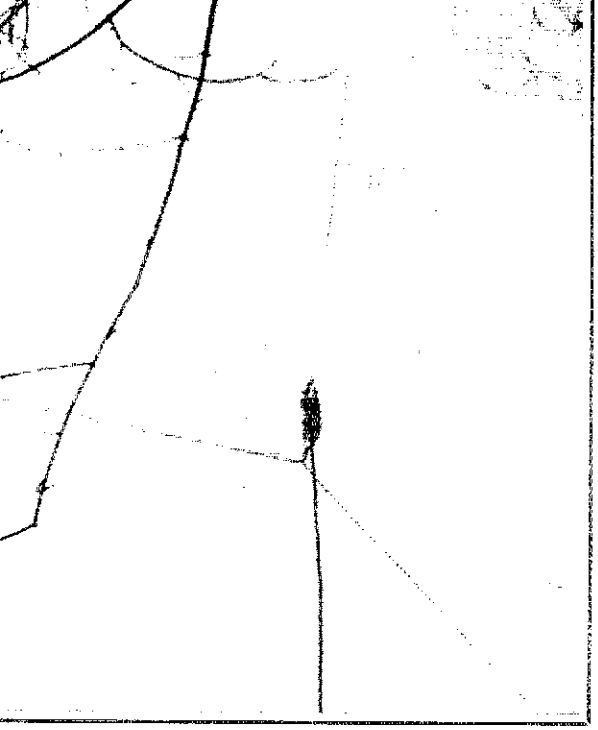

A Tree-Mounted 30-Meter Ground-Plane Antenna

Work DX with this inconspicuous, low-cost and easy-to-build wire antenna. It's great also for portable operation.

By C. L. "Chuck" Hutchinson,* K8CH

A tree-mounted, vertically polarized antenna? Sound silly? Well, it's not! Perhaps textbooks do not recommend it, but I'm having good luck with a 30-meter "ground plane." The antenna did not cost much, is inconspicuous and works quite well for DX QSOs.

The evolution of this idea began more than a decade ago. My friend Al Francisco, K7NHV, was a doctoral candidate at Michigan State University. Al was living on campus and wanted to get on the air from there. University rules did not permit outside antennas. How would he solve this dilemma?

Al's solution was simple, and it worked! He ran a piece of RG-58/U cable from a bedroom window to the ground. From there, he slit a shallow trench to a nearby tree and buried the cable. At the base of the tree a couple of radials were soldered to the coax-line braid, then buried. Another piece of wire formed the main radiator of his 20-meter vertical. You had to walk right up to the tree to see it! Even more amazing to Al and his friends was that it worked about as well as you would expect for any 20-meter vertical with only a couple of radials. It was a good idea, the kind one doesn't forget!

Several years later I moved to a new location. In short order, a modest tower with a triband beam sprouted from the back yard. Dipoles for the 40- and 80-meter bands were hung in the trees. It was possible to work DX on 40 meters, but the low dipole worked *too well* on short skip; a vertical antenna would be a better alternative. I knew from experience that a vertical with 16 or more radials would be a good performer.

Where to put the antenna? That's when Al's idea came back to mind: Use a tree to support the vertical radiator! This time a TV mast, not wire, would serve as the vertical radiator. About 30 feet from the corner of the house stood a full-grown walnut tree. A look at the tree confirmed that three branches were perfectly situated for supporting a 40-meter vertical.

Later that day, with the help of my teenage son, the vertical was eased into position close to the tree trunk. A length of treated 4- × 4-inch lumber was buried to serve as the base insulator.[1] A large nail held the vertical mast in place. My son (Bryant is a good tree climber) wrapped a short length of clothesline rope around the mast at each branch. Next, he tied four square knots. The loose ends were then wrapped around and tied to the branches. We finished the job by burying 32 radials around the mast and running a piece of RG-8/U cable into the ham shack. The results were great! For the next three years the antenna served me well. Many choice DX tidbits were snagged while using that vertical antenna.

