Overcoming Design Deficiencies in *RigRunner* DC Distribution Panels

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Introduction

The West Mountain Radio *RigRunner* power distribution panels use Anderson PowerPole connectors and automotive blade fuses for connecting and protecting multiple loads on a single source. While these panels are very useful in radio electronics installations, they suffer from at least three design deficiencies: (1) The blown fuse indicator circuit allows current to flow to the load even after the fuse has blown; (2) The blown fuse indicator LED is hidden by the installed fuses and is impossible to see under normal conditions; and (3) The PowerPole connectors cannot be equipped with retention clips and they accidentally disconnect very easily. MFJ and possibly others make very similar products, but I have never used them and do not know if they suffer the same problems. I discovered the flaws the hard way several years ago but occasionally forgot about it, leading to far more trouble-shooting time than necessary on my many projects.

Description of Flaws

Each *RigRunner* circuit includes an LED blown-fuse indicator (figure 1) through which the circuit continues to be powered at reduced voltage even though the fuse has burned opened due to overload or short circuit (flaw 1). The output voltage after the fuse has opened depends on the load. The blade fuses are fast-acting and have little tolerance to transients, which causes nuisance opening. With no load connected, full system voltage is measured with a digital multimeter (DMM) at the connector on the load side of an open fuse – a confusing indication to say the least.

The blown-fuse indicator LED glows when the fuse has opened, getting its current through the load and a 1200 ohm current limiting resistor. This assumes the load has sufficiently low impedance to allow enough current to flow to forward bias the LED. The LED is located on the internal PCB and hidden by the installed fuse (flaw 2). This has proven more of an annoyance than a safety problem (the resistor limits the current to 10 mA in a 12 V system).

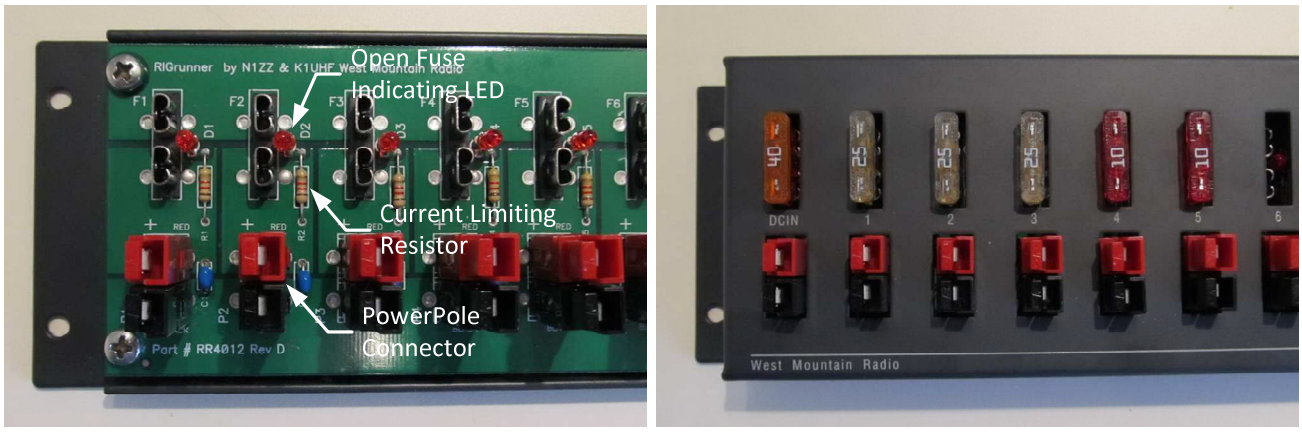

Figure 1. Left: Cover removed from a RigRunner distribution panel. The blown-fuse indicator LEDs on the printed circuit board can be seen just to the right of and between the two fuse blade sockets. The 1200 ohm current limiting resistors are

visible below and to the right of the LEDs. Right: The LEDs are invisible under normal lighting conditions. A faint glow can be seen when a fuse blows and the ambient light is low. These images show early versions of the distribution panel with through-hole resistors and LEDs. Later versions use surface mounted devices (SMD).

The accidental disconnection of a connector (flaw 3) is another serious annoyance, especially at remote sites. The PowerPole connector contacts have very little retention force. It is quite easy to simply brush up against a connector and accidentally disconnect it. The connectors easily fall out while simply dressing the many power cables associated with a *RigRunner*. In some cases, it is not obvious the connector has fallen out or is ready to fall out.

Solutions

Remove power, all fuses and power distribution cables from the distribution panel. Remove the cover and proceed as follows:

Flaw 1 and Flaw 2: Simply remove the LED current limiting resistor or LED from each circuit. I cut the through-hole resistor leads (figure 2). For the SMD resistors on the more recent panels, I cut the resistor body while heating one end with a soldering iron and then removed the other end. Since the LEDs cannot be seen anyway, nothing is lost but now the circuit will completely open if a fuse blows. Troubleshooting with a DMM will be much easier and much less confusing;

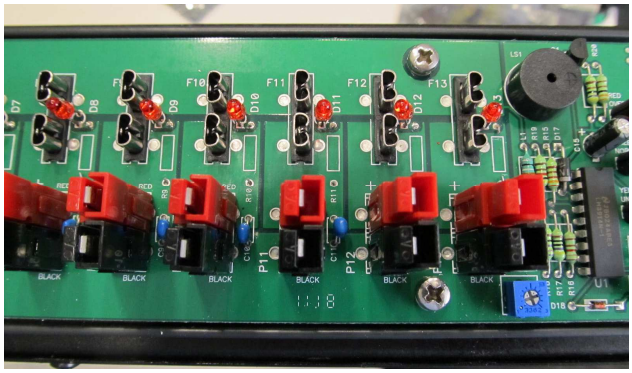

Figure 2. Removal of LED current limiting resistors (through-hole types). The resistor leads have been cut and the bodies discarded. Compare to left side of figure 1.

