VENT PIPE STEALTH ANTENNA
Version One, 146 to 180 MHz

by WA5SWD, Ed Lawrence

INTRODUCTION

Stealth antennas may be the only practical answer to restrictive homeowner association limitations. Far be it from me to suggest that a person might wish to flaunt certain unreasonable provisions, but it might be a lot more practical to ask for forgiveness rather than permission.

Suppose that the disguise were good enough that the antenna was never noticed. The chances are good that one could operate a clean transmitter and never be detected. No complaints, no problems!

What acceptable vertical objects stick up unnoticed on every homeowner's roof? Vent pipes! How about a vent pipe antenna? I obtained the parts from Home Depot®. Note in **Fig. 1** the BNC Connector mounted on the uphill side of the antenna.

Fig. 1

This antenna is for the two-meter amateur band but works well past the weather channels at 162 MHz. I started out with a base plate intended for use on a 4/12 roof, common in this area. The sheet metal base was 12 inches square.

I cut a 8.5-inch length from a 24-inch length of three inch diameter galvanized sheet metal pipe, from the end with the reducing crimps. The pipe formed a 6.25 inch riser that served to lengthen the base section to approximately a quarter wavelength on two meters. I mounted a BNC connector, complete with a 6-inch wire from the center pin to the top of this riser with 4-40 screws.

Needing a 3-inch diameter insulator, I found a cosmetics jar that was just slightly smaller at The Container Store® for $1.49. See **Fig. 2**.

Fig. 2

I marked the insulator jar with two circumferential guide marks that left a 3/8-inch gap between them. A drop or two of acetone sealed the lid on tightly, improving the strength markedly. Loosen the lid slightly, add two drops of acetone, and tighten the lid again. The acetone melts the threads a bit and fuses the two parts together.

Next I cut away a bit of the insulator, allowing it to clear the connector when positioned with the lower guide mark just even with top of the lower pipe. Remember to drill a hole in the insulator to pass the wire from the BNC center through, right above the clearance notch. Connect this wire to the top pipe by soldering or by using a solder lug and a pop rivet. I prefer soldering.

I used the remainder of the 3 inch galvanized sheet metal pipe to form the top radiator. This would need to be trimmed to length for resonance at 146 MHz.

As it turned out, my 6.25-inch riser was a bit long. I was forced to cut three-inches triangles from each corner of the base, as shown in **Fig. 3**, to tune more correctly.

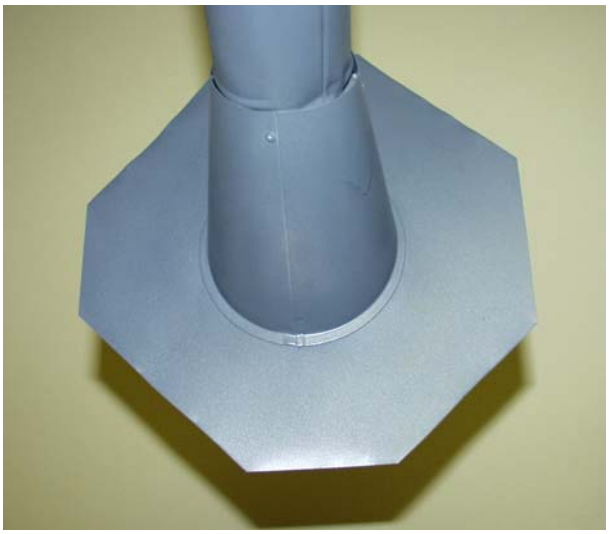

FIG 3.

Fig. 4 provides the network analyzer plot of SWR. **Fig. 5** shows the return loss, and **Fig. 6** shows the S_{11} curve.

