is used to manually turn the connected generator on and off, or to select the *AUTO* feature which enables the active generator autostart and autostop settings to control the connected generator. Available options are:

OFF: The *OFF* selection turns the generator off if it is running from either a manual "on" command or an autostart command. When *OFF* is selected, the AGS is prevented from starting the generator automatically (default).



Info: When *OFF* is selected, the AGS turns off immediately without any cooldown time (if set).



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



Info: If the generator is manually started from the generator control panel or a generator remote panel, selecting *OFF* may not shut down the generator.

7.0 Using an AGS Module

ON: The *ON* selection manually starts the generator by sending a “start” command from the AGS module. Once the generator is started, it must be manually stopped, either from an external stop switch or by selecting *OFF* from the *03 Gen Control* menu, which sends a “stop” command from the AGS module.



Info: When “*ON*” is selected, the Magnum inverter will not attempt to accept the generator AC voltage until the warm-up period is satisfied.



Info: You can manually start the generator and have it automatically stop by selecting *ON* from the *03 Gen Control* menu, and then changing the selection to *AUTO* to automatically stop the generator. When *AUTO* is selected after the generator has been manually started, it displays the AGS status as “*Start VDC*” and uses the stop setting in the *SETUP* button’s *04A Gen Run VDC* menu (even if not active) or the *04F Max Gen Run Time* menu, whichever occurs first. This is useful if you want to make sure the generator starts before you leave; the *Max Gen Run Time* setting ensures the generator does not run longer than required.

AUTO: This selection uses the settings from the *SETUP* button’s *04 AGS Setup* menus to automatically start and stop the generator. Refer to the *04 AGS Setup* menus in Section 7.1 to set the start and stop parameters for the generator.

7.3.2 Monitoring the AGS

The ME-ARC remote’s *METER* and *TECH* buttons have additional menus that are helpful for the proper operation and monitoring of your AGS system.

7.3.2.1 ME-ARC Remote’s AGS METER Button

Press the ME-ARC remote’s *METER* button, rotate the *SELECT* knob to the *03 AGS Meter* menu, and then press the *SELECT* knob to access the AGS Meter read-only menus. Rotate the *SELECT* knob to view the various AGS meters.

METER: 03A AGS Status Menu

This read-only menu displays the AGS’s current status. There are 26 different status messages that can display to identify what state the AGS is currently in—only one displays at any one time (refer also to Figure 7-2).

Available statuses are (see Tables 7-2 thru 7-4 for information on each):

- AC In
- Gen Cooldown
- Gen Warm-up
- Manual Run
- No Comm
- Off
- Quiet Time
- Ready
- Start Amp
- Start Exercise
- Start SOC
- Start Temp
- Start Test
- Start Time
- Start Topoff
- Start VDC
- Gen Run Fault
- Fault Amp
- Fault Exercise
- Fault SOC
- Fault Temp
- Fault Test
- Fault Time
- Fault Topoff
- Fault VDC
- Fault MaxRn



Info: This menu is important when determining if the AGS is working correctly, or for troubleshooting an AGS installation. For any fault mode displayed in the status menu, refer to Section 7.7.3 in this manual.

METER: 03B DC Volts-AGS Menu

This read-only menu displays the DC voltage measured at Terminals #3 and #4 of the AGS 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 METER button's *01A DC Volts* and *04C DC Volts-BMK* menu items. When troubleshooting, read the appropriate related meter for each device. When troubleshooting the AGS, use the *03B DC Volts-AGS* menu for verification and testing purposes.

METER: 03C Gen Run Time Menu

This read-only menu displays the length of time the generator has been running since it was autostarted by the AGS. This helps determine how long the generator has been running in Auto mode if you were not present when it started. This menu is enabled when *CTRL: 03 Gen Control* is set to *AUTO*, but does not display run time when the generator has been manually started. Cooldown and warm-up times are not included in the gen run time display.



Info: The *Gen Run Time* menu's timer is started when the gen run sense voltage/signal is correct and qualified at the AGS module. It is not considered qualified until after a full start attempt and the *Gen Warm-up Time* setting is satisfied. Cooldown and warm-up times are not included in the gen run time display. Total generator run time = *Gen Run Time* + *Gen Warm-up Time* + *Gen Cooldown*.



Info: The times in this display are shown in tenths of an hour (0.0 hrs., 0.1 hrs., etc.)—thus, 0.1 hrs. = 6 minutes.



Info: The *Gen Run Time* display resets to 0.0 each time the generator is autostopped. This meter is not designed to replace the hour meter for total hours the generator has run.



Info: This display is used by the *SETUP: 04F Max Gen Run Time* menu to determine the generator's maximum run time when started automatically.

METER: 03D AGS Temp Menu

This read-only menu displays the temperature of the AGS remote temp sensor (included with AGS, but use optional), and is helpful in determining its proper placement and operation. This temperature value can be displayed in either Fahrenheit or Celsius depending on the *SETUP: 01E Temp Display* setting. Use this menu to change the temperature format, if required.

METER: 03E Since Gen Run (Days) Menu

This read-only menu displays the number of days since the generator has last run. This is useful in determining if the start and stop settings are set up correctly. This timer begins once the *CTRL: 03 Gen Control* menu is set to *AUTO*, and then counts by one for every 24-hour period the generator does not start. The Days Since Run timer resets any time the generator starts, which could be either by autostarting the generator (including from a previous exercise run), or manually starting the generator.



Info: When the DIP switch inside the AGS is set to "2-Wire Standby Mode", if you do not use the ME-ARC to manually turn the generator on, the Days Since Run timer will not be reset to zero.

7.0 Using an AGS Module

7.3.2.2 ME-ARC Remote's AGS TECH Button

Press the ME-ARC's TECH button, and rotate the SELECT knob to access:

TECH: 01 Temperatures

Press the SELECT knob, and then rotate the knob to display the current temperature reading of the AGS's remote temp sensor. If the remote temp sensor is not installed, "AGS TS Open" displays.

TECH: 02 Revisions – AGS

Press the SELECT knob, and then rotate the knob until the AGS module software version is shown on the screen (i.e., AGS: 5.2).



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

TECH: 04 Fault History

Press the SELECT knob, rotate the knob until the *04B AGS Faults* menu displays, and then press the SELECT knob.

- **04B AGS Faults** – This menu displays a history of the last nine AGS faults. Information for each fault displays from the most recent fault (H1) to the earliest/past recorded faults (H2 up to H9). Refer to Figure 7-1 below.

The top line displays the AGS fault mode. The bottom line displays the fault history number, day(s) since this fault occurred, and the time this fault occurred.

Rotate the SELECT knob to display additional readings for this fault (series of three screens for each fault). The following information displays: DC voltage on the AGS at the time of this fault, and the temperature of the AGS temperature sensor at the time of this fault.

Continue to rotate the SELECT knob to display earlier faults (as applicable).

