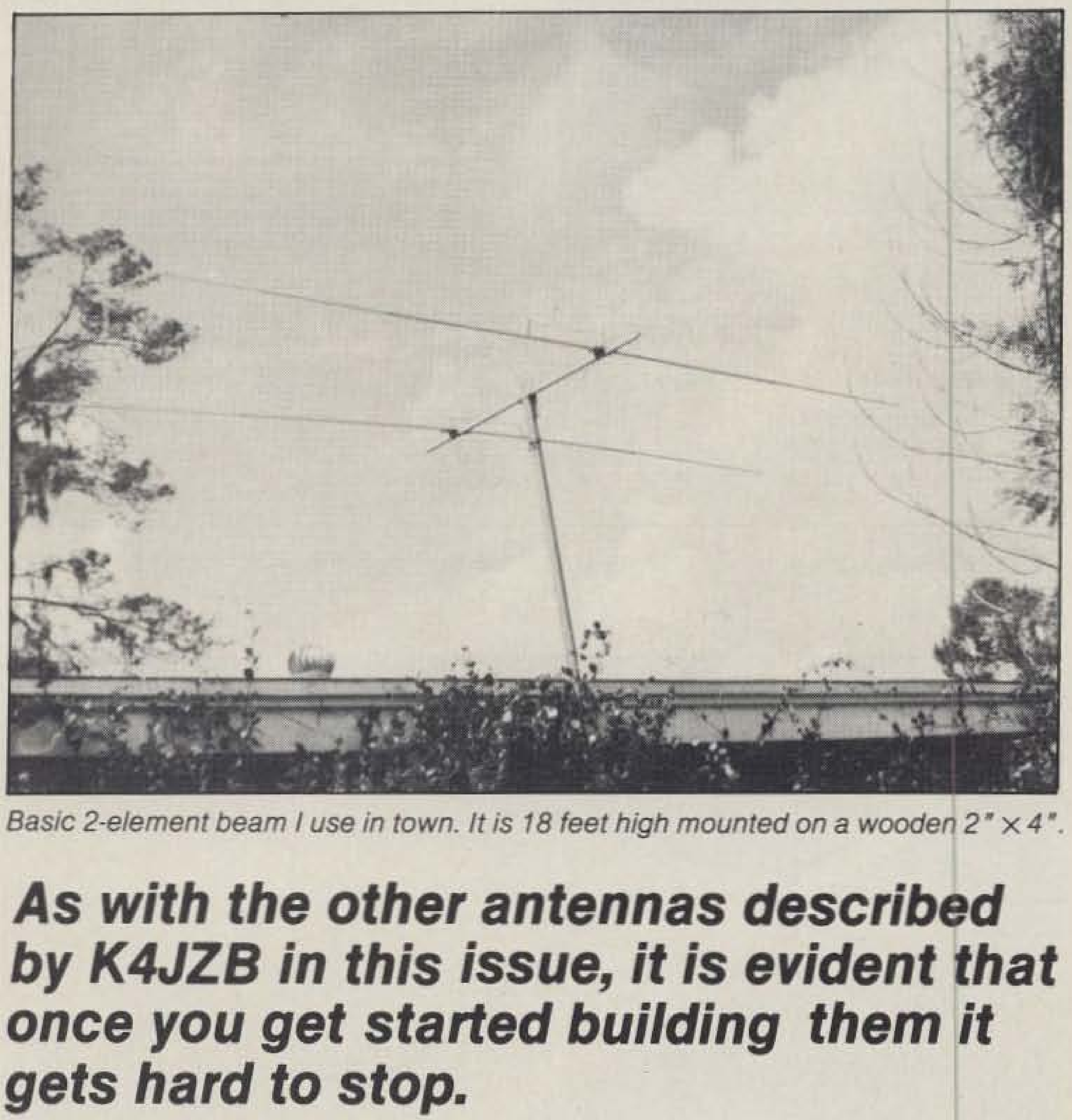
# SIMPLE DO-IT-YOURSELF ANTENNAS FOR 10, 15 & 20 METERS

BY ROBERT F. ZIMMER*, K4JZB



*Basic 2-element beam I use in town. It is 18 feet high mounted on a wooden 2" × 4".*

## *As with the other antennas described by K4JZB in this issue, it is evident that once you get started building them it gets hard to stop.*

This article is about a series of antennas laid out to attempt to arrive at a high-gain phased beam. A lot of time and work, to say nothing of the study and thought, have gone into this project. I personally built and installed all the antennas to be described.

