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Amateur Radio

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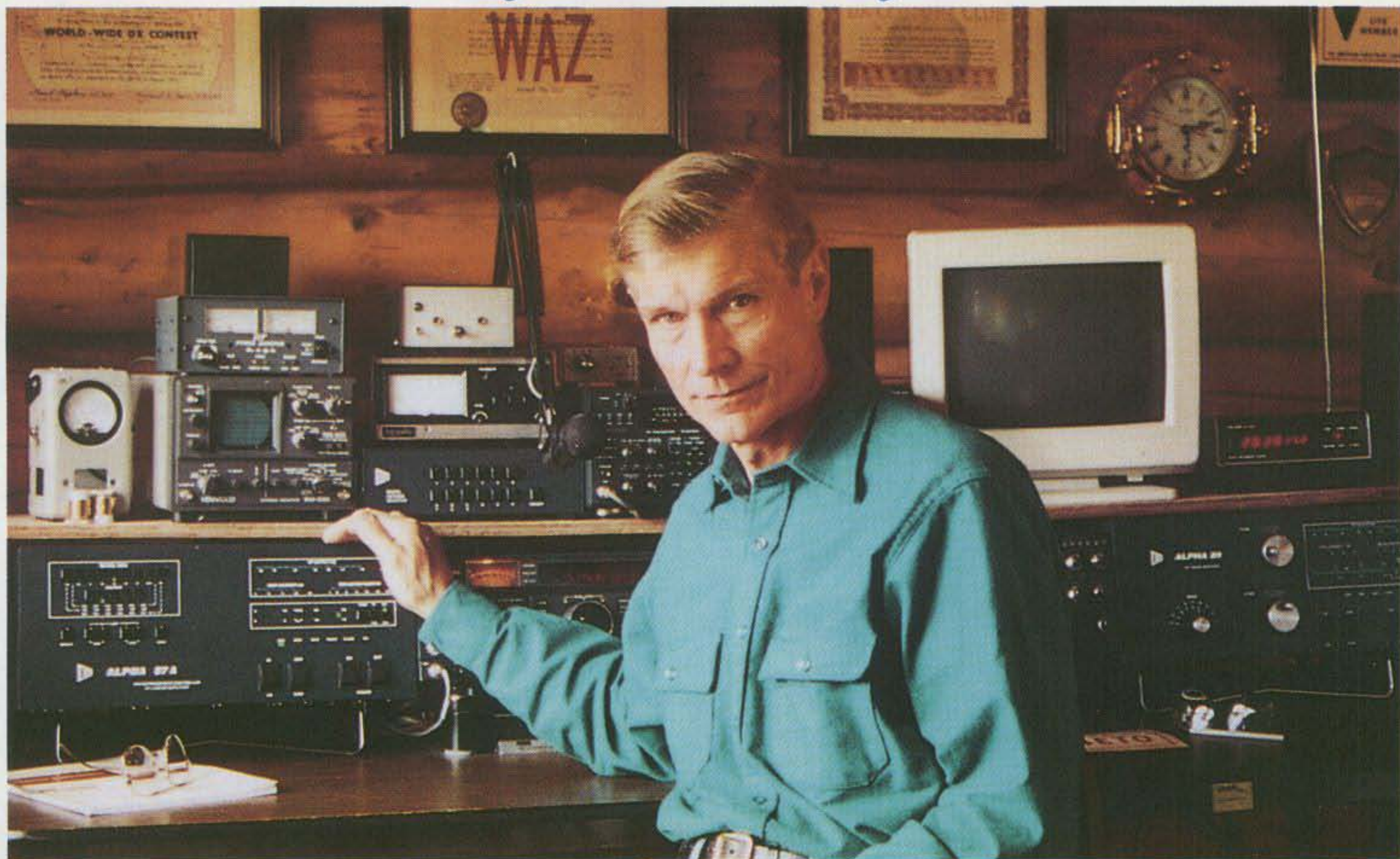
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Dick Ehrhorn, W4ETO

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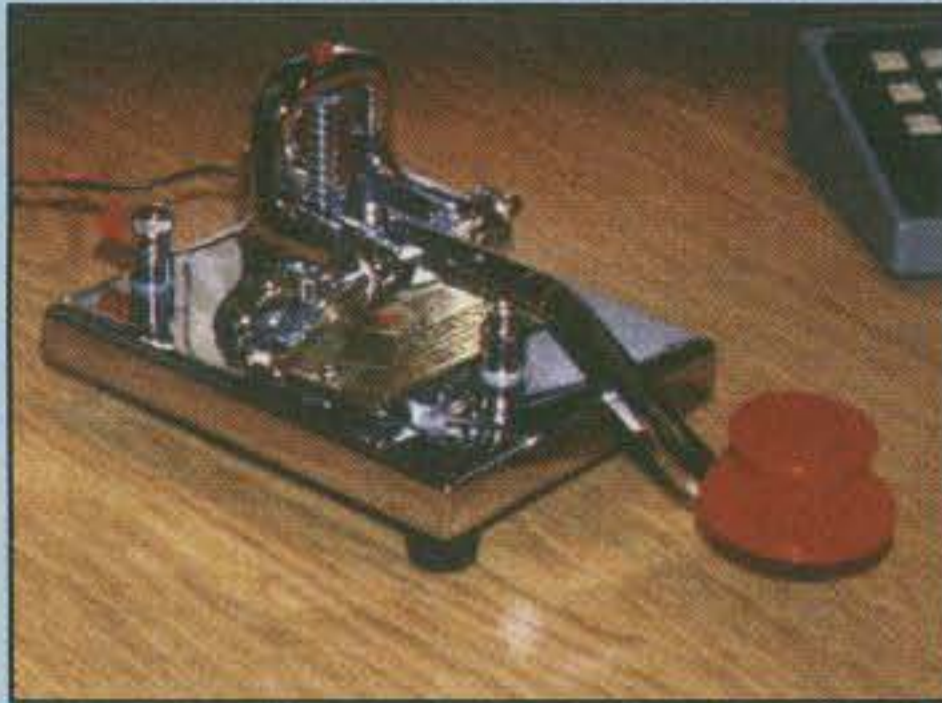
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ON THE COVER: Down in King, North Carolina (a suburb of Winston-Salem) we find Dave Kennedy, N4SU, at the controls of this neat setup. Dave enjoys a fair measure of success on 160 meters, with 260 countries worked and 257 confirmed. 99% of Dave's operating is CW. His 10 acre antenna farm includes seven bi-directional Beverages, giving him a receiving edge from 14 different directions on the compass. For transmitting on 160 he uses a 100 ft. telescoping aluminum tower with a 25 ft. aluminum whip at the top, with the entire structure gamma-fed at the base with open wire line. Hung from the tower are two full-wave 40 meter loops also fed with open wire line, which function on 40 as a bi-square and on 80 as a vertical 8JK. They also add a small bit of gain on 160, acting as parasitic elements. The monoband amplifiers in the rack on the left are all homebrew using 304TL's on 160, 80, and 40. (Photo by Larry Mulvehill, WB2ZPI)



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ZERO BIAS

AN EDITORIAL

Somewhere around the first week in September the local Sears store started to build their large Christmas display on the lower level. My first thoughts included the obvious: They're really rushing the seasons, and it's a bit crass. It's been a trend there for the last few years to push the holiday season a little hard and to prepare early so as to get shoppers in the right frame of mind.

By the third week in September everything was pretty much in order, including the large display of animated figures all moving and caroling. Okay, so it's a little unnerving in September, even though you find yourself humming along with the animated figures. Is there an analogy or parable in this that relates to amateur radio, or is it simply some Sears corporate *eminence grise* pushing the bottom line? I opted for the analog and parable, obviously.

Well, as Sears knows, and as we all know too, we operate on a 12-month lunar cycle. The holidays come again predictably every 12 months. Start to sound familiar? Perhaps, for humans, 12 months is about the right amount of time, as we all seem to have short interest spans and poor long-term memory. After all, there aren't great throngs of people running around in July and August saying that Christmas and Chanukah are dead, it's all over, and nothing good will ever happen again. In fact, most people just get on with their lives during July and August and never give the holidays a thought. The few others are obsessive/compulsive and start their shopping early so as to be prepared for what they know to be ahead. The religious aspects of the holidays don't change; they are predictable and reassuring in their long traditions. We know they are coming and we look forward to them.

With humans, though—especially amateur radio operators—if you stretch out the period between holidays, say 10 or 11 years, then we almost come to the point of human sacrifice. We get depressed, we become fatalistic, and we definitely believe the end is in sight. All we're missing is the white robe, the sandals, and the placard announcing, "Repent! The end is near!" Some of us apparently have forgotten the last holiday season and what we experienced then. Some are obviously too young to remember or weren't around when the sun gods last smiled upon us. Most of us have read the texts and mouthed the words, but have ignored the oral tradition. Either we don't believe that the sun will shine, or somehow that fact has lost its relevance. In some mysterious way, Cycle 23 will present itself to the amazement and awe of those who witness it as if it were the first time in human existence. They will turn their attention skyward and say, "Wow! How long has this been going on?" Pretty soon someone will come up with a solid-state sundial that you can strap to your wrist.

Perhaps we should take a serious lesson

from Sears. If it's one thing they do have, it's marketing experience and a record of sales. We have about 700,000 amateurs in this country, and historically we are terrible marketing and sales people. We have the greatest product in the world—enjoyable, fun to use, and readily accessible. Our product is also weighed down with *sturm und drang*, irrational if not illogical hurdles, and an unwritten caste system that says who's real and who isn't. It does make it a bit hard to sell.

Sears may see some of the down points to the holidays, but they prefer to focus on the warm, fuzzy parts, the parts that bring happiness and joy to most people. Basically two thirds into the cycle they start to show us the good, positive, ideal aspects of the holidays and get us into the proper frame of mind. Of course they want to sell products. That's why they're in business. We're not talking about altruism here; we're talking about purpose.

With amateur radio, the warm, fuzzy parts come in at the end, if at all. We don't start selling ourselves two thirds of the way through the sunspot cycle, or generally at any point. We are always up front with all the hurdles, requirements, and testing procedures one must pass before any concept of happiness and joy can express itself. We seem to stress suffering, conflict, and hardship as admirable traits to be emulated. Maybe they are admirable traits, but it does make it hard to sell the hobby. Contrary to some belief, the amateur radio *esprit de corps* is not based on the Army's Green Berets nor is it based on how much pain we can either endure or inflict in order to build pride.

Maybe we don't lend ourselves to the same kind of marketing strategy the holidays enjoy, but there's got to be something besides sunspot peaks to keep us going. I don't think I'll ever go into an amateur radio store around this time of year and expect to see little singing animated figures. Who knows? Maybe someone will come up with a small, disheveled porcine figure that gyrates with a hotdog in one hand and an HT in the other. And for a few bucks extra it may burp when you squeeze it, and say, "Pull my finger." After all, that's how a lot of us see ourselves at hamfests—not too attractive a role model.

We have a great hobby with a lot to offer. At least 700,000 people think so. I guess you can surmise that simply by the numbers, but in actuality it's hard to say with any degree of certainty what most of us are doing with our respective licenses. Most of us lead insular lives quite apart from what passes as mainstream amateur radio. The recent rash of protest letters and e-mail messages over Little Leo caused quite a stir, but in total numbers, they represent an infinitesimal percentage of the whole number of effected amateurs. Over the 43 years that I've been involved with ama-

teur radio I've seen and read about all of the things that were supposed to "kill amateur radio" or ruin it by outrageous changes. Well, none of these things came close to putting a dent in what was. They only served to make things different. Sure, growth was halted by some things. But we moved on in spite of doom and gloom theories to the point now where we are trying to figure out just what it is we all are doing. What we're trying to come to grips with now are all the differences. We all certainly don't do the same things, and a lot of us are doing things that were unheard of 43 years ago, with equipment that no one even dreamed about.

Maybe all the turmoil and doom and gloom that some amateurs profess as tradition and values are simply extensions of human nature and have nothing to do with the hobby. We all like to have at least part of our lives ordered and structured with a sense of tradition, very much like the holiday season. Well, in spite of what some people think, amateur radio is not a religious experience. It's a hobby that has changed continuously over the years. Our exams have changed, our modes have changed, our privileges have been fragmented by the inclusion of more license classes, and the very things that seem to bug a lot of us today will be non-issues in a few years. Life will go on, the changes will be accepted as givens, and a few of us will remember the way things once were. Of course, the way things once were will greatly tick off the remaining group that came before that period.

Long, long before there was radio, or amateur radio, or computers *et al*, there were cultures that knew about the sun and the movement of the planets and even meteor showers. That, however, didn't make them special or help them to survive in the long run. Peoples who could adapt and change survived. While the promise of the new cycle will bring a lot of us out of our caves to celebrate and rejoice in sunspots, it won't do a heck of a lot in the long run to ensure the continuation of our tribe. Maybe it's time to market and sell the concept of what we do, and how we do it, and how much fun it can be—all without wires. Everything else either has changed, will change, or certainly will be different in five years. A young person taking an amateur radio exam today will in all likelihood be questioned on items that will have absolutely no bearing on the technology they will be using 15 years hence.

The upcoming cycle should make the hobby easier to market and sell. More of us will be happy, wearing smiles, and talking about all the wonderful things happening on the bands. The world will have come back from wherever it went, and it will be holiday time once again. It's time to share the good news.

73, Alan, K2EEK

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ANNOUNCEMENTS

• **AMSAT Annual Meeting** – The Radio Amateur Satellite Corporation (AMSAT) is holding its annual meeting in Tucson, Arizona, November 8–10. The conference will feature forums on all aspects of amateur satellite operations and the status of satellites under construction. There will also be displays of satellite-related technology and amateur satellite ground stations. For more information, contact AMSAT, 850 Sligo Ave., #600, Silver Spring, MD 20910 (phone 301-589-6062; fax 301-608-3410).

• **ARNS Publications Contest** – The Amateur Radio News Service (ARNS) is conducting its annual publications contest, which is open to all amateur radio organizations. Membership in the ARNS is not required. General-circulation magazines and professional journals are not eligible. The contest is aimed at identifying superior performance in amateur radio journalism and evaluating club newsletters with suggestions for improvement. To enter the contest, a club should submit one copy of any issue of its newsletter published during July through December 1996. The newsletter should be accompanied by a contest application. Application forms are available from Lee Knirko, W9MOL, President ARNS, 111 S. LaSalle St., Suite 2100, Chicago, IL 60603-1302. Applicants should include an SASE. Contest entries must be mailed to the same address and must be received by December 31, 1996.

• **The following Special Events are scheduled for November:**

K2GQ, from Irvington-Roseland, New Jersey; Irvington-Roseland Amateur Club (IRAC); to celebrate the club's 51st anniversary; Nov. 9–10; 1400–2100Z; in the General portion of 80, 40, 20, and 15 meters, Novice 10 meters, and 146.52.

KB2UGB, from the New Jersey Navel Museum, Hackensack, New Jersey; Piscataway ARC; as a tribute to the *USS Ling 297WW* II submarine; Nov. 2, 1400–2200Z; in lower 25 kHz of General (phone) bands 10–40 meters. For certificate, QSL Richard Alderiso, 438 E. Bay Avenue, Unit 13, Barnegat, NJ 08005.

KB2YCT, from Nutley, New Jersey; Robert D. Grant United Labor ARA; to honor veterans of the armed forces and Samuel Gompers, labor leader; Nov. 11; 1200–2300Z; on 28.420, and 20, 40, and 80 meters. For certificate, send SASE to RDGULARA, KB2YCT, P.O. Box 716, Nutley, NJ 07110-0716.

KC5PCN, from the Coast Guard Station on South Padre Island; Brownsville CHARRO ARC; to commemorate the

return of the snowbirds to south Texas; Nov. 9; in General phone subbands on 20 and 15 meters and the Novice phone subband 10 meters (propagation permitting). QSL with SASE to CHARRO ARC, 3554 Boca Chica, Brownsville, TX 78521.

WB5MII, from V.A. Medical Center, Albuquerque, New Mexico; the AARC and WB5MII; to honor veterans; 1500Z Nov. 11 to 0400Z Veteran's Day; in lower General phone bands and up on 20, 15, 17, 20, 40, and 80 meters. For certificate, send QSL to AARC, P.O. Box 11853, Albuquerque, NM 87192.

5-land, AACCS Straight Key Day, to commemorate the anniversary of the Army Airways Communications System, established Nov. 1938; 1500–2300Z Nov. 11; on 14050–14060, 7050–7060, and 21050–21060 kHz. Answer or call CQ AACCS, then ragchew. Send any comments to W5LK, 9602 Langdon Lane, Houston, TX 77036.

• **These hamfests, etc., are slated for November:**

Nov. 2, **6.91 Friendly Fest**, Waukesha County Expo Center Arena Forum, Milwaukee, Wisconsin. Call Burt, N9VBI, at 414-328-0535; or send SASE to The Milwaukee Repeater Club, P.O. Box 2123, Milwaukee, WI 53201. (Exams.)

Nov. 2, **Lake ARA Annual Hamfest and Electronic Expo**, East Lake Chamber of Commerce Building, Sorrento, Florida. Contact John Wentz, W8HFK, 26445 Evert St., Leesburg, FL 34748-8034 (352-728-2615).

Nov. 2–3, **Cincinnati Computer Fair**, Cincinnati Gardens, Cincinnati, Ohio. For more information, call 513-263-3378.

Nov. 2–3, **13th Annual Odessa Hamfest**, Ector County Coliseum, Exhibit Building C, Odessa, Texas. For more information contact Robert Jordan, N5RKN, phone 915-335-7980; or e-mail <N5RKN@aol.com>. (Exams.)

Nov. 3, **Fox Cities ARC Annual Hamfest**, The Starlite Club, Kaukauna, Wisconsin. Contact Larry Siebers, KD9IA, 414-757-1167. (Exams.)

Nov. 3, **Massillon ARC Auctionfest '96**, Stark County Fairgrounds, Canton, Ohio. Contact Jack Cale, N8FEB, 6021 Longbrook SW, Massillon, OH 44646 (216-477-8261); or Don Wade, WD8DEA, 7300 Sunset Strip NW, Apt. 7, North Canton, OH 44720 (216-497-7232).

Nov. 9, **Hershey Hamfest**, Hershey Armory, Hershey, Pennsylvania. Contact Harold Baer, KE3TM, 619 W. Second Street, Hummelstown, PA 17036 (717-566-8895). (Exams.)

(Continued on page 117)

EDITORIAL STAFF

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Lew McCoy, **W1ICP**, Technical Representative
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The WEETENNA

An Electrically Shortened Multi-Band Dipole To Fit Whatever Space Is Available

No, this is not your basic leprechaun antenna only seen on St. Patrick's Day. It is, however, small enough that the little guy himself might use it at his own QTH.

BY GEORGE MURPHY*, VE3ERP

Every amateur is always looking for the "Magic Antenna"—one that works all bands, occupies no space, and costs nothing. In spite of past wild claims to the contrary by many self-acclaimed Antenna Know-It-Alls (including me), there is no such thing. The WEETENNA, however, comes close.

The WEETENNA concept is shown in fig. 1. Simple, right? WRONG! The idea is simple, but unless you or a friend has access to a computer, carrying it out can be extremely intimidating due to the dreadful mathematics that are involved. The WEETENNA is based on the principle of the off-center loaded dipole, with lumped-constant loading.¹ If that very full mouthful does not nauseate you, a look at the design equations will. (We decided not to publish the equations here for fear they might scare you off—ed.)

How then can one design a WEETENNA without equations? Simple. With the aid of a computer and free software called HAMCALC, a collection of more than 80 programs dealing with amateur radio.²

HAMCALC will design a WEETENNA as fast as you can input the required data, which consists of only the center frequency of the portion of each band you want to work and your choice of the overall length of the proposed dipole antenna array. If you decide to wind your own coils with insulated wire, you will also be asked to wind a short length of the insulated wire you want to use around a ruler so as to determine the close-wound turns-per-inch for that particular wire.

The program is in two parts. The first part calculates the inductance required for a selected size of antenna wire at a given frequency (see fig. 8[A]), and the second part designs a coil of that inductance using the same size wire (see fig. 8[B]). There is no reason why you can't run the two parts of the program independently if you want to use different wire sizes for the coils and the antenna itself. As we shall see later, the physical design of the WEETENNA makes it possible to use relatively small wire for everything.

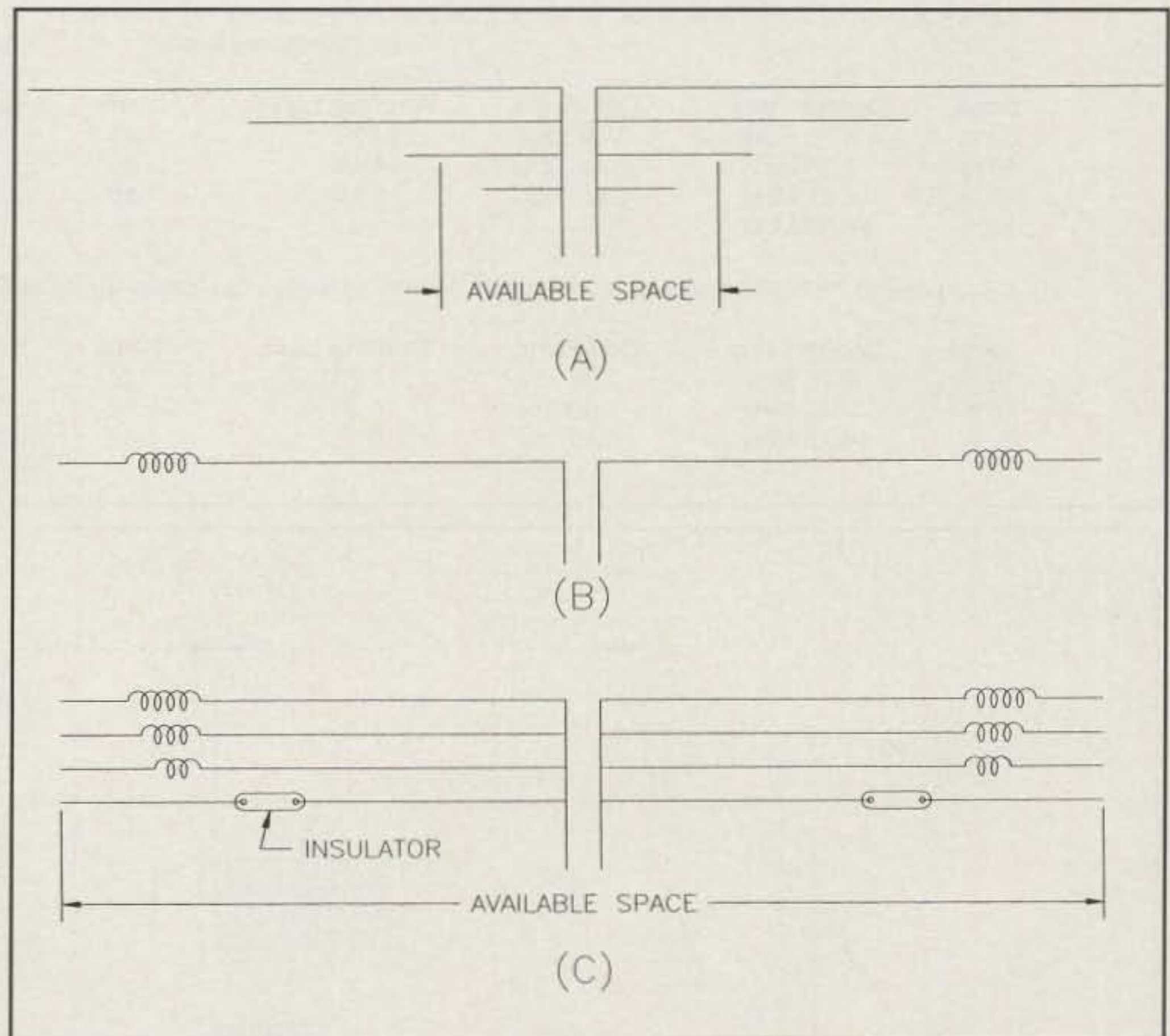


Fig. 1— (A) TWAP (Time Worn And Proven) Multi-Band dipole—several dipoles mounted one above the other originating from a common feed point fed by a single transmission line. Usually the space required exceeds the space available. (B) TWAP electrically shortened lumped-constant loaded dipole fed with 50 ohm coaxial cable (see text). Old Timers who lived in apartments often used this configuration by mounting two horizontally opposed TWAP center-loaded mobile whips bottom to bottom on a windowsill or balcony railing. (C) TWAP antennas (A) and (B) combined. Voilà! The WEETENNA!

A 31 ft. WEETENNA For 80, 40, 20, and 10 meters

As an example, let's suppose you have space for a 31 ft. dipole, a roll of #18 insulated wire that close-winds at 9 turns-per-inch, and you want to center your operations on 3.750, 7.150,

14.250, and 28.600 MHz. HAMCALC comes up with the dimensions shown in fig. 2, letting you know that a 28.6 MHz dipole is only 16 ft. 4.1 in. long and no loading coils are necessary (see fig. 9 for details). When building your WEETENNA, you might want to add about 5% to the length of each leg that has no coil to allow for pruning later.

* 77 McKenzie St., Orillia, ON L3V 6A6, Canada

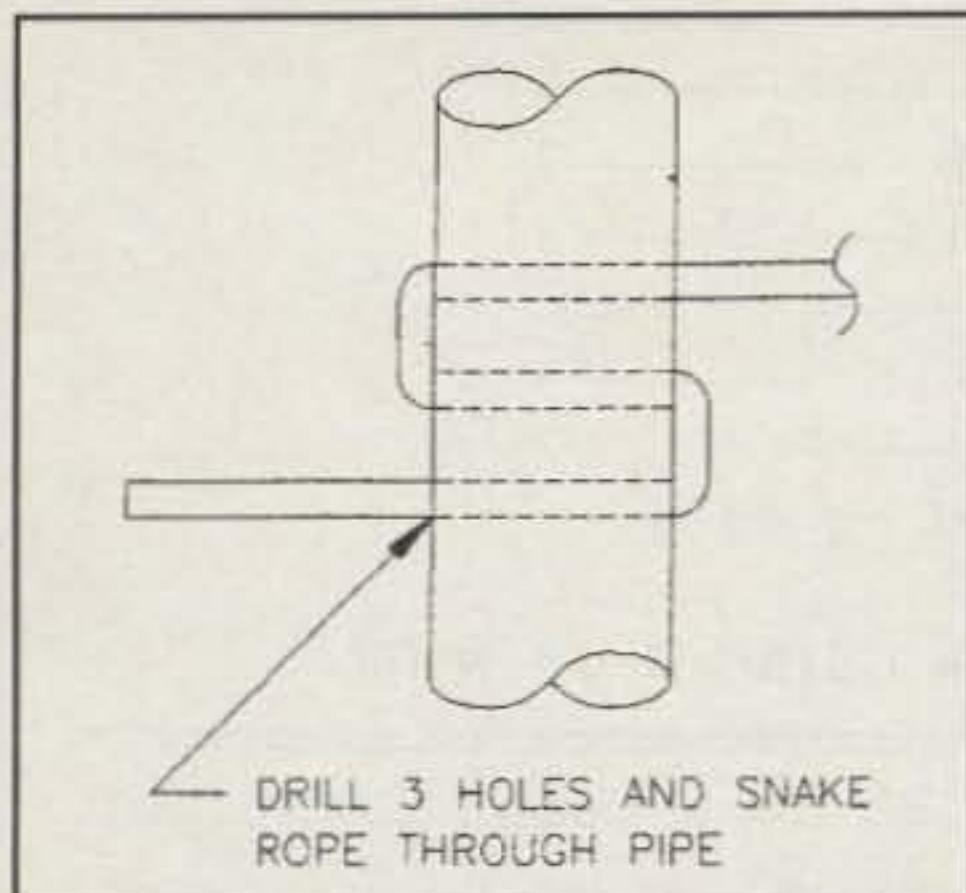


Fig. 4— Rope ends. The "snake" system of securing ropes makes adjustment easy. If you are worried about the ropes slipping (they probably won't), you can fill all the holes with silicone caulking.

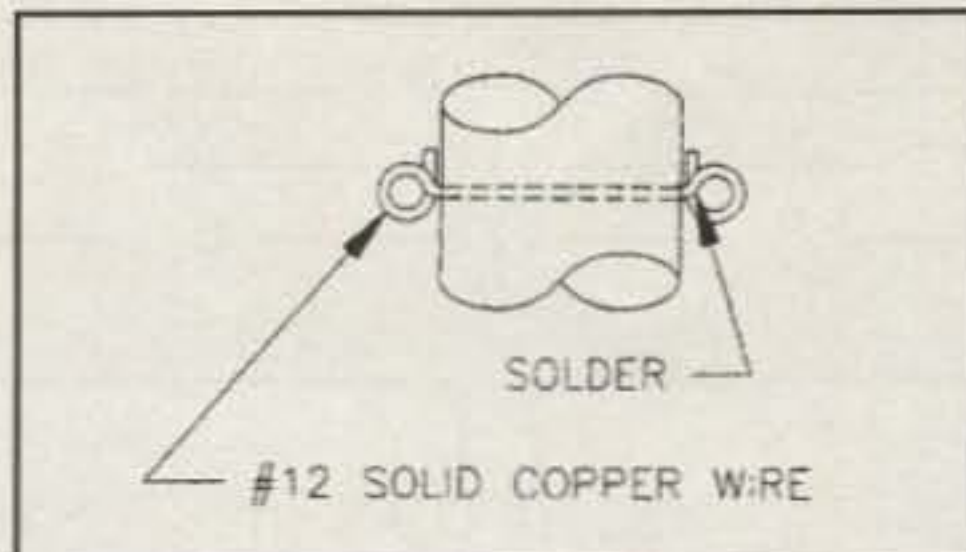


Fig. 6— Spacer pipe. Form loops around a 1/4 inch drill and solder junctions where wire crosses itself.

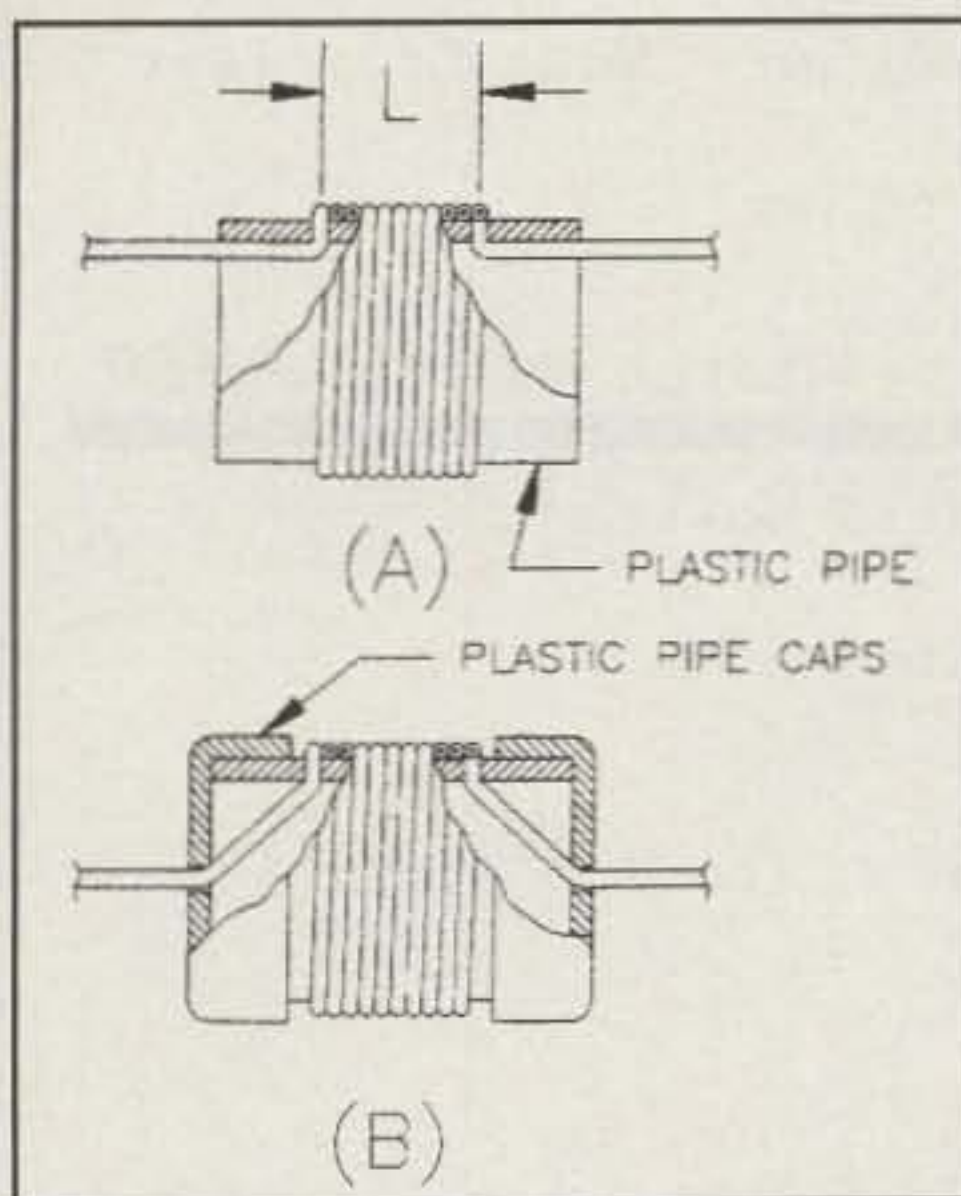


Fig. 5— (A) Coil forms. Drill holes in form spaced L apart where L equals length of winding. This will assure proper close-wound spacing of the turns. (B) For a professional touch install plastic pipe caps after final testing and pruning. Capless, large-diameter coils suspended below the wire as in (A) may whip around on windy days.

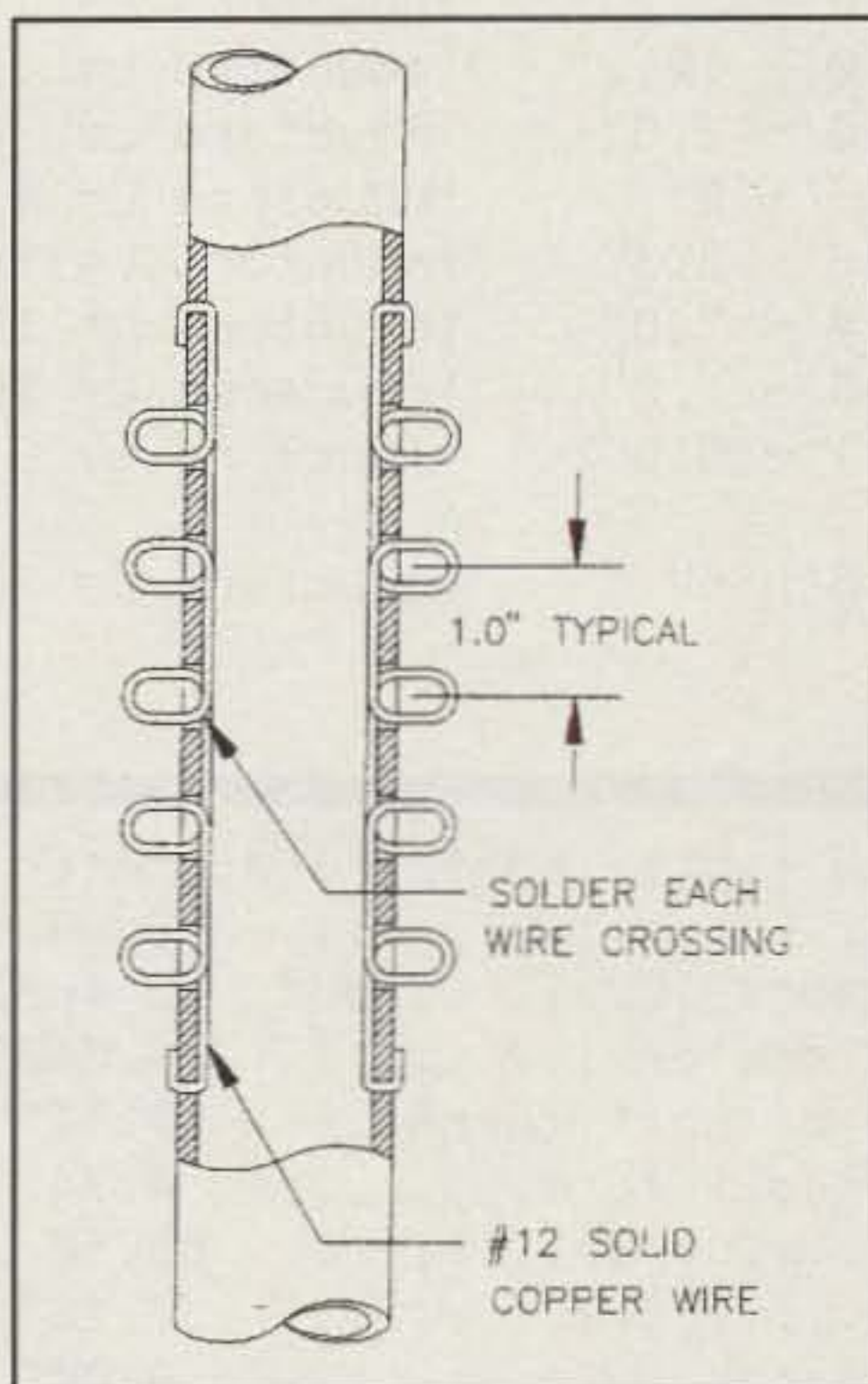


Fig. 7— Center pipe. Drill 5/16 inch holes through pipe for wire loops. Form loops around a 3/8 inch drill, solder junctions where wire crosses itself, and then squeeze loops to about 3/16 inch inside dimension. Use #8 screws and washers to secure the antenna wires during testing and pruning. At final assembly stage solder wires to loops and seal all holes with silicone caulking.

Construction Details

The general arrangement of a WEETENNA is shown in figs. 2 and 3. It is hung from a suspension rope that takes most of the weight and tension off the antenna itself. This allows you to use small-gauge soft copper wire if you want.

Details are shown in figs. 3 through 7. You may, of course, use any construction method you want, but using cheap³ and readily available plastic plumbing pipe for coil forms and spacers makes things simple. You can even make your own insulators out of small-diameter plastic pipe if your junk box does not yield any fancy ones. As with any antenna, seal the end of the coaxial feedline so that moisture cannot penetrate the cable, the exposed braid, or the insulation of the exposed center conductor. In

other words, plaster the lot liberally with goop.⁴

When constructing the loading coils, leave a short pigtail on one end to connect to the spacer pipe and a long pigtail not less than dimension "C" long (see fig. 3) to terminate at the end insulator. If you install pipe caps (see fig. 5), secure them with goop, not plastic-pipe cement which will weld them in place forever, thus preventing future fiddling due to the average amateur's propensity for never getting it right the first time. Serious 30-Year Veteran Extra Class Antenna Know-It-Alls such as myself refer to fiddling with antenna boo-boos as "pruning."

Testing and Pruning

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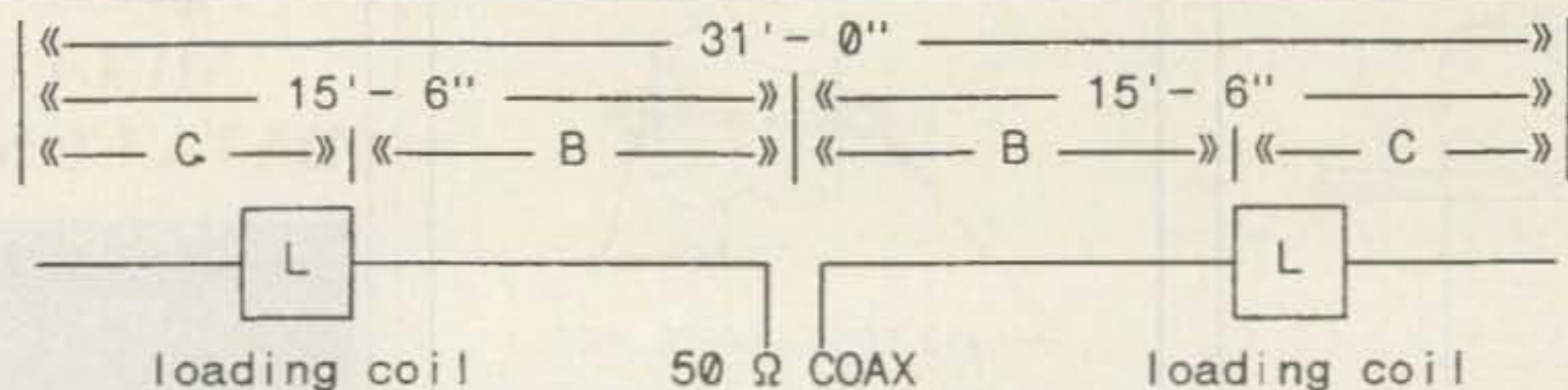
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< 3 >	B= 4'- 7.8"	C= 10'- 10.2"	Inductors L= 83.58 μ H	
< 4 >	B= 6'- 2.3"	C= 9'- 3.6"	Inductors L= 97.78 μ H	
< 5 >	B= 7'- 9"	C= 7'- 9"	Inductors L= 117.87 μ H	
< 6 >	B= 9'- 3.6"	C= 6'- 2.3"	Inductors L= 148.28 μ H	
< 7 >	B= 10'- 10.1"	C= 4'- 7.8"	Inductors L= 199.36 μ H	
< 8 >	B= 12'- 4.7"	C= 3'- 1.2"	Inductors L= 302.16 μ H	
< 9 >	B= 13'- 11.4"	C= 1'- 6.5"	Inductors L= 612.01 μ H	Most Efficient
< 0 >	B= 12'- 0"	C= 3'- 6"	Inductors L= 266.86 μ H	

COIL DESIGNER

by George Murphy VE3ERP

DESIGN SPECIFICATIONS for a 1.5:1 length-to-diameter ratio coil:

Inductance.....	266.86 μ H
Solid copper wire gauge.....AWG#	18 insulated
wire diameter.....	0.0403"
Approximate spacing of coil turns....	0.111"
Outside diameter of coil form.....	4.741 in. (coil ϕ 4.852")
Number of turns.....	65.50
Length of coil.....	7.28"
Number of turns per inch.....	9.00
Length-to-Diameter ratio.....	1.50:1

ALTERNATE DESIGN FOR 71 FULL TURNS ON A 4.5" ϕ COIL FORM:

Inductance.....	266.86 μ H
Solid copper wire gauge.....AWG#	18 insulated
wire diameter.....	0.0403"
Approximate spacing of coil turns....	0.112"
Outside diameter of coil form.....	4.500" (coil ϕ 4.611")
Number of turns.....	71.00
Length of coil.....	7.97"
Number of turns per inch.....	8.91
Length-to-Diameter ratio.....	1.73:1
Approx. length of wire in coil.....	85.71 feet

Fig. 8- Computer screen display of the 3.75 MHz antenna design parameters for the WEETENNA shown in fig. 2 (see text).

TENNA. Fire it up and locate the frequency on each band where minimum SWR occurs. These frequencies are what HAMCALC refers to as the "Prune" frequencies. Due to your antenna site and installation conditions⁵ these probably will be somewhat off your design frequencies. Run the program in the Prune mode and enter the Prune frequencies. HAMCALC will tell you how many turns to add or delete

from each coil (the overall length of the antenna does not change). You probably will be able to do this easily by drilling new holes for the wire in the coil form as shown in fig. 5(A). If for some reason this is not possible, it is no big deal to make another coil. Don't forget to fill the old holes with goop.

If any of your WEETENNA dipoles do not have loading coils, you are on your own, and

you will have to prune the length of wire just as Old Timers had to do in the years BC (Before Computers).

The HAMCALC Program

HAMCALC is extremely user friendly. It has to be. I used to write very complex programs

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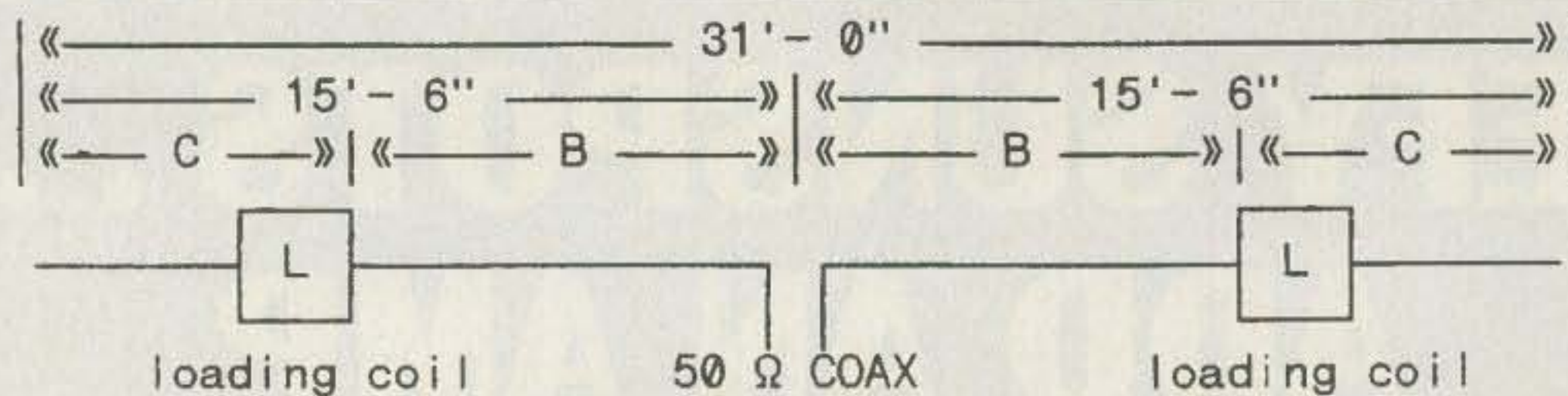
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Fig. 9- Computer screen display when you try to design a WEETENNA for a space that doesn't need one!

SHORT INDUCTIVE LOADED DIPOLE for Restricted Space

by George Murphy VE3ERP

This antenna is a dipole with lumped-constant loading. At modest heights (10-30 metres) it will work well if its physical length is longer than $0.2 \times$ wavelength. This threshold length is displayed early in the program. Shorter lengths will be less efficient.

The antenna can be fed directly with 50Ω coaxial line. The design is based on the concept of inductive loading, widely used in centre loaded mobile whip antennas.

For maximum efficiency the antenna should be as long as possible, consistent with available space. The loading coils should be as far from the centre feed point as possible, bearing in mind that the farther the coils are from the feed point the larger they become.

The program calculates 9 different combinations of inductor size and location. You can specify an additional location if you wish.

For maximum efficiency select the combination using the largest inductor that is practical for your application. When you select one of the options your screen will display a list of commercial coils of the inductance required.

For an acceptable Q choose a coil whose length does not exceed twice its diameter, or you can design your own coil by selecting option <2> from the main menu.

Make printouts of each screen display as you are designing your antenna for later use when testing and pruning.

Pruning is accomplished by adjusting the number of turns on the loading coils. All you have to do is determine the frequency where the SWR is lowest. Run the program again, using the original data, except you re-design the antenna for the PRUNE frequency, which the program provided when you selected the PRUNE option from the menu.

What the PRUNE option does is shift the design centre frequency from where it ended up to where you wanted it in the first place.

