# The Insta-Flex 2 Meter Yagi Beam

*Right at home in awkward places.*

Darwin Ogden KB7WOS
790 West 800 South
Richfield UT 84701

If you have ever transported a yagi beam, or carried it through woods or underbrush, you know how the elements are always catching or getting damaged on something—so you will love the Insta-Flex Yagi Beam. It's inexpensive, easy to construct, and the elements can bend all over the place and still return to their proper positions.

The thing that makes the flexible elements and flexible gamma match possible is an everyday metal carpenter's tape measure. I had thought about using the tape measure for some time. The problem was designing a flexible gamma match. Thanks to suggestions from Dean Harmer WB7PRB and Berry Bradley WB7REL, the combination of flexible elements and gamma match, coax capacitor, and PVC boom came together.

***"The elements can bend all over the place and still return to their proper positions."***

I keep my beam in a fishing rod carrying tube behind the seat in my pickup. A cardboard mailing tube or PVC pipe would work just as well.

Setup is instantaneous: Just pull it out of the tube and the elements will spring into position. Connect the coax to the antenna and your radio and you're on the air.

## Construction

As shown in **Fig. 1**, I drilled a hole in the 90° side of the "T" for the coax connector. I used a BNC chassis mount on the first, and an SO-239 connector for the second Insta-Flex I built. The BNC is easier to install, but requires an adapter (Radio Shack™ 278-120) to connect it to coax using a PL-259-type connector.

Place one mark on the "T" where the driven element is to be located and one where the gamma rod is to be (see **Fig. 3**). Drill a small hole at the mark, all the way through the "T" where the driven element and the gamma rod will go; this will make an aligning hole. The gamma rod can be mounted either way—up or down.

The curved slot for the elements and gamma rod can be made any way you want (**Fig. 3**). The easiest way I have found is to trace the curve of the tape measure on the PVC, and then use a scroll saw to cut the curve.

Another method is to melt it through using a piece of the tape measure and a propane torch. The curved slot is very important for the rigidity of the elements. If you make a straight slot for

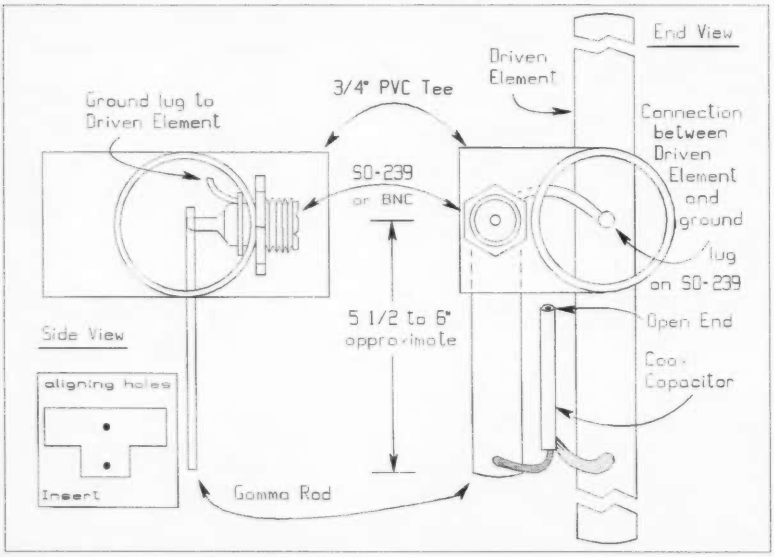


*Fig. 1. Tuning the Insta-Flex Yagi, method A.*

the elements, they will lose their ability to spring back into position, because the natural curve will be taken out of the tape measure. Place the piece of tape measure to be used to melt the slot directly over the small aligning hole. Make sure it is perpendicular to the "T" as shown in **Fig. 3.** Heat the piece of tape measure about one inch above the PVC, and when it is hot enough, it will melt the PVC. Light pressure will help force it through. Don't press too hard; the tape measure will bend very easily as the temperature increases. You will probably have to turn the "T" over and do the same thing on the other side. Make sure of the direction of the curve, as the element will have to go through both top and bottom curved slots. After the PVC cools, fit the element.

