

***RI*Grunner 4010S**

Automatic FET switched
Powerpole®
intelligent DC power panel

owners manual

2ND EDITION

FOR POWERPOLE INSTALLATION INSTRUCTIONS AND FOR
FURTHER HELP GO TO OUR SUPPORT PAGE:
<http://www.westmountainradio.com/supportrr.htm>

West Mountain Radio

<http://www.westmountainradio.com>

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The voltage comparator and audible alert:

A feature of the RIGrunner 4010S is our precision expanded scale voltage comparator display, with audible alert. To explain this feature we need to discuss 12 volt systems. What we commonly call 12 volt equipment isn't; it is a nominal 13.8 volts. A lead acid battery is a nominal 12.6 volts when charged and not under load, and should be approximately 14.0 volts under charge. A quality 12 volt power supply will have its regulated output set to 13.8 volts. Most radios are specified to require 13.8 volts plus or minus 15%. 12 volt automobile or aircraft alternators have voltage regulation set between 13.5 and 14.3 volts depending on temperature.

We have provided an accurate and very unambiguous display of your voltage, that takes the above in to account. There are three LED's: red overvoltage, green normal, and yellow undervoltage. The points at which the LEDs switch colors are set accurately to 11.5 and 15.0 volts. Our selection of these points gives a reliable indication of proper and safe operation of your power supply, battery or alternator. A green, or normal indication, is all you need to look for.

An undervoltage indication, shown by the yellow LED, is less than 11.5 volts. This should be safe for your radio, but may cause improper operation. Low voltage on a modern radio can cause a loss of phase lock and a frequency error. This is a definite indication that you have a problem with your power source; a bad connection, an unregulated power supply, a bad alternator or dying battery.

A normal indication with the green LED says, "EVERYTHING IS GOOD! You are between 11.5 and 15.0 volts, don't worry about a thing."

A red overvoltage indication is bad, DISCONNECT OR TURN OFF YOUR POWER SUPPLY IMMEDIATELY! You may overheat or damage your radio or other equipment. As supplied there is an audible alert, unlike other RIGrunners, on both undervoltage and overvoltage; you do not have to be watching the LED's, you will hear that you have a problem.

You may configure the audible alert for only undervoltage or only overvoltage, or you may disable it altogether. Simply place the P14 jumpers on under, over, both or none. Store the unused jumpers on a single pin so that you don't lose them.

NOTE: because of the characteristics of the comparator chip it is normal for the undervoltage LED to glow very dimly with a normal or overvoltage indication. It is also normal for the LED's to change intensity as it steps through 10 precision points or to flicker on the edge of these points. You may have two LED's on if you are exactly at the switchover point.

If you should have a bad power source or power connection you may see the yellow LED flash or come on during transmit. This happens with most automobiles when running the starter motor. Check your power source and connections. It is possible for RF from a transmitter to cause an electronically regulated power supply to lose regulation and cause an overvoltage alert during transmit. The RIGrunner is extensively RF bypassed and should minimize the possibility of this problem. If you do have an overvoltage condition during transmit especially with a VHF high power amp, it is due to inadequate RF filtering on the DC lead of the VHF amplifier, or poor RF immunity of the power supply regulator circuit.

RIGrunner 4010S

Thank you for purchasing a RIGrunner 4010S! We think that you will enjoy having a RIGrunner with Powerpole connections throughout. Having proper DC distribution should make a long overdue improvement to the convenience and safety of your station. The RIGrunner is a simple device and it's basic function is obvious. The RIGrunner 4010S is the 12 volt equivalent of a 120 VAC power panel in a house except that it has a convenient on/off switching system.

There are some considerations to think about. Please read these instructions carefully before setting up your RIGrunner. Read our support page for powerpole installation instructions: <http://www.westmountainradio.com/supportrr.htm>.

Choosing a mounting location:

Pick a location that is close, or central to, most of your radios and accessories; especially those that draw large amounts of current. Locate your power source as close as possible to the RIGrunner. Remember that every wire has resistance, longer wires have more resistance. More than a 10' run of # 10 wire is not quite adequate to supply the RIGrunner to full output without a significant voltage drop.

Locate it in a cool dry place with good ventilation. In other words, do not put it on top of your amplifier or room heater, or cover it with something. Do not put it in the engine compartment of your car either. Do not put it on the floor of a car; rain from open windows or snow covered boots may cause water damage.

Put it in a location that gives easy access and is easy to see; for obvious reasons.

Connecting your equipment:

The first step is to put a pair of PowerPoles on EACH and EVERY cable that you own that supplies or uses 12 Volts DC. We are kidding, but really, the more of your 12 volt connections that have Powerpoles, the more convenient it will be to connect and make use of your equipment. Remember that Powerpoles are genderless, the same connector arrangement works on both supply and load. You can charge batteries, or power with batteries, using the same connectors.

Powerpoles can be installed by soldering or crimping. Be sure to make good connections. For detailed Powerpole connector installation instructions see our RIGrunner support page <http://www.westmountainradio.com/supportrr.htm>.