Fig. 10- Computer screen display of program preface.

which impressed computer hackers, but were of no use to me because I couldn't figure out how to run them.

Keep your printer on-line when you run HAMCALC. One of HAMCALC's handy features is a message bar that appears at the bottom of every screen display, giving you the option of moving along with the program or making a hard-copy printout of the screen display before moving along with the program.

Except for a few numbers that you are asked to enter, most of the program is menu-driven by single keystrokes in response to multiple-choice questions.

To start things off, select the "Short Dipole for Restricted Space" option from the HAMCALC main menu. You will get a multiple-choice sub-menu that gives you three options: run the program, design a coil, or quit. (If all you want to do is design a coil, select the

design-a-coil option. You will be asked to enter the inductance and the turns-per-inch, and the program will design the coil.)

To design a WEETENNA select the "Run" option. This presents you with a brief description of what you are about to design (see fig. 10). You then are asked if you want the dimensions in metric or old-time feet and inches.⁶ This is followed by a request to type in your choice of frequencies and antenna length.⁷ Next, from

a displayed table of wire sizes you are asked to select one. When you do, you will see a screen display similar to fig. 8(A), except item <0> is not there yet. Instead, you are asked if you want to add your own choice of "B" and "C" dimensions. If you answer "yes," you have to type in the "B" dimension you want. You then get a display that looks more like fig. 8(A).⁸

Make a hard-copy printout of the screen display for later reference when testing and pruning the antenna. The next step is to select your choice of WEETENNA by pressing one of the numbers in < > in fig. 8(A). The screen displays a list of B&W commercial coils for the selected antenna, just in case you don't want to wind your own.⁹ When you exit this display, the program returns to its start-up menu.

Select the Coil Design menu option. You will be asked to wind a length of the antenna wire you selected around a ruler and enter the number of turns that can be close-wound in one inch. The top half of the screen will then display the design parameters of the coil (the top half of fig. 8(B)). The bottom half of the screen displays a list of commonly available plastic pipe sizes and the request to enter the size coil form you want to use. You can, of course, use any coil form you want¹⁰, but plastic pipe is cheap and plentiful.¹¹ When you enter a diameter, the bottom half of the screen display changes to something like the bottom half of fig. 8(B), except the number of turns probably will not be an even number. You will be asked if you want to even up the number of turns, and if you do, then enter the nearest whole number to the number of turns shown. The display will change to show a coil of the same specifications, but with an even number of turns (fig. 8(B)).

Make a hardcopy printout of the screen display, and then exit to return to the startup menu, which now has an added option to prune the antenna. If you want to prune your WEETENNA, you must first run the program from the beginning, entering the same data that appears in the printouts (figs. 8[A] and 8[B]) that you saved when originally designing the antenna. This lets HAMCALC know what it is you want to prune. When you have entered all this data and the program returns to the startup menu, you select the "Prune" option from the menu, which asks you to enter the frequency at which each dipole exhibits the lowest SWR. A new inductance for each coil is calculated and displayed on the screen. You are then taken through the coil design procedure again, at the end of which you compare the original and new normalized coil designs to find out by how many turns you need to prune the coil.

That's all there is to it.

Conclusion

If you are a relative newcomer to amateur radio, you should learn the acronym that was the "Knot In The Knickers" to all of us Old Timers—HDYKIWWIYDTI (How Do You Know It Won't Work If You Don't Try It?). If you think you have no space for a multi-band dipole antenna, you probably are wrong. All you need is a firm belief in HDYKIWWIYDTI and a couple of supports between which to hang a WEETENNA.¹²

Footnotes

1. Hall, Jerry, K1TD, "Off-Center-Loaded Di-

pole Antennas," *ARRL Antenna Anthology* publication No. 36, p. 107. Also the *ARRL Antenna Book*, publication No. 15, 14th edition, pp. 10-5.

2. You will need HAMCALC version 8.8 or later. For a free copy of HAMCALC version 9.4 on a 3 1/2 inch 1.44 Mb diskette, send a check or money order for \$5.00 (US) to cover cost of disk, mailer, postage, and handling to the author, George Murphy, VE3ERP, 77 McKenzie St., Orillia, ON L3V 6A6, Canada.

3. "Cheap" is my favorite operative buzzword.

4. My choice of goop is usually general-purpose silicone sealant, because it can be removed without too much trouble if you do something wrong, which I usually do.

5. Antenna designers are always careful to point out that if their design doesn't work, it is probably due to *your* site conditions. This cover-up is known as "Antennagate."

6. For the example antenna discussed in this article I chose feet and inches because we are dealing with coils, and turns-per-inch seems to be a universally accepted standard for coils. If

anyone knows what the equivalent metric standard is for turns-per-inch, I would appreciate your letting me know.

7. Courses in typing are available at your local community college or trade school.

8. For the example WEETENNA discussed in this article I typed in "12" because that is the length of the longest feet-and-inches tape measure I could find in the shack.

9. This program originally was intended to feature commercial coils, but for most WEETENNAS there was no coil available to suit the design. When there was one available it was usually one of the large, expensive ones. Being your basic Cheapnik, I rewrote the program for home-brew coils rather than spend a buck.

10. You can also design coils using the HAMCALC program "L/C Network Tuned Circuits."

11. Plentiful is okay, but *cheap* really gets my attention.

12. Such as: (a) the inside end walls of your attic; (b) the existing supports for your clothesline (you will have to buy a clothes dryer); or (c) two very tall, retired professional basketball players. ■

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The Jade Products BC-04 "Smart Charger"

BY DOUG DeMAW*, W1FB

The official name for the Jade battery charger is the BC-04 High Current Lead-Acid/Gell-Cell Battery Controller. I shortened the review title by assigning the name "smart charger." It does indeed qualify for that title. This product is supplied in kit form and can be programmed by the user to recognize and implement a variety of charging protocols. The heart of the charger is a UC3906 IC that was described for use in a gell-cell charger by W. Dion in his June 1987 *QST* article entitled "A New Chip for Charging Gelled-Electrolyte Batteries." An application note by R. Valley of Unitrode Corp., which describes how to employ the UC3906 chip, is available from Jade Products for a small fee.

Basic Functions

The BC-04 has a maximum charging rate of 5 amperes. It can be configured to deliver 12 or 14 volts, respectively, to a 6- or 7-cell battery. Most automotive 12 volt batteries are 6-cell types. A combination of seven gell-cells would, for example, call for a 14 volt output from the charger. Four LED status indicators on the front panel allow the user to keep track of which phase of operation is occurring.

A kit is available for adding a low-voltage disconnect function (optional). This circuit protects the battery from discharging into the charger if the AC power should fail. A severely discharged battery can be damaged permanently.

Essentially, the BC-04 is designed to maintain a battery in a proper state of charge. It is incapable of overcharging a battery, thereby allowing the battery to be connected to the charger indefinitely.

The charger senses the condition of the battery and controls the charging needs accordingly. When the battery condition requires maximum charging, the BC-04 kicks into the BULK CHARGING mode at 5 amperes. An intentional overcharge takes place after the battery reaches full charge, and then the charger shifts to the FLOAT mode, which is a trickle-charge state. The brief overcharge feature is included to give the battery a final jolt to ensure that it is ready for action. If the battery is nearly at full charge when it is first connected to the BC-04, the charger commences in a trickle-charge mode. An ammeter on the front panel indicates a 0 to 100 percent charging rate. This unit may be used in combination with a solar-panel charging system for keeping a battery topped off during hours of darkness. The operating manual explains how this can be done with



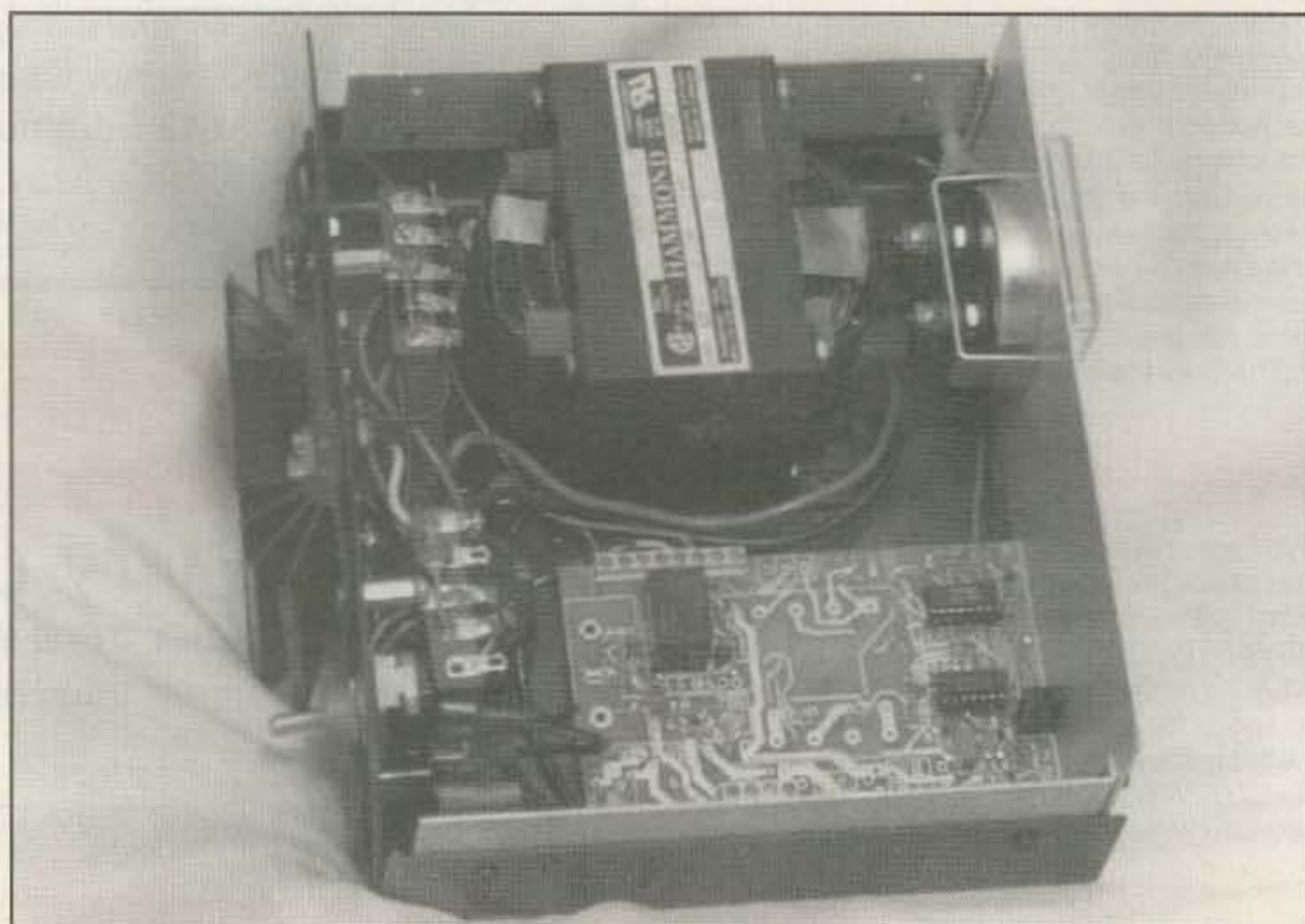
The Jade Products BC-04 High Current Lead-Acid/Gell-Cell Battery Controller.

solar panels, wind chargers, or water-driven generating systems.

Assembling The Kit

I had the kit assembled and operating in seven hours. Builders with less hands-on experience may require up to 15 hours to complete the proj-

ect. I recommend the use of a magnifying glass to help identify the part numbers and color bands on the smaller components, especially for older builders with "tired eyes." Fortunately, the parts for the various stages of assembly are packaged separately in plastic bags, preventing the kind of confusion that results when all the parts for a kit are provided in one bag. Each



The BC-04 with the top cover removed showing the components and quality construction.

*P. O. Box 250, Luther, MI 49656

bag is identified with a number that matches the number of the assembly step in progress.

A high-quality commercial-grade PC board is used in the charger. It has plated-through holes, and each part location is plainly marked with a silk-screened label. The assembly manual is clearly written. Each comprehensive assembly step includes a pictorial diagram that illustrates where the parts are installed on the PC board.

I was impressed with the quality of the components. For example, the power transformer is one of the top-notch products produced by the Hammond transformer company, Guelph, Ontario, Canada.

I encountered only one area of confusion in the assembly booklet. It involves the mounting of the pass transistor on the heat sink. The instructions state that the mica insulating wafer for the TO-3 transistor should be discarded and that the transistor is mounted directly on the heat sink. I discussed this with the manufacturer. He stated that the nonconductive anodized heat-sink surface provides sufficient insulation to prevent the Q1 collector from short-circuiting to ground. Nevertheless, I elected to use the washer, "just in case." I coated both sides of the mica insulator with heat-sink compound to improve the conduction of heat to the heat sink.

There are numerous places on the PC board where parts are not mounted, even though silk-screened numbers are found at those points. Those sites are for use with other types of circuits that the manufacturer may provide for other applications. You need not worry about those locations if you follow the assembly steps with care.

The only mechanical problem I encountered involves mounting the rear panel on the cabinet. The mounting holes at the bottom would not line up. This was caused by the bottom shell of the cabinet being bowed downward about $\frac{3}{16}$ inch at the outer ends. I had to apply substantial pressure to the shell in order to make it flat. This cured the problem.

Physical Description

The BC-04 cabinet measures $3\frac{1}{2}$ "H x $8\frac{1}{2}$ "W x 10"D. The case is painted forest green, and the panel is an off-white color. The assembled weight is 12 pounds. A 15 inch AC line cord is supplied with the kit. I found this inconvenient. I have replaced it with a 3 foot cord that has No. 18 conductors.

Final Comments

Jade includes a $5\frac{1}{4}$ inch floppy disc with the kit. It contains information about the charger and permits the owner to select specific component values for changing the operating characteristics of the BC-04. The software runs under DOS on an IBM-compatible PC.

I am impressed with the quality and performance of the Jade battery charger. It has become a useful addition to my workshop for maintaining my tractor and marine batteries until I can use them next spring. Performance is exactly as specified in the manual.

The BC-04 is manufactured by Jade Products, Inc., P.O. Box 368, East Hampstead, NH 03826-0368. Phone 1-800-523-3776 when ordering. The price class for the charger is \$200. The optional low-voltage disconnect kit sells for \$18.95.

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The amateur radio certificates are \$14.95 each, and the General Radiotelephone Operator certificates are \$19.95 each. Either can be shipped in a solid-oak, smoke-glass frame for \$5.00 extra, plus \$3.00 shipping and handling. The individual certificates are shipped first-class mail, and the framed ones are sent priority mail. For more information, contact License Certification Service, P.O. Box 211, Fair Oaks, CA 95628-0211 (phone 800-792-3787; or on the web at www.quiknet.com/certs), or circle number 101 on the reader service card.

AL-800H 1500 Watts "Plus" Amplifier from Ameritron

Ameritron has added the AL-800H and AL-800 to its line of linear amplifiers. The AL-800H uses two Eimac 3CX800A7 tubes and powers up to 1500 watts "plus"; the AL-800 uses one Eimac 3CX800A7 tube and powers up to 1250 watts. These new amplifiers carry an all-band operation from 160 to 15 meters, including the WARC bands. They are user modifiable for 12 and 10 meters and feature a tuned input circuit,



output network, tube protection, ALC control, vernier reduction drives, heavy-duty power supply, multi-voltage operation, air-cooled ventilation systems, dual illuminated cross-needle meters, a Step-Start Inrush Protection™ program, and Lexan front-panel decal. The AL-800 and AL-800H have a grid current that limits circuits and protects tubes.

Both amplifiers measure 8.5" x 16.5" x 14.25" and both come with a one-year warranty. For more information, call 1-800-647-1800 for the Ameritron dealer nearest you; or to order direct, call 601-323-8211; fax 1-601-323-6551; or write to Ameritron, 116 Willow Road, Starkville, MS 39759; or circle number 104 on the reader service card.

Bilal's ISOTRON 160C Antenna

The ISOTRON 160C antenna for the 160 meter band has a maximum height of 9.5 feet and mounts on a conventional mast. It is a resonant antenna and needs no radials. The antenna is directly fed with coax, is tunable, and can be set for a preferred portion of the band. It is priced at \$159.95 (plus shipping).

For more information and a free catalog of Bilal's full line of ISOTRON antennas, contact Bilal Company, 137 Manchester Drive, Florissant, CO 80816 (719-687-0650), or circle number 102 on the reader service card.

AEA IDR-96™ Integrated Data Radio

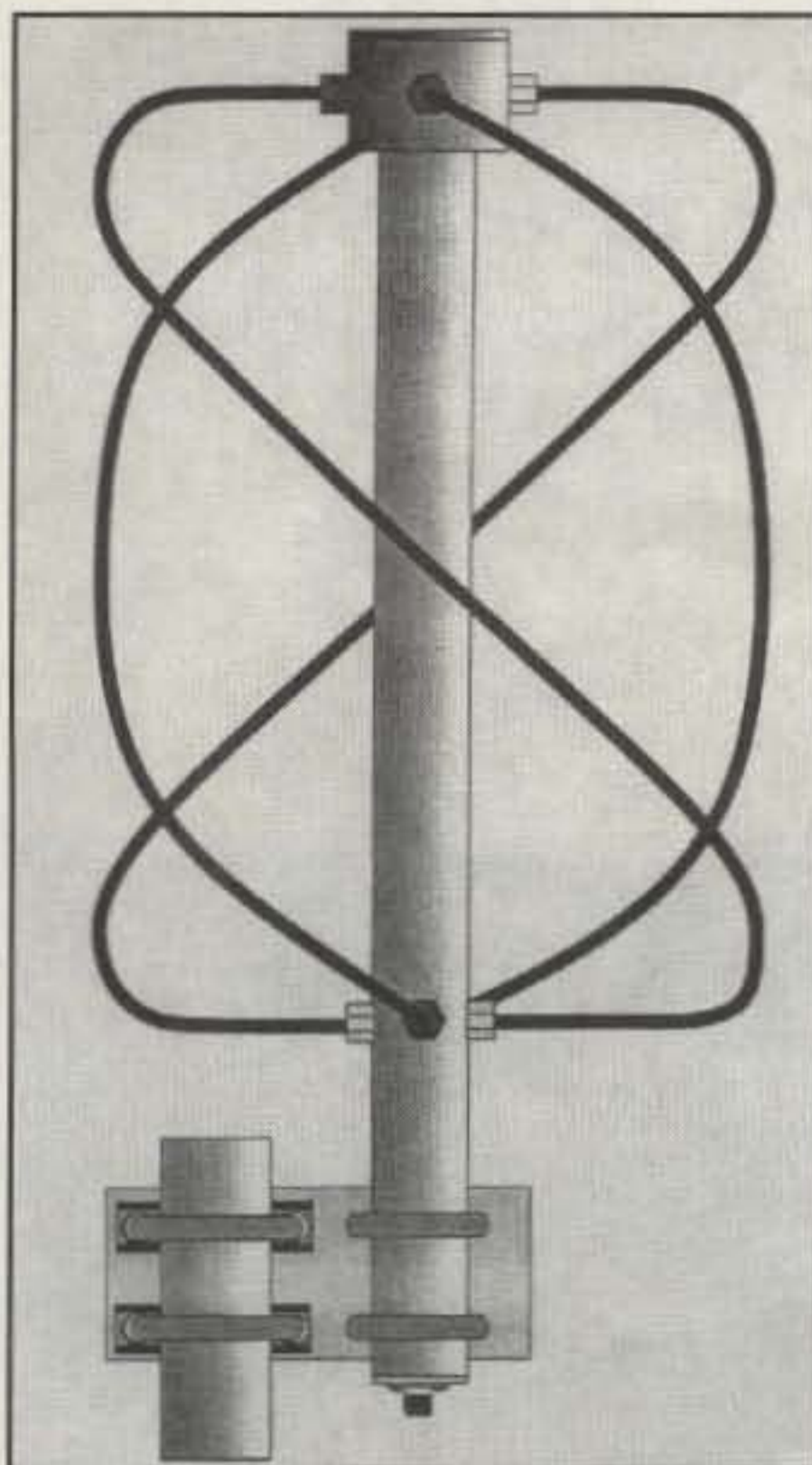
Advanced Electronic Applications, Inc. has introduced the IDR-96™ Integrated Data Radio which integrates the technology of the PK-96 TNC with the simplicity and high switch-over speed of a crystal-controlled radio. This is a 9600 bps TNC with full-featured mailbox; gateway node operation; advanced Global Positioning System commands; identification of TCP/IP, TheNet, and NetROM; and more. The integrated radio is a crystal-controlled, 5 watt transceiver. The radio is built into the unit. You can purchase the standard IDR-96 440 MHz (with the 441.1 MHz TX and RX crystals installed), or you can special order an IDR-96 with any one TX and any one RX frequency between 430-450 MHz.



Two software programs are included: PacRatt Lite™ and APRS™. List price of the IDR-96 standard model is \$499. List price of the special order model is \$535. For more information, contact Advanced Electronic Applications, Inc., P.O. Box C2160, Lynnwood, WA 98036 (800-432-8873), or circle number 108 on the reader service card.

Directive Systems DSQ-137 137 MHz Quadrifilar Helix

The quadrifilar helix is a good choice for space communications where precise aiming or tracking is neither desired or required. The quad helix provides maximum gain of over 4



dBic at a point directly overhead. The half-power beamwidth is quite broad and will allow good reception in any direction from the zenith to within 20 degrees of your horizon. Polarization is circular to minimize fading effects from Spacecraft tumbling and Faraday rotation in the ionosphere.

Maximum mast size of the DSQ-137 is 2 inches; weight is 6 lbs.; height is 36 inches; width is 18 inches, wind area is .62 ft. sq.; and wind survival is 100 mph. The antenna is provided with a painted gray finish, and all hardware is stainless steel. The elements and machined parts are brass. For pricing and more information, contact Directive Systems, RR #1 Box 282, Dixon Road, Lebanon, ME 04027 (phone 207-658-7758; fax 207-658-4337), or circle number 105 on the reader service card.

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ICOM has introduced the IC-T7A dual-band compact handheld, which measures 2 1/4"W x 4 13/16"H x 1 1/8"D. The miniature size is accomplished in part through the use of a single PA power module (MRF-5007) for both UHF and VHF. It also utilizes single circuits for the receiver IF, PLL, and transmitter drivers. Features include a one-touch operated keypad, single volume-control knob, backlit LCD, 50 encode and 50 separate decode frequencies, tone scan function, nine DTMF memories for auto-dialing, and more.

For more information, contact ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004 (206-454-8155), or circle number 103 on the reader service card.



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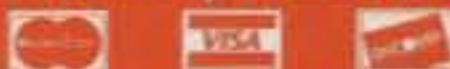
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BY HILLAR RAAMAT*, N6HR

A while back I went to a local flea market where someone was selling 386 motherboards, 30 dB soundboards, 2400 modems, 3 wpi washboards, and god knows what-else for next to peanuts. The low prices would have made anyone drool.

Not being a computer type myself (I can barely spell the plural of "abacus."), I took the liberty of bypassing that lofty vendor until I saw on the next table a beautiful collection (and for sale, I might add) of old telegraph keys—restored Vibroplexes and Johnsons, with which in years past I used to slap out messages on the ship's radio while dutifully checking the 500 kHz frequency for stranded mermaids on deserted tropical isles.

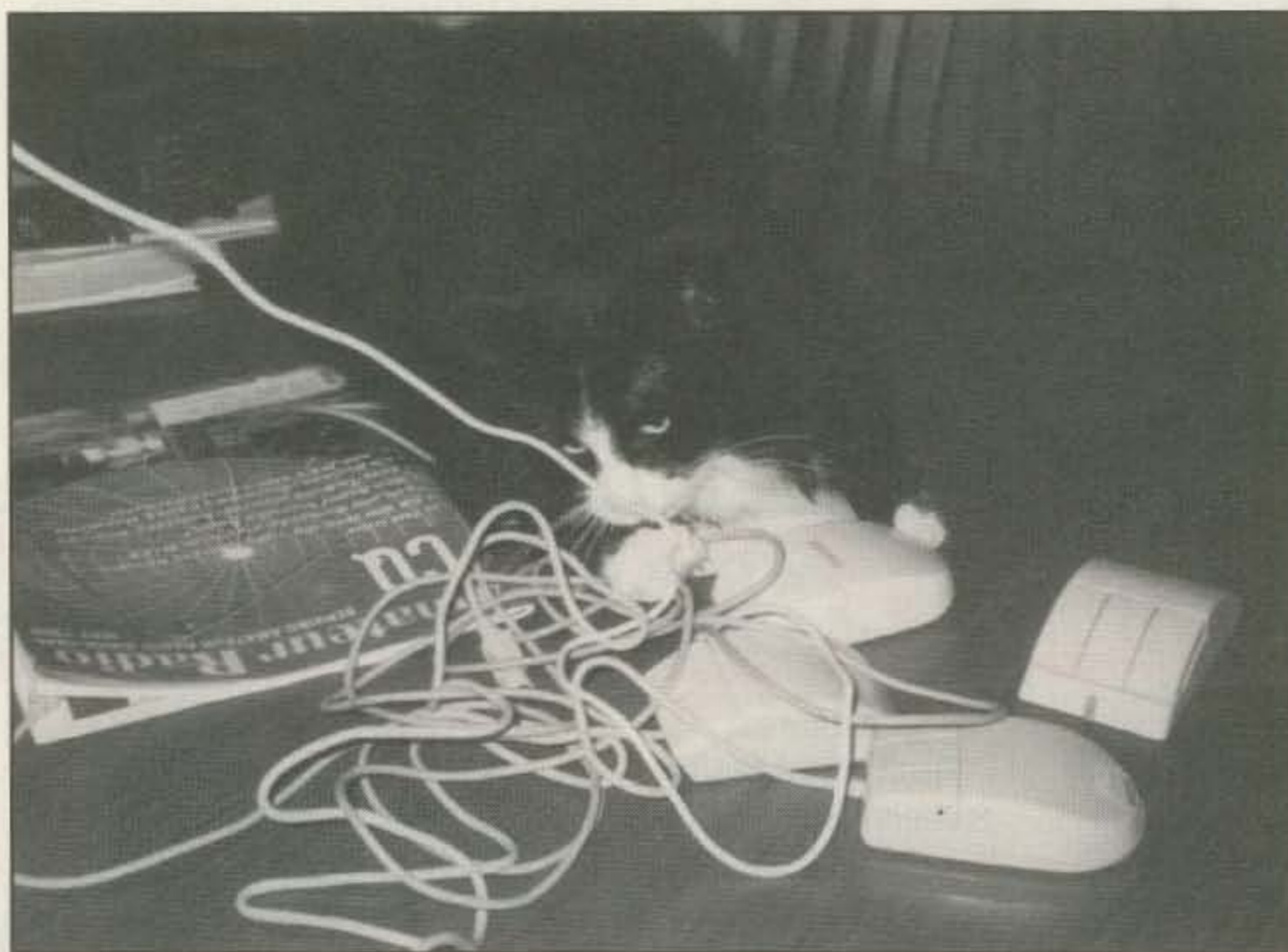
BANG! I got hit by one of Zeus's flashes! That guy had a bucket of mouses (mieces?) under his table—those white thingies that never do what you want them to do, but only do what you tell them to do. I asked, "How much?" and he sold me four of them for 5 bucks! Later on in a used electronics emporium I found two more, this time for 2 bucks apiece (overhead, I guess). Every one of these mieces was different. Two had three keys, and four had two keys. Some had long cords, while others had no tail at all. "Balls in or balls out" was another category! The only thing they had in common was that none of them worked for the originally intended purpose.

Zeus hit again! I can make a keyer paddle out of them!

By the following Saturday all the preliminary thinking had been done. Out came the screwdrivers and the soldering iron and the 20× magnifying glass. After toiling for three hours, the result was two fully "iambic" quality keyers. And, you too can do it!

The Procedure for Reconstructive Surgery

Gut the "mouse" of everything but the microswitches, connector cable, and case. Get rid of the rollerball assembly and every diode, transistor, and other electronic cockroach soldered to the board. They are "bad news bears" and later will cause shorts!



Maxie, the DX cat, helps enviderate the next batch of mouse keyer candidates.

Make sure you can check the polarity and continuity of the microswitches. Now resolder three connections—the "ground"—i.e., the common to the microswitches, and the "connect side" to one or two or the three microswitches leading to the plug connection. Let's say you started with a two-switch "mouse." The wire to the 9-prong female plug has six wires. Wire it up any way you like. The common wire is ground and the other two wires would go to one microswitch (the dot) and to the second microswitch (the dash). If you have a three-microswitch mouse, connect the third one to a third wire to be used later.

On the "output" end cut off the 9-prong plug with snippers and just save the wire. Strip the wire. Use a stereo miniature plug to connect to your keyer—"dot" (left switch) on the center, "dash" (right switch) to the barrel, and "ground" to the base. For three-wire mouses, keep that

third wire long and able to be connected to your keyer memory.

I have a "LogicKeyer" as my keyer. Plug tin that stereo plug! Presto! Instant iambic keying! (If you didn't wire it up right, the LogicKeyer has a "reverse" by pushing both outer buttons. It goes ". - . . . -").

On the three-key versions, I connected the middle key to one of the memories of the LogicKeyer. I have in the memory just the callsign. That third wire may require an extra miniature plug.

After you get used to the up-and-down motion of the "mouse" instead of the side-to-side-and-squeeze motion of the iambic keyer, you can send as good CW as the microswitch movements allow. It's a snap if you're a piano player (or "keyboardist"). Go set a mouse trap at your next flea market and keep your soldering iron warm! ■

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How To Construct A Low-Cost Elevation Rotation System

There is more than one way to get there from here. W6POK shows us how to fabricate a simple elevation system for satellite work.

BY HUGH R. PAUL*, W6POK

Operating on the various high and low earth orbit satellites has been a pleasurable pursuit of mine over the years, albeit a rather casual one. Satellite operation has always been secondary to my primary interest in VHF/UHF terrestrial communications and DXing on the HF bands. Consequently, I have not gotten into computerized tracking programs and the like, nor have I cared to invest a great deal of money or effort in dedicated satellite operating facilities.

For Mode B operations on Oscars 10 and 13, my antenna system has consisted of either linear or circularly polarized Yagis mounted on a 4 to 5 foot crossboom, in turn mounted to a vertical support mast or single tower section. One of the old Alliance U-100 or U-110 rotors served to provide elevation rotation of the array. Current construction articles in the *ARRL Handbook* and *Antenna Handbook* still recommend these old rotors for elevation control. Unfortunately, they no longer are manufactured, and it has reached the point where it is difficult to find one in good condition on the used market.

*P.O. Box 379, Paw Paw, MI 49079

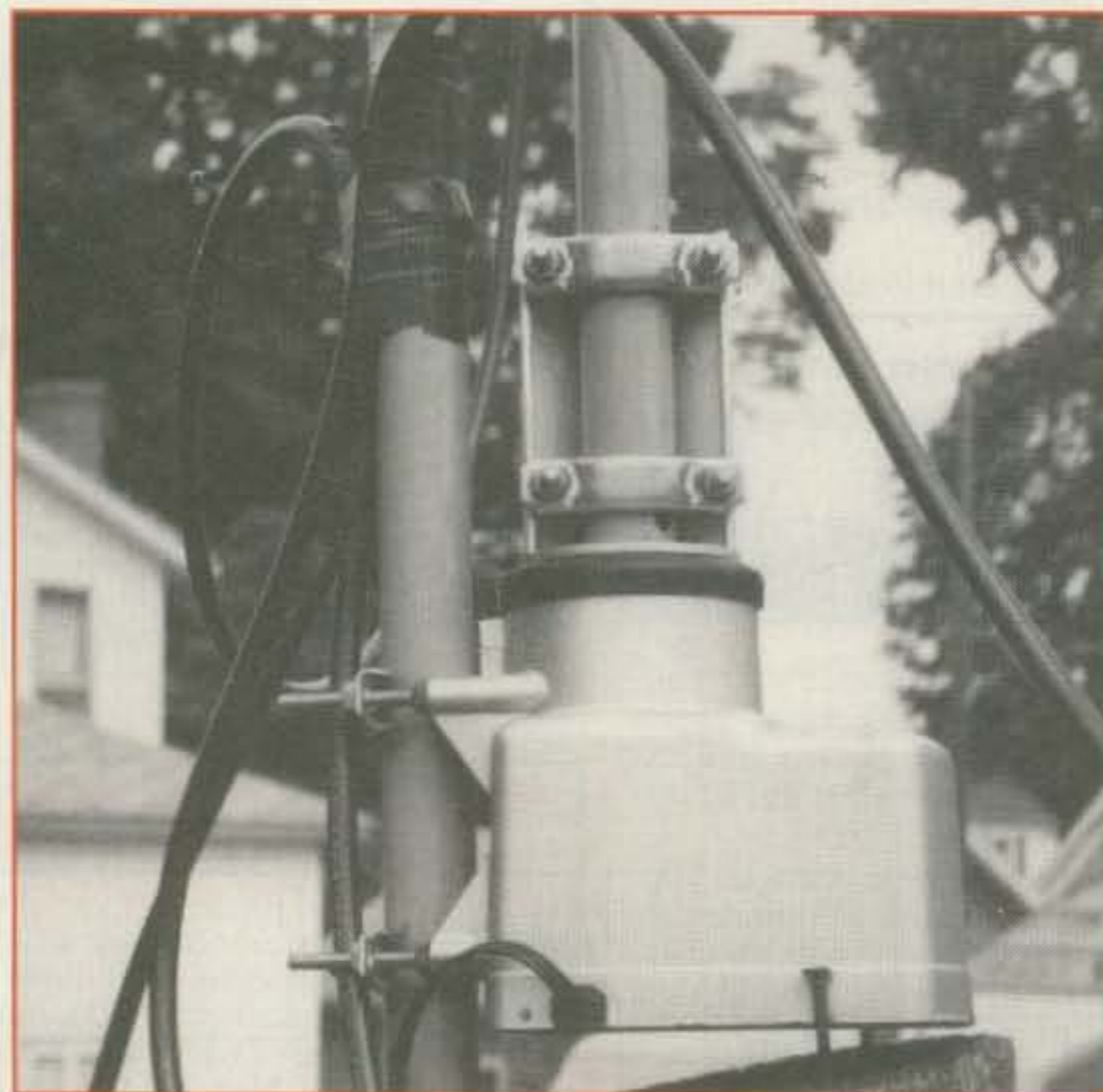
The advantage of these rotors, besides cost, was their design. A 1 1/4 inch mast section could pass through the rotor center, thus making it ideal for elevation rotation when mounted on its side. Several manufacturers currently are offering some excellent rotors for azimuth and elevation control of satellite antenna arrays. However, they are expensive. If you don't require automated tracking and can't locate one of the old Alliance rotors, there is another low-cost alternative.

While on a long-term assignment in Turkey, I was using the "armstrong" method for rotation of my satellite antennas. Due to weight restrictions and power differences, I had left my rotors at home. This method of rotation was a bit tiresome, especially on rainy days. Setting out to find an alternative, I was surprised to find that a 220 VAC, 50 Hz version of the Phillips U-105 rotor was available at one of the larger TV dealers in Ankara. This was the same rotor (shown in the photo) that I had been using as an azimuth rotor at my stateside station for several years. The U-105 is available here from both amateur radio suppliers and some TV shops. With a little effort these rotors can be made to

function efficiently as elevation rotors.

The key to using the U-105 for elevation is to be able to distribute the load and eliminate lateral torqueing of the rotor's mast clamp and drive train. In the Amateur Electronic Supply catalog, the U-105 is listed at \$69.95. In the same section of the catalog there is listed a companion model TB-105 support bearing for use with the U-105, at a cost of \$18.25. One of these bearings can be seen in the picture being used in conjunction with the U-105 functioning as an azimuth rotor. You will need two of these support (thrust) bearings to convert the U-105 into an elevation rotor.

The rotor case is constructed of cast metal with a sheet-metal hinged floor plate for access to the motor connections. The control cable passes through a grommetted slot on the side, near the bottom of the case. Because the rotor will be lying on its side, we need to be concerned about water entry into the unit. If the rotor is mounted with the control-cable entry port downward, we still can get water under the rain cover on the mast clamp or around the floor plate. The easiest solution is to clamp a sheet of rubber around the body of the assembly or



↑ This is a close-up view of the Phillips TB-105 support bearing. You will need two of these for this project.

← This is what the basic Phillips U-105 antenna rotator looks like.

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\$21⁹⁵ MFJ-1702B



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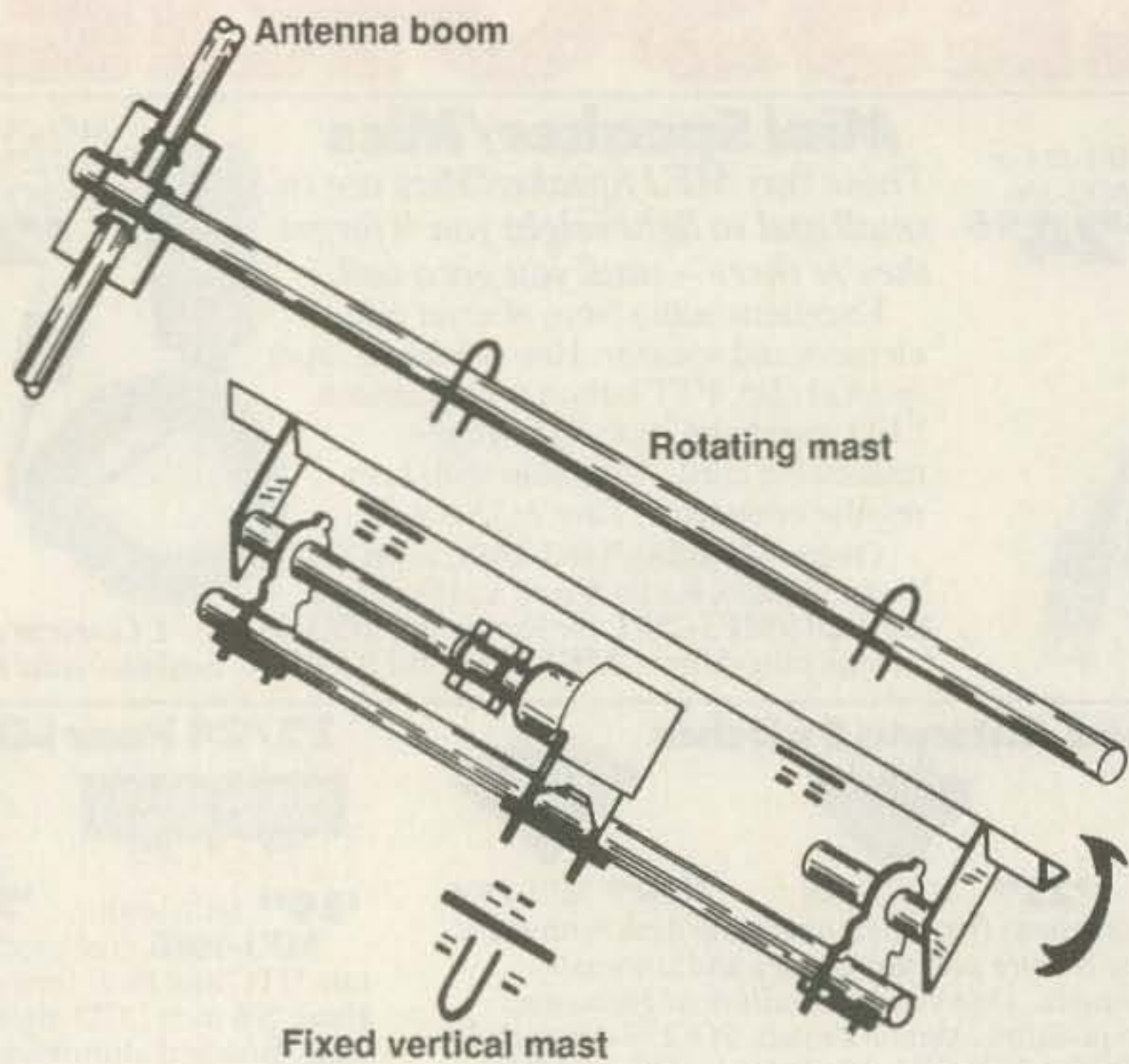


Fig. 1— Shown here is the basic overall mechanical view of the elevation system. (See the text for construction details.)

make a cover from a flexible plastic refrigerator food-storage container.

The rotor is supplied with two mast clamps and four sections of threaded bolt stock, which thread into holes at the back of the rotor housing. With the rotor mounted horizontally to a section of 1 1/4 inch diameter steel mast, a full

1 inch of bolt stock extends beyond the clamps, a length more than sufficient to mount a 1/8 inch aluminum plate, through which two additional U bolts and clamps will be required for attachment to the vertical support mast. I used a sheet that was 7" x 9" and had previously been used on another project. With the rotor horizontal,

the spacing of the four bolts is 3.5 inches on center horizontally and 2.25 inches on center vertically. The bolt stock measures 1/4 inch in diameter. Size of the additional U bolts and the spacing will depend on the diameter of the mast to which the final assembly will be mounted.

From fig. 1 you can see that the rotor is centered on a 28 inch long section of steel mast. There is some latitude as to actual length required, but I chose to keep the support bearings a little farther from the rotor housing and give myself some latitude with regard to positioning of the bearing clamps. The support bearings and the mast clamp on the rotor will accept mast sizes of 1 1/8 inch to 2 inch diameter. Depending on the size of your array, you may wish to use larger material than shown.

I used two sections of 1 1/4 inch diameter mast material for the part of the bracket that passes through the support bearing on one end and the support bearing and rotor mast clamp on the other end. Again, you have some latitude with regard to the length of these sections. I used a length of 6 1/2 inches for the former and 10 1/2 inches for the latter. A local machine shop then welded a 6 inch length of flat 3/16 inch by 1 1/2 inch steel plate to one end of each of the mast sections. At the other end of these plates a V notch was cut to accommodate welding to a 30 inch length of 1 inch steel angle iron. The actual antenna support boom can then either be clamped or bolted to the angle iron. This offers flexibility in your choice of boom materials. Most of the fiberglass boom material offered by suppliers is 1 1/2 inches in diameter, too large to pass through the older Alliance antenna rotors. If you are using fiberglass rod, it is suggested that you use screw-type hose clamps for securing the boom to the angle iron, thus maintaining the structural integrity of the boom material.

It is important that the antenna array and cross-boom mounting structure be balanced to minimize stress on the gear train of the rotor. The procedure I used was to first go through the rotor control calibration procedure in the instruction manual. The control was then placed at the west position on the compass rose. When the motor ceased rotation, I then positioned the cross-boom mount so that it was directly below the rotor and then tightened the mast clamps. The cross boom to which the two Yagi arrays are mounted was then positioned with the hose clamps tightened to the point where the boom could still be rotated with light finger pressure. The antennas were positioned on the cross boom to achieve static balance at all elevation angles. The boom clamps were then tightened with the antenna array in a horizontal position.

Elevation of the array is accomplished by rotation of the control between the west position (0 degrees) and the north position (90 degrees). Minimum stress on the gear train is exhibited when the antennas are in a horizontal position, which is where I usually placed them when not in use. However, rotation due to wind forces up to 40 miles per hour in strength was never experienced in either elevation or azimuth, regardless of position.

The U-105 is indeed a light-duty rotor, but it is fully capable of functioning as either an azimuth or elevation rotor for VHF/UHF arrays with boom lengths on the order of 10 feet. The rotor has been functioning successfully as an azimuth rotor since 1992. If you have been unable to find an old Alliance rotator, why not give this alternative a try?



TOWERS & HAZER

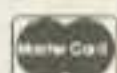
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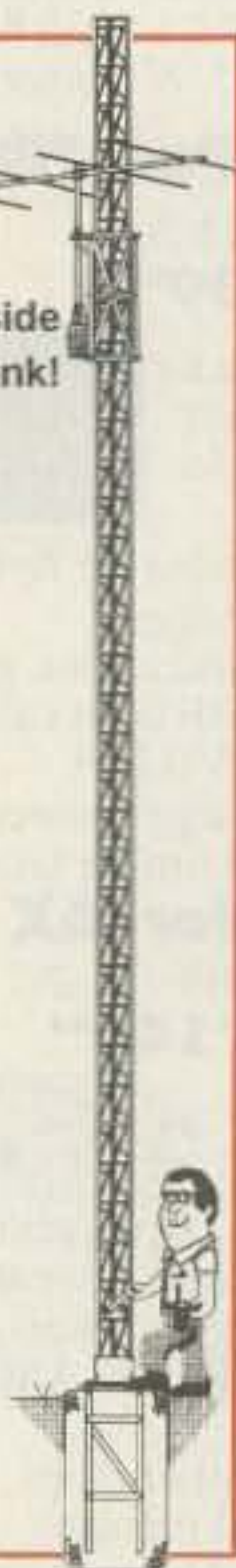
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M1850A	50ft, M-18 16 sq ft, 87 MPH w/Hazer 6	\$2292.64
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CIRCLE 151 ON READER SERVICE CARD

The Paragon Technology NEC-Win Antenna Analysis Software

BY DOUG DeMAW*, W1FB

The catch phrase "user-friendly" is an important one to those of us who need to read books such as *DOS for Dummies*, *I Hate Wordperfect*, and *Windows for Dummies* in order to manage our PCs. I appreciate a well-written, lucid software manual after becoming a self-taught user of an IBM-compatible system. The foregoing books were vital to my learning process, along with frequent on-the-air support from W4ZCB and WA9EZY. In this context I am deeply impressed with the NEC-Win user's manual. Not only does it provide an in-depth treatment of antenna analysis procedures, the authors lead the user through the process with plain English from software installation to complex analysis.

NEC-Win is completely menu-driven and designed to operate in Windows 3.0 or later. Other requirements are that your hard drive has 10 MB of available space for program files, a minimum of 8 MB of RAM, a VGA or SVGA monitor, MS-DOS version 5.0 or later, plus a mouse. A math coprocessor is required for 80386 and 486SX systems. You will also need a 1.44 MB floppy drive. The software is supplied on two 3.5 inch diskettes.

What Can NEC-Win Do For You?

Not only can you analyze the performance of your present antennas via NEC-Win, you can crank in the parameters for those antennas you have always wondered about but were reluctant to build and test, and then see the radiation pattern on your monitor screen. Fig. 1 shows the bidirectional pattern of a dipole antenna, as developed with NEC-Win. Issuing the PRINT command produces this pattern on paper by means of your printer. The software may also display the antenna X-Y plot, as in fig. 2. You can also view the elevation pattern, which is shown in fig. 3. Carrying the analysis one more step allows you to display a three-dimensional surface plot of the type seen in fig. 4, which is for a log-periodic antenna. What could be more fun and educational than sitting at your computer and designing antennas, especially during the cold and confining months of winter? It is important to realize that as a user you must have a reasonable knowledge of antennas and the operation of Windows. *The ARRL Antenna Book* can serve as an important adjunct to this computer program if you are weak on antenna theory.

