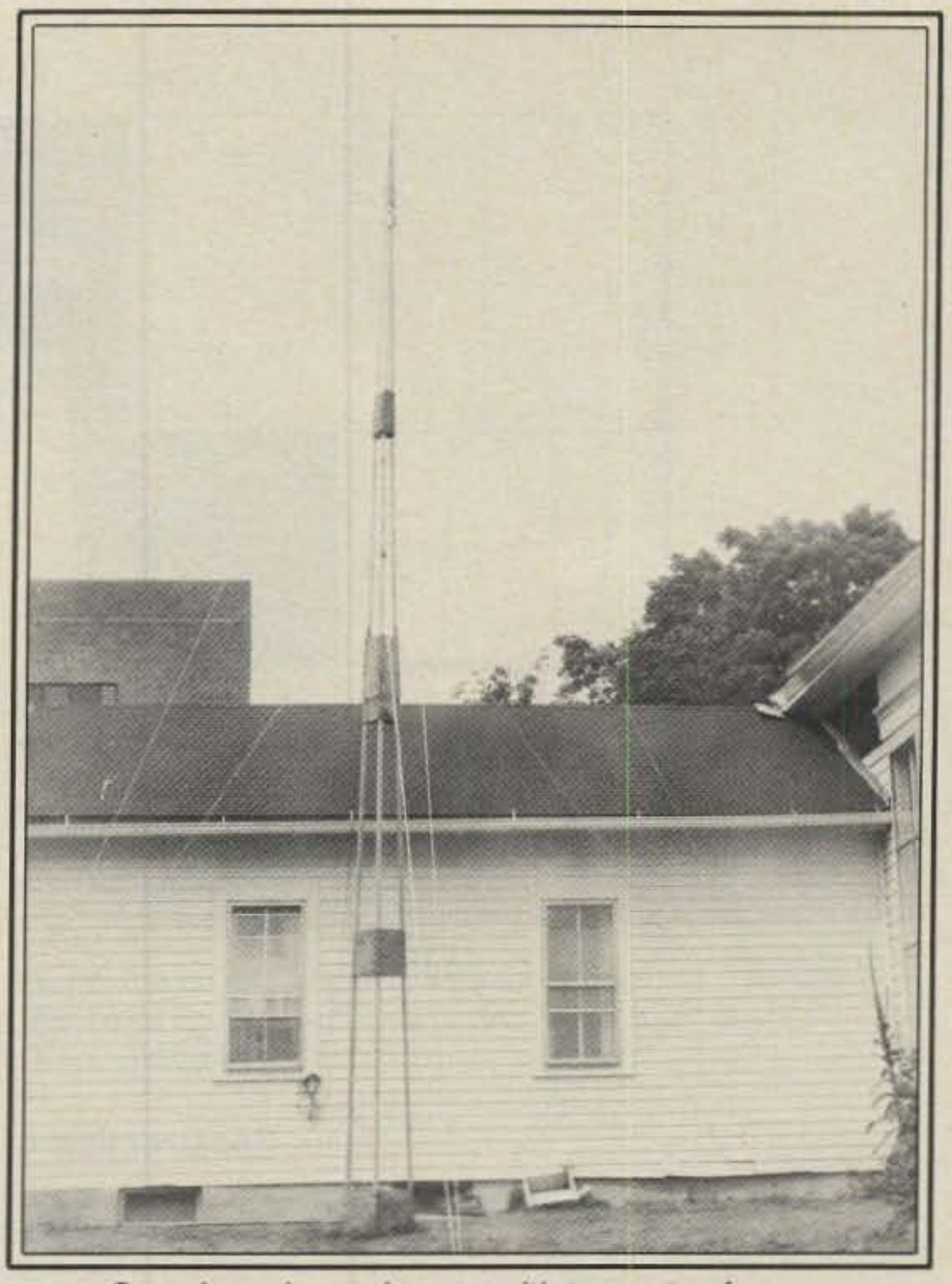
This may qualify as the 101st thing you can make with a sheet of plywood. WA2JHD presents a home-improvement magazine-type project for the do-it-yourselfer.

