



PROJECT BUILD

A Copper Tape Antenna for Two Meters

Project by Steve Ford, WB8IMY
Process Photos by Dino Papas, KLØS

Tools

- Wire cutters
- Soldering iron and solder
- Hobby knife or scissors
- Small screwdriver

Materials

- 10 inches of #18 insulated wire
- At least 30 inches of 3.2 mil adhesive copper foil tape (Steelsoft 3.15 mil)
- 2 screw-type banana plugs (gold-plated 4 mm screw-type banana plugs)
- 1 MWRFF Source BNC female-to-dual-4 mm-banana-female jack adapter/connector

Here's an absurdly simple — and even “disposable” — dipole antenna you can build for operating on the 2-meter band. It's ideal for amateurs who can't install antennas outdoors, because this antenna is designed to stick onto any convenient window in your house or apartment.

At the core of the antenna are two strips of adhesive copper foil tape. Copper tape is very inexpensive, and comes in rolls just like any other tape. The tape has copper on both sides, but one side is coated with an electrically conductive adhesive. We'll only need about 30 inches for this project, so you will have a lot of tape left over for other experiments.

The antenna is easy to build, and because the copper tape is so inexpensive, if something goes wrong (or if you ever want to re-position the antenna), just throw the antenna away and make another! Assembly time is about 15 minutes.

There are many ways to approach this project. The steps shown here will result in an antenna that is as easy as possible to install. That's why the design uses components that plug into each other. For example, the antenna uses an inexpensive connector and a couple of banana plugs to accommodate connections to the tape strips as well as the coaxial cable for your radio.

Even so, this design is extremely flexible. You won't have to use the components suggested; maybe you'll have a different approach in mind — for example, the process photos show solder-on banana plugs, rather than the screw-on type recommended in the materials list. Regardless of how you put everything together, the result should be an antenna with a reasonably low SWR (less than 2:1) across most of the 2-meter band.

Depending on where you install your antenna, it should allow you to reach most nearby repeaters and make some direct simplex contacts as well.

Step 1

Using the hobby knife or scissors, cut two 15-inch strips of copper tape. Do not remove the paper backing. Also cut two 3-inch lengths of insulated wire, and strip away about 1/2-inch of insulation from the ends of both wires (see ①).

Step 2

Unscrew the screws from two banana plugs, but don't remove them completely. Now insert the stripped ends of the insulated wires into the plugs and tighten the screws (see ②).

Step 3

Using your soldering iron, solder the other ends of the insulated wires onto the ends of the two copper tape strips. You may find that you must press the tip of the iron into the wire and tape, holding it there while applying the solder, and then continuing to hold it until the solder flows onto the copper (see ③). You may also want to use tools or other objects to hold the tape strips and wires in place while soldering.

Step 4

Take the tape strips to your chosen window. Choose a location on the glass that is as far as possible from any long pieces of metal. Also beware of metal window screens. You cannot have a window screen in front or behind the antenna, as this will "detune" it, resulting in a high SWR.

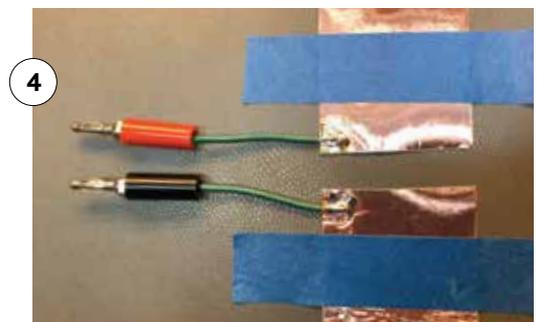
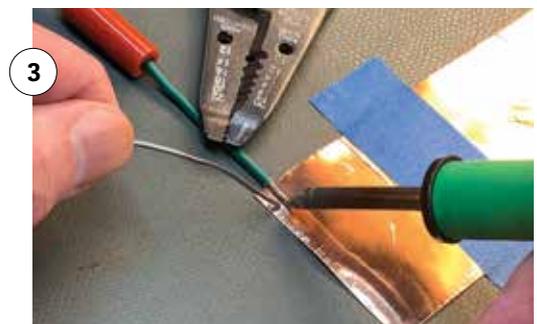
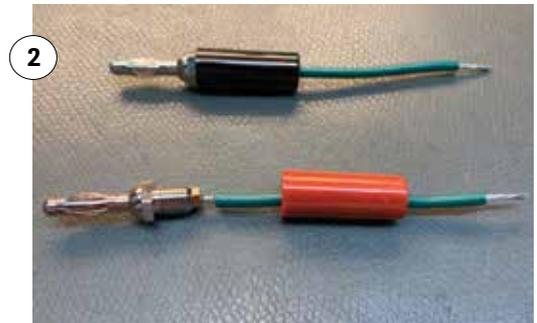
Gently remove the paper backing from one strip of tape and apply the tape to the glass in a vertical orientation. The end of the strip with the banana plug should be on the bottom.

