

WB2HOL Tape Measure Yagi Kit Instructions
(Design modified by KØGR)

Kit Contents:

1- Front boom 11 5/16" x 3/4" PVC	6- Element keepers 1" x 3/4" PVC
1- Rear boom 6 13/16" x 3/4" PVC	1- Reflector element 41 3/8" x 1" tape measure
1- Handle 5 1/2" x 3/4" PVC	1- Director element 35 1/8" x 1" tape measure
1- Radio support 5" x 3/4" PVC	2- Driven elements 17 3/4" x 1" tape measure
1- Balun form 3 1/4" x 3/4" PVC	1- 3/4" PVC street elbow 45°
2- Driven/Reflector 3/4" PVC cross (sanded inside)	1- Hairpin match 5" 18 gage wire
1- Director 3/4" PVC T (sanded inside)	9- Sheet metal screws #4 3/8"
1- Handle 3/4" PVC T (not modified)	1- 50" RG58 coax BNC male & shield/center separated

Notes: The side of the PVC fittings with the tape will be called the front throughout these instructions. When instructed, insert all PVC pipes fully into fittings until they hit the depths stops. This will require strong, downward twisting pressure or a rubber mallet. The exception to this rule are the 6 element keepers, which are hand tight.

* Steps 10, 11, 24, and 26 can be completed early if availability of tools is causing a delay for other steps.

1. Drill a 7/32" hole through one wall of the PVC balun form centered 7/8" from one end. Do not drill though both walls of the form. (After marking drill locations, you may choose to temporarily insert the ends of the form into the unmodified ends of the PVC crosses to hold the form and aid in aligning the holes.)
2. Drill a second 7/32" hole centered 2 1/4" from the same end as the first, going completely through both walls.
3. The coax will make sharp bends when it exits holes drilled in the form. Tapering and rounding the edges of these holes will increase the bend radius and prevent the edges from cutting into the coax jacket. Using a small Dremel rotary tool grinding bit and/or a small round file, taper and round the bottom of the first hole towards the closest end of the form. Taper and round the top of the first hole in a direction parallel to the cut end of the form. Do this one direction only so the first wrap of coax enters the hole with an increased bend radius.
4. Taper and round the top of the second hole in the opposite direction as the first hole so the last wrap of coax enters the hole with an increased bend radius.
5. Smooth the edges of the second hole exit on the back of the form. No need to taper and round this hole.
6. Start the coax balun by passing the cut end of the coax through the second hole, starting on the back side and out the top through both walls of the form, pulling all of the coax through until the BNC connector contacts the form. Wrap the coax around the form 7 times without overlapping. Inset the end of the coax through the first hole and out the closest end of the form, pulling all of the coax through. It is not necessary to make the wraps tight around the form at this point.
7. Insert the rear boom PVC into one of the unmodified holes of a PVC cross. Insert the coax in the second unmodified hole of the cross and out through the boom, pulling most of the coax through.
8. With the cross front facing up, the boom pointed away from you, and the BNC connector pointed horizontally to the right, insert the form into the cross. The drilled holes and the sanded holes in the cross should be aligned.
9. Orient the remaining PVC cross facing up and insert the coax through one of the unmodified holes of the cross, make a left turn inside, and out the left sanded hole. Partially insert the other end of the middle boom into the second, pulling the remaining coax completely through. Set this assembly aside until step 12.
- * 10. Bend a 180° arc in the center of the hairpin wire, making a U shape 1" wide. Starting 1/4" from the ends of the wire, bend each end out slightly.
- * 11. Brush acid flux on the sanded pads of both driven elements to aid solder adhering to the steel tape measure. Tin the pads with solder and a soldering iron, leaving a puddle of solder the size of a pencil eraser on each corner.
12. Bend the coax center conductor and shield so they are 180° from each other and perpendicular to the coax.

13. Orient the front of the driven cross up with the coax exiting on the left side. Lay one of the driven element numbers up so the lower solder puddle is under whichever coax center/shield is pointed down toward the coax balun. Lay one end of the hairpin on the upper solder puddle so the U is on the opposite side as the coax. Solder both the hairpin and the coax center/shield to the driven element pad.
14. Insert the second driven element numbers up into the right hole of the cross, under the coax, and out the left side a few inches.
15. Align the remaining coax center/shield and the hairpin end on top of the other solder puddles and solder both to the pads. You may need to use something heavy or a helper to keep the coax bent into the proper position.
16. Clean the flux away from both solder pads with alcohol and a cotton swab.
17. Roll the hairpin 'U' up and back towards the coax in a 1" diameter arc until it forms a complete circle.
18. Remove the middle boom from the second cross while pulling the coax end back towards the center of the cross. As the coax end, solder pads and the bent hairpin U approach the cross, squeeze it into the hole and continue to pull the coax, centering the two driven elements in the cross.
19. Rotate the entire assembly 180° so the balun is away from you. Reach into the top hole of the cross (with needle nose pliers or your fingers) and unwind the hairpin U back out into its original flat orientation.
20. Flip the entire assembly over so the cross fronts are down. Align the small mark on the back of one of the elements with the side of the cross and in line with the hole through the cross. Insert one element keeper under the element and into the cross, sandwiching the element between. Push the keeper in while maintaining the alignment mark and the position of the element. Hand pressure is all that is required. Keeping the elements straight and avoiding it sliding too deep will be very tedious and will probably require several attempts. Use pliers to pull the keepers out if you need to start over. Repeat this process for the second element and keeper. Check the alignment of the elements and adjust as necessary, there should be 1" between them inside the cross.
21. Lock the PVC connections (not the element keepers) together as you complete the remaining steps.
 - a. Optional 1: Drill 1/16" holes completely through the PVC connection 1/4" from the edge of the T or cross. To prevent drilling through the coax inside the boom, use wooden dowels to hold the coax away from the drill hole. Insert a #4 screw in the hole but do not overtighten. This connection is reversible.
 - b. Optional 2: Use PVC glue to permanently secure each connection.
22. Pull the extra coax through the rear boom, reflector cross and the first drilled hole in the form while fully inserting the rear boom into the driven cross. Re-wrap the coax again 7 times and pull the extra coax out through the second hole by pulling on the BNC connector end. It is important to make the wraps tight around the form. You can optionally wrap electrical tape over the coax to hold the wraps in place as needed.
23. With the reflector cross front down, insert the reflector element numbers-down and over the coax. Align the element and secure using the method in step 20. Squeezing both keepers at the same time works well.
- * 24. Lay the director T front down and insert the director element with the numbers-side facing down. Align the element and secure using the method in step 20. Insert the front boom into the bottom hole of the T.
25. Insert the front boom into the open hole of the driven cross, being careful to insert the hairpin into the end of the boom without deforming it. Ensure all 3 elements are pointed in the same direction, aligned with each other, and the PVC is seated completely in the crosses and T's.
- * 26. Assemble the handle and radio support (handle and radio support PVC pieces are interchangeable if desired):
 - a. Insert the radio support PVC into the socket end of the 45° street elbow.
 - b. Insert the handle PVC into the bottom hole of the handle T.
 - c. Insert the 45° elbow into the handle T, aligning the handle and the radio support so they are parallel.
 - d. The method to attach the radio to the support is determined by the builder and can be completed later. One method is to drill a cable-tie sized hole completely through the radio support PVC just below the 45 street elbow. Loop a cable-tie through these holes and the radio belt clip.
27. Insert the form support PVC into the handle T to complete the antenna assembly. Lock any remaining PVC connections together using the methods listed in Step 21.