HOW TO WIN IN THE PILEUPS

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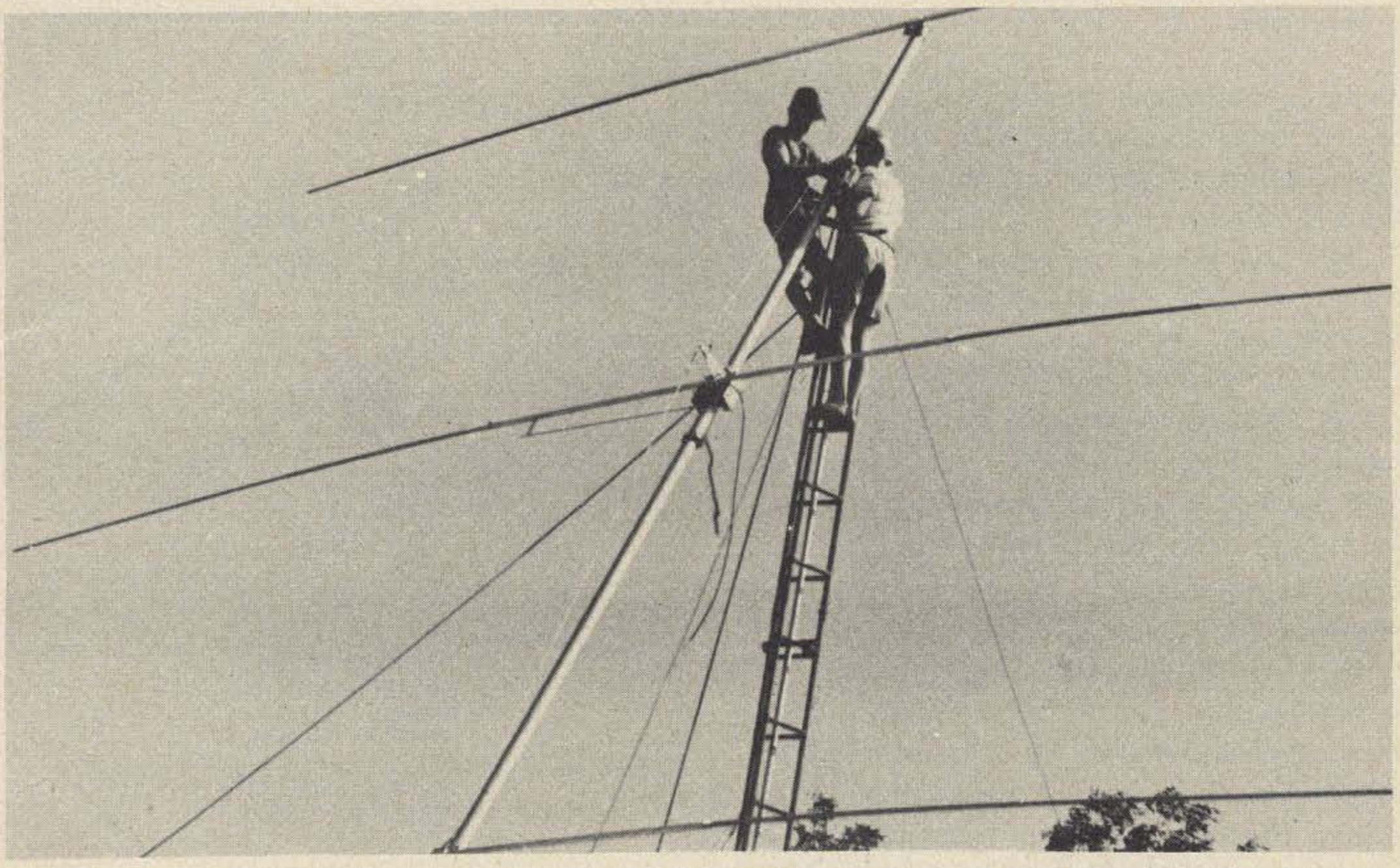


There is an XT2 sitting on the band and everybody you can think of is calling him, trying to beat the other fellow out. So you get in and try your luck with your kilowatt and your dipole. If you're lucky, you might work him – that is, if you live a couple of miles away from the chap. If not, there is no conceivable way you can work the fellow within the next couple of hours.

