An Antenna For 75 Meter WAS

A breezy account of how one ham discovered the obvious and turned it to his advantage while tackling a 30-day 75 meter WAS.

BY JOSEPH E. TAYLOR,* K5PAC

ONE of this country's wisest statesmen/scientists, B. Franklin, is reported to have said, "It is amazing how consistently, and with what exquisite persistence, we mortals reject and all truth which does not fit into the mold of our existing systems of thought."

Gentle Ben was one of the foremost electronics experts of his day; a real pioneer, one might say. And he was not paid for his efforts in this direction, so we might say that he was an amateur. Even so, it would be somewhat presumptuous to call him an early day ham.

Nor is it likely that Franklin was speaking prophetically of us hams as a genre in the above quoted statement. But, in any case, the shoe fits, doesn't it? Who of us has not had the experience of suddenly realizing the significance of some old axion we have known all our lives but never thought was really important?

A few weeks ago I was idling away a pleasant hour or two of early A.M. time on 75 meters, an unaccustomed band and hour for me. As the dial spun back and forth across the band, I was amazed to hear the long skip coming in so well. Sevens and sixes were pounding through with nine-plus signals. Even a KH6 was clearly copiable in our mid-southern QTH as he checked into a western phone net.

It was apparent that there was more here than I had suspected! After working a few of the rarer western states that morning, a warm recollection began to course through my mind. It was the memory of a pleasant winter whiled away racking up a WAS on 80 meter c.w. The rig at that time was a converted ARC-5 running, as I recall, just under 15 watts. I never got Vermont that winter, and Hawaii and Alaska were not counted in the totals then, but the thrill was the same.

That evening the rig was still set up for 75 so we got everything warmed up and began again to see who we could sort out. In a matter of hours, without ever actually making the decision to start, an outline map of the US was found and the services of the #2 son were recruited in a bona fide effort as getting a 75 meter s.s.b. WAS. The #2 son's job was to fill in red ink the outlines of the states as we worked them.

The equipment then, as now, was a Swan 350. A linear was available but we agreed not to use it to add just a bit of a handicap factor. The antenna at that time was a dipole 134 feet in length and fed with open wire into a tuner. This combination had served quite heroically for several years past on a number of bands, including 75. We established the time limitation of one month which was, just incidentally, about the time the winter long skip would be fading out anyhow).

Every evening and every morning produced new states—for the first week or so. Then at the time of our first inventory, it looked to #2 son that we had been too generous in giving ourselves a month for this task. Being 11 years old and a fairly optimistic turn anyhow, he just couldn't see our taking more than another week to finish up. After all we had 28 states then and that was well over half ...or so he reasoned.

But the inevitable slowdown came soon enough. #2's exaggerated sense of optimism began to fade. The new ones were becoming scarcer than the dental apparatus of the rooster's bride, of proverbial fame. But it was the eleven year old who noticed that about our map which I had completely overlooked.

*6 Evergreen Court, Little Rock, Ark. 72207

"Why is it," he asked, "That we have all these down here, (pointing to the southwest) and all these up here, (pointing northeast) but nothing here or here (as he indicated the opposite quadrants)?

"Well Son," I began patiently, "it is really quite elementary. You see an antenna like ours radiates best at 90° angles. That would mean up here and down here."

This was, of course, lesson number one in antenna theory. But then #2 came back with the clincher: "It looks like a big eight, doesn't it?"

Like a *big eight*, indeed!! That was exactly what we had outlined on our map as we had colored in the states we had worked! For more years than I cared to remember I had known this simple basic fact about antennas, but that evening what we had traced out, altogether accidentally, hit me with all the force of a new discovery!

There was no real question about it, we had to put up another wire as nearly as possible at 90° to the present one.

But like other ideas that have crept into our cranial cavities, this one was easier to say than to accomplish. We had pine trees in the aforementioned corners of the lot far enough apart to hang a half wave on 75 meters; but other direction was something else.

Our lot, like most other lots, was hardly in the acreage category, but something had to be done, so the manuals were consulted and the midnight oil was ignited.

