A REMOTE POWER CONTROLLER

Some older solid-state transceivers such as the Ten-Tec Triton IV will run from battery power but lack a switch to turn the radio on or off from the front panel. You have to either unplug the power cord or remove the cables from the battery. As designed, the power switch for the Triton IV controls the 120 V ac supply primary circuit in the matching model 262 power supply. The power switch does not, and cannot, handle the more than 20 A at 13.8 V dc the transceiver requires.

Mike Bryce, WB8VGE, developed the remote power controller shown in **Fig 19.75** to solve the problem. It was originally described in September 2007 *QST*. The front power switch on the radio operates normally, but it now controls a large power relay. This relay sends +13.8 V dc to the radio from any source, be it a battery or an ordinary dc power supply.

What Makes it Tick

The relay, K1, is controlled by power MOSFET Q1. The MOSFET is controlled by turning on the radio's power switch, which sends 13 V to the gate of Q1 through R3, a current limiter. Resistor R2 discharges the gate of Q1 when the power switch is turned off. Resistor R4 keeps the gate low, preventing Q1 from turning on from noise or stray voltage. Resistor R4 serves another purpose too. It allows about 2 mA of current to flow through the radio's power switch. This is enough to clean the contacts of the power switch.

Capacitor C1 charges via K1's coil, causing closure of the relay contacts. Once K1 has pulled in, however, it doesn't require the same amount of current to keep the contacts closed. Resistor R1 provides just enough current to hold the contacts in after C1 charges. The result is a savings of over half the required holding current. For the Omron relay specified, the nominal coil current is 90 mA. With R1 in series, the current drops to a battery saving 40 mA. While it does not sound like a lot, of savings, over the course of several hours or days this adds up to quite a few ampere-hour savings.

DS1 lights up when the relay pulls in. (If minimum power consumption is your goal you can leave out R5 and the LED.) Diode D1 clamps the EMF produced when K1's coil drops.

Filter capacitors C2, C3 and C4 keep

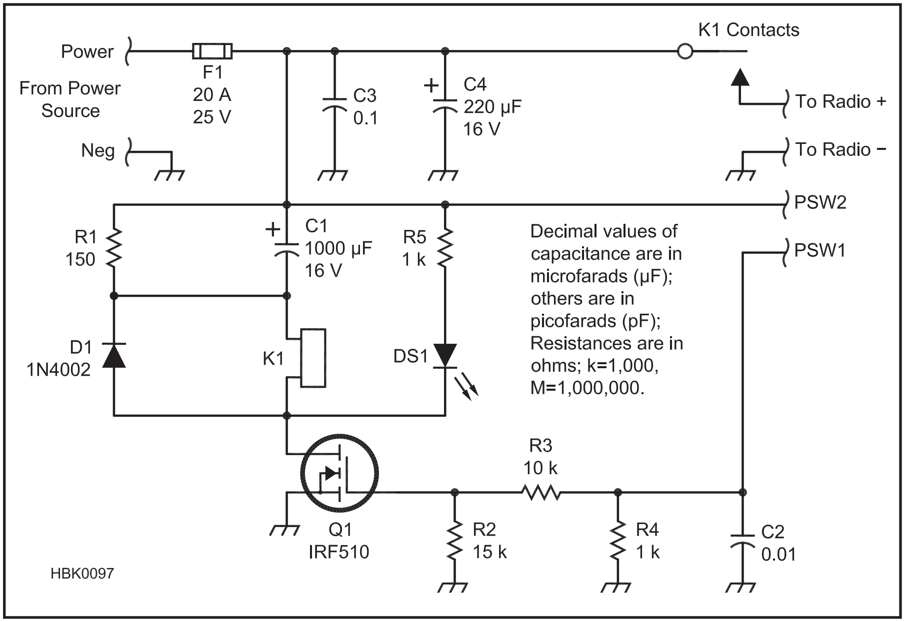

Fig 19.75 — Schematic of the remote power controller.

C1 — 1000 µF, 16 V electrolytic.
C2 — 0.01 µF.
C3 — 0.1 µF.
C4 — 220 µF, 16 V electrolytic.
D1 — 1N4002 rectifier.
DS1 — LED.
F1 — 20 A automotive blade-type fuse.
K1 — T-90 Omron relay, Mouser 653-G8P1A4TP-DC12.
Q1 — IRF510 power FET.
R1 — 150 Ω, 1 W.
R2 — 15 kΩ, ¼ W.
R3 — 10 kΩ, ¼ W.
R4, R5 — 1 kΩ, ¼ W.

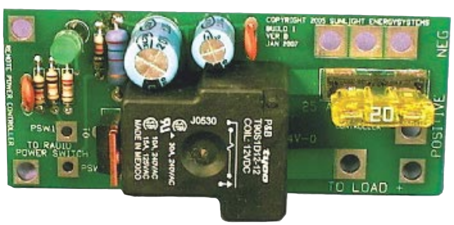

Fig 19.76 — The completed PCB for the remote power controller.

stray RF and other noise out of the circuit. F1 is a 20 A ATC "blade" type fuse for safety. Every high current dc line should be fused, but in the case of the old Triton IV an additional magnetic circuit breaker should be installed as well.[1]

Building Your Own RPC

The remote power controller shown in **Fig 19.76** is built on a double sided, plated through printed circuit board. A kit of parts and PC board are available.[2] You could easily build one using perf board or even "dead bug" style.

There is nothing fancy or special required. You can change the values of most of the parts without any problems, although the value of R1 should be left alone. Too much resistance and K1's coil won't stay in. Too low and you'll eat up battery power in the coil. I found that 150 Ω was about right for the relay specified.

You could substitute a Potter & Brumfield T90 relay for the one specified (Mouser 655-T90S1D12-12). To save some money, an open frame version will work too (Mouser 655-T90N1D12-12).

The power MOSFET is sensitive to damage from static discharge, so handle carefully. Once installed in the PCB it's quite robust.

After assembly, make a few simple tests to make sure the circuit is working correctly. You'll need a 13 V dc power supply with current limiting. Don't start out trying to use a large battery (like a car battery), because if you have a wiring error such a battery can supply enough current to burn copper traces right off the board!

Apply power to the circuit. Nothing should happen. Now, short the PSW1 and PSW2 pads. The relay should click in and the LED should light. A quick check on the output pad labeled TO RADIO with your VOM should show +13 V dc referenced to ground. Remove the short between PSW1 and PSW2 and the relay should drop out and the LED should go dark.

To ensure that the current saving function created by R1 and C1 is working, temporarily unsolder one end of R1 and remove this lead from the PCB. Now short PSW1 and PSW2. The relay will click in and then drop out. This shows that C1 has been charged via the relay initially, but with R1 out of the circuit there's no holding current available. Solder the loose end of R1 back in the circuit.

The assembly fits in a small plastic project box from RadioShack. Finish up with your favorite dc connector.

Anytime you need to control a high current, low voltage load from a distance, the remote power controller can do it. For example, you might use one to control dc fans, low voltage emergency lighting, or a VHF "brick" amplifier.

Notes

[1]Older Ten-Tec transceivers did not have SWR foldback circuitry. These transceivers relied on the matching power supply to protect the finals. When the SWR is high the finals draw more current than they should, tripping the power supply. Ten-Tec required a fast acting magnetic circuit breaker (AIR PAK T11-1-20.0A recommended) to protect the finals while running from a battery or any non Ten-Tec power source.

[2]A complete kit of parts for the RPC with the printed circuit board, or just the PC board, are available from SunLight Energy Systems. See **www.theheathkitshop.com**.