HOW TO BUILD A PLYWOOD TOWER

BY BILL GREENE, JR.* WA2JHD



Complete plywood tower with two sets of guys.

Let there be no mistake about it: I've always been a plywood nut. I love the stuff, and I'll try anything with it. It's been that way ever since the days when I worked with a construction firm. After I got into amateur radio, naturally enough came the thought why not make an antenna tower out of plywood?

This idea festered in the back of my mind for several years. Then just a short while ago I was thumbing through Bill Orr's *Simple, Low-Cost Wire Antennas For Radio Amateurs,* and I discovered a neat design for a 10-15-20 meter ground plane meant to be hung from a tree. Deep down in my plywood brain the two ideas fused together, and I decided to do something about it.

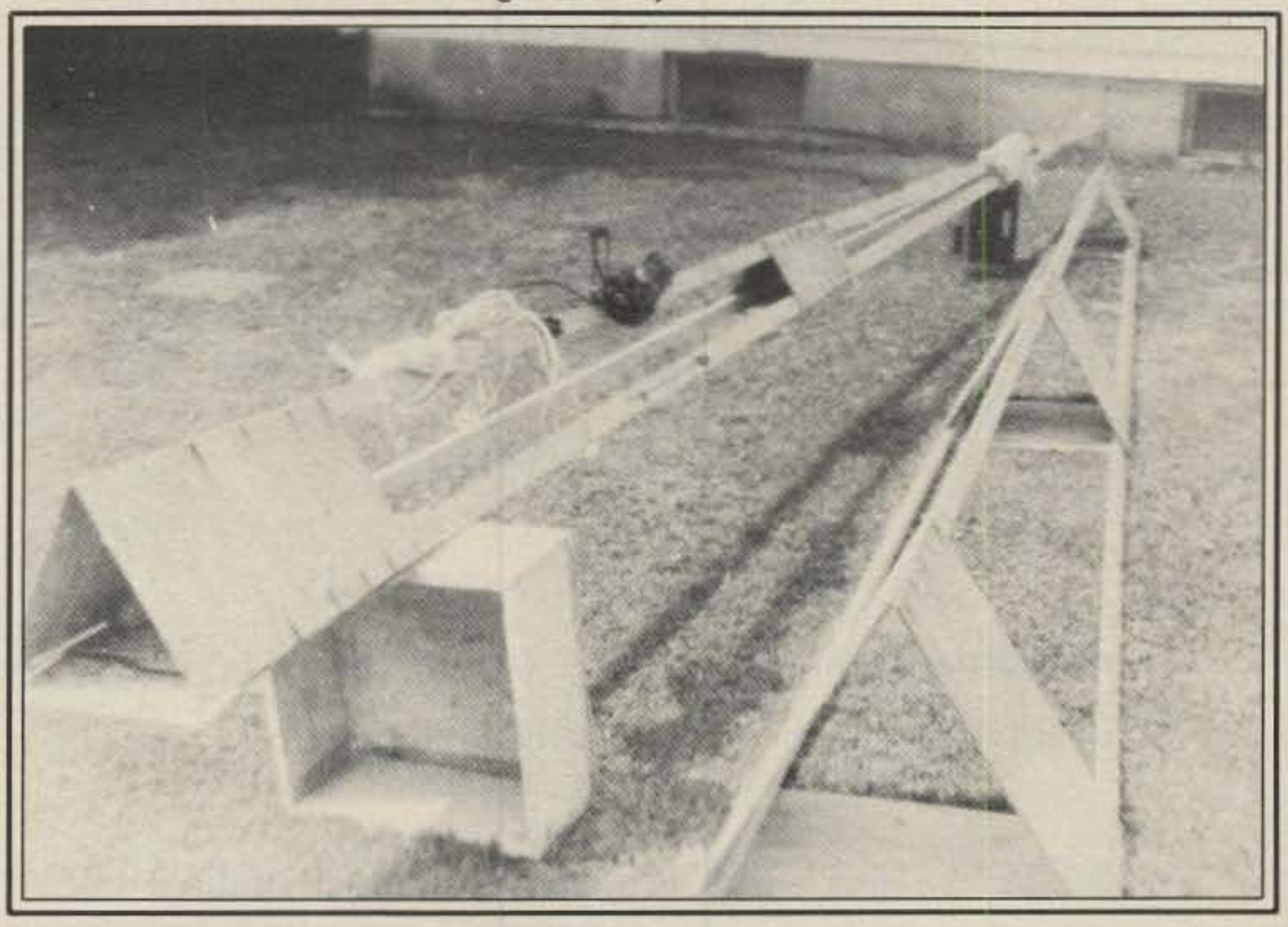
By nature I'm a tightwad, so naturally I had to build this thing using no more than one sheet of plywood. The tower had to be as tall as possible, and since I'm a field-day freak it had to be transportable. When the wheels finished turning and the sawdust settled down, I had a tower made entirely of wood. It stands about 36 feet high and supports a 3-band ground-plane system.

