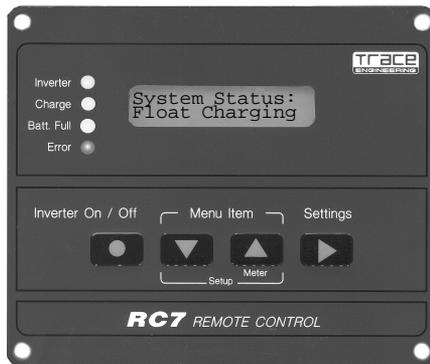




# RC7 & RC7GS

## Remote Controls

Rev. 1.3x



# Installation and Operator's Manual



# RC7 & RC7GS Remote Controls

## Table of Contents

Section	Description	Page
1.	<b>Introduction</b> .....	1
	<b>Features</b> .....	1
	ON/OFF Control	
	Meters	
	Controls	
	Status Monitoring	
2.	<b>Installation</b> .....	3
3.	<b>Operation</b> .....	5
	<b>Front Panel</b> .....	5
	Indicators and Controls	
	Status LEDs	
	Inverter LED	
	Charge LED	
	Batt. Full LED	
	Error LED	
	LCD Display	
	Push-buttons	
	On/Off	
	Setup/Menu Item Push-button	
	Meter Mode Push-button	
	Settings Push-button	
	<b>RC7 and RC7GS Setup Menu</b> .....	9
	Sense Search	
	Auto LBCO	
	Battery Capacity	
	Battery Type	
	Charge Rate	
	Set Shore Power	
	RC7 Setup	
	LCD Contrast	
	External Shunt	
	Fuelgauge Cutout	

3. **Operation** (continued)

<b>RC7GS Setup Menu</b> .....	14
Set Clock (RC7GS Only)	
Select Genset	
Generator Start	
Generator Stop	
Begin Gen Quiet and End Gen Quiet	
<b>Saving your Setup Choices</b> .....	18
<b>RC7 and RC7GS System Status Displays</b> .....	19
<b>AC Source Messages</b> .....	19
Waiting for AC	
Genset Status:	
Pending, Cranking and Genstart	
Starter Cooldown and Gen Start	
<b>Gen Set Error Messages</b> .....	20
Gen Won't Start	
Gen Quiet Fault	
Low AC Input V	
<b>Inverter Mode Messages</b> .....	20
<b>Charger Mode Messages</b> .....	23
Bulk Charging	
Absorption Charging	
Float Charging	
Equalizing Charging	
<b>Inverter/Charger Error Messages</b> .....	25
Over Temperature	
Overload	
High Battery Voltage	
Low Battery Voltage	
DCLD Lockout Error	
Charger Fault	
<b>Meters Display</b> .....	28
Average Shunt Amps	
Battery Voltage	
Inverter/Charger Current	
AC Output Voltage	
AC Input Amps	
Battery Temperature	
Transformer Temperature	
FET Temperature	
Estimated Battery Capacity	

3.           **Operation** (continued)

**System Status Messages** ..... 31

                  Battery State of Charge

                  Time Left to Run

                  Time Left to Charge

                  Set Shore Power

                  Generator Start/Stop

**Generator Connection** ..... 33

                  Onan Quiet Diesel

                  Power Tech Wiring Diagrams (2 and 3-wire)

                  PowerTech 2-wire

                  PowerTech 3-wire

**RC7 and RC7GS Setup Menu** ..... 36

**RC7 and RC7GS User Menu** ..... 37

**Storage Checklist** ..... 38

                  Preparation for Storage

                  Interior Storage

                  Exterior Storage

4.           **Service Information** ..... 39

## IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of this product.

To reduce the risk of electrical shock, and to ensure the safe installation and operation of this product, the following safety symbols have been placed throughout this manual to indicate dangerous conditions and important safety instructions.



**WARNING** - A dangerous voltage or condition exists in this area. Use extreme caution when performing these tasks.



**CAUTION** - This procedure is critical to the safe installation or operation of the unit. Follow these instructions closely.



**NOTE** - This statement is important. Follow instructions closely.

- All electrical work must be done in accordance with local, national, and/or international electrical codes.
- Before installing or using this device, read all instructions and cautionary markings located in (or on) the manual, the controller, the batteries, and the PV array.
- Do not expose this unit to rain, snow or liquids of any type. This product is designed only for indoor mounting.
- To reduce the chance of short-circuits when installing or working with the inverter, the batteries, or the PV array, use insulated tools.
- Remove all jewelry such as rings, bracelets, necklaces, etc., while installing this system. This will greatly reduce the chance of accidental exposure to live circuits.
- The inverter contains more than one live circuit (batteries, PV array, generator, etc.). Power may be present at more than one source.
- This product contains no user-serviceable parts. Do not attempt to repair this unit.

## SAVE THESE INSTRUCTIONS

## 1.0 INTRODUCTION

### Features

The RC7 and RC7GS (Generator Start) are control units that allow remote operation of any RV, Legend Series II, Truck Series II, and Mariner inverter/chargers rated from 2000 to 3000 watts.

NOTE: The generator start functions (GS) only apply to the RV Series inverter/charger.

NOTE: The inverter and remote control must have software version 1.3x.

The RC7 and RC7GS feature:

- Simple menu driven programming for full control of all inverter/charger functions
- A three-level menu to prevent accidental setting changes
- Meters to display voltage and current
- RJ11 phone jack connection to inverter
- Internal memory to retain inverter/charger menu settings even with a loss of power
- An Intelligent battery fuelgauge displaying percent of battery charge and the time left to run
- Error message and informative information displays used to optimize system performance
- Remote ON/OFF inverter operation



**Figure 1**  
**RC7 Front Panel**

### 1.0 INTRODUCTION

All operating controls and indicators for the RC7 and RC7GS are located on the front panel of the remote control. The inverter, software Rev. 1.3x must be installed in both the inverter and remote. Refer to the instructions in the RVU-2 Software Upgrade Kit manual if an upgrade is required.



**NOTE:** The RC7 and RC7GS are identical remote controls; however, the RC7GS has additional features for controlling a generator. These features are noted in this manual as available for the "RC7GS only."

#### **On/Off Control**

The inverter portion of the inverter/charger can be switched OFF or ON using the remote control. The standby charger in the inverter is automatic and always ready and available for charging whenever ac power is applied.

#### **Meters**

The RC7 and RC7GS remotes feature several meters that monitor the operating conditions of the power center. These meters include: Average Shunt Amps, Battery Voltage, Inverter-Charger Current, AC Output Voltage, AC Input Amps, Battery Temperature, Transformer Temperature, FET Temperature, and Estimated Battery Capacity.

#### **Controls**

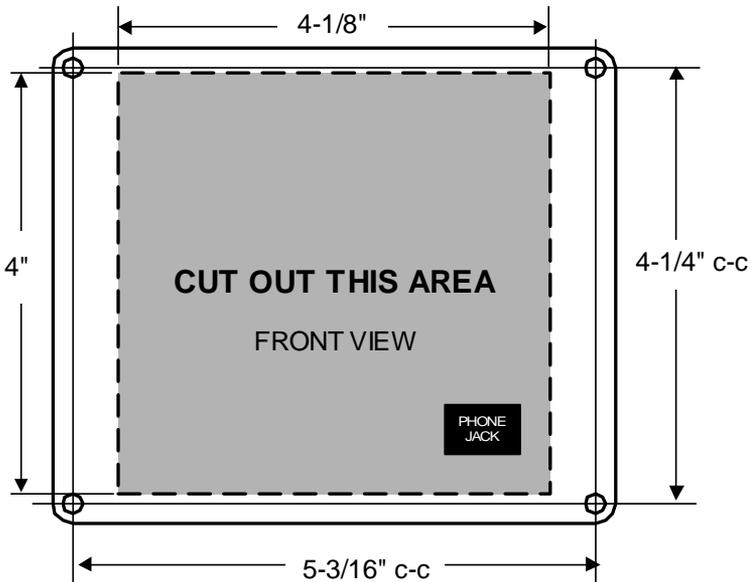
The RC7 and RC7GS allow the inverter to be switched ON or OFF with the press of a push-button on the remote. Both devices can be used to configure the inverter/charger to the specific system and preferences including Battery Capacity, Battery Type, Charger Rate, Low Battery Cutout, Shore Power Amps, External Shunt, Fuelgauge Cutout, and Display Contrast. In addition, the RC7GS starts and stops of the genset automatically or manually, allows the setting of generator make and model, sets a "quiet time" during which the genset will not start automatically, and has manual overrides for auto gen start.