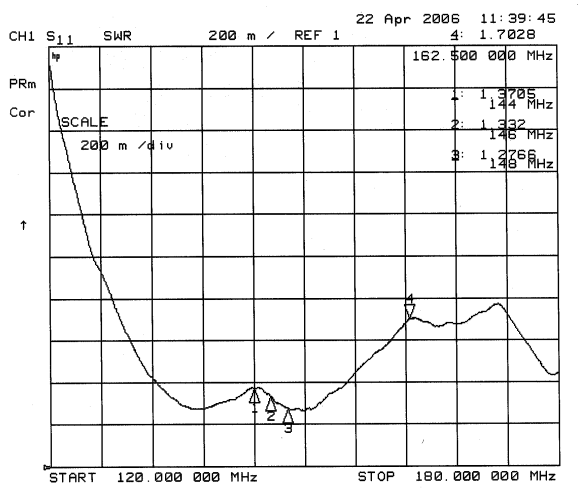

FIG 4.

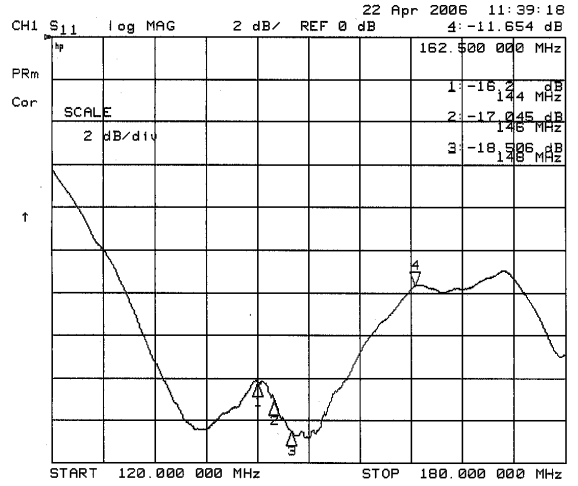

FIG 5.

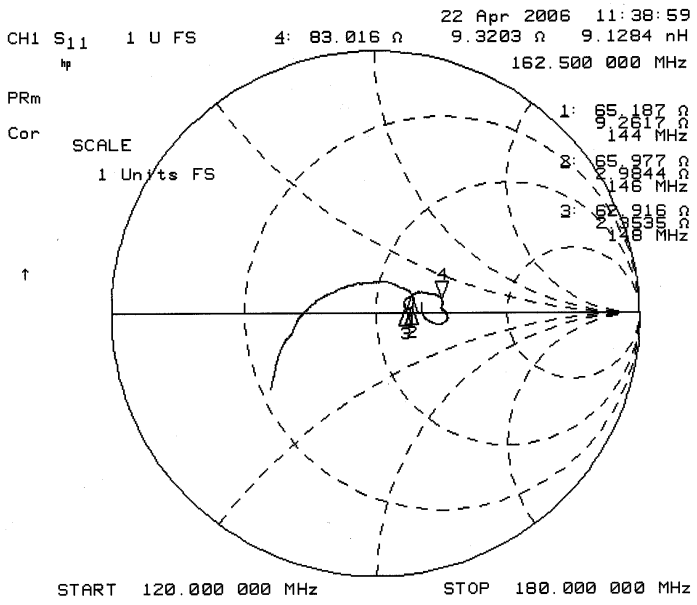

FIG 6.

I used 1/8-inch pop rivets to build this antenna. First I marked where the cutaway insulator lined up with the seam in the riser. Then I attached the insulator to the top radiator, being careful to match the mark for the seams of the riser section. Pass the BNC center pin wire through the hole in the insulator and mount this assembly to the riser and base. Finally I pop riveted the riser to the base after cutting several slits in the crimped portion. The tabs thus formed were flared out to match the flare of the base section.

Align the lower guide mark with the top of the riser and secure with pop rivets. Check for a reasonable SWR with an Antenna Analyzer. I had to cut my radiator down to 13 7/8 inches for the best match. Make your measurements with the antenna in the clear, preferably at the desired location.

Although I have described this as if it were a monopole, it truly is a dipole, center fed. Run your coax away at a right angle if possible to minimize coupling to the feedline.

