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Simple Switcher

— a remote antenna switch with no control wires

A remote antenna switch may be just what you need to solve your antenna switching problems. Even better, how about one with no control cables? Let me explain.

The idea of having a dc voltage and an rf voltage on the same antenna feedline at the same time may seem impossible to you. But, as I learned, this can easily be accomplished and there can be many applications. By using the antenna feedline as the control cable, you can supply a low voltage to power an antenna-mounted preamp or control relays mounted on an antenna. In this article, I will describe my remote antenna switch, which uses the antenna coax feedline to carry a dc control voltage for the antenna switching relays.

When I was designing my triband quad, I decided not to use a balun, but to feed each antenna with a separate feedline to the transmitter. This seemed to be a good idea until I added up the cost of all the coax cable! (And this was supposed to be one of those inexpensive projects.) So, again, it was back to the drawing board. The problem was how to feed three antennas with only one feedline.

Then this was mentioned to me: Why not send 12 volts dc through the coax, mount a relay on the antenna boom, and do all the antenna switching at the antenna? I hadn't known that I could put a dc voltage on my coax and transmit at the same time, but it sounded like a good idea. That way I could connect each antenna's quarter-wave matching section into the relay box and use only one run of coax down the tower to the transmitter.

After more talking and reading, I saw a circuit in *The Radio Amateur's Handbook* that would do just what I wanted. My switch is a little different than the one described in the *Handbook*, but the principle is the same.

The theory behind the switch is simple. See Fig. 1. A power supply is needed to provide a positive and negative 12 volts dc and is connected in the feedline between the transmitter and the antenna (Fig. 2). At

Photo A. Power supply unit.

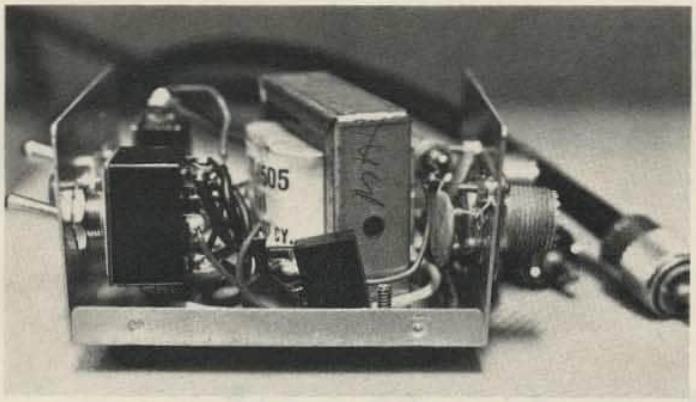

Photo B. Cover removed.

the antenna end of the coax is the relay box with two relays that switch the three antennas. See Fig. 3. A diode is used in the relay box to act as a gate to activate the correct relay. Rf chokes are used in the power supply and relay boxes to keep the rf out of the power supply and off the relay power terminals. Disc capacitors also are used in each box to isolate the antennas and transmitter from the 12 volts dc.

Construction Hints

The construction of each unit is very simple and straightforward. The power supply is housed in a 2" x 3" x 4" cabinet. Things will be a little cramped, but with a little care, everything will fit. The transformer is a 117/12.6 V, 1.2 A Radio Shack no. 273-1505. The full-wave bridge rectifier is an ECG 169. A pilot light is a nice feature to have so that you won't forget to turn the unit off. The capacitors are small .01-uF discs, and the rf chokes I used were 1 mH.

The relay unit is housed in a 2" x 2" x 4" metal box. The relays, the most expensive parts, are two Radio Shack 12-volt dc DPDT no. 275-206s with 3-Amp contacts. (SPDT relays will work, but I couldn't locate any.) These relays are mounted in a plastic case which makes it easy to epoxy them in the metal box. When assembling the unit, seal the box to make it watertight, but put a small hole in the bottom for ventilation.

Operation

Once the project is completed, be sure to check out the unit with a dummy load to make certain that each relay does work. This might save you an extra trip up the tower. When connecting the antenna to the outputs, connect the most often used antenna to output A. That way, the unit will be off most of the time and when the unit is turned on with switch S1, switch S2 is used to select antenna B or C.