Since the tower is not meant to be set on a foundation, it is kept upright by guy ropes fastened to 4 foot iron pipe stakes. A ground wire runs down through the center. Three vertical antennas—one for each of the aforementioned bands—are supported on the tower with TV twinlead standoffs. They come together to a common feedpoint consisting of a coaxial lightning arrester.

The ground-plane radials are made of three-conductor telephone cable, one conductor being cut for each band. There are three of them fastened to the guy ropes.

How well does it work? Well, I took it to a field-day operation on the football practice field of nearby Alfred University. We intended to use the soccer-type goalpost as a fulcrum to get it off the ground. It took five of us just a couple of minutes to get

Tower disassembled and ready for loading on top of the car. Using crates or sawhorses during assembly reduces back strain.



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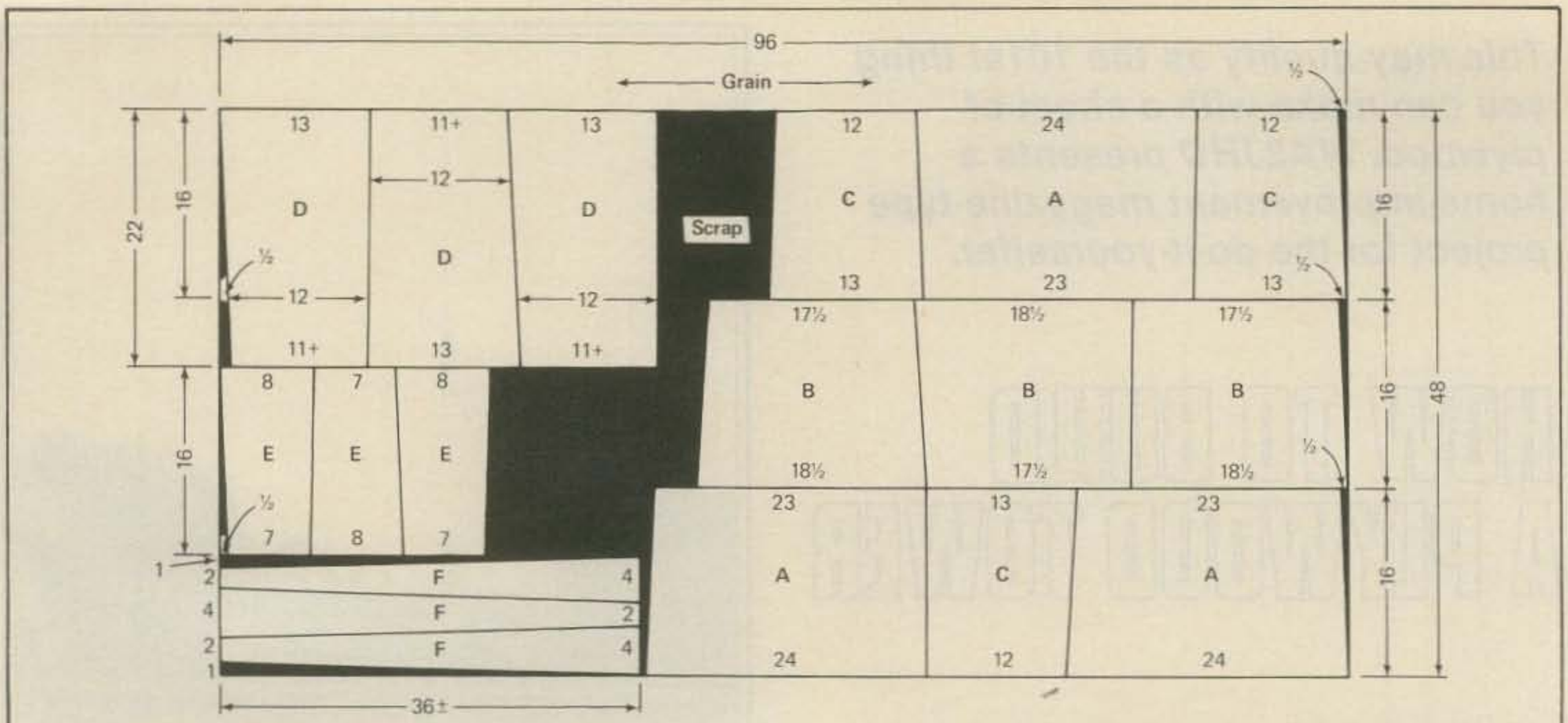


