Forty Meter ZL Special

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AFTER struggling through the morass of commercial broadcast stations around 7135 kc to copy the Florida RTTY Emergency Net one Sunday afternoon, I staggered out of the shack swearing never again. Unless you've had the experience of being kicked in the head by several foreign soap operas crying to the tune of 50 kilowatts or so each, it's hard to imagine the exasperation involved in trying to work RTTY on forty from this location. As I had the coverage of Florida primarily in mind, and the working of stations on the Eastern Seaboard as a second consideration, I decided that a fixed antenna with good forward gain and high front to side ratio would fill the bill.

The ZL special has been around for a good number of years but has been used mostly on ten, fifteen, and twenty meters. After reading the specifications, this seemed to be a good prospect for my beam.

The antenna described here is a variation of the ZL special and is a good compromise of good gain and directivity, small space requirements, and best of all, low construction cost. The total list of supplies consist of two 2x2's, 300 feet of wire, a hank of TV twinlead, and twelve insulators which can be cut out of plexiglass. Before we begin the description, let me say again that this was not built for a DX antenna, but rather for good coverage of Florida, of which 80 percent lies south of this location. However, when it was temporarily raised to sixty feet, the first contact was in South America.

Basically, the antenna is a pair of folded dipoles fed 135° out of phase. The ends of the elements are drooped downward to form a pair of inverted V's hung from a common boom. All wires on each side of the boom are in the same plane, resulting in the whole array looking something like a four element beam.

Construction begins with the boom which can be of either wood or tubing cut to 17 feet 6 inches. I used two 2x2's butt-jointed and reinforced at the center to reduce sagging. Insulators were fastened at each end and at 18 inches in from each end as shown in Fig. 1. The director consists of a folded dipole resonated at the desired frequency. The reflector is cut about 8 percent longer until the antenna is raised and tuned. Between the feedpoints of the two elements, a length of 300 ohm TV lead-in is connected with a half twist for the phase shift. This lead-in handles my kilowatt okay in this application. The feedline is connected at the feedpoint of the director. With the dimensions given for 7140 kc or using the formulas in Fig. 2 for other frequencies, the impedance is close to 75 ohms. I played around with 75 ohm twinlead and baluns for my transmitter. Needless to say, bandswitching became a dismal affair. In desperation, I tied on RG-11, and, wonder of wonders, it worked! The pi-network of my linear was quite happy with the new load.

The end wires of the director were adjusted in and out until a low point was found in the SWR at the desired frequency. When the best point was found, the wires were soldered in place. The reflector was tuned in the same way for maximum gain, using a field strength meter. This was done with the boom raised to its permanent height and the elements stretched out to their approximate tie points. At this location, the apex of each V is at 40 feet and the apex angle is 60 degrees. Sharper angles tend to decrease the usable bandwidth and directivity. As this angle is decreased, a point is reached where the array becomes too critical to tune. This point seems to be at an angle of 30°.