My antenna switch has performed well for over two years and makes a neat installation. My transmitter runs 100 Watts, and I have had no trouble with the relay contacts. They probably will handle more power if you are careful not to switch antennas while transmitting.

Now that you have the basic concept of how this system works, you can apply it to solve your own antenna switching problems. This same unit could be used to select verticals or other antennas. In a future project, I am going to apply this same principle to power an antenna-mounted preamp. I am sure that there are many other applications using this concept, and I would be interested in hearing about them.

Thanks to Cliff WB5KCQ for his technical assistance on my projects.■

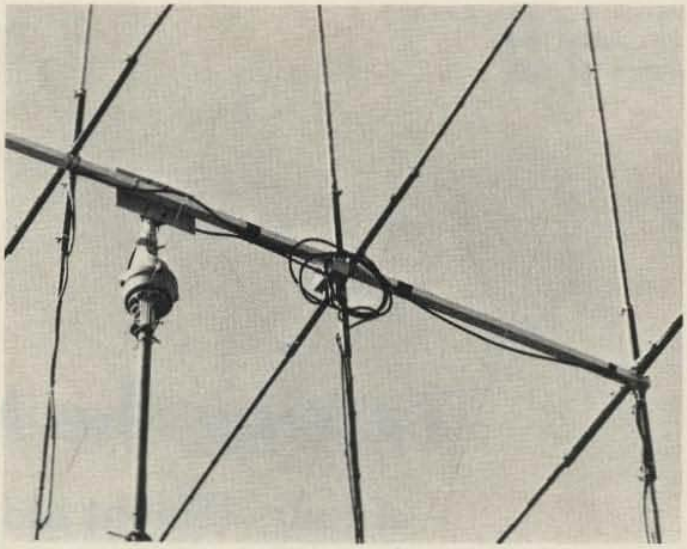

Photo C. Antenna mounted relay unit. Each antenna's ¼-wave matching section is connected to the bottom of the box. Only one run of coax is needed to connect the relay unit to the transmitter.

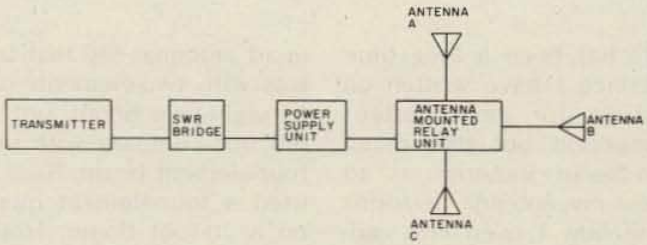

Fig. 1. Block diagram.

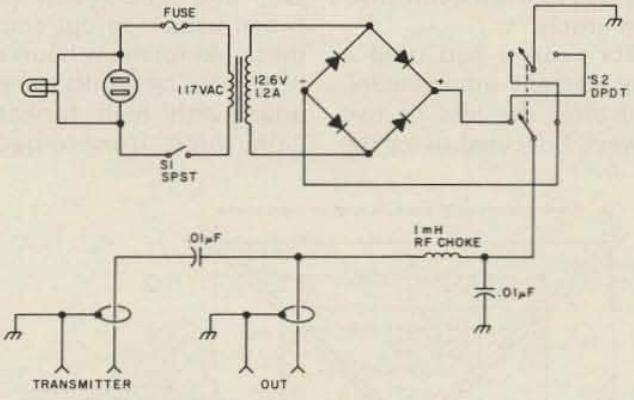

Fig. 2. Power supply.

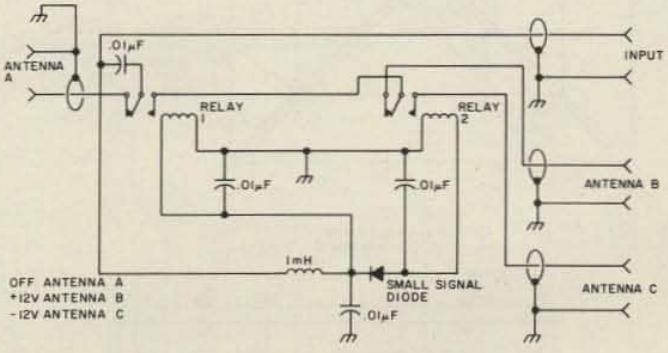

Fig. 3. Antenna-mounted relay box.