

Ham Radio 101
Tape Measure Beam for 2M
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Directors Note: The information for this article was made available to me by Mike Slygh (KI6IRA). Mike suggested this home brew project to me for several reasons. The club has gotten back to T hunts and building this antenna is especially suited for T hunts. The materials needed for this project are available at your local hardware store.

The technical information for this article comes from Joe Leggio (WB2HOL)

It has been brought to my attention that T hunts are getting popular again and in fact, SOARA has been conducting T hunts on a regular basis. Mike Slygh (KI6IRA) has built an antenna suitable for use in T hunts and has shared the article with me.

The antenna offers several features that are suitable for home brewing. The parts are available from a local hardware store. The tools required are general hand tools like a tape measure, PVC cutters or a hand saw, cordless drill, and a screwdriver.

The antenna makes use of an ordinary tape measure for the reflector, director and driven element. The boom is made from schedule ½ inch 40 PVC sprinkler pipe. The cross pieces are made from ½ inch PVC parts and are glued together to the boom. (See figure 1)

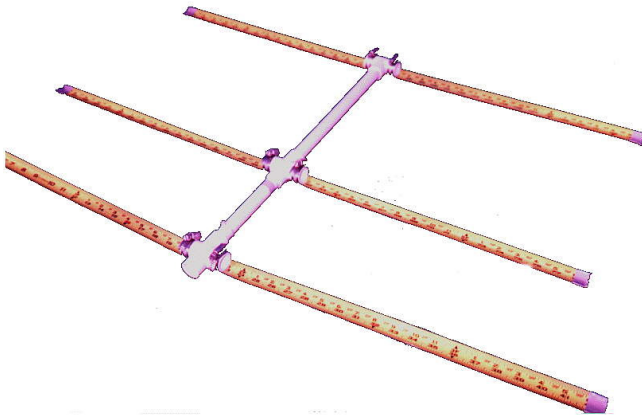


Figure 1

Figure 1 shows a completed antenna. The tape measure parts are held in place with hose clamps.

This design exhibits a clean design that is optimized for a very clean notch at the sacrifice of some forward gain. See figure 2

The whole idea of the antenna is to have it fit easily into the car or SUV. The elements can be folded back with out damaging the antenna. This antenna may be suitable for a home QTH location where it may have to hidden in an attic.

The design was optimized using a shareware computer aided yagi design. The program was written by Paul McMahon (VK3DIP).

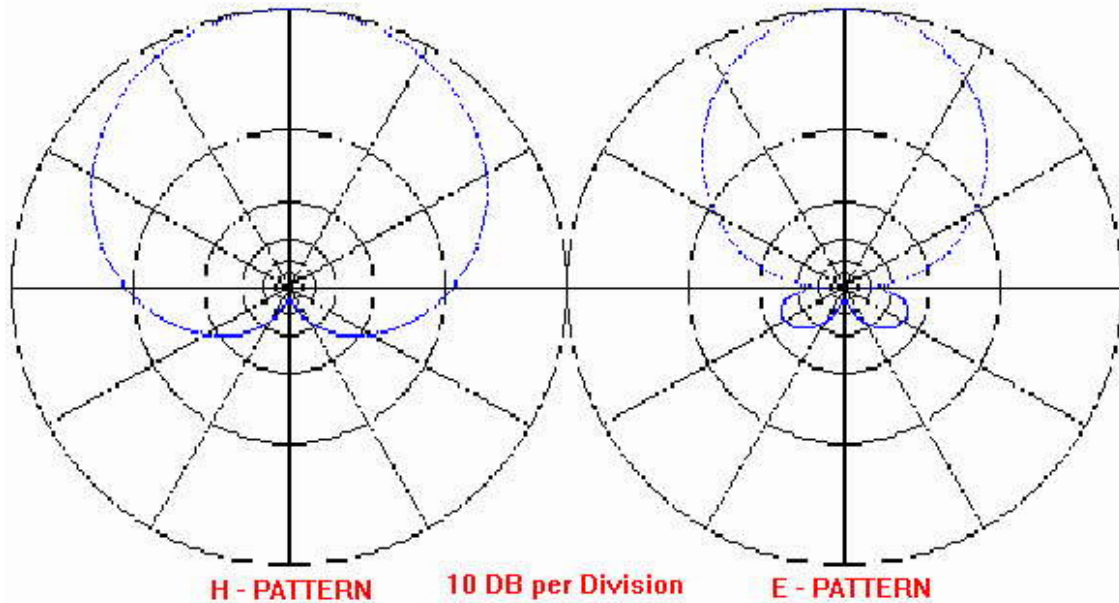


Figure 2

Figure 2 illustrates the expected performance from this design. The design of the antenna required some kind of a matching network which the author WB2HOL designed.