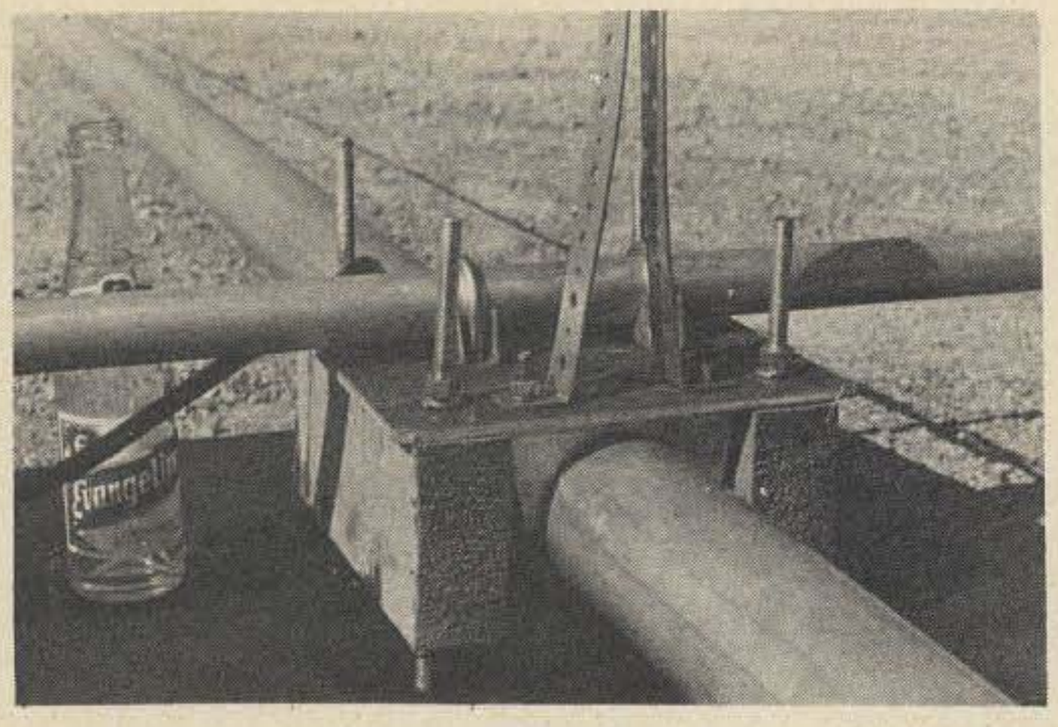
So get away from the ordinary and build yourself a three-element, wide-spaced beam and be the first to work that rare DX. I guarantee that with this type of antenna you can beat out any three-element triband beam and even some of the short-boom four-element beams.

This three-element, widespaced beam is plenty sturdy; it is of all-aluminum construction and so far has withstood winds up to 80 mph and a few Canadian ice storms.

If you intend to build this beam, *do not* alter any of the physical dimensions, as this will decrease the efficiency of the antenna. The frequency of the array was set in the middle of the band to allow its use on the CW and phone portions of 20m.

The elements are constructed of thin-wall aluminum tubing, of the diameter and length stated in Table I.

Each element is constructed of seven pieces. The center portion is 1 in. inside-



The view of the antenna element and its mounting.

diameter aluminum conduit to give strength to the remaining portions of the elements. The conduit is slotted at each end on both sides for about 3 in.

The remaining portions are fitted together to the values shown in Table II. About 4 in. from each individual piece of tubing is placed a self-tapping screw to insure that the elements do not move or rattle. At the end of each element is placed a drip hole about 1 in. from the end and a cork is press-fit in the end of the tubing to prevent the elements from whistling in the wind.