Fig. 1– Layout of the 4′ × 8′ sheet of plywood.

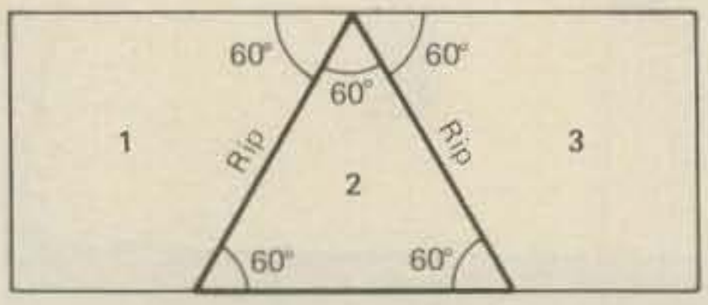


Fig. 2– A section of 2″ × 4″. Set your table saw blade at 60°.

up. Since the ground was not suitable for the stakes (6 inches of topsoil over bedrock), we tied two of the guys to the legs of the goalpost and the third to a car bumper. It looked grand with that little American flag fluttering from the top.

The results were well worth it. Of the first 23 hours of field day, we were on the air only 12 of them (catnapping and lousy band conditions account for the rest). On 20 we made over a hundred contacts. We switched to 10 for the last hour and logged 25 more. In all we reached 34 states, 4 provinces, Cuba, and the Virgin Islands. All contacts were beyond the first, second, and third call areas.

The tower cost me a total of about $30.00. With a permanent installation, I see no reason why you couldn't build one as high as 64 feet. (Of course, you'd need more than one sheet of plywood.)

Construction

Lay out the plywood, noting the direction of the grain (fig. 1). If the tower is to be built in two take-down sections, use all six patterns. Omit gusset **C** if it is to be built in a single length for a more permanent installation.

Rip the 2″ × 4″'s into three triangular sections (fig. 2). These will be the uprights for the tower.

If you are building the tower in two sections, assemble the bottom section first, using the photos and fig. 3 as a guide. When you do the upper section, note that it must fit snugly over the top end of the bottom section. In other words, gusset **D** must fit snugly over gusset **C**. You will probably get the best fit if you assemble the top section directly over the end of the bottom section. Add the 2″ × 2″ section to the peak inside gusset, applying a little fudge factor as needed.

Now drill three holes in a triangular pattern through each pair of gussets **C** and **D**, and bolt the two sections together. You may want to double-nut the bolts. Let the glue set overnight.

While the tower is still lying on the ground, begin wiring it from the top down. Cut a length of braided copper wire to a quarter wave at 20 meters, and fasten it to the peak using a TV standoff. Put another standoff about a foot from the bottom end of the wire. Then temporarily tack the end of the wire to one of the uprights. From this point, run the 15 meter wire up a second of the tower uprights. Run a 10 meter wire up a third upright. (You may want to position the three antennas so that one side of the tower will be clear for resting on the ground prior to raising.)