The author devised a “hairpin” which produced a low SWR and is illustrated in figure 3. The author used a 5” length of enameled insulated 18 ga. wire. Almost any type of wire can be used. 14 ga. house wire works well as does 22 ga. hookup wire for the matching network

The construction of the antenna is quite simple. Use a pair of tin snips or shears to cut the tape to length. Figure 4 shows all of the dimensions for the antenna. Remember to sand off the sharp edges as they can produce a nasty cut. You can also put some kind of tape across the edges of the tape measure to protect yourself. For the driven element make sure that all of the paint is scraped away to expose bare metal. The RG58 or whatever 50Ω coax you use will attach right to either side of the driven

element. Figure 3 also shows how to attach the coax to the driven element.

If you choose to solder the coax to the tape measure, be very careful as the PVC has a low melting temperature and the steel tape does not like to be soldered.

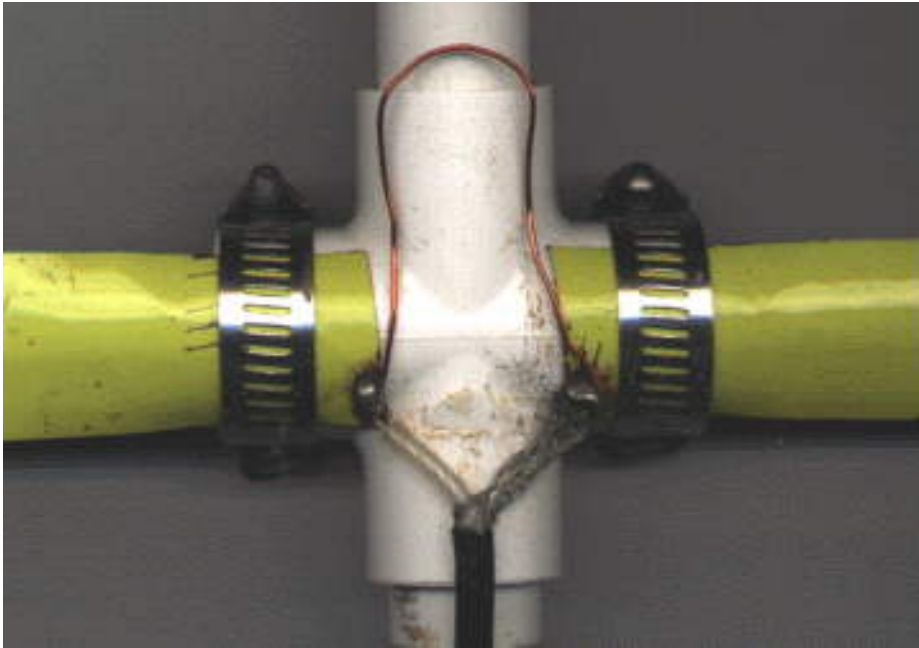


Figure 3

My suggestion is to put a 6-32 or 8-32 screw through the PVC and fasten it with a flat washer, lock washer, ground lug and nut. Then solder the coax to the ground lug.

Another method to attach the coax to the tape is to run a 6-32 or 8-32 screw through the PVC and then use the hardware stack up as described above except leave the ground lug out of the stack up. Fasten crimp-on ring lugs the center conductor and braid. Then tighten the nuts until you have a secure fit.

To cut the PVC to length, you can use a common hack saw or if you happen to have a set of PVC cutters, those work better as they leave a clean edge. I find that if you rough up the PVC surface, use PVC primer on both parts and then glue both parts; you will have a secure connection.

WB2HOL did not glue his PVC together and relied on the ID and OD fit of the PVC pieces. A sheet metal screw may also be used to fasten the PVC pieces together

Figure 4 below has a pictorial sketch of the antenna. All of the dimensions are spelled out.