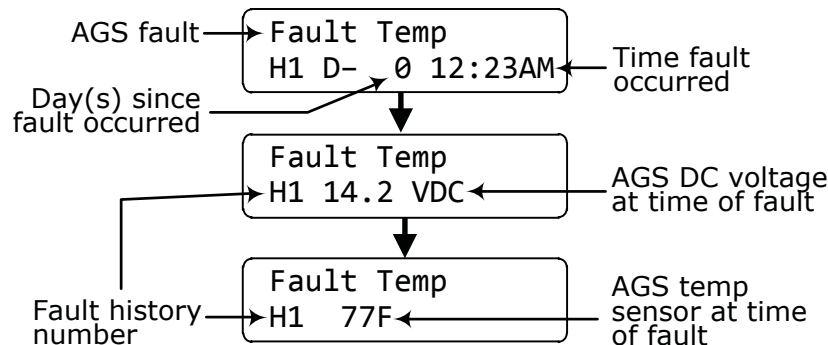


Figure 7-1, AGS Fault History Menu Items

- **04C Clear Faults** – This menu allows all recorded fault history information—for any inverter and/or AGS that is network connected—to be cleared/erased.

7.4 Enabling the ME-AGS-N

Before the AGS can begin operating/monitoring for an autostart condition (using active AGS settings in your ME-ARC remote control), it must be enabled.

To enable the AGS:

1. Press the CTRL button on the ME-ARC remote, and then rotate the SELECT knob to the *03 Gen Control* menu.
2. Press the SELECT knob. The *Set Gen Control* screen displays with the current gen control setting and an arrow to the right.
3. Turn the SELECT knob to the *AUTO* setting.
4. Press the SELECT knob again to select this setting. The selection arrow appears to the right of the screen.

The AGS is now ready to automatically start/stop the generator once an autostart condition is satisfied.

Note: If power is lost to your remote, the AGS control setting will return to the default *OFF* setting. Once power is restored, you must enable the AGS again.

7.5 Starting and Stopping the Generator

The generator can be manually started/stopped, as well as autostarted/autostopped using the available settings from your ME-ARC.

To autostart/autostop the generator:

In order for the generator to autostart/autostop, one or more of the following autostart/autostop conditions must be pre-set (see Section 7.1):

Autostart Conditions

- 04A Gen Run VDC (pp. 66-68)
- 04B Gen Run Time (p. 68)
- 04C Gen Run Amps (pp. 68-69)
- 04D Gen Run SOC (pp. 69-70)
- 04E Gen Run Temp (pp. 70-71)
- 04G Quiet Time (pp. 72-74)
- 04H Gen Run Exercise (pp. 74-75)

Autostop Conditions

- 04A Gen Run VDC (pp. 66-68)
- 04B Gen Run Time (p. 68)
- 04C Gen Run Amps (pp. 68-69)
- 04D Gen Run SOC (pp. 69-70)
- 04E Gen Run Temp (pp. 70-71)
- 04F Max Gen Run Time (p. 72)
- 04G Quiet Time (pp. 72-74)
- 04H Gen Run Exercise (pp. 74-75)

To manually start the generator:

1. Press the CTRL button.
2. Turn the SELECT knob to the *03 Gen Control* menu.
3. Press the SELECT knob. The *Set Gen Control* menu displays with an arrow to the right of the current setting.
4. Turn the SELECT knob to the *ON* setting.
5. Press the SELECT knob again to select this setting. The selection arrow appears to the right of the screen. The generator should start at this time.

If the generator does not start as expected, refer to Section 7.8 "ME-AGS-N Remote Troubleshooting" in this manual.

7.0 Using an AGS Module

To manually stop the generator:

1. Press the CTRL button.
2. Turn the SELECT knob to the *03 Gen Control* menu.
3. Press the SELECT knob. The *Set Gen Control* menu displays with an arrow to the right of the current setting.
4. Turn the SELECT knob to the *OFF* setting.
5. Press the SELECT knob again to select this setting. The selection arrow appears to the right of the screen. The generator should stop at this time.

If the generator does not stop as expected, refer to Section 7.8 "ME-AGS-N Remote Troubleshooting" in this manual.

To manually start the generator and have it automatically stop:

1. Press the CTRL button.
2. Turn the SELECT knob to the *03 Gen Control* menu.
3. Press the SELECT knob. The *Set Gen Control* menu displays with an arrow to the right of the current setting.
4. Turn the SELECT knob to the *ON* setting.
5. Press the SELECT knob again to select this setting. The selection arrow appears to the right of the screen. The generator should start at this time.

Once the generator is running, rotate the SELECT knob to *AUTO* (under the *03 Gen Control* menu), and then press the SELECT knob to select this setting. If the generator does not start or stop as expected, refer to Section 7.8 "ME-AGS-N Remote Troubleshooting" in this manual.

Note: When the generator is manually started, but then changed to autostop, the *SETUP: 04A Gen Run VDC* settings are used to determine when the generator will autostop. If the *SETUP: 04A Gen Run VDC* is set to *OFF*, the *Start/Stop Volts Delay* and *Stop Gen Volts* values that were entered prior to selecting *OFF* will still be used to autostop the generator.