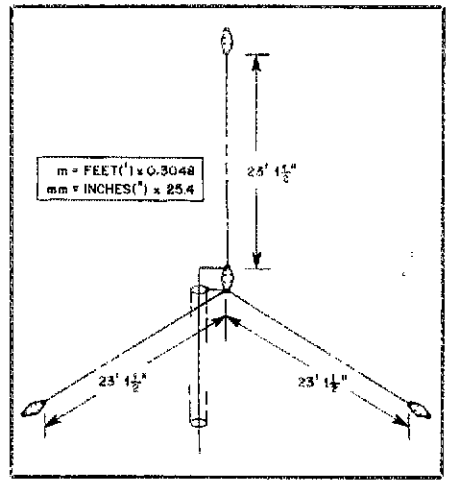

Fig. 1 — Dimensions and construction of the 30-meter ground-plane antenna.

An Antenna for 30-Meter DXing

On the day the 30-meter amateur band was opened by the FCC, I used a Transmatch and 40-meter dipole to make a few contacts. Later, I tried an 80-meter dipole. Both were okay, but each worked too well on short skip. Stations within a couple of hundred miles were very loud — not the best situation for DXing!

A vertical antenna would cure that ... perhaps another version of the K7NHV special. There was a serious problem, however. Limited space and rocky soil meant that a good radial system would be almost impossible to realize. Rats! But wait, why not build a ground-plane antenna? I could make it all from wire, and two radials should be sufficient. I went to work.

I reached for my calculator and came up with the proper length for the elements, using the formula:

$$\ell_{(feet)} = \frac{234}{f_{MHz}}$$

*ARRL Senior Assistant Technical Editor

[1] m = ft × 0.3048; mm = in × 25.4; kg = lb × 0.4536.