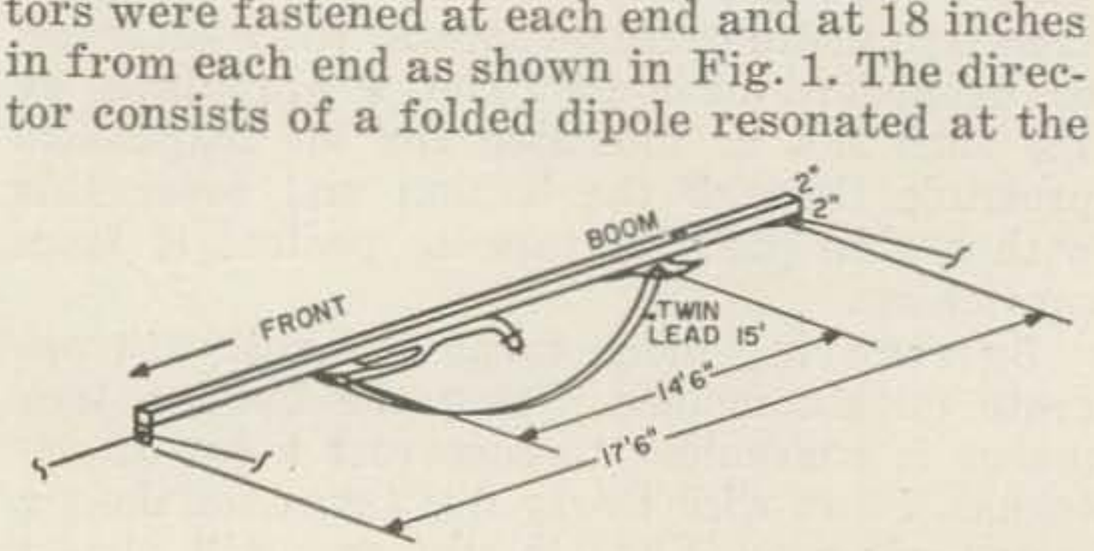
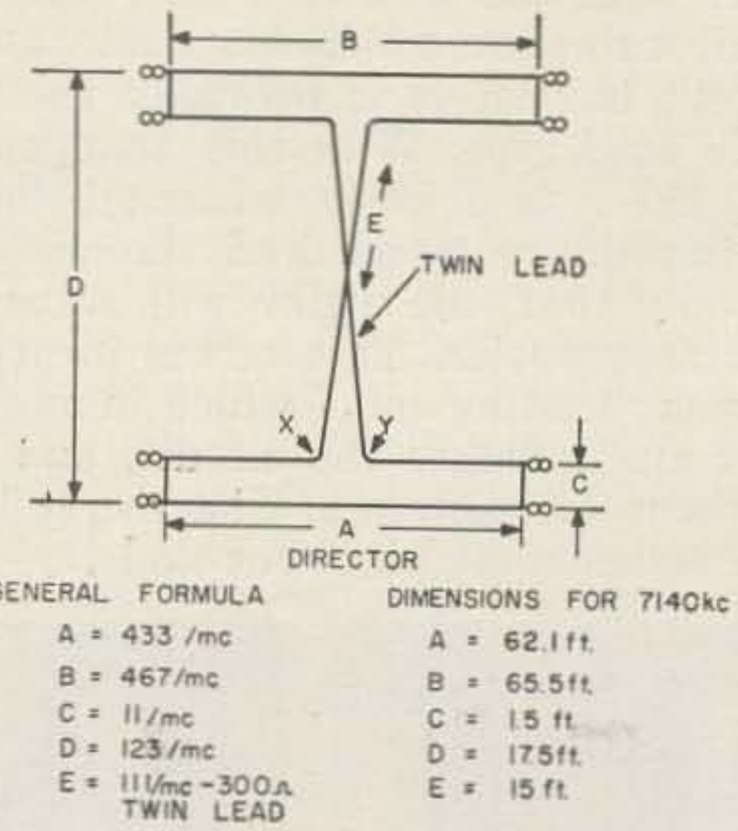


FIG. 1



GENERAL FORMULA	DIMENSIONS FOR 7140kc
A = 433 /mc	A = 62.1 ft.
B = 467/mc	B = 65.5 ft.
C = 11/mc	C = 1.5 ft.
D = 123/mc	D = 17.5 ft.
E = 111/mc -300Ω TWIN LEAD	E = 15 ft.

