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ISOpwr
Operating Manual
2011

Congratulations on purchasing the West Mountain Radio ISOpwr. It isolates an auxiliary battery while also supplying power to the battery.

The ISOpwr is an automotive ON-OFF switch that will charge an auxiliary battery and run mobile radio equipment. The ISOpwr turns ON when the car is running and the alternator is over 13.5 volts. The ISOpwr turns OFF when the alternator is not running and the car's battery has fallen below 12.6 volts.

Equipment connected to the ISOpwr will be powered from the auxiliary battery. When the car is running the equipment is also powered by the car's alternator.

Note: The car's battery will never be drained by leaving the equipment turned on. The car will always start.

The ISOpwr is ideal for use in all vehicles utilizing an auxiliary battery for diverse purposes such as a radio command set up for ARES, RACES, FEMA, contest VHF/UHF rover, moderately powered ham equipment, a re-charging station for electric model airplanes, boats and cars, and for RV's and campers.

The ISOpwr may be used without a battery to automatically turn a radio on whenever the car is running. The radio will turn off with a short delay after the car is stopped.

General Installation Instructions

The ISOpwr connects between the automotive 12-volt system and the auxiliary battery. The auxiliary battery and the equipment are usually located in the car's trunk. Place the ISOpwr unit close to the battery and equipment. Then run the cable to the car's battery.

Note: The ISOpwr should be mounted in a dry location. It is not waterproof.

The unit comes with Anderson Powerpoles. Input (CAR) is on the left side and this connects to the auto's 12-volt battery; the auxiliary battery (BAT) connects to the right Powerpole; and your equipment (OUT) connects to the center Powerpole. If you need to power multiple devices, it is suggested to install a RIGrunner distribution panel and connecting it to the ISOpwr's output.

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It is always good practice to use number 10 AWG wire when connecting up 12 volt, 100 watt, radio equipment. Number 12 AWG wire will often work fine if the lengths are kept short.

It is recommended to use RED colored wire for all positive leads, and BLACK colored wire for all negative leads. Then install BLACK and RED Powerpole connectors respectively. Observing the color code system may avoid making a polarity error.

Figure 1 is the connection diagram.

Safety Precautions

a. Auxiliary Battery Choices:

1. When using an automotive battery, it should be mounted in the trunk or under the hood. Do not place it in the passenger area of the vehicle. These unsealed batteries will emit gases that are dangerous in a closed area.

2. If using a sealed lead acid battery, it can be placed internally. The AGM, glass mat type is a good choice. It has a charging voltage that is similar to the car's alternator voltages.

3. If using a GEL type battery, it also can be placed internally. However, confirm that the alternator voltage does not exceed 14.5 volts (at 70 degrees F). This will ensure full life for the GEL cell.

b. Fuse at the Cars Battery

A fuse must be placed in the wire at the battery terminals connecting to the car's battery. A 40 ampere fuse is recommended. This safety precaution is necessary because the battery is a large power-storage device that, if shorted, would release a massive amount of energy, sometimes causing the battery to explode.

ISOpwr Checkout.

Following installation, the ISOpwr can be easily checked for correct operation.

1. With the engine OFF, make sure the ISOpwr green LED is off.

2. Start the engine. After a few seconds the Green LED will illuminate showing the car is now connected to the auxiliary battery and/or the radio equipment. Make sure that the radio also turns on.

3. Turn off the engine. The green LED will stay on for a while because the car's battery may be above 12.6 volts. After a few minutes the car's battery will have dropped to less than 12.6 volts and the ISOpwr will turn off.
   Note: To rapidly drop the car's battery, switch on the car headlights.

ISOpwr Operation with Auxiliary Battery

The ISOpwr output (OUT) and the auxiliary battery (BAT) are internally connected together. Therefore, equipment connected to the ISOpwr output is powered directly from the auxiliary battery.

When the car is running, the ISOpwr Green LED will illuminate indicating that the auxiliary battery is being charged by the car's alternator. Equipment connected to the ISOpwr will also be powered by the car's alternator.

When the car is OFF, the ISOpwr LED will go out after a short period of time.

Note: The current supplied by the car's alternator is shared between the car's battery and the auxiliary battery, according to the load and the various voltages.

ISOpwr Operation without Auxiliary Battery

The ISOpwr may be used without a battery. It will automatically turn ON and apply the car's charging voltage to any load whenever the car is running. It will turn OFF with a small delay after the car is no longer running. This is useful to prevent items from discharging the car's battery when they are inadvertently left on.

To use without an auxiliary battery, connect the ISOpwr input (CAR) to the car's battery. Then plug the radio (or any other item) into the ISOpwr output (OUT). The radio will be powered whenever the car is running.

Many times a radio is left turned on in a vehicle. However, with the ISOpwr, it will automatically turn off thereby preventing a drained car battery.

Technical Description

The ISOpwr is a voltage-controlled switch connected to the 12-volt source. The circuit consists of a power MOSFET with a high side driver, a voltage comparator circuit, and a power diode.

The MOSFET is basically a variable resistor functioning as a switch. Its resistance is less than 10 milliohms in the ON mode, and many megohms in the OFF mode. The MOSFET is kept cool by conducting heat to the heatsink.

Note: The device contains a high-side driver that also protects the FET. It turns off if the temperature rises too high and if the current exceeds 100 amperes, (i.e. a shorted output.) The MOSFET is rated to handle more than 40 amperes.

The voltage comparator senses the ISOpwr's input voltage. If the voltage is above 13.4 volts it switches the MOSFET ON. When the MOSFET is on, the comparator changes the reference so the input voltage now must fall to below 12.6 before the MOSFET goes back to OFF. (This "hysteresis" system prevents the ISOpwr from going on and off during load variations.)

There is an 80-ampere Schottky diode in series with the output. This prevents any reverse voltage problems as well as providing a 0.25 volt drop to prevent overcharging the auxiliary battery from a non-precise alternator.

Note: A battery's quiescent voltage is between 12.0 and 12.2 volts. When the alternator is charging, the applied voltage varies from 13.8 to 14.4 depending upon the current being supplied. Therefore, the ISOpwr turns on when the alternator is operating, and turns off when the car's system has returned to the car's battery only.

The Green LED is connected to the MOSFET's output. It is lighted whenever the MOSFET is on. It does not measure charging current.

A 40 ampere fuse is in series with the ISOpwr input. The fuse may be changed to a smaller value if needed.

Specifications

Operating Voltage	20 volts maximum
Quiescent Current	Less than 5 ma
Maximum Current	40 Amperes
Voltage Drop	0.25 volts at 1 ampere, diode drop
Series Resistance	0.01 ohms maximum
Switch Time-Constant	5 seconds
Turn ON Threshold	13.3 (+- 0.1) volts
Turn OFF Threshold	12.6 (+-0.1) volts
Green LED	Indicates that the ISOpwr output is ON
Size	5.25 x 3.95 x 1.65 inches
Weight	1 lb.
Enclosure	Heatsink, black anodized aluminum. Painted aluminum cover