

TRACE 2KW RV INVERTER — and the RC6 and RC7GS Remote Controls (Updated Oct 9)

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One of the most popular Inverters used in Monaco coaches is the Trace 2KW RV Inverter. This model is software controlled using the RC6 or RC7 remote controls. The RC7GC provides an automatic way to start the generator when the batteries are discharged. It's functions are programmable through the remote controls. It has a four-stage battery charger that is temperature compensated. The stages are called Bulk, Absorption, Float and Equalize. I will not spend time here describing ac or dc loads and battery charging because those subjects were covered in a prior article. I will attempt to describe the best ways to use this device.

RC6 – The Remote Control 6 is a basic monitor and control panel that uses light bars to display voltage, current flow, charge mode and error codes. The voltage has a light bar that go from 10.5 to 15.0 volts in .5-volt steps. The current flow light bar goes from 30 to 300 amps in 30 volts steps in the inverter mode. This measures the instantaneous current flow out the battery. When this bar is in the charge mode is starts a 15 amps and goes to 150 amps in 15 amp steps showing the instantaneous charge rate. There are two lights that show charge mode, bulk charge and float charge. When the inverter is in the Absorption Mode the Bulk Mode light flashes on and off. When the batteries are fully charged the Float light is on steady. Error conditions for High Battery, Over Temp, Over Load and Low Battery are shown using the current flow light bar. There is a Power button to turn the inverter on and off. If you desire more control of the inverter, then the RC6 should be replaced with a RC7 Remote Control. If you want to have automatic generator start/stop function the RC6 can be replaced by an RC7GS and you will have to have some wiring done to connect the Inverter to the Generator. The charge for this rewiring is usually a couple of hours of labor. The RC7 does all the functions of the RC7GS except for automatic Genset starting.

RC7/RC7GS – Remote Control. The major functions provided by the RC7GS are (1) Calculation of State of Charge (SOC) of Battery Bank, (2) capability of tailoring the inverter/charger to the various types and sizes of batteries, (3) capability of specifying the current shore power available, automatically starting and stopping the generator with a "quiet time" lockout and (4) displays variables as numbers instead of light bars. The RC7GS is necessary, in my opinion, for proper battery maintenance while dry camping (boondocking).

The RC7GS has four lights and a digital display to communicate its status. It has four buttons that are used individually or in combination to control the display and set programmable settings and functions. Learning to use the RC7GS is about the same as learning to program a VCR. The Trace manual describe all this information in detail but here I will give the KISS (Keep It Simple) version of batteries and make recommendations on the best settings for the variables controlled by the program that control everything.

Control Buttons are Inverter On/Off, Menu/Setup down and up arrow and Settings side arrow.

The Inverter On/off button turns the invert on and off. When it is in the on position the green Inverter light will be on steady unless you have shore or generator power and then it will be flashing. This means the inverter is ready to switch on within a fraction of a second, if shore or generator power is lost. The light will be off if the inverter function is not required. It should be noted that if shore/generator power is on then the charger/converter function of the inverter is on. It is not possible to turn it off totally from the Remote Control. This button is also used to manually start and stop the genset.

The center two button that show an arrow up and an arrow down are used from many functions. For example, they are used to scroll up and down from item to item on the main display. System Status, GenSet Status, Battery State of Charge, Time left to Run, Time left to Charge, Set Shore Power and Generator Start/Stop are the items on the scroll down steps.

The **Main Menu** System Status shows:

- Waiting for AC/AC Available
- Searching/Inverting
- Bulk Charging/Absorption Charging/Float Charge/Equalizing

When Error Conditions happen it displays the following error conditions:

High Temp/Less Load	Condition/Action Required
Overload/Less Load	
Hi Bat/Stop Charging	
DCLD (DC Load Disconnect) lockout error/Change Setting	
Charger Fault (Contact Trace ASAP)	

GenSet Status:

- Pending Genset Start
- Pending Manual Stop only
- Cranking Genset
- Starter Cool down (genset did not start on first try)
- Genset won't Start (genset won't start after fourth try)
- Low AC input V
- Gen Quiet Fault (This comes on when the RC7GS wants to start the genset but it is in the quiet time. As soon as it is time i.e. 7am the genset will start.

