Practical 6-Meter Yagis

Boom length often proves to be the deciding factor when one selects a Yagi design. **Table 6** shows three 6-meter Yagis designed for convenient boom lengths (6, 12 and 22 feet). The 3-element, 6-foot boom design has 8.0 dBi gain in free space; the 12 foot boom, 5-element version has 10.1 dBi gain, and the 22-foot, 7 element Yagi has a gain of 11.3 dBi. All antennas exhibit better than 22 dB front-to-rear ratio and cover 50 to 51 MHz with better than 1.7:1 SWR.

Half-element lengths and spacings are given in the table. Elements can be mounted to the boom as shown in **Fig 35**. Two muffler clamps hold each aluminum plate to the boom, and two U bolts fasten each element to the plate, which is 0.25 inches thick and 4 × 4 inches square. Stainless steel is the best choice for hardware, however, galvanized hardware can be substituted. Automotive muffler clamps do not work well in this application, because they are not galvanized and quickly rust once exposed to the weather. Please note that the element lengths shown in Table 6 are half the overall element lengths. See page 20-7 to 20-11 in Chapter 20 for practical details of telescoping aluminum elements.

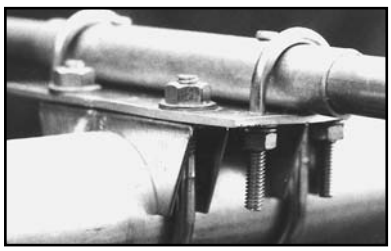

Fig 35—The element to boom clamp. U bolts are used to hold the element to the plate, and 2-in. galvanized muffler clamps hold the plates to the boom.

The driven element is mounted to the boom on a Bakelite or G-10 fiberglass plate of similar dimension to the other mounting plates. A 12-inch piece of Plexiglas rod is inserted into the driven element halves. The Plexiglas allows the use of a single clamp on each side of the element and also seals the center of the elements against moisture. Self-tapping screws are used for electrical connection to the driven element.

Refer to **Fig 36** for driven-element and hairpin match details. A bracket made from a piece of aluminum is used to mount the three SO239 connectors to the driven element plate. A 4:1 transmission-line balun connects the two element halves, transforming the 200 Ω resistance at the hairpin match to 50 Ω at the center connector. Note

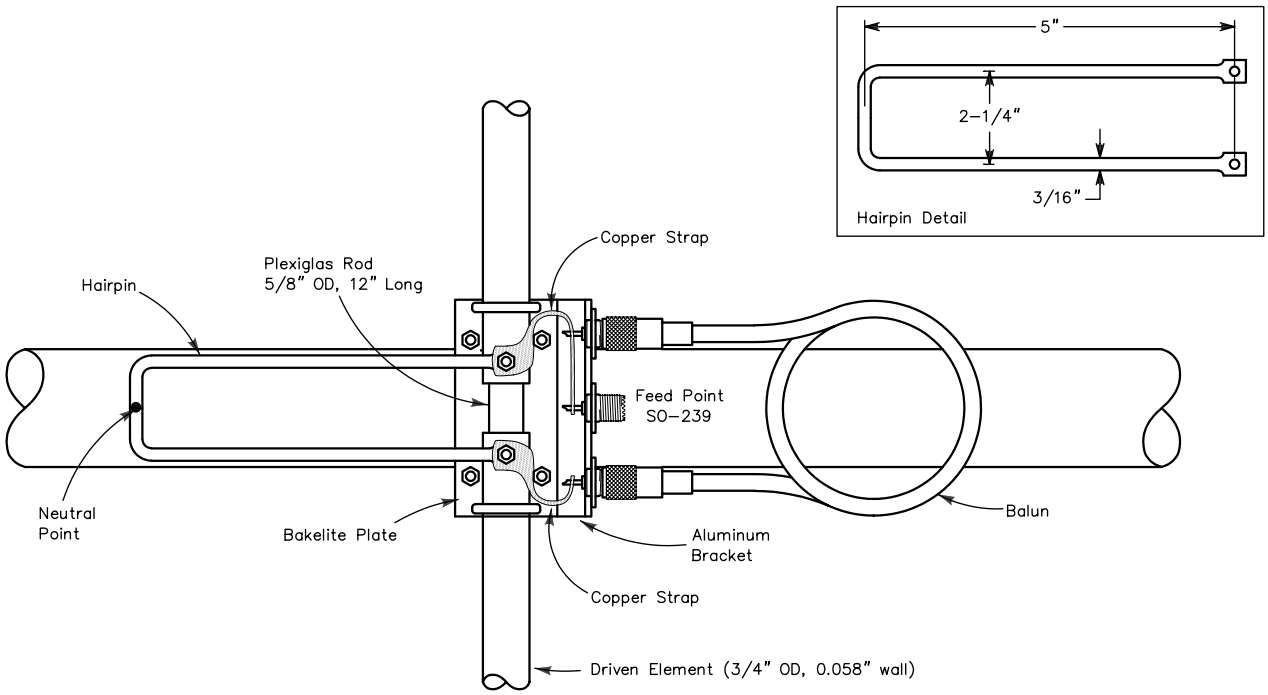

Fig 36—This shows how the driven element and feed system are attached to the boom. The phasing line is coiled and taped to the boom. The center of the hairpin loop may be connected to the boom electrically and mechanically if desired.
Phasing-line lengths:
For cable with 0.80 velocity factor – 7 ft, $10\frac{3}{8}$ in.
For cable with 0.66 velocity factor – 6 ft, $5\frac{3}{4}$ in.

Table 6
Optimized 6-Meter Yagi Designs

	Spacing Between Elements inches	*Seg 1 OD* Length inches*	*Seg2 OD* Length inches*	*Midband Gain F/R*
306-06				
OD		0.750	0.625	
Refl.	0	36	23.500	7.9 dBi
D.E.	24	36	16.000	27.2 dB
Dir. 1	66	36	15.500	
506-12				
OD		0.750	0.625	
Refl.	0	36	24.000	10.1 dBi
D.E.	24	36	17.125	24.7 dB
Dir. 1	12	36	19.375	
Dir. 2	44	36	18.250	
Dir. 3	58	36	15.375	
706-22				
OD		0.750	0.625	
Refl.	0	36	25.000	11.3 dBi
D.E.	27	36	17.250	29.9 dB
Dir. 1	16	36	18.500	
Dir. 2	51	36	15.375	
Dir. 3	54	36	15.875	
Dir. 4	53	36	16.500	
Dir. 5	58	36	12.500	

*See pages 20-7 to 20-11 for telescoping aluminum tubing details.

that the electrical length of the balun is λ/2, but the physical length will be shorter due to the velocity factor of the particular coaxial cable used. The hairpin is connected directly across the element halves. The exact center of the hairpin is electrically neutral and should be fastened to the boom. This has the advantage of placing the driven element at dc ground potential.

The hairpin match requires no adjustment as such. However, you may have to change the length of the driven element slightly to obtain the best match in your preferred portion of the band. Changing the driven-element length will not adversely affect antenna performance. *Do not adjust the lengths or spacings of the other elements—they are optimized already*. If you decide to use a gamma match, add 3 inches to each side of the driven element lengths given in the table for all antennas.