7.6 ME-AGS-N Menu Map using the ME-ARC

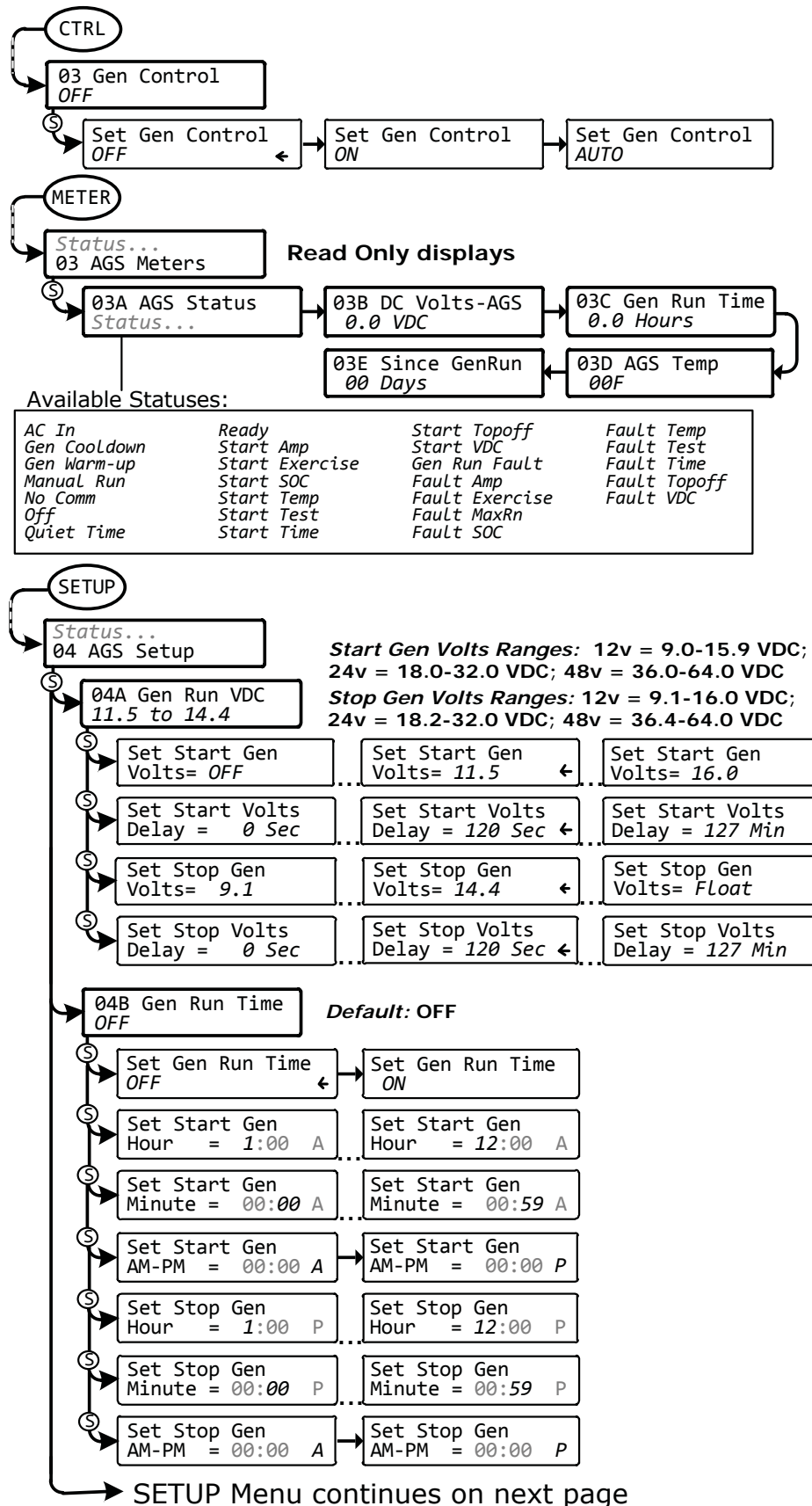


Figure 7-2, ME-AGS-N Menu Maps using ARC Remote (Section 1)

7.0 Using an AGS Module

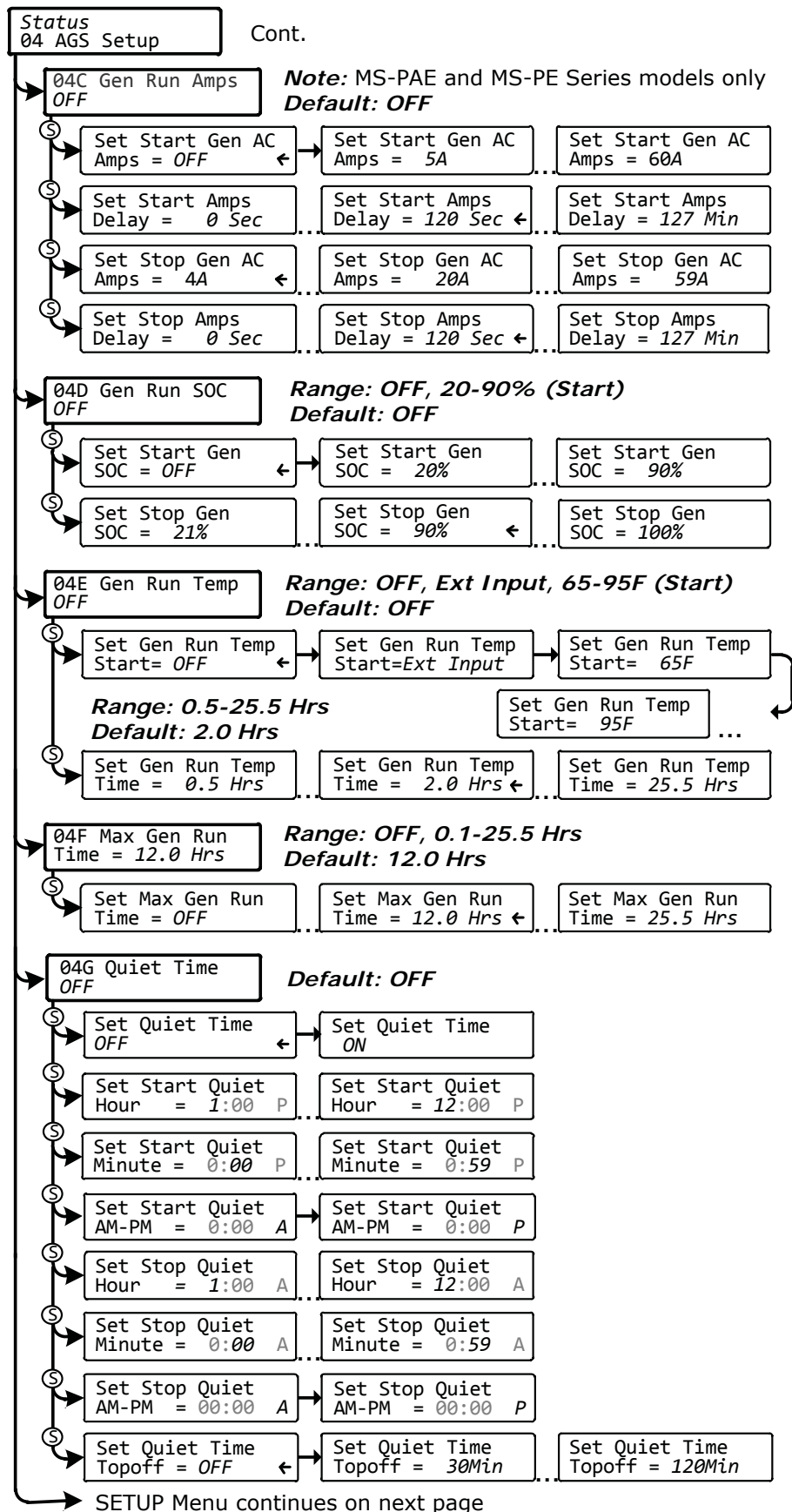
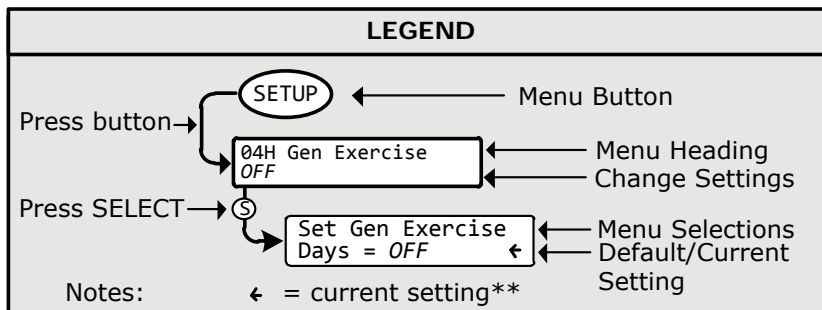
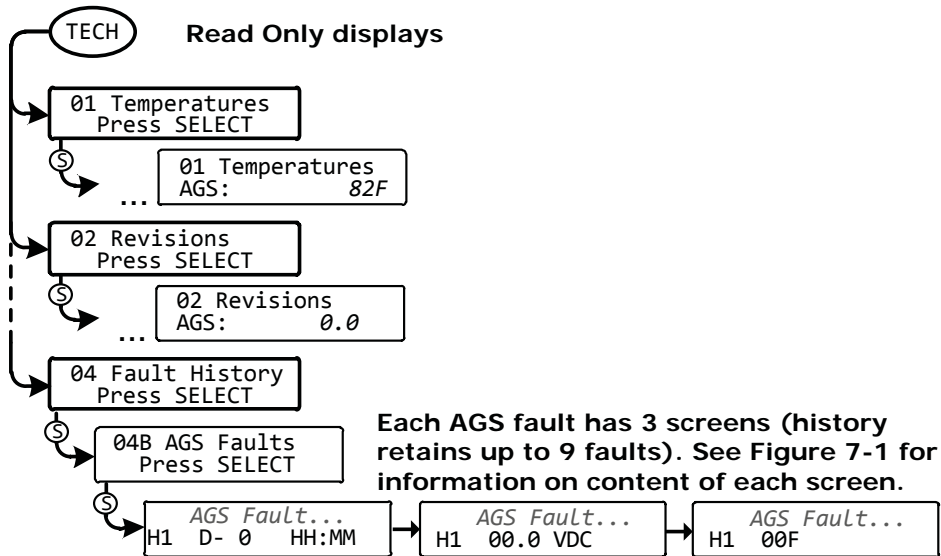
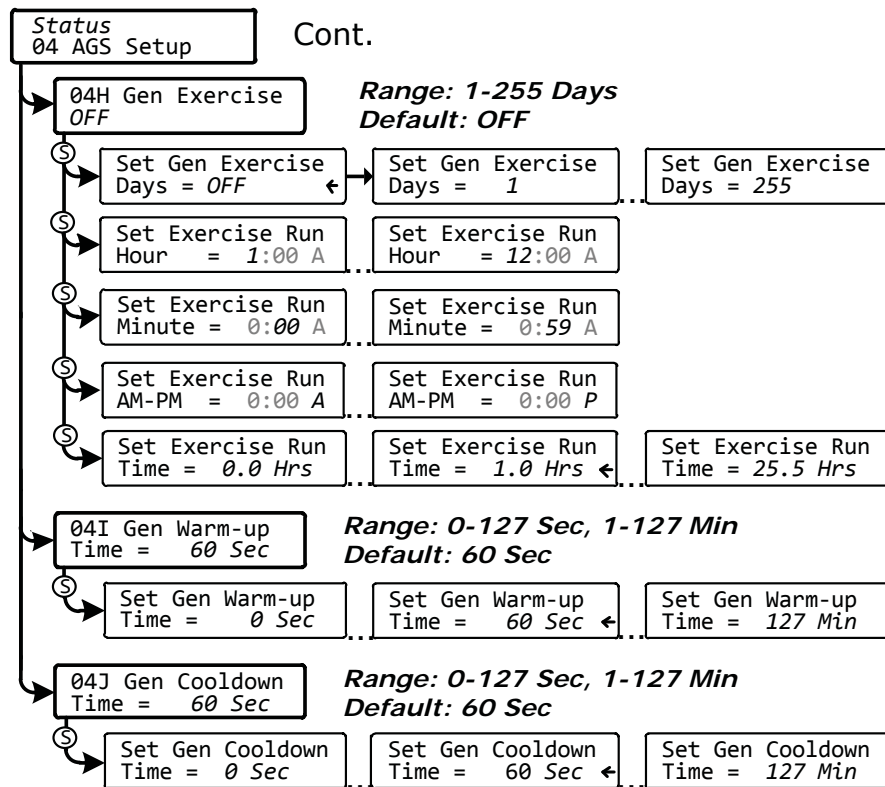


