

Building a WA5VJB Cheap Yagi

1296 MHz edition

The WA5VJB “Cheap Yagi” is a simple and elegant design. Construction of the antenna is quite simple, with a non-conducting boom, and through-the-boom construction. Elements are welded or brazing wire. Impedance matching is fixed in the design through a “j-pole” driven element. Thus no gamma or delta match is required for an impedance of 50Ω . Soldering a pigtail to the driven element simplifies the mechanical construction of the antenna by eliminating a bracket.

I have used these antennas for roving, portable operations and at home for a number of years now. The simple, lightweight design makes them particularly suitable for portable operations.

This manual augments the original online documentation available from www.wa5vjb.com/yagi-pdf/cheapyagi.pdf.

Preliminaries

Construction of any antenna, even one as simple as a “cheap yagi” entails using tools and chemicals. And using tools and chemicals involves certain risks. Protect yourself and work carefully. Here are some cautions:

- Protect your eyes. Wear shatter resistant glasses or safety glasses.
 - Cutting welding rod produces flying objects that can damage your eyes
 - Power drills throw bits of wood and metal that can damage your eyes
 - Power sanders throw dust and debris that can lodge in your eyes and cause damage
 - Soldering sometimes makes flying molten metal that can damage your eyes
 - Epoxy glues can damage your eyes
 - Hot glue can damage your eyes
- Avoid touching epoxy glue in liquid form. Wear latex gloves when gluing. People who experience repeated skin contact with epoxy can develop severe allergies to the materials.
- Don't touch hot soldering irons or glue guns. They will burn you.
- Using power tools, like a drill press, or a power sander, entails risk of physical harm. Use caution and if you are not familiar with proper use, please ask first.

Preparing the boom

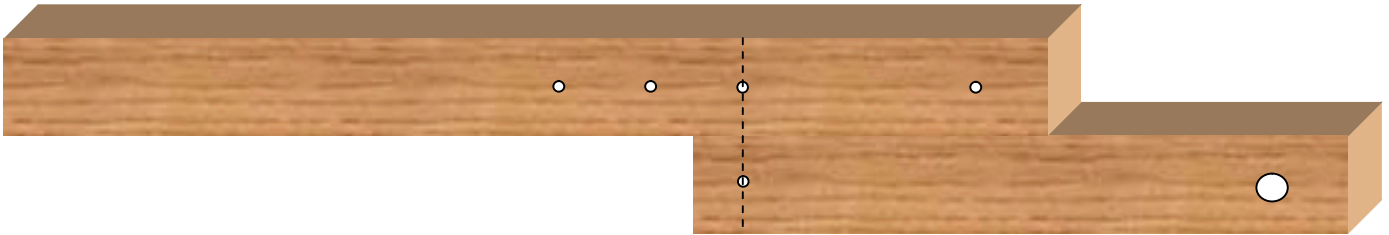
Drilling

1. Clamp the boom template into the drilling jig using a clamp at each end.
2. Drill ten 1/8” holes in the boom using the template as a guide.

Gluing

1. Identify the driven element hole.
2. On the bottom of the boom, mark a line $\frac{1}{2}$ way between the driven element and first director element.

3. Glue a small piece of boom material from that line overhanging the end of the boom. This boom extension will hold the bottom of the driven element and any mast support bracket.

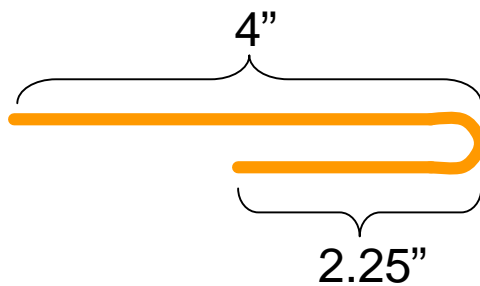


4. When the glue has dried, draw a perpendicular line straight down from the driven element hole across the boom extension.
5. Using your completed driven element (or a sample driven element), mark and drill the location for a lower hole in the boom extension (see figure)
6. Optional: Draw a 1/4 " hole in the boom extension for a mast support bracket.
7. Optional: Shape the ends of the antenna to lower wind loading.
8. Optional: Coat the finish antenna with spar varnish or some other material to protect it from the weather.

Preparing the driven element

The driven element is made of 1/8" bronze brazing rod. Your kit includes a 12" piece that is much longer than is needed. We will bend the element first, and then trim the ends to length. Use the bolt cutter for cutting the bronze rod.

1. Find and mark the approximate center of the 12" bronze rod.
2. Put the rod into the bending jig, and bend the center around the 1/2" bar. You will have to over-bend the rod. Work it until the two halves are parallel. Keep the ends straight.
3. Mark the longest end at 4.0" from the center of the curve.
4. Cut and file (or sand) the end so the length is 4" (caution: flying metal may occur here!).
5. In the same way, mark, cut, and trim the other end to 2.25". Bevel both ends.