#### **Status Monitoring**

The RC7 and RC7GS remotes monitor operating conditions including: the ac supply, inverter operation, charger operation, battery condition, generator condition (RC7GS only), Time Left to Run, and Time Left to Charge..

**2.0 INSTALLATION****Installation Procedure:**

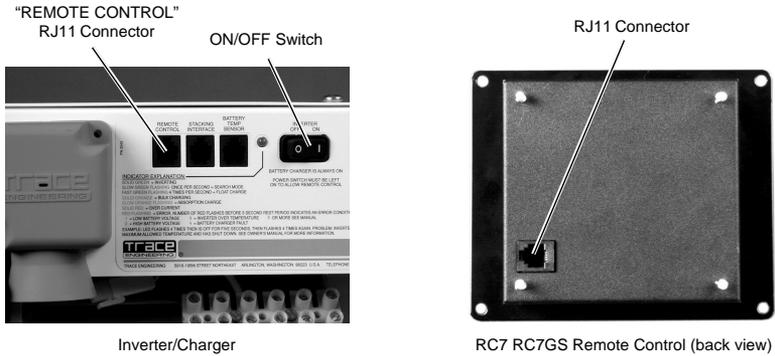
1. Select an appropriate location to install the remote control.
2. Refer to the drawing (Figure 2) for hole and cutout dimensions or install the remote in a standard double-gang outlet box.
3. Run the cable between the RC7 remote and the inverter/charger. Do NOT use standard telephone cable.
4. Place the ON/OFF switch on the inverter to the OFF position and disconnect the ac power.



822-4A-011

**Figure 2**  
**Installation Dimensions**

## 2.0 INSTALLATION



**Figure 3**  
**Remote Control Connectors**

4. Connect the communications cable into the RJ11 port on the inverter/charger marked "REMOTE CONTROL." Connect the other end of the cable into the jack on the remote (Figure 3).
5. Secure the remote to the wall or outlet box using the appropriate screws (4 required).
6. Wait for the LCD display to show the message "Waiting for AC."
7. Place the ON/OFF switch on the inverter to the ON position.



**NOTE:** The remote will not operate the inverter if the inverter's ON/OFF switch is in the OFF position.

8. Reconnect the inverter to the ac source. After a brief delay, the remote will display a system status message similar to Figure 4.

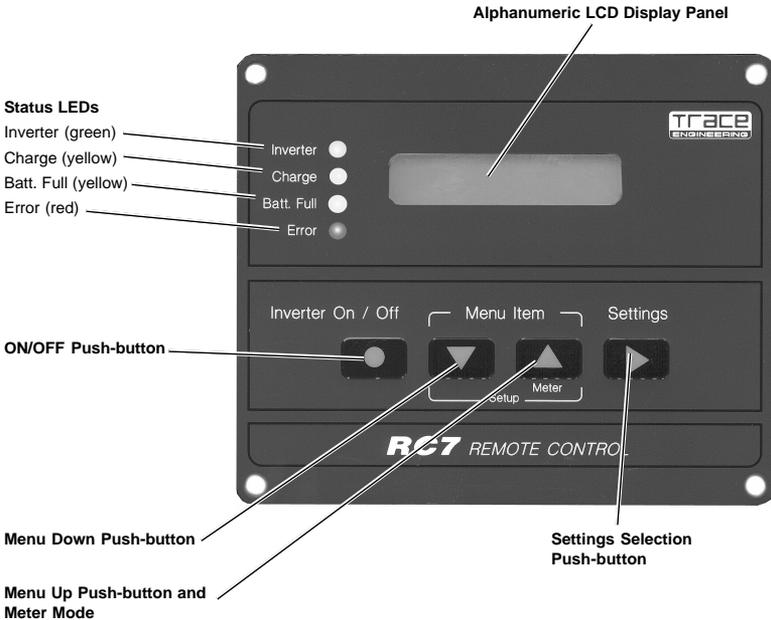
System Status:  
AC Available

**Figure 4**  
**System Status Message (in LCD display)**

## Front Panel

### 1. Indicators and Controls

The RC7 and RC7GS front panels contain LEDs, LCD display and push-buttons for viewing status and system setup. All operating power for the remote control is provided by the inverter/charger via the supplied cable.



**Figure 5**  
Front Panel Controls and Indicators

### 2. Status LEDs

There are four LEDs on the front panel which light solid or flash during operation, indicating the system's status. Upon initial power-up of the inverter, all LEDs will flash as the unit goes through a self-test. After the initial power-up test completes, the LEDs will indicate the current state of the inverter and charger. Use these LEDs along with the LCD display for detailed system status.



822-4A-001

**Figure 6**  
Status LEDs

### 3.0 OPERATION

#### 3. Inverter LED

The green Inverter LED indicates the inverter is switched ON and ready to provide backup power. If there is no ac power, the inverter LED will be ON solid, indicating that the inverter/charger is in the inverter (ON) mode.

Inverter LED	Other LEDs or Devices	Meaning
ON (solid)		Inverter ON
Flashing	Charge LED (flashing)	Inverter ready (charging)
Slow Flash		Load Sense Searching
Flashing	Error LED ON + Buzzer	Inverter Error
OFF		Inverter Switched OFF

#### 4. Charge LED

The Charge LED indicates the current battery charge mode.

Charge LED	Other LEDs or Devices	Meaning
ON (solid)		Bulk Charging
Slow Flash		Absorption Charging
Fast Flash	Batt. Full LED ON	Float Charging
Very Fast Flash		Equalize Charging
OFF		Inverter Mode (no charging)

#### 5. Batt. Full LED

The Batt. Full LED indicates the state of charge on the batteries. This LED will not illuminate until the batteries have charged up to at least 90%. The duration of the LED's ON time will increase until the batteries reach 100%, which at that time, the LED will be ON solid. In the inverter mode, the OFF time duration of the LED will increase until the batteries discharge to below 90% at which time the LED will extinguish.

Batt. Full LED	Other LEDs or Devices	Meaning
Solid		Battery Fully Charged (100%)
Flashing		Battery Charged 90% or higher
OFF		Battery Below 90% Charge

#### 6. Error LED

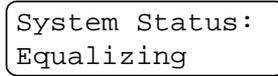
The Error LED indicates that there is a problem with the inverter/charger or batteries. Check the LCD display to find and correct the nature of the problem.

Error	Other LEDs or Devices	Meaning
ON (solid)		Check System

## 3.0 OPERATION

## 7. LCD Display

The LCD display is a 16 x 2 lines (32 characters total) back lit, alphanumeric display, used for setting up the system operation as well as viewing current status or error messages. Scrolling through the display items is accomplished by using the push-buttons below the display.

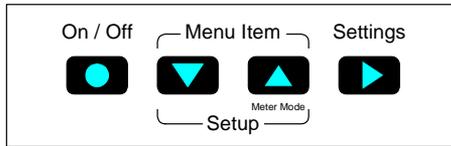


822-4A-002

**Figure 7**  
**LCD Display**

## 8. Push-buttons

There are four pressure-sensitive push-buttons on the front panel of the RC7 and RC7GS used to control the inverter and enter system operating parameters.