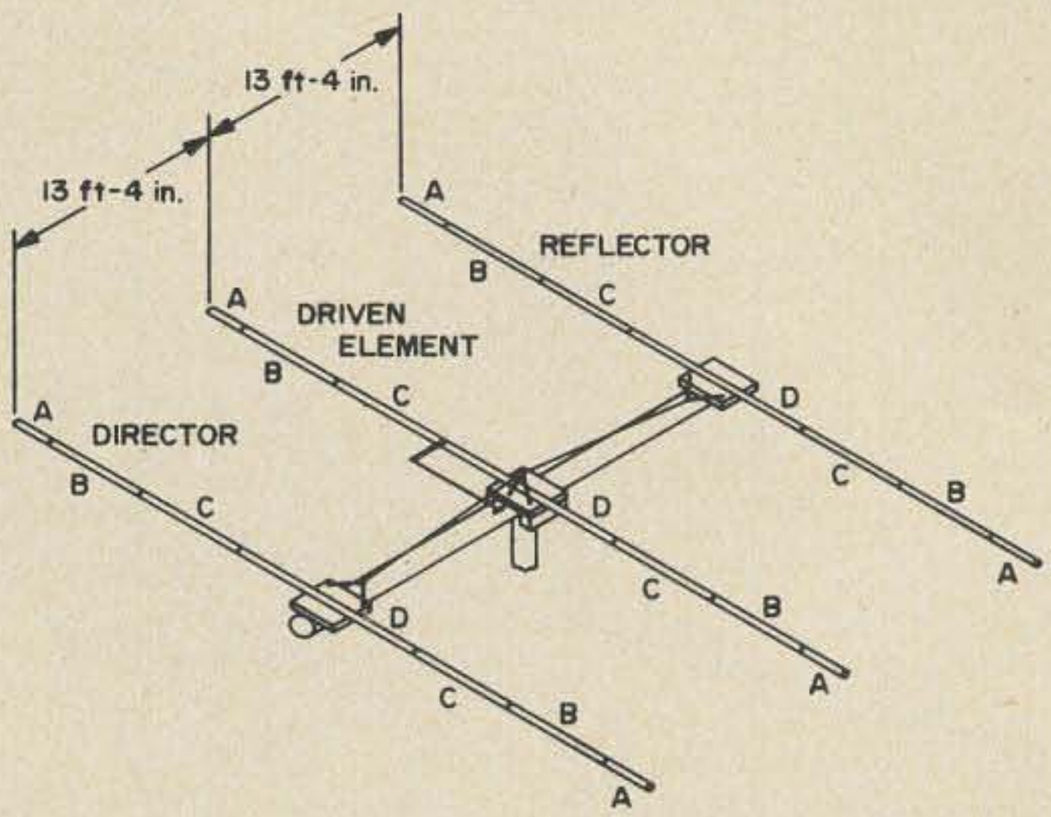
All three elements are constructed in the same manner, the only difference being their physical lengths. To obtain the proper length on each side of the center of the boom, the thin-wall aluminum portions of the elements are adjusted in or out of the aluminum conduit. Once the proper distance has been attained, drill a hole about 8 in. from the edge of the conduit and drop a self-tapping screw in, and also place a hose clamp about 1 in. from the end of the conduit.

Just a small note here on cutting the thin-wall aluminum. Most of the tubing comes in 12 ft lengths, so on the antenna portion cut the tubing in half and to obtain the proper lengths for the director and reflector for their overlap cut the tubing 6 in. off center.

The boom is a 17 ft 4 in. piece of 3 in. aluminum irrigation tubing. It is the most expensive single portion of the antenna, but is well worth the money spent, from at least the standpoints of the strength it gives and its light weight.

At each end of the boom there is a circular block of wood, the diameter of the pipe, which is fitted in the end of the pipe and then nailed. This precaution is necessary unless you are a bird lover.

The main feature of this antenna is the method used to mount the elements to the boom and keep them there. Aluminum plates (0.25 in. thick) are used in this deal. The plate is held to the boom by two 3 in. muffler clamps. The plate in turn holds the element with two smaller muffler clamps as shown in Fig. 2. The plate is first mounted



ELEMENT LENGTHS

REFLECTOR 35 ft-5 in.
DRIVEN EL. 33 ft-5 in.
DIRECTOR 31 ft-5 in.

