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# A 6-Meter Portable Yagi Antenna



This compact antenna breaks down for storage inside its PVC boom.

## H. Scott McCann, W3MEO\*

This easily deconstructed 6-meter beam uses a painter's pole mast and two telescoping aluminum elements, and is suitable for portable low-power operation, especially in the portable category of VHF contests. Its dimensions are shown in Figure 1.

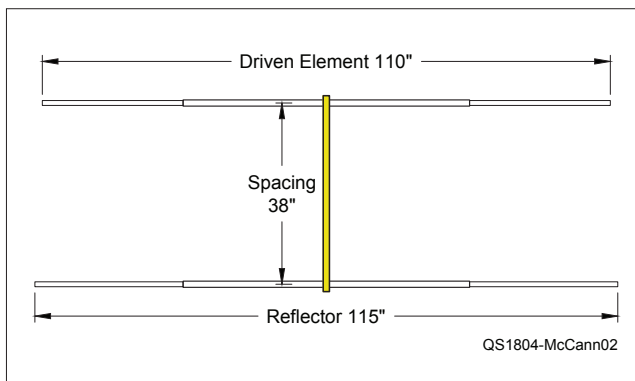


Figure 1 — Overall dimensions of the antenna.

\*Honorable Mention in the 2017 QST Antenna Design Competition, 6 Meters and Higher Frequencies category

## Materials

### PVC parts, from your local hardware store

- 1-inch PVC pipe cut to length (see text)
- Slip-on PVC cap (see Figure 2)
- Slip-on cap with threaded opening and screw-in plug (see Figure 2)
- 1-inch to 1/2-inch threaded T
- 1 can of PVC cement

### Aluminum parts, from [www.aircraftspruce.com](http://www.aircraftspruce.com)

- (4) 32-inch inner portions, 3/8 x .049 AS# 03-39550-6
- (2) 27 1/2-inch reflector outer portions, 1/4 x .035 AS# 03-39300-6
- (2) 24 1/2-inch driven element outer portions, 1/4 x .035 AS# 03-39300-6
- (1) 8-inch reflector center rod, 03-45600-2 AS#0345600-1
- (10) 8-32 x 1/4 Allen screws, AS#04-00183

### Fiberglass part, from [intothewind.com](http://intothewind.com)

- (1) 1-foot length of 1/4-inch fiberglass rod

## Construction

The boom, made from PVC pipe, also stores the aluminum elements, feed-point adapter, and screwdriver-style Allen wrench needed for assembly. The feed-point adapter is fashioned from a piece of brass.

### The Boom

The boom is made from pieces of 1-inch PVC pipe joined in the middle with a 1-inch to ½-inch T. The boom length is such that the two elements are 38 inches apart when assembled.

The T screws onto a painter's pole that acts as a mast. A pipe cap is cemented to one end, while the other end has a screw cap adapter to close the tube when it is used as the carrying case (see Figure 2).

Drill the ¼-inch holes for the inner element sections through the caps for solid support. It is very important to do a lot of dry fitting before cementing, as PVC cement sets nearly instantly, allowing no time for adjustment. It has to fit together properly the first time.

### The Elements

Elements are ⅜-inch aluminum tubing cut 32 inches long for the inner portions, and ¼-inch aluminum tubing for the outer portion cut as described in the "Materials" sidebar. Outer portions are adjusted for overall element length and marked with paint (see Figure 3) for easy assembly in the field without further measuring. The central portion of the reflector uses a ¼-inch aluminum tube.

The central portion of the driven element is a ¼-inch fiberglass rod. Inner portions are drilled and tapped, for



**Figure 2** — Detail of reflector center. The threaded yellow piece is the end of the boom. The boom is a piece of PVC pipe (shown in yellow) which also serves as a storage case. When you take the antenna apart, all parts slide into the boom through the standard PVC to the threaded adapter, and a threaded PVC pipe cap screws into the hole to close the case/boom. The cap is removed in the photo to show the construction of the end of the antenna.



**Figure 3** — Paint marks on driven element showing proper extension distance. See the text for dimensions.

⅜-long 8 × 32 Allen screws, about 1 inch from each end to secure to the center and outer portions (see Figure 2). Alternatively, slit the 3.8-inch pipe and clamp with small hose clamps (see Figure 4). One of the driven element inner portions is threaded ⅜ × 24 to attach the feed point (see Figure 5).