Setting Up The Parameters

After you create the geometry for your anten-

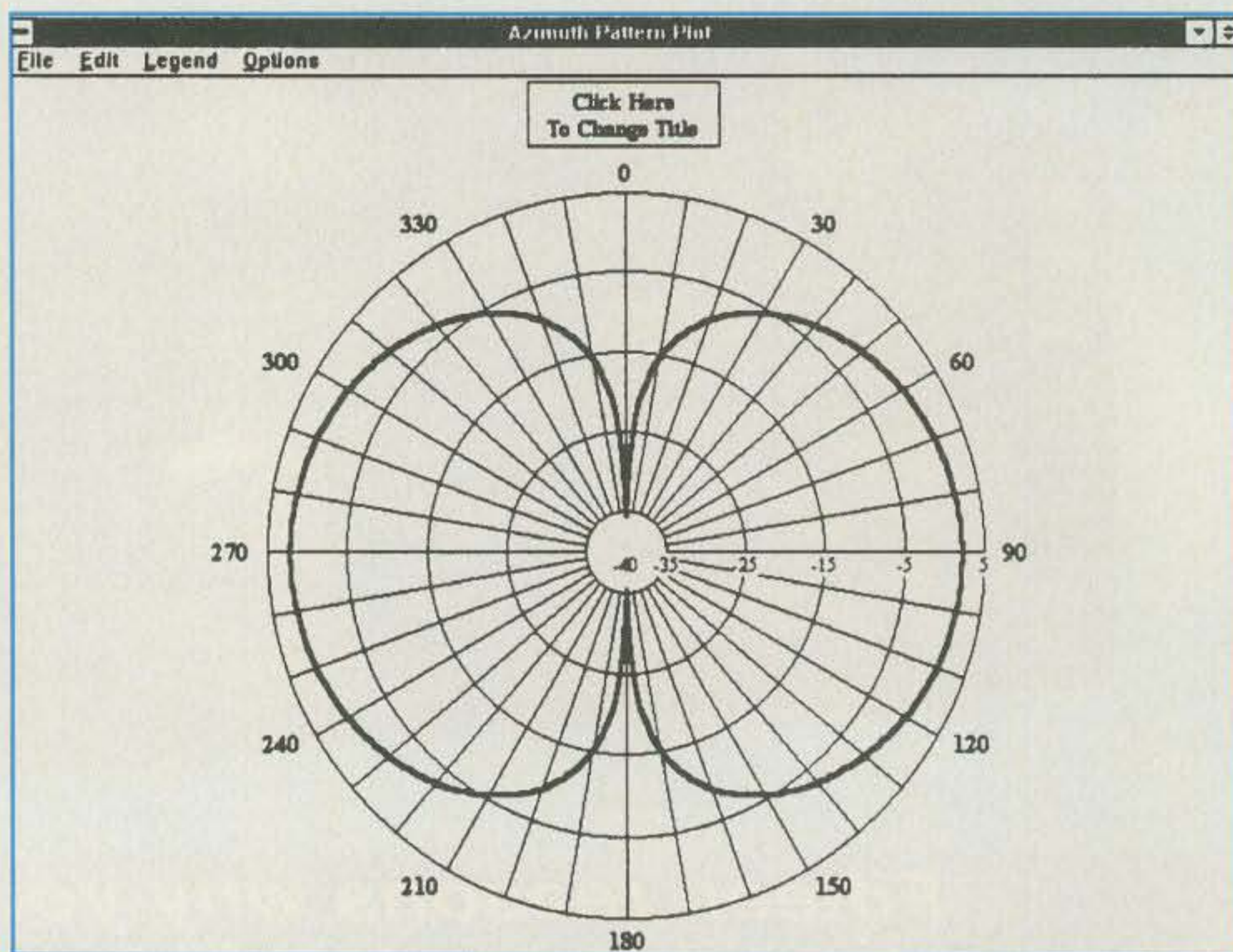


Fig. 1—Bidirectional plot for a typical dipole antenna, as derived with NEC-Win.

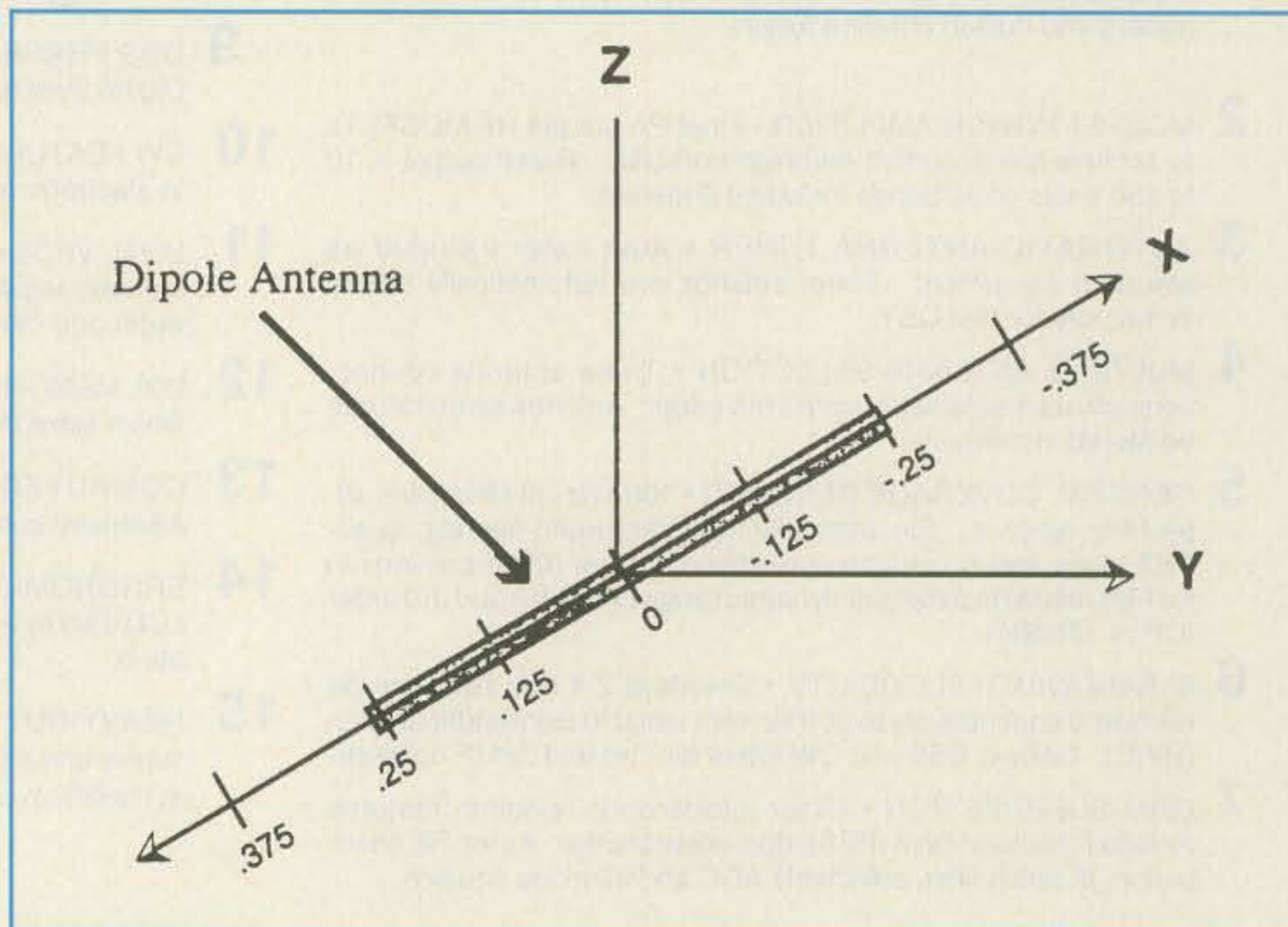


Fig. 2—Dipole X-Y plots can be produced with the software, as shown here.

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Other KENWOOD not Pictured

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TM-241AHK2L 2M FM xcvr, backlit **CLOSEOUT 279⁹⁵**
TM-441A 440MHz FM transceiver..... **SPECIAL 349⁹⁵**
TM-733AHKBLD 440MHz FM, backlit, duplexer **539⁹⁵**
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TS-690S HF transceiver w/6 meters..... **1499⁹⁵**
TS-790A 2M/440MHz SSB/FM transceiver..... **1849⁹⁵**
TS-950SDX Deluxe HF transceiver **3999⁹⁵**

NEW!



TS-570D HF Transceiver

160-10M Amateur Band operation • 500kHz-30MHz receive • 100W output • Automatic antenna tuner • 16-bit DSP technology • Scrolling menu; 46 types of functions • Dedicated packet port • RS-232 port for up to 57,600 bps PC control • Electronic keyer • CW auto-tune **TBA**



TS-50S HF Transceiver

Super compact! • 160-10M Amateur Band operation • 500kHz-30MHz General Coverage receiver • 100W output • Dual vfos • DDS (Direct Digital Synthesizer) with "fuzzy-logic" control • AIP system • 100 memory channels • Dual-menu system • Multi-function microphone • 12V DC @ 20A • 7" w x 2 1/2" h x 9" d, 6 1/2 lbs..... **\$1019⁹⁵**

TS-60S VHF Transceiver

All-mode 50MHz transceiver with 90W output. Same features and looks as the TS-50, above..... **\$1049⁹⁵**



TM-742AD Dual Band FM Transceiver

144MHz/440MHz dual-band operation • 50/35W output • 4 band options for tri-band operation • Dual/triple band receive • 101 memory channels per band • Detachable display and control panel (optional) • Backlit display • 13.8V DC @ 11A • 9" w x 2" h x 6 1/4" d, 3.3 lbs..... **\$699⁹⁵**

TS-642AD Dual Band Transceiver

Same features and looks as the TS-742AD but 144MHz and 220MHz dual-band operation..... **\$849⁹⁵**

TM-642A same, but no backlit display **CLOSEOUT 799⁹⁵**
Hot! UT-28S 28MHz band option **CLOSEOUT 169⁹⁵**
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TM-261A 2M FM Transceiver

144-148MHz tx; 118-174MHz rx • 50W output • MIL-STD 61 multi-function memory channels plus 1 call channel • Memory name function • DTSS selective calling • Multi-scan capability • Dual menu system • Multi-function microphone with backlight keys • DTMF memory function • CTCSS tone encoder; optional decoder • 13.8V DC @ 11A Compact! - only 5 1/2" w x 6 3/4" h x 6 1/4" d, 2.2 lbs... **\$269⁹⁵**

TM-461A 70cm FM Transceiver

Same features and looks as TM-261AD but 438-450MHz transmit, 400-470MHz receive, 35W output..... **\$439⁹⁵**



HANDHELDS

TH-22AT 144MHz single band operation • MOS FET power module • 3W output • DTMF keypad • 40 memories, 1 call channel • Multiple scan functions (VFO, call & memory) • Dual scan stop modes • 2.2" w x 5.7" h x 1.0" d ... **\$229⁹⁵**
TH-22ATH 5W version **259⁹⁵**
TH-42AT 440MHz version **339⁹⁵**

TH-28A 144MHz single band transmit and dual-band receive capability (144MHz/440MHz) • 2.5W output • Alphanumeric memory • Alphanumeric paging • 40 multi-function memory channels • Tone alert system with time indicator • 1.95" w x 4.56" h x 1.49" d **\$329⁹⁵**
TH-48A 440MHz version w/144MHz rx... **SPECIAL 289⁹⁵**

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TH-79A(D)H 5W version..... **419⁹⁵**

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na, you must enter the analysis parameters. These include the type of ground under the antenna (no ground, perfect ground, real ground, and Sommerfield ground). You must also enter the frequency of interest, along with data about how many sources and loads will be present on a wire. You will also assign a conductivity factor for each wire in the antenna. This is easy because the menu lists the various metals commonly used for antennas. Just click on the appropriate one. The conductor diameter must also be entered. The ANALYZE feature of the software enables you to look at the maximum gain, VSWR, beam width, and front-to-back ratio of the antenna.

The ROTATE function lets you rotate the selected conductor or group of conductors around the X, Y, and/or Z axis. You may also zoom in on a selected part of the antenna.

NEC-Win includes a button bar which contains numerous icons that are clicked on as you progress through the analysis set-up steps. The appropriate icons are shown next to the various operating steps throughout the manual in true user-friendly fashion.

The program includes provisions for including networks, such as traps and loading coils, in any segment of the antenna. Analysis may also be done with or without a transmission line attached to the antenna. More than one trans-

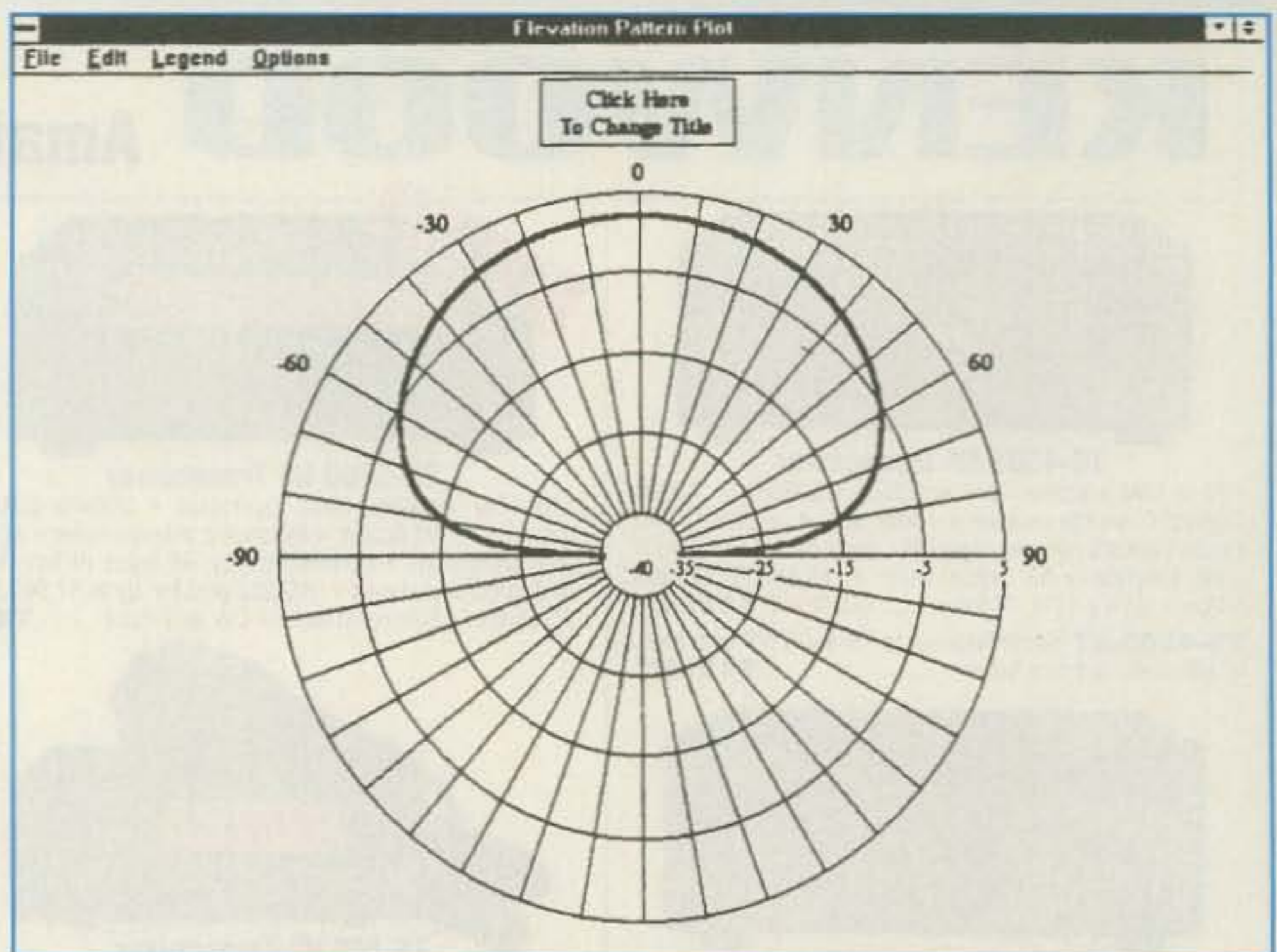


Fig. 3— A dipole elevation pattern generated via NEC-Win.

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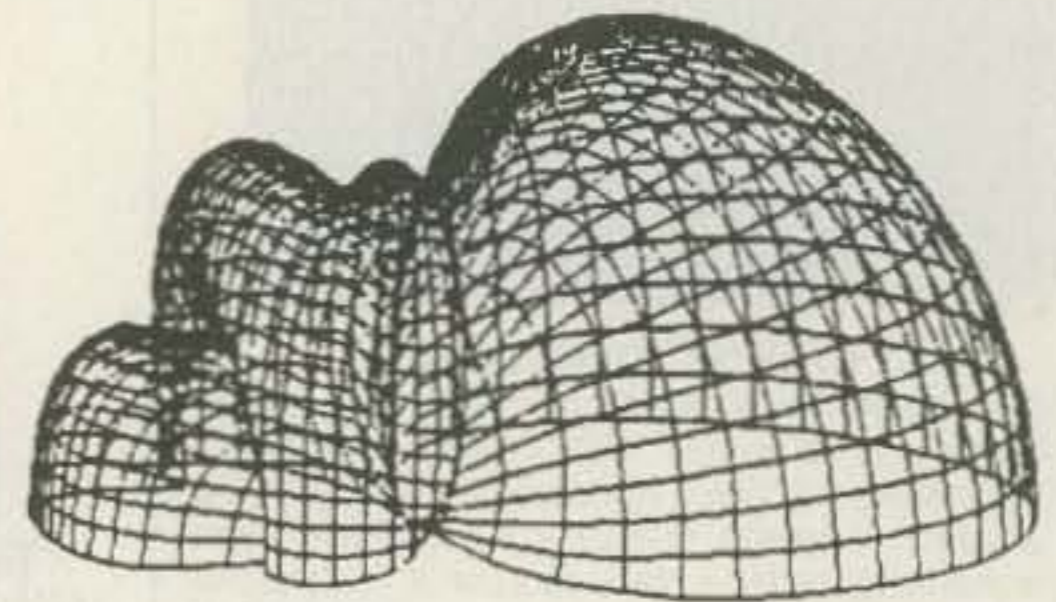
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SPACE - RESET VIEW



POINTS = 1387
LINES = 2774

Fig. 4— A three-dimensional surface plot for a log-periodic antenna. A few clicks with the mouse produce this and other plots on the monitor screen.

mission line or stub can be specified in the design simply by indicating where it is attached.

Summary Comments

From a purely subjective point of view I find NEC-Win superior to some other antenna analysis programs I have tried, because the manual is so easy to comprehend and follow. Some example files (.NWB) for learning to run the program are included in the directory. They

include dipole, conical monopole, bowtie, log-periodic, inverted-V, and Yagi antennas. E- and H-plane patterns are contained in these files. I would definitely recommend NEC-Win to any technically oriented amateur who is computer skilled or is a budding hacker. If I can master this program, anyone can!

The price for the software is \$75. It is produced by Paragon Technology, Inc., 3001 Research Drive, Suite A1, State College, PA 16801 (814-234-3335; FAX 814-234-0228).

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Current (cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (lbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES

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WZ4F	2,928,101
K7QQ	2,735,016
KA4RRU	2,342,250
K6HNZ	1,851,300
K4VUD	1,779,657
NB7N	1,757,525
AI2C	1,415,910
W6TKF	1,414,656
N5OKR	1,386,185
NW6S	1,148,811
KM6YX	1,066,114

28 MHz

N5NMY	67,084
W4YV	29,889
KC5IIP	2,622

21 MHz

N6MU	266,760
N4BP	156,123
W5ASP	99,180
KY2P/4	47,888
W9RE	46,032

14 MHz

N8II	1,526,460
N3HBX	1,473,756
K5UA	1,287,900
W7FP	606,618
K1DWQ	455,344

7 MHz

KV0Q	1,642,302
KK6XN	1,014,024
W3GH	775,390
WM2V	286,896
K0JN	150,920

3.7 MHz

KE1Y	1,337,484
AB6ZV/7	809,432
AE4MJ	36,736

1.8 MHz

AC4NJ	32,606
AA4MM	14,280
K0CS	2,622
K4JYO	1,804

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K1HTV	1,325,985
WS1A	1,049,010
WD5K	706,200
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WA4ZXA	673,182
AC0W	624,258
NA2Q	551,642
KD1YN	518,367
W7ZMD	495,112
KJ6HO	483,912

28 MHz

N5NMX	24,528
WB4HFL	6,580
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W9CNF/M4	410

21 MHz

WA7BNM/6	134,096
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KI4DC	8,512

14 MHz

N4MO	638,990
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KB8IBS	238,620
K2BQW	185,072

7 MHz

AA9IA	40,960
W4YDD	32,364
N8LIQ	19,750
W2FGY	17,864
WA5JWU	8,320

3.7 MHz

WA3RSK	355,752
K9FOH	19,584

1.8 MHz

N5IA	4,350
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DX ALL BAND

3V8BB	12,604,241
HH2PK	11,634,343
WR6R/WH7	11,272,224
P40V	11,209,231
PJ9Y	10,099,584
VD3EJ	9,675,061
S50A	8,211,376
OT6T	7,347,655
GI0KOW	6,278,118
5N0T	6,061,398
CQ4DIZ	5,199,018
4N0AV	4,912,488
OM7DX	4,569,240

LU7DW	4,546,237
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F6FGZ	3,769,206

28 MHz

LU4HAW	625,359
ZP0Z	209,600
ZL1AXB	49,941
ZX2WPX	33,075

21 MHz

ZX5J	8,632,268
CW6V	6,312,600
PW4Y	5,694,480
9R1A	4,728,856
AH8A	4,200,847
ZP0M	4,066,838
ZP5MAL	3,917,200
J56CK	3,769,600
4X/OK1JR	847,926
XR4B	565,432

14 MHz

6V6U	4,960,836
OK1RI	4,710,882
FM5CD	3,860,480
IY2ARI	3,223,102
WH6CQH	2,698,162
YM2ZW	2,562,296
IV3YYK	2,274,616
HA8IE	2,205,240
ZA1AJ	2,083,521
S50R	2,066,206

7 MHz

EA8AH	7,334,012
CY7A	5,991,500
VD7NTT	4,424,136
II3T	3,431,232
AY1I	3,289,652
N6VI/KH6	2,831,532
S53M	2,677,164
SP7GIQ	2,654,768
HG9R	2,609,280
YT7A	2,556,684

3.7 MHz

TE1C	2,161,568
YT6A	1,976,436
P40A	1,715,076
UA2FJ	1,323,168
S57DX	1,070,244
YZ1U	1,066,912
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S51AG	918,996
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S54E	382,910
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YU1ZZ	346,326
OM5CD	220,818
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LU5E	1,095,590
ZC4EE	1,024,860
YL2KA	1,023,309

28 MHz

LU3HWE	309,657
LU9HSZ	281,750
LU3FZW	271,040
LU4FCZ	166,004
CX8CP	131,217

21 MHz

PP5UA	2,715,072
LU8FOZ	1,694,420
EA8AKN	1,500,741
LU1HTF	1,087,124
LU3HEO	1,011,780

14 MHz

IR9B	1,862,350
LU5FCI	1,448,500
US4LAD	1,441,196
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EA7AGW	729,908
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ED3PX	570,472
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7 MHz

XE2DV	2,414,320
4V2B	1,206,200
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T97V	271,392

3.7 MHz

HA8IB	487,770
S57J	423,752
DL4FMA	407,376
SV2AEL	283,860

1.8 MHz

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OZ3SK	122,112
OK1NG	114,204
OK1FFU	105,376
OL3Z	80,676

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KF8UM	1,548,976
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K3SW	642,470
KC0ZC	588,720
N1NQD	571,725
N6CCL	502,944
KA7ZUM	451,278
N8BJQ	412,192
K2LE	373,842

DX

UU5J	6,872,481
S07NY	5,978,840
SK0WJ	1,738,692
S59AA	1,248,628
IK2HKT	1,001,988
JF1SEK	793,324
YO3FRI	601,152
JK2VOC	190,390
EA5YJ	182,178
S50U	172,200

14 MHz

S54ZZ	1,440,306
ON4DPP	1,131,612
DL7IO	1,030,778
OK1DIG	1,006,604
OI3NXW	752,124

7 MHz

IO2A	551,892
DK0IU	43,420

3.7 MHz

DL5FDA	622,728
IN3ASW	517,992

1.8 MHz

EA1DVY	6,400
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QRP/p

N1AFC	A	369,664
WT3W	A	218,316
AA7VY	A	164,651
KA1CZF	A	135,044
WA6FGV	21	2,806
W6CN	14	72,890
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LY3BA	A	605,581
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YU1EA.....A.....	514,512
SP7LZD.....A.....	418,992
YT7TY.....A.....	314,484
7J6ACT.....A.....	301,301
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LU7FEU.....28.....	22,680
S59D.....21.....	26,319
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KQ4HC.....	2,062,011
KZ6X.....	2,040,108
NX3Y.....	2,000,241
K3MD.....	1,843,776
KI7WX.....	1,525,667
K5XI.....	1,524,936
KR0B.....	1,402,259
NE2W.....	1,369,115
W6EEN.....	1,011,500
N5OZB.....	966,216

DX

ZX0F.....	24,096,061
HC8A.....	21,912,001
VP2E.....	11,701,794
WP4U.....	11,430,148
IR4T.....	10,234,755
TM1C.....	10,099,496
LZ5W.....	9,255,480
TK1A.....	9,153,720
TA2II.....	7,925,790
XR8S.....	7,675,670
CT8T.....	7,308,004
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CAIG DeoxIT D5 Contact Restorer

BY DOUG DeMAW*, W1FB

Both amateurs and engineers have progressed markedly since the days when health-hazardous carbon tetrachloride was the standard fluid for cleaning dirty switch contacts in electronics equipment. Since those days there has been an almost endless number of products developed for cleaning electrical contacts. Some of these products worked quite well, while others were of inferior quality. At best, normal operation was restored for only brief periods because the affected electrical contact areas would oxidize again, thereby causing unreliable performance. CAIG Laboratories, Inc. addressed this problem some years ago when it produced a spray product called CRAMOLIN. That chemical was formulated to improve conductivity, deoxidize, clean, and lubricate all metal contacts and connectors, including those with gold plating. CRAMOLIN is no longer available because the chemical makeup of the product did not meet current government standards.

The New Deoxidizer Spray

CAIG now produces a highly effective replacement product called DeoxIT D5. The propellant is Dymel 152a. Freon, which was used in CRAMOLIN, is no longer being used by CAIG.

DeoxIT D5 is designed to improve conductivity, clean, preserve, lubricate (reduce wear and abrasion), and deoxidize electrical connections. It is effective on similar and dissimilar metals, the latter of which greatly encourage oxidation and corrosion. There are no ozone-depleting CFC compounds in the new formula. This is good news for environmentalists and users alike.

DeoxIT is useful not only for amateurs, but for commercial personnel involved in the maintenance of automotive, marine, aircraft, medical, telephone, electrical, TV, computer, and a host of other equipment. For example, my computer keyboard developed an inoperative key while I was preparing a document. I squirted a shot of DeoxIT under the key tab of the defective letter, worked it up and down a few times, and then went on with the composition of my document. That key has functioned flawlessly ever since. I have treated other inoperative computer keys in the same manner in the past year. I had many intermittent keys on my keyboard keyer after 15 years of use. I sprayed all of the keys with DeoxIT, and this cured the problem. I use the spray compound twice a year to clean and deoxidize the electrical-hookup plug and socket between my camp trailer and truck. On another occasion the ignition switch on my wife's car failed to work one



CAIG Labs' DeoxIT D5 contact restorer.

day. I squirted DeoxIT into the key slot, turned the switch on and off a few times, and operation returned to normal. It is now a year later. The problem has not reoccurred.

Amateurs will find this product especially effective and long-lasting on dirty band switches, noisy potentiometers, the bearings on variable capacitors, and the movable contacts on rotary inductors. I have had similar long-lasting results after spraying intermittent relay contacts with DeoxIT. This was especially helpful with an FT-102 transceiver I owned. That model had a case history of relay failure because the gold plating on the contacts was too thin to last. Ordinary contact cleaners offered relief for a few days, but the intermittent condition always returned. One application of DeoxIT lasted until I disposed of the equipment a year later.

Other CAIG Products

CAIG Laboratories produces a wide variety of cleaners, rejuvenators, and conductive coatings. The latter product is designed especially for use as shielding against EMI and ESD. A catalog that describes the many CAIG products is available from the manufacturer.

One of the more recent products that should

appeal to amateurs and engineers is CAIG ProGold. It cleans and deoxidizes surface contamination, while penetrating plated surfaces, where it bonds physically with the molecules of the base material. Although this product is designed especially for cleaning and protecting gold-plated contact surfaces, such as PC board edge connectors and relay contacts, it provides long-lasting protection (1 to 10 years) on silver, rhodium, copper, nickel, and other precious metals. ProGold and DeoxIT are available in a variety of dispensers, including spray cans, wiping pads, pen applicators, syringe dispensers, needle dispensers, and brush applicators.

CAIG products are available from distributors throughout the USA. In Michigan the products may be purchased from S. F. Electronic Supply, 1200 Monroe Ave., Grand Rapids, MI 49505, and Audio Advisor, 4649 Danvers Dr. S.W., Kentwood, MI 49512. Information concerning your nearest distributor may be obtained by phoning CAIG Laboratories.

DeoxIT D5 and ProGold are manufactured by CAIG Laboratories, Inc., 16744 W. Bernardo Drive, San Diego, CA 92127-1904 (phone 619-451-1799). DeoxIT 5.5 ounce spray-can price class: \$11.95. ProGold G5 spray (5 oz) has a price class of \$15.95. ■

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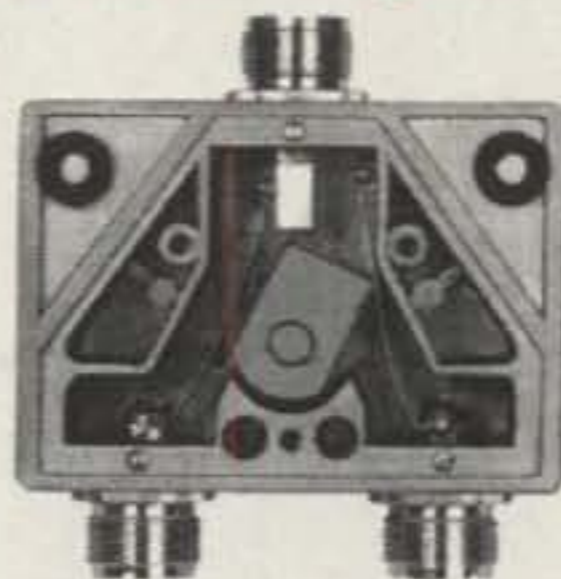
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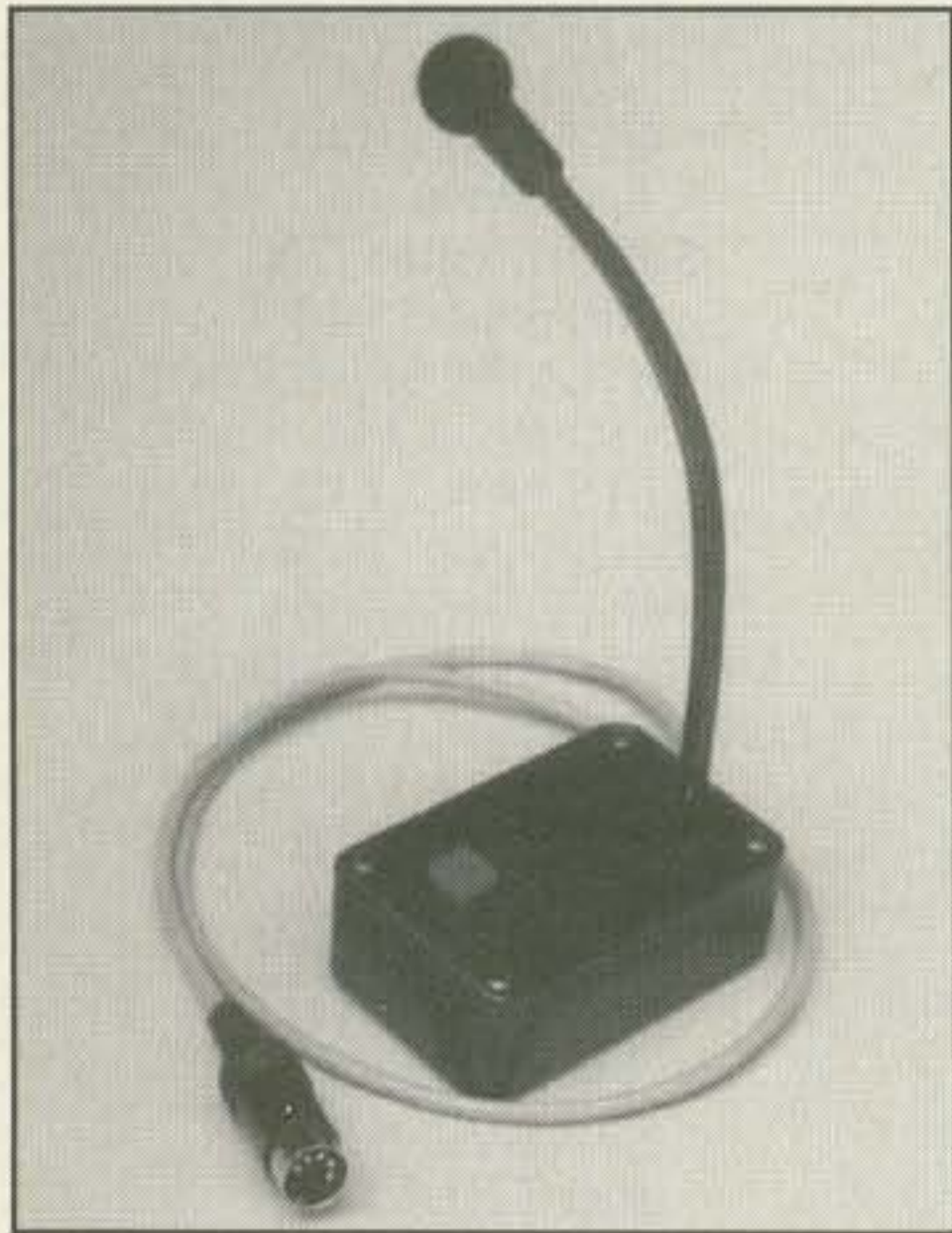
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How To Build A Desktop Microphone

Here's an interesting project that's easy to build, fun to use, and speaks right to the issue.

BY RICK LITTLEFIELD*, K1BQT



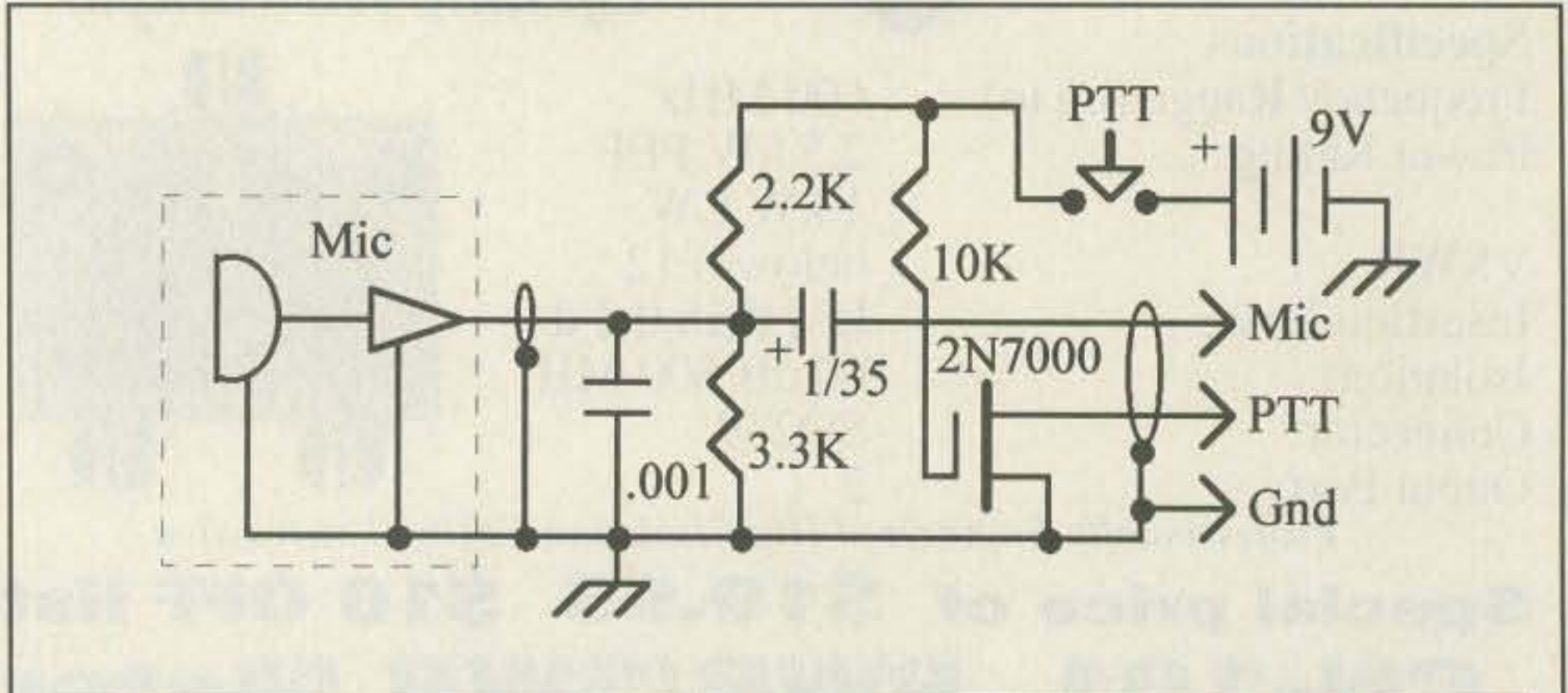
The completed electret microphone has simple lines and fits in well with contemporary radio gear.

Good desk microphones are always in demand, but the price tag on some brand-name models may leave you with sticker shock—especially if you own several radios. I solved this problem by building my own! A short trip to Radio Shack and the local hobby shop yielded most of the parts I needed, and a couple of evenings spent on light assembly produced a microphone that sounds great for a fraction of the price.

Circuit Description

The heart of this project is an inexpensive electret condenser microphone element available from Radio Shack (part No. 270-090). Don't be fooled by the low price, as speech quality is outstanding! Like most low-cost electret elements, the 270-090 has a built-in FET preamp that requires external DC power (see fig. 1). Some transceivers, especially those with 8-pin jacks, provide operating voltage for an electret element at the microphone jack. However, many other radios do not, making a self-powered design more universally useful. For stand-alone power I used a 9 volt flat-pack battery and voltage divider R1, R2 as a power source. At 6 volts the microphone element draws around 2 mA.

*109A McDaniel Shore Drive, Barrington, NH 03825



Parts List

1—Radio Shack PC-mount condenser microphone element, RS270-090.
1—Radio Shack 3 1/4" x 2 1/8" x 1 1/8" molded project box, RS270-230
1—Radio Shack "soft-feel" SPST momentary push-button switch, RS275-1566
1—Power clip for 9-volt rectangular battery, RS270-324
1—9-volt rectangular alkaline battery, RS23-553
1—Radio Shack windscreen for tie-clip microphone, RS33-4006 (pkg of 4)
1—microphone plug (RS270-025 for ICOM, Yaesu, Kenwood HF radios; RS274-003 for MFJ)

1—length of two-conductor microphone cable, RS278-514
1—10 inch length mini-shielded cable, RG-174 (remove plastic covering)
1—7 1/2 inch length K&S ST-6-3/16 inch square plastic stock
1—1 inch length K&S TB-12-3/8 inch round plastic stock
1—PC board, or perfboard with pre-drilled pads, RS276-148
1—2.2 K resistor
1—3.3 K resistor
1—10 K resistor
1—VN-10 or 2N7000 IG-FET
1—.01 μ F disc
1—1 μ F electrolytic

Fig. 1—Schematic diagram of power supply and switching circuit.

By powering the microphone element only when PTT switch SW1 is depressed, service life of the battery is stretched to approximate shelf life. The only tradeoff is loss of VOX capability; the microphone goes dead whenever the PTT switch is open, and speech signals cannot activate the radio's VOX circuitry. In addition to supplying Vcc to the electret element, PTT switch SW1 supplies turn-on bias to Q1 through R3. This causes Q1 to conduct, providing a low-resistance ground path for the transmitter PTT line. Q1 replaces the second set of contacts usually found on PTT-type "leaf" switches, and permits the use of an inexpensive SPST soft-touch switch.

While it is relatively easy to make a microphone that *sounds* good, making one that *looks* good from readily available materials can be a

bit of a challenge. To avoid the Chez plumbing-parts "white plastique" motif, I chose small, lightweight materials to complement the diminutive size of the element (see fig. 2). These items included model-builder's square-plastic tubing and a small molded project box for the base enclosure. To bring unity of form to a multi-colored collection of parts, I sprayed the box lid and neck materials with semi-flat black paint (Krylon 1613). This non-glare surface resists marking, provides a close match to the plastic project box, and also blends in well with most contemporary transceivers.

Construction

I constructed the microphone's power and switching circuitry on a small PC board (see figs.

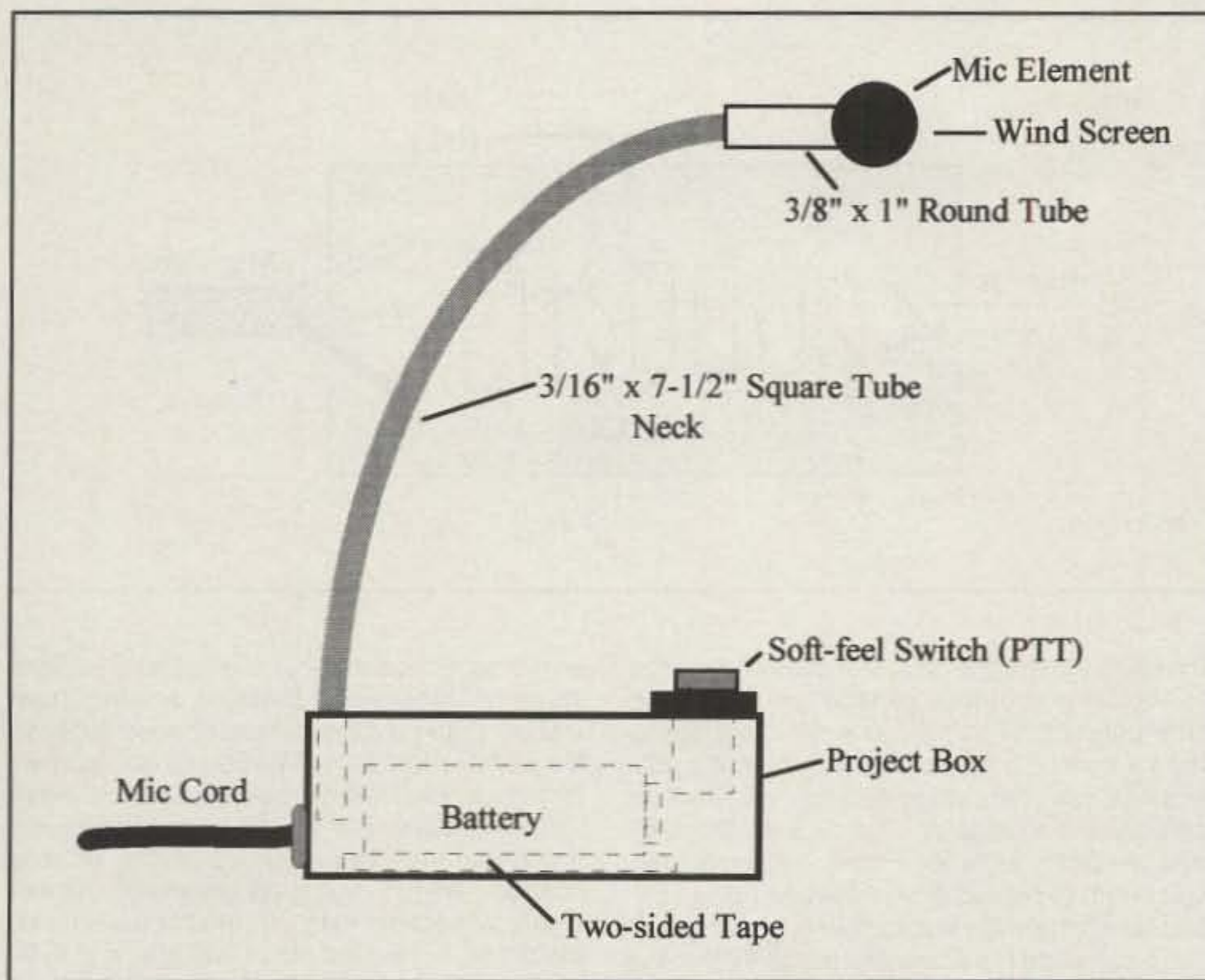


Fig. 2—Microphone uses readily available materials from Radio Shack and a hobby store.

3[A] and [B]). If you don't have PC-board materials handy, a small piece of pre-drilled mini-board—such as Radio Shack 276-148—will

work fine. Note that all tracks and solder connections are placed on the *top-side* (or component side) of the board. This provides a flat sur-

face on the bottom that permits easy mounting to the project box with two-sided tape or contact cement. Be sure to install the mic cable, element line, and battery wiring on the board before gluing the module inside the box.

K&S $\frac{3}{16}$ inch square tubing used for the neck normally comes in 15 inch lengths. Cut one of these in half ($7\frac{1}{2}$ inches), and you'll have two pieces of the correct length. Next cut a 1 inch length of the $\frac{3}{8}$ inch round plastic tube. The outside matches the diameter of the microphone element and the inside friction-fits over the square tubing. To bend a curve into the neck, I used a 4 inch diameter tin can as a form. No heat was needed. I simply bent the tubing until it retained the final shape I wanted. Once the curve is formed, slip the 1 inch transition in place, pushing it about $\frac{1}{4}$ inch over the neck. Spray-paint both pieces.

Next remove the aluminum plate from the project box and cut as shown in fig. 4. To prepare for painting, I roughed the surface with fine sandpaper and sprayed on a liberal coat of Heavy-Duty Eazy-Off™ oven cleaner (however, you may omit this step if you are uncomfortable working with caustic materials). Be sure to observe all precautions, as Heavy-Duty Eazy-Off contains lye, which serves as a powerful etchant to skin as well as aluminum. After allowing the lid to etch for about 20 minutes, rinse and dry thoroughly before painting. To prepare the molded portion of the box, drill a single $\frac{1}{4}$ inch hole in the lower left-hand rear panel and install a small grommet for the microphone cable.