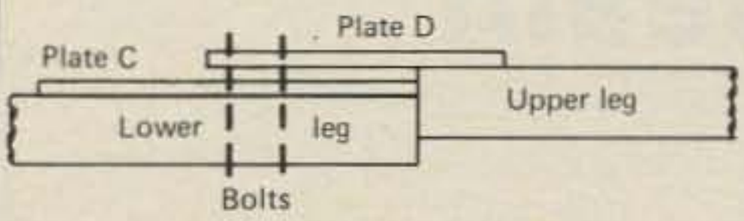
If you've done everything right, you should have a foot of wire free on each of the bottom ends (temporarily stapled to the uprights, remember?). Join the three together, soldering them into a banana plug. This should fit snugly into the center portion of the coax lightning arrester. The coax to your rig is then connected to the

Bill of Materials

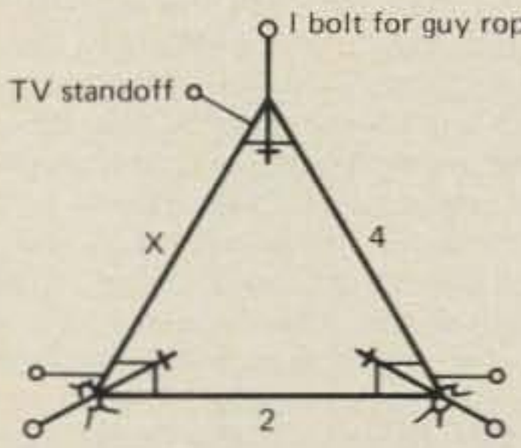
1	sheet exterior plywood, 4′ × 8′, ¼ ″ or thicker
4	good quality (no knots or warps) 2″ × 4″ × 8′
200′	nylon line (about ¼ ″)
60′	braided copper wire
50′	three-conductor telephone wire
6	4 foot lengths ½ ″ iron pipe (for guy stakes)
1	coaxial lightning arrester
9	¼-20 bolts, 1 inch long, with nuts, flat and lock washers
4′	2″ × 2″
6	I bolts long enough to go through the 2″ × 4″s
2	ground clamps

Coax cable, at least 50 feet
Waterproof glue and annular nails

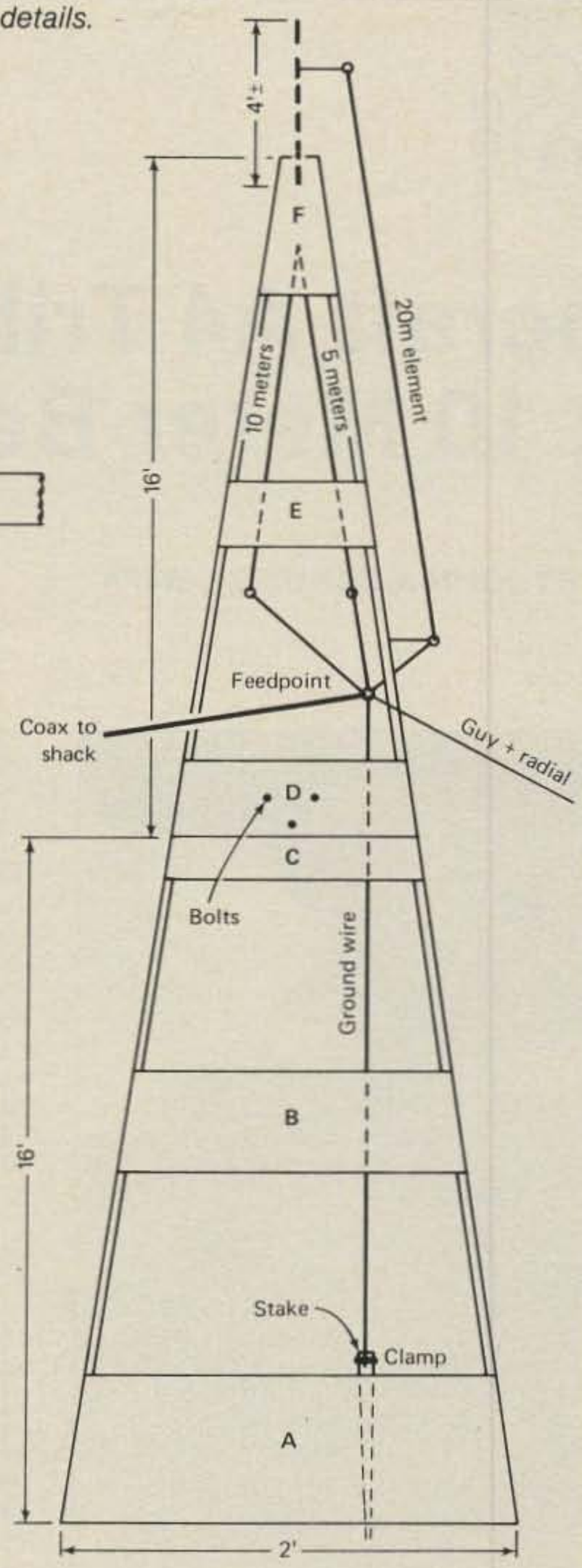
Fig. 3– Plywood tower construction details.



