BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

More About the W6SAI OCF Antenna

Last month I discussed the off-center-fed (OCF) dipole antenna and described one that I built. My antenna is shown in fig. 1. It is designed for 40-20-15-10 meter operation. As a nice bonus, I found that it also works on 18 MHz. Operation on 10 or 24 MHz is not possible due to extremely high SWR on the balun and feedline.

The antenna has been up for about six weeks and performs very well. It took a little effort to remove RF from the outside of the coax line. Once that was accomplished with ferrite isolators, the line length could be varied without a change in the SWR reading. I've worked plenty of DX with the antenna, and it provides a modest amount of gain on the higher bands (see Table I).

The only direct comparison I could run was on 18 MHz, where I compared the OCF against a ground-plane antenna, well located, with the base about 10 feet above ground. In the great majority of cases (including contacts in Europe and Asia), the OCF dipole was at least a good S-point better in both transmission and reception than the ground plane. On the other bands I had no comparison antenna.

On 40 meters during my weekly sked with W6GNX (about a mile away from me) and W6FR in Fullerton (about 380 miles away), Marv reported no difference in signal comparisons between my signal and W6GNX, as judged against previous contacts when I used a 40 meter, center-fed dipole.

On 20 meters DX could be worked, but it was often difficult in the face of competition from high-power stations with big beams. If I had a good shot at the DX, I usually raised it. Ten meters was generally dead, so the reports were few. However, the OCF was a hot antenna on 18 and 21 MHz. It was easy to break the pile-up on F6BLQ/D2 (Angola) on 18 MHz, and on a good opening on 21 MHz 10 Europeans in a row were worked on first call in less than 30 minutes. All of the above contacts were made with 100 watts.

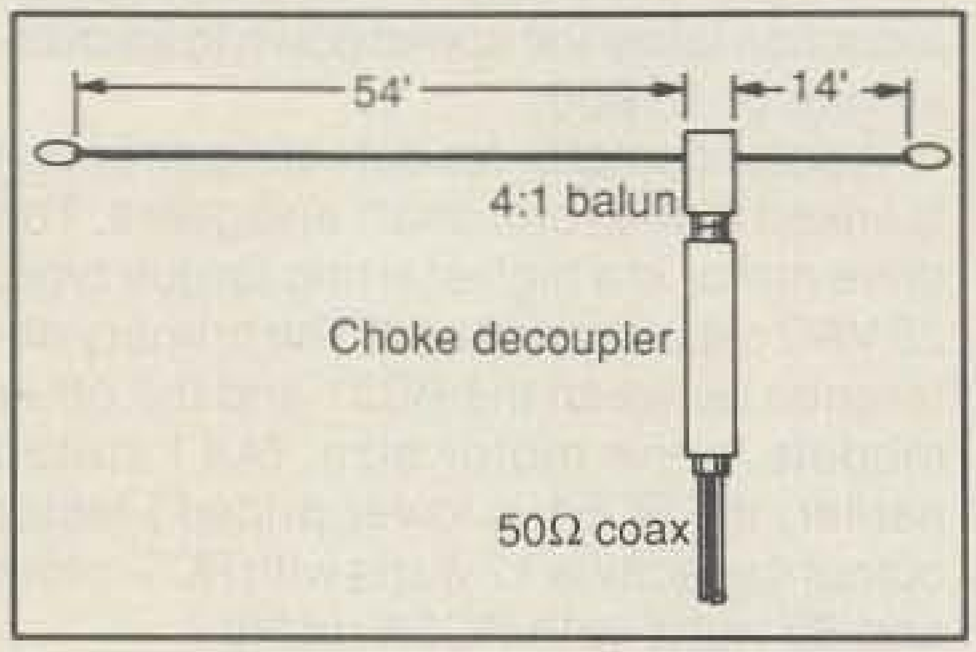

Fig. 1– The W6SAI experimental OCF multiband dipole. Balun is B4-2KX and decoupler is C1-2K (both by Radio Works).

Gain Over λ/2 Dipole

Band	Gain (dBd)
40	0
20	0.4
17	0.6
15	0.9
10	1.4

Table I– Gain of OCF antenna on HF bands.

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Pattern Plots of The OCF Antenna

The computer-derived pattern plots for the HF bands are shown in figs. 2 through 5. The antenna is oriented as shown in fig. 1. On 40 meters the classic dipole pattern exists with a slight unbalance in the plot (see the 90 and 270 degree points). At an elevation of 40 feet the main lobes are maximum at an elevation of 50 degrees above the horizon.