ALL MOUNTING PLATES ARE 8 in. x 8 in. SQUARE

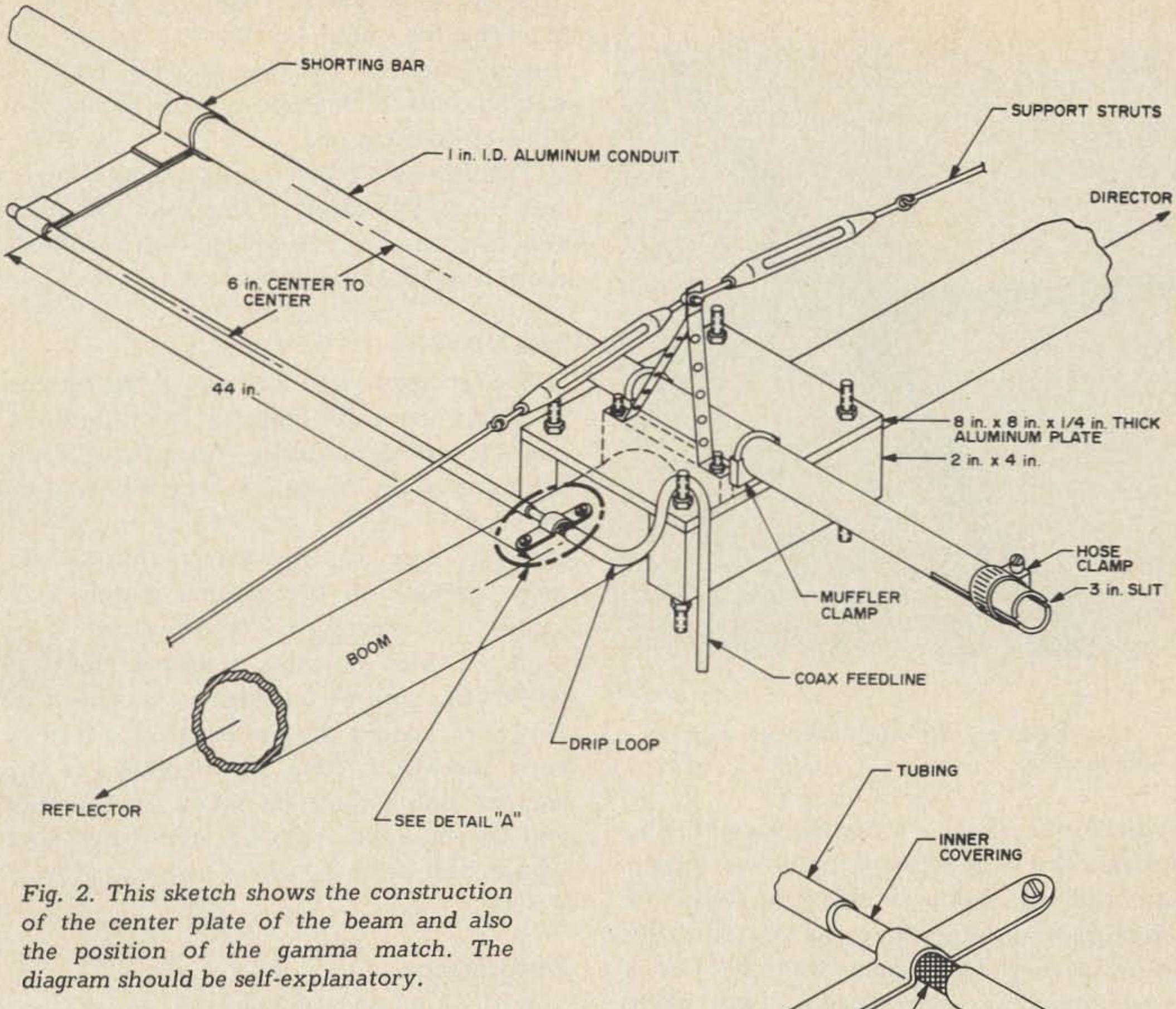
ELEMENT SECTION	ELEMENT			TUBING DIAMETER
	DIRECTOR	DRIVEN EL.	REFLECTOR	
A	2 ft	2 ft	2 ft	3/4 in. O.D.
B	5-1/2 ft	6 ft	6-1/2 ft	7/8 in. O.D.
C	5-1/2 ft	6 ft	6-1/2 ft	1 in. O.D.
D	10 ft AL. CON.	10 ft AL. CON.	10 ft AL. CON.	1 in. I.D.