Figure 7-3, ME-AGS-N Menu Maps using ARC Remote (Section 2)

7.0 Using an AGS Module



** For this menu map, the arrow denotes the factory default settings

Figure 7-4, ME-AGS-N Menu Maps using ARC Remote (Section 3)

7.0 Using an AGS Module

7.7 ME-AGS-N Remote Status Messages

A status message may be an operational or fault message. Access the AGS status menu (METER button's *03A AGS Status* menu) to view the AGS's current operating status. This menu is important when determining if the AGS is working correctly, or for troubleshooting an AGS installation.

7.7.1 AGS Remote Operational Statuses

Refer to Table 7-2 below for a brief description of the possible AGS operational statuses that may display (depending on your remote).

Table 7-2, AGS Remote Operational Statuses

STATUS	DESCRIPTION
AC In	The inverter/charger is connected to another source such as a grid or an alternate generator, and is not controlled by the AGS. When <i>AC In</i> displays, the AGS is prevented or locked out from all autostarting conditions, except for when the generator needs to exercise—if enabled.
Gen Cooldown	The autostop setting has been met in one of the generator autostart/autostop menus and the generator has been disconnected from the inverter/charger. However, the generator is still runs until the cooldown time is met (as per the <i>SETUP: 04J Gen Cooldown Time</i> setting).
Gen Warm-up	The AGS is attempting to start the generator and a time period has been set under the <i>SETUP: 04I Gen Warm-up Time</i> setting. Once the AGS status indicates "Warm-up", the inverter/charger's AC input ignores any incoming AC power. This prevents the inverter/charger from loading the generator during warm-up. Once the AGS has determined that the generator is running, the warm-up time setting must be met before the generator can connect to the inverter/charger.
Manual Run	The generator was started manually from a start/stop switch directly connected to the generator, or from the <i>CTRL: 03 Gen Control</i> menu.
Note: The AGS determines that the generator has been manually turned on by sensing a gen run sense voltage to Terminal #2 on the AGS's 8-port terminal block. However, if the Gen Type DIP switch is set to "2-Wire Standby" (which doesn't require a gen run sense voltage), manually turning the generator on displays a status of <i>AC In</i> rather than <i>Manual Run</i> .	
No Comm	The AGS is not communicating with the inverter/remote. This is a normal status if there is no AGS-N (Network version) connected in the system. If an AGS is installed, then refer to Section 7.8.2 "Resolving Operational Statuses" for assistance.
Off	The <i>CTRL: 03 Gen Control</i> menu is set to <i>OFF</i> . This setting will not allow the AGS to autostart the generator.

Table 7-2, AGS Remote Operational Statuses (cont.)

STATUS	DESCRIPTION
Quiet Time	The AGS has entered Quiet Time per the <i>SETUP: 04G Quiet Time</i> setting.
<i>Note:</i> The generator will not autostart during Quiet Time.	
Ready	The <i>CTRL: 03 Gen Control</i> menu is set to <i>AUTO</i> , and the AGS is ready to automatically start the generator based on the active autostart settings under the <i>SETUP: 04 AGS Setup</i> menu.