On 20 meters a clover-leaf pattern exists with a slight cant to the longer wire. Angle of elevation of the lobes is at 25 degrees. On 15 meters the lobes split again, with a decided advantage to the directions off the longer wire. Even so, the difference in pattern symmetry is only about 2 dB. The

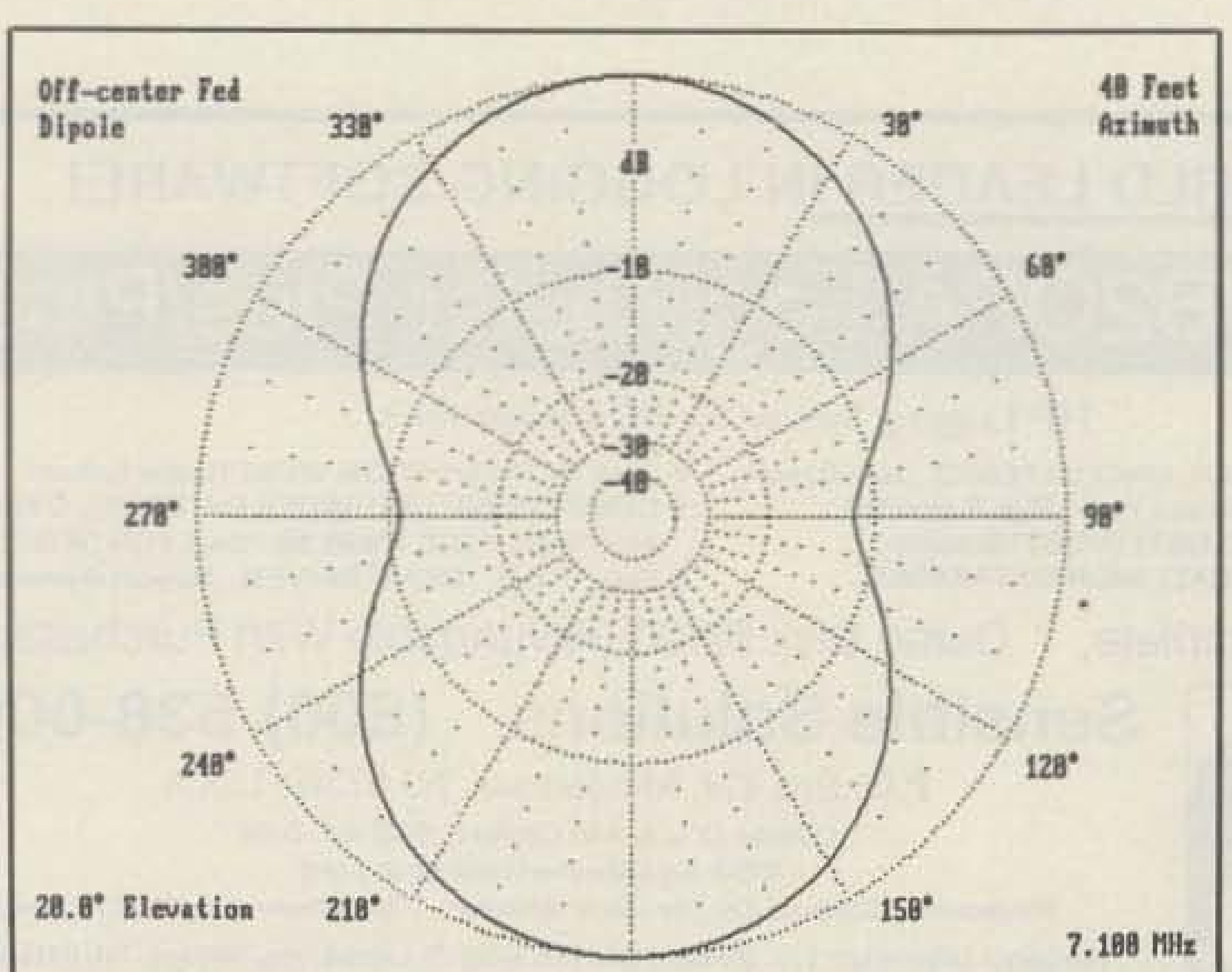

Fig. 2– Azimuth plot of OCF dipole on 7 MHz. Note on 270-90 degree axis the pattern is slightly canted to the left.