The first antenna (fig. 1) was the W8JK bidirectional beam. The feeding system was changed to use gamma matches and 52 ohm cable, hence no need for a matching unit. The spacing between element is 1/8 wavelength, which figures out to be 4 feet on 10 meters, 5½ feet on 15 meters, and 8 feet 8 inches on 20 meters. The use of gamma matches permits the elements to be fastened directly to the boom—no need for split elements or high-loss insulators.

The boom is 1½" aluminum tubing, but any tubing, including conduit and TV masts, could be used. The element mounting plates are aluminum angle plate 12" long × 5" wide × 3/16" thick. The plates were obtained from a building supplier. As the plates were not perfectly true, they were obtained as scrap and are perfect for my use.

The elements used are 1" O.D. × 8' for 10 and 15 meter center sections, with 7/8" and 3/4" telescoping sections added to make up the necessary lengths on 15 meters. The 1" tubing was cut to length on 10 meters. On 20 meters the center sections should be 1⅛" O.D. × 12', with two telescoping end sections of 1" × 12'. The elements are joined by cutting two slots about 1" long, 90° from each other, and are fastened with stainless steel hose clamps.

Now to the gamma matches. Many good ones have been described over the years. The first one I used was a piece of RG59U cable cut to the specified length. The inner conductor was connected to the feed line, and the shield to the element under a hose clamp. The s.w.r. was always under 1.5:1 and worked fine for many years under all kinds of weather conditions. The latest one in use here uses 3/8" tubing from scrap TV antennas and is much more durable. The RG8U or RG11U coax with the outer covering and shield removed slides nicely into the 3/8" tubing and is very easy to adjust and seal.

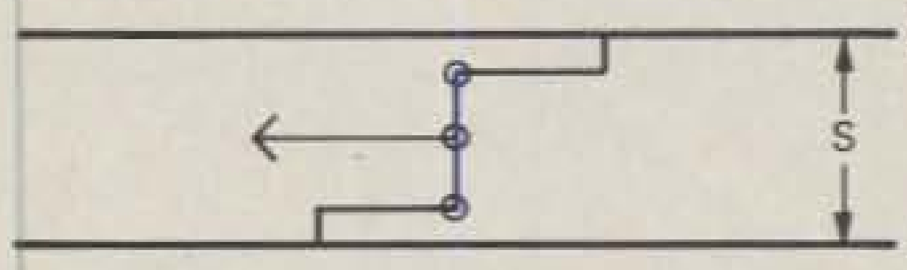



*Fig. 1– The bidirectional antenna uses a low-impedance feed system for untuned operation.*

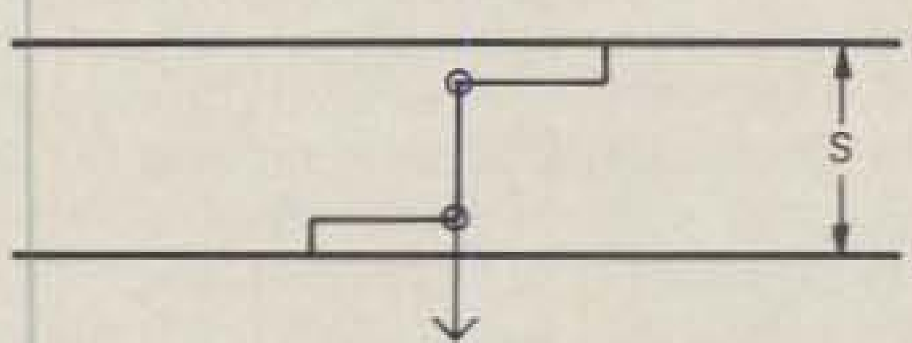



*Fig. 2– The unidirectional antenna is a very simple beam with an untuned feed system.*

The feed line between elements is made of No. 12 electrical wire. It has proven to be preferred over coax cable, but care must be taken that the elements are connected electrically to the boom. Short lengths of aluminum strips are used for this purpose.