To begin final assembly, locate the PC board, neck assembly, and microphone element. Install the microphone cable through the grom-

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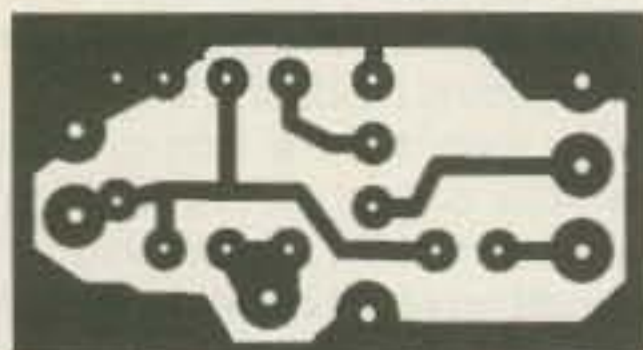
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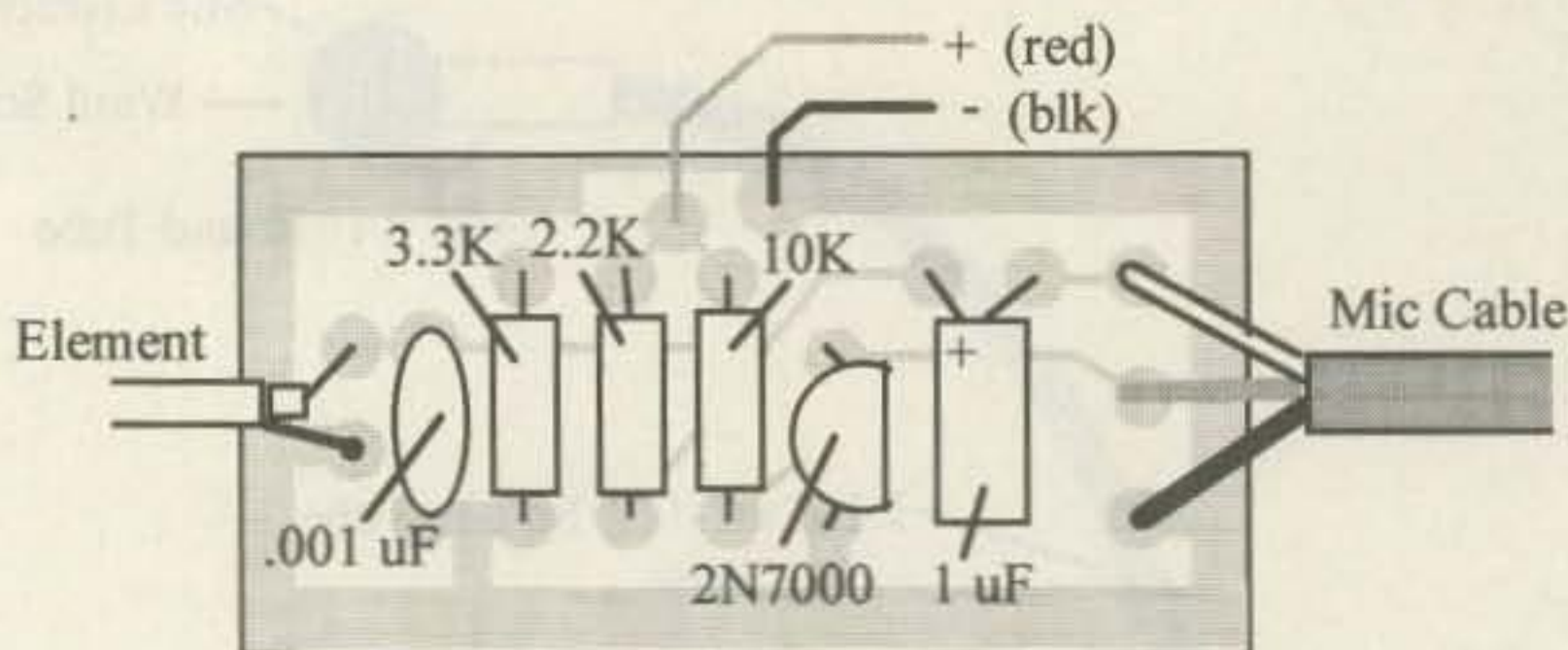
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A

Figs. 3(A) & (B)—PC board artwork and parts layout for microphone electronics. Note that parts will be mounted on the foil or solder-side of the PC board.



B

met at the rear of the project box. Next find the 12 inch length of RG-174 element cable and measure 3 inches from the PC-board termination. Remove the outer insulation from this point to expose the shielding braid. Removing this allows the RG-174 to fit inside the square K&S neck stock. Thread the shielded line through the neck until it exits the transition piece. Clip both microphone element terminals to about 1/4 inch, and solder a line lead to each, connecting the shielded side to the case terminal. Make sure the terminals are separated and don't short circuit when installed inside the transition.

To secure the element to the neck, coat the joining surfaces with a thick layer of contact cement and set aside to dry. When dry, align

the element with the neck and gently tug on the PC-board end of the shielded line to pull the cartridge snugly to the neck. Press firmly to form a bond. To mount the neck onto the project box, coat the mating surfaces with contact cement and allow to dry. Then clamp the neck and box firmly together. Finally, secure the circuit board to the left side of the box using contact cement and the same mounting technique.

To complete the assembly, install SW1 in the box lid. Now cut the red battery-clip lead about midway and solder each end to a terminal of the PTT switch. To secure the 9-volt battery in place, install strips of two-sided tape on the bottom of the box. Plug the battery into its snap connector and position it on the tape. Make sure the battery clears the switch body when the lid is installed. To finish off your microphone, install the foam windscreen on the element. This may take a bit of stretching, but it will fit.

Operation

When installing the transceiver microphone connector, be sure to consult your operating manual for the jack pinout. Also, check the radio's specification sheet or schematic to confirm that the PTT switching circuit uses a low-current ground path for activation. Some radios may employ load-sensing on the microphone element line, or may hot-switch +12 volts directly to the radio's T/R relay. These circuits will not activate with your microphone, and the latter type may damage the switching transistor in your microphone. Most modern SSB and FM-mobile transceivers are compatible with the microphone and will work fine.

This particular microphone is categorized as

an *omnidirectional electret* device, and exhibits some characteristics that are different from *unidirectional dynamic* microphones such as the popular Kenwood MC-60. To get top performance, you'll want to be aware of what those differences are. For one thing, the omnidirectional pattern may pick up more off-axis sounds—things such as amplifier blower noise, screeching kids, etc. On the other hand, the element has less acoustical coupling to its enclosure, so you can expect fewer problems with low-frequency hollowness and desktop thumps. Also, because the element is electrostatic rather than electromagnetic, you may pick up less interference from magnetic fields generated by power-supply transformers and computer monitor fly-backs. You may even notice less *proximity effect*—a tendency for a microphone to sound progressively bassier as you speak closer to it. On the cautionary side, "close-talkers" should back off a bit, as it is somewhat easier to overdrive electret elements than dynamic cartridges. For best results, position your mouth 2–3 inches from the element and talk past the windscreen at about a 45-degree angle. This technique is used by broadcasters and professional narrators to obtain the best speech intonation and signal-to-noise ratio when recording or transmitting.

On-the-air reports with this microphone have been excellent. I now have three of them which I regularly use on the MFJ Travel Radios, Kenwood TS-440, and VHF-FM rig. RF immunity appears good, and speech quality remains unaffected when I kick on amplifiers. The first prototype has been in service for over a year on its original battery and still is going strong. Why not give one a try? ■



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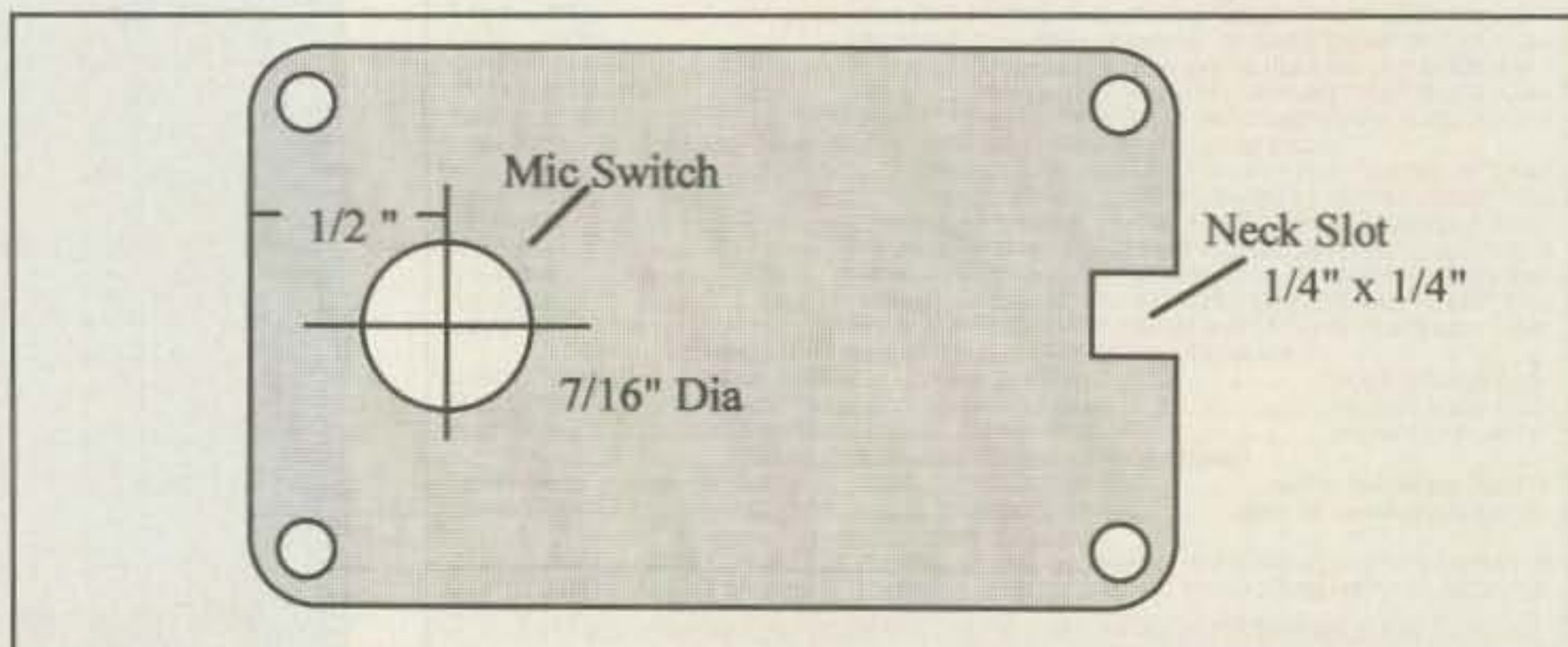


Fig. 4—Pattern for preparing the project box cover.

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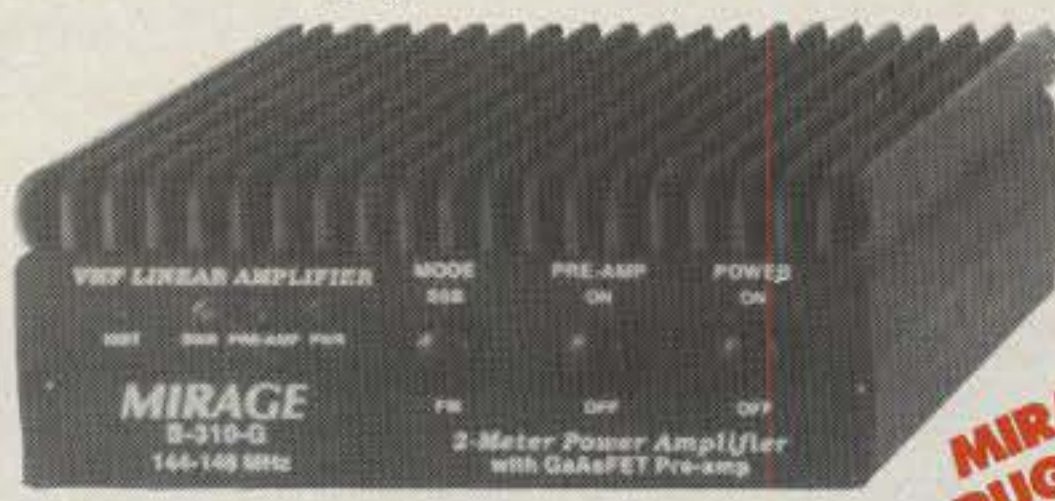
Boost your 2 Meter handheld or multimode (like ICOM 706) to a super powerful 100 watts... All modes: FM, SSB, CW... 18 dB GaAsFET receive preamp... Reverse polarity protection... Silent cooling fan... Free HT-to-amp coax and mobile bracket

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B-310-G Suggested Retail



MIRAGE RUGGED!

Polarity Protection can save your amp if you connect power backwards.

Compact but Powerful

Mirage's integrated HeatsinkCabinet™ and whisper quiet fan gets heat out fast!

The results? An ultra-compact 4³/₄x1³/₄x7³/₄ inch 2¹/₂ pound amplifier that delivers a super powerful 100 watts.

Free Accessories

Free 3 foot handheld to B-310-G coax cable -- just plug and play! Free mobile bracket! Free rubber mounting feet for home use!

Plus more...

Automatic RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

Full one year MIRAGE warranty

With Mirage's legendary ruggedness, you may never need our superb warranty.

Power Curve -- typical B-310-G output power

Watts Out	25	50	75	95	100	100+	100+
Watts In	1/4	1/2	1	2	4	6	8

For an incredibly low \$199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!

Turn "You're breaking up... Can't copy" into "Solid Copy... Go ahead."

Talk further... Reach distant repeaters... Log onto faraway packet bulletin boards. This rugged Mirage B-310-G amplifier

operates all modes: FM, SSB and CW. It's perfect for all handhelds up to 8 watts and multi-mode SSB/CW/FM 2 Meter rigs.

It's great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!

Low noise GaAsFET pre-amp

A built-in low noise GaAsFET receive pre-amp gives you 18 dB gain -- lets you dig out weak signals.

Fully Protected

SWR Protection prevents damage from antennas whipping in the wind. Reverse

Dual Band 144/440 MHz Amp



\$199 BD-35 Suggested Retail

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Power Curve -- typical BD-35 output power

Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

Add this Mirage dual band amp and boost your handheld to 45 watts on 2 Meters or 35 watts on 440 MHz!

Works with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

Full Duplex Operation

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- Custom wrap-around heatsink -- runs cool

- Reverse Polarity Protection -- saves your amp if you connect power backward

- Automatic RF sense Transmit/Receive switch -- makes operation easy

- Low input SWR -- keeps your handheld safe from overheating

- "On Air" LEDs -- for each band

- Free mobile mounting bracket

- Free 3 foot handheld-to-BD-35 coax cable

- Small size: just 5x1³/₄x5 inches

- Full one year MIRAGE warranty

- Legendary MIRAGE ruggedness

Call your dealer today for your best price!

35 Watts for 2 Meter HTs

B-34-G

\$99

Suggested Retail



Power Curve -- typical B-34-G output power

Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- 35 Watts Output on 2 Meters

- All modes: FM, SSB, CW

- 18 dB GaAsFET preamp

- Reverse polarity protection

- Includes mobile bracket

- Auto RF sense T/R switch

- Custom heatsink, runs cool

- Works with handhelds up to 8 watts

- One year MIRAGE warranty

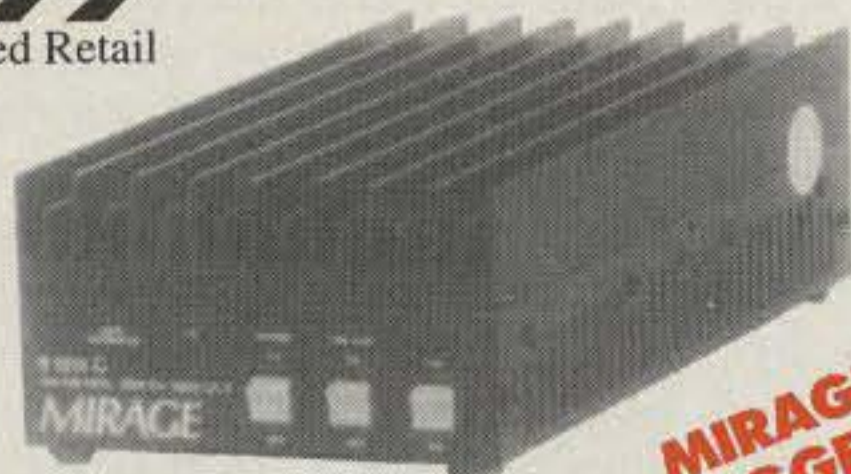
35 watts, FM only... \$79

B-34, \$79. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3¹/₈x1³/₄x4¹/₄ inches.

MIRAGE RUGGED!

160 Watts on 2 Meters!

B-5016-G **\$299** Suggested Retail



MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power

Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. Power Curve chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. We know of one that has been in constant use since 1979!

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's Therm-O-Guard™.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1, \$45, Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5¹/₂ in.

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CIRCLE 145 ON READER SERVICE CARD

The New Vibroplex Straight Key

BY JOHN DORR*, K1AR

With all the talk about WRC-99 and CW's role in the future of amateur radio licensing requirements, Morse Code has risen to a rather high-profile state in recent months. When you really stop and think about it, however, Morse Code is as old as amateur radio itself; in fact, it's older!

One of amateur radio's strengths over the years has been its diversity. Whether your interests lie with satellites or traffic handling, there's something for everyone. CW operation is just one of those areas of avocation. While CW has taken a back seat with many of today's amateurs, for others it is still as vibrant and active a mode of communication as ever.

When thinking about CW in amateur radio terms, you can't help but recall one of amateur radio's most recognized icons: The Vibroplex Company. Vibroplex has been in existence since 1890, and a *CQ* advertiser since 1947! After "bug" inventor Horace Martin joined the company in 1904, Vibroplex began marketing its Morse sending products to commercial telegraph operations and eventually to amateur radio users, too.

Perhaps the best-known key of all is the infamous J-38 straight key. Few old-timers missed out on the excitement that came from getting on the air for the first time and tapping out that initial CQ on a J-38 style key.

Vibroplex, in the spirit of its fine tradition, has just announced the new Vibroplex Straight Key, and *CQ* was fortunate to receive one of the very first units off the assembly line. This charmer represents everything you would expect in an industry-leading product. Its sheer weight—over 3 pounds—makes this key a perfect addition to your station, whether you intend to install it for active use or simply use it for display.

As you might imagine with a key as beefy as this one, I did not experience any movement around the table while I was sending. Using the same lever shape as the old J-38, this is a finely-machined collectible that can be used in everyday operation, making it a breeze to send CW "the old-fashioned way." Vibroplex's engineers have gone a long way to ensure that the key's adjustable spring tension and sending pad make the unit comfortable for



An old classic and a new one. Shown in this photo is the deluxe version of the new Vibroplex straight key.

just about any fist. You'll also appreciate the pre-wired connecting cable with a standard 1/4 inch RCA connector on one end and spade lugs on the other end.

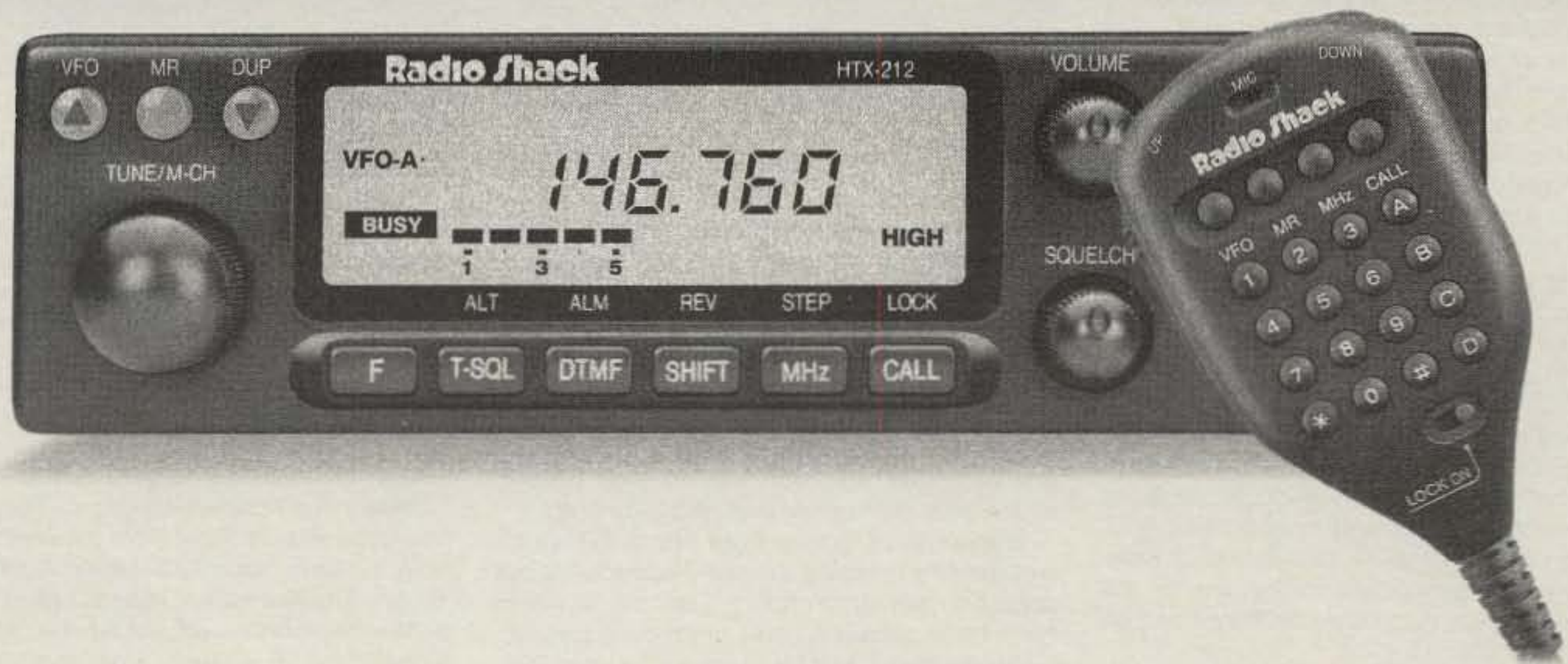
Many of the technological advances in amateur radio—such as packet, satellites, weak-signal operation, software, and other areas—have overshadowed our long-standing traditions. Yet when it comes to the old days of Morse keys, the collectible market is as strong as ever. Several members of the "CQ gang" are proud owners of scores of antique keys in their growing collections. The new

Vibroplex Straight Key will be a welcome addition to these collections, and just may be a good place for you to start yours!

Vibroplex's new Straight Key is available in a deluxe model (chrome base) or a standard version (black-powder coated base). Each key is delivered with its own unique serial number. List price for the deluxe beauty is \$174.95 and for the standard unit \$139.95. For more information, contact The Vibroplex Company, 11 Midtown Park, E., Mobile, AL 36606 (phone 800-840-8873; fax 334-476-0465), or visit your local amateur radio dealer.

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ZL8RI

The Kermadec Islands Story

Were you one of the lucky ones? ZL2AL tells us what it was like on the other end, and what it took to put that smile on your face.

BY L. F. (LEE) JENNINGS*, ZL2AL

Actually, a major DXpedition doesn't just "happen." It takes just about as much organization as a NASA space flight (and costs about the same!).

After operating ZL7AA in 1993, I was hooked on pile-ups. A rumor that the Kermadecs was in the planning stage surfaced in late 1994 through a close friend, Ron, ZL2TT. I put my name forward. "Ken who?" I said, when I learned that the organizer was not some well-known, Honor Roll DXer.

My first meetings with Ken Holdom, ZL2HU, in 1995 confirmed that Ken was a "detail man" and a very skilled administrator with plenty of experience in dealing with government departments that thought that Raoul Island was the preserve of a few well-healed, gray-shoed scientists and visiting dignitaries from New Zealand. The Department of Conservation (DOC) was demanding passports, dictating terms, and offering very little. During 1995 the letters flew around the houses of bureaucracy in New Zealand. Eight loose-leaf binders full of hundreds of letters to everyone except the Queen and the Sultan of Brunei was testimony to Ken's dogged determination and belief that it would happen—and he was going to make it happen.

By late 1995 the Department of Conservation had not only heard of Ken, but was eagerly offering us facilities on the island (at a price). They couldn't wait to issue permits as long as they could be convinced we wouldn't be smuggling wild and exotic fauna and flora off the island, nor introducing mice to the island. I never was a gardener, and I don't like mice!

The Radio Frequency Service eventually issued our requested call of ZL8RI, and the Department of Conservation and other government departments all capitulated in time. Permits were very specific for landing on the island—no earlier than dawn on May 4 and off the island by May 14.

The beginning of 1996 saw the team firm up to include Ken, ZL2HU; Ron, ZL2TT; Lee, ZL2AL; Chris, ZL2DX; Al, WA3HYN; and Bin, JA3EMU. Peter, ZL3GQ, joined us in the two months before we left. The seven members of the team had over 220 years of amateur radio experience among them. 5BDXCC, 5BWAZ, and DXCC were plentiful. Five of the seven



Getting there isn't always half the fun. Our "Voyage from Hell" faced 20 foot seas, which is one way to lose weight fast.

members were active CW operators. From the outset, it was apparent that our combined contesting and DXing experience would be invaluable on Raoul Island.

Early meetings showed that a DXpedition of this size was almost an impossible challenge. Obtaining \$45,000, a 75 foot ship, generators, and five drums of diesel fuel was the major problem. Gathering operating gear, computers, antennas, and food was another. Getting all the gear there and back was daunting.

Hundreds of letters went out to DX clubs worldwide. Financing a major DXpedition is like collecting money for charity. Climbing K2 would have been easier! As time went on, however, financing began to look "possible" in late 1995. Response was muted at first, and help came slowly. Organizations such as the INDEXA, NCDX, RSGB, CDXC, EUDXF, LADXA, Clipperton DX Association, Danish DX Group, JA DX groups, and other small clubs worldwide promised finance because Raoul had not been operated significantly since the early 1980s. It was the number one Most Wanted country in Europe, and was on most club lists worldwide in the top ten. Individual amateurs who needed ZL8 helped with some amazing donations.

March 1996 brought the news that Yaesu and the Nagara Antenna Company would generously help with equipment and QSLs. Brilliant! We all heaved a sigh of relief, and planning took on a new urgency. ZL8RI was rapidly becoming a reality.

History

Raoul Island is the largest island of the 15 islands in the Kermadecs group. They are 680 nautical miles off shore from the northern tip of New Zealand, midway between Auckland and Tonga. The Kermadec Islands are actually the peaks of submerged volcanoes which rise higher than Mt. Everest from the 30,000 foot depths of the Kermadec trench. This ocean chasm, one of the deepest in the world, was formed from the subducting of the Pacific plate under the Indo-Australian plate. Raoul Island is the 3000 hectare northernmost island in the group, with sea cliffs soaring up to 800 feet. Basically, Raoul Island is a live volcano! Wisps of steam still rise from a gaping caldera in the center of the island. Three lakes lie in the craters of past eruptions. The last eruption was in 1964, when black mud, steam, and rocks shot

*203 Beresford St., Hastings 4201, New Zealand

up 24,000 feet. Earthquakes, one as recently as a year ago, still scare the pants off the few DOC officers who live permanently on Raoul.

Cyclones are regular visitors, and although the climate is sub-tropical, weather surprises are often in store for the unwary. Raoul, the only weather station in the empty seas to the north of New Zealand, is an important link in the global weather network.

Oranges, bananas, and passion fruit grow there, and a visitor to the island in the late 1880s recorded 54 species of exotic plants. The island was privately occupied by the Bell family from 1878 until it was annexed by New Zealand in 1937. Prior to the Bell family residing there, it was a whaler's and seabird's paradise. In 1990 the Department of Conservation created one of the largest marine reserves in the world when it protected 4000 square miles of sea and coastline around the Kermadecs from exploitation and damage. Water temperatures are 3 to 4 degrees Celsius warmer than the warmest coastal waters in New Zealand.

The Beginnings

The plan was to assemble at Lee's home in Hastings at the end of April, welcome our overseas visitors, spend a few days getting to know each other, load the ship, and plan operating strategy. We were assuming that there would still be the odd sunspot left for us, but I personally believe that Mother Nature is married to Murphy, and that unholy alliance has the potential for disaster at the best of times. We simply decided to ignore the sunspot count, K-index, and other things solar, and hope they would ignore us.

The final meeting of the New Zealanders took place at the end of April, one month before the scheduled departure. Ken confirmed we had finances in the bank to at least get there. The last month seemed to compress into a few days. Finally, Al and Bin arrived from overseas in Wellington to meet Ken. Peter arrived from the South Island, and the full team arrived in Hastings on April 28 for the last few frantic days of checking, procuring items we had missed on prior lists, and making last-minute changes to some of the gear. Cutting coax lines, checking connectors, and packing expensive radios in waterproof plastic wrap was completed. Simple things such as remembering a drum pump for the drums of diesel fuel could have proven embarrassing. There is no electronics store on Raoul Island. Forgotten items could cost us dearly later. It was also a time during which we got to know Bin and Al. They soon found out what "The Kiwi way" is. It's to go with the flow. It's to improvise and change on the run. It's solving problems before they arise.

April 29 saw us inspecting and beginning the loading of the yacht *Evohe* at the Port of Napier, which is situated 10 miles from Hastings. The *Evohe* is a 75 foot, two-masted, steel-hulled, motor-sailer ketch with all the latest Sat-Nav equipment on board. The yacht can accommodate 7n crew members and 14 passengers and has sailed to all parts of the globe. Safety was our concern, and the *Evohe* met our requirements easily.

Ron and Lee went to the local supermarket and bought food and provisions for the 11 days we were to be on the island. The manager rubbed his hands in glee as he took delivery of his new Rolls Royce. The evening of departure was party time with 20 or so local ZL amateurs

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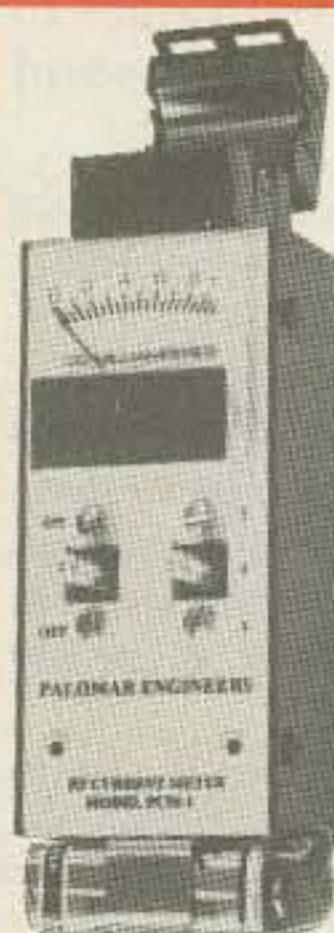
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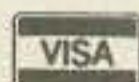
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With relatively calm water we transferred gear from the yacht Evohe to the zodiac and headed for shore.

at Lee's home to wish the team well. Anticipation was at fever pitch, and few of us slept well that night.

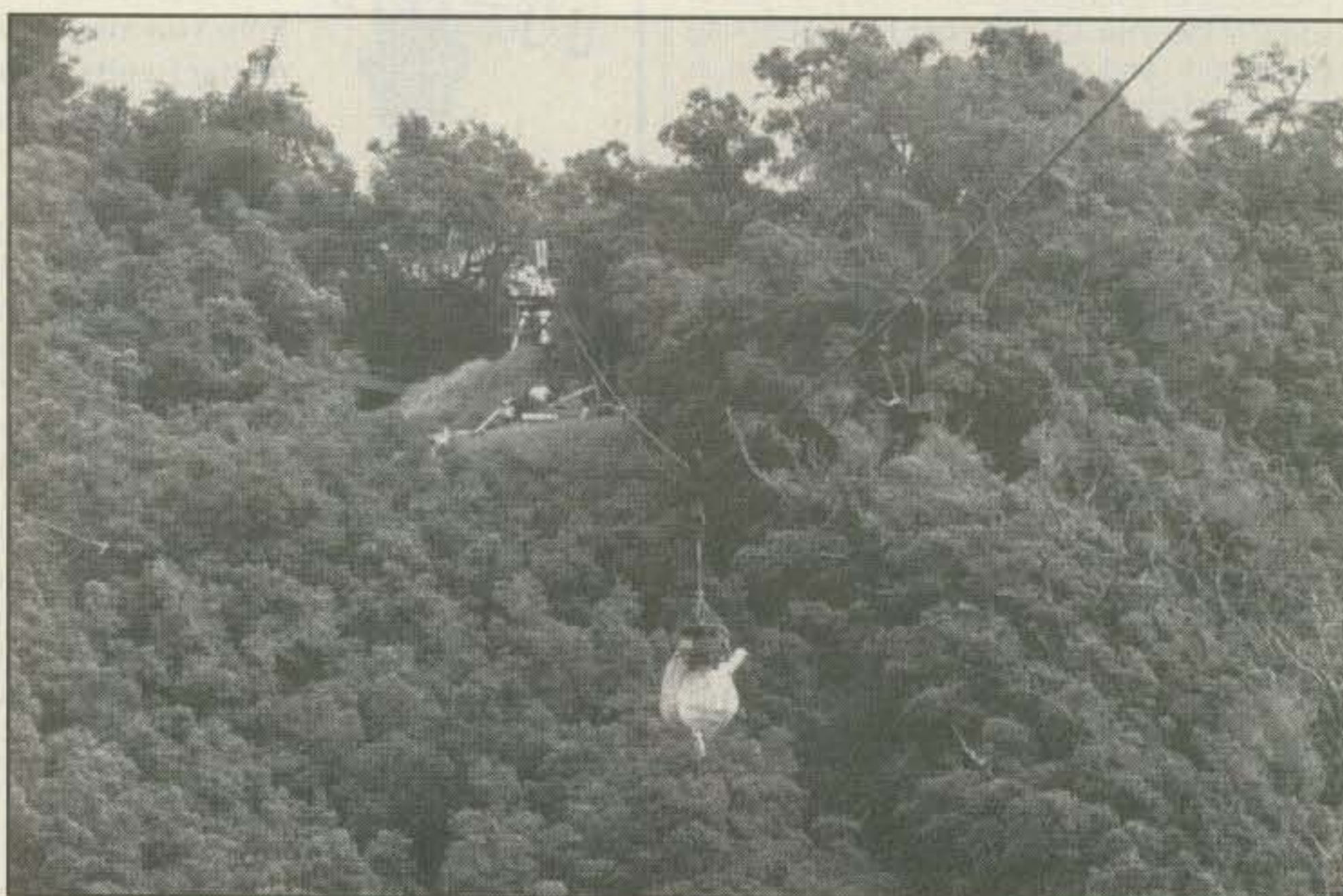
The Voyage

The morning of departure saw us all up early and at the wharf. We were ready to go at 9 AM. Unfortunately, the captain wasn't. Neither was the ship. At 1:30 in the afternoon, after frustrating passport, customs, and fueling delays, we departed Napier. Four hours out after a fine cruise the weather took a turn for the worse, and most departed the decks and went below.

Twenty-four hours later saw us 220 nautical miles on our way in rough seas with 10 foot waves, the bow pitching 15 feet and the yacht rolling 30 degrees in a following sea. And then

it got worse! A simple exercise such as walking from the bunk to the main cabin was fraught with danger. Several of us were thrown around the cabin or companionway into fixed furniture. The offer of dinner brought polite refusals from all of us. Most of the team ranged in color from a shade of white to a puce, bordering on green. Most lost weight. Ron's bloodshot, pleading eyes over the top of a paper bag told the story.

Occasionally, between the northerly storms and fronts through which we sailed, a lull saw Al and Chris operating the IC-735, which was part of the yacht's radio gear. Good DX was worked with an L-shaped vertical winding its way up through the masts and rigging. More important, we were able to communicate with our ZL friends in New Zealand, who excelled in keeping our families informed.



All of our gear, including the generators, was hoisted up the steep incline via a "flying fox," a mechanical marvel.

As each degree of latitude decreased on the GPS, we noticed it was getting warmer, and the seas were getting rougher. Rolling 30 degrees side to side and pitching 20 feet at the bow was a nightmare—if you could have one. Sleeping in the forward bunks was impossible, with the bed disappearing 20 feet below us in a few seconds, followed by the same rise, which compressed our stomachs with the G-force of a stunt pilot's aircraft. The rest of the trip to Raoul Island was more of the same. We all existed in a trance-like state in a twilight zone waiting for the end.

Arrival

Suddenly it was over. Raoul Island appeared like a dark cloud on the horizon early on the morning of May 4th. By 8 AM Keith Springer, the officer in charge of the Department of Conservation on Raoul, had been contacted on marine VHF for assistance in getting ashore. We moored on the northeast side of the island at a place called Fishing Rock, which has a gantry crane and flying fox operated by the DOC. We surveyed this dormant but active volcano, and it suddenly became obvious why landing is difficult. Rough seas, rocky beach, difficult access, and a daunting 800 foot cliff face to climb present major problems.

The procedure for landing was simple. We got the gear out of the ship's hold and into a Zodiac. We then raced the Zodiac to shore with the gear in the cargo nets and made a flying pass at the crane hook. We snagged the net full of gear onto the hook as the zodiac pitched up and down 3 to 6 feet in the swell. We dodged the load as the crane winched it up and swung it around onto the rock. We then loaded the gear onto the flying fox and watched it disappear up the cliff face to the top of the foxway. Next we unloaded the gear from the net and onto a large trailer pulled by a tractor and drove the load about two miles to the "woolshed," which is not a woolshed at all, but a tiny four-room house.

We repeated this procedure many times, and many hours later we are ready to set up. It was homecoming for Chris, ZL2DX, who worked on the island in 1986 as a mechanic. It was his job to dismantle a tractor in New Zealand into little pieces, bring it to Raoul, transport the pieces up the foxway, and reassemble the beast at the top. You guessed it. Same tractor. Chris's eyes were moist.

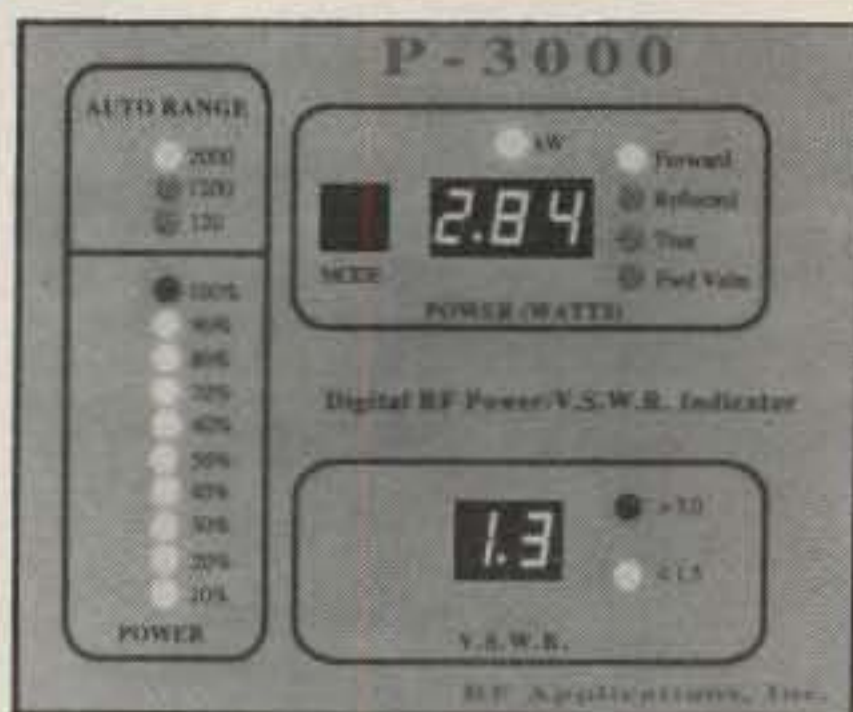
People are not allowed the luxury of the travel up the fox. They walk, if they manage to survive the hazardous transfer from the zodiac and scramble up the rock to the base of the crane. "Between a rock and a hard place" takes on a whole new meaning when you have just seen a shark circling your yacht half an hour before you make the landing. You become very determined to make the rocks the first time between the swells. The water is not an option.

Setup

Finally we had arrived and it was all on. "80 meters in the kitchen . . . 40 and 20 meters in the bedroom . . . let's put the FT900s on 12 and 17 in the small room . . . bunks in there . . . that 120 foot pine tree would make a great antenna support. . . get the generators into the hut. . . anybody know where the roll of coax went? . . . who's got the soldering iron? . . . where's the FT1000 manual? . . ."

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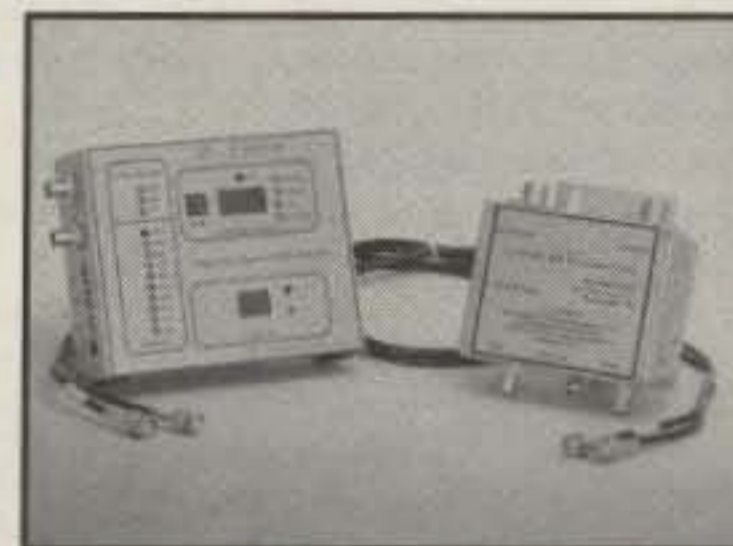
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The intrepid crew of the Kermadec Islands DXpedition is shown upon arrival off Raoul Island. The best is yet to come. From left to right are Al, WA3YUN; Ron, ZL2TT; Ken, ZL2HU; Chris, ZL2DX; Lee, ZL2AL; and Peter, ZL3GQ. Bin, JA3EMU, is kneeling in front.

And so it went for the next 24 hours. Two tri-banders, a WARC duobander, and four verticals went up without mishap "Slingshot Al," WA3YVN, used his device with deadly accuracy to place lines up over the huge Norfolk pine trees just outside the operating shack to hoist the giant delta loops. All antennas went up without a hitch. Bin, JA3EMU, produced an antenna analyzer "black box" out of his toolkit and pronounced that the systems would work. Even the generators cooperated for a while. We started to come to grips with the rats, cockroaches, and ants which had obvious designs on our food stores.

The DOC staff on the island invited us for a barbecue that night. We debated whether or not we should we take 3 hours off. It was a unanimous yes! And what a pleasant affair it was, with the DOC staff turning on a very informal, but typical Kiwi welcome. The team left as soon as was socially acceptable and returned to getting on with setting up in spite of the lack of sleep over the previous four days. Anticipation grew. Murphy was around in minor ways, but he was tired, too.

We're On The Air!

Initial plans called for getting each station on as quickly as possible. Al suggested that we wait and go on the air with a full operation, making the most impact possible. Reason prevailed even though we all wanted to get the first QSO in the log.

Individual operator schedules were charted on the wall. It was agreed months earlier that the first QSO belonged to Ken, ZL2HU. May 5, 1996 at 0410Z, ZL8RI on Raoul Island was on the air with a major operation. We tried to prepare Ken for what some of the more experienced members of the team knew would happen when he called CQ on 14.195. He made his call, released the boom mic VOX, and stared at the radio in disbelief when he was "jumped" by over 1000 screaming voices cov-

ering 20 meters up to 14.250. AA2GQ got the first one. Ken worked a few more and turned the mic over to Al. He was visibly shaken by his first encounter with serious pile-ups.

Other stations followed on all bands. The pile-ups grew and grew. We could take any band, call CQ, and amateurs all over the world were waiting. Five minutes later we hit the packet clusters and all hell broke loose. It was hour after hour of adrenaline pumping amateur radio at its best. Ron was waving his hands around and shouting "sayonara" while Peter, ZL3GQ, grasped the Bencher paddle like he was holding onto a \$1000 bill. If DXers are seen by the rest of the amateur radio community as a little "funny," then DXpeditioners are really the "lunatic fringe."

We were astounded at the interest ZL8RI created. Constantly monitoring of our progress on K1EA's CT logging program showed CW rates approaching 200 per hour, while SSB rates soared over 275. Hour after hour it went on. And they still kept coming. It was amusing to log some of the more unusual ones. Beaming the USA on 15 meters produced an EA9. Out of a horrendous pileup on 80 meters SSB popped K6UMB/M. One of the last QSOs was a VE3 operating portable in Syria.

Twenty-four hours later we started posting QSO totals on a wall chart for all operators. Totals were taken from the computers and hand logs each day around 4 PM. The first day showed nearly 5000 in the log. Peter, ZL3GQ, and Bin took over the RTTY and CW operations on the lower bands with great success. During the last weekend of ZL8RI, the Volta RTTY contest was on, and Peter and Al found themselves very popular indeed. Bin spent the evenings on 160 and 80 meters trying to give vital lower band contacts to as many as possible among appalling QRN. Many W's, JA's, and VE's were worked.

We originally had targeted 30,000 QSOs for the operation, and we were tracking our target well. Operators settled in to daily routines.



Ron, ZL2TT, concentrates to pull another one out of the pile-up.

Some enjoyed the night work. The division between day and night became blurred. Sleep was difficult with the noise of generators and QSOs ringing in our ears. I have a small electronic alarm clock which emits a repeating "dit-dit-dit" at 500 Hz when it goes off. One night,

at 2 AM, when it went off to remind me of my late shift, I awoke with a fright, mentally looking for S51H. As the crickets chirped outside the tent in the silence of the night, it dawned on me that the pile-ups were taking their toll on my mind and I was losing it!

I found that the Europeans peaked from midnight until about 4 AM local time on 20 meters and used that opportunity to give them some joy. Europeans were difficult to work at the best of times. They tripped all over themselves in the pile-ups. Some countries in particular thought that the best way to work DX is to find the center of the pile-up, crank up as much power as possible, set the keyer to 40 WPM, and let loose. They did n't fair well with us. QSO rates dropped to 50 to 75 per hour, but we persisted because we tried to give every area in the world a fair share of air time.

How To Work DX

Meal times provided a little sanity to our existence. Aside from comments and compliments to the chef (we all cooked), talk revolved around the huge pile-ups and how it all was going for us. Accolades were welcomed. We often talked about how many amateurs missed us and why they were not successful in the pile-ups. DXpedition ops always take the path of least resistance—the easiest to work. It either comes down to a very loud, clear, properly modulated signal on the top of a pile-up or working the "cunning foxes" on the side of the pile-ups. These "foxes" would look at the width of the pile-up, and position themselves on the up side just out in the clear, but very, very near the edge. They would then call about 15 WPM on CW, or slowly with proper phonetics on SSB. Short calls followed by listening for four seconds (that's as long as it takes us to load their call into the computer) produced the results



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every time. No result and the foxes would repeat again and again, same rate, same method, and they got my attention because they were easy to work. The G's, OH's, ON's, and SM's are good at it. The W's are better. The JA's are masters.

I asked Bin, JA3EMU, why the JA's are such superb, disciplined operators. The answer was formal training in their clubs. I wonder how many clubs around the world actually have experienced DXers teaching their members how to be effective operators? Power, compressors, and big antennas pale into insignificance when compared with style, experience, and cunning.

