The 2 Meter Tape Measure Antenna
(K4IVE Version)

Are you looking for an easy kid friendly project? Are you looking for a project to encourage a new generation of ham radio operators?

This project is unusual, so it's something that will certainly capture the attention of anyone, particularly a kid. It's an antenna built out of PVC pipe, a tape measure and a handful of hose clamps.

This antenna is designed for two-meter operations, which, for a newbie ham operator, is one of the bands available under the Technician license in the US. Plus, it's easy to build and gives a great opportunity to teach several subjects with a hands-on approach.

Materials List:
3/4" Schedule 40 PVC Pipe - at least 25"
6 ea. hose clamps, big enough to fit around the PVC pipe
1 ea. 3/4" PVC tee
2 ea. 3/4" PVC crosses
8 foot RG-58 cable with a connector attached to one side. I soldered a female BNC to mine.
5" of wire. Use solid copper wire, but anything works.
Rosin core solder
Tape measure with 1" wide tape
PVC glue

Tools Needed:

Soldering iron
Tape measure
Pipe cutters
Wire stripper
Shears or scissors
Sandpaper
SWR Meter
Screwdriver for tightening the hose clamps

Step 1: Cutting the elements and assembling the boom:

You'll need to cut two pieces of PVC pipe. One piece will be **11 1/2", the other 7".** This, along with the PVC connectors, will form the frame of the antenna.

Assemble the pipe to form the frame ("boom") of the antenna. Fitting each piece together, the **11 1/2" piece** connects between the tee and the first cross.

The PVC tee is the front of the antenna. **The 7" piece** connects between the first and second crosses.

Disassemble the tape measure by pulling the tape out of the case. If you pull the tape past its end, you'll find that it's connected to a spring. Simply twist the tape so it disconnects from the spring.

Cut the tape at **35 1/8"**. This will be the director of the antenna and will attach to the front of the antenna.

Cut **two 17 3/4"** long pieces of the tape. These will serve as the driven elements.

Cut an additional element from the tape. This will need to be **41 3/8"**. This is the reflector element.

Cut the outside ends of all of the elements until they are round and sand them smooth. These are extremely sharp if left rough. Also sand off about 1/2" of paint on the inside ends of the driven elements. This will be where you will solder the wires later.

Note: If you are going to mount the antenna, set it up so the antenna will be forward of the mounts. Yagi antennas may suffer in performance if mounted elsewhere, like the center of the boom.

Step 2: Installing the elements of the antenna:

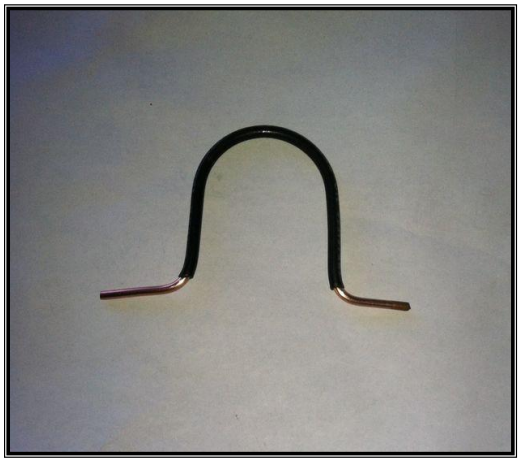
Slip the hose clamps over the PVC tee at the front and slip the Director element under it. Tighten the hose clamps so they are secure.

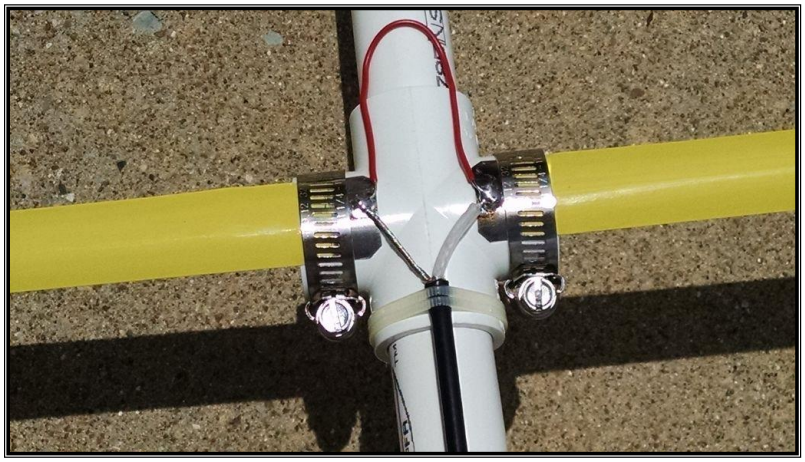
Attach each of the driven elements to the frame of the antenna with the sanded sides facing each other. Before securing the elements, space the elements **1" apart** and tighten the clamps.

Finally, attach the reflector element at the rear of the antenna and tighten the clamps.

Mark the center of these elements to ensure they are centered.

Step 3: Soldering the wires:





Now you will tin the ends of the driven element. Simply heat the soldering iron and apply solder to the tape measure at the sanded spots. Make small pads where you can solder two wires to each driven element.

Strip the end of the RG-58 cable and isolate the outer and inner wire. Solder one side of the RG-58 to a driven element and the other to the opposite driven element.

Strip the **5" piece of wire** and solder each end to each of the driven elements.

I chose to add an optional piece of PVC at the rear of the antenna to make it easier to hold and/or mount. I also chose not to glue the PVC together so the antenna can be broken down for storage.

Step 4: Adjusting the antenna:

Adjusting the antenna is very simple. Simply attach a SWR meter between the antenna and the radio. Adjust your radio to **146.580 MHz** and check your SWR reading.

If the reading is more than 1.2 to 1, **turn off your radio** and adjust the driven elements by loosening the hose clamps and moving the elements toward each other.

Turn on your radio and check your SWR again. Repeat until your SWR is at an acceptable level.

When adjusting the driven elements, **make sure your radio is off**.

Step 5: Technical Notes:

Software modeling programs show that this antenna should have a gain of 7.3 dBd.

While this antenna is designed for VHF two-meter operations, it can easily be redesigned for other frequencies like 1.25 meter, 70 cm or 33 cm.

There are many websites that will calculate the length of and length between the elements on a Yagi-Uda antenna. You can try Martin Meserve's (K7MEM) online calculator.