

Club Project Yagi

Kent Britain WA5VJB

This antenna has been built in over a dozen meetings as a club project for new hams. Simple, cheap, and can be built in three versions for a few bucks. Using the same boom, the student can build one in a matter of minutes for 432 MHz weak signal, AMSAT, or for the FM repeater band.



One thing nice about this design is it is not critical on the dimensions. So you don't need a micrometer to measure out the elements. A good old yardstick is accurate enough.

Before the class I will make up a batch of booms. I like to use $\frac{1}{2}$ " x $\frac{3}{4}$ " trim wood, but any wood about $\frac{1}{2}$ " thick will work. You don't want to use anything much thicker, it will change the tuning of the antenna. So $\frac{1}{2}$ " x $\frac{1}{2}$ " or $\frac{1}{2}$ " x 1" can also be used.

I am fairly careful marking where the holes will go for the first boom, then I can use that boom on my drill press as the template for the next dozen or so booms. Sometimes more students show up than I have pre-drilled booms. That's when you make them a team project and it's up to them as to who takes it home. But they both know it's easy to make more.

Elements

The antenna is designed for $\frac{1}{8}$ " diameter element material. I do not recommend changing the element diameter. A lot of material can be used for the elements. $\frac{1}{8}$ " Aluminum Ground Rod wire works well, Bronze Welding Rod, Aluminum Welding Rod, Hobby Tubing, and even those rolls of #12 Aluminum wire used to suspend drop ceilings can be used. The rolls of wire are usually cheapest and the Bronze Welding Rod the strongest. One trick to straighten rolled wire is to take a good length of it, 5 to 10 feet, pull on it hard, and then twist it a turn or two. Amazing how it straightens out and hardens.

Driven Element

For the Driven element it is much easier if you use something you can solder to. The Bronze welding rod works well as does #10 or #12 solid Copper wire. The loop in the driven element can be $\frac{1}{2}$ to 1 inch wide. The width of the loop is not a critical dimension.



Securing the Elements

A drop of glue holds the elements in place. Epoxy, Silicon Glues and others can be used. I usually use a drop of “Super glue” but on the Driven Element glue the element in place after you have soldered on the coax. Glue it first and you get a cloud of hot fumes while you solder the coax. And those “Super Glue” fumes are nasty.

Not sure which version they want? Suggest the 432 MHz version. This is one of the few Yagi antennas designed to be modified with wire cutters.

Securing the Coax

Cable ties work pretty well. But garbage bag ties, bread ties, electrical tape, and even a big wad of glue have also been used. The solder joints on the driven element need some stress relief. For the coax itself, most any 50 Ohm coax can be used. Keep the free ends of the coax as short as practical. Long leads will change the resonate frequency of the driven element.

Tune Up

Simply built to the dimensions the SWR is usually better than 2 to 1, certainly good enough for most work. But I like to bring along the equipment to tune them. An antenna analyzer is good, a rig and SWR meter is plenty. This makes sure they really work. Over the years there have been some very creative ways to interpret the instructions, and we are also testing their construction. For the instructor you might want to bring also some 1/8” brass or

Copper hobby tubing. For the student that *'Cut it off twice and it's still too short'* you can solder on an inch or so of tubing on the tip of the element as in this Photo



Suggested Kit

- Pre-Drilled ½” wide wood booms
- Element Material About 6’ for each antenna
- Tape Measure or Yard Stick
- Soldering Iron and Solder
- Cable Ties
- Glue
- Coax ends with connectors
- Hobby knife
- Wire Cutters (Bolt Cutters if using Bronze Welding Rod)
- Antenna Analyzer or Rig with SWR meter

Dimensions

	Spacing all versions	432 MHz	435 MHz	445 MHz
Reflector	0”	13.5”	13.4”	13.0”
Driven Element	2.5”	12.75”	12.7”	12.5”
Dir 1	5.5”	12.4”	12.4”	12.25”
Dir 2	11.25”	12.0”	12.0”	11.75”
Dir 3	17.5”	12.0”	12.0”	11.75”
Dir 4	24.0”	11.0”	11.0”	11.0”

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Handle or
Holes for a
U-Bolt

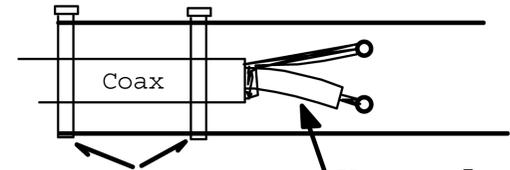
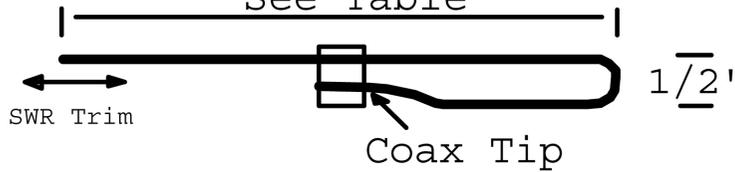
Element Spacing

0" 2.5" 5.5" 11.25" 17.5" 24.0"



Ref DE D1 D2 D3 D4

See Table



Element Lengths

432 435 445 MHz

Ref	13.5	13.4	13.0
DE	12.75	12.7	12.5
D1	12.4	12.4	12.25
D2	12.0	12.0	11.75
D3	12.0	12.0	11.75
D4	11.0	11.0	11.0

Notes

Dimensions for 1/8" rod elements

Cable Ties Keep leads
Very short

For outside use the antenna can be painted

Title 432-435-445 MHz		
Size B	Number CQ	Rev A
Date: 07-01-15		Drawn by: KEB
File Name: Simp3B.pcb		Sheet 1 of 1