Preparing the other elements

The reflector and all of the driven elements are made from 1/8 welding rod. Your kit includes ten short pieces of welding rod. Each piece is used to make two elements. For example, one is used to make the reflector and the shortest driven element. There are a series of jigs (aluminum tubes embedded in a block of wood) that are used for measuring the element lengths. Here are the steps for each element.

1. Place the welding rod in the appropriate jig.
2. Mark the cut point with a Sharpie.
3. Use a side cutter, bolt cutter, or lineman's pliers to snip the length slightly long.
4. File or sand the element to length at the cut end
5. File or sand in a slight bevel on the cut end to make it easier to insert the element into the boom.
6. Optional: Use the calipers to check the length

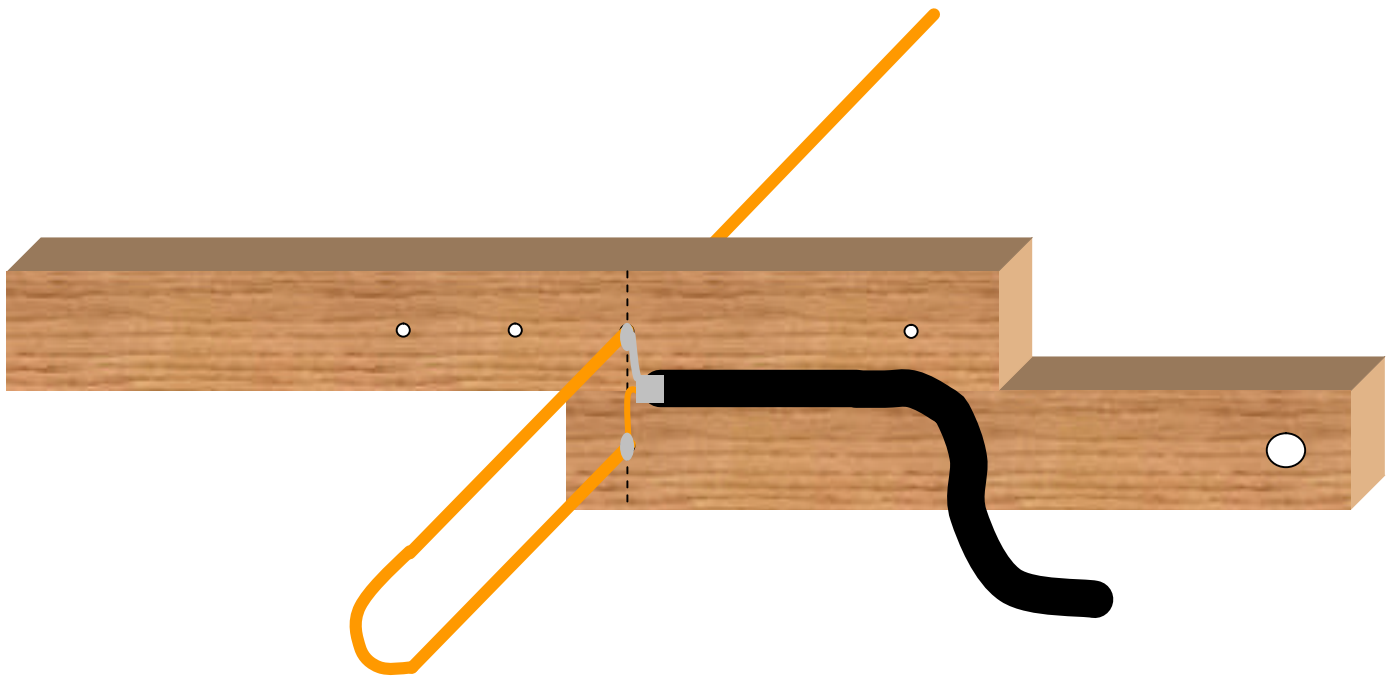
Attach elements to the boom

Driven element

1. Slide the director into the boom with the long end through the boom and the short end through the boom extension.
2. The short end should be inserted into the boom extension until it is flush with opposite side of the boom extension.
3. Prepare the pigtail by stripping the cable and separating the center conductor and the shield.
4. Solder the shield to the upper (longer) element (see figure, next page).
5. Solder the center conductor to the lower (shorter) element (see figure, next page).
6. Hot-glue the element to the wood at the junction.
7. Use two cable ties to hold the pigtail to the boom.

Passive elements

1. Insert the nine passive elements into the boom. The longest element (reflector) goes into the hole aft of the driven element. The order is from longest to shortest working your way to the front of the boom.
2. Carefully center each passive element using a ruler or calipers.
3. Use hot glue (optional: epoxy) to hold each passive element in place.



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Darryl Holman
WW7D
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