Make the curved slots for the reflector and director(s) the same way. Attach the SO-239 or BNC with a wire connected to the ground lug, long enough to reach the center of the driven element. Now install the driven element and the gamma rod, and secure them with hot glue or epoxy. Solder the wire from the ground lug to the center of the driven element **(Fig. 1** or **2).**

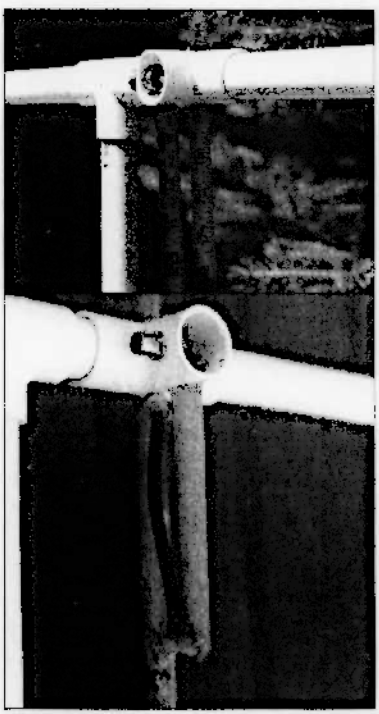

***Photo A1, Photo A2.*** *Close-ups of gamma section.*

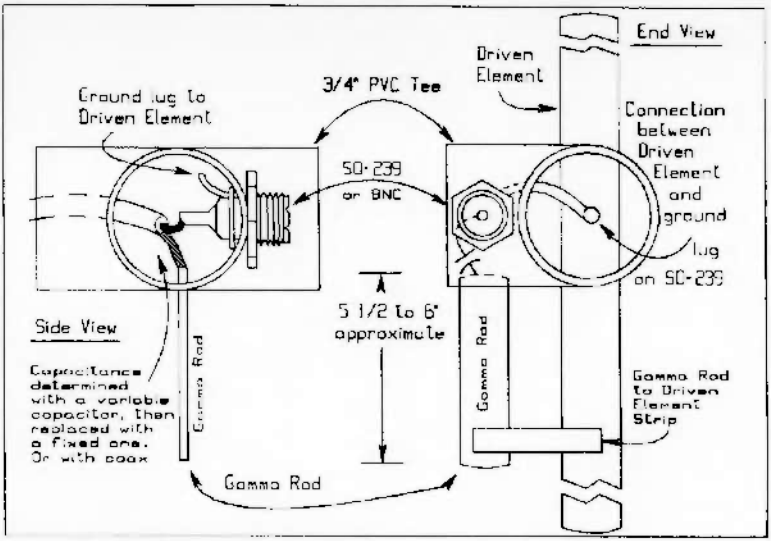


***Fig. 2. Tuning the Insta-Flex Yagi, method B.***

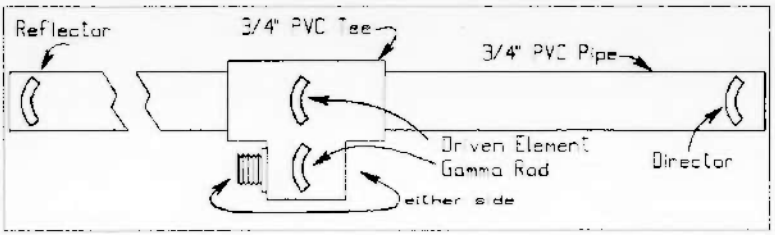


*Fig. 3. Attaching the elements.*

Use either method to complete the gamma match construction. Use a piece of coax to make the needed capacitance. If you use Method A, you may want to put a nonconductive support between the end of the gamma rod and the driven element.