822-4A-003

**Figure 8**  
**Push-button Controls**

## a. On/Off

The On/Off push-button controls the inverter section of the inverter/charger. Press this button once to turn the inverter ON or OFF. The charger section of the inverter is not affected by this function and maintains the batteries whenever ac power is present. On RC7GS models, this push-button also controls the generator. Refer to Generator Start/Stop. Use this control when you do not want the inverter to supply backup power in the event of an ac line failure. Ac output power is available only as long as the ac line is present.



**NOTE:** Pressing this push-button disables the inverter function. Ac backup power will NOT be available during a utility outage. The green INVERTER LED must be flashing (with ac utility applied), indicating the inverter is in a ready state. Pressing this push-button while the green LED is ON solid (indicating backup mode), will cause the loss of the inverter output.

On / Off



822-4A-004

**Figure 9**  
**Inverter ON/OFF Push-button**

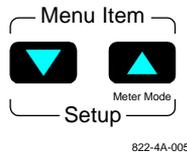
### 3.0 OPERATION

#### b. Setup/Menu Item Push-button

The Setup/Menu Item push-buttons accesses the system setup menus. Press and hold both push-buttons for approximately 5 seconds or until the display clears, then release the buttons. Press the UP or DOWN arrow buttons to scroll through the menu items. To exit the Setup mode, press and hold both push-buttons for approximately 5 seconds until the LCD display changes back to the System Status display.



NOTE: Menu items are described later in the manual.



**Figure 10**  
**Setup/Menu Item Push-buttons**

#### c. Meter Mode Push-button

The Meter Mode push-button (above) accesses the various operating parameters such as output voltage, amperage, temperature, etc. To access the Meter Mode, press and hold the Meter Mode push-button for approximately 5 seconds.

#### d. Settings Push-button

The Settings push-button scrolls through the various menus. Press this button while in the Setup mode to move through the menu items one at a time. If the desired item or setting is passed, continue pressing the Settings push-button until the item or setting reappears. This push-button is also used to enable and disable the equalize charge mode.

Settings



822-4A-006

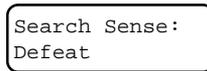
**Figure 11**  
**Settings Push-button**

### 3.0 OPERATION

#### RC7 and RC7GS Setup Menu

The Setup menu configures the RC7 and RC7GS to specific operating system parameters. To access the Setup menu press and hold the UP and DOWN arrows push-buttons for approximately 5 seconds until the LCD display clears. Choose the desired configuration settings for the system from the appropriate menu. Exit the Setup Menu by pressing both the UP and Down arrow push-buttons for approximately 5 seconds. The new settings will be saved in nonvolatile memory 20 seconds after exiting the Setup mode (if nothing is changed during the waiting period).

The initial menu that will appear in the LCD display is the Search Sense menu shown below.



**Figure 12**  
Initial LCD Display Item

The following menu items appear in the exact sequence they appear on the RC7. Refer to pages 36-37 for the complete menu structure.

#### 1. Search Sense

Search Sense enables or disables the power-saving “search” mode logic circuitry. Refer to the inverter’s Operator’s manual for a complete description of the Search Sense mode.

To configure the Search Sense mode, use the RIGHT arrow push-button (Settings), to scroll to the desired setting. The default setting is *Defeat*.



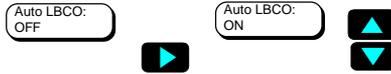
**Figure 13**  
Search Menu Selections

Defeat disables the Search Sense function. The remaining selections, specify the minimum wattage load that must be present on the inverter to qualify as a load and bring the inverter out of the search mode. After selecting, press the DOWN arrow to access the next menu.

### 3.0 OPERATION

#### 2. Auto LBCO

Automatic Low Battery Cut Out (Auto LBCO) prevents the inverter from draining the batteries below 10.9 V dc (with no load on the output). When this mode is enabled (ON), the inverter shuts OFF when the batteries reach 10.9 V dc. When it is disabled (OFF), the inverter remains ON until the batteries reach a voltage of 8.5 V dc, at which point the inverter will shut off. When ac input is available again, the inverter automatically resets and begins charging the batteries. The default setting is OFF.



**Figure 14**  
**Auto LBCO Selections**

Press the RIGHT arrow (Settings) to select the desired function. After selecting, press the DOWN arrow to scroll to the next menu or the UP arrow to move to a previous menu.

#### 3. Battery Capacity

Battery Capacity refers to the battery's reserve capacity in amp-hours. The RC7 approximates the battery state-of-charge (SOC) and run-time then estimates the battery capacity (Auto) over several charge/discharge cycles. However, setting the capacity manually assures a more accurate initial SOC and run-time calculations. The default setting is Auto.

The Battery Capacity setting also sets the absorption charge time where the batteries are charged at the bulk voltage.

- Auto ----- 110 minutes (1.8 hours)
- 125 A hrs ----- 60 minutes (1 hour)
- 250 A hrs ----- 90 minutes (1.5 hours)
- 375 A hrs ----- 120 minutes (2 hours)
- 500 A hrs ----- 150 minutes (2.5 hours)
- 1000 A hrs ---- 180 minutes (3 hours)



**Figure 15**  
**Battery Capacity Selections**

### 3.0 OPERATION

#### 4. Battery Type

To ensure the batteries are receiving the proper charge voltage, the Battery Type must be selected for the type of batteries used in the system: GEL Cell, Liquid Lead Acid and AGM. The default setting is GEL Cell.

This voltage varies depending on the batteries used, as specified below.

BATTERY TYPE	BULK V DC	FLOAT V DC	EQUALIZE V DC
GEL Cell	14.1 V dc	13.6 V dc	Defeated
Liquid Led Acid	14.6 V dc	13.4 V dc	15.5 V dc
AGM	14.4 V dc	13.4 V dc	15.5 V dc



**Figure 16**  
**Battery Type Selections**

#### 5. Charge Rate

The battery charger's maximum output current can be specified using the Charge Rate menu. The default is 100% of the maximum charge rate. Refer to the inverter/charger Operator's manual for specific system settings.



**Figure 17**  
**Charge Rate Selections**

### 3.0 OPERATION

#### 6. Set Shore Power

The inverter monitors the ac power being drawn by both the battery charger and the ac loads connected to the inverter. If the current draw approaches the shore power circuit breaker rating, the battery charger reduces the amount of current supplied to the batteries to provide the maximum current to the ac loads. Set Shore Power ensures the battery charger does not exceed the shore power circuit breaker rating. This setting should match the shore power or generator's circuit breaker rating. The default setting is 30 amps.



**Figure 18**  
**Set Shore Power Selections**

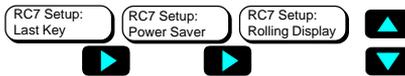
#### 7. RC7 Setup

The RC7 LCD screen displays system status and error messages that occur during normal operation. From the Setup menu select:

Last Key (default) to display the last system status message displayed after exiting the Setup menu.

Rolling Display to automatically show system status, state-of-charge, time left to run, time left to charge, set shore power and gen start/stop (RC7GS only).

Power Saver to shut off the LCD display and LEDs after five minutes without a key-press or new error message. Pressing any key will reactivate the LCD display and LEDs for another five minutes. Errors during the power saver mode will “wake-up” the remote.



**Figure 19**  
**Set Shore Power Selections**

## 3.0 OPERATION

## 8. LCD Contrast

The LCD Contrast menu adjusts the contrast to accommodate changing lighting conditions and viewing angle. The default setting is Max. Contrast.



Figure 20  
LCD Contrast Selections

## 9. External Shunt

When two inverter/chargers are utilized in a system, an additional RC7 can be used as a battery “fuel gauge.” This requires an external shunt. Refer to the inverter/charger’s Operator’s manual for instructions on installing an external shunt. The External Shunt menu selects the fuelgauge unit. The default is None.



