

Low Cost Legal Limit Remote Antenna Switch for 160-6 Meters – Powered through the coax cable! by Phil Salas - AD5X

Introduction

A solution for those who need an extra coax run is a remote antenna switch. And there are two ways to power a remote antenna switch. You can use a separate control wire from your operating position. Or, you can run the relay control voltage up the center conductor of the coax cable. Putting the control voltage on the coax center conductor is the cleanest way, and in my case, the only way to do it.

Components

The isolation inductors are 100uhy JW Miller 4632 (Mouser 542-4632). These handle 400ma of current and provide a high Q such that full legal limit can be used from 160- through 2-meters. These inductors have no resonances in any of the ham bands over this range. The 0.01uf coupling capacitors should be 3KV rated (Mouser 581-5ST103MCMCA). While the coupling capacitor voltage rating is not critical since there is very little voltage drop in this application, the large physical size of these capacitors makes it easy to dissipate any power dissipated due to any capacitor losses. If you operate down to 160 meters, parallel three of these capacitors for best performance. For the relay, I've found that most SPDT 5-10 amp relays work just fine up through 6-meters. Use 10-amp contacts for 1500 watts (5.5 amps rms for 1500 watts @ 50 ohms). With a little care in wiring, even coverage up to 2-meters is not that difficult to achieve.

Indoor Unit

The indoor unit, shown in Figure 1, bridges the DC control voltage onto the coax center conductor near the operator's position in the shack. I built this circuit into a Mouser 563-CU-3000A aluminum box. For the DC connection, I used PowerPole connectors. You can either add a SPST switch on this box to control the DC voltage, or switch the incoming 12 volts from another location.

Remote Switch

The schematic of the remote switch box is shown in Figure 2. For the outdoor switch enclosure, I have had great success using those aluminum electrical outdoor boxes meant for adding external switches and outlets to your home. The most common kind has three 1/2 inch threaded holes in it - one on the back and two on the sides. You will also need a blank aluminum cover for this box. The cover comes with a weatherproof seal. The box and cover will cost you around \$4 at any hardware store. The box comes with two threaded hole plugs. In this application you will need to plug all three 1/2 inch holes so you will need to buy an extra hole plug. Your first task should be to drill a 3/8 inch hole in the back of the box and secure a 1-1/2 inch long 3/8 X 16 bolt to the box with a 3/8 lockwasher and nut. The threaded end of the bolt protrudes out from the back of the box. This bolt can be used to attach the relay box to any nearby supports. Use stainless steel hardware to prevent corrosion.

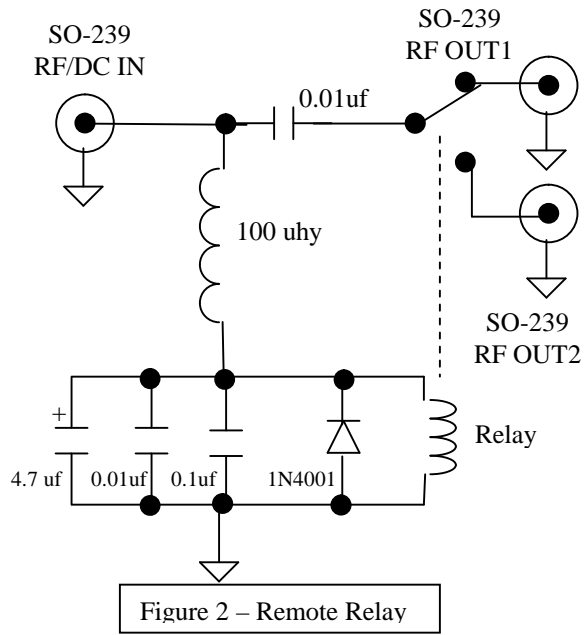
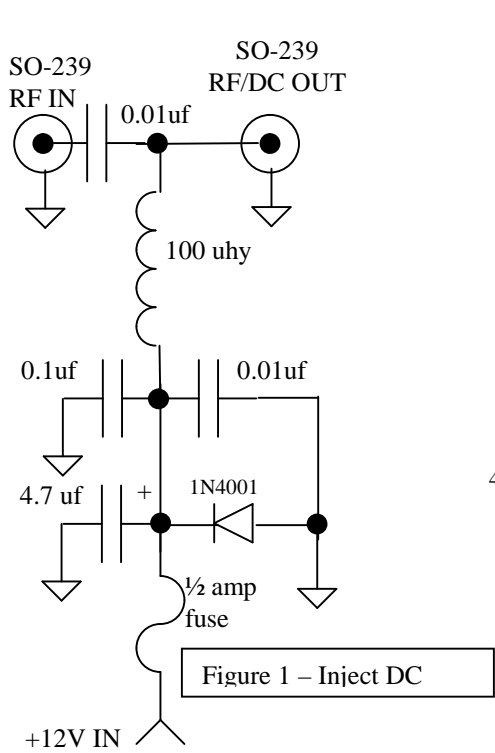
As you can see in the photos, all the components for the outdoor switch box mount on the cover. Three 5/8 inch diameter holes are punched in the cover for the SO-239 connectors. Use epoxy, hot-glue or liquid electrical tape to weatherproof the SO-239 connectors. Use stainless steel hardware to keep from having corrosion problems.