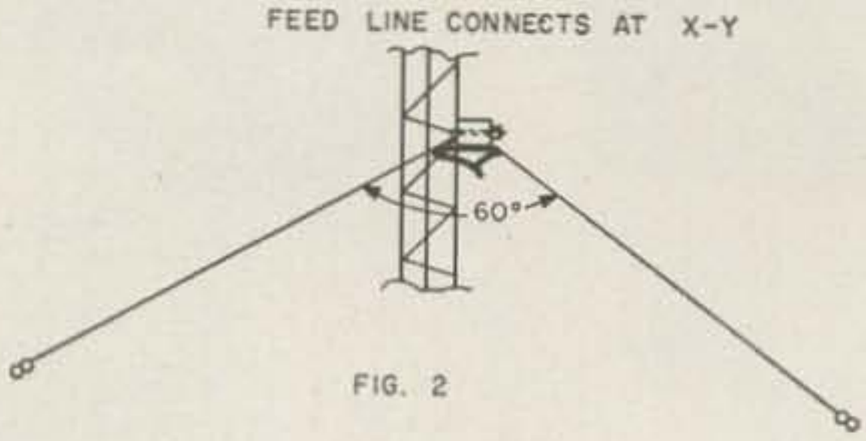


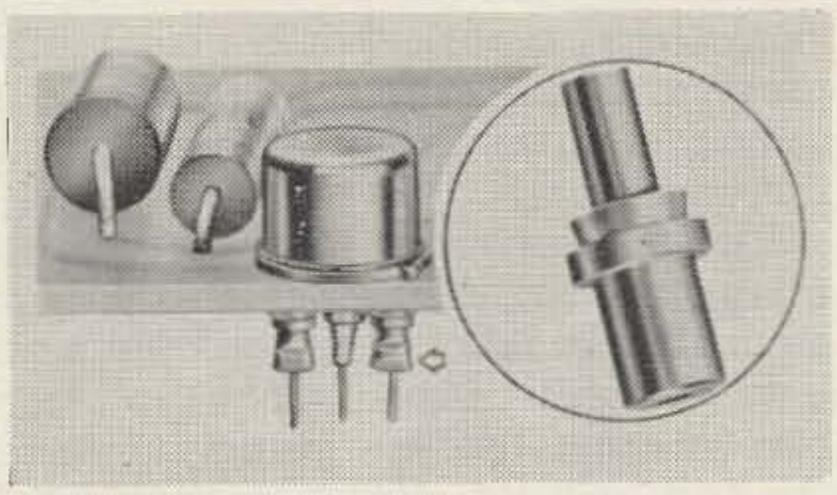
FIG. 2

This is a simple antenna to build if you have a structure such as a pole, tree, or tower that can support the boom at 30 feet or more. 40 feet seems to be a good height for working stations out as far as 400 miles. The labor is well worthwhile when the performance is considered.

I checked gain against my dipole, which is 20 feet higher than the beam. When transmitting, forward gain to stations 100 miles or closer is about 6 db better than the dipole. On longer hauls, it is closer to 10 db as reported on good receivers, such as 75A4's, HQ-180's, 75S-1's, etc. On receive, a real mystery pops up. When I switch from the dipole to the beam, signals from the South jump at least three S-units. This dipole is a good one, too. The high readings may be due to a greatly different radiation angle or to the presence of obstacles in the field of the antennas. I think that a more likely reason is the same thing that makes the cubical quad and dual-diversity beam such good receiving antennas. All have a large cross-section and each has nearly an equal proportion of vertical to horizontal components. Front to side ratio is about 25 db measured with a field strength meter. Front to back was purposely kept low, as I did not want to lose northern stations. Stations to the East and West are down far enough to make forty meters much more comfortable to work.

So, fellows, let's don't let forty fall by the wayside as a reliable band because of small space. This antenna can take up almost as little space as a full sized twenty meter beam and is still full sized on forty. Don't be persecuted by Russian propaganda stations or get involved in *John Loves Mary* in Spanish. Put up the Inverted-V ZL-Special and live! ... W4AXE

A Grabber



Soldering leads shortens transistors life. Heat sinks, often not infallible, necessitate undesirably long transistor leads. What do we do? We build transistors, beautiful little gems, expensive little gems. Then we blithely ruin them by the thousands trying to solder them into the circuit. The solution? Classically simple. Don't solder transistor leads. Insert and solder special crimpable eyelets in the circuit. Then slip the transistor leads thru these and crimp, giving a positive electrical connection and the shortest one possible. I know. *I* should have thought of it, too. *Vector* has them all ready to go. They're called TRANSCRIMPS, available from Vector Electronics, 1100 Flower St., Glendale 1, Calif.