The Great Volcano Trek

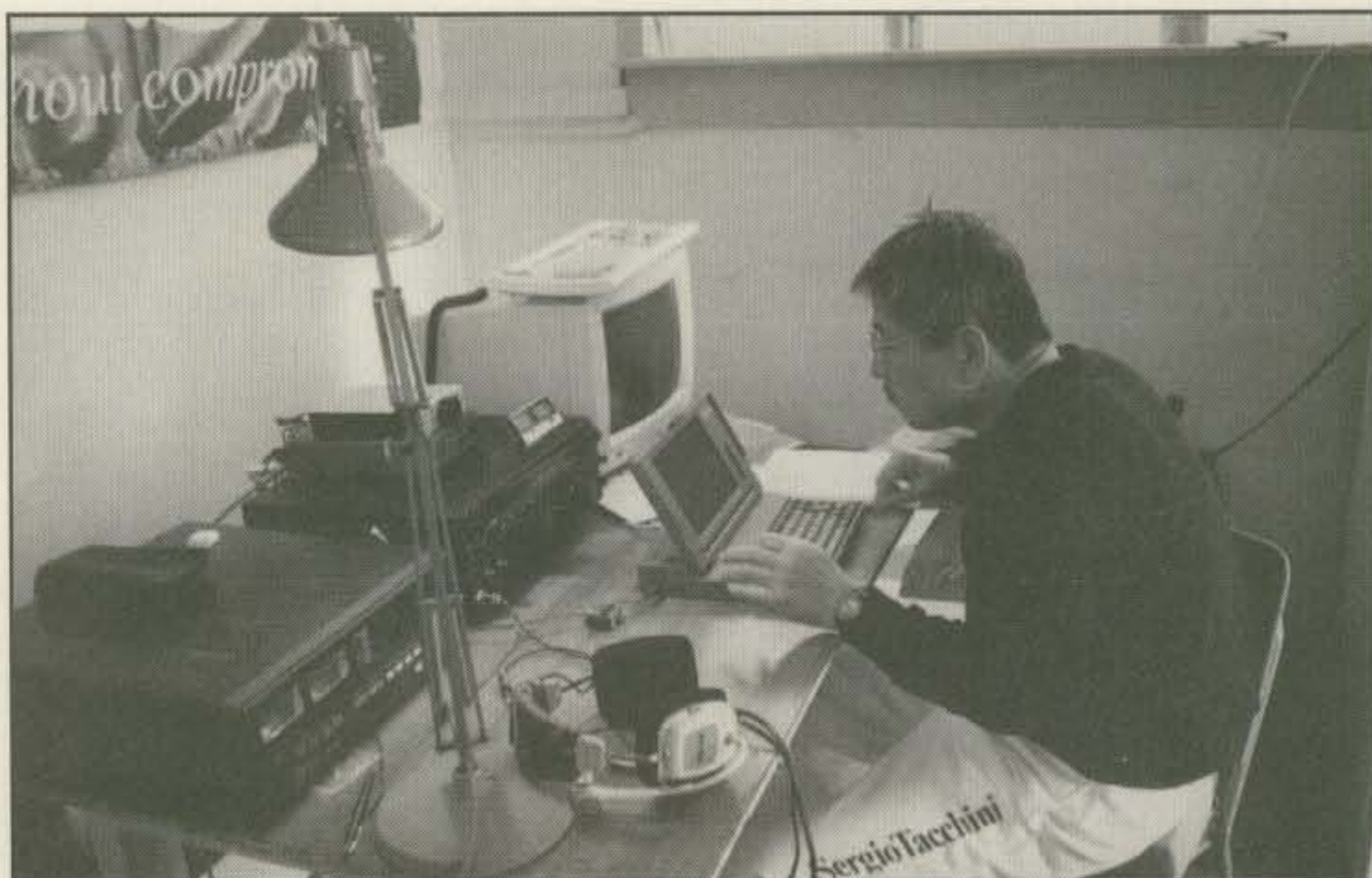
Since we were on a live volcano, we thought that we should go and see it. Ruth, a farmer from Tuatapere in the South Island and a volunteer DOC worker for only four months, offered to guide Ken, Peter, Ron, and me for a morning trip to see the crater. At one time the island was a paradise for sea and land native birds. But the introduced goats, rats, and weeds have caused major ecological problems. The goats ate the native shrubs and trees. The rats raided the nests and ate the birds' eggs. The remaining birds spread the weed seeds. The DOC eliminated the goats about twelve years ago. They are keeping the weeds under control and eliminating some species. The rats are everywhere and will be dealt with when the weed problem is solved. Then, so the theory goes, the native and sea birds will return. The birds are plentiful in adjoining islands where there are no rats.

Somehow I had this funny impression that one walks to the crater and looks down into it, suitably impressed. Wrong! The Raoul Craters (three of them) rise up out of the island nearly 1500 feet, and you have to fight your way up narrow tracks for an hour or so to get to the lip of the rim. You then descend down into the crater through the bush. Bush? In some places the island is dense bush with Pohutakawa, Rimu, and other native trees and shrubs. The volcanoes haven't erupted for many years in any major way, and there is a thick native forest on the island which makes the going hard at times.

We finally made it to the warm lake in the cauldron of the crater and watched live steam vents on the side of the crater and hot gas vents at the edge of the Blue and Green crater lakes. The remains of twisted and gnarled trees lay strewn around the ground, evidence of the 1964 eruption. On average, Raoul erupts every 30 years. It has been 28 years since the last one, and although it may have been my imagination, we made the trip back to the rim of the crater a little quicker than it took to go in. It was a very enjoyable trip, and our gratitude and thanks must go to the local DOC staff for the opportunity to visit the craters.

Murphy Strikes

We were growing more tired with each day, but the daily totals kept mounting and our target chart showed that we could achieve our goal. And then Murphy struck on May 12 early in the morning. One of the two 5 kW generators seized and died. Within a few minutes all unnecessary power drain was cut, some linears turned off, and we reduced to three stations. Within 24



Sans green keys, Bin, JA3EMU, logs some RTTY time.

hours one of the tri-banders developed trouble. No signals. Dummy load. The team pressed on and totals still mounted, but it was obvious that Murphy should not be tempted again.

Our license and permit dictated that we had to be off the island by May 14. During the 24 hours before departure all nonessential equipment and gear was repacked and boxed ready for the trip home. The last QSO with UR4LCH at 1600Z passed unremarkably on the morning of departure.

It was daybreak. The team worked feverishly at taking down the antenna systems and loading the trailers for the trip back to Fishing Rock and the gantry crane. The DOC staff arrived at 10 AM and started moving the tons of equipment. We carried the computer log disks by hand. One of our contacts in the USA in the last few days quipped, "If the boat sinks, make sure you save the backup disks."

Ron, who went with the first load to the top of the foxway, reported on VHF that the tractor had broken down after the last load. Murphy struck again! We had to walk the 2 miles out to the foxway. It was a beautiful morning and the sun was shining, so the trip along the top of the cliffs gave us a good chance to look down on the beach and out to sea where the *Evohe* was moored waiting for the zodiacs to fill her hold with our cargo.

Homeward Bound

Early afternoon came and we said our good-byes to the DOC staff, some of whom came on board and almost seemed sad that we were leaving. We set sail for home, detouring around to Boat Cove in the south shadow of the island where the yacht *Shiner* was lost during the successful 1984 DXpedition to Raoul Island. It was an interesting but melancholy place.

The journey out past Meyer and Napier Islands was memorable, with flat seas, glorious weather, and Pink Floyd on the yacht's stereo. The captain made for L'Esperance Rock, an extinct volcano cone rising 1000 feet out of the sea and a hazard to unwary sailors.

Surf pounded on the rocks as two of the crew went diving in the crystal-clear waters of this marine reserve. Ron, ZL2TT, and Al took the zodiac out around the rock for photographs and a little sightseeing adventure while Ken and a few hardy crew members had a quick "dip." During this time the yacht crew kept a wary lookout for vertical fins in the water.

"What did you see below?" I asked Roger, one of the divers. He replied that there was a large 100 pound groper on the bottom, hundreds of huge kingfish, the odd shark, and at times huge schools of reef fish that obscured his diving partner, who was only a few feet away.

"It was quite beautiful," he remarked. I came close to giving up amateur radio at that point for the new hobby of diving. Reason prevailed, however. The allure of a good CW pile-up was still too much.

A few hours later we set sail for home as clouds loomed on the horizon. Most of the team went below for a bit of much needed sleep, the first long stretch in two weeks. We awoke to worsening weather.

"You're not going to like this," the captain said. He had heard the weather reports. The weather worsened, with southerlies coming up out of the Antarctic and up the east coast of New Zealand. The yacht was rolling and pitching again. It was obviously going to be "The Voyage from Hell, Part II—The Return."

The weather was even worse than the journey to Raoul, with huge seas, 40 to 50 knot winds, and angry white, frothy spray blowing off the top of mountainous waves. Food was running low and the will to eat was even lower. At 3 in the morning, about 30 hours before our ETA at the Port of Napier, one of the two diesel engines developed fuel problems and failed. Still, one engine and sails would get us there eventually. Our speed was slashed to 4.5 knots and the rest of the voyage from hell was extended another 15 hours. A few hours out from Napier, the seas calmed and went flat, the sun came out, and we went up on deck again. Nice touch. Eight days of sailing and we were able to spend only 7 hours on the deck. It was unfair,

but it was worth it. We were home safely and had accomplished what we set out to do.

The Statistics

Equipment: Yaesu FT1000, Yaesu FT1000MP, Yaesu FT900 (two), Yaesu FL7000 amplifier, Heath SB220 amplifier, Heath SB200 amplifier, ICOM 2KL amplifier, Nagara tribander, Nagara WARC duo-bander, Cushcraft tribander, Create 10-40 meter vertical, Cushcraft R7 vertical, Create 160 meter vertical, 80 meter Delta loop, 40 meter Delta loop, MFJ 982 Versa-Tuner (two), Bencher paddles, laptop computers (six), IBM 286 clone, CT logging program by K1EA, 5 kW diesel generators (two), teddy bear mascot (Ron's).

Band Totals (roughly): 160 meters 300, 80 meters 2300, 40 meters 5200, 30 meters 1300, 20 meters 10,500, 17 meters 500, 15 meters 6800, 12 meters 1600, and 10 meters 900.

Total 33,900 QSOs: 13,800 CW, 19,100 SSB, 1000 RTTY.

Sunspots: 12? You're kidding . . . right! Sounded like 200 +.

Acknowledgments

Warwick, Clea, and Bruce of the New Zealand Department of Conservation (DOC) were extremely helpful once we got to know them. Without their helpful advice and suggestions, ZL8RI would not have happened. The DOC team on the island was a fine group of talented young New Zealanders with outstanding physical fitness. They taught us a great deal, and we could not have done it without them. Their cooperation was excellent.

The Yaesu Corporation of Japan supplied the two FT1000's, FL7000 linear amplifier, and the two FT-900's. The Yaesu gear worked flawlessly and ran cool to the touch. We couldn't kill them. The Nagara antennas worked extremely well. Their tribander has all the elements driven like a log periodic, and its performance and narrowness of beam was such that you could point it at any given country and you heard little else. Their WARC duobander was a joy to use and would be a worthwhile addition to any antenna farm. The Create 40-10 meter vertical worked better than our 40 meter loop. I usually don't like verticals, but am now planning to buy one of the Create verticals. The Cushcraft R7 loaned to us by Ham Radio Direct in New Zealand worked very well.

INDEXA and NCDXF helped us considerably with finances. We are extremely grateful for their help.

Most of us would have been hard pressed if we had to make a rational decision whether to divorce our wives or go to Raoul Island. Thank you to our wives for not putting us in that position and for supporting our dreams. Thanks, too, to all the amateur radio organizations and individual amateurs around the world who put their money on the line and put their faith in us so that we could make it happen.

It was a trip of a lifetime for all of us. And yes, we are thinking about the next one!

(Note: A 40 minute PAL standard video tape of the DXpedition is available from the author. The price is \$30 NZD posted anywhere in NZ or \$30 US dollars posted anywhere in the USA. Send money order to: L. F. Jennings, ZL2AL, P.O. Box 54, Hastings, New Zealand.) ■

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CIRCLE 31 ON READER SERVICE CARD

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Antenna Column Ramblings—Part II

This month, we'll again ramble on with our usual formula of antenna, software, and book notes. As is our custom, we'll begin just where we should—with antennas. Stay with us. There's lots to come this month.

Antenna Ramblings

MFJ Dual-Band Flexible Duck Trio. The "accessory wizards" at MFJ have come up a trio of new dual-band flexible rubber-duck antennas for handhelds. The MFJ-1717 is $15\frac{3}{4}$ inches long and thus performs essentially as a halfwave at 440 MHz, yielding a claimed 2.15 dBi gain on that band. On 2 meters the antenna functions as a quarterwave radiator.

High-Q, low-loss construction is featured, and the \$19.95 antenna comes factory-tuned. The antenna is rugged and is said to be able to take all the bending, twisting, flexing, and tugging you can dish out. The radiator is protected by a durable, synthetic rubber compound, and it has a hard protective safety tip. A strong, rigid base protects the matching network from flexing and possible detuning.

Two other "ducks" complete the series. The mid-size MFJ-1716 version is similar to its big brother, but is smaller at $8\frac{3}{4}$ inches in length; this makes it roughly a quarterwave on 440 MHz and a loaded quarterwave on 2 meters. It's \$16.95. Finally, the MFJ-1718 duck is sim-

ilar to its bigger brothers, but is only $4\frac{1}{4}$ inches in length; it uses an efficient, high-Q helical-wound radiator. The MFJ-1718 duck is \$12.95.

For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (1-800-647-1800).

New ONV Full-Body Harness. As we've pointed out previously several times, whenever you climb your tower, you're trusting your life to your own sense of carefulness, to your safety belt, and to whatever else keeps you safe from plummeting to earth. Using a belt also frees up both hands and lets you lean back away from the tower to easily reach tools and hardware. With these factors in mind, be sure that you obtain a high-quality belt that's commercially manufactured, tested, and approved. Above all, be sure to very carefully check your belt's condition **each time** you use it.

As we've noted, one good source of safety belts is the ONV Safety Belt Co. For years they have offered a deluxe belt with a seat harness for \$89.95 that accommodates up to a 42 inch waist; a similar model that handles up to a 56 inch waist is \$10 extra. The regular ONV safety belt is \$74.95. Recently ONV also introduced a "Full-Body Harness" assembly for \$89.95. They also offer a 3 foot accessory rope lanyard for \$33.95.

A special "tower climbing lanyard," three feet in length that has large "gorilla hooks" to clip on ONV safety belts also is available at \$39.95. These large hooks are for an added measure

of safety while you're ascending and descending the tower by keeping you attached to the tower at all times—a requirement many tower climbers fail to observe. Other climbing accessories you may find useful to obtain include tool pouches for carrying tools and hardware, extra snap hooks, safety lines, a hard hat, safety goggles, steel-shank boots, and gloves.

For further information, contact ONV Safety Belt Co., P.O. Box 404, Ramsey, NJ 07446 (1-800-345-5634).

TX RX Systems Antenna Accessories. TX RX Systems, Inc., of Angola, New York, offers a variety of specialized RF and antenna accessories of interest to the VHF, UHF, and microwave enthusiast. These include multicouplers, signal boosters, duplexers, cavity filters, and associated hardware.

One of their newest products is the Model 28-25-92358, a 6 meter Vari-Notch® Duplexer that covers 50–54 MHz. It supplements their line of Vari-Notch duplexers for 2 meters, 220–225 MHz, 420–450 MHz, and 1.2 to 1.3 GHz.

289 Poplar Drive, Millbrook, AL 36054

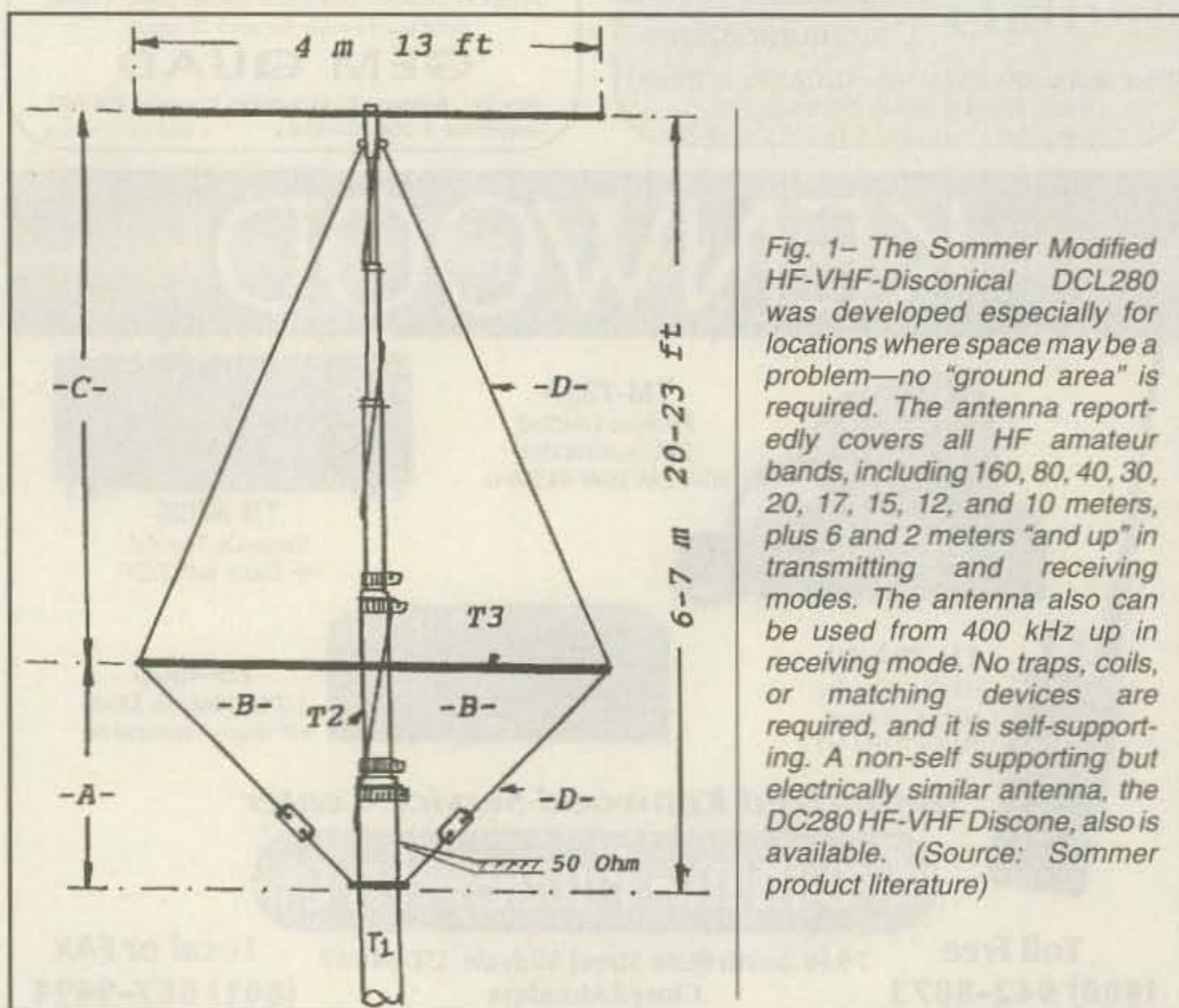
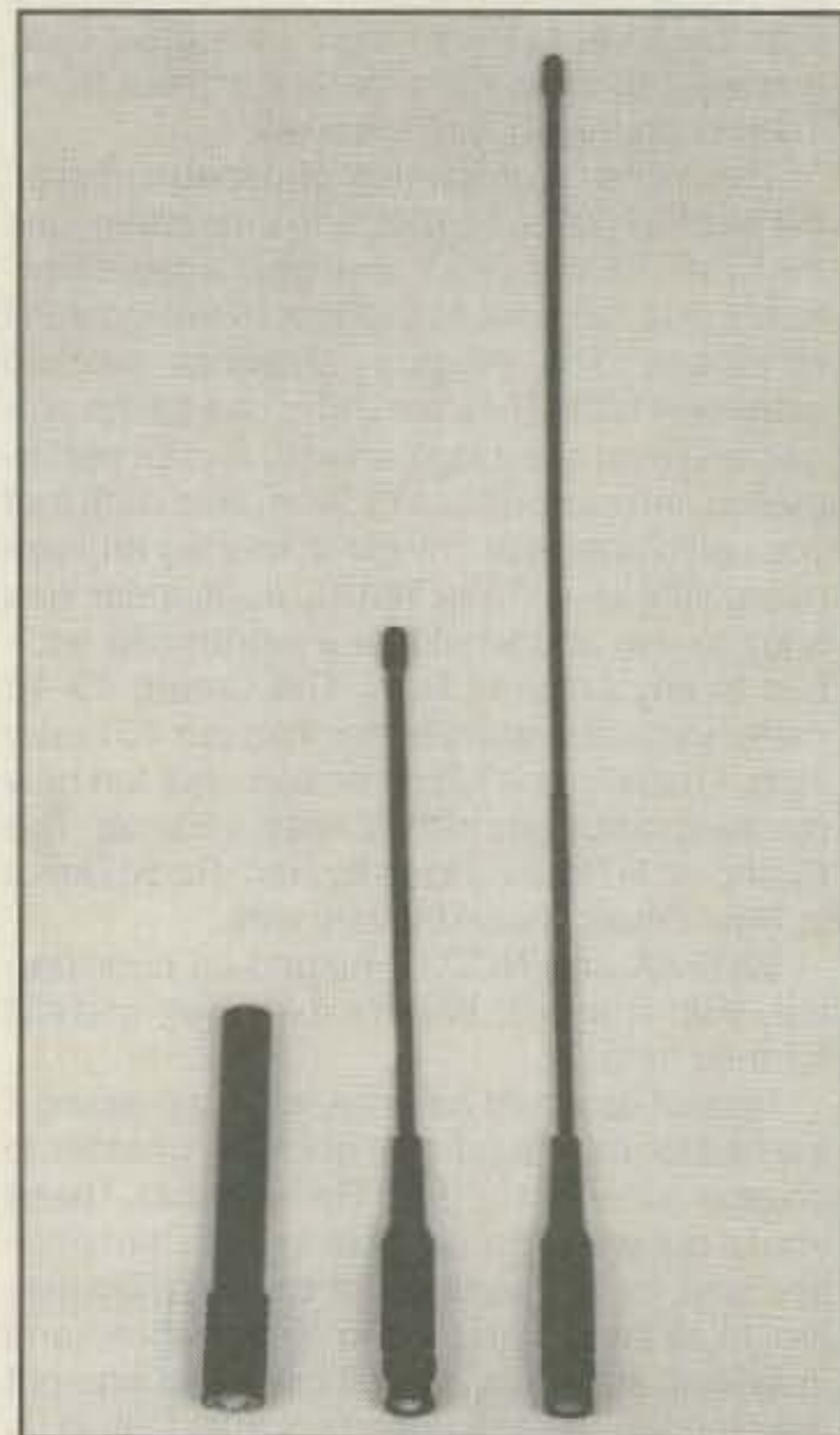


Fig. 1—The Sommer Modified HF-VHF-Disconical DCL280 was developed especially for locations where space may be a problem—no "ground area" is required. The antenna reportedly covers all HF amateur bands, including 160, 80, 40, 30, 20, 17, 15, 12, and 10 meters, plus 6 and 2 meters "and up" in transmitting and receiving modes. The antenna also can be used from 400 kHz up in receiving mode. No traps, coils, or matching devices are required, and it is self-supporting. A non-self supporting but electrically similar antenna, the DC280 HF-VHF Discone, also is available. (Source: Sommer product literature)



MFJ has come up with a trio of new dual-band flexible rubber duck antennas for handhelds. The MFJ-1717 (right) is $15\frac{3}{4}$ inches long and effectively works as a halfwave at 440 MHz; on 2 meters the antenna is a quarterwave. Two other "ducks" complete the series. The MFJ-1716 (at center) is smaller at $8\frac{3}{4}$ inches in length, while the MFJ-1718 "shorty" duck (left) is similar to its bigger brothers, but is only $4\frac{1}{4}$ inches in length. (See text.)

The new 6 meter unit is a four-cavity duplexer that uses full quarterwave coaxial cavity resonators with the patented Vari-Notch coupling devices to achieve over 100 dB transmitter-to-receiver isolation at even very narrow frequency separations. The TX RX design is said to offer significant suppression of transmitter spurious radiation at TV channel 2, which has proven to be a very troublesome channel for 6 meter operation.

The 6.625 inch diameter, temperature-compensated cavities can easily handle 250 watt repeaters while providing the high degree of filtering required for higher power operation. The duplexers are shipped factory tuned to your repeater frequencies, but easily can be retuned to new frequency pairs.

For more information on the company's products, contact TX RX Systems, Inc., 8625 Industrial Parkway, Angola, NY 14006 (716-549-4700).

Sommer HF-VHF Discone. In several columns, we featured the rather unusual HF antennas offered by Walfried Sommer, W4/DJ2UT. In one previous column we described the heart of the Sommer product line, the Sommer trapless multiband beams.

As we noted, these clean, no-trap driven arrays were developed to overcome trap losses to try to make multiband beams perform as well as monobanders despite the problems and shortcomings involved with closely spaced designs. The resultant Sommer multibanders, available in several three- and four-band designs, effectively use a complex system of active and inactive driven elements, depending on the particular band in use.

Another Sommer offering we previously profiled was the Tele-Command-System TCS80, a flexible vertical antenna system that covers all HF amateur bands from 75 through 10 meters (3-30 MHz continuously). Still another product we discussed was the HF SKYDISK, a close cousin of the broadband discone popular on VHF and UHF. This antenna effectively does the work of a full, broadband HF discone, without its awkward size, by providing only an element of the cone for each HF band. The 15 foot antenna covers all bands from 10 to 40 meters. It has a single 50 ohm coax feed, low SWR on all bands, and no traps.

Sommer now offers another related Discone-based HF/VHF antenna. It's the Sommer Modified HF-VHF-Disconical DCL280, developed especially for locations where space may be a problem. The antenna effectively covers all HF amateur bands, including 160, 80, 40, 30, 20, 17, 15, 12, and 10 meters, plus 6 and 2 meters "and up" in transmitting and receiving modes. The antenna also can be used from 400 kHz up in receiving mode.

No traps, coils, or matching devices are required, and the antenna handles up to 5 KW RF power. The antenna needs only a simple mast for support; it's self-supporting, so no guy wires are required. The typical DCL280 antenna is about 20-23 feet high and 13 feet in diameter. It's suitable for backyard, roof, or garage installation. A sketch is shown in fig. 1, and typical SWR curves are presented in fig. 2. It's \$490; a non-self supporting but electrically similar DC280 HF-VHF Discone is \$360.

Spec sheets showing the antennas' details and theory of operation are available from Sommer Antennas, P.O. Box 710, Geneva, FL 32732 (phone 407-349-9114; Internet: <summer1@ix.netcom.com>).

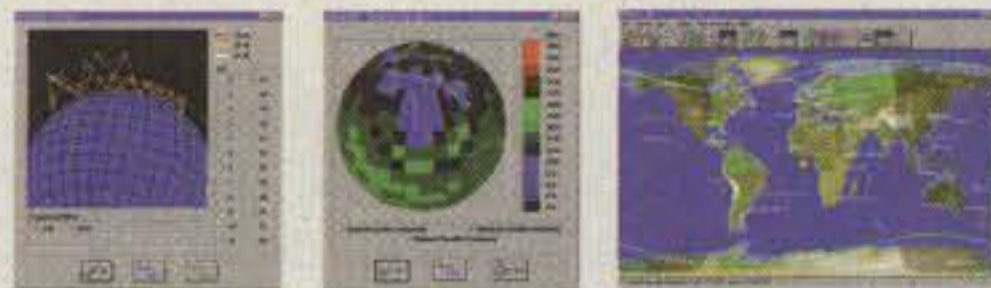
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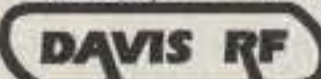
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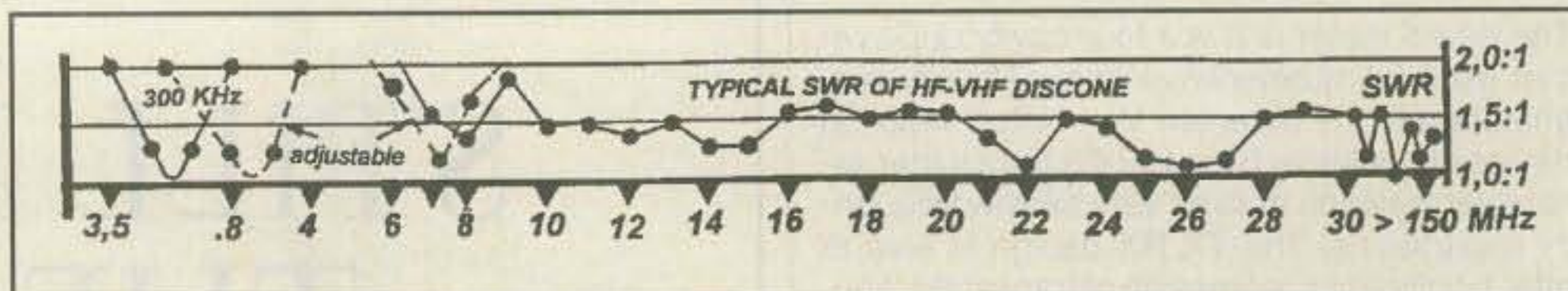


Fig. 2—The Sommer DCL280 claims to offer HF to VHF SWR performance within a very narrow SWR range: a low SWR reportedly is achieved on all frequencies by this top-fed antenna. No tuning is required for 13 MHz and up; some fine tuning at the base is required for 80 and 40 meters. Shown here is a typical SWR curve for the antenna from 3.5 to 150 MHz. Spec sheets showing working details and theory of operation are available from the manufacturer. (Source: Sommer product literature)

Spi-Ro Manufacturing Catalog Update. In several columns we've mentioned this small firm as a good source of antenna accessories and parts, although they've moved since we last mentioned them in June 1995. The six-page Spi-Ro flyer shows a number of complete HF antennas, including all-band and limited-space dipoles, multiband trap dipoles and slopers, a SWL "longwire," and single band antennas. Most are assembled, but Spi-Ro offers kit versions of each antenna at up to \$12 less.

Some very convenient products for amateurs with limited space for full-size HF wire dipoles are their Antenna Shorteners. These are loading coil pairs used in series with the antenna flattop to significantly reduce the antenna's physical length. The devices let you to shorten a 40 meter antenna to 38 feet overall, an 80 meter antenna to 69 feet, and a 160 meter antenna to 100 feet. These dimensions represent length reductions over 40 percent. Complete shortened dipoles also are available.

The Spi-Ro flyer also shows baluns, transmatchers, center connectors, coax, ladderline, insulators, lightning protectors, support rope, surge protectors, traps, RFI suppression kits, and other antenna parts and accessories. Contact Spi-Ro Manufacturing, Inc., at a new address: P.O. Box 2800, Hendersonville, NC 28793 (1-800-728-7594).

Alpha Delta Update. Alpha Delta Communications is another favorite supplier of amateur and SWL HF antennas, lightning protection devices, coaxial switches, antenna hardware, and other antenna accessories. They recently issued a glossy, 12-page catalog that showcases their expanding product line.

The catalog describes their "DX series" HF wire antennas, which include amateur and SWL slopers, no-trap multiband dipoles, and monoband dipoles; the RT, LT, and HV series Transi-Trap™ surge protectors, field-replaceable Arc-Plug™ cartridges, and SEP static cartridges; Delta series two- and four-position coax switches; and antenna hardware kits and insulators.

Alpha Delta is now also the new licensed distributor for all Outbacker products in the U.S., Outbacker's popularity in this country having outgrown the facilities of Don Arnold's QTH. All of Outbacker's products will now be available through Alpha Delta.

For more details and pricing on all of their products, contact Alpha Delta Communications, Inc., P.O. Box 620, Manchester, KY 40962 (606-598-2029). Their catalog is free of charge.

CUBEX Yellowjacket and Stinger Update. In the March column we noted the Stinger, an add-on to the popular CUBEX Yellowjacket 4-element, 2 meter quad antenna. As we indi-

cated, the 3-element Stinger is simply added to the directors of an existing Yellowjacket antenna. The result is a solid, 7-element quad antenna with claimed 50 percent more gain than the Yellowjacket working alone. The Stinger add-on comes with a fiberglass boom coupler and an aluminum boom/mast coupler plate.

The Stinger is priced at \$44.95 + \$7 s/h, or \$85.50 + \$9 s/h as a package together with the Yellowjacket. Also, we misquoted the price of the basic Yellowjacket quad in the March column. It's also priced at \$44.95 plus \$6 s/h, as advertised by CUBEX.

In addition to VHF and HF quads and quad kits themselves, CUBEX also offers the do-it-yourself quad builder a complete line of often difficult to find quad hardware and parts. Components offered include end spiders, fiberglass arms, elements, matching transformers, arm clamps, booms, and other goodies.

A brochure and a "quad vs. Yagi" fact sheet are available from CUBEX Company, 2761 Saturn St., Unit "E," Brea, CA 92621 (714-577-9009).

Down East Microwave Price List and Product Summary. In August 1994 we highlighted Down East Microwave. Since then the company has relocated to Frenchtown, New Jersey. It continues to manufacture a broad line of RF products for VHF, UHF, and SHF amateurs. It specializes in amateur and commercial antennas, linear power amplifiers, preamplifiers, and transverters. They also distribute some products made by others and stock a variety of microwave components, including transistors, crystals, circuit boards, and specialized cables and connectors.

Interestingly, the firm's price list and product summary is organized primarily by frequency band and wavelength. At first glance this can make it difficult to find things—unless you also note that they also show some functional listings, including antennas, broken out by band; components, organized by type; and accessories. But this style of organization has the advantage that if you're only interested in a particular band, you can immediately see what's available for that band.

Down East's Microwave's band classifications in their price list and product summary run to short wavelengths. They include 6, 2, and 1.25 meters; 70 cm (430–450 MHz); 33 cm (902–928 MHz); 23 cm (1240–1300 MHz); 1691 MHz (WEFAX); 13 cm (2000–2400 MHz); 9 cm (3300–3480 MHz); 5 cm (5760 MHz); and 3 cm (10.4 GHz).

Future products are expected to include satellite up- and down-converters for Phase 3D International Satellite operation; preamplifiers for 13, 9, 5, and 3 cm; new 5760 MHz and 10 GHz transverters; and a variety of SETI (search



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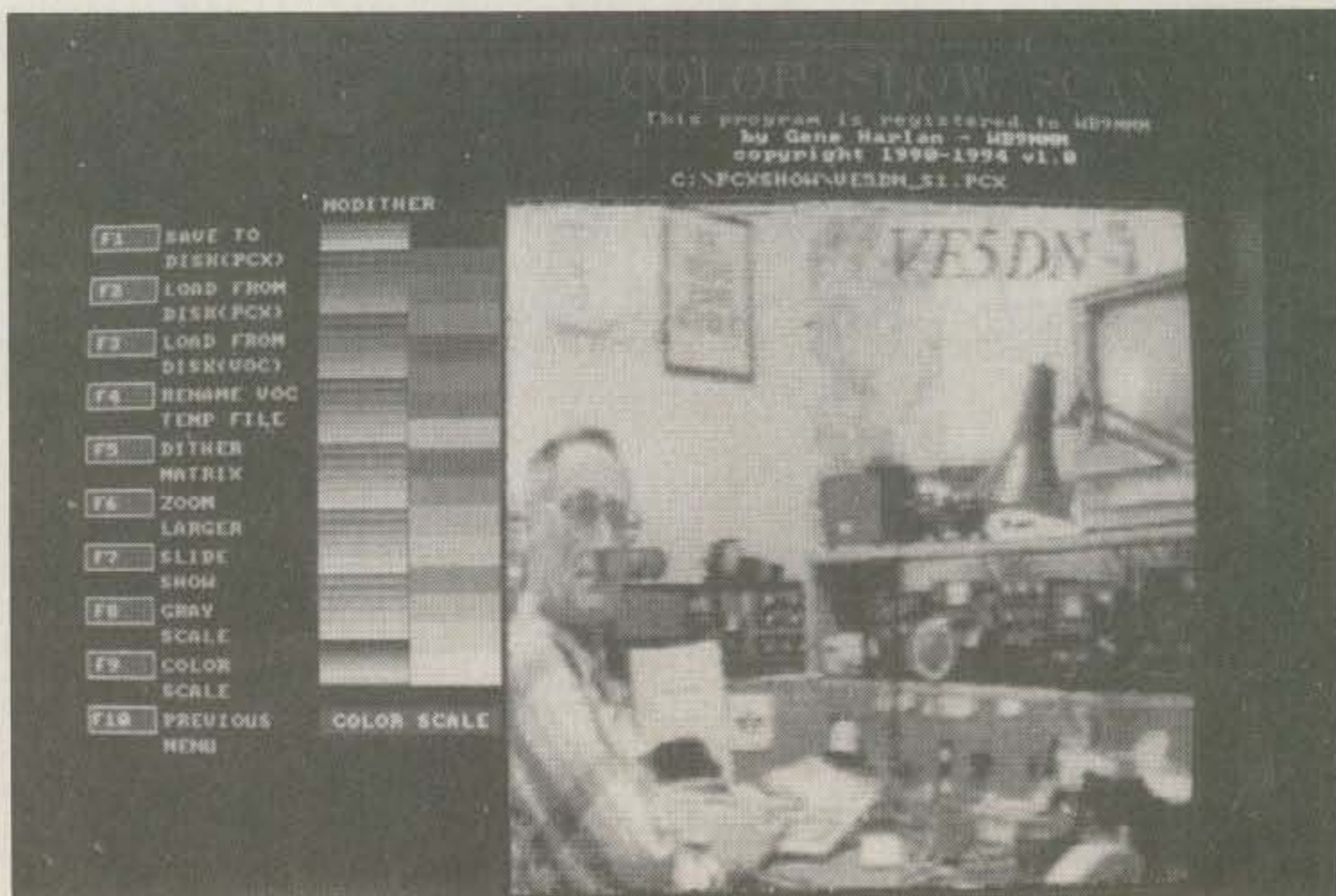
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Color Slow Scan Television for the Sound Blaster's features include receive for Robot 8, 12, 24, and 36 second black-and-white, Robot 36 and 72 second color, Scotty 1 and 2, and Martin 1 and 2 images. The program also offers conversion of images to a "voice file." A color image of VE5DN's SSTV-equipped hamshack is shown in this photo. (WB9MMM photo)

for extraterrestrial intelligence) related products. A free, 16-page catalog is available from Down East Microwave, Inc., 954 Rt. 519, Frenchtown, NJ 08825 (908-996-3584).

The Radio Works Update. For several years, we noted the growth of Jim Thompson, W4THU's The Radio Works. Jim is a wire antenna specialist and sells a variety of antennas and antenna accessories, including ready-made antennas, baluns, line insulators, support line, connectors, wire, cable, and more.

A new Radio Works catalog came my way not long ago, and in it I noted a change in Jim's "dual catalog philosophy" in which he eliminated the Reference Catalog. Jim long had issued his General Catalog, but several years ago he also issued what he called a Reference Catalog to read more like a magazine than a conventional antenna catalog. The Reference Catalog included full specifications and descriptions of each Radio Works antenna and balun, along with extensive data and observations on wire, coax, and antenna support line.

More than just a listing of commercial products, the Reference Catalog contained several articles, especially on "high performance" wire antennas. But Jim says he decided not to produce a second edition, instead including some of the most important information in the General Catalog, which now tops out at just under 100 pages.

The General Catalog is \$4 postpaid from The Radio Works, P.O. Box 5169, Portsmouth, VA 23703 (804-484-0140). (Some copies of the original Reference Catalog may still be available, so it's worth your while to inquire of Jim if you want one.)

Software Ramblings

MSCODE: Morse Code Made Easy for Windows. In the April column we highlighted Ken Bradford's DOS-based shareware program, Morse Code Made Easy. It's a menu-driven

computer learning tool that lets you set the pace in learning the code.

As we noted then, Morse Code Made Easy features three menu-selected modes: Lessons, Practice, and Word Test. You can change the tone, number of words per minute, how many characters are sent at a time, and whether or not the characters are displayed as they are sent. The program checks your progress and displays a score based on the level of difficulty. There are 27 lessons arranged from the least to the most difficult; the practice menu option lets you select either "hear what you type" or "type what you hear"; and the Word Test selection lets you choose one of 27 word lists that start with short, easy words and progress to longer and more difficult words.

Ken now has introduced a new Windows version. The new Windows version (I examined V6.1) includes all of the features of the DOS version, which we described in April. Additional new features include pop-down menus, scroll-through lists, spin button control, and Windows help files that show snapshots of the different screen options and how to use them.

Like the DOS version, the new Windows version is shareware, and you have a 30-day trial period in which to decide if you want to continue to use the program and register it. Registration is \$25 plus \$4 s/h for the latest version. Future program updates are \$5, and your registration number will unlock all future shareware versions.

The program is offered by Brad's Software, 4649 Wyoming Dr., Dallas, TX 75211-7843 (214-339-6920).

PerCon CD-ROM Databases Update. In the December 1995 column we noted the wide variety of CD-ROM databases offered by PerCon. The company, an FCC contractor, offers a full line of FCC-related databases for both business and amateur markets on CD-ROM.

PerCon's major business-oriented products are extracts from the FCC Master Frequency

Database, organized by region or group. We noted that more to amateur and listener hobbyists' tastes are several other products, which include SPECTRUM; SPECTRUM for Scout, for use with the Optoelectronics Scout™ handheld frequency recorder; and HAM_db and Open Repeaters, an amateur radio call sign database with nearly 700,000 records.

PerCon recently issued several new products, as well as new releases of the databases we noted last December. These include the Regional Series Incremental Update CD-ROM; Spectrum Summer '96; Spectrum-Canada Frequency Database, featuring Canadian frequency data; and a new version of HAM_db and Open Repeaters, which includes over 10,000 open repeater records from Artsci Publications. Various upgrade offers are available to previous PerCon database users.

PerCon's web site, at <<http://www.perconcorp.com>>, provides free access to a sample SPECTRUM database search. The company also now sells Optoelectronics hardware products bundled with PerCon CD-ROM software. For more information, contact PerCon Corporation, 4906 Maple Springs/Ellery Road, Bemus Point, NY 14712 (716-386-6015).

Harlan Technologies Update. In April 1995 we highlighted Color Slow Scan TV for the Sound Blaster, offered by Gene Harlan, WB9MMM, of Harlan Technologies. We noted that it provides full color SSTV send and receive using your PC and its Sound Blaster or compatible sound card. The \$99.95 program's numerous features include receive for Robot 8, 12, 24, and 36 second black-and-white, Robot 36 and 72second color, Scotty 1 and 2, and Martin 1 and 2 images, plus conversion of images to a VOC-format "voice file" for transmit. Color and black-and-white, receive-only versions of the software also are available.

In the meantime, we also learned that Harlan Technologies planned to publish *CyberHam™*, a magazine to combine amateur radio and computers, and to show how they connect. The planned focus is on SSTV, ATV, RTTY, AMTOR, packet, and satellite communications. There also will be an emphasis on computer hardware and programming, beginning computer aspects, reviews of amateur radio shareware and commercial programs, amateur radio on the Internet, ham BBSs, and more. The first issue was planned for September release, so it should be available well before you read this. A one-year (six issue) subscription is \$19.95. Special promotional tie-ins with Gene's SSTV products are available.

For more information, contact Harlan Technologies, 5931 Alma Dr., Rockford, IL 61108 (815-398-2683).

Norton NT Tools. Many of our readers are, of course, using Windows 95 on their PCs. In the February and July columns we noted that Symantec Corporation issued a comprehensive set of utility software products for Windows 95 to address a variety of deficiencies and assist you in moving to the new operating system. The three products introduced were Norton AntiVirus, a comprehensive 32-bit antivirus protection utility; the Norton Utilities, a 32-bit utility package that offers continuous system protection and data recovery; and Norton Navigator, for enhanced file management and desktop navigation.

For those brave souls (which doesn't include your columnist) who have gone to the "top of the line" and use the upscale Windows NT oper-

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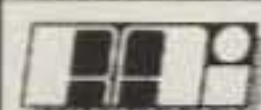
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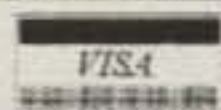


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CIRCLE 85 ON READER SERVICE CARD

ating system, Symantec has launched a roughly comparable single set of tools to scan and repair viruses, manage files, and monitor and view key system information under Windows NT. The new product is Norton NT Tools, and it's available on CD-ROM for what looks like a very attractive price (\$49.95).

The new utility offers protection against viruses on the desktop and over the Internet; automatic alert notification of virus definition updates via Internet online services; Internet FTP (file transfer protocol) site access and file downloading with drag-and-drop techniques; browsing of network resources; file compression using any of several formats; real-time system monitoring and status with the built-in "System Doctor"; information on key system resources; and considerably more.

For additional details, contact Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063 (1-800-441-7234).

The Reference Shelf: Books and Catalogs

Long-Awaited RSM Transmitter Book. In several of our columns we reviewed Ray Moore, ex-K1DBR's *Communications Receivers*, in the 1st, 2nd, and 3rd editions. Ray's book, in its several incarnations, is an authoritative guide to American communications receivers from 1932 to 1981—the vacuum tube era. It covers all the major manufacturers, including RME, Hallicrafters, National, Hammarlund, Collins, Morrow, and others. About 400 receivers (over 700 if you count variations) from some 68 companies are profiled.

The 3rd edition (\$19.95, 125 pages) was the best, with improved reproduction of photographs, including some new ones; many new receivers; and several pages of information on military surplus receivers such as the BC-312, BC-348, and BC-454. Over 10,000 copies of the book in its various editions are in print.

Since 1992 Ray has been working hard on a companion transmitter book, which he originally planned to do in two volumes. Volume

One was to cover 1930 through World War II, and the second was to cover the postwar years through 1980. For various reasons, the two planned volumes were combined, with the result a single volume of 144 pages.

The new book, *Transmitters, Exciters, & Power Amplifiers*, is a beauty. It covers some 561 amateur HF-band, U.S.-made transmitters from 118 companies, and there are some 470 photos showing most of the transmitting equipment described. There also is a short historical "transmitter development" section.

Ray's new book obviously was a labor of love, and it fills a void in amateur radio's annals. I enjoyed the book immensely, although I was somewhat disappointed by omission of the long-planned transmitting tube section, the shortened history section, and the only "fair" quality of many of the photos.

The new, perfect-bound book is \$21.95 plus \$3 s/h. It's available from RSM Communications, P.O. Box 1046, Key Largo, FL 33037-1046 (305-853-0379).

The AMRAD Newsletter Update. AMRAD is the Amateur Radio Research and Development Corporation, a small but global group of dedicated radio and computer experimenters. Its focus is on developing skills and knowledge among members in radio and electronic technology, advocating design of experimental equipment and techniques, and promoting research. Some of the areas of special interest to AMRAD and its members include spread spectrum, packet radio, RTTY, HF digital communications, digital signal processing (DSP), satellites, and deaf communications.

The association mails the "AMRAD Newsletter" to members six times a year; technical articles, product announcements, and news are featured. Membership in AMRAD, which is \$15 annually, includes the newsletter. Contact the Amateur Radio Research and Development Corporation, P.O. Drawer 6148, McLean, VA 22106-6148 (Internet: <<http://www.amrad.org>>).