Battery State of Charge:

Percent Gauge or "empty to full" bar graph. Use the "settings" button to change from one to the other.

Time Left to Run:

This is the time left in the battery bank at the current loads displayed in hours and tenths of hours.

Time Left to Charge:

The time required to fully charge the battery bank.

Set Shore Power:

You can set the shore power setting to 30, 25, 20, 15, 10 or 5 amps at this point using the "Settings" button on the display. This setting should be set to the actual shore power that you are plugged into. Obviously if you have a 50 amp hook up, you will set this setting to 30 amps. This setting is used by the Inverter to regulate battery charging so that even when ac appliances are in use, the loads including the battery-charging load will not exceed the current connection's capability. This does not measure the ac power going to the roof air conditioners, so if you are using the ac's and you are plugged into a 50 amp service you should set this setting to 20 amps. If you have a 30-amp service and you are using the roof airs then set it to 10 amps. If you don't do this, the main circuit breakers will probably pop.

Gen Start/Stop:

You can now use the on/off button on the RC7GS to manually start or stop the genset.

EQUALIZING CHARGE STATE –

The latest software version contains a fourth charge state called **EQUALIZING** that is an important for proper wet cell acid battery maintenance. The Equalizing charge mode can be activated when in the float charge mode by holding down the Setting Button for at least 6 seconds and then the main display changes to a System Status of Equalizing. For about 3 hours the charger raised the charge voltage to 15.2 and about 25 amps. At this point the Sulfating on the battery lead plates is literally boiled off. The electrolyte level (liquid) should be full during the process and I recommend that you leave the battery bay door open to help dissipate the heat. This should be done once every month or two, depending on how many charge/discharge cycles have been experienced. AGM Batteries should also be Equalized. This is not to be done for Gel Cell. **ALL** 12-vdc appliances like the radios, water pump, refrigerator or etc. should be disconnected during this period because high voltage could damage the device.

METER FUNCTIONS: The RC7GS has the capability of digitally displaying several conditions in the Inverter. Understanding what the meter readings mean takes a few words and here we go.

To enter the meter mode you hold the Down Arrow button down for 5 seconds. During this time you will hear a pulsing sound in the RC7GS. You can now use the up/down buttons to scroll down to look at the meters offered.

AVG Shunt Amps – this reading shows the approximate current flow into (+) or out of (-) the battery bank. Therefore if the inverter is currently in the charger/converter mode the reading will show the instantaneous number of amps that are flowing from the inverter into the battery bank. This should vary from +100 amps starting Bulk Charge Mode to +3 amps when in Float Charge Mode. If the inverter is currently providing ac power to the coach, i.e. no shore/gen power, this reading will show a few amps if nothing is on to +300 amps if you turn on the microwave, toaster, hair dryer, space heater, color TV etc. all at the same time. If you have a 500 AH (amp hour) which would be four golf cart batteries, you should only do this if you want to discharge this battery bank in an hour or so. If you do this, the "Overload"

error mentioned above will probably happen and the inverter will shut down to protect itself and all the ac appliances that are operating.

Battery – this is a reading that shows the instantaneous voltage measured at the battery bank. This is not an indication of much, unless there is **NO load** on the batteries and they have been idle for at least 30 minutes. This is not possible in normal use of the Coach. When the inverter is charging this reading will probably be 14.4-vdc showing the current charge voltage. When in Float mode it should read 13.2-vdc. As the batteries are being used the voltage could go as low as 10-vdc for example when the batteries are 1/3 SOC and you turn on the microwave when the inverter is on. It does not mean that the batteries are dead. The only time a voltage measurement of a battery bank is a valid measurement of the SOC is when there has been no load at all on the batteries for 30 minutes. That means you have to disconnect all dc loads from the house battery with the main switch, wait 30 minutes and then take the measurement.