TABLE I – THIN WALL LENGTHS

ELEMENT SECTION	DIRECTOR	DRIVEN EL.	REFLECTOR
A	1 ft-3 in.	1 ft-3 in.	1 ft-3 in.
B	4 ft-9 in.	5 ft-3 in.	5 ft-9 in.
C	4 ft-9 in.	5 ft-3 in.	5 ft-9 in.
D	10 ft	10 ft	10 ft

TABLE 2

THE VALUES GIVEN ARE FROM THE EDGE OF ONE PIECE TO THE EDGE OF THE OTHER.



DETAIL "A"

Fig. 2. This sketch shows the construction of the center plate of the beam and also the position of the gamma match. The diagram should be self-explanatory.

on the boom with the 3 in. clamps and tightened slightly. It should be mentioned that all hardware used was galvanized heavily and then lead plate was used on all the nuts and bolts to prevent seizing and rusting.

The aluminum conduit portion of the elements is mounted and tightened on each plate. There are two pieces of grappling iron, about 6 in. long, which are placed on each side of the boom, one each under the nuts which are the furthest away from the ends of the boom. Make sure that the distance from the center of one parasitic element to the other is 26 ft 8 in.

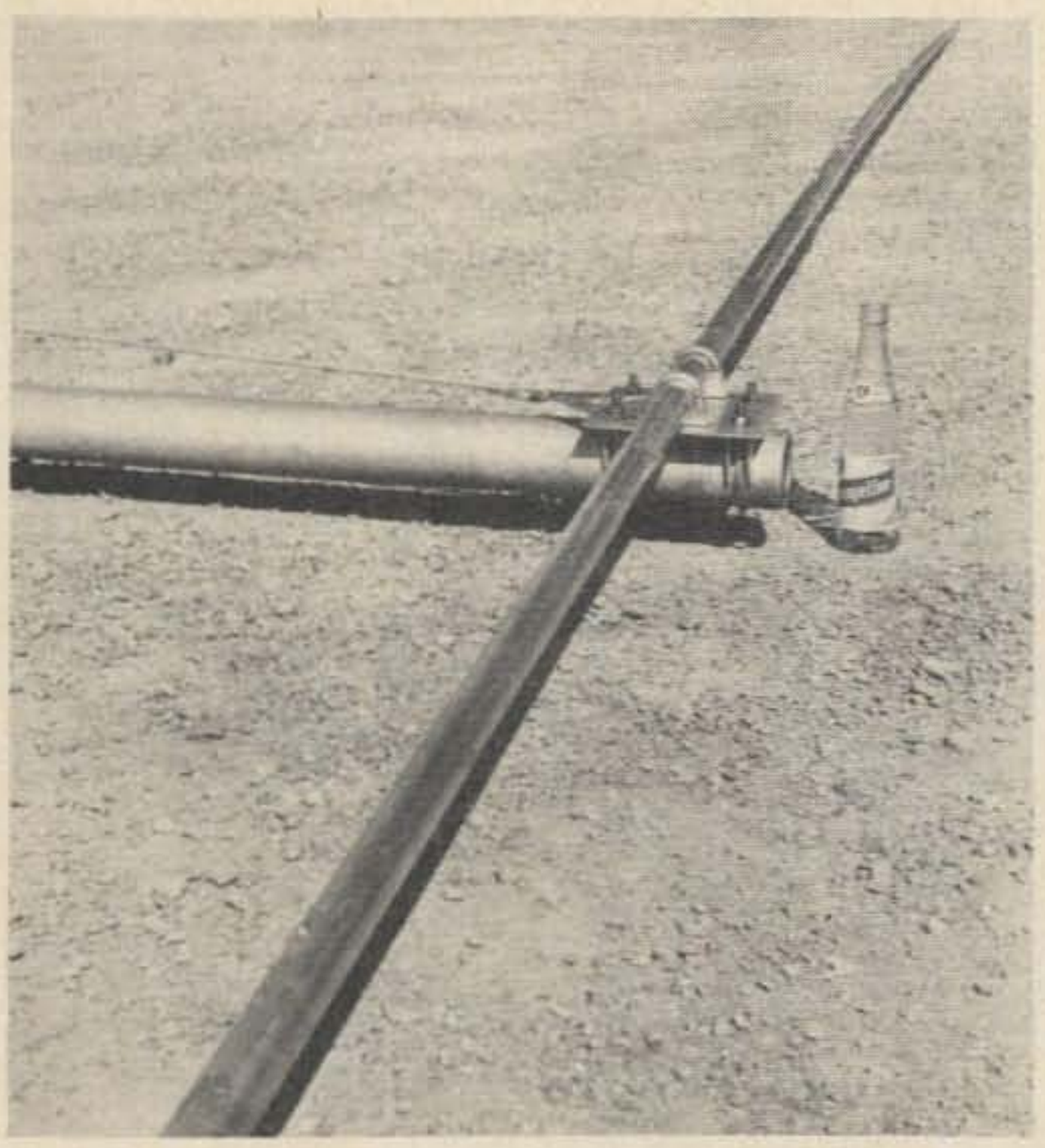
The center plate is a two-fold job. Two pieces of 2 x 4 are cut to length of the plate and long bolts about 7 in. are placed through the plate and boards and slightly tightened.