7.7.2 AGS Remote Start Statuses

The following "Start" statuses identify the condition that autostarted the generator. If you determine that the autostart condition occurred sooner than expected (or didn't want this autostart condition), refer to the Setup section for your specific remote to change (or defeat) the autostart setting.

Table 7-3, AGS Remote Start Statuses

STATUS	DESCRIPTION
Start Amp	The generator has started based on the <i>SETUP: 04C Gen Run Amps</i> setting.
Start Exercise	The generator has started based on the <i>SETUP: 04H Gen Exercise</i> setting.
Start SOC	The generator has started based on the <i>SETUP: 04D Gen Run SOC</i> setting.
Start Temp	The generator has started based on the <i>SETUP: 04E Gen Run Temp</i> setting.
Start Test	The AGS is in Test mode. Test mode may be started from the TEST button located on the AGS,
Start Time	The generator has started based on the <i>SETUP: 04B Gen Run Time</i> setting.
Start Topoff	The generator has started based on the <i>SETUP: 04G Quiet Time Topoff Time</i> setting.
Start VDC	The generator has started based on <i>SETUP: 04A Gen Run VDC</i> setting.

7.0 Using an AGS Module

7.7.3 AGS Remote Fault Statuses

The following "Fault" statuses indicate that the generator wasn't able to start based on an expected autostart condition. Refer to Section 7.8.3 "Resolving AGS Faults Using the Remote" for help in diagnosing the problem.

Table 7-4, AGS Remote Fault Statuses

STATUS	DESCRIPTION
Gen Run Fault	The generator successfully started and ran for more than two minutes, but unexpectedly stopped before the AGS could automatically stop the generator.
Fault Amp	The generator failed to start in Start Amps mode.
Fault Exercise	The generator failed to start in Start Exercise mode.
Fault SOC	The generator failed to start in Start SOC mode.
Fault Temp	The generator failed to start in Start Temp mode.
Fault Test	The generator failed to start in Test mode.
Fault Time	The generator failed to start in Start Time mode.
Fault Topoff	The generator failed to start in Start Topoff mode.
Fault VDC	The generator failed to start in Start VDC mode.
Fault MaxRn	The generator turned off because the <i>SETUP: 04F Max Gen Run Time</i> setting had been met. This fault can occur when: 1) an autostop parameter has been met, but it did not stop the generator, or, 2) the autostop condition exceeded the <i>Max Gen Run Time</i> setting.

Table 7-5, AGS Default Settings on ME-ARC

Menu Items	Default Settings
Gen Run VDC	Start Volts: 11.5 VDC (12v) Start Volts Delay: 120 Sec Stop Volts: 14.4 VDC (12v) Stop Volts Delay: 120 Sec
Gen Run Time	OFF
Gen Run Amps*	OFF
Gen Run SOC	OFF
Gen Run Temp	OFF
Max Gen Run Time	12.0 Hrs
Quiet Time	OFF
Gen Exercise	OFF
Gen Warm-up Time	60 Sec
Gen Cooldown Time	60 Sec

**MS-PAE, MS-PE and MSH Series models only*

7.7.4 AGS General Notes

- If a fault condition occurs, select the *OFF* setting from the *03 Gen Control* menu. If the problem persists, refer to Section 7.8 “ME-AGS-N Remote Troubleshooting” in this manual.
- When the gen control setting in the remote is in the *OFF* position, all generator autostart functions are disabled and the AGS module’s STATUS indicator will also be off.
- When AGS control is set to *AUTO*, and an autostart condition occurs, it attempts an automatic generator start. This is done by closing its internal relays (based on the Gen Type selection) to control the starter – much like a person does when manually starting the generator. The starter is turned on for short periods of time and then turned off. If the AGS determines that the engine has started while cranking (STATUS indicator lights solid green), the starter is turned off after a short delay. If the engine does not start, another attempt is made to turn on the starter after a long delay period. This is repeated until the generator starts or until all its start attempts are reached, which causes the AGS to go into a fault condition (indicated by a blinking FAULT indication on the remote and a solid red STATUS indicator on the AGS module).
- If using the temperature autostart feature in an RV coach, set the air conditioner thermostat slightly less than the setting (*04E Gen Run Temp* menu). If using two air conditioners, it is suggested that the second air conditioner thermostat be set 2° to 5° higher than the first air conditioner. This staggered setting allows the first air conditioner to start and run in an effort to keep the coach cool. If the temperature continues to rise inside the coach, the second air conditioner will turn on.
- When the generator starts successfully, the STATUS indicator on the AGS module will turn solid green. The generator will run until an autostop condition is reached or until it is manually turned off; at which time a stop signal will be sent to the generator.
- If the generator is running when the AGS module’s TEST button is pressed, the generator will stop and then start again. The generator will then run for approximately 30-60 seconds before shutting off.
- There is a delay before the AGS attempts to start the generator. The delay is adjustable on volts and amps (*04A Gen Run VDC* and *04C Gen Run Amps* settings). There is no delay if the AGS attempts to start the generator when the temperature around the remote temp sensor rises to the *04E Gen Run Temp Start* setting.
- Several autostart/autostop settings can be active at once. However, once an autostart condition becomes active, all other autostart conditions are ignored until the specific condition that caused the generator to start (e.g., *Start Gen AC Amps*) is satisfied by its autostop condition (e.g., *Stop Gen AC Amps*). Once the generator has completed this autostart/autostop cycle, the AGS immediately begins to monitor for any active autostart/autostop settings again.

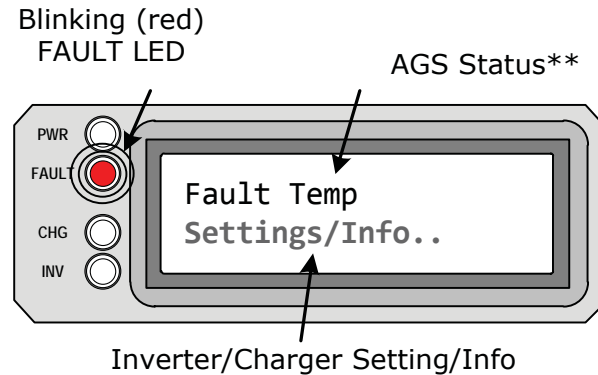
7.0 Using an AGS Module

7.8 ME-AGS-N Remote Troubleshooting

This section assists you in using your remote control to identify a fault, and to resolve an abnormal operational condition detected within your AGS system.

7.8.1 AGS Fault Message Screen

When an AGS fault is detected, and the remote's FAULT LED comes on, the fault status is displayed on the LCD screen. Figure 7-5 is an example of how fault messages appear on the ME-ARC remote. Use the remote's LCD screen and the information in this section to identify and correct the issue. The FAULT LED blinks and the fault alternates with the inverter/charger status.



*** AGS status alternates with inverter/charger status (scrolling).*

Figure 7-5 ME-AGS-N Fault Message (Example)

7.8.2 Resolving Operational Statuses

The following operational statuses can display on your ME-ARC, and some may indicate an abnormal condition. This section provides additional information and assistance to resolve these statuses (if needed).