For the unidirectional beam (fig. 2), it was only necessary to increase the length of one element by 5% and attach the feed line to the other element. To determine the results of this change I had the cooperation of Fred Morgan, W8FOU, who lives about 5 miles south of

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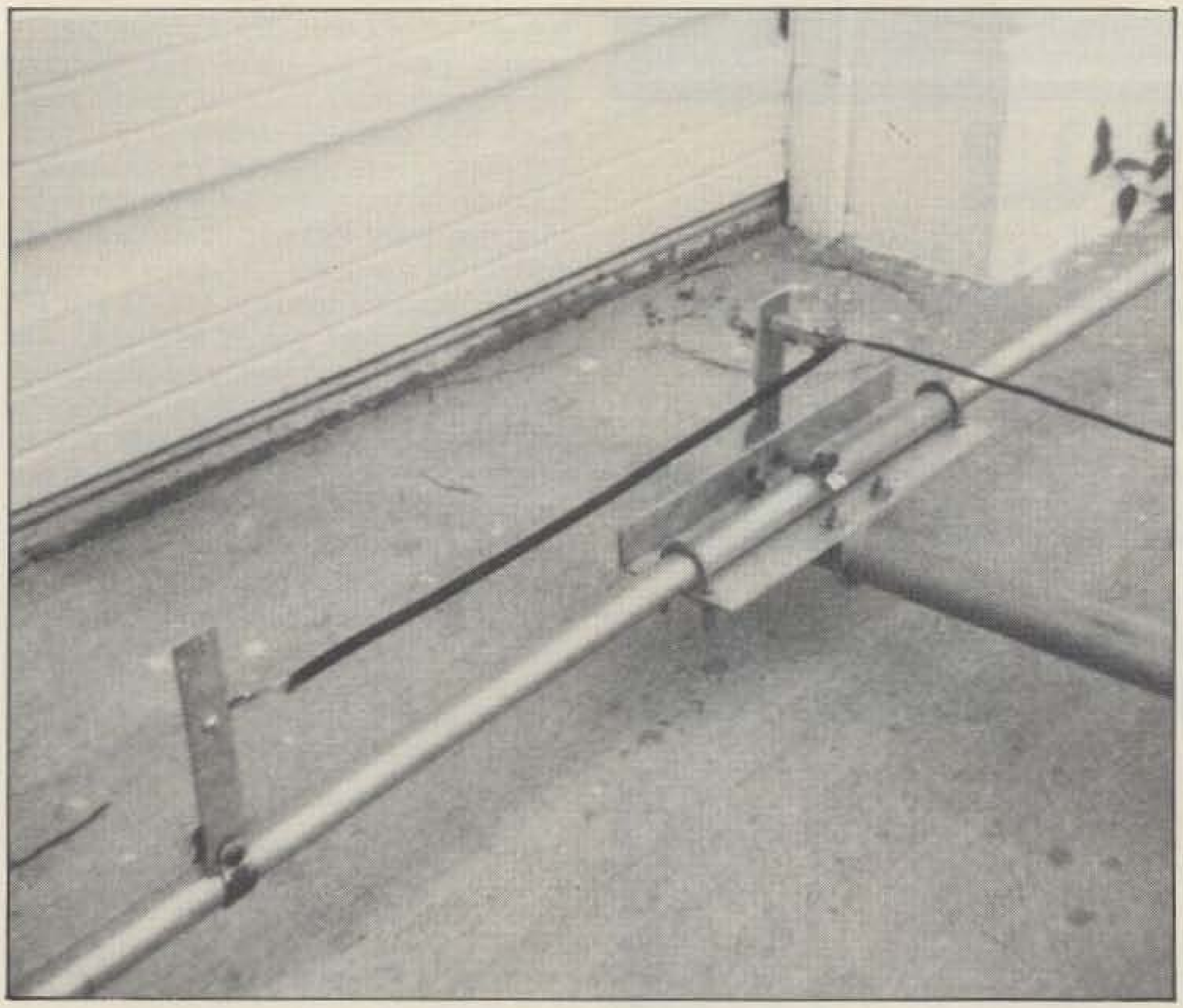


This view shows the element mounting plate and the feeding method.