Performance

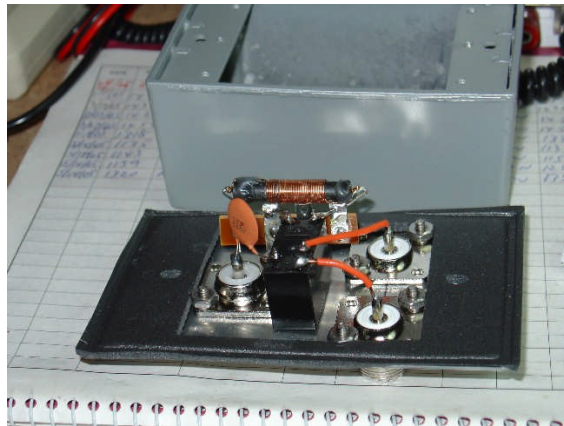
How does this switch work? Great. 10 amp relay contacts are fine for high power. I did measure the VSWR through both the indoor unit and the outdoor relay unit through a short piece of coax into 50 ohm loads placed at the outdoor unit outputs. The VSWR stayed at 1:1 up through 12 meters. From 28 Mhz to 50 Mhz the SWR increased to 1.2:1. However on 2 meters it dropped back to 1:1. The SWR starts getting bad above 150 Mhz. So - this switch works great through 2 meters!

Conclusion

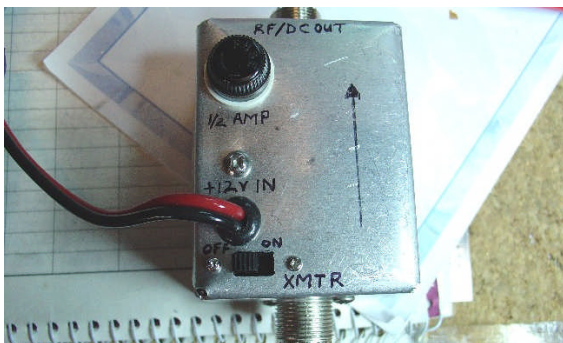
I've described an easily built remote relay switch that will cost you no more than about \$20 including both the indoor and outdoor units (about the cost of 50 feet of RG-213!). This switch provides you with an alternative to adding additional coax cable runs when you increase your antenna farm!



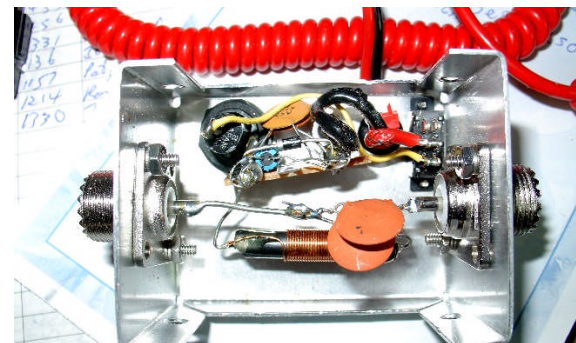
Outside Unit - External View



Outside Unit - Internal View



Inside Unit - External View



Inside Unit - Internal View