Figure 21  
External Shunt Selections

## 10. Fuelgauge Cutout

The Fuelgauge Cutout menu sets the battery voltage zero percent state of charge (0% SOC) with no load. This is the point at which the battery has zero reserve amp-hours remaining. The Fuelgauge meter uses this number to determine the 0% battery state-of-charge voltage. The default is 9.5 VDC.



Figure 22  
Fuelgauge Cutout Selections

### 3.0 OPERATION

#### RC7GS Setup Menu

The RC7GS (Generator Start) features several additional setup menu selections related to automatic generator starting, stopping and generator quiet time.

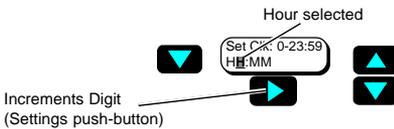


**Figure 23**  
RC7GS Front Panel

#### 1. Set Clock (RC7GS only)

Some generator functions are based on the time of day. The clock must be properly set to ensure the programmed function will perform at the correct time. The clock uses 24-hour time and ranges from 00:00 to 23:59.

To access the Set Clk menu, scroll down past the generator menus by pressing the DOWN arrow. A flashing cursor appears below (and behind) the hour (H) or minute (M) characters in the display. Every eight seconds the cursor alternates positions. When the cursor is under the hour digit, press the Settings push-button to increment the hours to the current hour (00 to 23). When the cursor is under the minutes digit, press the Settings push-button to increment the minutes to the current minute (0 to 59). Press and hold the Settings push-button to quickly increment the time, or press and release to increment the selected digit by one unit at a time.



**Figure 24**  
Set Clock Display

## 3.0 OPERATION

## 2. Select Genset

After setting the clock, press the UP arrow once to access the Select Genset menu. Select the type and model of the generator by pressing the Settings push-button (RIGHT arrow) until the genset's name and model is displayed in the LCD readout. The default is Onan QuietDiesel.

 NOTE: Not all generators are supported.



CAUTION: Other 30 through Other 80 are reserved for future use and must not be selected.



**Figure 25**  
Select Genset Display

## 3. Generator Start

After setting the clock and selecting a generator, set the parameters for automatically starting the genset based upon a battery voltage or State-of-Charge (SOC). Press the UP arrow and scroll through the menus to access the Generator Start menu. Press the Settings push-button (RIGHT arrow) until the required setting is in the LCD display.

 NOTE: The Auto Gen parameters can not set unless the clock is set-up first.

The default Generator Start selection is Manual (Push On). This setting disables all automatic start functions. Any other selection from the Generator Start menu, enables the RC7GS to automatically start the generator based upon the battery's state-of-charge.



**Figure 26**  
Generator Start Menu Selections

### 3.0 OPERATION

The generator can be started or stopped at any time by pressing the DOWN arrow push-button (User Menu) until the Gen Start/Stop menu is displayed. Press and hold the On/Off push-button on the RC7GS front panel until the generator starts or stops. Release the push-button as soon as the generator starts. If the inverter/charger senses an ac supply while the remote control On/Off push-button is pressed, it will shut down the generator.

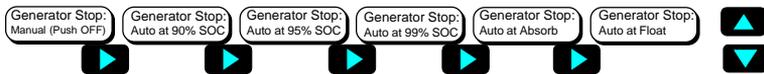
 **NOTE:** If the genset is manually started from the remote, a manual override is initiated and the generator will NOT stop automatically. Shut down the generator manually.



**Figure 27**  
**Generator Start/Stop (on User Menu)**

#### 4. Generator Stop

The RC7GS can be configured to shut down the generator automatically when the batteries reach 90 to 99% SOC, or when the charger initiates the Absorption or the Float mode of charging. Refer to the inverter/charger's Operator's manual for a detailed description on charging modes. The default is Manual (Push Off).



**Figure 28**  
**Generator Start/Stop (on User Menu)**

The generator can be stopped at any time by accessing the user menu until the "Gen Start/Stop: Press (On/Off)" menu is displayed. Press the ON/Off push-button on the RC7GS front panel until the generator stops.

 **NOTE:** The generator will start immediately if the auto-start parameters are still met.

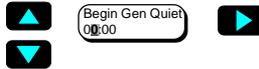


**Figure 29**  
**Generator Start/Stop (on User Menu)**

**3.0 OPERATION****5. Begin Gen Quiet and End Gen Quiet**

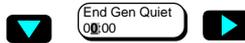
The period of time during which the generator is prevented from starting automatically can be defined using the RC7GS.

To specify the begin quiet time, scroll to the Begin Gen Quiet: 00:00 by using the UP and DOWN arrow push-buttons. Set the Begin Gen Quiet start time. The selected digit for hours or minutes will be underlined and highlighted (refer to the Set Clock section for details on setting the time).



**Figure 30**  
**Start Generator Quiet Time**

Press the DOWN arrow to access the End Gen Quiet: 00:00 menu and select the appropriate end time.



**Figure 31**  
**End Generator Quiet Time**

 **NOTE:** Setting begin and end time to 00:00 defeats the quiet time mode.

 **NOTE:** If the generator is running at the begin quiet time, it will be shut down automatically. If the auto-start parameters are met during quiet time, the buzzer will sound and the LCD displays the message "Gen Quiet Fault." The generator will start automatically at the end of the quiet time.

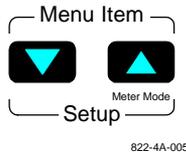
### 3.0 OPERATION

#### Saving Setup Choices

Once the setup options are complete, press and hold both the UP and DOWN arrow push-buttons until the display clears (approximately 5 seconds). The setup choices will be saved in nonvolatile memory 20 seconds after exiting the Setup menu if no other actions are taken. These settings will be preserved until changed.



NOTE: The GenStart settings will not be saved if the RC7GS is disconnected or dc power is lost.



**Figure 32**  
**Press and Hold to Save Settings**

**3.0 OPERATION****RC7 and RC7GS System Status Displays**

The RC7 and RC7GS remote controls display the operating mode and system status by lighting one or more LEDs located on the front panel and/or by displaying a message on the LCD display. The four LEDs reflect the same information as the single tricolored LED on the inverter/charger.

There are four types of system messages:

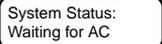
- AC source messages
- Inverter messages
- Charger messages
- Error messages

**AC Source Messages**

AC source messages appear when alternating current (shore power) is present. In addition, the RC7GS ac source messages describe the current activity, if any, of the generator.

**1. Waiting for AC**

Anytime the inverter is OFF and ac is not present, the LCD screen displays "Waiting for AC."



System Status:  
Waiting for AC

**Figure 33**  
**Waiting for AC**

**2. Genset Status: Pending, Cranking and Genstart**

When the RC7GS is setup to start the generator for a specified condition (SOC or battery voltage) and that condition has been met, the LCD displays "Pending Genstart."



Genset Status:  
Pending Genstart

**Figure 34**  
**Pending Genstart Messages**

When the initiating condition (SOC or battery voltage) has occurred, the Pending Genstart message is displayed for approximately two minutes awaiting a change in the condition or a manual override. If neither condition occurs, the RC7GS attempts to start the generator and displays "Cranking Genset."



Genset Status:  
Cranking Genset

**Figure 35**  
**Cranking Genset Messages**

### 3.0 OPERATION

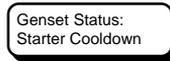
Once the generator starts, there is a brief delay to allow the genset to reach operating speed and for the inverter/charge to synchronize to the generator, at which point the LCD display shows that ac is again available.



**Figure 35**  
**Cranking Genset Messages**

#### 3. Starter Cooldown and Gen Start

In the event the genset does not start within 30 seconds, a two-minute starter cooldown message is displayed after which another attempt to start the generator occurs. This cycle repeats itself three more times over a 12 minute period.