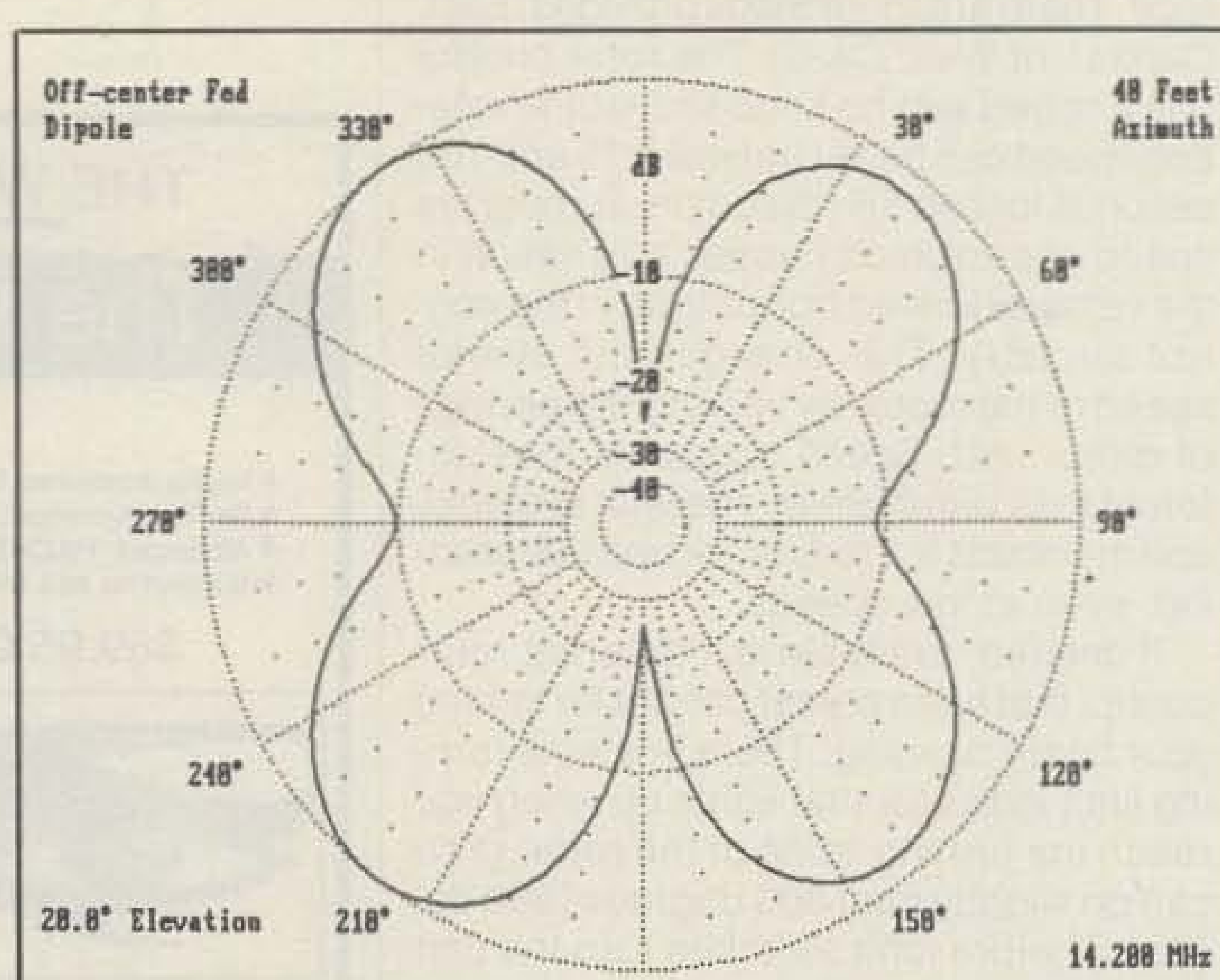

Fig. 3– Azimuth plot on 14 MHz. Slight cant on clover-leaf pattern can be seen.