*“The boom, made from PVC pipe, also stores the aluminum elements, feed-point adapter, and screwdriver-style Allen wrench needed for assembly.”*



**Figure 4** — An alternate method of element construction uses small hose clamps.

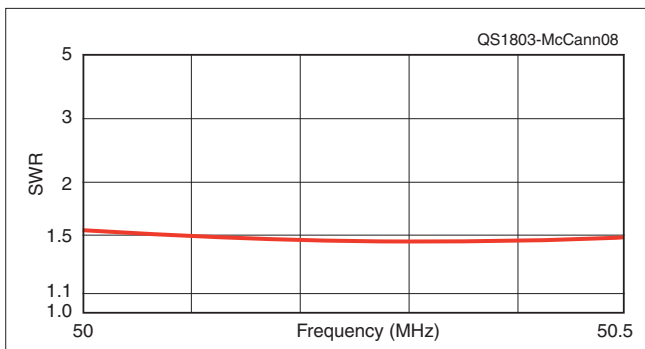
### The Feed Point

The feed-point adapter, as shown in Figure 5, is a ⅜ piece of brass 1⅜ × ⅝ inches, tapped at one end ⅜ × 24 for one side of the driven element, and a ⅜-inch hole at the bottom for a BNC connector. The center terminal of the BNC attaches to the piece of brass or copper tube with a 2½-inch piece of wire. The tube is large enough to slip on the other side of the driven element, secured by an 8-32 Allen screw. Connect the coax with a right-angle BNC adapter.

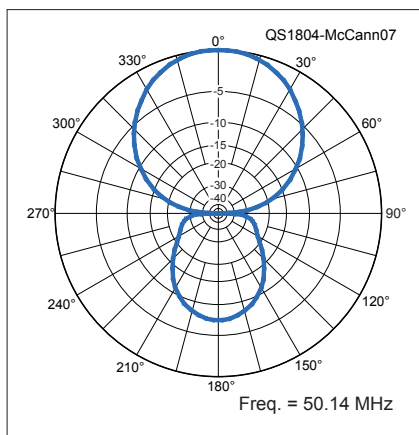


**Figure 5** — Detail of feed-line connection to driven element. I did not use a current choke or a balun at the feed point.

*“ This beam is not designed for permanent installation, but has stood up to brief summer storms. ”*



**Figure 7** — SWR plot simulated using EZNEC.



**Figure 6** — Horizontal (azimuthal) plot simulated using EZNEC.

## Evaluating the Antenna

Figure 6 shows the azimuthal pattern of the antenna, and Figure 7 shows the SWR from 50 to 50.5 MHz, both simulated using EZNEC software. The theoretical match was confirmed on the air; my rig showed about 1.5:1 SWR, meeting my expectations.

This beam is not designed for permanent installation, but has stood up to brief summer storms. Using this antenna, I added some “awards wall-paper” to my shack, and I hope it does the same for others who try it.

Scott McCann, W3MEO, has been licensed since 1957 and holds an Amateur Extra-class license. He is a retired college professor, active in Army MARS (AAR3FK), RACES, QRP portable, and weak-signal VHF operations. Scott can be reached at [achess@juno.com](mailto:achess@juno.com).

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SSB Electronic USA is offering a full line of Beko Elektronik solid-state amplifiers for the 6-meter through 70-centimeter bands. New models include the HLV-1400 2-meter amplifier, rated for a minimum of 1,400 W RF output on 144 – 148 MHz. For the 70-centimeter band, the HLV-770 is rated at 770 W, and the HLV-1470 is rated at 1,470 W RF output. Both amplifiers cover 430 – 440 MHz. Repeater models covering 440 – 450 MHz are available on special order. These amplifiers require 25 W input power, but custom drive levels can be specified at time of order. All Beko Elektronik amplifiers feature overdrive, input spike, temperature, and SWR protection, built-in sequencing and voltage feed for external preamplifiers, and integrated transmit-receive relays. For more information and pricing, visit [www.ssbusa.com](http://www.ssbusa.com).