- **AC In** – This is a normal status when the input to the inverter/charger is connected to an AC source such as utility/grid power, or to an alternate generator that may not be controlled by the AGS.



Remedy: The *AC In* status prevents the AGS from autostarting. To enable the AGS to autostart the generator, remove any AC power connected to the input of the inverter/charger.

- **No Comm** – This is a normal status if there is no AGS installed. If an AGS is installed, use the information below to determine the remedy.



Remedy: If an AGS is installed, then follow these steps:

1. Ensure the green READY indicator on the AGS module is on (blinking or solid) to indicate that the AGS module is getting power.
2. Ensure the communications cable is connected from the Network port on the Magnum inverter to the NETWORK port on the ME-AGS-N.
3. Ensure you have the correct communications cable.

7.8.3 Resolving AGS Faults using the Remote

Should an AGS fault occur, use your ME-ARC remote and the information in this section to resolve the issue.

- **Gen Run Fault** – The generator successfully started and ran for more than two minutes, but the generator unexpectedly stopped by itself before the active AGS autostop condition was finished.



Info: The AGS module determines the generator is running by monitoring the gen run sense voltage/signal. When this gen run sense voltage/signal is no longer available, the AGS thinks the gen is off or has stopped.



Info: Gen run fault detection is not active if the generator is manually started.



Remedy:

A) If the generator is still running: Confirm you are getting the correct gen run sense signal to the AGS module. For assistance, refer to your ME-AGS-N owner's manual.

B) If the generator is not running: Check the generator for fault codes and adequate fuel. If neither is an issue, check the generator's owner's manual for troubleshooting tips to determine why it may have shut down on its own.

For the eight faults listed below, refer to the Remedy immediately following.

- **Fault Amp** – The generator failed to autostart and run per the *04C Gen Run Amps* menu's start parameters.
- **Fault Exercise** – The generator failed to autostart and run per the *04H Gen Exercise* menu's start parameters.
- **Fault SOC** – The generator failed to autostart and run per the *04D Gen Run SOC* menu's start parameters.
- **Fault Temp** – The generator failed to autostart and run per the *04 Start Temp F* menu's (ME-RC) or the *04E Gen Run Temp* menu's (ME-ARC and ME-RTR) start parameters.
- **Fault Test** – The generator failed to autostart and run after the red TEST button is pressed on the AGS module.
Note: The ME-ARC can be set to manually turn the generator on and off, which can be used to test the generator wiring to the AGS.
- **Fault Time** – The generator failed to autostart and run per the *04B Gen Run Time* menu's start parameters.
- **Fault Topoff** – The generator failed to autostart and run per the *04G Quiet Time Topoff* start parameters.
- **Fault VDC** – The generator failed to autostart and run per the *04A Gen Run VDC* menu's start parameters.



Remedy: One of the above fault messages may display on the ARC remote when:

- A. The AGS attempts to start the generator four times, but the gen failed to start and run per the specific autostart parameters; or,
- B. The generator started, but did not provide the correct gen run sense signal to the AGS module. For either scenario, refer to your ME-AGS-N owner's manual.

7.0 Using an AGS Module

- **Fault MaxRn** – The generator has turned off because the gen run time—after autostarting—has exceeded the *SETUP: 04F Max Gen Run Time* setting.



Info: The *Max Gen Run Time* menu uses the *SETUP: 04B Gen Run Time* display to determine the generator's run time. Cooldown and warm-up times are not included in the *Gen Run Time* display.



Remedy: Confirm that all the autostop parameters that are active or enabled can be satisfied before the *SETUP: 04F Max Gen Run Time* setting is reached.

- If using the *SETUP: 04A Gen Run VDC* menu's parameters:
 - with a battery voltage setting to autostop, ensure the autostop voltage is less than the temperature-compensated absorb charge voltage.
 - with the "Float" setting to autostop, ensure the time that the charger is in the Bulk Charge and Absorb Charge¹ stages is shorter than the *04F Max Gen Run Time* setting.

Refer to the *SETUP: 04A Gen Run VDC* section for additional information on this setting.

- If using *SETUP: 04B Gen Run Time*, confirm you have not set the total run time (start time to the stop time) longer than the *SETUP: 04F Max Gen Run Time* setting.
- If using *SETUP: 04C Gen Run Amps*, confirm the inverter load(s) that is used to determine the *Stop Gen AC Amps* setting is not required to run longer than the *SETUP: 04F Max Gen Run Time* setting.
- If using *SETUP: 04D Gen Run SOC*, confirm that the *METER: 04A BMK SOC* reading is not "Think'n", but shows an actual percentage reading on the display (i.e., 85%), and the *Stop Gen SOC* setting can be satisfied before the *SETUP: 04F Max Gen Run Time* setting is reached.
- If using *SETUP: 04E Gen Run Temp*, the temperature around the remote temperature sensor has not reached the *Gen Run Temp* setting. You need to either lower the *Gen Run Temp Start* setting, determine how to cool the area (remote temp sensor location) to below the *Gen Run Temp Start* setting before the *04F Max Gen Run Time* setting is reached, or increase the *Max Gen Run Time* setting.

Lastly, confirm that your warm-up and/or cooldown time when added to your autostop condition does not exceed the *SETUP: 04F Max Gen Run Time* setting.



Info: Beginning with Revision 5.2 of the ME-AGS-N, the *Max Gen Run Time* setting can be defeated. In some cases, it may be appropriate to set the *Max Gen Run Time* setting to *OFF*. However, this feature is mainly provided as a safety feature to ensure the generator doesn't run longer than the time it takes to reach the autostop conditions or to expend the generator's fuel capacity, whichever occurs first – take this into consideration if this setting is defeated.

Note¹: Several conditions determine the length of time that the charger is in the Absorb Charge stage. Ensure the *SETUP: 03E Absorb Done (Time, Amps, or SOC)* setting—determines when the Absorb Charge stage is complete and enters the Float stage—is taken into account when setting the *04F Max Gen Run Time* setting.

7.8.4 How to Clear AGS Faults

Go to the *CTRL: 03 Gen Control* menu, and then select *OFF*.

Note: After the fault clears and the reason for the fault is determined, be sure to re-enable the AGS to autostart. Go to the *CTRL: 03 Gen Control* menu and select *AUTO*. Refer to Figure 7-2.

Once the fault is cleared and the reason for the fault is determined, you should re-enable the AGS to see if the fault returns, or test the AGS/generator system by performing the AGS functional test for your remote (see Section 7.2).

7.8.4 How to Clear AGS Fault History

Go to the TECH button's *04 Fault History* menu, press the SELECT knob, and then turn the knob until the *04C Clear Faults* screen appears.

At the *04C Clear Faults* screen, press and hold the SELECT knob until the "5.0 to 0.0 second" screen countdown is finished and the screen displays "HISTORY CLEARED".



Info: Be sure you do not want the fault history for either device (inverter or AGS). Once it has been cleared, it cannot be retrieved.