INDEX Publishing Book Update. We've mentioned the INDEX Publishing Group, Inc.

several times in the column. We've noted editor Bill Cheek's many scanner and radio monitoring publications, including the two volumes of *The Scanner Modification Handbook*, *The Ultimate Scanner*, and *The World Scanner Report*.

The firm now is publishing several titles by other authors. New titles include *Radio Monitoring for Beginners*, by T. J. "Skip" Arey (\$16.95), *Scanner Modification & Antennas*, by Jerry Pickard (\$19.95), and *TRAVELSCAN*, by Henry Eisenson (\$9.95).

A new six-page foldout brochure includes a wealth of interesting, often fascinating book titles on a variety of topics. These include not only books on radio communications and scanner listening, but also books on investigation and privacy, identity and credit, online pursuits, gambling, and "gray markets" (including cellular fraud, spying techniques, etc.).

For a copy of the firm's brochure, contact INDEX Publishing Group, Inc., 3368 Governor Drive, Suite 273, San Diego, CA 92122 (1-800-546-6707).

Looking Back Five

Five Years Ago in Antennas and Accessories. Okay, so now you know what the column is like for November 1996. But what was "hot" in November 1991? That column was "Antenna Notes—Part I," a potpourri of antenna and accessories topics.

Turning first to antennas, the column featured several Austin Custom Antenna designs, including the Spectra and Ferret® scanner antennas; the Signalcraft FSO, an audible field strength oscillator; custom cabling from CAT Wire and Cable; NCG/Comet HF/VHF/UHF antennas; PolyPhaser Corporation's lightning/EMP and grounding solutions products; and the R&D ELSIE-PHASER, an L/C phasing unit for HF phased antennas.

Turning to computers and software, we discussed the R&D Electronics TCOM-777, a software multimode interface for the Tono Theta-777 communications terminal, from Bob Lewis, AA4PB; Quickyagi II and Autolog Plus, antenna analysis software and logging systems from Chuck Smith, WA7RAI; BMKMULTY, a six-module, multimode software package from M.J. Kerry, G4BMK, of Grosvenor Software; a Finnish logging program from OH1AA and OH1MIE; and Norton Utilities V6.0, a comprehensive DOS-based data protection and enhancement utility package from Symantec.

Bookwise, we looked at the *Practical Antenna Handbook*, by Joe Carr, K4IPV, from Tab Books; *A Technical Guide to the MCC at the Johnson Space Center*, by R.H. Nicholson, published by Universal Radio; and various AMSAT publications, including *A Beginner's Guide to OSCAR-13* by Keith Berglund, WB5ZDP; *The Satellite Experimenter's Handbook* by Dr. Martin Davidoff, K2UBC; and *Satellite Anthology*. In closing the column we also noted the Surplus Sales of Nebraska and the Herbach and Rademan catalogs of electrical and electronic components.

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Don't call a "CQ" unless you can improve on the band's silence.

73, Karl, W8FX

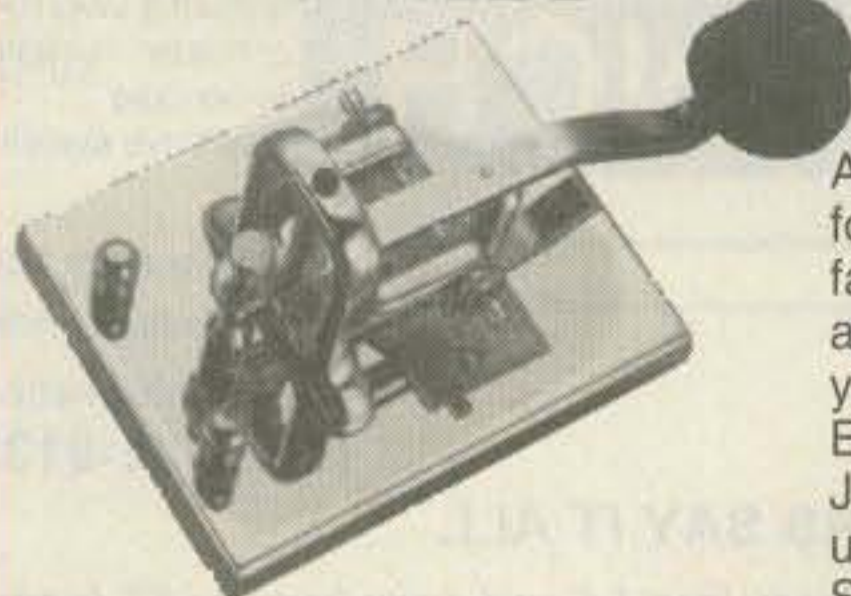
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(73 8/94) ... "its handheld PTT microphone has a solid feel and produces solid transmit audio. Its receive audio is full, loud and undistorted, and sounds better than many mobile rigs. And the rig is beautiful... maybe the only game in town for a moderately priced 6-meter FM rig." *(Radio Fun 10/94)* ... "The Azden PCS 7500H exceeds my performance expectations! It's a real bargain in today's ham equipment marketplace and every 7500H owner I've talked to agrees with me!"

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(QST 3/95) ... "With the AZ-61, Azden brings the convenience of an H-T to the 6-meter FM World... The design is rugged and Azden backs the durability with a two-year warranty (unique in the amateur equipment market)... The AZ-61 was a pleasure to use. The radio performed well in all applications: mobile, portable, and home." *(CQ 1/94)* ... "I was pleasantly surprised to hear just how good it sounds, both on receive and to the other operator on transmit. The ability to program so many different aspects of the radio also makes it quite attractive... Did I say that I enjoy using the radio? I certainly do! You will also enjoy owning one of them." *(73 11/93)* ... "This IS an advanced-featured handheld... I like it. I like the Azden AZ-61 6-meter a lot."

AZ-21A 2-METER HANDHELD

(CQ 2/95) ... "The reception of weak signals was outstanding with this unit... It is certainly one of the best I have ever heard... From a performance standpoint, I would give the AZ-21A a very high rating."

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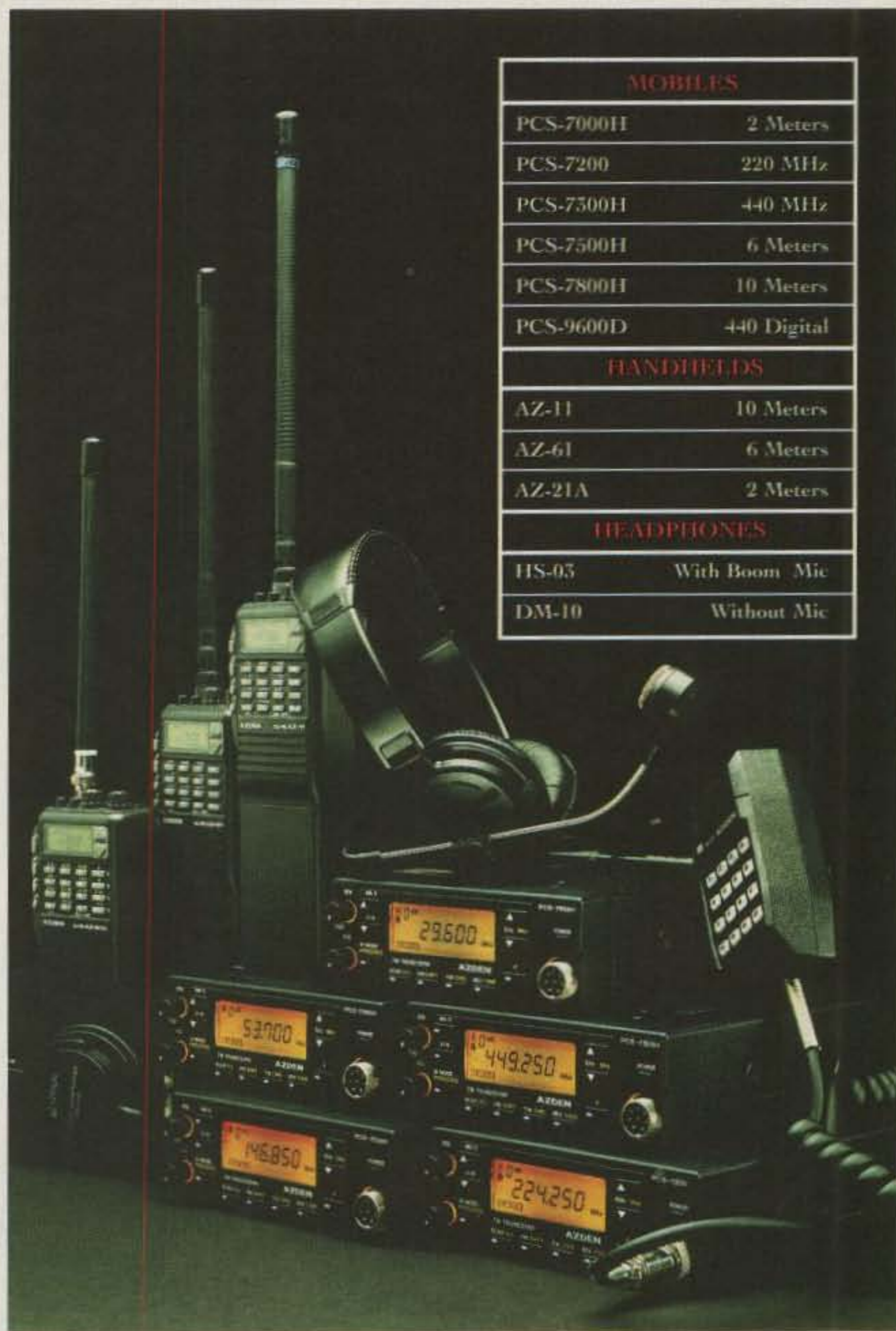
(QST 5/95)... "Putting it simply, the PCS-9600D is an outstanding transceiver. In fact, it is the only single-mode base/mobile rig that we've tested that is truly 9600-bit/s ready... The Azden PCS-9600D offers the best of both worlds. It's a capable 440-MHz voice rig and a true "9600-baud ready" packet transceiver."

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MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

A "Poor Man's" Method For Simple Antenna Pattern Measurements

The most common item besides the transmitter and receiver in (or outside, as is usually the case) the amateur radio operator's shack is, of course, the antenna. Many amateurs build and/or purchase and erect antennas of all sorts. Those who purchase usually rely on the manufacturer's instructions to get everything up and running. Those who build often have enough knowledge to measure and adjust until everything is working properly. This month's topic therefore is not intended to instruct how to measure SWR, or how to couple to the antenna. It is assumed that you already know how to do this. What we plan to discuss is how to measure the exact (or at least approximate) RF radiation pattern your antenna is producing. This is a measurement that is usually not done by the average amateur. Knowing the radiation pattern of an antenna, however, can give you some really important insight into just where your RF actually is going.

The technique, even without an elaborate antenna range, really is very simple. It is based on the fact that an antenna is a symmetrical device as far as RF is concerned. It transmits just as well as it receives. If you can determine its receiving pattern, you also will have a picture of its radiating pattern. Fig. 1 shows the test setup. A low-power signal source, set to the frequency of interest, is placed a distance of a few wavelengths (at least) away from the antenna to be measured and in the plane of the antenna. The antenna is then connected to a receiver with a linear (or at least roughly linear) S-meter. Then, depending on the physical nature of the installation, either the antenna is rotated in front of the signal source, or the signal source is moved in an accurate circular path around the antenna. The received signal strength is then recorded as a function of rotational position. The result, as shown in fig. 2, is a curve of the radiation pattern of the antenna. The final accuracy of the measurement is based on how carefully the setup is constructed, how stable the signal source is, how much the surroundings alter the signal, and how accurately the data is taken.

The signal source may be a homebrewed oscillator or may be the output of a decent-quality signal generator coupled to a small amplifier. The absolute frequency stability of the signal source is not

of prime importance, although it should be stable to at least a fraction of a percent. What is most important is the overall stability of the amplitude of the output. This cannot vary throughout the entire measurement interval, or the final results will be misleading. Also, the strength of the oscillator's output must be great enough to register on the receiver's S-meter.

Fig. 3 is a schematic of a simple but suitable oscillator. You will note that it is made of a quad NAND gate, a couple of common parts, and a crystal. As shown, using a surplus 3.58 MHz color-burst crystal, it can be used for both 80 meter measurements (at the fundamental) and 40 meter measurements (at the 7.16 MHz second harmonic). The output of the two-gate oscillator is coupled to the remaining gates, which serve as output amplifiers. The tuned circuits in the "final" are used to determine what frequency will reach the antenna. A small whip antenna, long enough to radiate enough signal for the receiver to receive, completes the signal source. The completed signal source is mounted in any available enclosure, such as a plastic or aluminum minibox, and is battery operated for convenience. A regulator is included to help

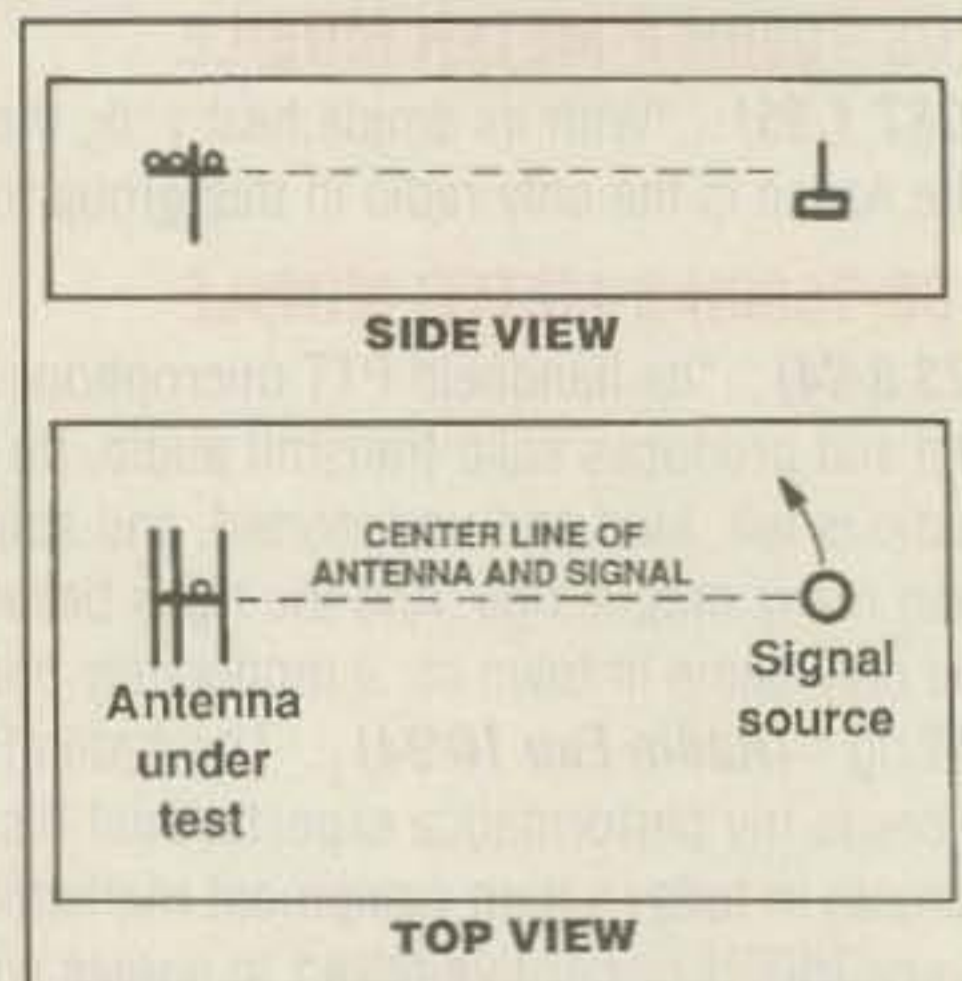


Fig. 1—Basic antenna radiation pattern test setup. Either antenna rotates and signal source is constant, or signal source is rotated around antenna as shown.

stabilize the output amplitude. The oscillator is "tweaked" by connecting a scope through a 10× probe to the extended antenna and by adjusting the slug-tuned coil for maximum output.

When making antenna measurements,

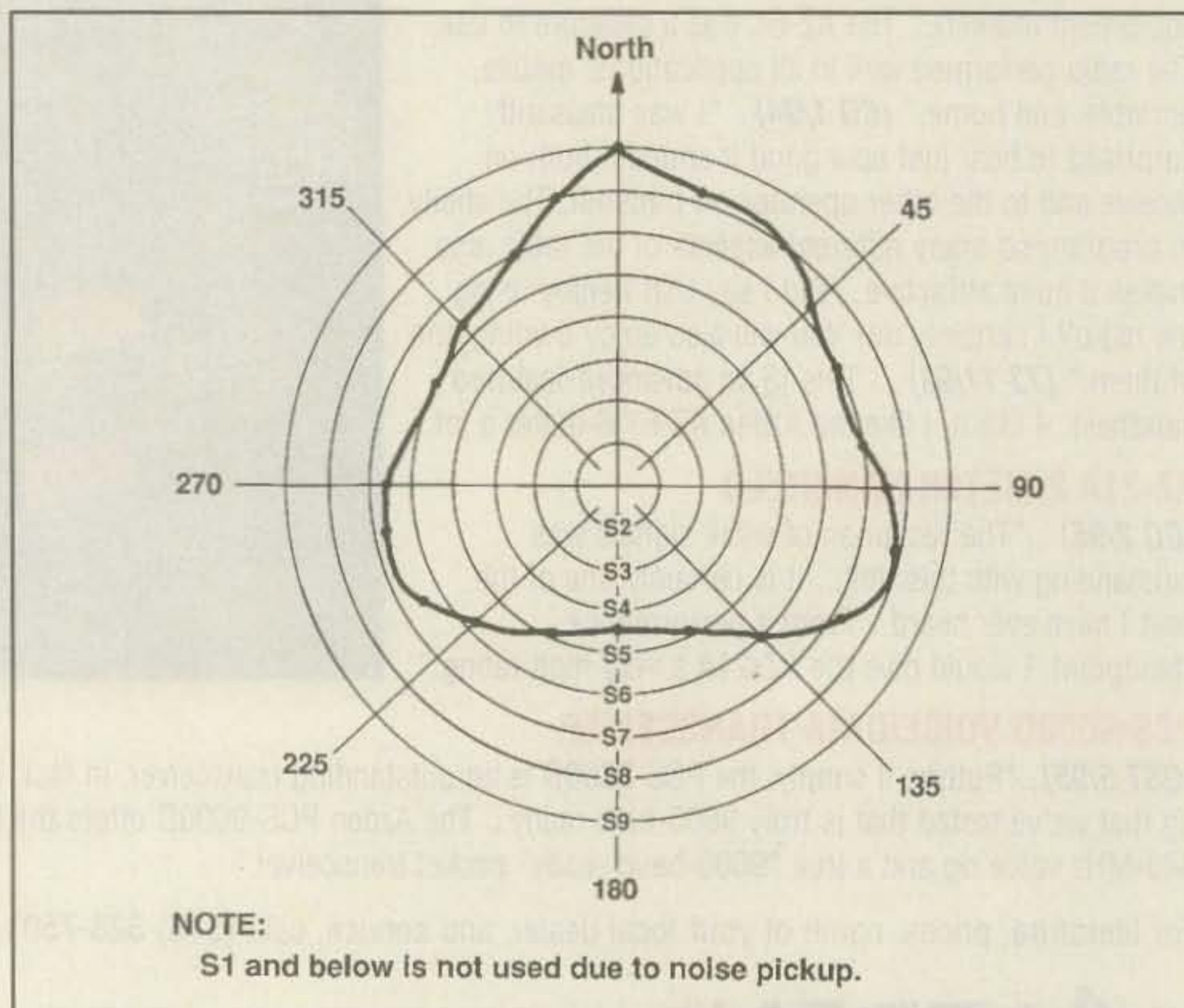


Fig. 2—Typical "homebrew" antenna radiation pattern.

c/o CQ magazine

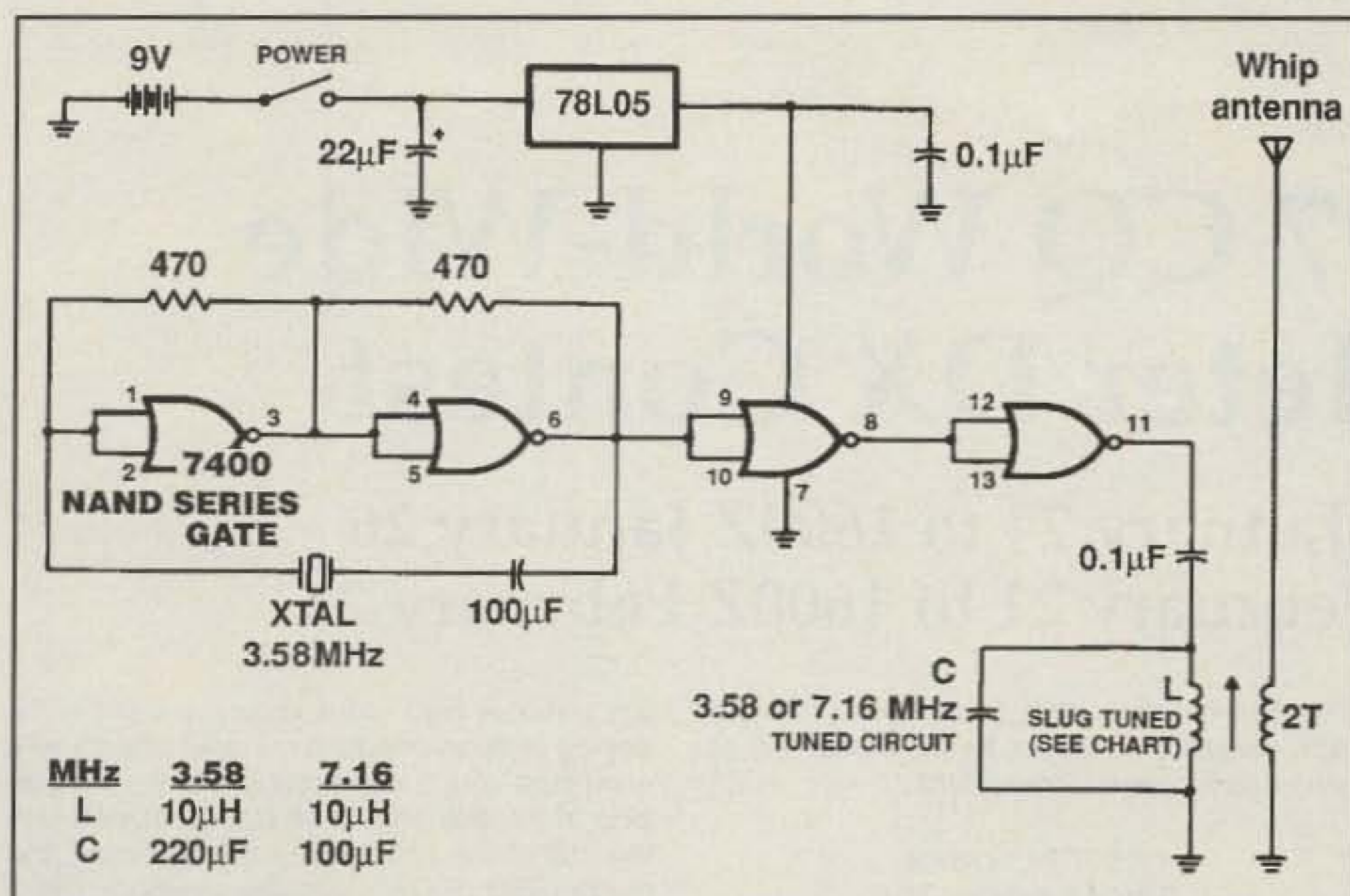


Fig. 3— Simple "one-chip" signal source.

it is useful to first find the point of greatest received signal strength and then to adjust the signal-source whip-antenna length so that the S-meter just indicates full scale. As you rotate the antenna, or move the

signal source in as close to a perfect circular path around the antenna as possible, all other readings will be less and will allow the graph to be completed without much trouble. It is also helpful if the sig-

nal-source antenna is oriented so that it is in the plane of the antenna being tested. If a vertical antenna is being evaluated, leave the signal-source whip antenna vertically polarized. If a horizontal Yagi, dipole, or long wire is being tested, orient the signal-source whip antenna so that it is parallel and in the plane of the antenna being tested. If the antenna under test is on your roof, a holder made of a 2×4 may be adequate to raise the signal source to the correct height. If this is impractical, or if you live in an apartment, you will have to do the best you can.

The purpose of the above exercise, as initially stated, is to get an idea of what your antenna is doing, not to produce a sophisticated technical graph for an antenna laboratory. Whatever you can accomplish with the equipment and techniques described will at the very least make you more informed as to how your signal is being radiated.

Above all, be very careful when performing these measurements to be certain that you **do not allow anything to come in contact with live electrical wires**. Also, do not get so carried away that you put yourself in a physical situation that can be harmful. After all, an antenna can be replaced; a person can't.

73, Irwin, WA2NDM

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Announcing:

The 1997 CQ World-Wide 160 Meter DX Contest

CW: 2200Z January 24 to 1600Z January 26
SSB: 2200Z February 21 to 1600Z February 23

The objective of these contests is for amateurs around the world to contact other amateurs in as many U.S. states, Canadian provinces, and countries as possible on the 160 meter band.

Classes: Single and multi-operator only. Use of packet, a spotting net, or logging assistance makes an entry multi-operator. Multi-operators should show the actual operator for each QSO. Under single operator there will be a designation of power level: H = power over 150 watts, L = power under 150 watts, and Q = 5 watts or less. There will continue to be only listings per state or country, but if there is sufficient activity or if a high enough score is made, then a separate certificate will be issued. Minimum score for the separate certificate is 5,000 points! Multi-operators will all be considered high power.

Exchange: RS(T) and state for USA, province for Canada, and either prefix or country abbreviation for DX. Contacts without some location indicator will be ruled invalid.

Scoring: Contacts with stations in own country, 2 points. Contacts with other countries on same continent, 5 points. Contacts with other continents, 10 points. *Maritime mobile contacts count 5 points. There is no longer any multiplier value for a maritime mobile contact.*

Multiplier: Each continental U.S. State (48), Canadian area (13), and DX Country. KL7 and KH6 are considered DX and not states for this contest. DX countries are DXCC plus WAE (IT, GM Shetland Islands, et al). Canadian areas include VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, and Yukon. Do not count States and Canada as separate countries. Remember that maritime mobiles no longer count as a multiplier.

Final Score: Total QSO points times the sum of all multipliers (states, VE, DX countries).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverified contact removed from the log.

Disqualification: A log may be disqualified for violation of amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate/unverified contacts or false multipliers. Logs that shrink more than 5% are subject to disqualification or warning. The calls of those warned or disqualified may be printed with the results.

Awards: Certificates will be awarded to the top scorers in each class by state, Canadian area, and DX country. Runners-up with high scores over 100,000 may also receive certificates. Low power or QRP entries may also receive certificates if there is sufficient activity or

the score is outstanding. The following plaques, with donating sponsors as indicated, will be awarded for exceptional efforts.

1997 PLAQUES SINGLE OPERATOR

	CW	SSB
World (W5MBB Memorial Plaques)	K5AAD	K5AAD
USA	K4TEA	K4JRB
Canada	K2UFT	VE3AQH
Zone 3 USA (Memorial)	KM4MG	N4TMW
Zone 4 USA	KR4DL	N4UCK
Zone 5 USA	WA4CUG	K4ODL
Europe	W8UVZ ^{et al}	N4NX
Africa	K4MZW	WB4ZNH
Oceania	K9UWA	KM4FV
Asia	NE4S	AH2BE
Japan ¹	W0ZV	—
S. America	K4JAG [†]	AE6E
N. America ^{**} (N4IN Memorial Plaques)	CQ	CQ

MULTI-OPERATOR

World	N4RJ	SE DX Club
USA	WS9V	WB9Z

¹No SSB operation is allowed in Japan at present.

²North America outside USA and Canada.

³Roy V. Brewer, W4UUH Memorial Plaque.

The procedure for the plaques is that the top scorer in the indicated area wins the plaque. However, a station can only win one plaque per contest section. The plaque is then awarded to the next highest scoring station. For example, WX8ZZZ wins top World multi-operator. Then the next station in the U.S.A. wins the U.S.A. plaque.

Intercontinental DX Window: 1830 to 1835 kHz should be left clear for DX stations for intercontinental QSOs in both contests. This is still voluntary but essential if the contest is to continue to attract rare DX as entries. **USA, Canadian, and European stations should refrain from using the window for local contacts.** Let's all make this work and increase our scores! This is a gentleman's contest and band, so let's help make intercontinental contacts happen.

Computer Logging: Please send us your computer disk. IBM, MS-DOS compatible disks are encouraged. The format we prefer is your CT.Bin or NA.Bin file. If you use a program different from the one mentioned above, the generic format should contain a vertical single column of calls in chronological order. The committee will require, on request, a disk for

any possible high score, provided that the paper log or dupe checking material as originally submitted was a computer printout. The outside of the disk should be clearly labeled with the call of the entrant, the files included, the mode (SSB or CW), and the category. Disks **must** be accompanied by a paper summary and dupe sheet, or are subject to **penalties or disqualification.**

Manual Logs: Sample log and summary sheets may be obtained from CQ by sending a large SASE with sufficient postage to cover your request. You can make your own with 40 contacts per page with columns for GMT, exchanges, multiplier, and points.

Dupe/Check Sheets: All logs over 200 contacts must provide a check sheet or dupe list. A check sheet or dupe list is a list of all calls in alpha sorted order.

For All Logs: Show the multiplier only the first time it is worked. Each page must have sub-totals for multipliers, contacts, and points. A running total below the sub-total on each page is recommended. Dupe or check sheets with every entry are requested and are required with over 200 QSOs. Include a summary sheet with your entry showing the scoring and other essential information. Include a printed name/ mailing address and a signed declaration that all rules have been observed. Please put the summary sheet at the front of the log. All logs should clearly indicate total multiplier, WVE multiplier, and DX multiplier.

Club Competition: Any club that submits at least three logs can enter the Club Competition. The name of the club must be clearly identified under club competition on the summary sheet. Club competition is a "for fun" competition to foster more activity. There is a separate listing for the club scores.

Log Submissions: Mailing deadline for CW entries is February 28, 1997; for SSB entries the deadline is March 31, 1997. *Exception:* You may send both logs in one package as long as the CW log is received by March 31, 1997. Try to mail early to assure receipt. For a return receipt enclose an SASE or SAE with postage or 1 IRC. Avoid the registered postal route, as this delays getting the log until someone can sign the receipt! Finally, proofread your log before submission. Each year many errors are corrected that you should catch! Logs or sections of a log that are unreadable will be disqualified.

Send all logs to 160 Meter Contest Director David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092 USA. **Please indicate CW or SSB on the envelope.**

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Single Band FM Mobiles



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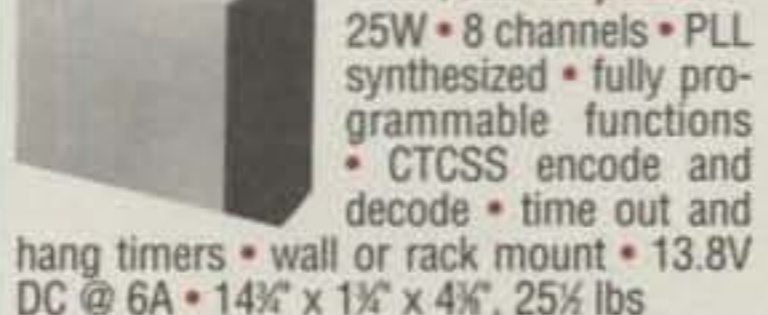
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Where Are We Heading?

For the past several months amateur radio has been awash with controversy. Beginning in May, when the League called us to action over the proposed threat to 2 meters and 70 cm, it has culminated in the FCC's Report and Order which enacted new rules regarding RF exposure. Because of these FCC actions, some in amateur radio feel that our hobby is in jeopardy of going away, having been regulated out of existence. While the threat to 2 meters and 70 cm is just at the proposal stage, the RF Safety issue is now a regulation that is in place and affects all of us in the hobby.

As controversial as it is, however, there are two sides to the issue. Below are two interpretations of the FCC's new regulations, one from Dr. Wayne Overbeck, N6NB, who is in support of them, and the other from the ARRL, which opposes them as they are presently written.

The Sky is Not Falling

(from the Internet)

By Dr. Wayne Overbeck, N6NB

I understand that some concerns have been expressed here about the FCC's Report and Order in the RF safety proceeding, which was released August 1.

As a supporter of the FCC's new rules (and a longtime VHF-UHF enthusiast), I want to say something: I don't think the sky is falling.

I was present when the FCC and EPA conducted their survey of RF fields at amateur radio stations in 1990. Let me say emphatically that the fields at typical HF and VHF-UHF amateur radio stations are nowhere near the levels proscribed in the new rules. At my own station, even when I fully telescoped my LM-470 to 25 feet, the fields inside the house and around the neighborhood were below the newly adopted standards on all bands. With the LM-470 fully extended, the readings on the FCC's high-priced instrumentation were miniscule! The same results were obtained at the homes of several other hams who run the legal limit and large antennas.

The only installations that approached the FCC's new limits were stations that combined moderate or high power and antennas within a few feet of the operator, family members, or neighbors. Examples of problem installations:

- 100 watts into a 146 MHz whip on the roof of a car, with people leaning against the car (or in some cases, sitting in "hot spots" in the near field inside the car).

- 500 watts into a 5-element 50 MHz Yagi on a 20 foot mast mounted on a van (which produced fields exceeding the standard at ground level about 20 feet in front of the antenna,

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VHF PLUS CALENDAR

Nov. 3	Moon Apogee and last quarter. Poor EME conditions.
Nov. 4	Taurids meteor shower predicted peak.
Nov. 8-10	AMSAT-NA Symposium, Tucson, AZ. (See text for details.)
Nov. 10	New Moon. Poor to moderate EME conditions.
Nov. 13	Lowest Moon declination.
Nov. 15	Moon Perigee.
Nov. 17	First quarter moon. Good EME conditions. Leonids meteor shower predicted peak.
Nov. 23-24	ARRL EME contest, second weekend.
Nov. 24	Full Moon. Poor EME conditions.
Nov. 27	Highest Moon declination.

although the fields inside the van were safely below the standard).

- VHF-UHF antennas mounted in the attic of a condominium, driven by 100 to 1000 watt transmitters (fields exceeded the standard in some places below the antenna, probably including some areas in neighboring condos).

The FCC/EPA team didn't measure the fields at any of the biggest VHF-UHF moun-bounce stations (no owner of such a station volunteered to take part in the survey). However, a 144 MHz EME station running 1500 watts into a 24 dBd antenna array (i.e., roughly 300,000 watts ERP) could well generate an RF field in a nearby house that would exceed the standard. That is why most EME operators are careful to avoid pointing a ground-mounted array at the horizon if there are people nearby in the line of fire.

The van used in the 500 watt 6 meter tests described above was mine. It's a VHF-UHF contest vehicle capable of high power all the way up to 1296 MHz. I have used it at full power many times since the FCC/EPA team measured the fields, but only in remote areas where there aren't any people wandering around in front of the antennas. Under the new FCC rules, it will still be legal to use a van-mounted station like this one as long as the owner takes common-sense precautions. For example, it's not the station of choice to demonstrate amateur radio at the county fair!

I'm sure none of us would defend amateur radio operations that expose unknowing people to RF fields exceeding the standards recommended by leading technical organizations such as IEEE, with or without an FCC rule.

Why, then, is an FCC rule needed? It is needed because many amateurs have been unaware of the potential hazards of RF fields and would have remained so if this rule had not been adopted. All the FCC is really asking amateurs to do is learn about this and make certain that their own stations adhere to some basic principles of RF safety.

Research into the health effects of athermal RF and low-frequency fields has perhaps reached the point where research into the health effects of smoking was 32 years ago,

when the first Surgeon General's report was released. While there are still many unanswered questions about RF safety, organizations such as the IEEE and the National Council for Radiation Protection and Measurement are not hooting at the moon in recommending standards for public and occupational exposure. There are biological effects of RF energy.

Let's just say that when the health questions involved here are better understood, it turns out that RF fields exceeding the current standards pose health hazards for just a small part of the population. Wouldn't the FCC's new rules, which will pose only a minor inconvenience for most of us (while greatly increasing awareness of the operating practices that should be avoided), be justified even if they save only a few lives? And what if it turns out that the health hazards are more serious than we now realize? This is not just a matter of protecting amateurs from themselves; the FCC acted because some amateurs have in fact exposed their families and neighbors to RF fields that leading standard-setting organizations consider unsafe.

The new rules will *not* force most amateurs to modify their stations. The FCC's own measurements of RF fields at amateur radio stations demonstrated that most of us can easily comply with the rules. Also, as a former communications attorney, I seriously question the suggestion that these rules will cause angry neighbors to file a bunch of lawsuits. No sane lawyer is going to take such a case on a contingent fee, and darned few neighbors can afford most lawyers' hourly rates. Besides, our neighbors don't even know about this: it's been virtually ignored by the popular press.

These are some of the considerations that led me (and other members of the former ARRL Bio-Effects Committee) to support the FCC's proposed rules in Docket 93-62. I recently wrote a short summary of what Docket 93-62 actually says. [Below is] a summary [of the changes].—73, Wayne Overbeck, N6NB

A Summary of Docket 93-62: Here are some highlights of the amateur radio portion of ET Docket No. 93-62, approved by the FCC on August 1, 1996:

1. Amateur radio stations will no longer be

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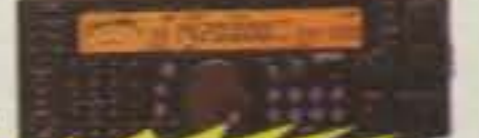


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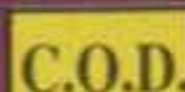
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categorically exempt from complying with the FCC's RF safety standards. However, individual amateurs will not be required to perform the complex environmental assessments that are required of many other FCC licensees.

2. The standards for RF safety that amateurs (and other FCC licensees) will be required to meet are a combination of the 1992 ANSI/IEEE standards and somewhat stricter standards developed by the National Council for Radiation Protection and Measurement. The standards establish limits for human exposure to RF fields; the permissible field strength (or "power density") varies by frequency. The lowest power density is allowed in the 30-300 MHz range. At those frequencies, the exposure limit is 1.0 milliwatt per square centimeter in "controlled environments" (averaged over any six-minute period) and 0.2 milliwatts per square centimeter in "uncontrolled environments" (averaged over any 30-minute period). Amateurs' own households will fall under the standards for controlled environments, while RF fields in other areas such as neighbors' homes must not exceed the stricter limits that apply in uncontrolled environments.

3. Amateurs whose output power exceeds 50 watts will be required to evaluate their station configuration (including power output, antenna gain, frequency, proximity of the antenna to inhabited areas, and duration of transmissions) to assure compliance with the new rules.

4. The FCC will publish charts and tables to help amateurs determine that their installations and operating parameters comply with the rules. There will be examples showing safe distances from various kinds of antennas with various combinations of frequency, power output, and transmission duration.

5. Five questions concerning RF safety are to be added to each of three amateur radio examination elements (elements 2, 3A, and 3B). Application forms for new licenses and renewals will require amateurs to certify that they have read and understand the new RF safety requirements.

6. As a practical matter, the new rules will not require most amateurs to modify their stations. The FCC conducted a survey of RF fields near amateur radio stations in 1990 and concluded that only a few station configurations may result in exposures that would exceed the new standards. Potential problem areas may include high-power mobile installations, antennas located indoors or close to neighbors' units in apartments and condominiums, and high-power VHF-UHF stations using very high-gain antennas near populated areas (e.g., a moon-bounce array pointed toward an adjacent house).

**League Petitions FCC To Change
New RF Safety Rules**

(From the "ARRL Letter," September 13,
1996 via the World Wide Web)

The ARRL has petitioned the FCC to reconsider and reverse portions of the Commission's August 1, 1996 Report and Order that imposed RF-emission safety standards on amateur radio, including a 50 W threshold to trigger an RF-safety evaluation. In setting the 50 W threshold, the ARRL said, the FCC failed to consider the effect of antenna height, antenna gain, emission mode, duty cycle, or operating frequency. The League asked the FCC either to

scale the evaluation threshold by frequency to match the maximum permissible exposure (MPE) limits—directly corresponding to the way the regulations scale the exposure levels with frequency—or to set the evaluation threshold for all HF operation at 150 W at a distance of 10 meters from all parts of the antenna.

At or below that power level and at that distance from the radiator, "you'd be well on the side of safe, even at 100% duty cycle, with any antenna likely to be encountered on HF," said ARRL Laboratory Supervisor Ed Hare, KA1CV, our HQ staff liaison to the ARRL RF Safety Committee. "Some VHF/UHF and microwave station configurations could result in an RF exposure exceeding the requirements of the regulations, so the 50 W limit to trigger an evaluation is more appropriate above 30 MHz," said Hare. The ARRL Laboratory staff is working on a QST article that explains the new RF-safety regulations. "The article will tell hams how to evaluate their stations to be in compliance with the new rules," Hare explained.

Hare also emphasized that all stations, regardless of output power or frequency, still must abide by the specified MPE limits for RF. "Even my 10 mW HF station has to be in compliance with the MPE limits. At that power level, even under the existing rules, I don't have to evaluate whether it is compliance, however; it is presumed that stations running less than 50 W PEP are in compliance."

The new rules, effective January 1, 1997, require licensees of amateur stations running 50 W output or more on any band to conduct a routine RF-safety evaluation to determine if the station could expose people to RF levels that exceed the MPE limits specified in the new rules. (Mobile installations using push-to-talk, regardless of power, are exempt from the environmental evaluation requirement.) In its reconsideration filing, the League called the 50 W threshold "regulatory overkill" and "without scientific basis." Among other things, the League said the means to conduct RF radiation evaluations are not yet available, and the ability to reconfigure a station that might exceed the new limits "is highly problematic." Coupled with any state and local land-use and RF-exposure regulations that might exist, application of the new rules "may constitute a *de facto* revocation or modification of the station license," the League said.

"If amateurs cannot operate using outdoor antennas due to deed restrictions, and they cannot use indoor antennas due to concern about exceeding the MPE levels, all amateur communications are precluded."

In addition, the ARRL contends that rules imposed in the Commission's Report and Order "were adopted through flawed procedures." The League said the FCC adopted the rules without advance notice and opportunity for prior comment by those who would be most affected. "Neither the League, nor radio amateurs generally, had any opportunity to comment on, or suggest alternatives to, the rules adopted by the Commission," the ARRL petition said. "The Commission cannot impose substantive rule changes without adequate notice."

The ARRL said that the new rules differentiate between ham stations and other Commission licensees, "which are treated far less restrictively." While the FCC preempted state and local government regulation of personal wireless service facilities based on environmental effects of RF emissions, it refused to do

the same for ham radio "without any basis for the distinction."

The League's petition also said the rules in the Report and Order "contain substantive obligations" that affect both individual hams and the preparation of ham radio examinations. The ARRL already has asked the FCC to extend the deadline to change amateur examinations and modify question pools, but the Commission has yet to act on the request. "The Commission failed to address the impact on radio amateurs, amateur groups, or publishers of amateur radio examination preparation materials," the League said. Noting that the FCC has not yet issued revised documents to assist amateur radio licensees in determining MPE compliance, the League said that, as it now stands, hams have no way to determine the scope of their obligations under the new rules.

The League suggested the FCC vacate its new RF safety rules governing amateur stations and issue a further notice to permit comment on the proposed rules, and, in particular, the 50 W threshold. Hare said the League's proposed HF threshold of 150 W at 10 meters distance from the antenna "encompasses a much greater range of typical amateur radio operation without compromising safety."

According to the September 9, 1996, issue of *Radio Communications Report*, the ARRL was not the only one to challenge the RF exposure guidelines. Others filing petitions for reconsideration or clarification are the Personal Communications Industry Association, the Electromagnetic Energy Association, Hammett & Edison Inc. (a consulting firm), and the US Department of Defense.

Are These New Regulations Something to Worry About?

Having read these two views on the new regulations, it is important to recall that Wayne was once the Secretary of the ARRL Bio-Effects Committee, which was set up to advise the ARRL Board of Directors on this subject. In 1994 the ARRL Board and the committee came to a disagreement over the content of the committee's report (which was opting for a stronger stand about the problems of RF safety). The upshot of this disagreement was that all of the committee members either resigned or were fired by then ARRL President George Wilson, W4OYI.

As you can deduce, Wayne is in favor of them as they stand. The League is not. The League would prefer the FCC to set a power limit of 150 W, because most amateurs operate store-bought transceivers which run 100 W or less. By having the higher limit, these amateurs who run power under that threshold would feel that they were exempt from the regulations.

However, as Ed Hare, KA1CV, the League's Laboratory Supervisor, points out in the above quote, none of us is exempt, except those of us who run mobile with a push-to-talk arrangement (Rovers, take note!).

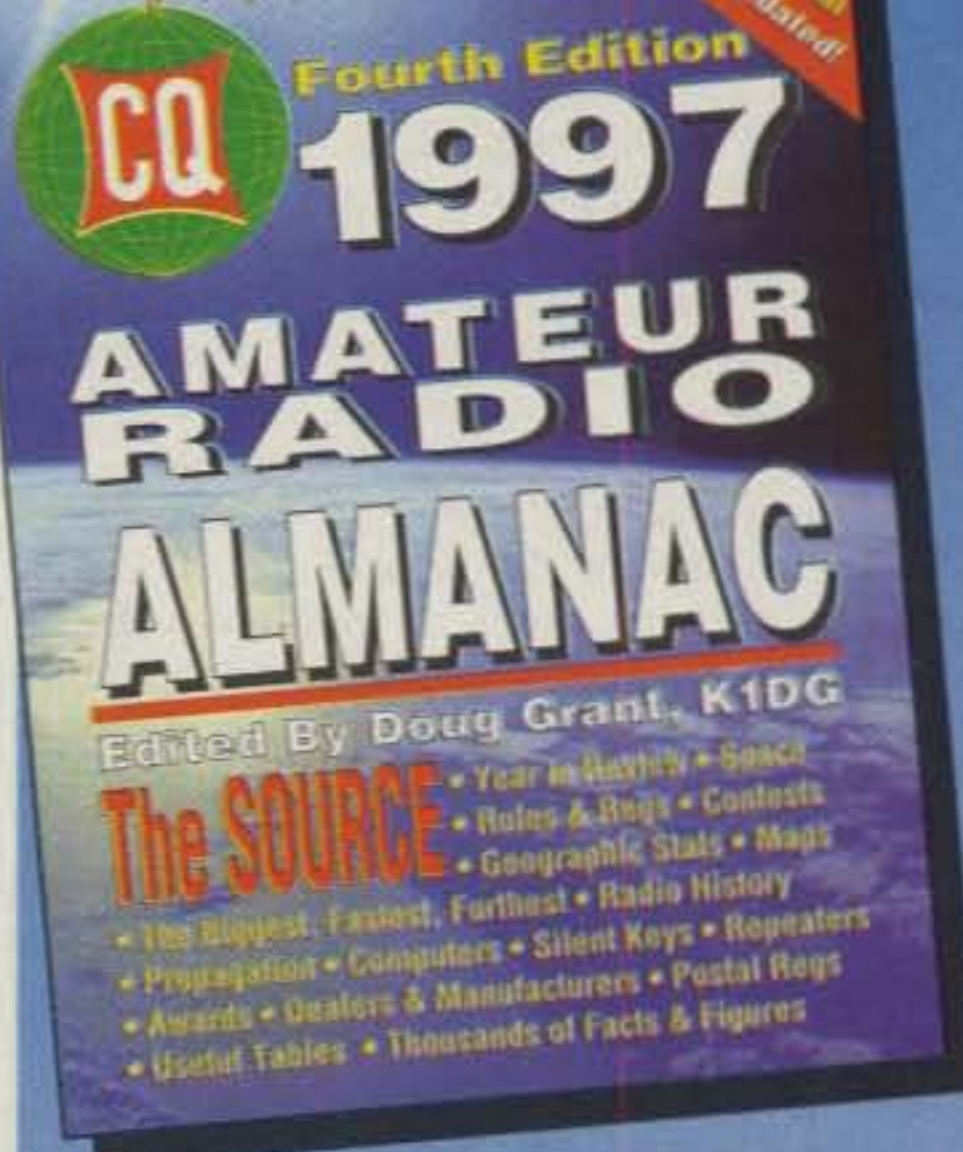
Is there a problem with RF safety? Yes, definitely. Let's face it. We have a hobby that is fraught with dangers. How many of us have felt the sting of an RF burn, even from our handheld? Those of us in the weak-signal community know our own tales of misfortune, or have heard the tales of others. I know of one amateur who has permanent eye damage suffered as a result of working on a 70 cm array when someone applied power to it. Additionally,

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another amateur told me that upon looking inside a 70 cm amp that was operating, his eyes "got warm."