Before securing the reflector and director(s), measure, cut and dry-fit the boom pieces into the "T"s. Once the proper spacing between elements is made, install the reflector and director(s) in the respective slots and secure them using hot glue or epoxy. Line all the elements up and press the boom pieces into the "T"s. You don't have to cement it together. If you do, make sure the elements and boom pieces are lined up *very* quickly; once the cement is set, you can't change it. I didn't cement mine and don't have a problem. If it comes loose, just line up the elements and press it together again.

## Tuning

•Method A (**Fig. 1**): Connect the coax to the ends on the gamma rod and driven element as shown. Check SWRs and start trimming the coax off about 1/8" at a time. Check SWRs after each adjustment. After the lowest SWR reading is obtained, if it is not acceptable, try moving the attacking point on the gamma rod and driven element. You may need to trim a little off both ends of each element. It is better to cut the elements a little long and trim them than to have to replace them with longer ones. After the correct length of the coax capacitor is found, seal the open end with hot glue or epoxy. Make sure you leave the end *open*! Glue the coax capacitor to the side of the gamma rod. You might want to glue a piece of nonconducting material between the gamma rod and the driven element for added strength.

***"Setup is instantaneous: Just pull it out of the tube and the elements will spring into position."***

•Method B (**Fig. 2**): Use a variable capacitor (optional), and adjust for lowest SWRs. You may have to move the strip between the gamma rod and driven element up or down. After the correct capacitance is found, leave the variable capacitor in place, replace it with a fixed one, or use a coax capacitor. I've found it easier to replace the variable capacitor with coax and trim as needed. With both a three-element and a four-element, I have had better luck and faster tuning using the coax capacitor.

I have shown the Insta-Flex to lots of hams and have gotten lots of strange looks when they see what it's made of and how flexible it is. Try it—if you have comments, questions, or suggestions about improvements, I'd like to hear from you! 73

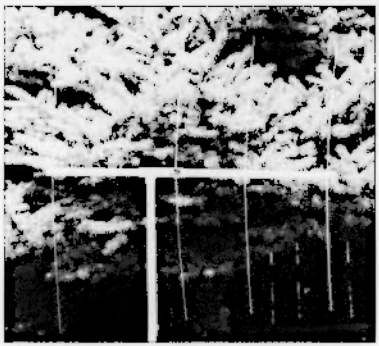

*Photo B. The Insta-Flex in operation.*

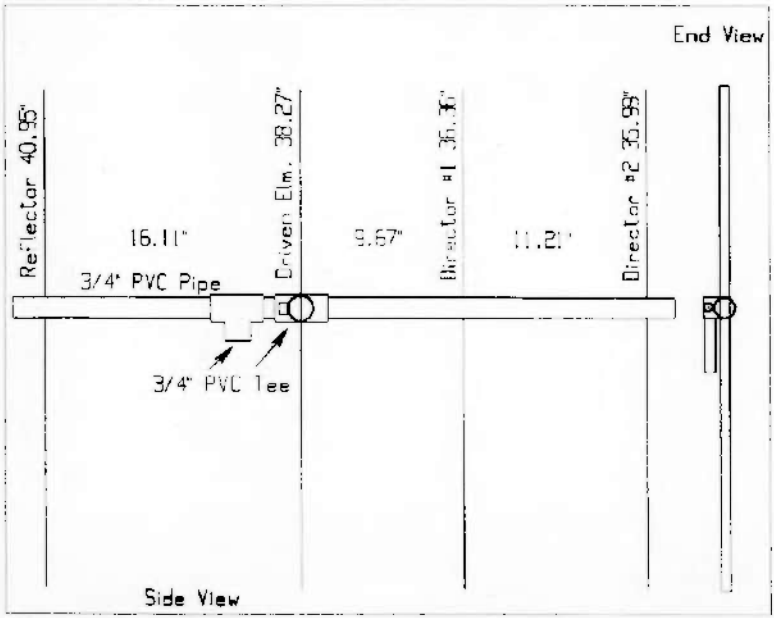


*Fig. 4. Yagi for 3 or 4 elements.*