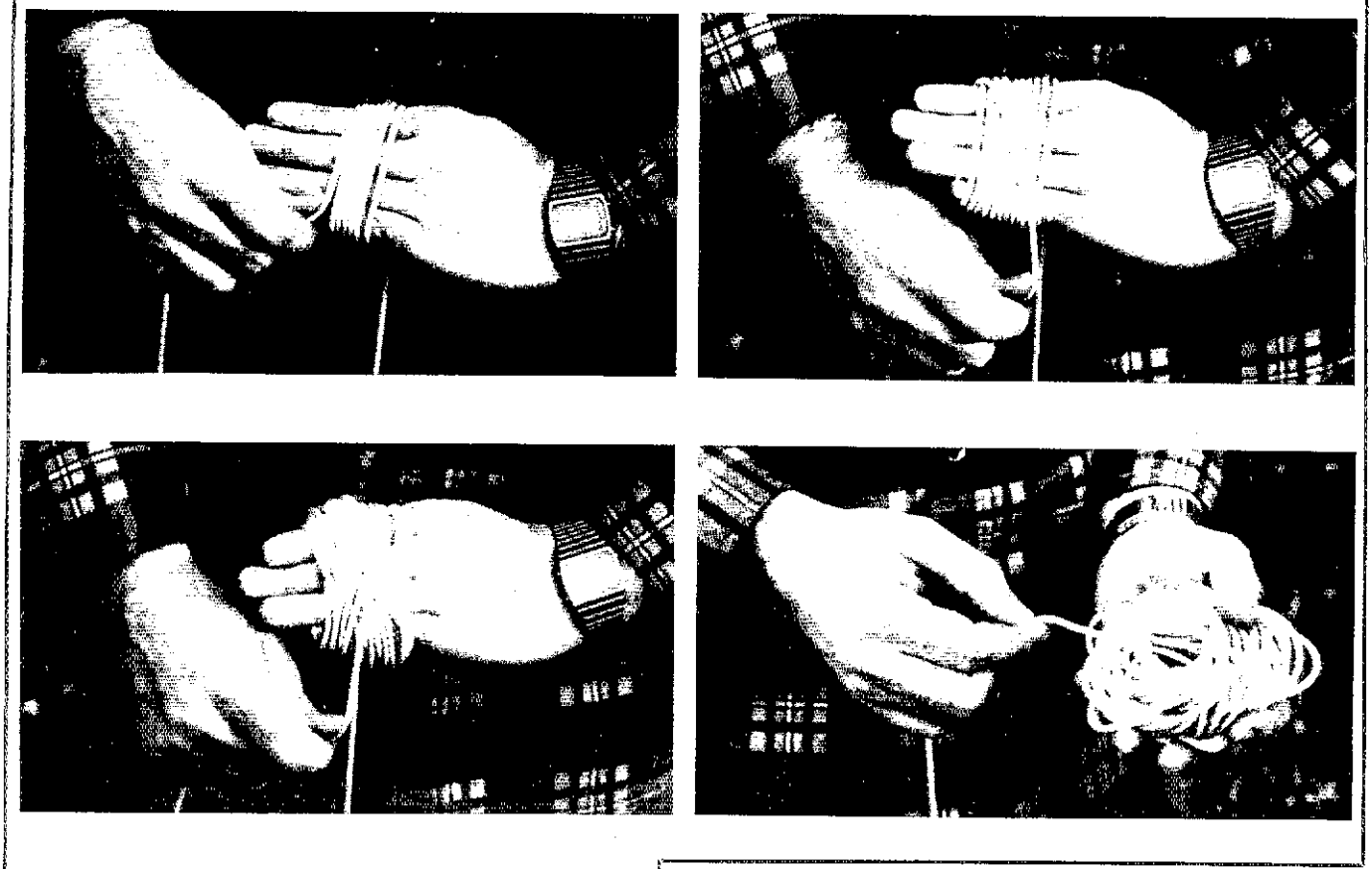

Fig. 2 — Chuck, K8CH, demonstrates how Ben Hassell, W8VPC, prepares a line for throwing. When the weight is thrown, the line should come freely out of the middle of the ball.

The vertical portion and each radial of the ground plane should be 23 feet 1½ inches for resonance at 10.12 MHz. The wire and insulators were on hand. It did not take long to assemble the antenna as shown in Fig. 1.

This time, the perfect tree was found at the back of the lot. Beneath it grows a lot of brush — it makes it hard to work around, but great for camouflage. Only one obstacle stood in the way of speedy installation. How to get a line through the crotch 40 feet above the ground?

Getting a Line into a Tree

Many methods are used to get an antenna support line into the "right" crotch of a tree. You could use a bow and arrow or a slingshot. A strong person can throw a no. 18 nylon line, with a proper weight on the end, to about 40 feet. That's good enough for this project.

There are a few tricks you should avoid learning "the hard way." First, make sure there is nothing breakable within throwing range. Unless you are extremely fortunate, at least one throw will go astray. Second, secure the free end of the line so it does not end up out of reach in the air. This is particularly frustrating when you have just managed to "hit the target."

I like to use an 8-inch adjustable wrench for a throwing weight. It has just about the right heft, and it is nice and smooth. If you don't like to gamble, use something else. For this project, I found a floor flange that weighed a bit less than a pound. It worked quite well.

When you miss your target, as I frequently do, don't try to pull the throwing weight back over a branch. Take it from one who knows the indignity of viewing a beautiful, shiny adjustable wrench swinging in the breeze from a rotten old tree branch. It takes only a few seconds to let the weight fall to the ground and then pull the line on through the tree. That way you get another try with the same weight. Trees look ugly when they are decorated with

dangling wrenches, transformers, pipe fittings and rocks!

Make sure your throwing line does not tangle, or you will have a mess. Ben Hassell, W8VPC, uses a method that is particularly effective in brush or tall grass. Ben lays the throwing weight on the ground. He then scramble-winds the line into a ball around his fingers (Fig. 2). The end of the line tied to the weight comes out of the middle. For a right hander, lightly grasp the ball in the left hand. ("Southpaws" reverse hands.) With the right hand, lift the weight by the line and swing it 'round and 'round. Let the weight fly in the direction of the "right" crotch. Success may require several attempts, but keep trying.

Working on a mowed lawn is much easier. Lay the line out in front of you in large S shapes. Make sure there are no twigs or stones for the line to catch on. You want the line to feed smoothly from the ground as the weight goes flying on its way.