Remove the paper backing from the other strip and apply it vertically to the glass, just below the top strip. The banana plug on this bottom strip should be at the top, close to the plug on the top strip. Leave a gap of about 1/2 inches between the ends of the two strips (see ④ for a dry run of this on a workbench).

You'll notice that we're suggesting that the copper tape antenna should be oriented vertically. That's because most FM stations, including repeaters, use vertically polarized antennas. But there is nothing preventing you from trying different orientations to see what happens. Thanks to the ease and flexibility of using adhesive copper tape, you can turn almost any window into your own antenna laboratory!

Step 5

Insert the banana plugs into the adapter and use electrical or transparent tape to secure the adapter to the glass (see ⑤ for a dry run of this on a workbench).



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Step 6

Connect your coaxial cable to the adapter and rout the cable horizontally away from the antenna for as long as possible, using tape as necessary to support the cable. Use lightweight cable such as RG-58 and a BNC connector. Because this cable is being used at VHF, however, keep the length at 30 feet or less — less is better.

Step 7

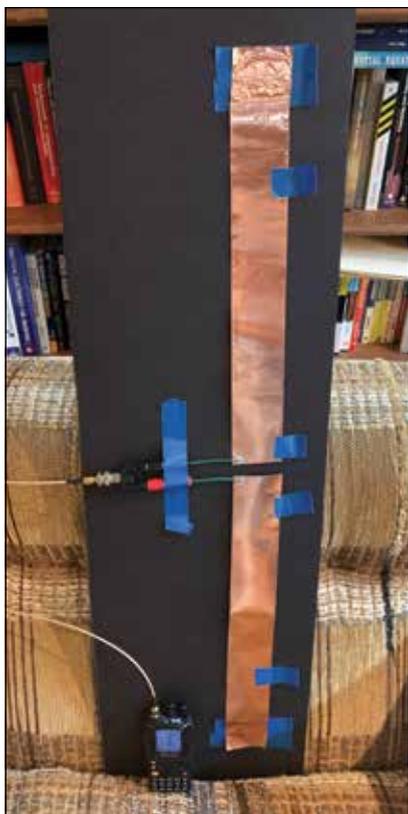
Connect your 2-meter FM transceiver. If your transceiver has a built-in SWR meter, try a test transmission and look at the result. If frequency at which the SWR is lowest is too low in the band, remove 1/2-inch pieces from both ends of both tape sections and try again. If it is still too low in the band, remove more pieces from each strip until you achieve the lowest SWR (preferably less than 2:1) at 146 MHz. Make sure the pieces you remove are of equal lengths.

On the other hand, if the low SWR point occurs at a frequency *above* the 2-meter band, add pieces of tape to each end. The adhesive is electrically conductive, so you can put the edges of the additional pieces directly on top of the top and bottom edges of the strips (see ⑥).

If your radio lacks an SWR meter, but at least has a power-output meter, transmit and check the indication. If the meter indicates that you are putting out maximum power at the power level you selected, chances are good that the antenna SWR is acceptable. But if the power meter indicates that the radio is reducing its output from the level you selected, this is strong sign that a problem exists.



Steve Ford, WB8IMY, is the retired Editor in Chief of QST. Dino Papas, KLØS, is a frequent QST and On the Air contributor and has been an amateur radio operator for over 50 years. You can contact Dino at kl0s@arrl.net.



Coming Unstuck with Ham Ingenuity

When building this antenna in order to photograph the process, Dino Papas, KLØS, strayed from the instructions a bit — as hams sometimes do. He used blue painter's tape to mount the antenna on a piece of poster board, so he could adjust the SWR before permanently sticking the antenna to a window. Of course, it could be argued that you could just leave the antenna mounted on the board so it could be moved to wherever you'd like to put it.