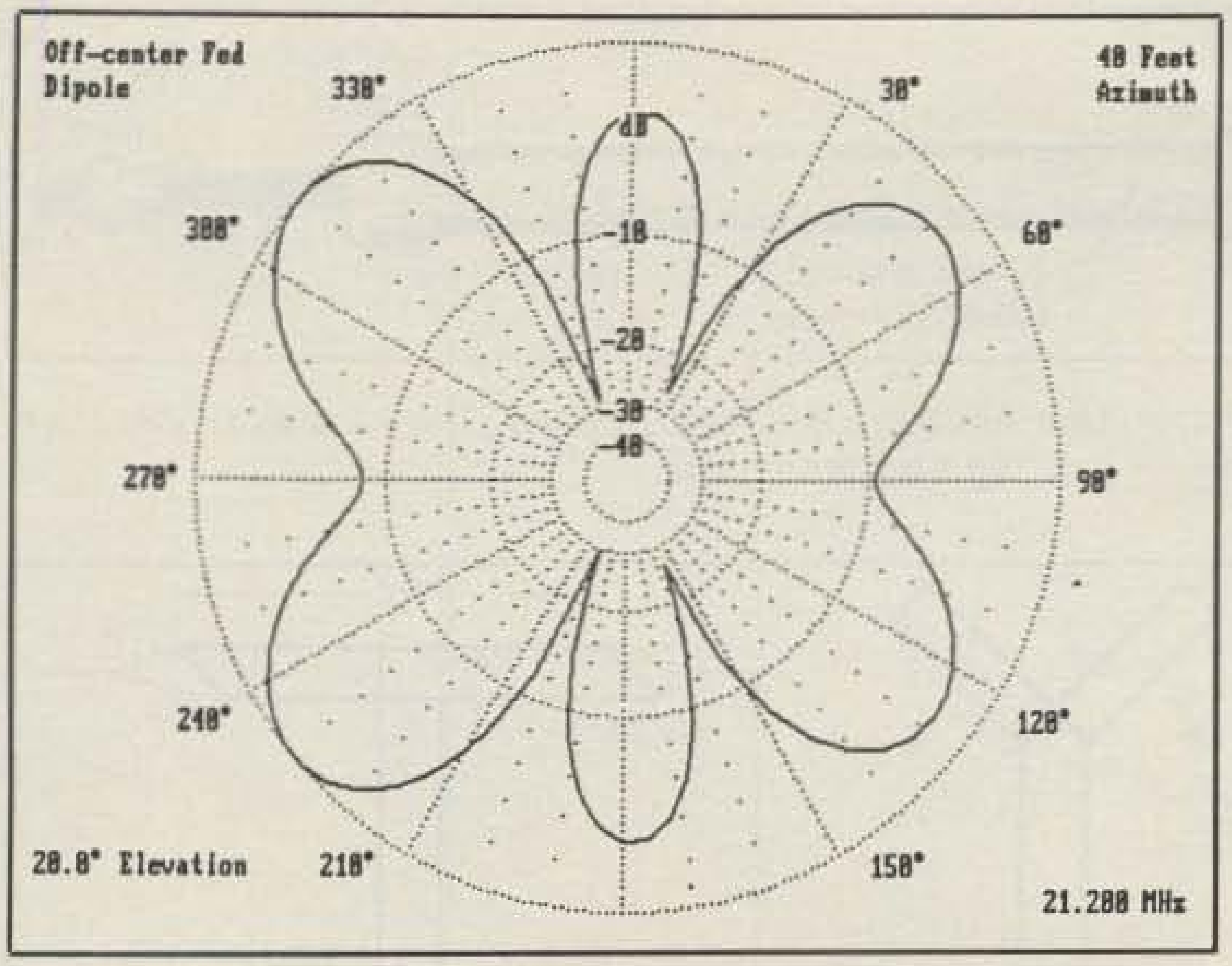

Fig. 4– Azimuth plot on 21 MHz. Cant amounts to about 2 dB on major lobes.