The requirements were simple enough to understand:

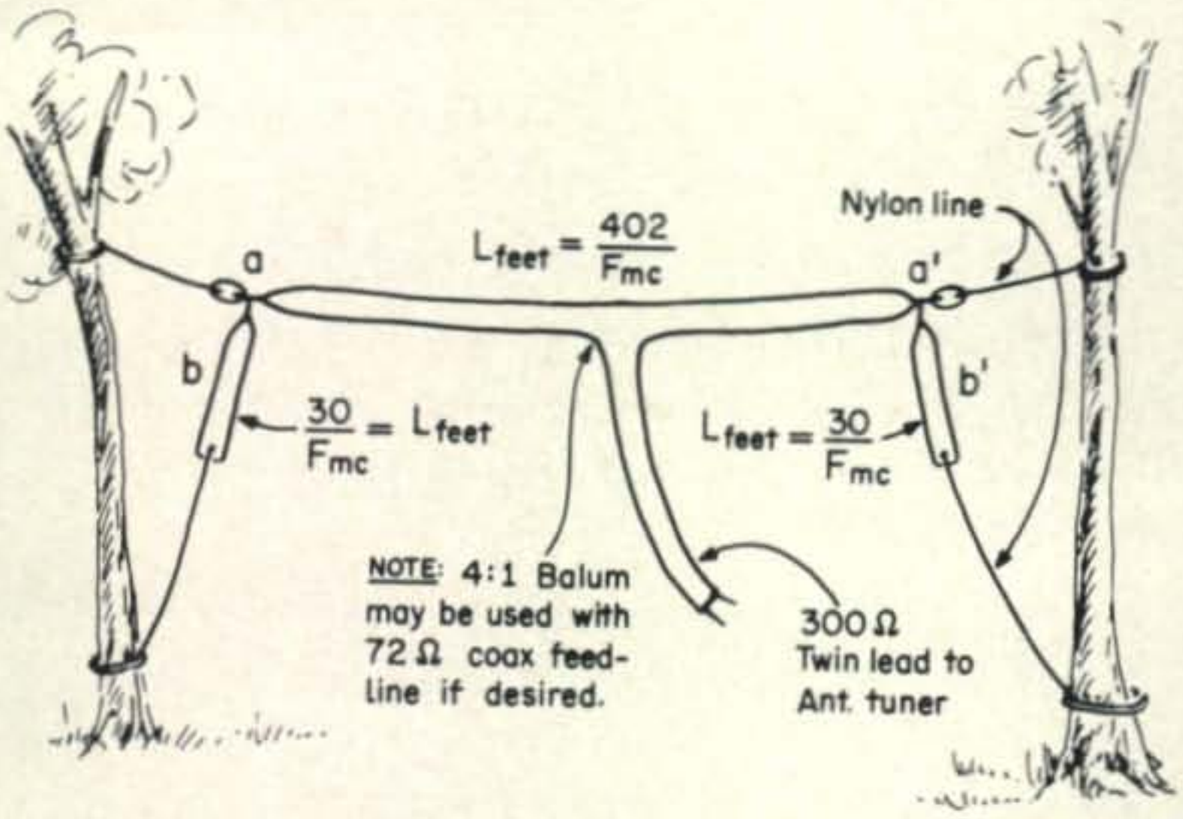

Fig. 1—Dimensions and construction of an efficient, inexpensive antenna for 75 meters suitable for the average city-lot dwelling amateur. The antenna is shown fed with 300 ohm line but if a 4:1 balun is used at the dipole center, 72 ohm coax may be used instead.

