

Cheap and Dirty Coax Switch
by
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Years ago it wasn't always possible to run out to your local amateur radio store and buy accessories. Of course, things are different now, with the Internet, overnight delivery services, etc. However, there still is the factor of cost. What is described herein is a cheap, but effective, coax switch that will handle a couple of hundred watts of transmitter power, uses readily available parts, with a total of six positions, and is relatively easy to build.

This coax switch utilizes a quantity of one "tin" can (i.e. from a can of corn), quantity of one 6 position rotary switch from Radio Shack (cost less than \$2.00 with tax), and lengths of either RG58/U or RG8/X coaxial cable. The switch can be assembled using a number of ways to connect to the antennas, load, converters, etc. This article will be concerned with the cheapest to build, but will also give the details on using other methods of connecting as well.

The first thing to obtain is a normal "tin" can. Those short, fat cans used for corn will do well. If you are building one of the alternate switches, a larger can, like a 12 ounce to 1 pound coffee will work even better. Just make sure the can is made of steel. Aluminum cans are way too thin to use. Also, it is very difficult to solder to aluminum (yes, it can be done, but you don't want to try, believe me!).

Use a "normal" type of can opener to remove one end of the can. Save the end piece. Eat the contents, then remove the label from the can. Wash it well in detergent and water, then dry completely. In the center of the end of the can itself, drill a 3/8 inch hole (this is for the mounting of the switch. Next, drill three 1/8 inch holes spaced evenly around the outer rim of the bottom approximately 1/4 inch from the rim. If you want to use exact spacing, the description towards the end of the article tells you how to do this.

Next, drill seven 3/16 inch holes in the end piece that has been removed per the attached diagram. It is through these holes that the coaxial cable will pass. Then, using a soldering gun, tin the areas around each hole and around the edge of the end piece. It should be very easy to get the metal to take the solder (use the "shiny" side of the metal). Also use the soldering gun and solder to "tin" the rim of the can itself.

Cut seven pieces of either RG58/U or RG8/X coax whatever length desired. Remove about three inches of the outer sheath of the coax (black plastic). Next slide the shield back until you can "squeeze" about 1/4 inch in diameter about 1/4 inch from the remaining outer sheath (see photos). Using diagonal cutters, cut

the shield all the way around the coax and remove the extraneous shield material. Strip the inner conductor about $\frac{1}{4}$ inch (see photos). Push each piece of coax through the holes in the can end piece (with "shiny" side towards the outer sheath -see photos).

Next, make sure that the shield of the coax "flares" out in all directions, and make sure that it is in contact with the metal of the can end piece. Solder each shield directly to the can lid.

Next, cut off about 1 inch from the shaft of the rotary switch. This will allow a knob to be placed on the final project with good clearance, but not too far from the finished item. Put three #8 by $\frac{1}{2}$ inch long machine screws with the screw heads inside the can itself through the three holes drilled in the can. Secure these with "hex" nuts on the outside of the can.

Find the switch lug that corresponds with the first position. Then the second, third, etc. Solder the first coax center cable to the first position, then the second, and so on. Next, solder the seventh cable to the common point on the switch. The switch is then mounted inside the can with the shaft protruding through the $\frac{3}{8}$ inch hole. You might have to punch a small hole for the locking mechanism on the switch (or bend it back). Put on the mounting nut and tighten with a wrench. Put some type of label on each cable to show the position (i.e. 1 through 6) of the switch and the input cable as well.

At this point the can end piece should be very close to its original position. Using the coaxial cables as a handle, push the end piece into its original position. Then "tack" solder it in place at several positions. Next, solder the end piece back into position. This completes the basic coaxial switch.

On the ends of the coaxial cables, place whatever type of connectors desires (UHF, BNC, N, etc.).

To mount the switch on a panel, a $\frac{3}{8}$ inch hole should be drilled and three $\frac{3}{16}$ inch holes drilled to match the three #8 machine screws. Put the switch shaft through the large hole and secure the switch with "hex" nuts using the three #8 screws. These can be "finished" off with "cap" nuts of the proper size that are available from hardware stores and home building centers. Finish off with a knob of choice.

A more expensive, but also more versatile switch can be made by using either UHF or BNC female connectors mounted directly to the can end piece instead of soldering the coax directly to it. If UHF connectors are used, it will probably be necessary to use a larger can, like a coffee can, for the switch. In this case, use #18 or #20 insulated stranded wire from each connector to the switch. They should be long enough to allow the switch to be mounted and still leave about an

inch before the can end piece is back in place. Again, solder the end piece back into its original position.

If you want to have "exact" spacing of the cables, etc., you can determine it with a compass and a piece of paper. Set the compass to the radius of the can (half the diameter). Draw a complete circle. Then start at any point on the circle and mark off the radius of the circle against the circle itself. This will be exactly six times. Then draw another circle with a radius about $\frac{1}{4}$ inch less than the original inside the first circle. Draw straight lines from one mark on the circle to the opposite side through the center. Do this for all marks (a total of three lines).

Cut out the circle. Place it on the end of the entire can. On every-other place that the lines cross the inner circle, punch (or otherwise mark) the can end. There will be three marks that can be drilled for the mounting holes. Number (scratch the can, put on a label, etc.) each of the cables from 1 to 6.

On the can end piece place the circle. At every place the lines cross the inner circle punch (or otherwise mark) the end piece. Do the same thing for the center of the circle (the stationary point of the compass). Then drill with the $\frac{3}{16}$ inch drill.

Is the switch exactly 50 ohms? Maybe, maybe not. However, for operation from 160 through 10 meters, and probably 6 meters, it will be close enough. Is it pretty? Depends on your soldering. But, it will work! Besides, at a cost of well under \$5.00 including knob, it is well worth the money. Also, you will have the satisfaction of having built it yourself.