SECTION THRU TOWER JOINT



SECTION SHOWING LOCATION OF STANDOFFS AND I-BOLTS



ELEVATION

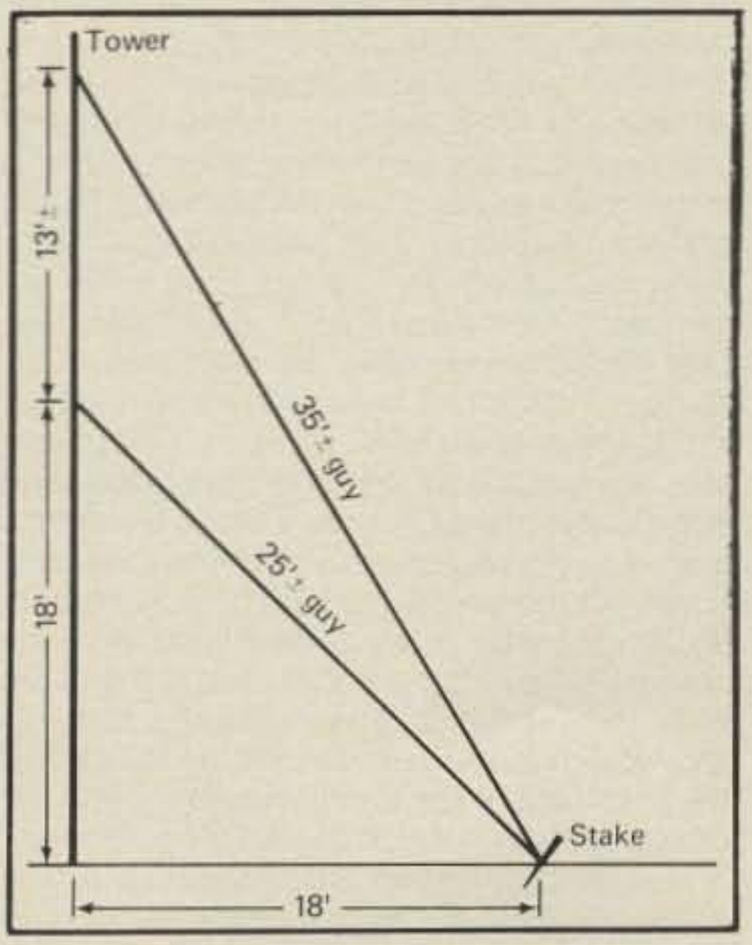
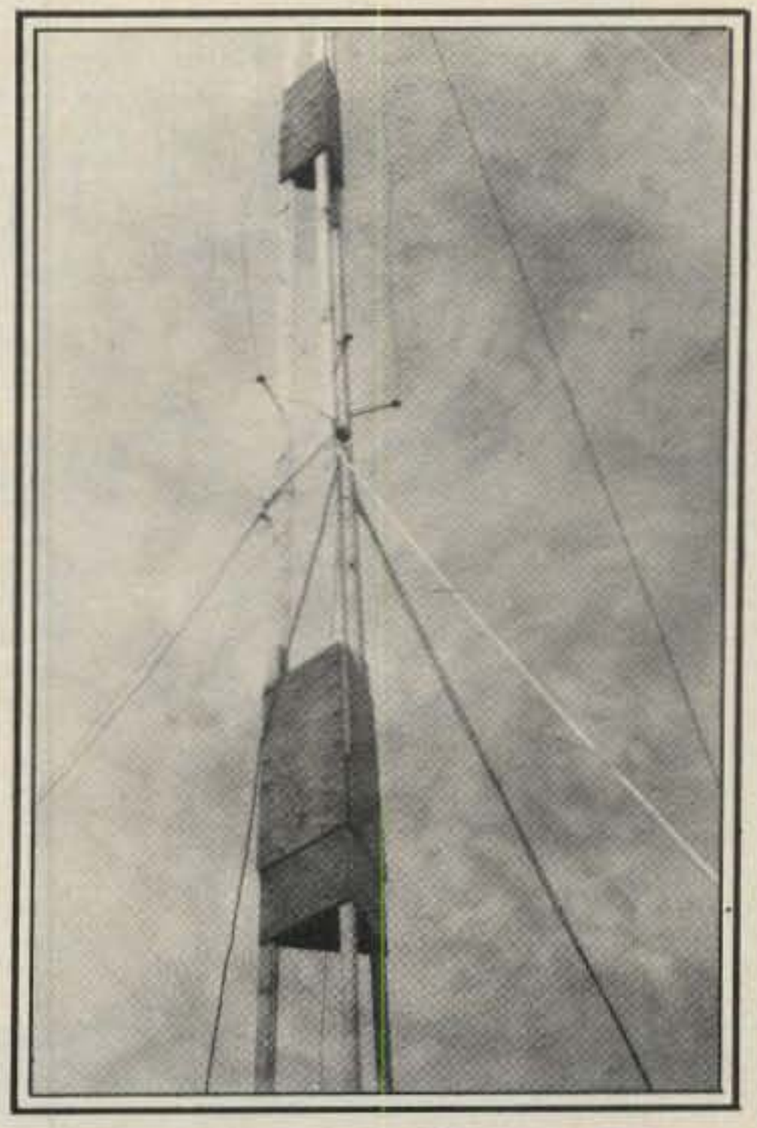