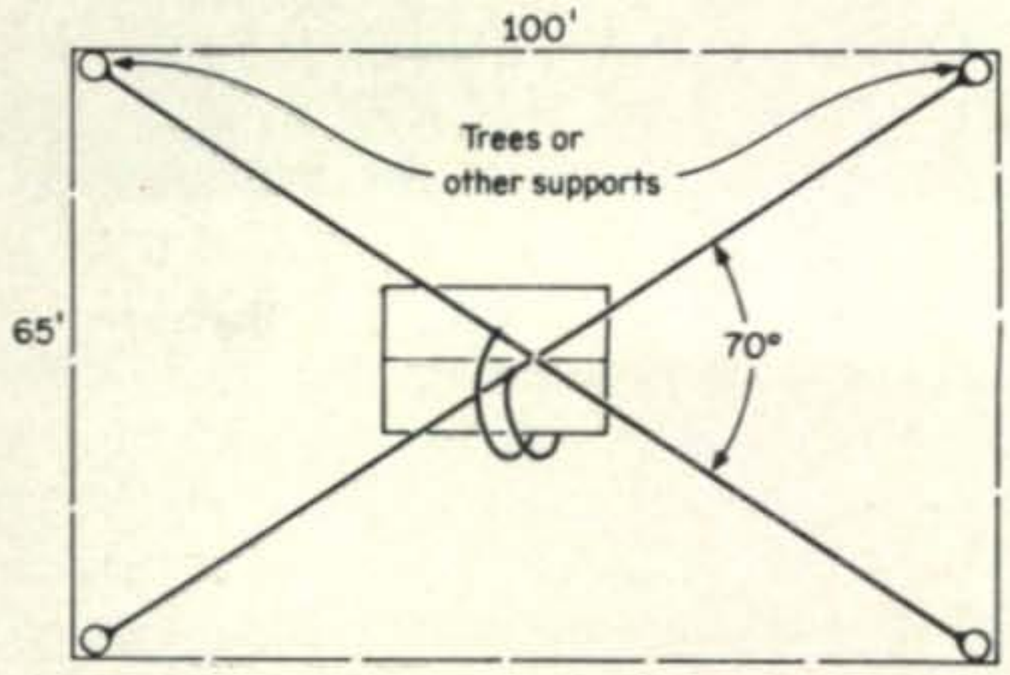

Fig. 2—Two of the shortened 75 meter dipoles may be erected at a 70° angle to each other within the confines of a reasonably small 65' × 100' city lot.

1. We needed an antenna with a high order of efficiency (some of the remaining states were the more remote ones, naturally).

2. We needed an antenna with a *maximum* length of 108 feet.

3. The antenna must have fairly wide band coverage with an acceptable s.w.r. overall.

All sorts of options were considered. We looked at verticals; loaded dipoles; fan dipoles; etc., etc. Each had its advantage and each its liabilities.

After much consideration the antenna that was selected was the old, but not frequently used, configuration of the folded dipole with ends shorted and bent down. This antenna has all the advantages most of the others have, and suffers from only a few of the disadvantages. It can be erected in a space of just over a hundred feet. It is efficient and well matched, and, not least of all, it is fairly broadband when constructed with 300 ohm line.

A good grade of twin lead was secured since previous experience with the cheaper variety had proved that it is just that: cheap. Any constructor will do well to shop a bit before buying any twin lead. Investment in a higher quality will ensure larger wire and more strands which is important since the antenna must support its own weight in all varieties of weather.

Figure 1 shows both the configuration and the formula for calculating the length of such an antenna. The velocity factor of the twin is used in deriving the length of the shorted ends, but this has already been taken into account and is mentioned here only for the curious.

When constructing such an antenna, or any other for that matter, one rule stands out above all others: Measure the length carefully! Lest you may have blinked while read-

ing that last sentence, a repetition may be in order: MEASURE CAREFULLY. More unhappiness results from the overlooking of this cardinal rule than all other causes put together in antenna construction.

Once the correct length has been established and the wire cut, proceed next to fold the antenna section (the flat top) in the exact center. This will ensure symmetry which is vital for the proper functioning of this radiator.

To find the shorting point measure off the distance from the end of the wire after the leads have been stripped and shorted and soldered together. Then when the insulation is to be removed for the shorting at points a and a^1, cut *very* cautiously and slowly so as not to cut or score any of the strands of small wire. This is not as difficult as it sounds, but caution is in order here.

If you cut for a center frequency of 3.9 mc your antenna will be about 118 feet long and sections b and b^1 will be about 7 feet 8 inches long. These can be folded at any convenient angle up to 90°.