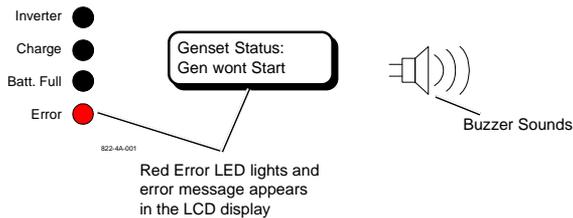


**Figure 36**  
**Starter Cooldown Messages**

### Gen Set Error Messages

#### 1. Gen Won't Start

If the genset does not start after the four attempts, the RC7GS displays the message "Gen Won't Start" and the red Error LED on the front panel lights. No further attempts to start the genset will occur. Correct the starting problem and manually start the genset by setting the RC7GS to "Manual (Push On)" from the setup menu and then set it back to the previous auto-start menu, which resets the RC7GS.



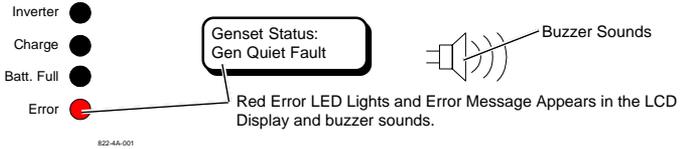
**Figure 37**  
**Gen Won't Start Error Message**



NOTE: Press any arrow push-button to cancel the buzzer.

#### 2. Gen Quiet Fault

Whenever the RC7GS is configured to Auto Start the generator under a specified condition and the condition occurs during the gen quiet period, the LCD will display the Gen Quiet Fault message and the red Error LED will light. The remote control also emits a series of beeping sounds for up to five minutes or until the error condition is corrected. The gen quiet period can be overridden by resetting the Gen Quiet Begin and End time to 00:00.



**Figure 38**  
**Gen Quiet Fault Error Message**

-  NOTE: Press any arrow push-button to cancel the buzzer.
-  NOTE: If the genset is manually started from the RC7GS remote, a manual override is initiated and it will not shut down automatically. "Man Stop Only!!" (Figure 39) will be displayed in the LCD. Shut down the genset manually as previously described.
-  NOTE: The Gen Quiet Fault error is not actually a system error or fault but rather an alert that the system has reached the selected auto-start parameter during the quit time selected.

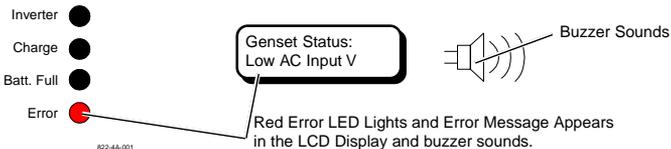


**Figure 39**  
**Genset Manual Stop Only Display**

The Gen Quiet Fault error is automatically reset at the end of the quiet time period if no other action is taken.

**3. Low AC Input V**

The Low AC Input V Fault error indicates the input ac voltage is below 45 V ac (B+ is present—Power Tech generators only). The red error LED is ON and the buzzer sounds. When the ac voltage is above 45 V ac, this error message will disappear.



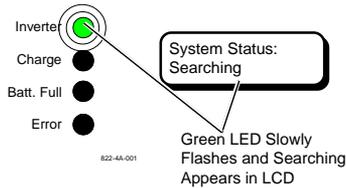
**Figure 40**  
**Low AC Input V Error Message**

-  NOTE: Press any arrow push-button to cancel the buzzer.

### 3.0 OPERATION

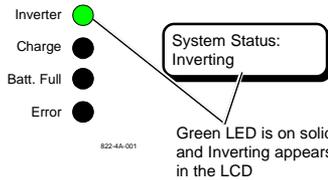
#### Inverter Mode Messages

When the inverter is ON (no ac present), it is either inverting or measuring the ac output circuits for a load meeting the specifications set up in the Search Sense menu selection (Figure 12 and 13), (if the Search Mode is selected). When the inverter is in the Search mode, "Searching" appears in the LCD display and the green Inverter LED will slowly flash.



**Figure 41**  
**Inverter in Search Mode**

When the inverter/charger is in the inverter mode (no ac available), "Inverting" appears in the LCD display and the green Inverter LED is on solid.



**Figure 42**  
**Inverter Mode**



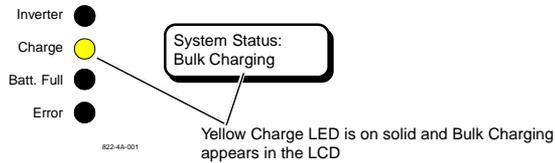
**NOTE:** The Inverter LED will slowly flash during the charge mode if the inverter is switched ON and will be OFF if the inverter is switched OFF.

## Charger Mode Messages

When ac (shore power) is available, the inverter/charger automatically switches to the charger mode. There are four separate charger modes: Bulk, Absorption, Float and Equalization. Refer to the inverter/charger Operator's manual for details on charger modes.

### 1. Bulk Charging

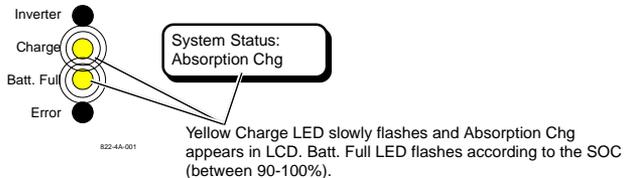
When the charger is charging in the Bulk mode, the LCD will display "Bulk Charging" and the charge LED will be on solid.



**Figure 43**  
Bulk Charging Mode

### 2. Absorption Charging

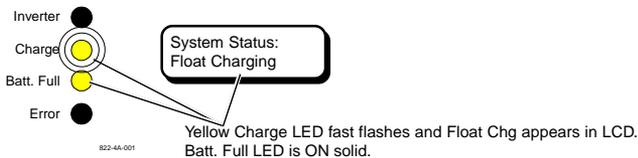
When the charger is charging in the Absorption mode, the LCD displays "Absorption Chg" and the Charge LED slowly flashes. In addition, the Batt. Full LED will start to flash when the battery reaches 90% state-of-charge (SOC). The ON duration of this LED increases as the batteries SOC increases and is ON solid at 100% SOC.



**Figure 44**  
Absorption Charging Mode

### 3. Float Charging

When the charger is in the Float mode, the LCD displays "Float Charging" and the Charge LED will quickly flash. At this point the batteries are fully charged (100%) and the Batt. Full LED is ON solid.



**Figure 45**  
Float Charging Mode

### 3.0 OPERATION

#### 4. Equalizing Charging (Liquid Lead Acid and AGM Batteries ONLY)

To activate the Equalize mode, press and hold the Settings push-button (RIGHT arrow) until the LCD display clears and "Equalizing" appears (approximately 6 seconds). The Charge LED will increase its flashing rate to approximately 8 flashes per second (flickering). The Equalize charge will continue for 3 hours and then automatically change back to Float.



**NOTE:** Equalizing the batteries should only be done when the batteries are fully charged (i.e., from Float mode) and only on liquid lead acid or AGM batteries. Vent caps on batteries (lead acid only) should be removed prior to running the Equalize mode. If the Equalization charge mode is cancelled, (by pressing and holding the Settings push-button for approximately 6 seconds) the LCD display will indicate the System Status as Absorption chg for approximately 30 seconds before returning to Float charging.



**CAUTION:** Only Liquid Lead Acid or AGM batteries should be equalize charged. Running an equalize charge on batteries other than liquid lead acid or AGM types could permanently damage them.



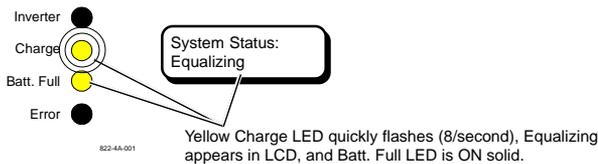
**CAUTION:** Do not attempt to remove vent caps on AGM batteries. Doing so may void the warranty.