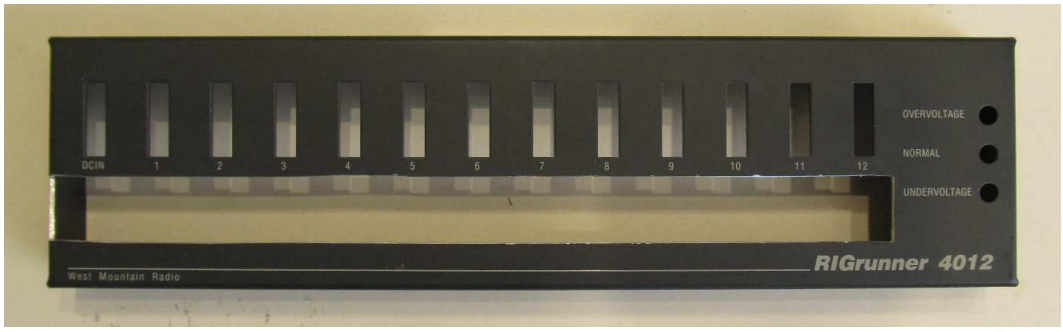

Figure 3. Cover for a 12-circuit distribution panel. The metal webs between the PowerPole connectors have been removed with a nibbler tool. The fuse slots are immediately above the cutout area. Compare to the right side of figure 1.

Flaw 3: Use a nibbler tool to cut the metal web on the cover between each PowerPole connector (figure 3). Also, notch out each end about 1/4 in (6 mm) to provide clearance for the retention clips on the end connectors.

Place the cover in a vise with wood protecting blocks on the jaws and file the cuts smooth. Clean up metal dust and replace the cover (figure 4-left). Now, the retention clips can be inserted onto either side of the connectors (figure 4-right).

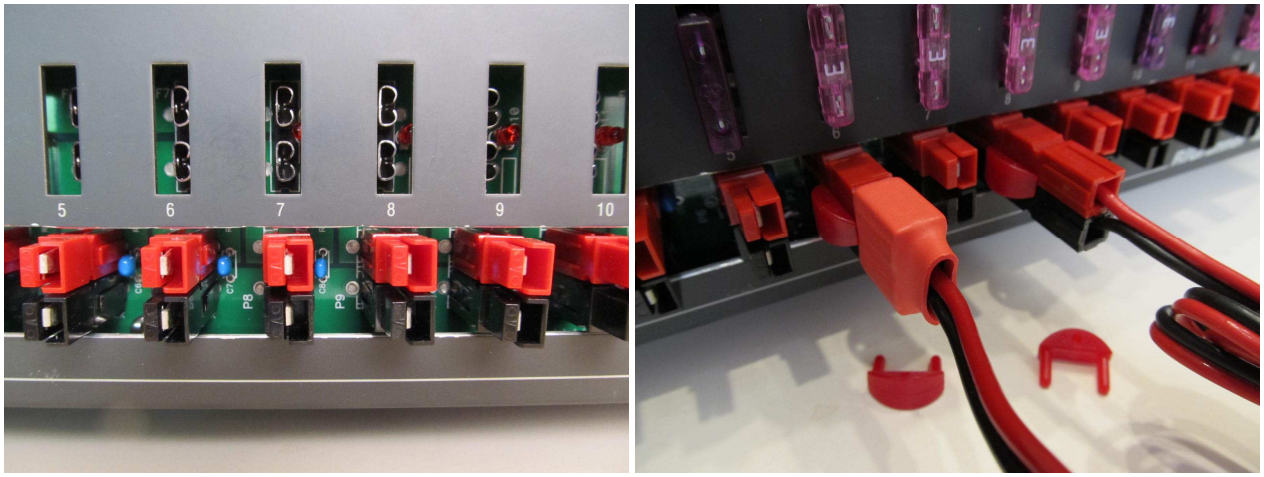

Figure 4. Left: Cover in place and modifications completed. Now, the retention clips can be inserted on either side to hold the connectors in place. Right: Retention clips in-place on two of the connectors with a couple extra clips immediately below. Only a little dexterity is needed to fit the clips, which securely hold the connectors in-place.

Comments: Do these modifications at your own risk and peril. RigRunner panels carry a 1 year warranty, which states in part: …. *Warranty does not cover damage caused by abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation, alteration, ….* The modifications described here fall under the "alteration" category (and probably under the "abuse" category as well) so, obviously, these modifications void any remaining warranty on the units to be modified.