Fig. 4– The guying arrangement.

other end of the lightning arrester with a PL-259 plug. The ground screw of the lightning arrester connects to a conductor (the unused remnant of the braided wire) that reaches down to a ground connection. Mount the lightning arrester to one of the tower uprights with a pipe clamp.

Cut three pieces of indoor, three-conductor telephone cable to a quarter wavelength at 20 meters. Measure and mark a quarter wavelength for 15 meters, and for 10 meters on each cable. Carefully cut into the insulation at each of these points. Cut one of the conductors at the 15 meter point, and cut another conductor at the 10 meter point. Draw out the unused lengths of the cut conductors. If you do it right, you should have one conductor cut for each of the three bands. Join together all of these conductors from each of the three cables, and connect



This view shows the feedpoint and the section connecting gussets.

them to the ground screw of the lightning arrester.

What you have done is build three ground-plane antennas onto the tower, one for each band, using a common feedpoint. Once the tower is raised upright, the ground-plane radials will use the guy ropes as supporting messengers. The tower is now complete. All you need to do is get it standing up.

I first set up mine at my office, the Allegany County Museum in Belmont, New York. If you know the location, perhaps you can appreciate a 5 by 8 signal report from Washington State using less than 100 watts.

There was only one set of guy lines at first, and they were attached to the tower at the feedpoint, about 18 feet above ground. After the tower had been up about two weeks, we had a wild storm with winds gusting up to 40 m.p.h. The top of the tower shook out its bolts and buckled. The damage was slight, and a couple of days later I was back in operation. This time I had two sets of guys—one in the original position and one attached higher up. The guys were anchored to three stakes (made of 4 foot lengths of iron pipe), and three more were driven just inside the base to keep it from shifting. One of them also served as a ground rod.

So there it stands on the hillside in Belmont, New York, performing beautifully. Once in a while I get a wisecrack or two, but they usually fade away when the results are demonstrated. The only exception came when my brother, WB4LXF, stopped by. Then the best DX I could show off was with a new General 200 yards down the street! Still, although it doesn't look like much, I built it and it works. Isn't that part of what amateur radio is all about? CQ