Furthermore, there is speculation that John Chambers, W6NLZ, who conducted successful record-setting VHF and above QSOs with Tommy Thomas, (then) KH6UK, developed a fatal brain tumor because of his exposure to RF radiation. I've said this before in this column: Microwave ovens cook the food (including pieces of meat) via microwave radiation generated by a klystron, a high-powered microwave tube. Like it or not, you are a piece of meat. And, if exposed to microwave radiation, you stand a chance of being cooked!

So what is this regulation requiring of us amateurs? Principally, more awareness. There will be new questions introduced into the Novice, Technician, and General class question pools. Additionally, there will be a statement added above the signature line to the 610 form which indicates by your signing that you have made sure that your station is in compliance with the regulations. Essentially, this is, as they call it in the legal world, an indemnity clause. The FCC has advised you of your obligations, and you are certifying that you are aware of them and have taken the necessary steps to be in compliance.

How enforceable is that clause? Considering that the most recent FCC action was several years in the making and it came about only after it was initiated by the intervention of three congressmen and the wife of the President of the U.S., it's not likely that the FCC will be showing up at your doorstep asking you to demonstrate how you have certified that you are in compliance. Nevertheless, if your neighbors decide that they have had it with your interfering with their TV, telephone, and whatever else they can find, and if they find a sharp lawyer who will allege in a lawsuit that, among other things, your RF radiation is harmful to their health, you will have to demonstrate how you are in compliance, at least in court. Furthermore, the FCC is off the hook in the lawsuit because you have certified to the Commission that you are in compliance with the regulations.

Sorry, Wayne, but I'm not as optimistic as you are when speculating about whether or not my neighbors would sue me.

Frankly, if I were looking for a way to make money from this regulation, I would be in the insurance business. I would be creating an insurance policy which would protect my fellow amateurs from losses from potential lawsuits and signing them up right and left. Initially, the premiums could be kept reasonably low and the protection offered could be quite high, such as maybe a million dollars or so. But I'm not in that business, nor do I ever intend to enter it.

Seriously, the FCC has told us amateurs (as well as the rest of the world which communicates via RF) that RF radiation has the potential to create health problems and we need to take steps to protect ourselves and our neighbors from any potential harm that our hobby might cause. Whether or not the League is successful in getting the regulations modified is beside the point. There *will be* some sort of regulations in effect on 1 January 1997. We can either ignorantly gripe about them, or we can intelligently figure out how to come into compliance with them. Frankly, I think the latter course of action is the best for all concerned, especially our families and our non-amateur neighbors!

Free RF Safety Software Available

The following is from Brian Beezley, K6STI, via the Internet: "As a result of the recent FCC ruling that mandates RF-exposure limits for amateur stations beginning January 1, 1997, I'm making available at no cost a special version of AO Antenna Optimizer software that calculates electric and magnetic near fields. NF.EXE requires a 386 or better, math coprocessor, VGA, and DOS 3.0 or later.

"You can download the 245K NF.ZIP file from ftp://n6nd.nosc.mil. You may copy this free software for others as long as no charge is involved and the software is used for amateur purposes only. After you unzip the file, see READ.ME for more information. Please carefully read the section on accuracy limitations of near-field modeling. I hope this software helps hams evaluate their stations for compliance with the new FCC rule. The software should be especially useful at high-power contest, DX, and EME stations.

"I'm providing this free software without support. The package includes extensive documentation and 92 example antenna files. I hope you'll refrain from calling, writing, or e-mailing questions about downloading or using the software. Thanks!—Brian Beezley, K6STI."

Before you download Brian's software, be sure that your computer meets the requirements as outlined above, particularly that it has a math coprocessor because the software *will not* work without one.

Current Conferences

The following is from AMSAT's home page: **AMSAT-NA Space Symposium Set:** The 14th AMSAT-NA Space Symposium and Annual Meeting will be held on 8-10 November 1996 at the Holiday Inn-City Center in Tucson, Arizona. This year's event will feature a wide range of activities, including the following.

Forums: Phase 3D satellite developments and ground station ideas; progress reports on many new amateur satellites currently in development; and new developments by radio amateurs in satellite operations and related fields.

Beginner's Forum: A special series of presentations for the newcomer to satellite operations will cover the basics—terminology, tracking, equipment issues, plus much more.

Displays: Hardware and software currently under development for both orbital systems and ground stations will be available for examination.

Demonstration Stations: Both analog and digital satellite stations will be active throughout the weekend. Stop by and operate on the "birds."

Tour of the Kitt Peak National Observatory: A special tour of the 12-Meter millimeter wave radio telescope (68-300 GHz) and the 25-Meter Very Long Baseline Array site operated by the Tucson operation of the National Radio Astronomy Observatories on Kitt Peak (elev. 2096 m, 6875 ft.) is being arranged. Touring of some selected optical telescopes at the Kitt Peak National Observatory will also be available.

Tentative Meeting Agenda: A tentative agenda for the meeting is available on the World Wide Web at <http://www.amsat.org/amsat/agenda.html>.

Registration Form: If you would like a copy of the registration form, contact Larry Brown by

e-mail at <nw7n@amsat.org> and send him your post office mail address.

Current Contest

The second weekend of the ARRL annual EME contest is scheduled for 23–24 Nov. Complete rules are in the September issue of *QST*.

Current Meteor Showers

Two showers, the *Taurids* and the *Leonids* meteor showers, will peak this month. The *Taurids* is scheduled to peak on 5 November and the *Leonids* is scheduled to peak somewhere between 0400 and 1000 UTC on 17 November. Peak activity is not much above sporadic levels at 10–15 meteors per hour for the *Taurids*. However, peak activity for the *Leonids* is expected to be above 60 meteors per hour, with the OH5IY program predicting a 99% probability of completing a QSO at my QTH (EM15) at 0830 UTC.

There's A Storm Coming

Thirty years ago this month I was standing in formation outside of my barracks at 5:30 AM. It was just six weeks earlier that I had been drafted into the U.S. Army, beginning a 2½ year tour of duty.

Having been just awakened by the drill sergeant, my mind was not fully functioning. However, one of my fellow recruits happened to look up and notice that there were a considerable number of meteors falling. Then I became really awake!

I remembered reading in Sam Harris's "The World Above 50 Mc." column in *QST* of the potential for a meteor storm from the *Leonids* meteor shower. Here I was standing in formation, wishing all the more that I was a thousand miles away and out of the Army.

Well, I missed that storm. However, I have since learned much about meteor showers and the potential storms. I have lived through false alarms such as the 1994 *Perseids* (at least it was pretty much of a false alarm for us in North America). Nevertheless, I am fairly confident that the next predicted storms will come to pass. I base this confidence partly on what I observed standing in formation 30 years ago.

Astronomers who study these things (meteors) say that the *Leonids* has a periodicity of about 33 years, maybe somewhat less. At least a couple of years ago articles started appearing in *Astronomy* and *Sky and Telescope* magazines, predicting storms for 1998 and/or 1999. One of the (at that time proposed) indicators of these predictions being right was an increase in shower activity in the years preceding 1998 and 1999.

Last year's *Leonids* meteor shower showed a significant increase in activity, as did that of the year before. Far from being storms, nevertheless, both years' showers showed promises of the potential of things to come. If this year's *Leonids* meteor shower continues to show an increase in activity, then watch out for the storm in two years! Actually, next year's activity won't be half bad either.

Above are the predicted dates and times for this month's showers. Jump in and make a few contacts. Then you can be the judge of what we can expect in the next few years.

Fifty Years Ago on 50 MHz

It was on 1 March 1946 that the FCC authorized the amateur band change from 56 MHz to 50 MHz. With the newness of the band came record-setting attempts. One such record occurred 50 years ago this month. On 24 November 1946, Ed Tilton, W1HDQ, was heard on 6 meters almost simultaneously by Clive Heightman, G6DH, and Hilton O'Heffernan, G5BY. Pronouncements of their receptions of Ed's signal were made on 10 meters. Attempts were made to make it an entirely VHF contact with

G5BY transmitting 58.632 MHz. However, Ed did not copy Hilton's signal because the MUF did not reach that frequency.

At about the same time that Ed was making his historic cross-band QSO, a couple of U.S. amateurs were making the first F₂ contact on 6 meters. Grid, W4GJO, operating from Orlando, Florida, and W6QG, operating from Santa Ana, California, made contact with each other. Additionally, W4IUJ, in West Palm Beach, was heard by W6QG, working W6FPV at the same time. Ed reported in his "The World Above 50 Mc." column in *QST* that these contacts were

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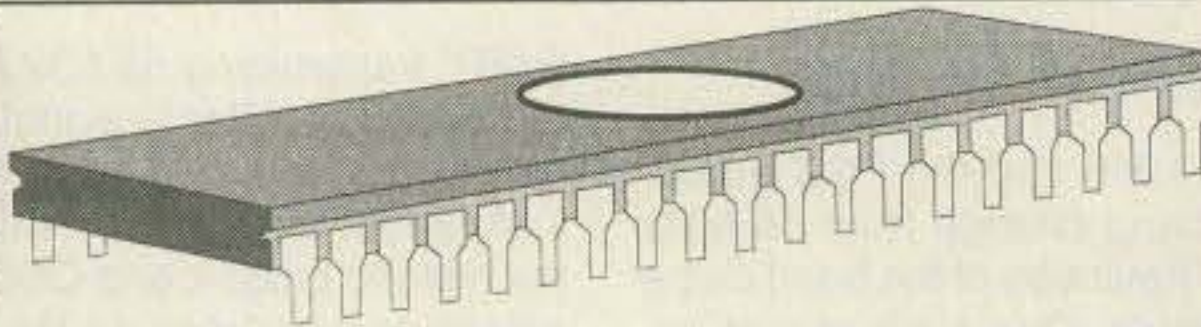
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firsts of two sorts. They were the first F₂ contacts and the first Florida to California contacts reported on this band.

Now, 50 years later, we sit at the bottom of the sunspot cycle, looking forward to the next three years when the next cycle will be sufficiently high to once again produce F₂ propagation. North America to Europe contacts via sporadic-E are a regular summer occurrence. My, how we now take this band for granted!

And Finally . . .

I was reading an article in *Charisma* magazine about reconciliation the other day. While I was reading it, I realized that much written about that problem can also be applied to our hobby.

We amateurs pride ourselves on being part of a big family. Yet in some ways we aren't family. We are a group of individuals who happen to practice the same hobby under a big tent called "amateur radio." What's wrong with this picture, and why do I not consider us a family?

Let's take the specialty of this column, VHF and above communications. I happen to like to make weak-signal contacts. However, as we all know, this aspect of VHF and above operating is in a minority. By far, the vast majority of activity on the VHF and above bands is repeater operation. It is almost always the first entry point people take into the hobby.

Because there are so many amateurs operating 2 meter FM, there is pressure on parts of the band which have been set aside for modes other than repeater operations. Not a week goes by but that something shows up on the Internet of yet another encroachment into someone's sacred part of the band. And when this happens, boy do the sparks fly! This is where we seem to forget that we all are in the same hobby. And we are in it together!

While we decry the violence shown by drive-by shootings, we take out our violence via spin-by transmissions. We will get on the air, call someone names, and then spin our VFO away from the frequency, as if we were speeding away from the scene of a crime.

What have we accomplished by such violent confrontations? Nothing but further alienation!

The point of the *Charisma* article was that the only way that reconciliation can occur is if all sides are sorry for their ill-advised actions toward others and are willing to ask for forgiveness from the parties which they have offended. The point of this editorial is that the only way we can move forward in this hobby is for reconciliation to occur among the various factions of the hobby. Otherwise we will continue down a path of self-destruction.

Bottom line: We need to stop attacking each other on the air; we need to stop flaming each other on the Internet. Instead, we need to make friends with those who do not share our interests in the hobby. Find out why they are upset and attempt to work with them to find solutions which are mutually satisfactory and to the benefit to the hobby as a whole. In so doing, we will turn a corner for the better for our hobby.

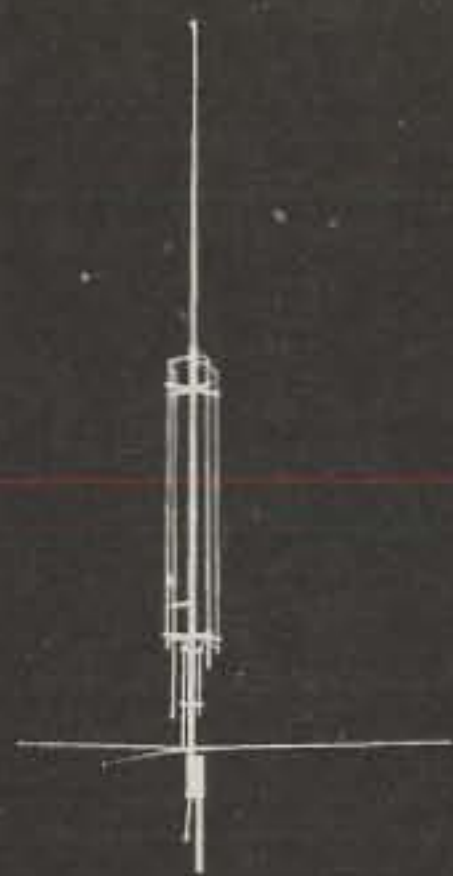
Thank you for your continued support of me as your columnist. I continue to look forward to your input. If you have a contribution or a comment or two, you know the routes. However, please note that my voice phone number has been incorrect. It is 405-528-6625. Even so, it is best to e-mail me, as I am not in Oklahoma City enough anymore to get your phone calls.

Until next month . . .

73, Joe, N6CL

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This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

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A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its **NO TUNE** feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

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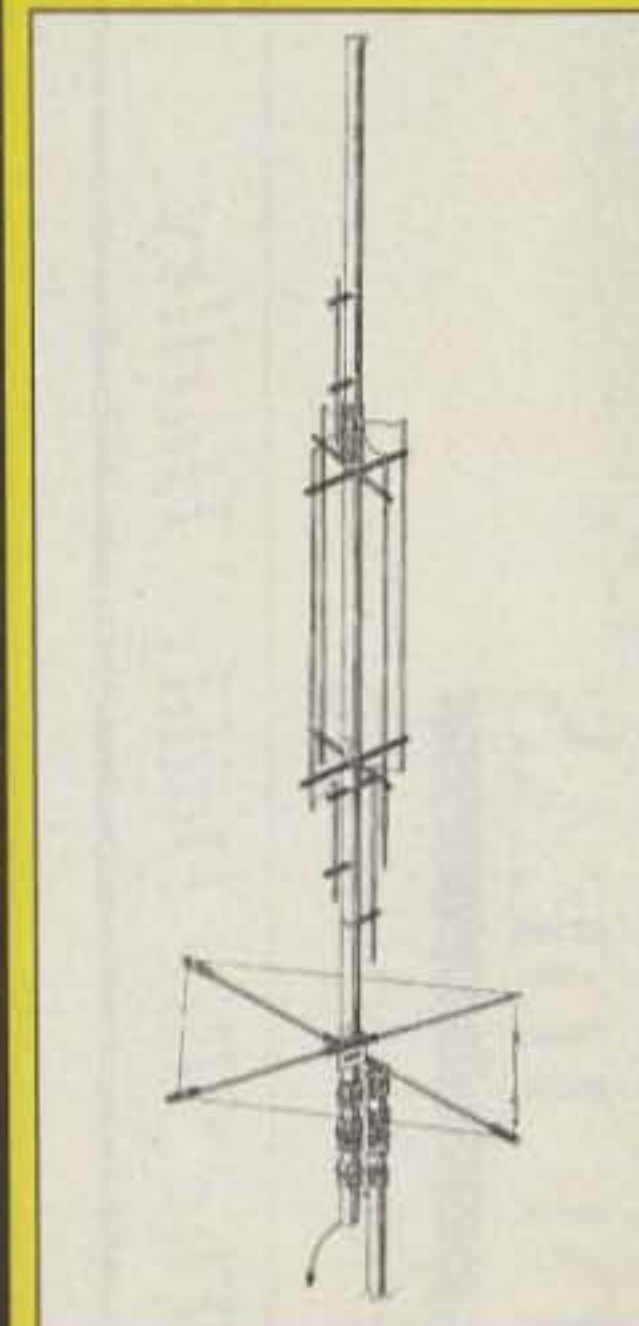
73—"This is a real DX antenna, much quieter than other verticals."

RF—"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by 5 units, not just DBs."

Worldradio—"These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if it is fed in the center."

IEEE—"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

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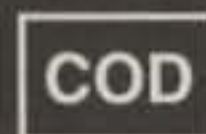
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Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	\$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	\$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	\$289
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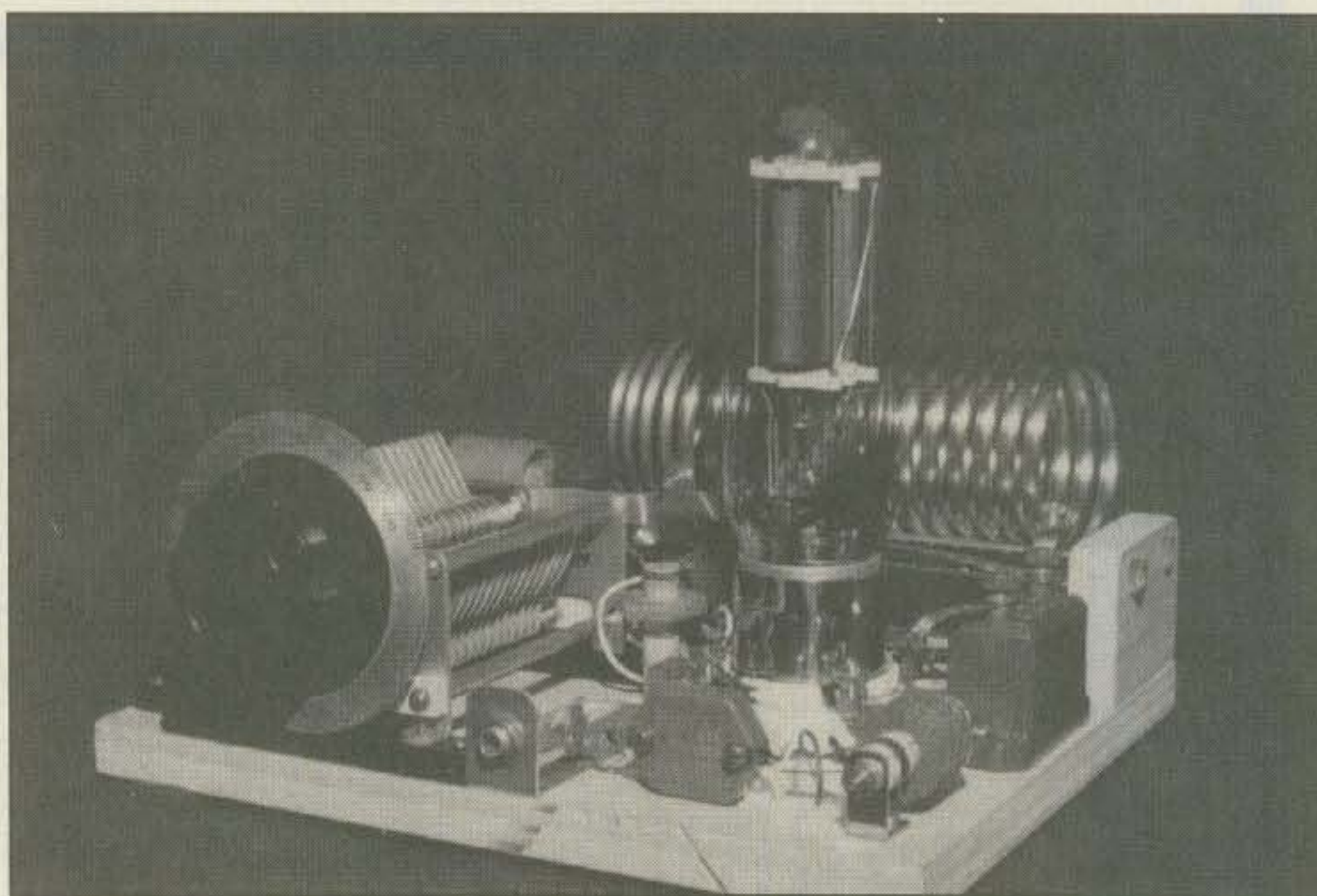
Classic Radio Supreme: The "Big Daddy" Hartley

I originally had planned to feature a new and unique subject in this month's column, but preparing it required more time than I expected. As a result, you are in for a super-treat substitute guaranteed to bring tears of joy (or at least envy!) to everyone's eyes—classic radio supreme. Yes, and in the main spotlight is one of the most glamorous golden-oldie transmitters we have seen in many years—a 1929 "big bottle" Hartley.

Featuring this 67-year-old delight is much more than recapturing the romance of genuine glow-in-the-dark rigs; it is also a lesson in proper construction and use so they can pump out a beautiful signal on today's bands. That does mean, however, that this is **not** a project for newer amateurs unfamiliar with vacuum tubes and self-excited "open air" rigs. **Dangerous and potentially lethal high-voltage and circulating RF current is present, and operator know-how is the only safeguard against out-of-band signals.** With those ground-floor facts understood, and assuming you have a sincere appreciation of the king of Hartleys or simply want to build a replica of old-time radio at its best for shack display, this is the one!

Before jumping into the details of our "big-daddy" Hartley, let's review some good-news items to ensure everyone is in an upbeat frame of mind. As I mentioned last time, sunspot counts are slowly rising (slowly indeed, but rising is better than dropping!), and upper band conditions are gradually improving. Call me over-anxious or over-enthusiastic if you wish, but the numbers I'm seeing are holding consistent, and I'm having a ball working DX and operating QRP even during this time of low sunspots.

In my last column I invited you to tune in WWV (5, 10, or 15 MHz) at 18 minutes after each hour, and I gave you some solar-flux-to-sunspot conversions. When that was written (in May and June), sunspots were approximately between 5 and 7. As this paragraph is being written (early August), WWV is announcing the flux as 78 (which, thanks to W6EL's outstanding MiniProp Plus program, converts to a sunspot count near 20), and I'm finding 20 and 30 meters open more than folks apparently realize. How so? When I listen closely in early mornings, there is a quiet but "open air" sound like you hear between stations when DXing is good, but few (if any) U.S. stations are active. I tune in adjacent-band utility services (such as aeronautical weather on 10.051 MHz, for example), and the rig's S-meter swings upscale significantly. Back on the amateur band, a well-placed CQ usually brings calls from stations in Japan, Korea, and other places (and I'm running less than 50 watts!). A few minutes later, South African stations start rolling through on 20 meters, and again I can work them with low power. That's not bad for sunspot counts between 15 and 20! Maybe I should keep the pre-



More beautiful than a speckled pup under a red wagon, this "big daddy" Hartley uses a famous 211 "50 watter" tube, illuminates a shack like a harvest moon, and delivers a great-sounding signal on today's bands. (Rig and photo courtesy Charles Preston, K4LJH.)

vious notes to myself and enjoy frolicking, but I'm just a good guy of amateur radio at heart and want everyone to enjoy the fun!

Your response to my little Micronaut QRPp fun transmitter featured in the April and May columns has been overwhelming. Thanks! I never realized such a simple project could be so captivating! Sescocom made kits of the Micronaut for a brief period, but then bowed out of the game (possibly because the kits were priced too low to cover product expenses). Many of you were left with returned orders (and returned checks), and have asked me to continue the Micronaut project. I am striving to do exactly that at this moment, and hope to have good "resurrection" news soon. Thus far, it looks like the kits either will cost a few dollars more or be available without a case. I'm not sure if a 3.58 MHz crystal should be included or if the surface-mount version should be dropped. Tell me your opinion, include an SASE, and I'll let you know when the new Micronaut kits are ready. Otherwise, stay tuned to this column for more details, and those of you with Micronauts going, tell us how they are "working out." Now on to the super Hartley!

"Big Daddy" Hartley

Okay, friends, you've seen the photos and are now anxious to read the story of our super classic, right? This 1929 masterpiece was built by Charles Preston, K4LJH, of Hamilton, Virginia. It works 80 meters as-is and can be changed to work 40 (or 30?) meters with another tank

coil if desired. Charles built the transmitter from two articles in *QST*. The circuit design came from an article by Ross Hull in the August 1928 issue of *QST* ("Overhauling the Transmitter for 1929"), and the coil design came from George Grammer's article in April 1933 ("Rotten Signals: How to Cure Them"). Both articles are terrific, but the latter is loaded with little-known information and should be considered "must reading" for all fans of self-excited transmitters.

The transmitter is built on a birch plywood base measuring 12" x 10³/₄". Large copper-tubing coils for the tank circuit and antenna coupling are mounted at the rear and stabilized in position by old-time glass curtain rods. The glass rod supports are cut from ³/₄ inch poplar wood. The tube, a classic 7¹/₂ inch tall 211 "50 watter" (so nicknamed because of its plate dissipation), sits in a large E.F. Johnson socket in front of the coils. The tuning capacitor is mounted on Derlin® spacers at the board's left front side. It is fitted with a large Johnson knob with metal backing to minimize hand capacity. A 10 by 1 inch ground buss strap with 90 degree bends on each end is positioned full depth of the board. A ¹/₄ inch key socket is mounted on its front end, and a ground lug is mounted on its rear. Antenna connections are on the rear, behind the tuning capacitor. Filament and high-voltage connections are via a six-screw terminal block on the board's left side.

Before continuing, I might point out the 211 was the "bees knees" in high-power vacuum tubes during the 1920s. Later it was upstaged by the 811 and 3-500Z. Today 211s are some-

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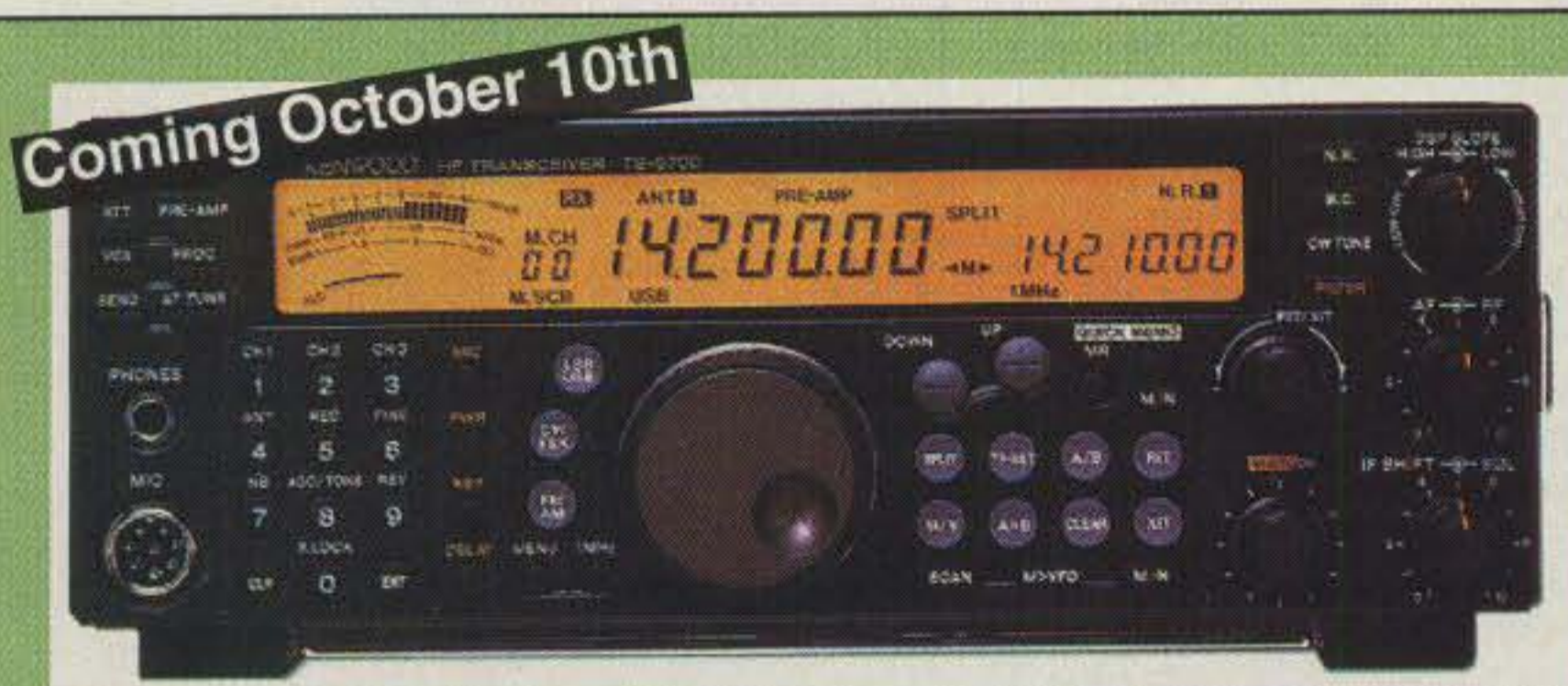
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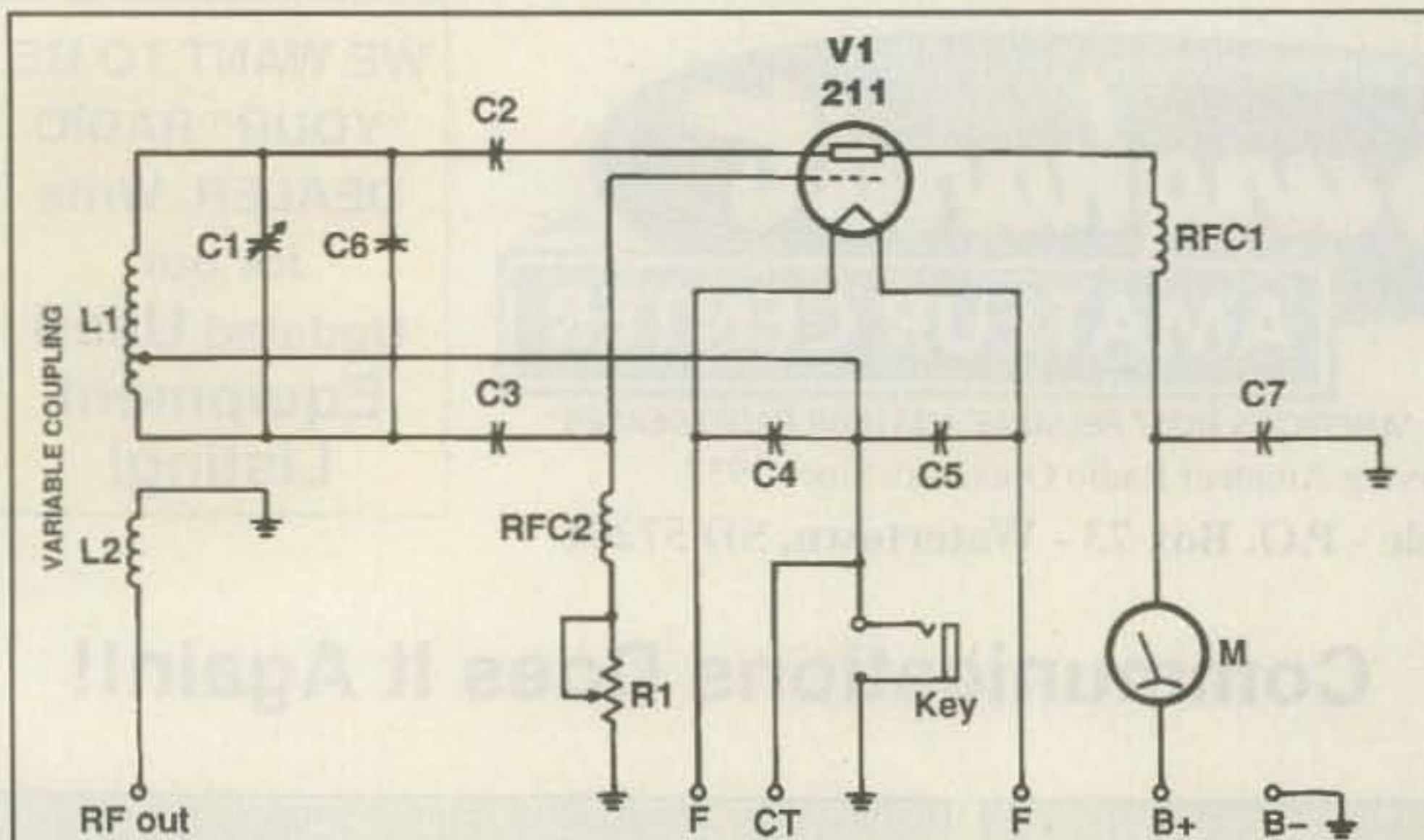
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Hartley 80 Meter Transmitter Parts List

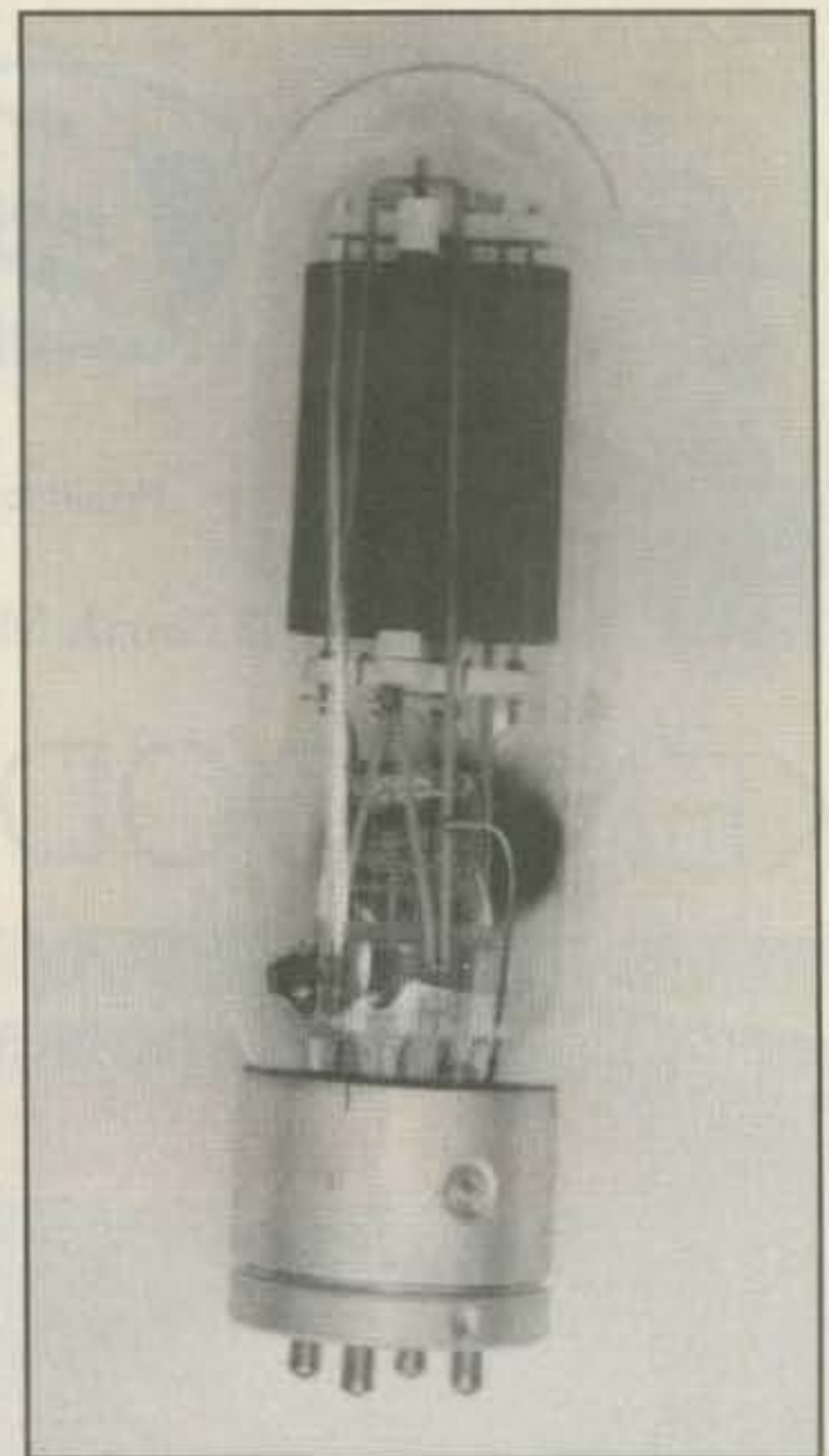
C1—250 pF transmitting type, National
 C2—600 pF 5 KV mica
 C3—250 pF 500 V mica
 C4—C5—.005 uFd 500 V mica
 C6—200 pF 7.5 KV transmitting door-knob type
 C7—.002 uFd 1200 V mica
 RFC1—2.5 mH Hammarlund CH-500
 RFC2—800 uH from BC-375 tuning unit
 R1—20K 50 watt, adjustable, wire wound
 L1—80 meters, 15 turns 1/4" copper tubing wound on 2" PVC pipe w/o.d. of 2 3/8" and spaced to a length of 6". The tap is placed approximately 8 turns from the grid end. A Mueller Electric Pee-Wee clip No. 45 is used for this purpose.
 L2—4 turns 3/16" copper tubing wound on the same form and spaced to a length of 1 5/8".
 M1—0-100 ma

T1—Transformer filament, 10 volts at 4 amps, Stancor P-8654
 V1—Type 211 transmitting tube
 Tube socket—4 pin, bayonet, E.F. Johnson
 Breadboard chassis—12"W x 10 3/8"D x 3/4" thick
 Connector—RF output, National type FWG
 Key jack—1/4" shorting type
 Supplier of brass rods—McMaster-Carr Supply Co., P.O. Box 440, New Brunswick, NJ 08903-0440 (1-908-329-3200). Pyrex glass rods part #8496K51, 1/2" dia. x 12" long, price as of May 1996 \$2.32 each.
 Angle brackets—brass, Stanley Hardware #80-3800
 Thumb nuts—nickel-plated brass, part #A-TNB-032. Small Parts Inc., 13980 NW 58th Court, P.O. Box 4650, Miami Lakes, FL 33014-0650 (1-800-220-4242).

Fig. 1—Circuit diagram for the "big daddy" Hartley, courtesy K4LJH (discussion in text).

what rare and expensive and are a collector's pride. The 211 (which was also labeled VT-4-C for the military) is shown in the photo. It has four stubby base pins, a side locating pin for mating with a twist-lock socket, and a massive

3-500Z-looking plate and grid assembly. The filament requires 10 volts at 3.25 amperes for operation, and the tube works with 300 to 1000 volts on its plate. Due to the high cost of 211s today, a small variac is placed in series with the



This 7 1/2 inch tall 211 tube is captivating indeed! Note stubby base pins, locating pin on the side, and hefty anode. This, friends, is a REAL vacuum tube! (Photo by K4TWJ.)

filament transformer's primary to raise and lower filament voltage (slowly, please). Likewise, using less than 1000 volts on the plate provides the longest obtainable tube life (Charles uses a highly regulated 300-400 volt supply and gets 5 to 10 watts output—nice and conservative).

Let's now shift focus to the transmitter's circuit diagram (fig. 1), and bring in some of the finer points of self-excited designs. First notice the rather unusual inclusion of an RF choke in the tube's grid circuit (800 uHy to 2.5 mHy values are fine here). Its purpose is to remove minute signal and AC variations affecting grid bias and to help ensure a pure DC note. Next notice a fixed capacitor (C6) is connected in parallel with the main tuning capacitor (C1). It is strapped directly to the variable's frame for stability. Why two capacitors rather than one? They produce a high-C tank circuit which is necessary for good frequency stability, permit minimizing coil turns (inductance), and give the tuning capacitor more bandspread. Ideally, the main (in-band) operating range will then fall between the tuning capacitor's half-mesh and full-mesh points. Although not apparent in the circuit diagram, all wiring connecting C1, C2, C6, and L1 is made with 5/16 by .032 inch copper strap to further ensure dynamic stability.

Next notice both the tank coil's tap and the grid leak resistor (R1) are adjustable. Setting each for a stable and clean-sounding signal requires patience and monitoring expertise. These adjustments should be made with full operating voltage applied and metered, and with the antenna coupled to the transmitter, as one adjustment affects the other. **Note: Strive to make adjustments during midday to**

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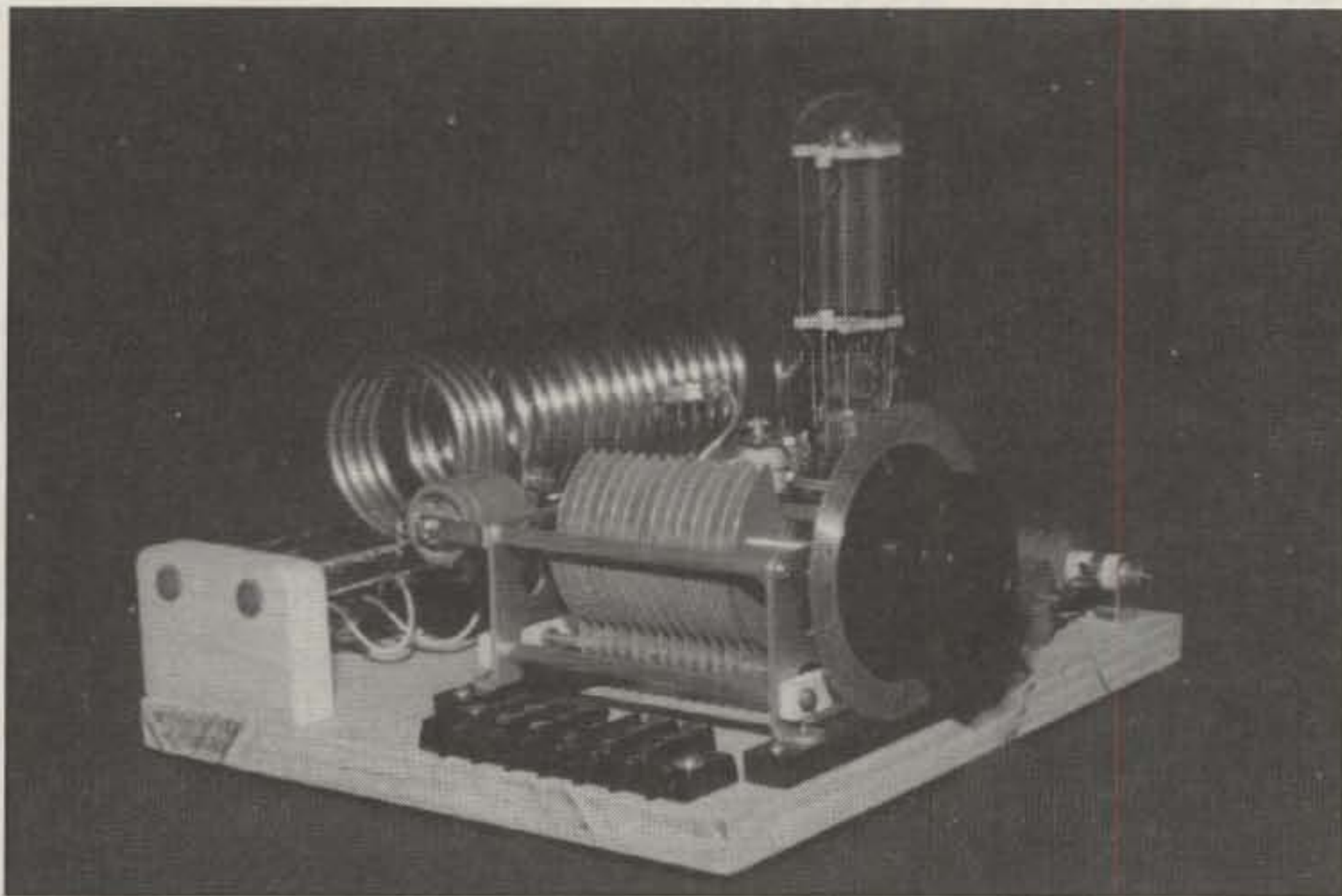
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Angled view of the Hartley showing the terminal block for input voltage, straps for door-knob capacitor, and glass rods supporting coils. Note the tuning capacitor is two-thirds meshed—an optimum position for high-C operation. (Photo via K4LJH.)

avoid QRMing others, and do not touch components when high voltage is present! Also, the antenna should only be coupled lightly to the transmitter. Ideally, a high amount of grid bias (as close to 20K ohms as is feasible)

and high feedback excitation (tap position closer to the plate end of the coil than usual) produces the most stable and "chirpless" signal. The adjustments must be made carefully, slowly, and in small increments. When properly set,

the transmitter's no-load (no antenna connected) plate current should be half its loaded (antenna connected) value, there should be no chirps, and the tube's plate should show no color. Got that, gang?

Column space is running low, so let's wrap up with some good final notes. Whether a self-excited transmitter runs 5 watts or 50 watts, it must be supported by a hefty and well-regulated power supply. Large filter capacitors are not the sole answer here. Use a good, high-current transformer and a series-string of voltage regulator tubes to ensure plate voltage does not drop between key-up and key-down conditions. Otherwise, a warbling signal can be expected. Placing the transmitter on a separate shelf or desk so vibrations from key manipulation do not cause frequency "burble" is also encouraged. Finally, use a key click filter on the input, a band-pass filter on the output, and always monitor the rig's signal when transmitting.

Special thanks to Charles Preston, K4LJH, for sharing views of his glamorous Hartley showpiece. Charles uses our featured rig with a pre-war HRO receiver and dipole antenna, and he has worked stations all along the east coast with that setup. Charles emphasizes that building and using classic gear brings new meaning and respect for old-time radio. Yes, indeed! May the romance continue forever!

Are many other readers using classic self-excited or crystal-controlled gear today? Both Charles and I would be delighted to hear from you (include an SASE, please!). More nostalgic fun is coming in future columns. Stay tuned!