**CAUTION:** All dc loads should be disconnected during the equalize charge period due to the higher voltage applied to the batteries (15+ volts dc). Refer to the inverter manual Equalize Charging section for details.



**NOTE:** The equalizing mode is defeated if GEL cell is selected as the battery type.



**Figure 46**  
**Equalizing Mode**

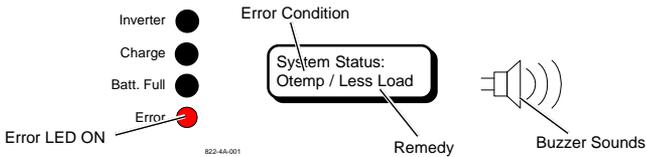
## 3.0 OPERATION

## Inverter/Charger Error Messages

Error messages display when a fault is detected with either the inverter or charger. The red Error LED lights, and the buzzer sounds. Error messages for the inverter/charger display the error condition as well as a suggested remedy.

## 1. Over Temperature

The "Otemp / Less Load" System Status message indicates the inverter/charger transformer and power components have exceeded a safe operating temperature. Reduce the load on the inverter. When the unit has cooled, it will automatically reset and resume operation. If this condition occurs often, make sure the inverter is in a cool location, has adequate ventilation and the cooling fan is operational.

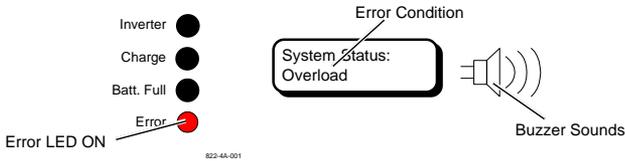


**Figure 47**  
Error Display—Over Temperature

 NOTE: Press any arrow push-button to cancel the buzzer.

## 2. Overload

The "Overload" System Status message is displayed when the load on the inverter/charger exceeds the maximum power rating of the unit. Reduce the load and restart the inverter/charger by pressing the ON/OFF push-button on the RC7 twice.



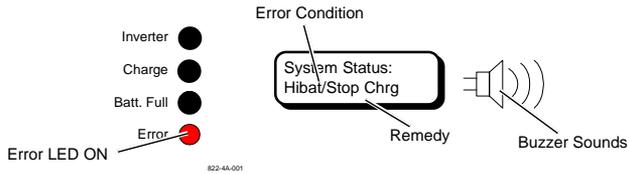
**Figure 48**  
Error Display—Overload

 NOTE: Press any arrow push-button to cancel the buzzer.

### 3.0 OPERATION

#### 3. High Battery Voltage

The “Hibat/Stop Chrg” System Status message is displayed when the battery voltage is too high. Switch off any other charging sources to allow the voltage level to drop. The inverter automatically resets and resumes operation when the battery reaches a safe voltage level. This condition usually occurs only when an additional charging source is used to charge the battery bank.

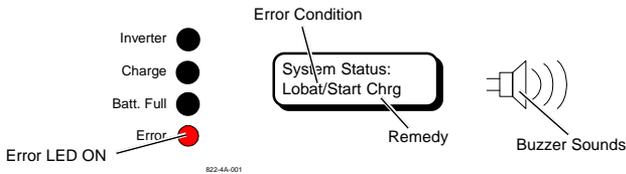


**Figure 49**  
**Error Display–High Battery Voltage**

 NOTE: Press any arrow push-button to cancel the buzzer.

#### 4. Low Battery Voltage

The “Lobat/Start Chrg” System Status message is displayed when the battery voltage drops below a safe level. The red Error LED illuminates and the Buzzer sounds. The inverter shuts off to prevent damage to the batteries. Provide an ac supply (such as shore power or a generator) to the inverter/charger to automatically start charging the batteries.



**Figure 50**  
**Error Display–Low Battery Voltage**

 NOTE: Press any arrow push-button to cancel the buzzer.

## 3.0 OPERATION

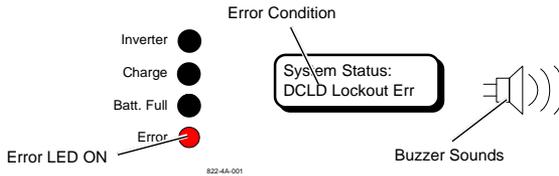
## 5. DCLD Lockout Error

The “DCLD Lockout Err” System Status message is displayed when the +12 V dc supplied to the “DCLD” input wire of the inverter/charger is lost and the DCLD feature is activated. In addition, the red Error LED will light and the buzzer will sound for approximately four minutes.

The DCLD (DC Load Disconnect) feature can be used to shut off the inverter/charger whenever +12 V dc is not available on this terminal.

 NOTE: Older units require a hardware modification to activate this feature. Refer to the instructions in the upgrade kit for DCLD.

 NOTE: The DCLD is not an error or fault with the system. It is an alert, indicating that the inverter is not running.



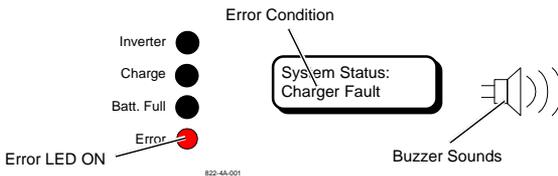
**Figure 51**  
Error Display—DCLD Lockout Error

NOTE: Press any arrow push-button to cancel the buzzer.

## 6. Charger Fault

The “Charger Fault” System Status message is displayed when an internal error is detected in the inverter/charger during charging. In addition, the red Error LED is ON and the buzzer sounds. After 15 minutes, the charge relay disconnects and the inverter section is shut down. The LCD displays “System Status: Overload.”

This fault indicates there is a hardware failure in the charger circuitry of the inverter/charger. If this message appears, contact Trace Engineering or the nearest Service Center.



**Figure 52**  
Error Display—Charger Fault

 NOTE: Press any arrow push-button to cancel the buzzer.

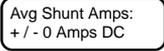
### 3.0 OPERATION

#### Meters Display

The RC7 and RC7GS have built-in meters that monitor inverter/charger activities. To view these meters, press and hold the Meter Mode push-button (UP arrow) for five seconds until the display clears. Use the DOWN arrow push-button to scroll through the meter displays. The information contained in these displays can be useful for troubleshooting the system.

##### 1. Average Shunt Amps

This meter displays the averaged current flowing through the internal shunt (external shunt if more than one inverter/charger is used) to and from the batteries.

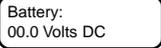


Avg Shunt Amps:  
+ / - 0 Amps DC

**Figure 53**  
**Meter Mode Display–Average Shunt Amps**

##### 2. Battery Voltage

This meter displays the current battery voltage level. Use this meter to check the condition of the batteries or monitor the levels under load.

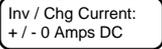


Battery:  
00.0 Volts DC

**Figure 54**  
**Meter Mode Display–Battery Voltage**

##### 3. Inverter/Charger Current

This meter displays the actual dc current supplied to the batteries when it is charging (+) and current drawn from the batteries when it is inverting (-).

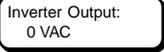


Inv / Chg Current:  
+ / - 0 Amps DC

**Figure 55**  
**Meter Mode Display–Inverter/Charger Current**

**3.0 OPERATION****4. AC Output Voltage**

This meter displays the actual inverter ac output voltage measured at the ac output. When in the charger mode, the meter will read "0 VAC." Search mode is indicated by "< 40 VAC" appearing in the display.

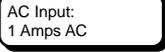


Inverter Output:  
0 VAC

**Figure 56**  
**Meter Mode Display-AC Output Voltage**

**5. AC Input Amps**

This meter displays the actual ac current (in amps) flowing through the inverter's AC INPUT HOT 1 terminal.

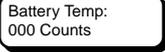


AC Input:  
1 Amps AC

**Figure 57**  
**Meter Mode Display-AC Input Amps**

**6. Battery Temperature**

This meter displays the external temperature of the battery bank when equipped with a Battery Temperature Sensor (BTS). The scale is divided into counts, which do not directly correspond to the Fahrenheit or Celsius temperature scale. A higher reading indicates a lower temperature. This meter is useful for service technicians.