Such an antenna can be matched to a modern transmitter in any of several ways. Two of the best ways are: 1—Bring the 300 ohm balanced line into a tuner and thence to the coax input to the transmitter or transceiver, or 2—A toroidal balun with a 4:1 ratio can be used without tuning. For a number of reasons the second method may be better if you are pursuing WAS. With the balun there is no further tuning to be done after the rig itself has been adjusted. This is an advantage when QSYing any distance. This matter of a minute or two lost in returning the antenna can make the difference between getting Vermont or North Dakota and having to wait for another opportunity. A second factor is that if the baluns are used they can go directly into a switch so that changing directions of maximum radiation is just a matter of one click. Such toroids also provide a consistently low s.w.r. over wide excursions of frequency.

If the reader is entertaining doubts about the advantage of a second wire for 75 meters, a few hours spent switching back and forth between two identical antennas differing only in direction or orientation will dispel any lingering uncertainties. The matter of working all states on 75 meters is not the easiest of enterprises in the first place so there is very good reason to put every possible advantage on your side.

[*Continued on page 104*]

The K7GCO Modified HT-18 Hy-Tower

BY KEN "JUDGE" GLANZER,* K7GCO

The following modifications made to the Hy-Gain HT-18 Hy-Tower give improved performance on the 160, 80 and 40 meter bands, and provide the added advantage of not requiring an extensive radial system except on 160 meters. Thus the antenna is ideal for installations on concrete or blacktop surfaces. The modified antenna is also outstanding because of its exceptional bandwidth and lower angle of radiation.

A SIGNIFICANT increase in performance of the Hy Gain HT-18 Hy Tower is obtained from the K7GCO conversion described here at the expense of automatic multiband operation, as separate matching systems are used on 75 and 40 meters. Direct feed is still used on 160 meters. On 160 meters the HT-18 does a good job base loaded, particularly with a "long" radial system. However, top loaded it works even better. A loading coil was added at the top along with a 2-piece extension and side braces or guy wires to support the extra weight and length in the wind.

160 Meter Operation: On 160 meters the K7GCO version is fed directly with coax in the normal manner. Current feed is still used on 160 and so a radial system is still

*202 South 124th Street, Seattle, Wash.

strongest reaching the East Coast from west of the Mississippi. In short, this old stand-by "8JK" has performed very well and made what once seemed a dead-end city lot a very rewarding experience. If you're in my predicament, this antenna could well be the answer to your problems. Give it a try. It costs little and requires little effort! ■

Half-Wave DDRR [*from page 22*]

DDRR antenna for v.h.f. use. Its dimensions for 6-meters probably make it somewhat impractical for most applications. However, for two meters on down it is particularly easy to construct for either fixed or mobile station use. The dimensions for bands other than two meters can be frequency scaled, as a first approximation, from the dimensions given for the 2-meter model. A model should be constructed for test purposes to determine the final dimensions. ■

75 M. WAS Antenna [*from page 28*]

The cost of the whole system including all the wire necessary to make both folded dipoles, is nominal. Refinements may be added, and these will certainly elevate the cost, but the basic antennas, lead-ins, and switches with a balun, should not cost in excess of $15-$20.

Nor is this system a particularly space consuming proposition. All of us know that a 75 meter antenna of any useful kind is not ideally suited to apartment dwelling—neither is this antenna. But if two such wires are put up at 70° angles to each other, (see fig. 2), the whole affair will go on a 100 × 65 foot lot, which is hardly in the estate category.

Result-wise, we completed our WAS in just over the month we had set as our goal. One or two of the "less difficult" states proved more of a problem than we had expected. We seldom had more than an hour of operating time per day, which didn't always come at the optimum propagation period, and this proved troublesome too. Depending upon whether you want to check into nets to get new states, on whether you want to make schedules on other bands for 75 meter contacts etc., you may expect to do better or worse than this. In any case, having two antennas oriented so that they cover all quadrants with major radiation lobes, will greatly help. Good luck. ■