8.0 Using a BMK

8.0 Using a ME-BMK

This section discusses how to set up and monitor Magnum's Battery Monitor Kit (ME-BMK) using the ME-ARC remote. It also covers other BMK menu options that are available using this remote. Use the mini-index below to direct you to the appropriate section.

8.1 BMK Setup	p. 94
8.2 Monitoring the BMK	p. 95
8.3 BMK Menu Maps	p. 98

8.1 Setting Up the BMK

Use the ARC remote's SETUP button to establish the charge efficiency and amp-hour size settings for your battery monitor (ME-BMK).

SETUP: 05 BMK Setup

This section provides information about charge efficiency and how to manually access/adjust this setting and the amp-hour setting.

- **05A Charge Eff** – This menu enables you to manually access and adjust your battery's charge efficiency. The charge efficiency setting allows the battery monitor to calculate the battery's charge efficiency. Normally, the ME-BMK battery monitor automatically calculates the battery's efficiency.

Default setting: *Auto*

Range: *Auto, 50%-97%*



Info: The factory default *Auto* setting allows the charging efficiency to be automatically calculated. In most circumstances, the *Auto* setting will determine the best charge efficiency.



CAUTION: If you do not know your battery's charging efficiency, leave it at the factory default setting. If the setting is manually set but incorrect, the state-of-charge (SOC) information will become more inaccurate with every charge.

What is charge efficiency? When a certain amount of energy is removed or discharged from the battery, this removed energy will need to be returned to keep the batteries at a 100% state-of-charge. As batteries are being charged, they lose energy—either in the form of heat, or while gassing. This loss of energy while charging means the battery will not be fully charged if you only return the current that was removed. To compensate for the battery's inefficiencies while charging, a charge efficiency setting is provided. The charge efficiency setting compensates the AH I/O (Amp-Hours In/Out) reading by ensuring the AHs returned to the battery are greater than the AHs removed.

For example, if your AH I/O display reads *000* and you begin powering a 25-amp load for two hours, the display will show *-050*. This indicates that you have discharged 50 AHs (2 x 25) from the battery. If the charge efficiency setting is set to *95%*, then as you begin charging and return 50 AHs, the AH I/O reading will be less than zero, indicating that the AHs removed have not been fully returned. The 95% charge efficiency setting requires 52.5 AHs (50/95) to be returned before the AH I/O returns to 0.

How do I access the charge efficiency setting? Press the ARC's SETUP button, rotate the SELECT knob to the *05 BMK Setup* menu, and then press the SELECT knob again to access the *05A Charge Eff* menu item (see Figure 8-1).

How should I adjust the Charge Efficiency Setting? The charge efficiency setting allows the battery monitor to calculate the battery's charge efficiency. The charge efficiency can be calculated automatically using the *Auto* setting, or can be manually programmed (see Figure 8-1).

The battery monitor is shipped with the charge efficiency set to *Auto*. This allows the battery monitor to automatically calculate variables that affect the charging efficiency such as battery type, battery age, and how the batteries are maintained—which is not always constant. With the *Auto* setting, the efficiency is recalculated each time the batteries reach a 100% state of charge. This setting can also be manually adjusted from 50% to 97% if the battery's charge efficiency is known. When using a setting other than the *Auto* setting, the battery monitor will use the manual setting to calculate the AH I/O display. For example, if you set the charge efficiency to 90% and 100 AHs are removed from the battery, the *AH Net* display would read "000" only after 111 AHs have been returned to the battery.

Again, if the charge efficiency is manually set and inaccurate, the SOC information will be more inaccurate with every charge. For this reason, continually monitor the AH I/O reading under the ARC's METER button.

To access the AH I/O reading: press the METER button, turn the SELECT knob until the *04 BMK Meters* menu appears, and then press the SELECT knob. Turn the SELECT knob until the *04E AH In/Out* display appears (see Figure 8-1). After several charge and discharge cycles (below 80% SOC), the AH I/O reading should be slightly positive when the SOC display reads 99%.

To view the SOC display: press the METER button and turn the SELECT knob until the *04 BMK Meters* menu appears. Press the SELECT knob, and then turn the SELECT knob until the *04B SOC* display appears. If the AH I/O reading is below 000 (negative number) when the SOC display reads 99%, then increase the charge efficiency setting. If you find that the AH I/O reading is substantially above zero when the SOC display reads 99%, then decrease the charge efficiency setting.

- **05B AmpHour Size** – This setting is used to calculate the battery's SOC reading.

Default setting: 400 AH

Range: 200-2500 AH



CAUTION: It is important that the *AmpHr Size* setting is correct or else the calculations used to determine the battery's SOC display will be inaccurate.

How do I access the AmpHr Size setting? Press the ARC's SETUP button, turn the SELECT knob until the *05 BMK Setup* menu appears, and then press the SELECT knob to display the *05A Charge Eff* menu item. Turn the SELECT knob to the *05B AmpHour Size* menu—the current AHs size setting displays. Press the SELECT knob to access the *Set AmpHr Size* function.

To adjust the AmpHr Size setting: From the *Set AmpHr Size* function screen, turn the SELECT knob to adjust the AH size setting. Press the SELECT knob to select and save the new setting.

8.2 Monitoring the BMK

Use the ARC remote's METER button to monitor battery bank information and to determine the status of your battery system.

8.0 Using a BMK

METER: 04 BMK Meters

This section describes what battery bank information is available from the battery monitor when using the ARC remote.

- **04A BMK Status** – This menu selection offers read only displays that give the current operating status of the battery monitor. This selection also provides information to determine if there is a power-up fault condition.
 - BM: Pwr-up Fault** – The battery monitor faulted when it was powered-up. The fault occurred because the power-up self test failed. See Section 7.0 “Troubleshooting” in your BMK owner’s manual.
 - BM: No Comm** – The battery monitor is not communicating with the remote. This typically means a ME-BMK is not installed in the system. If installed, refer to the ME-BMK Owner’s Manual to troubleshoot a “No Comm” status.
 - BM: Ready** – The battery monitor is connected and actively monitoring the battery system.
- **04B 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. The range is 0% to 100%, where 100% represents a fully charged battery and 0% means the battery is completely discharged.



Info: If the BMK has a power-up fault, this SOC screen will also display “Pwr-up Fault”.

When the sense module is first connected, the batteries will need to be fully charged (i.e., SOC = 100%) at least once to establish a SOC reference point. While this reference point is being calculated, the display will show “Think’n”, to indicate that the SOC reference point is being calculated. After the batteries are fully charged, the display will change from “Think’n” to “100%” and begin to provide accurate SOC percentage values.

If the sense module is disconnected from power, this display resets to “Think’n” and the batteries will require another full charge before this display begins providing SOC percentage information.



Info: Try to limit battery discharging to 50% of capacity (keep battery above 50% SOC). If batteries are allowed to be continually discharged below 50% SOC, their effective service life will be considerably shorter. This 50% rule has been determined to be the best compromise between available energy and the maximum number of discharge cycles a battery can provide.