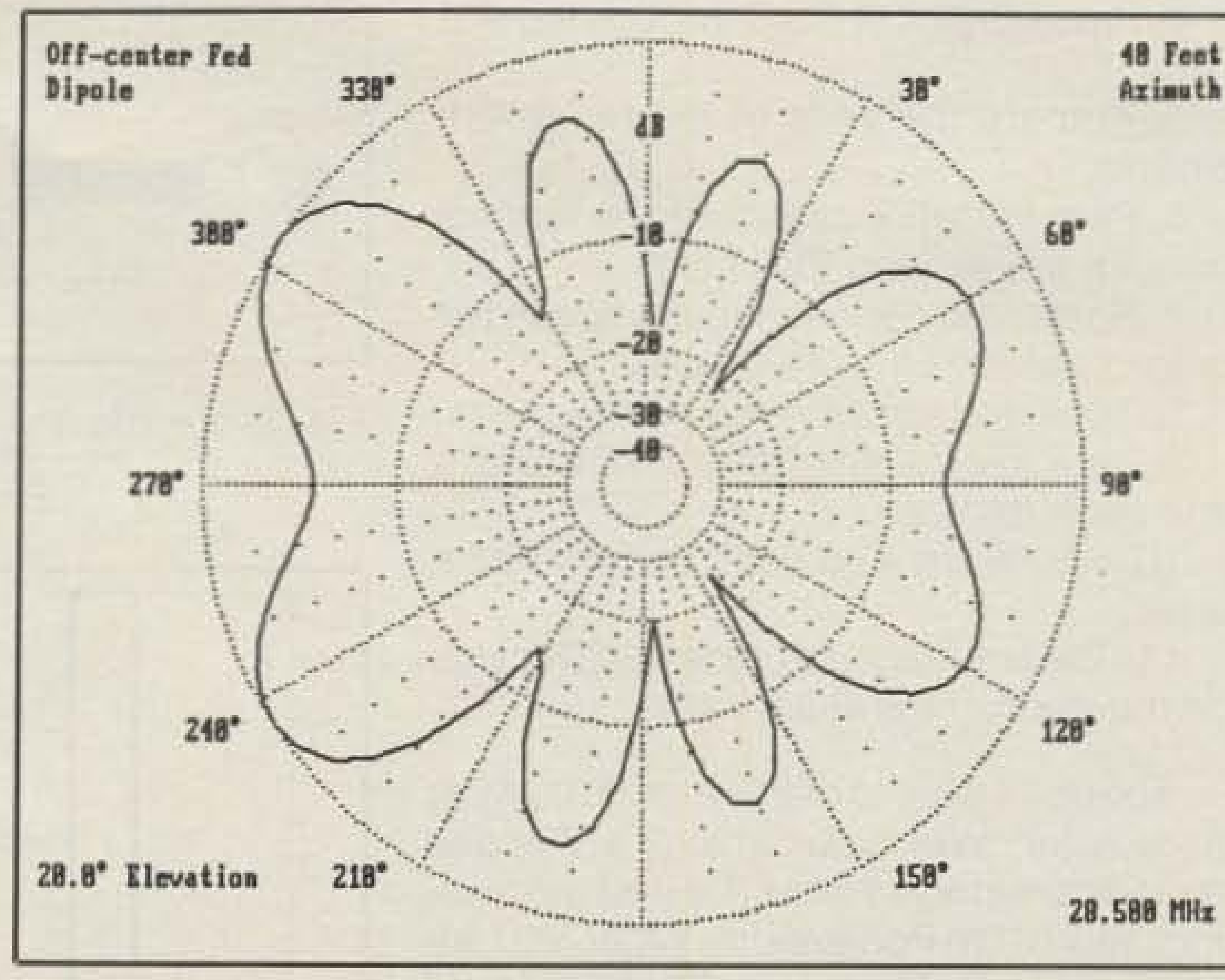

Fig. 5– Azimuth plot on 28 MHz. Cant is 3 dB on major lobes.

angle of elevation for the main lobes is about 15 degrees.

On 10 meters there is further lobe splitting with maximum radiation at an angle of about 30 degrees to the axis of the wire. Elevation of the main lobe above the horizon is about 10 degrees.

The elevation plots are controlled by antenna height above ground. In my case antenna height is about 40 feet. It should be noted in real-life the deep nulls shown in the patterns are probably washed out because the imperfect ground beneath the antenna blurs the reflection pattern.

Bandwidth Response of The OCF Antenna

I still haven't determined why the antenna exhibits such good SWR bandwidth. Possibly the interaction between the antenna and the 4:1 balun have a nullifying action on system reactance. It would be interesting to try a W2DU-style ferrite-bead balun in place of the ferrite-core balun presently used. This begs investigation, but I doubt if I will get around to it!

The computer program suggests that the antenna provides a good match on 50 MHz! I have no gear for that band, but someone, someday, will try the antenna on 6 meters and determine if the computer projection is correct.

Transmitter Loading

Although SWR is quite reasonable on the harmonically-related bands, it is higher than I like on 18 MHz (about 3:1). In addition, solid-state rigs don't like to work into even a modest SWR, and protect themselves by cutting power in response to the SWR level. Since this (or any other multiband antenna) exhibits SWR levels detrimental to operation of such transmitters,