Inv/Chg Current – this reading indicates the current being used in inverter mode or created in the charge mode by the inverter. This is an instantaneous reading and useful to check charge rates which should read +30-80 amps when in the Bulk Mode, +15-30 in the Absorption Mode and +3-5 in the Float Mode. The reading can be -200 amps or more when the demand for ac is very high in the inverter mode. It should be -2-3 amps when in the standby mode.

Inverter Output – obviously this reading should be 120-vac.

Battery Temp – this is an internal reading for the Trace Engineers and is of no practical use by the Rver.

Xformer Temp – this is an internal reading for the Trace Engineers.

FET Temp – this is an internal reading for the Trace Engineers.

Est. Bat. Cap – stands for estimated battery capacity if the “auto” is selected. This is the number when multiplied by 8 shows the number of AH (amp hours) capacity left in the battery. This value is calculated by the RV7GS.

EXITING METER MODE is accomplished by holding the meter button (down arrow) for 6 seconds.

SETUP MENUE The Setup mode is entered by holding both the up arrow and down arrow buttons down simultaneously for 6 seconds. You can then scroll down the 16 variables that can be programmed by the owner. I will describe each setting and recommend the option that is most appropriate for Monaco Coaches.

Search Sense - The choices are Defeat, 5w, 10w, 15w, 20w, 25w, 30w, 40w or >40w. This is the number of watts that the inverter has to see as a possible load, before exiting standby mode and providing ac power. The lower the setting the more sensitive this function becomes. A small ac light bulb would be about 25 watts as an example. A toaster draws about 1000 watts. The lower the setting the higher the dc power use. Defeat setting will disable the search sense mode and the inverter will always sit at full voltage

reading to power a load. If you choose to leave the inverter on, when dry camping then I recommend a 30w setting, which means that something like the TV has to be turned on to take the inverter out of standby mode. This will use a small amount of 12-vdc energy. Use the "settings" button to move from one setting to the next.

Auto LBCO – this function can be turned on or off. LBCO stands for low battery cut off. In the on position, the inverter will disconnect from the battery bank if it should reach 10.5-vdc protecting the batteries from over discharge. The off position is meant only for emergencies when it absolutely important to use the batteries down to total discharge. This should definitely be set to the **on** position.

Bat Capacity – choices are Auto, 125 A-hrs, 250 A-hrs, 375 A-hrs, 500 A-hrs and 1000 A-hrs. This setting allows the RC7GS to calculate the approximate SOC of the battery bank. In the Auto setting, it will take several charge/discharge cycles for this reading to become accurate but it will eventually happen. Most Monaco coaches use 4 golf cart batteries and therefore the setting should be 500 A-hrs.

Battery Type – choices are Gel Cell, Liquid Acid and AGM. This setting determines the maximum charge voltage used in the Charger Mode. For golf cart batteries use the Liquid Acid setting.

Charge Rate – The choices are 100%, 90%, 80%, 70%, 60%, 50%, 40%, 30%, 20% and 10%. This setting controls the charge rate of the Charger Mode of operation. The Trace RV is capable of 100 amps so the percentage is approximately the maximum current rate. Batteries last longer if the rate of charge is not their maximum rate. I recommend 80% to achieve a relatively quick recharge cycle and being gentle to the batteries.

Set Shore Power – the choices are 30 amps, 25 amps, 20 amps, 15 amps, 10 amps and 5 amps. This setting controls the charge rate of the Charger when other ac appliances are in use. For example if you are set at 15 amps and you are using the microwave, toaster and coffer maker while you are connected to 15 amp shore power, the charger reduces charge rate to zero so as not to overload the shore power circuit. This setting can also be adjusted while on the main menu as described above. This makes it easier the change the setting each time you use shore power. If you don't want to fuss with it, set it at 15 amps since we seldom use shore power with lesser capability.

