Abraham Lincoln on 2 Meters

Here is a staggered horizontal slot antenna, that is a wearable novelty top-hat antenna with high visibility for hams helping at public events.

By John Portune W6NBC

Arm bands or yellow vests help identify hams helping at parades, bike-a-thons and other public gatherings. This novelty eye-catching taste of showmanship, reminiscent of Abraham Lincoln, goes one step farther. It's a wearable 2m hat antenna, that will also greatly extend your HT's range, Figure 1.

Figure 1: Lincoln-style aluminum stovepipe hat antenna

What ham hasn't imagined a 19 in. 2m whip on top of a metal hard hat just for fun? But this nineteenth-century look-back has no spike whatsoever. In Figure 2, notice the half-wavelength staggered 2m slot antenna.

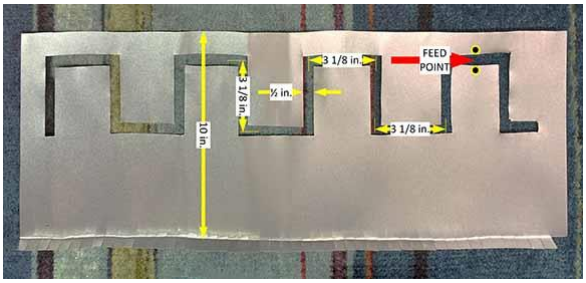

Figure 2: Half wavelength staggered 2m slot antenna cut in aluminum flashing. Bent-over tabs (½ in. x ½ in.) at the bottom attach the stovepipe section to the hat's brim with aluminum duct tape.

Figure 3 shows the coax connection and two horizontal stiffeners, both a sandwich of aluminum sheet and thick corrugated box cardboard glued in with hot glue. On the top stiffener, the aluminum is glued to the outside. The bottom stiffener has all but 1 in. of the cardboard cut out to allow access to the feed point. The aluminum here is not glued to the cardboard, but held in place by two tabs of aluminum tape.

The tape is Scotch 3311 heavy duty, 3.6 mill aluminum duct tape. Other similar brands are available on the internet or at local hardware stores. The bottom of the hat is completely shielded. It provides greater isolation from RF than from an HT with a rubber ducky.

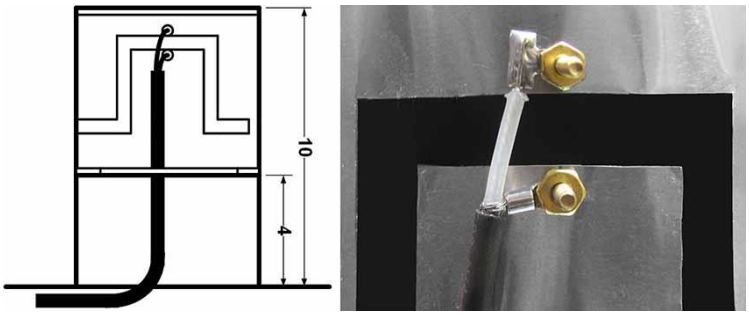

Figure 3: Cross-section, showing cardboard/aluminum stiffeners and coax connection

Perhaps surprising to some, this largely horizontal antenna is vertically polarized.– ideal for special-event simplex or repeater. For a more complete explanation of slot antennas, read the accompanying sidebar. The hat is omnidirectional and has a gain equal to a J-pole.

Constructing the Hat

Stovepipe section, brim and stiffener aluminum are cut from thin (.0078 in.) flashing aluminum found at most local hardware store or roofing suppliers. It’s a light-weight springy alloy that holds its shape well and can be cut with heavy scissors. I purchased a 10 ft. x 14 in. roll online:

The width of the stovepipe section (not given in Figure 2) depends on your hat size. To determine it, measure around your head and add ½ in. for the overlap of the aluminum plus another ½ in. for an internal soft headband.

For comfort, the opening in the brim and your head shape need to match. If your hat size is less than 7 in., shorten the horizontal portions of the slot a little and lengthen the vertical, keeping the total length of the slot the same. I had my wife photograph me from straight overhead and then transferred the picture to a drafting program (Visio) for scaling to size. I then added the brim, making it 2 in. wider on all sides than my head outline. The drawing became the template for cutting out the brim.

Roll the main hat section into the stovepipe shape, and hold it temporarily in place with masking tape. Fit it to the inside the brim and glue the aluminum overlap with hot glue. Next, using the ½ in. x ½ in. tabs, tape the stovepipe section to the underside of the brim with aluminum duct tape. Then, hot glue in the cardboard/aluminum stiffeners and attach the coax. Figure 3.

Tuning and Matching the Antenna

First measure the initial resonant frequency (the tune) and SWR (the match), with an antenna analyzer. Initially, the frequency will be low, as the total length of the slot is 2½ in. too long on both ends. To adjust the frequency, short the non-feed end of the slot with a sort length of aluminum duct tape, completely covering over the excess slot. To adjust the SWR short the feed end. By proceeding in small increments, a good tune and match are easy to obtain, but go slowly as the setting interact.

Supporting the Slot

Notice that the slot almost entirely separates the top and bottom of the hat. Support is needed. I considered plastic bars and screws, but discovered that heavy clear vinyl tape, also sold at hardware stores, as waterproof tape, is quite adequate. Apply a strip around the inside across the middle of the vertical sections of the slot. Remove the adhesive in the slots on the outside with solvent.

Final Considerations

As mentioned above, you'll need a soft headband for comfort. My local craft store yielded 1/8 in. foam sheets for two narrow inside strips.

Lastly, I created a decorative sign with Photoshop and cardstock, and coated it with clear spray in case the weather spirits decide to "rain on my parade." The band can be changed, appropriate to the event. The final touch is a decorative wrap of colored electrical tape around the top. "Be artistic!" Remember, this is a fun project for hams who enjoy showmanship.

The author will be pleased to correspond: jportune@aol.com. 519 W Taylor St. unit 111, Santa Maria, CA 93458. (805) 406-6176.)