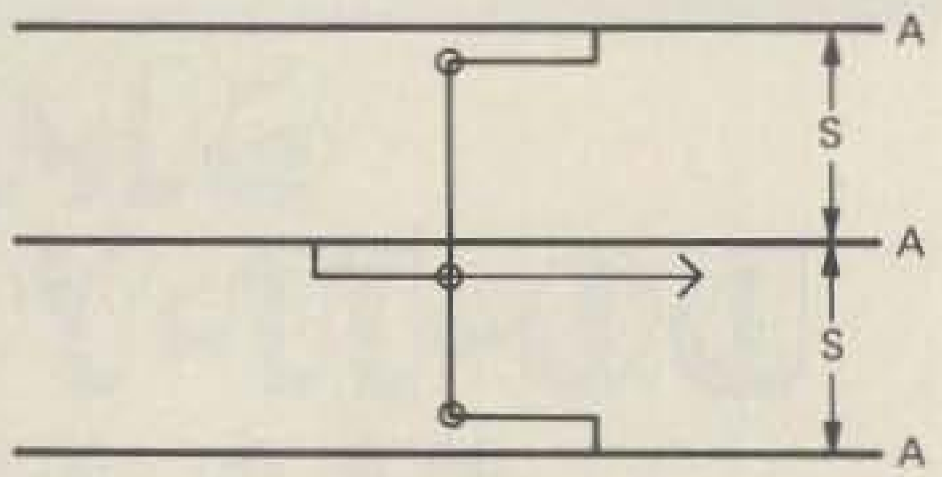



*Fig. 3– A bidirectional beam antenna with low-angle radiation that is quite simple to get working.*

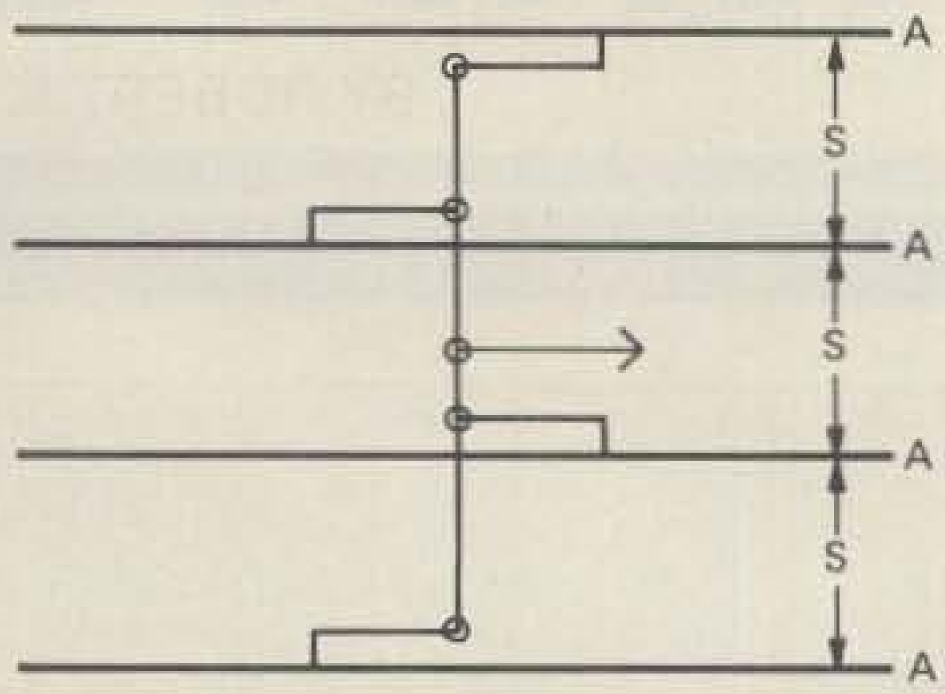



*Fig. 4– This bidirectional beam is a very good DX antenna at low heights.*

me. With the antenna bidirectional, signals ran S-9 plus 20 dB. When the changes were made, the signals fell to S-7, as the favored direction is now north. The signals have never been over S-7 in over one year of three times a week schedules with our buddies in Ohio. They also reported a big jump in signal strength when the antenna was made unidirectional. This antenna is in town, aimed north only, and it is just 18 feet high. With it I have worked JT, VU, and JA using only the Kenwood Twins on 15 meters—not bad for just 18 feet high.

Meanwhile, out at the farm the bidirectional beam was expanded to 3 elements (fig. 3) and 4 elements (fig. 4). They worked very well for DX with a very low angle of radiation, but the bidirectional feature made for a lot of unnecessary QRM, both in receiving and transmitting.