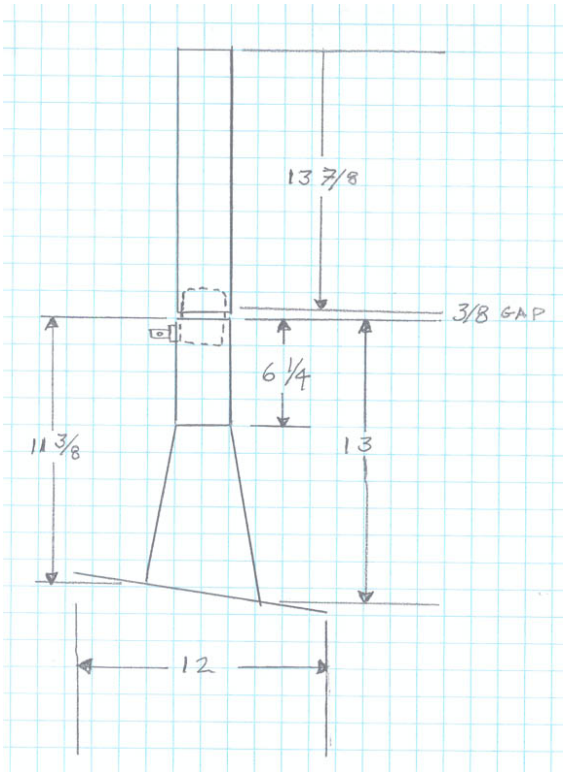

FIG 7. Finished Antenna Drawing
All dimensions are in inches. Make the top radiator a little long to start.

I spray-painted the antenna to match the color of the roof. (See FIG 3.) This is a requirement of many homeowners associations and helps out the stealth aspects.

This antenna should not be installed on other than electrical insulating roofs. It can be placed over a PVC vent since it is not airtight. It should NOT be placed over a metal vent pipe. Much simpler antennas can be used on a metal roof anyhow. Remember, this is a dipole so the base is RF "Hot."

NOTES:
1: The edges of the galvanized steel are extremely sharp. Wear gloves to protect your hands.

2. Acetone is a hazardous chemical. Use only in a well-ventilated space and DO NOT INHALE the fumes. Wear acetone-proof gloves if there is any chance of skin contact. Buy these in the Paint Department when you buy the vent pipe and base. The ones I got were for use with paint strippers. Acetone is a nerve poison and will quickly cause a loss of sensation in your fingertips.

3. You can run the coax down inside the base instead of using an external connector. There may be changes in tuning due to the proximity of the coax shield to the base plate. I have not tested this as yet.

4. Provide for water drainage. Standing water will adversely affect the operation of the antenna and possibly lead to roof damage,

5. Waterproof the BNC – feedline junction.

So there you have it: a simple, stealthy antenna for two meters. It is wide band, fairly rugged, unobtrusive, low cost, and easy to construct. It features easy adjustment, as long as you don't mind trimming sheet metal. The parts are widely available. Total cost of this project was about $20 US. **–30-**

Brief Biography of the Author

Ed Lawrence, WA5SWD **has worked as an Electronic Technician since 1958. He has been active in Amateur Radio since 1964 and presently holds an Extra Class License.**
Over the years his writing credits include articles in 73 magazine, QCWA, various club newsletters and www.antennex.com . Ed has worked at a lot of interesting places, including North American Aviation, Lear Stereo Division and Texas Instruments, from which he retired in 1991. Since then Ed has worked mostly as a Contract IC Mask Designer on microprocessor and cell phone chips for many of the major players.
Work locations have varied but include Switzerland, Ireland, Pennsylvania, Texas, Arizona, Washington and Oregon. Ed also has his Certified Flight Instructors rating, but is not presently a very active pilot due to his nomadic life style. Presently Ed works at RFSAW, Inc in the Dallas, Texas USA area. There he assists in test and development for RFID Passive Global Tags.

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