Battery Temp:  
000 Counts

**Figure 58**  
**Meter Mode Display-Battery Temperature**

### 3.0 OPERATION

#### 7. Transformer Temperature

This meter displays the internal temperature of the inverter/charger's transformer. The scale is divided into counts, which do not directly correspond to the Fahrenheit or Celsius temperature scale. A higher reading indicates a lower temperature. This meter is useful for service technicians.

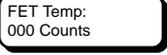


Xformer Temp:  
000 Counts

**Figure 59**  
**Meter Mode Display-Transformer Temperature**

#### 8. FET Temperature

This meter displays the relative temperature of the Field Effect Transistors. The scale is divided into counts, which do not directly correspond to the Fahrenheit or Celsius temperature scale. A higher reading indicates a lower temperature. This meter is useful for service technicians.



FET Temp:  
000 Counts

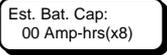
**Figure 60**  
**Meter Mode Display-FET Temperature**

#### 9. Estimated Battery Capacity

This meter displays the estimated battery amp-hour capacity based upon the average amp-hours used and the rate and duration of the charging cycles. Multiply the reading by eight to arrive at the approximate battery capacity. This is only an approximation and becomes more accurate as the number of charge/discharge cycles increases (approximately 15–20 charge/discharge cycles).



**NOTE:** If battery power is removed from the inverter, the calculation process restarts. 15–20 charge/discharge cycles must complete to reach accurate battery capacity.



Est. Bat. Cap:  
00 Amp-hrs(x8)

**Figure 61**  
**Meter Mode Display-Estimated Battery Capacity**

## 3.0 OPERATION

**System Status Messages**

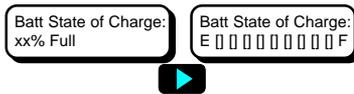
After installing the RC7/RC7GS, the LCD screen displays operating system status messages which is the default screen after exiting all other setting or meter functions. Operating parameters include; Battery State-of-charge (SOC), Time Remaining to Run, Time Left to Charge and Set Shore Power. The Gen Start-Stop switch is also available from these displays (RC7GS only).

Press the DOWN arrow to scroll through each display. When the last menu item is reached, the display wraps back to the first menu item in a continuous loop.

**1. Battery State of Charge**

This meter displays the estimated state-of-charge (SOC) of the battery or battery bank. The SOC is based on the estimated battery capacity. Since discharging the batteries to less than one half of their amp-hour capacity may damage the batteries, the meter estimates the 0% SOC and protects the batteries from over discharge.

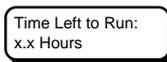
The display can be viewed as a percent-of-capacity or bar graph by pressing the Settings push-button (RIGHT arrow).



**Figure 62**  
**Battery State of Charge Displays (Percent and Bar Graph)**

**2. Time Left to Run**

This meter displays the estimated hours the batteries will support the load before requiring recharging. The meter is accurate to 1/10 of an hour (6 minutes).



**Figure 63**  
**Time Left to Run Display**

### 3.0 OPERATION

#### 3. Time Left to Charge

This meter displays the estimated hours required to charge the batteries to full capacity. The meter is accurate to 1/10 of an hour (6 minutes).



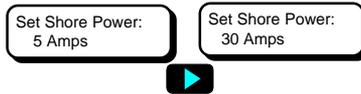
**Figure 64**  
Time Left to Charge Display

#### 4. Set Shore Power

This meter sets the shore power input (from 5-30 amps) so the total current draw from the charger does not exceed the circuit breaker rating, to provide the maximum current to the ac loads. Use the Settings push-button (RIGHT arrow) to change this setting to match the circuit breaker rating of the ac power source.

 NOTE: The maximum current draw from the 3000 kVA unit's charger is 28 amps.

 NOTE: This setting does not prevent the loads from exceeding the shore circuit breaker rating.



**Figure 65**  
Set Shore Power Display

#### 5. Generator Start/Stop

The generator can be manually started or stopped from this display by pressing the On/Off push-button on the RC7GS front panel.

 NOTE: Starting the generator from this display overrides all auto-start/stop function and displays "Man/Stop Only!!" on the User Status menu. Stopping the generator returns the auto start/stop functions.



**Figure 66**  
Generator Start/Stop Display

### 3.0 OPERATION

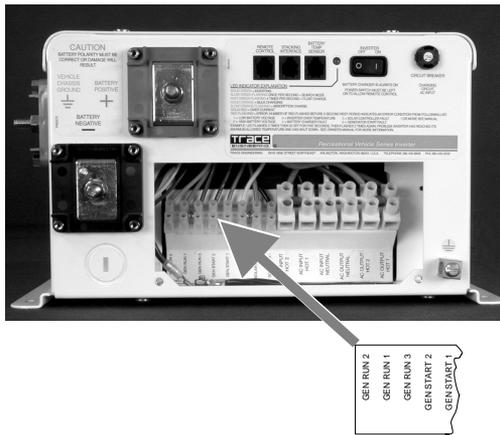
#### Generator Connection (RV Series only)

Proper installation and setup of the ac generator is essential for the correct operation of the inverter/charger. The RC7GS contains the proper software code to work with various generators listed in the LCD display.

**NOTE:** The RV Series inverter/charger must be at Software Rev. 1.3x to interface correctly with the RC7GS.

Connect the generator to the inverter as shown in the following diagrams. Select the generator type and model, as previously described under "Select Genset" on page 15.

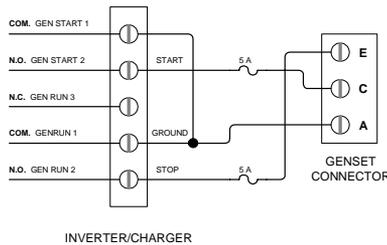
**NOTE:** The terminal strip for connecting the generator is shown below. Refer to the RV Series inverter/charger Operator's manual for complete wiring details.



**Figure 67**

#### Genset Connections on RV Series Inverter/Charger Terminal Strip

- Onan Quiet Diesel - HDKAJ, HDKAK, 7.5/8/10 and 12.5 kw**  
Connect the generator as shown below.



**Figure 68**  
**Onan Quiet Diesel Connections**

### 3.0 OPERATION

#### 2. Power Tech Wiring Diagrams (2 and 3-wire)

**Before wiring for the Power Tech option, read all instructions and cautionary markings located in the RV Series inverter/charger Operator's manual.**

 NOTE: Rev. 1.3x must be installed in both the inverter and RC7GS remote.

- Both 2-wire and 3-wire Power Tech Generators require a B+ (Battery Positive) wire from the generator to the inverter to indicate the generator is running.
- Power Tech supplies a *gray* wire on both 2-wire and 3-wire marked "12V power *or* +12V with engine running." This wire must be connected to the *white* B+ wire in the inverter's ac wiring compartment. The connector is a two-wire molex connector with a *white* and gray wire attached, which is taped to the chassis in the left-hand side of the ac section of the inverter.



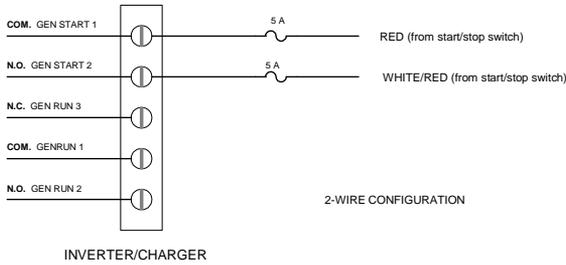
**Figure 69**  
**Molex Connector Identification**

 NOTE: The main board in the inverter must be a REV H or higher (S/N # AN 00655 or higher for RV2012; AS00085 or higher for RV2512; and AJ01001 or higher for RV3012) to work with Power Tech generators.