RC7 Setup – the choices are Last Key, Power Saver and Rolling Display. If set at Last Key the display will always be on, lights flashing and stay in the last position you put it in. In the Power Saver Mode, the RC7 turns off totally after about one minute and will not illuminate unless something changer. You can depress any button to get the display back. The RC7 automatically turns the display back on if a mode change or error happens. In the Rolling Display mode the RC7 automatically scrolls down the menu that you have selected. I recommend the Power Saver Mode, since some of the RC7's are installed in the bedroom of the some coaches and looking at flashing lights all night is hard to get used to.

LCD Contrast – the choices are Max Contrast, 87%, 62%, and min contrast. This is a way to set the brightness of the display. You set this one to your preference.

External Shunt – the choices are none, This Inverter and Other Inverter. This setting is used only when two or more Inverters are used in the same coach, like a Signature All Electric. For most of us it should always be set at None.

Fuel gauge Cutout – the choices are 9.5-vdc=0%SOC, 10.3-vdc=0%SOC, ..., 11.7-vdc=0%SOC and 11.8-vdc=0%SOC. This controls the SOC display and the SOC that you wish to run on. As I have mentioned before batteries last longer if they are never discharged below about 50% SOC. Using this setting you can make 50% SOC of the actually batteries appear to be 0% SOC on the meter. It's a way to make you try not to discharge the batteries more than 50%. For four golf cart batteries, with 500 AH, the fuel gauge would read zero, 0%, when the SOC is actually 250 AH. I like to read actual numbers on any meter so I set mine at 9.5-vdc=0%SOC.

Generator Start – the choices are Manual (push ON), Auto at 40% SOC, Auto at 60% SOC, ..., Auto at 11.0-vdc and Auto at 12.2-vdc. If set on Manual then the automatic generator start function is disabled. Since I have recommend that you never discharge your batteries less than 50% SOC, you know that I recommend 60% SOC as the point at which the genset will be automatically started.

Generator Stop – the choices are Manual (push OFF), Auto at 90% SOC, Auto at 95% SOC, Auto at 99% SOC, Auto at Absorb, Auto at Float. If sent on Manual then the automatic generator stop function is disabled. The setting at 90% will limit the generator run time for recharging. If set at 99% or Auto at Float, then the generator will run for the longest period to make sure that the batteries are really topped off. I set mine at "Auto at Absorb" and that way I am assured that the batteries are mostly recharged and that the generator will run for a period that my neighbors can handle. This setting will also operate even though you may have started the generator manually. The Generator can be stopped at any time by going to the main menu Generator Start/Stop display and holding the On/Off button down. The generator will immediately restart if the conditions are still present for Automatic Generator Starting. **Caution, If you leave this setting in any other position except Manual when the Generator Start is in the Manual setting, then when you try to start the genset with the switches on the dash, upper panel or bedroom, the genset will immediately shut down.** When I set it up for Manual Start I always set it up for Manual Start.

Begin Gen Quiet – This is the time that begins the period where the Automatic Start/Stop function will be inhibited. The display shows hours and minutes in 24-hour format with one or the other slightly flashing. Wait till the one you want to change is flashing and then hold the Setting Button down until the time you want is displayed. By pressing the button on repeatedly the value changes slowly. Holding the button down solid makes the number change quickly. If you go past the desired number you have to go around again. Normally you would set this time at 23:00 or 11 PM.

End Gen Quite – This is the time that ends the quiet period of Automatic Start/Stop. Set it the same way described above and should normally be set at 07:00 or 7AM.

Select Genset – the choices are Onan Quiet Diesel, Power Tech 2 wire, Power Tech 3 wire, ..., Other 80. Obviously set this to Onan Quiet Diesel for most Monaco Coaches.

Set Clk:0-23:59 – This allows you to set the clock and must be done for “Auto Start” to function. Set as described above in 24-hour military format.

EXIT SETUP MODE - To return to the main menu, hold both the Down and Up Arrow buttons down simultaneously.

SUMMARY – Again the words have just happened, even though I tried to make every explanation as simple as possible. If any of you Monacoers would like to submit a piece on the Heart Inverter or the new Trace 1.5KW and its associated RC8 and RC9 remote controls, please send the to me for posting on our page. Any feedback would also be appreciated.

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