The only thing you **ABSOLUTELY MUST DO** is to make sure that you assemble the connector pairs correctly. They must be according to the amateur radio standard used by the RIGrunner. **DO NOT PLUG ANYTHING IN** unless you are **CERTAIN** that you have **RED + PLUS AND BLACK - MINUS, CORRECT! CHECK THIS TWICE!**

The far left connector is labeled the DC input and is supplied with a 40 amp fuse. The next connector is labeled "MASTER" and is always on. The master outlet is where you would connect the radio or piece of equipment that you would like to automatically control the nine switched outlets. Plug the equipment that you would like to be switched on and off, in to

switched outlets 1-9. Start with the highest power connections to the left and the lower power drain units to the right, notice the supplied fuse ratings next to the connector you choose. Typically 12 volt input amplifiers and 100 watt RF output transceivers should be to the left, VHF radios next and smaller accessories to the right.

You may connect as many amplifiers and/or transceivers as you like, even though the maximum current with several transmitting at once would exceed the RIGrunner's 40 amp maximum. The limiting factor is the total current draw while transmitting. You may not be able to transmit with every radio at the same time. Most radios and amplifiers draw less than 3 amps in receive, but much more in transmit. The manuals for your radios should list the power consumption specs if you are concerned about this. You cannot hurt the RIGrunner or anything plugged in to it if the total current goes too high, you will simply blow a fuse or make an undersized power supply unhappy.

The RIGrunner comes supplied with a range of fuses installed. This assortment will probably be usable for most stations. Do not feel for any reason that you cannot change the fuses installed. Every RIGrunner outlet is safe up to 40 amps but the total for the entire RIGrunner is also 40 amps. Note that the fuse on the Master outlet should be sized to as low a value that is possible to adequately supply the equipment plugged in to that outlet.

You **MUST** have a fuse in each position that is in use. **ANY ATTEMPT TO BYPASS OR SHORT ACROSS THE FUSES WILL BE DANGEROUS AND VOID THE RIGRUNNER WARRANTY.** Since the maximum available automotive fuse is 40 amps, the RIGrunner will be protected as long as any value ATC/ATO fuse is installed. You should choose the correct fuse for your equipment.

Standard ATC/ATO automotive blade fuses are used. They are available at auto stores, super markets and even drug stores. These fuses are available in 10 values ranging from 1 amp to 40 amps.

The DC input should have a fuse that is appropriate for your power supply's rating. If you will be using a smaller power supply you may wish to use a lower value fuse than the 40 amp value supplied. Ideally all of the outlets should have a fuse that is equal to, or just over the maximum current draw of the unit on that fuse. If the unit to be plugged in already has a fuse on it's power cord you may match that value or go one value higher. Sizing each fuse for each unit is desirable especially on the master outlet but not absolutely necessary. Having a higher value than the minimum will simply give less protection for that unit, too low a value will blow out prematurely, of course.

Note that each fuse position has a LED blown fuse indicator that will conveniently light if that fuse is blown. There must be power to the RIGrunner and a load on the circuit that has the blown fuse for the blown fuse LED to light.

Automatic or manual power switching:

The RIGrunner 4010S has a unique, high performance and convenient power switching system. It uses an electronically controlled solid state FET switch designed to switch DC currents of up to 100 Amps. This FET switch is over current and over temperature protected. It should last indefinitely compared to a mechanical switch that suffers from arcing. The mechanical control switch in the RIGrunner carries none of the load.

The control switch has three positions: "OFF", "AUTO" and ALL ON". In the "OFF" position

only the switched outlets are switched off. In the "AUTO" position the switched outlets will automatically turn on whenever an adequate load current is drawn from the, always on, "MASTER" outlet. In the "ALL ON" position all of the switched outlets will be on regardless of what is connected to the master outlet.

IMPORTANT: The fuse installed in the master outlet must be chosen correctly (a package of extra fuses is supplied)! The power consumption of the unit you would like to use to control the master outlet must be matched to the fuse. Select the lowest value fuse that will supply your unit. A higher value fuse than is needed will reduce the sensitivity of the automatic control circuit. Too high a value may render the automatic control inoperative. Use the table below to select the proper master outlet fuse and to determine if the power consumption of the unit you plan to use will provide positive control.

Master Fuse Amps	Sensitivity Amps (typ.)	Master control unit
40	.8 A	160 watt VHF amp
30	.6 A	
25	.5 A	100 watt transceiver
20	.4 A	
15	.3 A	
10	.2 A	30 watt VHF mobile
5	.1 A	QRP transceiver
1	.02	small station accessory

NOTE! The current sensing circuit is very sensitive, it measures current with no additional voltage drop on the master outlet compared to an unswitched RIGrunner outlet. We are actually using the master fuse as the current sensing element! We have done everything possible to avoid false triggering of the automatic turn on. RF and transient voltages should not falsely trigger our circuit. The circuit is designed for 13.8 VDC operation. Operation at voltages in excess of 15 Volts may cause improper operation. We are not responsible if your equipment is accidentally left on due to improper operation.

NOTE: If the master outlet fuse is blown or removed that blown fuse LED will light and the 4010S switched outlets will turn on even if there is nothing plugged in to the master outlet. You should have a good fuse of any value installed at all times.