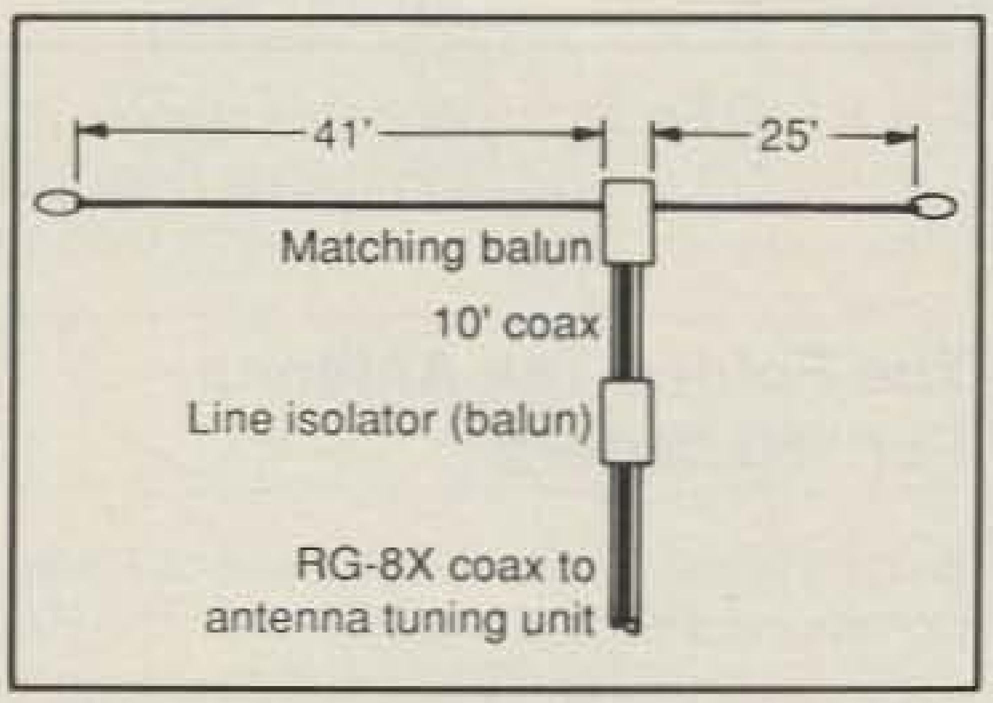

Fig. 6– The "Carolina Windom" for 40–10 meters by Radio Works. Larger versions cover 80–10 meters and 160–10 meters.

an antenna tuner is mandatory for optimum transmitter operation. The built-in tuner in some modern rigs does the job, or an external antenna tuner should be used. A low-loss, multiband antenna that doesn't require an antenna tuner, in my mind, doesn't exist yet. Perhaps more experimental work on off-center-fed systems may solve that problem. Oh happy day!

The "Carolina Windom"

A variation of the OCF design is the so-called "Carolina Windom" antenna (fig. 6). In its simplest form it permits a certain amount of feeder radiation to take place. This is accomplished by placing the current balun some distance down the coax below the feedpoint, allowing the current on the top portion of the line to radiate, presumably making things better. The idea is to fill in the nulls of the OCF pattern.

Well, I have no way of determining if this scheme works. My feedline drops down very close to the support tower (the OCF hangs from a yardarm on the tower) and close to the 8-wire rotor cable going up to the beam. I'd be coupling the coax into this bunch of wires with unknown results if I allowed feedline radiation.

It is an interesting idea, and someone who has the means to mount the OCF clear of the tower or nearby conductors can try this scheme and see if there is any merit to it. Keep me posted.

Building a Ferrite Line Isolator

Building a line isolator is not a big deal. The Wireman, Inc., 261 Pittman Rd., Landrum, SC 29356 (Press Jones, N8UG) furnishes an isolator kit consisting of 50 ferrite beads and a length of teflon coax (kit # 833) for under $10. It's easy to assemble an isolator from this kit (fig. 7).

You'll need a 12 inch length of gray PVC pipe, ¾ inch outer diameter used in sprinkling systems. This can be bought with both ends threaded. You'll also need two end caps of white PVC, schedule 40 type used for plumbing. The gray pipe will just thread itself into the white end caps.

The first task is to thread the beads onto the teflon coax and hold them in position with small plastic cable ties. The coax shield ends are twisted into pigtails and tinned. The next thing is to drill the end caps to pass RG-8 size cable. Use a ¾ inch drill and enlarge the holes, if necessary, to pass the cable. This should be a tight fit. The ends of the RG-8 cables are stripped, pigtails are made of the braid, and they are spliced to the ends of the teflon line after the line is passed through the PVC pipe. The inner conductors are wrapped with electrical tape, and the pigtails are connected together with a short length of tinned wire.

The assembly sequence is as follows:

1. Place the beads on the teflon cable and hold them in position.
2. Prepare the ends of the teflon cable.
3. Drill the end caps.