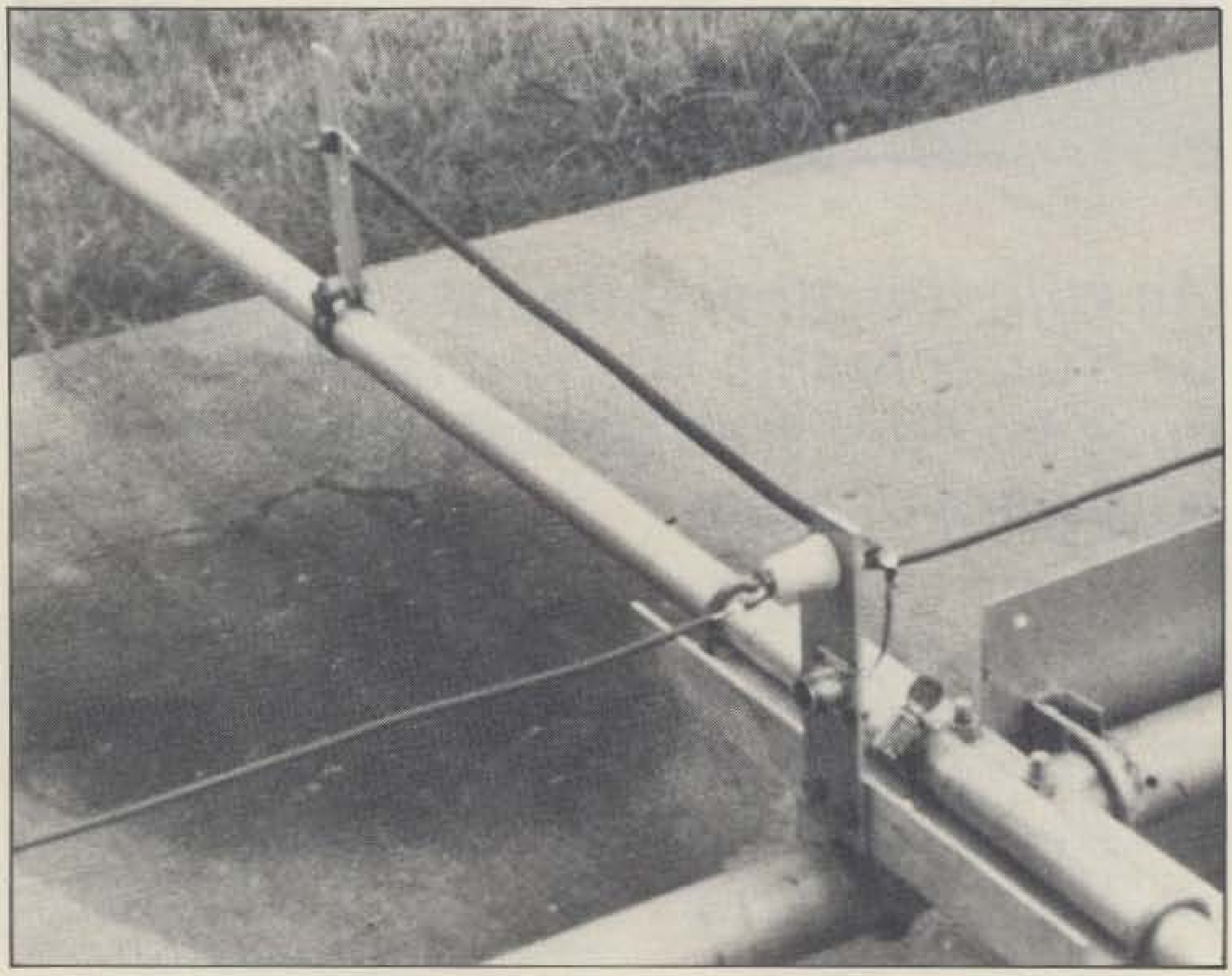
The bidirectional antennas were replaced by the unidirectional beam antennas, but they are very useful, and much knowledge was obtained by experimenting with them.

Trial and error has shown that at low heights the driven antennas are much superior to the parasitic types. The Yagi antennas are fine if they are up 50 to 70 feet, but at low heights they put out too high an angle of radiation. The driven beam seems to put out low-angle radiation at very low heights. I used one at a height of 14 feet for over 5 years and managed to work all over the world with little effort.

The 2-element antenna gives the best return for the money and effort spent. It also can use a smaller rotator. So, if you don't have a tall tower and a fat pocketbook, "try it—you'll like it."

| Freq. | A | R | S | Gamma Length | Spacing | Diameter |
|---|---|---|---|---|---|---|
| 14 MHz | 400" | 420" | 8½' | 40–48" | 3" | 3/8" |
| 21 MHz | 267" | 280" | 5½' | 30–36" | 2" | 3/8" |
| 28 MHz | 198" | 208" | 4' | 20–24" | 2" | 3/8" |

*Table I– Dimensions used for all antennas described in this article. These dimensions are not critical.*



*This close-up shows the RG-59U coax used as a gamma rod. The capacity between the inner wire and the outer shield forms the coupling to the antenna element.*