Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

HAIRPIN MATCH FOR THE COLLINEAR-COAXIAL ARRAY

☐ I have built several collinear-coaxial-array antennas over the years. A 2-meter version of this antenna is described in *The ARRL Antenna Book*, 13th edition, pp. 247-249. I could not adjust the SWR below 1.7:1. After talking with other hams who built antennas like this, I found that 1.7:1 is about normal for a minimum SWR value.

After many hours of experimentation, I devised a hairpin match that achieved a 1:1 SWR. Dimensions for the antenna and details of the hairpin are shown in Fig. 1. Fig. 2 illustrates the method of connecting the coaxial-cable sections together.

I suggest that you make an antenna using three ½-λ elements to start. Use solid-dielectric cable, which has a velocity factor of 0.66. If the resonant frequency of the antenna is off by more than about 1 MHz, you will have to trim the elements a bit. If it is only off by 0.5 MHz or so, then you can add extra elements at an adjusted length to fine-tune the resonant frequency. Add ½-λ elements in pairs, always maintaining an odd number of ½-λ sections.

I built a collinear-coaxial array for a local repeater. The antenna has nine ½-λ elements, and it seems to provide a reasonable amount of gain. — *Barry Boothe, W9UCW, Channahon, Illinois*

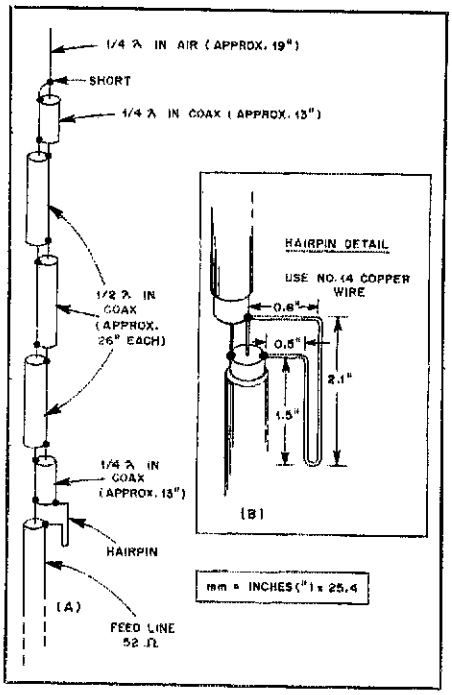

Fig. 1 — Approximate dimensions for the construction of a collinear-coaxial-array antenna are shown at A. B shows the details of a hairpin match used to obtain a 1:1 SWR.

DRILLING IC-PIN HOLES IN CIRCUIT BOARDS

☐ There are many different methods and ideas for producing circuit boards for projects. One step that has given most hams a problem is drilling the holes for a DIP IC. Here is a method I use to make circuit boards for construction projects.

Use rubber cement to attach a blank piece of circuit-board material to a block of wood. Place a copy of the board layout over the PC material and tape it to the wood. Now, drill the indicated holes, but when you come to an IC, drill two holes at diagonally opposite ends of the IC. Then, use two brads to hold a Radio Shack IC board (part no. 276-024) over the appropriate position. Use this predrilled board as a template to drill the other holes. (A piece of perforated board with the proper hole spacing or other template could also be used.)

After drilling all holes, slip a piece of carbon paper under the board-layout pattern and trace the wiring. Finally, remove the carbon paper and pattern and go over the lines with an etch-resist pen or enamel. Make pads around the drilled holes, even putting resist in the holes. The board is now ready to etch.

This system also works for projects with no published PC-board pattern. Carefully plan the layout to conserve as much space as possible. Avoid crossovers and keep the traces from coming so close together that they touch. — *Edson B. Snow, W2UN, Pompano Beach, Florida*

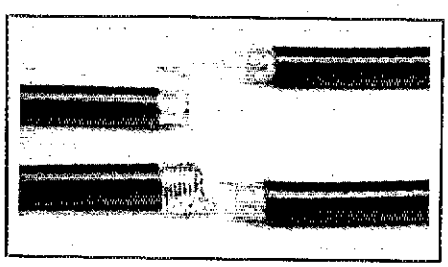

Fig. 2 — Prepared ends of the coaxial cable and the method of soldering them together.

COPPER-FOIL TAPE CIRCUITS

☐ When my wife and I enrolled in a class to learn stained-glass techniques, I made a wonderful discovery for my Amateur Radio projects.[1] Strips of copper tape applied to pieces of stained glass allow the project to be soldered together. This tape is inexpensive and is sold at any hobby shop that has stained-glass supplies. It is available in 5/32, 3/16, 7/32, 1/4-inch and wider rolls.[2] The adhesive on the tape is designed to withstand soldering heat.

The possibilities for this tape seem endless. It is great for making circuit traces for PC projects. If the 5/32-inch width is too great, narrower strips can be cut with scissors or a razor blade. The wider rolls of tape can be used to make round pads with a paper punch, or to cut curved traces. The adhesive is nonconducting, but I would not trust it to insulate the circuit traces. Build the pattern on an insulating material. Crossover traces can be insulated from one another by a piece of paper or other thin, insulating material. Where overlapping traces must be connected electrically, you simply solder them together. The tape is easy to solder to, but I recommend that you keep it in an airtight plastic bag to prevent the copper from oxidizing.

The tape is 0.0015 inch thick (1.5 mils). The cross-sectional area of the 3/16-inch tape is 281.25 square mils, which is equivalent to 358 circular mils. A no. 25 wire has an area of 320 circular mils. The tape should be able to handle 500 mA with no problems.

This copper tape can be used to wind coils on a cylindrical form. Such coils are ideal for a Transmatch because they exhibit low distributed capacitance. Fig. 3 shows why the tape coil has less capacitance than one made from wire.

The March 28, 1983 issue of *Design News* contains an article titled "Foil Tape Converts Reed Switch to Switchable Coaxial Conductor." This article describes how the CATV industry is using 4.2-mil-thick copper tape to make coaxial switches.[3] Fig. 4A illustrates the basic operation of a reed switch (relay) and Fig. 4B shows how a foil-wrapped switch can be soldered into a coaxial line. If the foil is wrapped in a spiral around the switch, the overlap edges should be soldered to form a cylindrical conductor around the glass.

Apparently, the relays and foil being used in

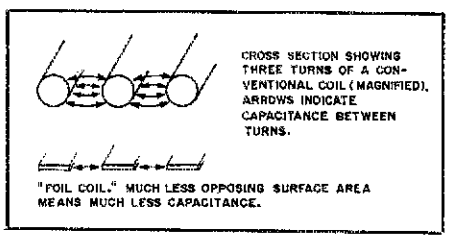

Fig. 3 — The cross-sectional area and distributed capacitance between turns of a wire coil and a foil-tape coil are shown.

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[1]This article is adapted from the June 1983 Ozaukee Radio Club Newsletter, P.O. Box 13, Port Washington, WI 53092.

[2]mm = in x 25.4.

[3]Scotch 1245 tape; available from 3M Company, St. Paul, MN.