WARNING: Do not adjust the internal calibration potentiometer, it is carefully set for proper operation.

PLEASE do not call to ask what size fuse to use or if the unit you would like to use for automatic control will work. We do not know the power requirements of all radios and station accessories ever made. Consult the owners manual for your unit or actually measure the power consumption.

A West Mountain Radio Whatt Meter is a handy way to easily measure Volts, Amps, Watts and Amp / hours all at the same time on one display.

Powerpole connector installation tips:

Assemble the red and black plastic housings together correctly on the first try, they fit snugly and can be difficult to get apart. See the picture below for ARES /RACES standard orientation that the RIGrunner uses. Note that you can assemble the red and black insulated housings in other ways for special applications.

Put the connector housings together before putting the connector pins in, this is easier, especially when using heavy paired wire.

Before soldering or crimping the contacts on to heavy paired wire, orient the contacts so that they are both facing the the correct direction so that they go in the housings without twisting the wire.

The plastic housings are held together with dovetail joints. Always slide these joints together! They will be damaged if you try to snap them together or apart. They ONLY slide together in one direction. This should be obvious by looking at them carefully.

Do not use roll pins on PowerPoles! Some people supply roll pins with PowerPoles. Do not use them, they can and will fall out, and knowing Murphy, right in to your new radio causing smoke! Anderson does not supply or recommend roll pins, they supply not roll pins but much more expensive spiral pins, which are better. We have tested both, even the proper spiral pins will fall out. If the pair of heavy wires are squeezed together near the back of the connector, like you might do when you pull the connector out, it will spread the bodies apart slightly and out falls the pin.

We spoke to Anderson about this concern and they said that they recommend using an cyanocrylic (Crazy Glue) glue to hold the connector bodies permanently together. They do not recommend their spiral pins for critical applications. Normally the dovetail joints in the housing hold well but if you like glue them don't use pins. Just make sure you have them assembled correctly BEFORE you put on the glue, they will be permanently bonded together, all it takes is a small drop in the seam between the red and black.

The contacts go in the housings in only one way. Insert the contacts with their sharp edge down against the flat spring that is in the housing. They should slide in and click. If you do not hear a click or they are not fully seated, fix them. When they are inserted fully you should notice that the contact and it's wire "floats" slightly inside it's housing. If it feels tight it may not be snapped in fully or you have made the contact wider than it originally was during crimping or soldering.

Tug slightly on the assembled connector to make sure the contacts are locked in place. If you have trouble getting the contact to lock in to the housing you may have squashed the contact wider deformed it some how. Look at the side profile of the contacts before and after crimping, you may have to bend it back straight before inserting it in to the housing.

When soldering the contact pins, be careful not to use too much solder. Keep the solder inside, where the wire goes. If a blob of solder gets on the outside of the connector body you may have trouble putting the contact into the housing. If you get solder on the contact surface area you will not make a good contact.

When crimping the contact pins use a crimp that contains the wire completely inside the pin and doesn't spread the connector apart. A good crimp is one where the dimensions of the crimped portion are no more than an uncrimped pin. If the crimp is flattened out you will not be able to easily push the pin in to the body. If you bend the contact blade in relation to the crimp area you should straighten it before putting it in to the body.

It is possibly to use larger or smaller gauge wire with the 30 and 45 amp connectors. The 30 amp connector pins will work with difficulty with #10 wire if you cut the end cleanly and carefully put each and every strand of that wire in to the pin. It may be is easier to use 45 amp connectors on #10 wire. Using 16 gauge or smaller wire in a 30 amp contact requires that you double or triple up the wire to fill the crimp receptical of the contact to get a good crimp.

A properly crimped contact should have a minimum hold on the wire of more than 25 pounds. A pair of connectors should snap together with 6 to 8 pounds force.

Last but not least, MAKE SURE you have the polarity correct before plugging in you equipment. "Measure twice, cut once" as the saying goes.

**For more detailed instructions see our support page:
<http://www.westmountainradio.com/supportrr.htm>**

RIGrunner Warranty

The RIGrunner is warranted against failure due to defects in workmanship or materials for one year after the date of purchase from West Mountain Radio or an authorized dealer. If purchased from an authorized dealer it must be returned with a copy of the original sales receipt or proof of purchase.

Warranty does not cover damage caused by abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation, alteration, lightning, or other incidence of excessive voltage or current. If failure occurs within this period, return the RIGrunner or accessory to West Mountain Radio at your shipping expense with a full explanation and necessary proof of purchase. The device or accessory will be repaired or replaced, at our option, without charge, and returned to you at our shipping expense. Repaired or replaced items are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the RIGrunner or accessory made after the expiration of the warranty period.

West Mountain Radio shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss, or damage caused directly or indirectly by use or performance of the products or arising out of any breach of this warranty, including, but not limited to, any damages resulting from inconvenience, loss of time, data, property, revenue, or profit, or any indirect, special incidental, or consequential damages, even if West Mountain Radio has been advised of such damages.

Except as provided herein, West Mountain Radio makes no express warranties and any implied warranties, including fitness for a particular purpose, are limited in duration to the stated duration provided herein.