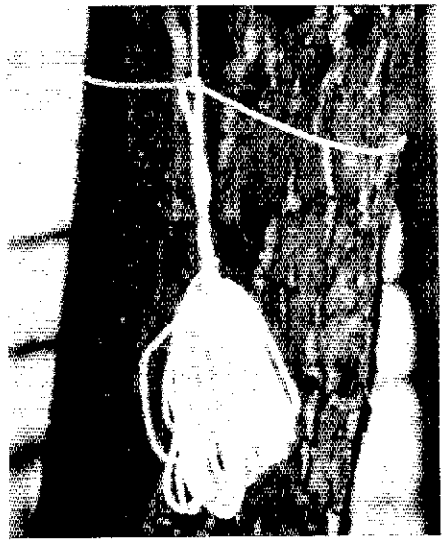

Fig. 3 — One method for securing the downhaul line to a tree. Excess line is neatly stored out of the way.

Final Steps

It took a few tries to get the line through that crotch at 40 feet. After that, things went easily. I tied the top insulator to the end of the line and hauled it up to just below the crotch. A doubled-up section of the downhaul line was wrapped around the tree at head level, and tied. Excess line was secured as shown in Fig. 3. Shorter lengths of line were tied to the radial ends and were secured to convenient trees above head level.

After several weeks of operation, I find myself well satisfied with the tree-mounted ground-plane antenna. It works at least as well for DX as does a dipole at 60 feet. For stations less than a couple of hundred miles away there is pretty good rejection. (The dipole works for them). There is no "dent" in my pocketbook, but perhaps best of all, the antenna is almost invisible. Why don't you give it a try? QST

Strays

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

☐ Wonder what you've been missing by not subscribing to *QEX,* the ARRL newsletter for experimenters? Among the features in the August issue were:

- Cliff Francis, Jr., WØMBP, shares antenna ideas in his article, "Thoughts on Antenna Design"
- "A Coax-Antenna Trap Program for the TIMEX/SINCLAIR 1000," by Andy S. Griffith, W4ULD
- Several unrecognized achievements on 48, 72 and 300 GHz are commented about in the VHF+ Technology column by Geoffrey Krauss, WA2GFP

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members is $6 for 12 issues; for nonmembers, $12. There are additional postage surcharges for mailing outside the U.S.; write to Headquarters for details.

NEW ENGLAND REPEATER COORDINATION MEETING

☐ Calling all New England Repeater Groups! There will be a meeting on September 15, from 1 to 5 P.M., at the Yankee Drummer Motor Inn, Rte. 12, Auburn, Massachusetts, just off the Mass Pike. Topics of discussion will include New England repeater frequency coordination programs and policies. If you or your group owns and operates a repeater, please send a representative. Your valuable input is needed. See you there!

QST congratulates...

☐ the following radio amateurs on 50 years as an ARRL member:

- Fred Berger, K4GX, of Venice, Florida
- Arnold B. Freeman, W2YD, of McKenzie, Tennessee
- Lawrence Lynch, W9CUV, of Monticello, Illinois
- Sam A. Sullivan, W6WXU, of Sonoma, California
- Edwin Wicklund, WØIGZ, of Kensington, Minnesota
- Alonzo Wierenga, W8GG, of South Haven, Michigan

TA PROFILES

☐ On March 16, 1977, we had the pleasure of welcoming Helge Granberg, K7ES, to our ARRL Technical Advisor team. His technical expertise on solid-state SSB devices and their applications and, more recently, on the development of high-power RF MOSFETs for SSB has been of great value to the League and Amateur Radio. Helge has written numerous articles for *QST,* and is the recipient of a *QST* Cover Plaque award (Jan. 1983). He has also contributed informative material for the ARRL *Radio Amateur's Handbook.*

Helge earned an EE degree from Syracuse University, and has been a member of the IEEE since 1967. He is the holder of two U.S. patents, has published over 25 articles for domestic and foreign professional magazines, and has written many Motorola Application Notes and Engineering Bulletins.

First licensed in Finland in 1950, as OH2ZE, he now holds an Extra Class license. He also holds an FCC Radiotelephone license, First Class. His primary interest in Amateur Radio is DX (mostly CW), and he has contacted 266 countries since 1980.

Residing in Phoenix, Arizona, Helge is the Principal Staff Engineer for the Motorola Semiconductor Products Sector (RF Power Group). His hobbies include gun collecting, electronics (not job related) and camping. — *Marian Anderson, WB1FSB*

TA Roy Hejhall, K7QWR (left), presenting TA Helge Granberg, K7ES/OH2ZE, with his *QST* Cover Plaque. The presentation was made at a Motorola Company awards banquet.