3.0 OPERATION

a. **PowerTech 2-wire**

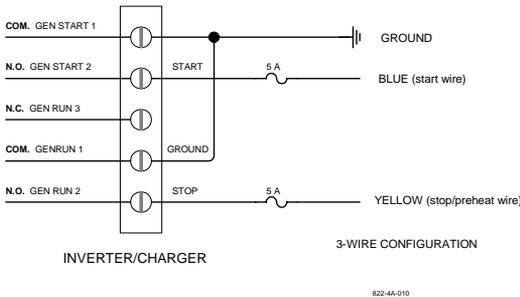
Connect the generator as shown below.



**Figure 68**  
PowerTech 2-Wire

b. **PowerTech 3-wire**

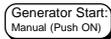
Connect the generator as shown in below.



**Figure 70**  
PowerTech 3-wire



**WARNING: WHEN STORING AN RV/RC7GS EQUIPPED VEHICLE INDOORS, ENSURE THE AUTO GEN START FEATURE IS DISABLED BY RESETTING THE GENERATOR START FUNCTION TO “MANUAL (PUSH ON).” REFER TO THE RC7GS SETUP MENU SECTION. FAILURE TO DO SO MAY ALLOW THE GENERATOR TO RUN WHEN THE AUTO-START PARAMETERS ARE MET PRODUCING DANGEROUS EXHAUST FUMES.**



**Figure 71**  
Select **MANUAL** Start for Storage

3.0 OPERATION

**RC7 and RC7GS Setup Menu**

Press and hold both menu item keys for 5 seconds

▲	Search Sense: Default	Search Sense: About 5W load	Search Sense: ...10 W load	Search Sense: ...40 W load	Search Sense: > 40 W load
▶	Auto LBCO OFF	Auto LBCO ON			
▶	Bat Capacity: Auto	Bat Capacity: 125 A-hrs	Bat Capacity: 250 A-hrs	Bat Capacity: 375 A-hrs	Bat Capacity: 500 A-hrs
▶	Battery Type: GEL Cell	Battery Type: Liquid Lead Acid	Battery Type: AGM		
▶	Charge Rate 100% of max	Bat Capacity: 90%	Bat Capacity: 80%	Bat Capacity: 20%	Bat Capacity: 10%
▶	Set Shore Power 30 Amps	Set Shore Power 25 Amps	Set Shore Power 20 Amps	Set Shore Power 15 Amps	Set Shore Power 10 Amps
▶	RC7 Setup: Last Key	RC7 Setup: Power Saver	RC7 Setup: Rolling Display		
▶	LCD Contrast: Max Contrast	LCD Contrast: 87%	LCD Contrast: 62%		LCD Contrast: Min Contrast
▶	External Shunt: None	External Shunt: This Inverter	External Shunt: Other Inverter		
▶	Fuelgauge Cutout: 9.5VDC=0%SOC	Fuelgauge Cutout: 10.3VDC=0%SOC		Fuelgauge Cutout: 11.7VDC=0%SOC	Fuelgauge Cutout: 11.8VDC=0%SOC
<b>RC7GS only</b>					
▶	Generator Start: Manual (Push ON)	Generator Start: Auto at 40% SOC	Generator Start: Auto at 60% SOC	Generator Start: Auto at 11.0 VDC	Generator Start: Auto at 12.2 VDC
▶	Generator Stop: Manual (Push OFF)	Generator Stop: Auto at 90% SOC	Generator Stop: Auto at 95% SOC	Generator Stop: Auto at 99% SOC	Generator Stop: Auto at Absorb
▶	Begin Gen Quiet 00:00				
▶	End Gen Quiet 00:00				
▶	Select Genset: Onan Quiet/Diesel	Select Genset: PowerTech 2-Wire	Select Genset: PowerTech 3-Wire		Select Genset: Other 80
▶	Set Clk: 0-23:59 00:00				
▼					

Note: The SETTINGS arrow moves across the columns - the UP and DOWN arrows scroll through the headings.

**RC7 and RC7GS Users Menu**

<b>System Status Messages</b>			
<b>AC Source</b>	<b>Inverter Mode</b>	<b>Charger Mode</b>	<b>Error Mode</b>
System Status: Waiting for AC	System Status: Searching	System Status: Bulk Charging	System Status: Otemp / Less Load
System Status: AC Available	System Status: Inverting	System Status: Absorption Chrg	System Status: Overload
		System Status: Float Charging	System Status: Hi Bat / Stop Chrg
		System Status: Equalizing	System Status: Lo Bat / Start Chrg
			System Status: DCLD Lockout Err
			System Status: Charger Fault
<b>RC7GS only</b>			
Genset Status: Pending Genstart	Genset Status: Man Stop Only!!		Genset Status: Gen wont Start
Genset Status: Cranking Genset			Genset Status: Low AC Input V
Genset Status: Starter Cooldown			Genset Status: Gen Quiet Fault

<b>System Status Display</b>	<b>Meters Display</b>
Batt State of Charge: xx% Full	Batt State of Charge: E 0 0 0 0 0 0 0 0 0 0 F
Time Left to Run: x.x Hours	Avg Shunt Amps: + / - 0 Amps DC
Time Left to Charge: x.x Hours	Battery Temp: 000 Counts
Set Shore Power: x.x Amps	Battery: 00.0 Volts DC
Gen Start / Stop: Press (ON / OFF)	Xformer Temp: 000 Counts
	Inv / Chg Current: + / - 0 Amps DC
	FET Temp: 000 Counts
	Inverter Output: VAC 0
	Est. Bat. Cap: xx Amp-hrs (x 8)
	AC Input: 0 Amps AC

### 3.0 OPERATION

#### Storage Checklist



NOTE: This applies only to the RV Series inverter/charger with RC7GS Remote.

Proper storage procedures extends the life of the batteries and ensures the coach is ready for operation when needed. The following checklist is for battery related storage activities.

#### Preparation for Storage

##### Interior Storage

- Check that all batteries are fully charged.
- Disable the Auto Gen. feature.
- Configure the RV to the correct shore service settings.
- Connect the shore power cord to a live outlet (confirm it is live).
- Switch the RV unit OFF using the remote's On/Off push-button (charger only mode).
- Switch OFF all unnecessary ac and dc loads.



**WARNING: DO NOT STORE THE COACH INDOORS WITH THE AUTO GEN START FEATURE ENABLED. THE GENERATOR PRODUCES DANGEROUS FUMES WHEN IT IS RUNNING.**

##### Exterior Storage

For exterior storage, follow the same steps as above. If shore power is not available, enable the Auto-Gen Start feature and ensure that enough fuel is available to run the generator for charging the batteries. The generator will automatically start and stop, depending on the battery's state-of-charge.

## 4.0 SERVICE INFORMATION

Trace Engineering takes great pride in its products and makes every effort to ensure your unit fully meets your RV powering needs.

If your product needs repair, contact our Service department at: (360) 435-8826 to obtain an RMA# and shipping information; or fax this page with the following information to: (360) 474-0616. Please provide:

Model Number: \_\_\_\_\_  
Serial Number: \_\_\_\_\_  
Purchase Date: \_\_\_\_\_  
Problem: \_\_\_\_\_

Include a telephone number where you can be reached during business hours and a complete return shipping address (P.O. Box numbers are not acceptable).

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
State / Province: \_\_\_\_\_  
Zip / Postal Code: \_\_\_\_\_  
Phone: (     ) \_\_\_\_\_  
Country: \_\_\_\_\_

If you would like to send us a photo and tell us about the system you are building, such as application, loads, size, operating environment and alternative power source, we'd like to hear from you.



visit our website at: [www.traceengineering.com](http://www.traceengineering.com)







5916 - 195th Street N.E., Arlington, WA 98223 Phone: (360) 435-8826 Fax: (360) 435-2229

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