This plate is mounted to the boom as the other two were, using muffler clamps again. Then the conduit is mounted and clamped in its place. By sighting at the end of the boom, look at the three pieces of conduit and make sure that all three are parallel to each other, then tighten all the muffler clamps.

Now the remaining portions of the elements are placed in their respective places and finally the hose clamps are installed and tightened. When you do this make sure that the drain holes are on the bottom facing the ground.

Matching

On this particular antenna, a gamma match was tried and when adjusted properly, proved to be a very wise choice because the swr was flat across the band and did not exceed 1.2:1. It was con-



The view of the end element and its mounting.

structed out of a TV antenna element. The shorting bar was constructed from aluminum and was made so that the center of the aluminum conduit to the center of the 48 in. piece of TV element was 6 in. This is very important. The capacitor was made out of a length of RG-8, 41 in. of the outer covering was taken off and then 40 in. of the copper shield had the same treatment. On the remaining 1 in. of braid, there was soldered a brass or copper bracket which will later be used to mount it to the beam. The remaining portion of the stripped end of the coax was placed inside of the gamma tubing.

The bracket must be mounted onto the boom and it must keep the 6 in. from center to center constant.

The bracket is held in place by two self-tapping screws placed on either side of the hump in the bracket. At the other end of the coax a coaxial connector was placed to provide easy connection to the feedline. The inside of the shorting bar is 44 in. from the center of the boom.

Installation

The beam is installed on the mast by means of another plate. This plate is made of ¼ in. steel and is drilled to accommodate the four long bolts which are on the center plate of the beam. This plate is welded onto the mast to provide for a good slip-free connection.

The antenna is lifted onto the steel plate and the bolts placed in the hole. The nuts and lockwashers are placed on it and all mounting hardware is tightened.

Adjustment

There need not be any adjustments necessary to the elements if precautions were taken in acquiring the proper sized tubing and the measurements followed to the inch.

There may be, however, some adjustment needed on the gamma match. The values that were given in the above were used on three previous antennas identical to this one and no adjustment was needed. However, should the need arise that it does need attention, then the bracket on the gamma match must be taken off and the end of the coax trimmed, about half to a whole inch until the swr is down to at least 1.5:1.

Performance

With a beam like this you should not have any trouble working that XT2. You could even work 200 countries with a 100W, thus eliminating the need for a big kilowatt. This beam can outperform any antenna in its class.

Specifications

Gain	8.5 dB over a dipole
FBR	25–30 dB
Side Att	50 dB
Boom	27 ft 4 in. x 3 in.
Turning Radius	22.5 ft
Weight	45 lb
Cost	$80

Acknowledgements

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