4. Pass lengths of RG-8 through the end caps.
5. Prepare the ends of the RG-8 with pigtails.
6. Pass the teflon coax (with the ferrites) through the ¾ inch PVC pipe.
7. Solder the connections between the teflon coax and the RG-8 coax.
8. Tape and insulate the connections.
9. Pour a small amount of PVC cement into each end cap.
10. Screw the end caps onto the pipe ends.
11. The last step is to place PL-259 plugs on the ends of the RG-8 cable.

You don't want to diddle around building an isolator? Well, you can buy a nifty one already assembled from The Radio Works, Inc., Box 6159, Portsmouth, VA 23703 (Jim Thompson, W4THU), item C1-2K. This will set you back $18.95, plus shipping.

The Four-to-One Balun

You can build a 4:1 balun from a kit (item 835) from The Wireman for $17.50 (plus shipping). Press also sells an assembled balun (item 824) for $36.95, plus shipping. The Radio Works sells a 4-to-1 balun (B4-2KX for $39.95), plus shipping.

So there you are. You can save money and build your own isolator and balun, or you can spend some more bucks and get them ready-made. The choice is yours.

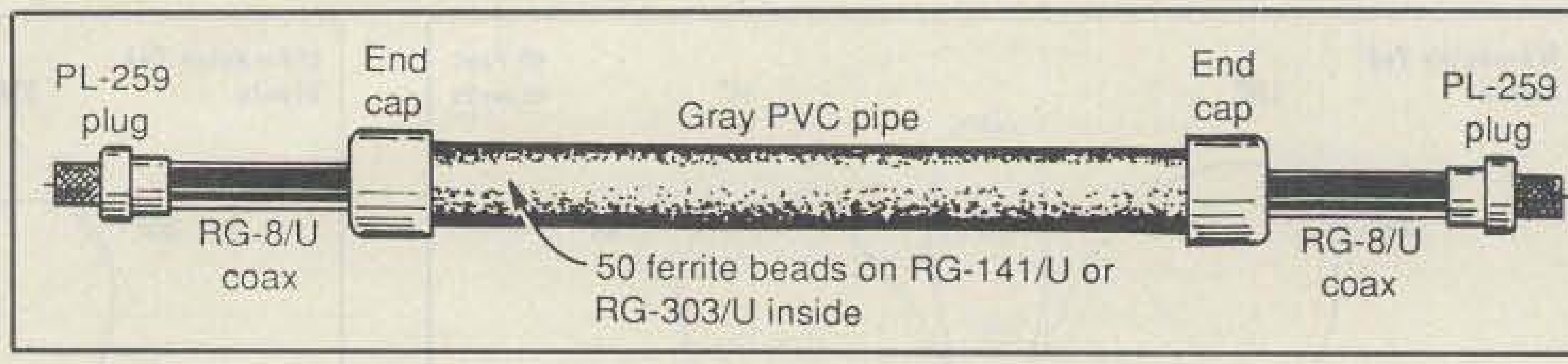

Fig. 7– Ferrite line isolator. Use Amidon FB-73-2401 beads. The kit is available from The Wireman, Inc.