- **04C DC Volts-BMK** – This meter displays the real-time battery voltage from 07.00 to 70.00 volts (± 0.02 volts).
- **04D DC Amps-BMK** – This meter displays the real-time charge current (amps into the battery) or 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.
- **04E 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. The range is $\pm 32,768$ AH.

When using the charge efficiency's *Auto* setting, the AH I/O value is recalculated after the battery has been fully charged (reaching 100% SOC) and $\geq 0.5\%$ of the battery capacity has been discharged. If the sense module is disconnected from power, the displayed AH I/O value resets to zero.



Info: The *AH I/O* display correlates with the *05B AmpHour Size* setting (under *SETUP* button) to help determine the *04B SOC* display. AH I/O example—if you run a 10-amp load for three hours, the display will show -30 AH. When you begin charging, the display will count from -30 AH back toward 0 AH.

- **04F Reset AH Out** – 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 identify and monitor the battery load consumption. The range is 0 to 65,535.0 amp-hours (0.1 amp-hour resolution).

To reset the amp-hours value to zero, press and hold the rotary *SELECT* knob for >5 seconds when the *Reset AH Out* display is shown. After this display has been reset, it will begin calculating and displaying new rAH out values. This display automatically resets to zero if the sense module is disconnected from power.

- **04G Total AH Out** – 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 AHs (6,553,500 amp-hours). The displayed number resets to 0.0k when the sense module is disconnected from power.
- **04H 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. To reset this display, press and hold the rotary *SELECT* knob for five seconds while the *Minimum VDC* display is shown. After this value has been reset, the display will begin monitoring and showing new minimum DC input values. If the battery monitor is not connected or not communicating, the display will show "0.0".
- **04I Maximum VDC** – This menu displays the highest battery voltage since the last reset. The voltage shown on the display is averaged each second, and 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. To reset this display, press and hold the rotary *SELECT* knob for five seconds while the *Maximum VDC* display is shown. After this value has been reset, the display begins monitoring and showing new maximum DC input values. If the battery monitor is not connected or not communicating, the display shows "0.0".

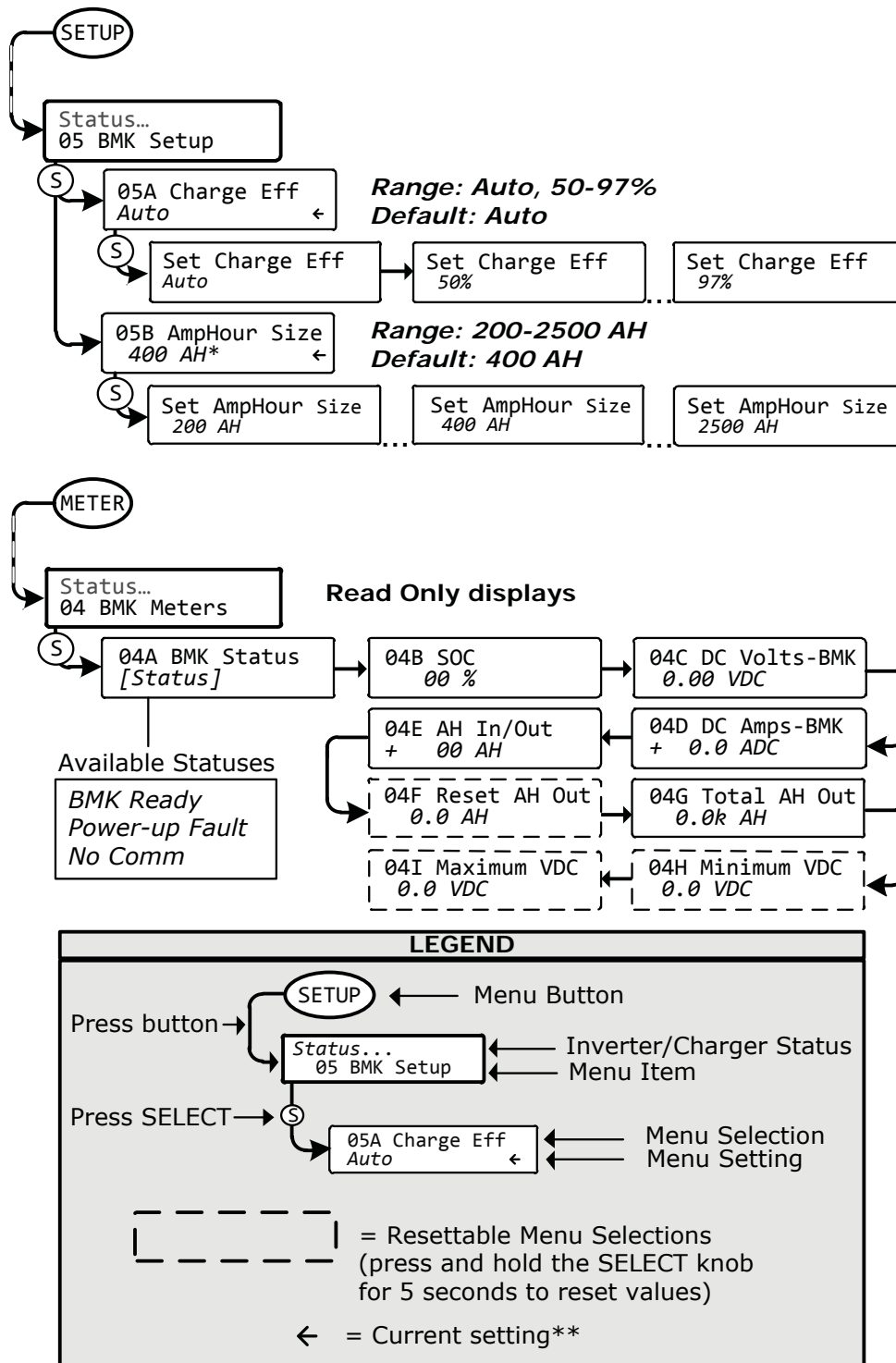
Table 8-1, BMK Default Settings on ME-ARC

Menu Items	Default Settings
Charge Eff	Auto
AmpHour Size	400 AH

8.0 Using a BMK

8.3 ME-ARC Remote's BMK Menu Maps

The diagrams below are a complete overview of the BMK settings and information displays available from the ME-ARC remote's SETUP and METER menus.



** - For this menu map, the arrow denotes the factory default settings

Figure 8-1, ME-BMK Menu Maps using ARC Remote

9.0 Limited Warranty

Magnum Energy, Inc., warrants the ME-ARC remote control 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.

Note: The normal 12-month warranty on this ME-ARC remote is extended to 5 years if it was ordered with and installed on one of Magnum's MP or MMP panel systems. To be eligible for the 5-year warranty extension, a proof-of-purchase is required at the time of repair/service showing that the ME-ARC remote and the MP or MMP panel system were purchased at the same time.

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 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

9.0 Service and Warranty Info

9.1 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/Service/ServiceCenters-US.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 for shipment is not covered under warranty.** We recommend sending the product by traceable and insured service.



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