

Thank you for purchasing the PWRgate....a simple 12 volt backup power system.

A PWRgate transfers up to 40 amperes at up to 16 volts dc continuously. It is a safe way to connect both a battery and a power supply to a load, while electrically isolating both the battery and the supply from each other. Whenever your 13.8 Volt power supply is on, the supply feeds the load. Through a PWRgate your power supply also charges the battery, keeping the battery healthy and ready for use. Whenever the power supply is off, the battery feeds the load. If either the power supply or the battery is malfunctioning, neither draws current from the other. Switching is instantaneous.

A PWRgate is a simple backup power system. Communication equipment will remain operative on battery during ac power blackouts. Power supplies and batteries can be swapped out while equipment remains on. No glitches.

Before installing the PWRgate, please read the following instructions.

## Choosing a mounting location

Pick a location that is close, or central to, your power supply, battery, and load. Some 12 volt equipment may draw large amounts of current. Remember, all wires have resistance so wires must be kept as short as possible and should have a large wire size in order to minimize the voltage drop.

The PWRgate can be installed in any orientation in a cool dry location that is well ventilated. Be careful not to restrict the cooling in any way. Do not place in direct sunlight, near heaters or heat sources.

The PWRgate can be mounted using number 8 hardware, using the two mounting holes.

## Connecting the power supply

Anderson Powerpoles are used for all PWRgate connections. See the inside cover and our support page <http://www.westmountainradio.com/supportrr.htm> "Powerpole Connector Installation Tips" for extensive Powerpole instructions.

The power supply wire should be heavy gauge and as short as possible. We suggest #10 wire, less than 6 feet long. West Mountain Radio carries 3 and 6 ft long ready made power supply cables, #10 red and black insulated wire, with 1/4 in ring terminals to fit most power supplies on one end and a pair of Powerpoles on the other.

When connecting, make sure that the RED Powerpole connects to the RED wire and connects to the PLUS terminal on the supply. Similarly, make sure that the BLACK Powerpole connects to the BLACK wire and connects to the NEGATIVE terminal on the supply. Check to see that the connections at the power supply are well tightened.

Plug the wire from the power supply into the PWRgate connector marked PS (power supply). Always confirm that the Powerpoles are plugged together securely.

## Connecting the load or power strip

If you are connecting directly to a radio or other device, you will need to install Powerpoles on their cords. Modern radios use RED wire for positive, and BLACK wire for negative (or common or ground). Double check this if you have non-standard equipment. Plug this wire into the PWRgate terminal marked OUT.

If you are connecting the output to a RIGrunner power strip you may use a West Mountain Radio 3 ft or 6 ft extension cables with #12 red and black insulated wire and pairs of Powerpoles on both ends.

At this point, check the system operation with the power supply. Simply turn on the power supply, and turn on the equipment, the equipment should work normally.

## Connecting the Battery

The battery wire should be as heavy and as short as possible. We suggest #10 wire less than 3 feet long. Batteries have less voltage than power supplies therefore voltage drop is more important. **WARNING:** a fuse must be installed physically as close to the positive terminal of the battery as possible. A short circuit in a battery wire, connected to a large battery, will instantaneously cause the burn white hot...avoid this situation! We did not put a fuse in the PWRgate as it would NOT protect the wire itself against a short.

Batteries have side posts, top posts, studs or fin terminals. Deep cycle, marine, AGM, etc. usually have two different sized polarized 3/8 inch and 5/16 inch studs. West Mountain Radio carries power supply cables and battery fuse kits. We also have lugs to convert top posts to studs.

## Batteries

**Caution: Handle batteries with knowledge and extreme care! Automotive and marine batteries have dangerous chemicals that can spill out. These batteries emit hydrogen that will explode from a small spark sending shrapnel and acid in all directions.**

**Batteries can get very hot when improperly charged or shorted, and explode. Shorted battery wires can and will cause fires, use a fuse located directly at the battery plus terminal.**

Chose a 12 volt battery with an ampere-hour rating according to your power needs. Find a battery with an true ampere hour rating, do not pay attention to "cranking amps".

Automotive and marine batteries are not safe as they will spill acid and give out explosive hydrogen fumes. They are much more dangerous than gell cell or absorbed glass matt (AGM) batteries. Gell and AGM batteries will not spill, will not explode and last longer.

Automotive and marine batteries are normally only used in protected, well ventilated, locations.

Automotive and Marine lead-acid types offer the best price to power ratio but they are dangerous. Marine batteries will tolerate deep discharges slightly better than auto batteries, but the can easily be damaged by repeated deep discharge. Gell cells and absorbed glass mat (AGM) batteries have many advantages and are usually worth the extra price. Select a battery that offers both safety and performance. See our RIGrunner links page for links to web sites with extensive battery information, <http://www.westmountainradio.com/linksrr.htm>.

## System checkout.

When the power supply and battery are connected, and the PWRgate is powering a load, a quick check-out is as follows. Simply turn on your equipment, unplug the power supply; the equipment should operate without interruption, now powered by the battery. Plug the power supply back in, and the equipment will now be powered from the ac power supply. You may notice a slight drop in the voltage, this is normal. A power supply is a nominal 13.8 volts and a battery is 12 volts.