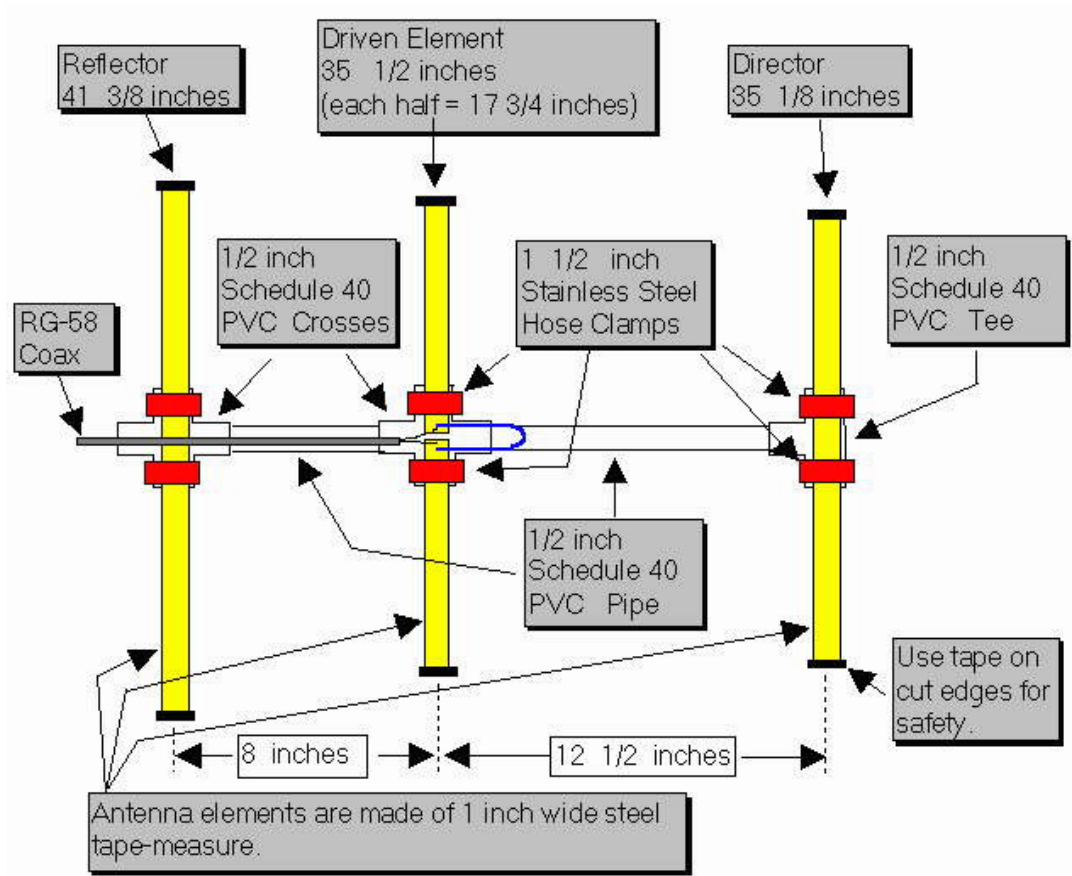


Figure 4

Cut the length of the tape to 41 3/8" for the reflector. Then cut two lengths of tape each 17 3/4" for the driven element. The director length is 35 1/8".

If you are planning to solder the feedline to the elements, it is a good idea to tin the elements with solder first. Then time the wire to be used for the hairpin match. If the tinned part of the hairpin match is 1/4" then the rest of the wire will be 4 1/2".

To make the boom, cut two pieces of PVC. One length should be 11 1/2". This will be used from the director to the driven element. The other piece should be cut to 7". This will for the boom from the driven element to the reflector.

While the author didn't address this, I believe that an additional PVC T can be added at right angles to the boom to form part of a boom to mast bracket. The key to this is to maintain the spacing from the director to the driven element or, if the PVC T is put between driven element and the reflector. It might be wise to use an adapter that adapts the T from 1/2" to either 3/4" or 1". This would add more support if the antenna is going to be vertically polarized and mounted in an attic to better access local repeaters or to provide some gain so that the operator can operate simplex.

Another variation of this design might be to look at a 440Mhz or 220Mhz antenna for installation in an attic. Why not have a 2M and a 440Mhz design on a boom that is mounted in the attic or at the roof line if the city ordinances are not violated?

Once you have completed the 2M design, what kind of performance would you expect? The SWR should be less than 2:1 across the entire 2M band. The front to back ratio is expected to be very good as predicted by the computer program YAGI-CAD. I have provided the link to the original article that Mike (KI6IRA) provided to me.

http://home.att.net/~projects/rdf/tape_bm.htm

This will allow you to download YAGI-CAD.

In summary this beam has been used on fox hunts, on mountain tops, at local public service events, outdoors, indoors in attics and just about everywhere.

The author of the original article, written by Joe Leggio, (WB2HOL) reports that his antenna has taken a lot of abuse getting it in or out of the car. So this should give the home brewer many years of excellent performance.

If you have any questions regarding this article, contact either Mike Slygh (ki6ira@soara.org or myself wb6wxo@soara.org)

Acknowledgement:

I would like to acknowledge Joe Leggio WB2HOL for his article. Several members of SOARA have built this antenna. For my part, my article is meant to be used as a vehicle to encourage other members of SOARA to become active home brewing and rebuilding ham radio equipment.