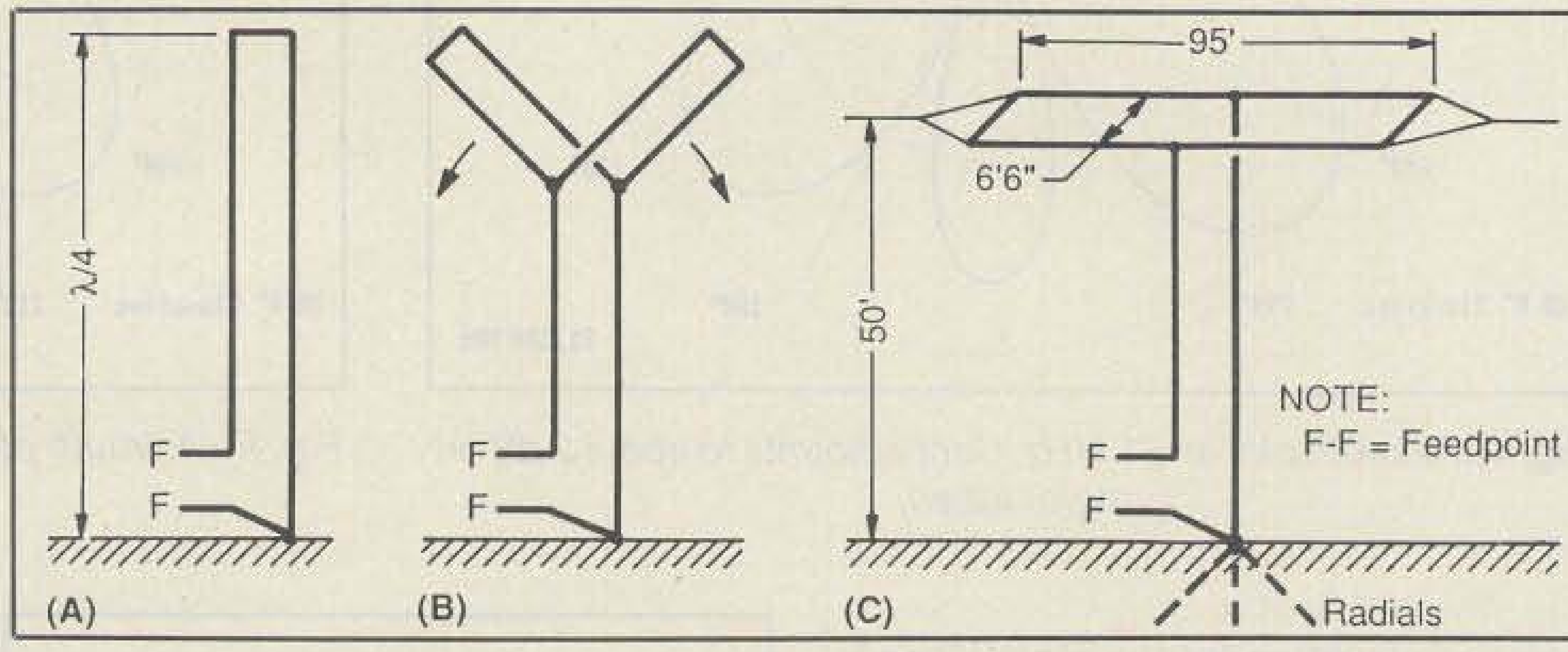

Fig. 8– (A) Folded monopole antenna. (B) Top portion divided into "T" configuration. (C) Dimensions from 1.85 MHz folded "T" antenna.

The Folded-Tee Antenna For 160 Meters

Writing in the August 1992 issue of *Radio Communications*, a publication of the Radio Society of Great Britain, Pat Hawker's Technical Topics column discusses an interesting low-band antenna. The information comes from Tony Preedy, A45ZZ/G3LNP (Sultinate of Oman). The design was first proposed for use in Saudi-Arabia to enable MF transmitters to be tuned rapidly to various frequencies and was used during the 1991 Middle East conflict. The derivation is shown in fig. 8. It is based upon the folded monopole concept (A) and provides a convenient impedance step up to match a 50 ohm feed system (B and C). A height of about 0.1 wavelength is suggested.

Adjustment is simple. The height is varied a bit to obtain a 50 ohm feedpoint, and the top lengths are trimmed symmetrically for resonance. The low portion of the band (1.8–1.9 MHz) can be covered with low SWR and without the use of an auxiliary ATU.

Tony also suggested this antenna could be scaled for 80 or 40 meter operation and used in conjunction with elevated resonant radials or counterpoise. Sounds good to me!

The Dead Band Quiz

With the sunspot cycle flagging and continued solar outbursts, the fall and winter DX season can't hold a candle to that of 1991. Spring 1993 may turn out to be pretty good, but it's downhill in the shade after that. Thus, there will be plenty of time for you to devote your mental energies to the "Dead Band Quiz" I inflict upon you from time to time.

This is an easy one for Old Timers of the early Big Band era. Give the title and subject matter of the following portion of a song recorded by Clyde McCoy on a Decca record circa 1933:

"Tear it down from the wall,
Lordy, oh Lordy, hear it fall,
Dog-gone you, slats and all,
Don't you go away folks,
'Cause that ain't all!"

In closing, I want to bring the following bit of forgotten technical history to your attention. Ted Chernin, KH6GI, brought it to my attention.

Ted says he recently read a story about Alexander the Great and how he had such phenomenal success as a military strategist. It seems that he was ingenious enough to make use of a photochromic liquid derived by his alchemist (the secret of its composition having been lost in antiquity). Alexander had his army commanders tear strips of cloth from rags, soak them in this liquid, and tie them around their wrists.

As the sun rose higher in the sky, the strips would darken from exposure to sunlight, acting very much like crude wrist watches. He was thereby able to synchronize his attacks when the strips turned very dark. At that time, he attacked his enemies from different directions. The idea worked so well that it has gone down in historical records as the first, the original, Alexander's Rag Time-band! (*Don't blame me; blame KH6GI.*)