If you would like use an ammeter, or a Whattmeter (sold by West Mountain Radio) to verify operation, follow this. Simply measure the current from the power supply when it is connected and powering the equipment. Measure the battery current when the supply is switched off or is disconnected. To measure the battery charging current, place the ammeter in the battery lead, make sure the power supply is on and the output is disconnected.

## Voltages

Radio manufacturers list the recommended dc supply voltage range for a specific radio model. Some radios are listed as 13.8 Vdc +- 15%, and others as 13.8 Vdc +-10%. Note that they are not rated for 12 volt operation but 13.8 volts.

12 volt power supplies should be adjusted to supply to provide 13.8 volts dc. The PWRgate has a diode in series with a voltage drop of 0.4V regardless of current. Therefore, the PWRgate output will be 13.4

volts.

Fully charged 12 volt batteries exhibit somewhat over 12 volts just after charge. But when they are supplying current, the voltage is diminished by the battery's internal resistance, typically to 12 volts nominal. The PWRgate will give a drop of 0.4 volts, thereby providing 11.6 volts to the radio.

Additional voltage drops can easily occur due to the high current and the resistance in the wires, the fuses, and the connectors. Therefore it is imperative to keep all wires as heavy and short as possible, as low an AWG number as practical, and as few connectors as possible. Also use a large supply fuses, 30 or 40 A to keep the fuse voltage drop low.

### PWRgate charging circuit

The charging circuit is a simple "float" charger in order to maintain a battery near full charge. The circuit is provided so that any 13.8 volt power supply will function safely as charger. It can supply about 1 ampere if the battery is heavily discharged. As the battery voltage rises, the charging current decreases until it supplies only a current equal to the quiescent discharge rate of the battery.

If a large battery were heavily discharged, it could take over a week to re-charge the battery using this circuit. Nevertheless, in most applications, the battery is only called on when a power failure occurs, hopefully infrequently. The charging circuit is useful to prevent self discharge of a battery keeping it healthy and ready for use. Otherwise batteries left unattended will go bad in a few months!

### Caution:

**Handle batteries with knowledge and extreme care! Automotive and marine batteries have dangerous chemicals that can spill out. These batteries emit hydrogen that will explode from a small spark sending shrapnel and acid in all directions.**

**Batteries can get very hot when improperly charged or shorted, and explode. Shorted battery wires can and will cause fires, use a fuse located directly at the battery plus terminal.**

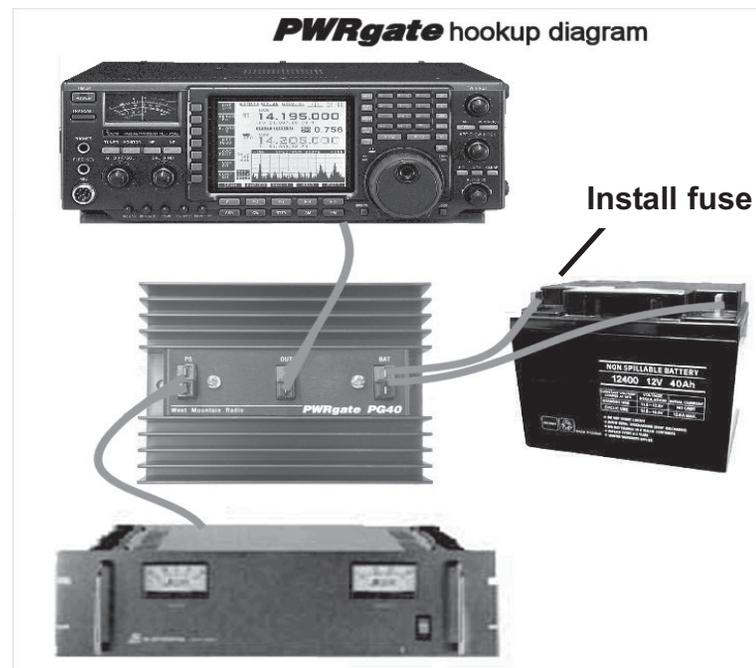
### Note:

**If you remove the cover pay attention to the labels on the PCB when replacing. If the labels were incorrect, connecting it backwards would cause the charging circuit to be inoperative.**

**IF YOU CAN'T FIND IT HERE GO TO OUR SUPPORT PAGE:  
<http://www.westmountainradio.com/supportrr.htm>**

# PWRgate PG40

**Simple backup 12 volt power system  
with Powerpoles®  
owners manual  
2nd Edition**



### Specifications

Maximum Voltage:	16 Volts dc
Maximum Current:	40 Amperes
Circuit:	Diode OR-Gate
Diodes:	Two Schottky 80 Ampere, 20 Volt
Voltage Drop:	0.4 Vdc Quiescent 0.6 Vdc at 40 Amperes
Charging Circuit:	Schottky diode and current limiting resistor.
Connectors:	Anderson Powerpoles, 45A
Size:	5.25 x 3.90 x 1.65 in, 13.4 x 9.9 x 4.2 cm
Weight:	0.9 lbs, 0.4 kg
Mounting Holes:	Two, 0.175 d, at 4.95 distance, for #8 hardware.

## West Mountain Radio

<http://www.westmountainradio.com>

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