73, Dave, K4TWJ

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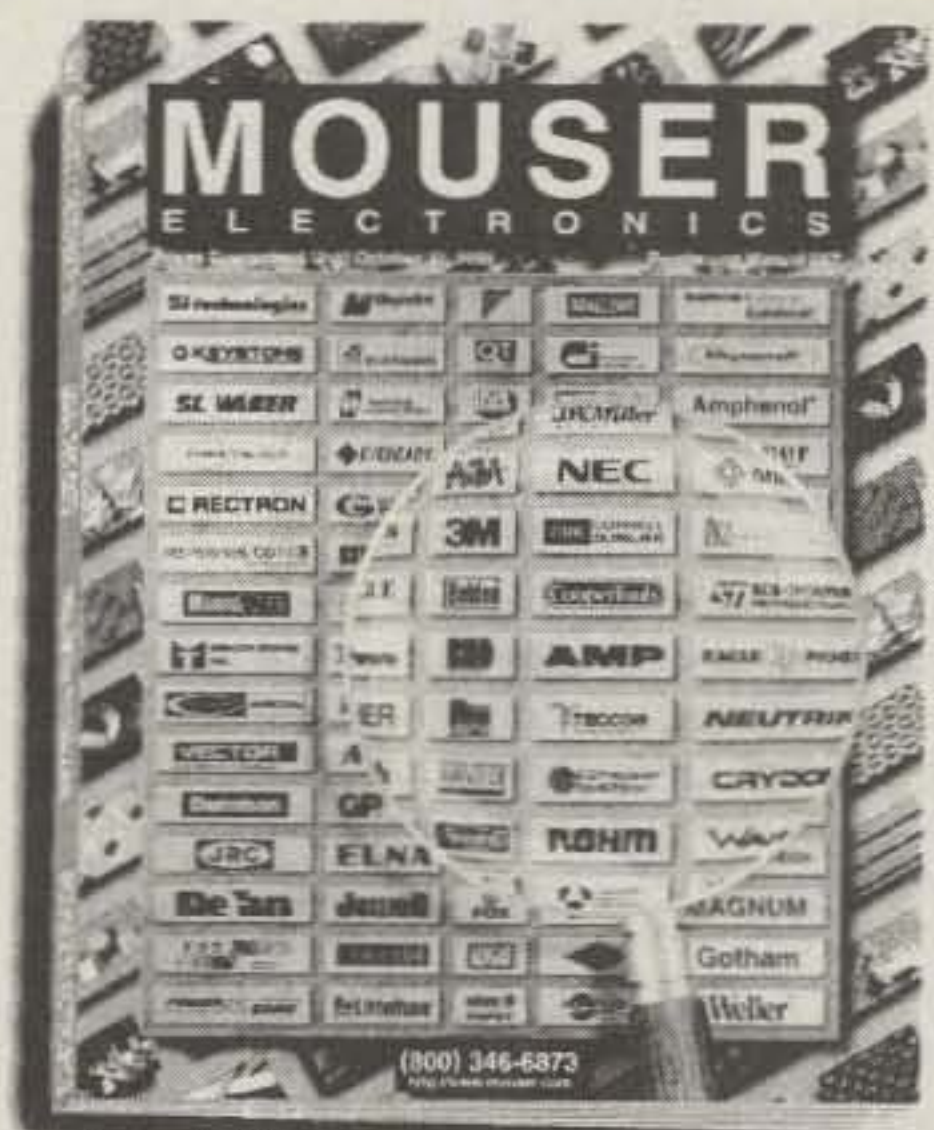
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CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Using Transistors As Diodes—Some Tricks

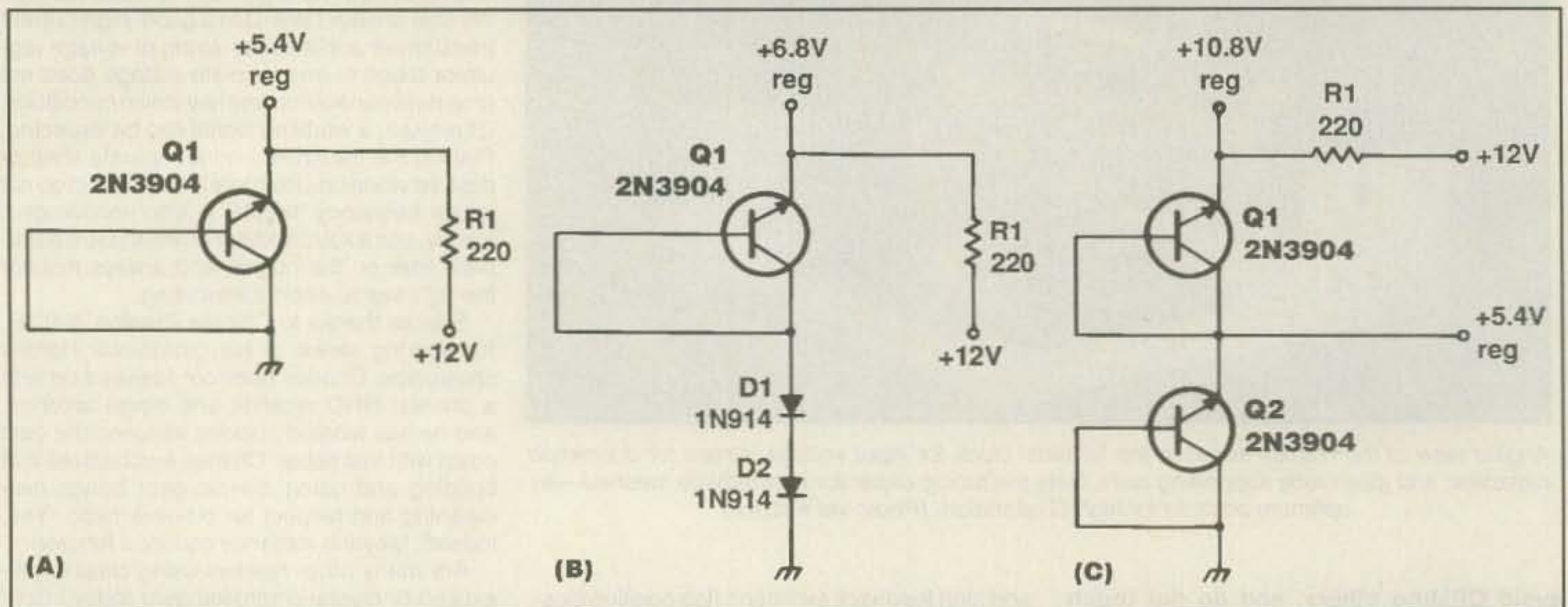


Fig. 1—Examples of NPN transistors used as diodes. Circuit (A) shows a +5.4 Vdc regulator. The regulated voltage may be increased by adding diodes, as shown at (B). Circuit (C) illustrates transistors in series to provide +10.8 V, regulated. Regulated +5.4 V is also available.

How many times have you needed a VVC (voltage variable capacitor) diode (a.k.a. Varactor) or a Zener diode, only to discover that your goodie trove was without those parts? It can happen at the most critical of times — when those parts are the only ones needed to complete a project. I know this from experience! Most of us, however, have a host of assorted small-signal NPN transistors on hand, and they can be used as voltage regulators or tuning diodes. This is not a new trick. Engineers and radio amateurs have been doing this for many years. I became aware of this approach many years ago when writing *Solid State Design for the Radio Amateur* (ARRL publication) with renown QRPer W7ZOI. Some of his circuits used bipolar transistors for the foregoing purposes. I am aware, though, that a large number of experimenters have not discovered this simple alternative to a trip to the parts store or the long wait for a catalog order to arrive. Therefore, I want to share this helpful information with the readers of *CQ*.

How It's Done

An NPN transistor—such as a 2N3904, 2N2222, or 2N4400—can be used in the examples given in fig. 1. Circuit (A) shows how to connect a 2N3904 for use as a low-current voltage regulator. Not all small-signal transistors regulate at 5.4 volts, as shown. Each transistor has its own characteristics. The maximum “zener” voltage I obtained was +8. You will observe at (A) in fig. 1 that positive voltage is applied through a limiting resistor, R1, to the emitter of Q1. The same method is used when working with standard Zener diodes. A 2N3904, for example, is on par with a 400 mW Zener diode in terms of the maximum power dissipa-

tion. The base and the collector terminals are grounded.

The regulated voltage may be increased by adding silicon diodes in the Q1 ground return, as illustrated at (B) of fig. 1. Each diode you add will elevate the regulated voltage by approximately 0.7 volt. In this example the regulated voltage has risen from 5.4 (at [A]) to 6.8 volts by virtue of D1 and D2.

Two NPN transistors may be used in series to elevate the regulated voltage from that of a single transistor. This can be seen at (C) in fig. 1. Two 2N3904 transistors yield a regulated voltage of 10.8. Furthermore, a 5.4 volt tap point is available between Q1 and Q2. This can be an advantage in the event regulation is needed at a lower voltage elsewhere in the circuit. A typical example would be a VFO power source.

Power transistors in TO-220 and TO-3 packages are suitable for use as huskier regulators when used with power resistors of the appropriate wattage rating.

I would be derelict in my reporting if I failed to say that silicon junction diodes are also suitable as voltage regulators. It is a common practice to use a single silicon power diode as a bias regulator for the base circuit of a transistor RF power amplifier when it is configured for class A or AB linear service. The regulated voltage is 0.7, which is the threshold voltage for silicon diodes. Two or more diodes may be used in series to increase the value of the regulated voltage. In essence, we are using the diode junctions of the transistors when utilizing the fig. 1 circuits. When diodes are used as regulators, it is necessary to apply the positive unregulated voltage to the anode of the diode.

Transistors as Tuning Diodes

Fig. 2 shows two transistors used as diodes.

Q3 acts as a varicap diode and Q2 operates as a 5.4 volt Zener diode. This circuit provides an example of a VFO that operates in the 40 meter band. The isolating buffer and amplifier stages have not been included in order to simplify the illustration.

Q3 causes frequency changes via the change in its junction capacitance as reverse voltage is applied to the emitter through R3. In other words, R3 and Q3 replace expensive, generally hard-to-find, double-bearing air-variable capacitors.

As is the situation with the voltage regulators in fig. 1, a point will be reached when the transistor current levels off and there will be no further change in junction capacitance. RFC1 isolates the VFO RF circuitry from RF ground. C3 is adjusted to provide the tuning range desired, by means of Q3 and R3.

This circuit was tested with a homemade, parallel-tuned Colpitts VFO that operates from 2.3 to 2.5 MHz. Q3 caused a frequency shift of 45 kHz. Greater changes in frequency will occur with VFOs that operate at higher frequencies, such as 5 or 7 MHz.

It is important to recognize that VVC-tuned VFOs, such as the one in fig. 2, have greater short-term drift than those which are tuned with well-designed air variable capacitors. As the Q3 (fig. 2) junction current and temperature increases upon advancement of R3, the internal capacitance of the transistor changes accordingly. Normally, short-term drift stabilizes within the first five minutes of VFO operation. Hence, the thermal problems with real VVC tuning diodes, and transistors used as varactors, can be tolerated for noncritical amateur radio applications.

The tuning range of a VFO can be extended by using two or three NPN transistors in parallel at Q3. Bear in mind that if you add transis-

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- ◆ The C-4 maintains the same turning radius, weighs about 40 pounds, with separate feedline so that the C-3 remains intact.
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- ◆ Force 12 now offers magnetic transmitting / receiving loops for 40 and 80/75, perfect for limited space and NVIS use: the **MTR-56** (6'x6") and the **MTR-618** (6'x18"), both made with 2" tubing. These mount vertically on the ground, deck, balcony, etc.
- ◆ Force 12 has verticals for 40, 80/75 and 160 mtrs. Add to this the several 20-40 yagis, the 40-30-20 yagi and multiple band antennas like the 5BA (20-10) and the 4BA (17-10). Force 12 offers a pair of 50 ohm 1:1 baluns; fully tested and vacuum impregnated for reliability. The B-1 is rated at 3KW and the B-1/C commercial version with N-connector, rated at 25KW.

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tors, the minimum capacitance of the VVC circuit will increase in proportion to the number of transistors used, up to a practical limit (usually three).

The fig. 2 VFO Circuit

Series tuning is used in the VFO of fig. 2. Q3 provides a much greater tuning range in a series-tuned circuit than if it were used in a parallel-tuned VFO. Otherwise, the fig. 2 circuit is the same as most Colpitts VFOs. Series tuning requires more inductance at L1 than when using parallel tuning. If a toroid core is selected for use at L1, it should be a temperature-stable type. Amidon (and others) no. 6 (yellow) core material is recommended if you cannot obtain a no. 7 core (white). The latter type is available from Amidon Associates, Inc.¹ The no. 7 cores are more stable than the no. 6 types. They have a permeability that is slightly greater than the no. 6 cores, but are not designed for operation above 30 MHz. No. 6 material is rated for use up to 50 MHz. The completed toroidal inductor should be doped with two coatings of low-loss sealant, such as General Cement polystyrene Q Dope. This will lock the turns in place to prevent frequency changes caused by movement of the turns during vibration or changes in ambient temperature. I discovered that Elmer's Glue, or a similar white woodworker's glue, is satisfactory as a low-loss coil cement. Tests indicated that there was no degradation of coil Q after the glue had dried, nor was there a discernible inductance change.

Fig. 2—Schematic diagram of a practical 7 MHz VFO that uses an NPN transistor (Q3) in place of an air variable tuning capacitor. Q2 is a +5.4 V regulator which is used as a Zener diode substitute. D2 and D3 serve as a DC switch for VFO frequency offset during receive. See text for information about C1 through C8. L1 has 53 turns of no. 28 enam. wire on an Amidon T68-7 (white) toroid core, or 56 turns of no. 28 enam. wire on a T68-6 (yellow) toroid core. R1 is a 10K ohm linear-taper carbon control (see text). RFC1 and RFC2 are miniature Mouser 1 mH RF chokes (note 3). →

Q2 functions as a 5.4 volt DC regulator (see fig. 1[A]). D2 and D3 act as a DC switch to offset the VFO frequency during RECEIVE. This is an important feature if the VFO is used at the transmitter operating frequency. Without the offset circuit the VFO will be heard in the receiver. C7 is chosen to provide the desired frequency offset. A 10 or 22 pF NP0 capacitor should be okay for 7 MHz operation. The operating voltage for D2 and D3 is supplied through the TR relay or manual TR switch.

VFO frequency stability will be enhanced if you use polystyrene capacitors at C5 and C6. Silver-mica capacitors are less temperature-stable than the former type. C2, C4, C7, and C8 should be zero temperature (NP0) disc ceramic capacitors for best stability. C4 should be the lowest value that will ensure reliable oscillation (oscillator starting). This will greatly aid the VFO stability. Trimmers C1 and C3 need to be NP0 ceramic for best frequency stability. Small air variable trimmers are suitable as substitute components.

Typical buffer and amplifier stages that should follow a VFO are described in *Solid State Design for the Radio Amateur*, W1FB's *Design Notebook*, and W1FB's *QRP Notebook*. These books are available from The ARRL.²

A quality potentiometer is required for R3 in order to ensure smooth, reliable operation. I suggest that you use a 2 watt carbon-composition control, such as the Allen-Bradley brand. Tuning of the VFO will be less critical if you employ a 10-turn potentiometer and dial mechanism. Alternatively, a 180-degree imported vernier drive may be used with R3 to slow down the tuning rate (available from Mouser Electronics³).

Summary

If you are a builder of amateur equipment, you should find the tips in this article helpful. Do not be afraid to experiment with various transistors for regulator and VVC applications. You may wish to develop a file that indicates which transistors work best for these applications. You will find that most small-signal transistors cost substantially less than VVC or Zener diodes. It pays to be thrifty!

Notes

1. Amidon Assoc., Inc., 3122 Alpine Ave., Santa Ana, CA 92704. Phone 714-850-4660 for parts or a catalog.
2. The ARRL, Inc., 225 Main St., Newington, CT 06111, or ARRL book distributors.
3. Part no. 45KN012 (1.5 in. dia.) or 556-S50 (2 in. dia.). Phone 800-346-6873 for catalog or to order. 73, Doug, W1FB

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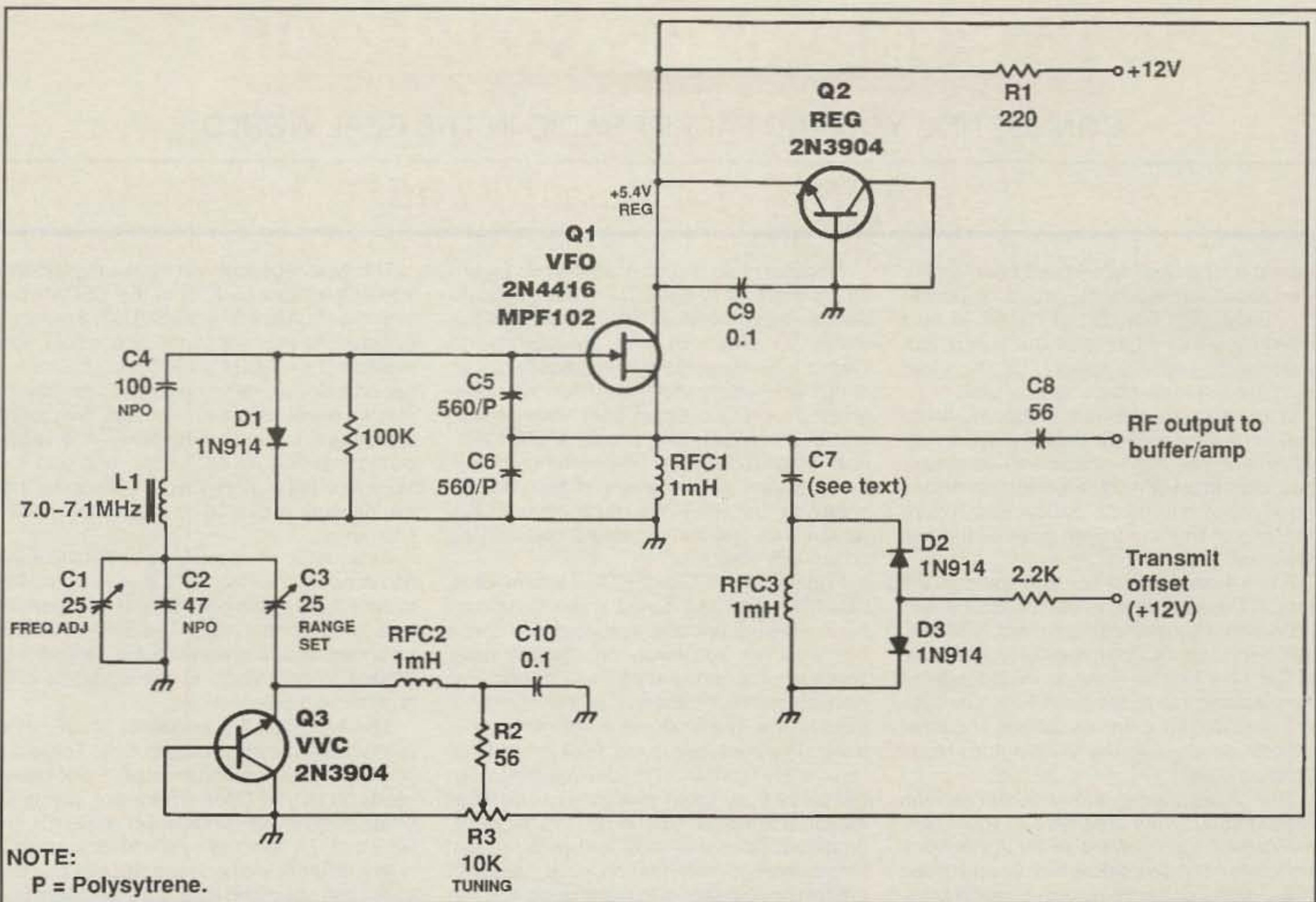
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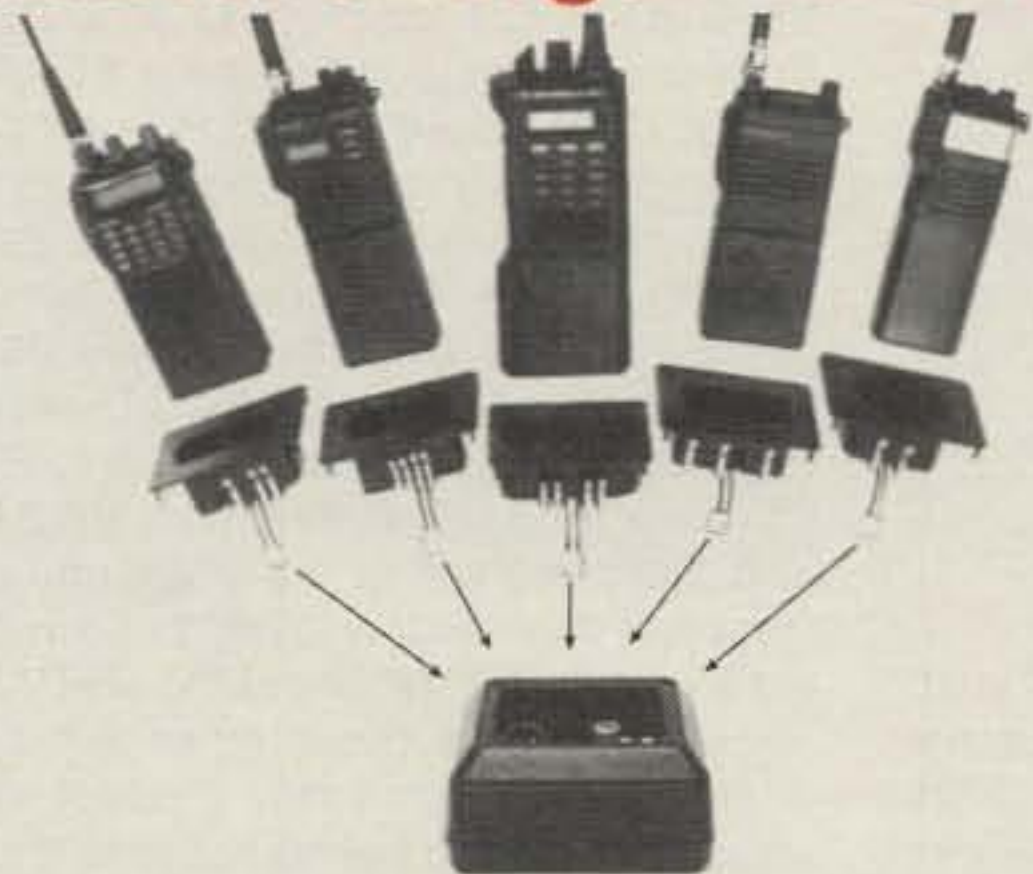
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One Heck of A Wake-Up Call!

For over a decade we have been writing about the wonderful world of packet radio. The fun part of packet is built around the many facets of the hobby that make up its endless novelty. On the other hand, packet radio has a serious side.

In late summer we here in the southeast found out first hand how packet plays a serious role in making it possible to communicate when most other communication modes are silenced. Hurricane Bertha was a door opener, but Hurricane Fran gave us the real "wake-up" call!

When Fran blasted her way through the door at Carolina Beach, North Carolina with 120 mile per hour winds, Rick Card, KD4JKX, president of the SEDAN, was there. Rick lives at Carolina Beach—that is, he once lived there. During Hurricane Fran, Rick was busy assisting with the communications and other support services in the Wilmington, North Carolina area.

That same morning, a few hours later, Fran passed through my area here in south central Virginia. I too saw the wrath of this horrible storm as she wreaked havoc, up-rooting trees, destroying homes, and flooding property. Thank God for solar power, as the 1400 amps at 13 VDC became my source of power while the utilities were being restored.

The Wrath of Fran

After the wrath of Fran had passed, Rick made his way to his home on Lee's Lane at Carolina Beach. Alas, he found only the remains of what used to be his home, amateur radio station, and SEDAN node. As he related to me what he found, I felt some of his pain by the inflections in his voice. Rick is a "trooper" when it comes to emergency communications, but on this day he had lost it all.

Rick had not lived at Carolina Beach long, and he had no insurance to cover his losses. In many cases the cost of insurance in the coastal areas is restrictive. Only a few weeks before that southeastern North Carolina had been hit by a hurricane called Bertha! He was spared from the impact of Bertha, but Fran took her toll.

Hurricane Bertha, like an unexpected and uninvited house guest, arrived with little warning. Blessedly, however, she left quickly and didn't cause as much damage as she could have, damage being a relative term. In Bertha's wake, nearly 1000 people lost their homes and over 3000 homes and businesses sustained major damage. Few lives were lost. The same cannot be said for Hurricane Fran, as many lives were lost and there were billions of dollars in property losses.

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Amateur radio played a critical role by enabling emergency agencies to communicate before, during, and in the aftermath of the storm. In New Hanover County, North Carolina amateur radio is an important part of our local emergency plan. Working closely with the Office of Emergency Management and the American Red Cross, ARES members mobilized quickly before the hurricane and provided vital voice and digital communications between the respective EOCs (emergency operations centers) and outlying community shelters.

From the Red Cross EOC—where Rick, KD4JKX, operated during these disastrous hurricanes—it became apparent why these agencies rely so heavily on amateur radio operators during emergency conditions: Normal communication links either do not exist or are overwhelmed by the volume of traffic. In a message to me, Rick related that he saw this first hand. He said that things can get pretty busy when everyone needs information at the same time! When this happens, amateurs fill in the gaps and pass critical, time-sensitive information that enables emergency personnel to make decisions that help save lives and property. Rick was one of the amateurs who were there to perform this service and who did so admirably.

Rick next received a message from Mac, WA4SGC, AEC Bladen City, North Carolina. Mac wrote, "... just wanted to thank you for providing this service ... at the EOC office in ETOWN [sic] we were able to show our county officials just how well the digital [SEDAN] portion of amateur radio worked ... they were impressed with your current bulletins [from NWS] on Bertha. Thanks es keep up the good work." Rick is only one of the many who help make the age-old tradition of amateur radio emergency communications work to the good of mankind.

From Necessity Comes Prevention

During Hurricane Fran, here in the Lynchburg, Virginia area I passed information across the Southeastern Emergency Digital Association Networks (SEDAN). Several other disaster communication teams delivered messages and relayed information relating to the devastating trail of Fran. "Geep" Powell, WA4RTS, and members of the LARC supported the Lynchburg, Virginia emergency communications group with information as to the nearest shelter for persons made homeless by the hurricane. This was just a small part of the traffic that was handled, but in every case the amateur operators were out in force, paying their dues and then some!

This type of occurrence makes the System Node Operators (SNOs) of the SEDAN put forth the effort to make the SEDAN a network that crosses as many states as possible. The addition of the SEDAN 9600 baud backbone has provided an enhancement to the network that we never dreamed possible. With more disastrous storms, tornadoes, and hurricanes showing up each year, and with the severity of the winters, there is no wonder that this network is getting so much more attention now.

As a matter of interest, we solicit the addition of new nodes from SNOs who would like to contribute to the continuity of this network by adding another node. The SEDAN knows no boundaries, and we welcome anyone who wishes to participate in the keyboard-only communications network.

The 145.770 MHz frequency is dedicated to keyboard communications only. There are no BBSes, DX spotting, or other traffic deterrents on the SEDAN. There are plenty of other frequencies already set aside for the BBS and DX spotting nets and forwarding.

In the future we hope the SEDAN can link to the northeast and across the southern and midwestern United States. At present there are only ten states that are a part of the SEDAN (see fig. 1). We welcome other regions to join us in making it a contiguous keyboard-to-keyboard and emergency network throughout the continent.

In any case, we extend a welcome to other SNOs who would like to support a node of the SEDAN. The guidelines and practices of the SEDAN are simple and easy to follow. For more information about the SEDAN, see the SEDAN Packet Radio Home pages on the worldwide Internet site at <<http://www.sedan.org>>. If you do not have access to the Internet, send a self-addressed, stamped (32 cent) envelope suitable for the return-mail delivery of the latest "SEDAN Guidelines & Practices" and the current map to SEDAN, 211 Luenburg Drive, Evington, VA 24550.

A complete set of drawings and instructions that explain how to build and install network nodes is available at the SEDAN www Packet Pages on the Internet. Again, if you do not have access to the SEDAN web site, send your return mailing address and \$5.00 to cover the two free books, the 3.5 inch disk of "BUXTERM.EXE" Packet Terminal Program, the X-1J4 network node code, and the return priority mail pouch, to the SEDAN address above.

Visit the SEDAN Internet Packet Radio Home pages at <<http://www.sedan.org>>. And until next month when we visit "Packet Clause" ...

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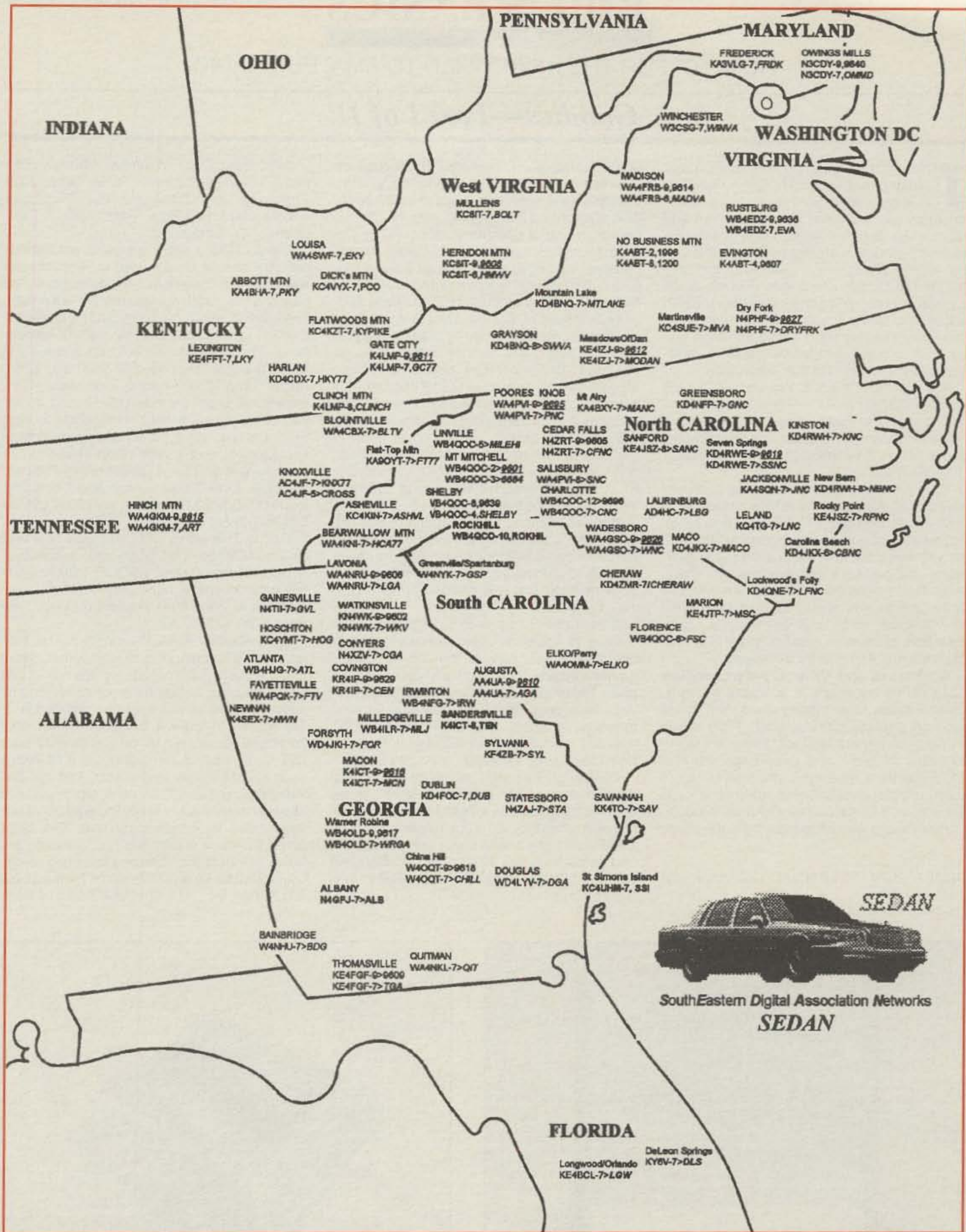


Fig. 1— At this writing ten states make up the SEDAN. Node aliases that are shown as numbers (9612, 9601, etc.) are nodes on the 9600 baud, 6 meter backbone. Hidden nodes are not shown on this map. The map is updated once each month. Full SEDAN network information is available from the SEDAN Internet web site at <<http://www.sedan.org>>.

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Goodies—Part I of II

This article contains information about amateur radio specialty items. I have included a wide variety of items which amateurs can wear and use. Equipment and accessories directly related to signal reception and/or transmission are not included in this article. Where prices are shown, they are only included to provide some idea of cost; exact, current costs should be requested from the seller before ordering any item. State sales taxes may apply, but they are not included in this article. Also, prepaid charges only apply to shipments being made to U.S.A. addresses.

At the end of some of the categories there is an "also see" sentence referring to other companies that sell related items. The company name is followed by a slash and the category under which it is listed (for example, Caps Unlimited/Patches).

If you are aware of similar items which should be included in articles of this type, please send such information to my California address, as it appears on this page. It is hoped that this article will make amateur radio a bit more interesting and pleasant for many readers. If you would like to receive any of the items mentioned in this article, you should let your family and friends know which ones interest you. Non-amateurs experience great difficulty in selecting hobby-related gifts for amateurs.

Backpacks and Other CQ Merchandise. CQ's sturdy backpack is available in black, green, or navy blue, and it sells for \$25; it has two front pockets. CQ also offers T-shirts with a choice of 18 print designs. These shirts are available in large and extra-large sizes at \$17.95 (extra-extra-large T-shirts cost \$2 more each). Poplin baseball-type adjustable caps are sold at \$12 each. The CQ logo is on the front of the cap with white lettering stating "One

of the CQ Gang—Since 1945." These caps are available in black, green, and navy blue. Eleven-ounce porcelain mugs cost \$7 each. One style shows the CQ logo, and the other is marked "Popular Communications" (CQ's sister publication). Leather "CQ Amateur Radio" coasters are priced at \$2 each, or a set of four for \$7. S&h charge is \$2 for orders under \$20, \$4 for \$20 to \$50 orders, and free above \$50.

Back issues of CQ magazine are priced at \$3.50 each. Payment may be made by AMEX, check, MasterCard, money order, Visa, or Discover. CQ also offers books and video tapes. The video tapes sell at \$19.95 each, plus s&h charges. The "Ham Radio Horizons" video provides a good introduction to amateur radio. CQ's "Getting Started" videos cover contesting, DXing, ham radio, packet radio, satellites, and VHF. CQ's address is 76 North Broadway, Hicksville, NY 11801-9962 (phone 516-681-2922, fax 516-681-2926).

Badges. Balloon Central markets 2.5 inch diameter callsign buttons which they imprint with your name and/or callsign against several neon-colored backgrounds. Their address is 30-A Manitou Drive, Kitchener, Ontario N2C 1L3, Canada.

Blue Ridge Stamp & Sign uses a 32-page catalog to advertise their extensive product line. In addition to badges, they sell all types of rubber stamps and a good variety of office supplies. The product line includes badges, calendars, caps, cups, desk signs, key tags, lighters, magnets, and pens. Jonathan Lee, KD4ZSD, runs this company. Their address is Route 4, Box 113, Elkton, VA 22827 (540-298-0350).

LQV Engraving sells identification badges, callsign desk plates, and small signs. These items are available in a wide variety of colors, fasteners, and sizes. Your request (with an SASE) will bring a data sheet with prices. The address is P.O. Box 4133, Overland Park, KS 66204-0133. J.L. "Mac" McCoy, W0LQV, runs this company.

(Also see: Caps Unlimited/Patches; R&J Fial Enterprises/License Plate Items; PBB Engraving/Signs; Trophies by Edco/Trophies.)

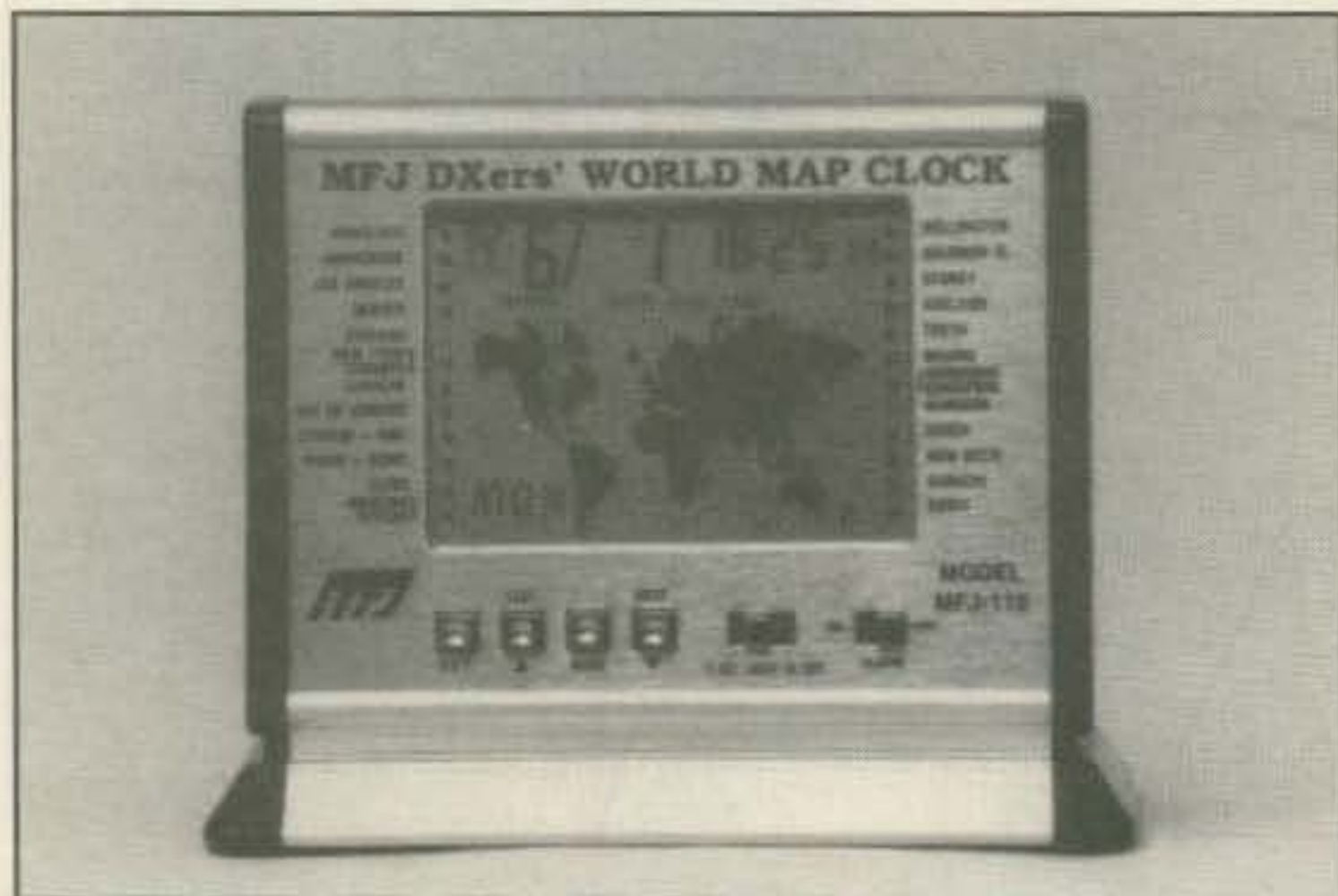
Calendars. See Blue Ridge Stamp & Sign/Badges; CQ/Backpacks.

Clocks. Many radio operators are familiar with the special clocks used in radio shacks aboard ships. These 6 inch diameter clocks are new and the real thing, but they are not cheap. The black phenolic quartz (40101) and electric (20881) clocks cost \$249 and \$549, respectively. The brass quartz (40100) and electric (20880) clocks are priced at \$486 and \$786, respectively. These special clocks show the international silent periods (15-18 and 45-48 minutes past each hour) highlighted in red. Eight and one-half inch black phenolic mechanical (20874) and quartz (40094) radioroom clocks are available on special order. They are available from Baker Lyman and Company, Inc., P.O. Box 838, Metairie, LA 70004 (phone 504-831-3685; fax 504-831-3786).

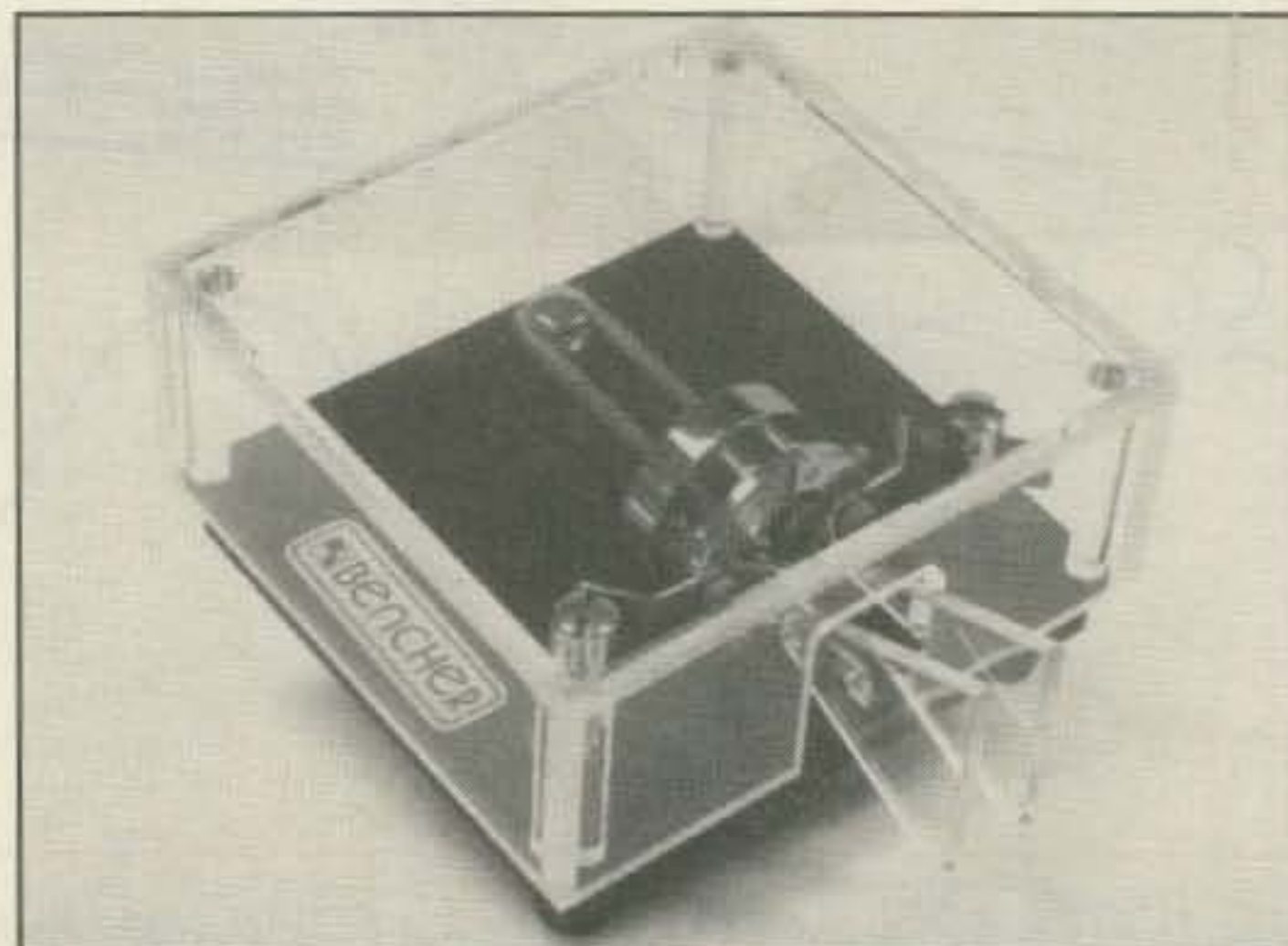
Gabay Tool offers UTC and local time wall clocks at \$26.50 and \$14.65 each, respectively, ppd. George Gabay, N9QQR, initially made these clocks just for use in his own station. His address is West 5541 Buckhorn Drive, New Lisbon, WI 53950.

Larry Abelkop, WA4LPV, runs B. A. Fox, Inc., which is a distributor of the Seth Thomas clocks that are popular with amateurs. His model 708 clock features a 24 hour face, quartz movement, step second hand, and a shatter-resistant face. The model 710 clock is the same as the model 708 clock, except it has the standard 12 hour face. The 708 and 710 clocks are 2.75 inches deep and 14 inches in diameter. The 708 and 710 clocks sell at \$38.45 each, which includes s&h to domestic addresses. The Station Master sells at \$53.45, including s&h fees. This 12/24 hour LCD clock shows seconds, minutes, and hours. It offers five features including alarm, countdown timer, and stopwatch. Their address is B.A. Fox, Inc., P.O. Box 6206, 113-115 North

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The MFJ world map clock measures 2.5"H x 4.125"W x 2.25"D. The price is \$24.95, plus s&h charges. The MFJ-112 shows the time and date at each worldwide location, and you can see where each contact (amateur) is located. The MFJ-112 also shows the month, date, and year, plus the day of the week. Pushbutton switches enable the user to easily move the display to any location in any time zone. It has a black map on a gold background. The MFJ-112 also includes an alarm.

MFJ also sells 500 eyeball QSL cards at

\$39.95, plus s&h charges. These 2.0" x 3.5" "business" cards are particularly useful at conventions, radio club meetings, and other amateur radio events. A nice coffee mug is available at \$3.95, plus s&h charges. The MFJ and Ameritron logos are shown in red and blue inks, with one on each side of the cup. This is a nice door-prize item at a low price. The address is MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (phone 800-647-1800; fax 601-323-6551).

(Also see: *Antique Electronic Supply/ Publications; Geochron Enterprises/Maps; Time & Again/Decals; Whiterook Products/Signs.*)

Clothing. Donovan Deily, WA3B, sells a nice assortment of caps, T-shirts, license plates, mouse pads, and mugs. The caps are seamless with a 100% poly front. They are available in black, blue, green, red, and yellow. His caps are priced at \$10.95 each. You can select from 23 colors and 48 standardized designs to obtain desired items. There are also eight name and callsign designs which can be applied to these items. T-shirts are sold at \$16.95 each. License plates and mouse pads are priced at \$19.95 and \$15.95 each, respectively. The standard and "mighty" mugs cost \$14.95 and \$15.95 each, respectively. He sells a stein at \$18.95. The s&h fee is \$2 per item. The address is R.D. 2, Box 2088A, Todd Drive, Leesport, PA 19533-9653 (610-916-4087).

Hats for Hams sells a very good assortment of T-shirts, golf shirts, and caps. T-shirts and golf shirts are available in beige (tan), light blue, light yellow, and white. Other light colors are available upon special requests from clubs or other groups, and they can be printed front and back. A red ARRL logo is available in two sizes (1.375" x 3" and 2.25" x 5"). The lettering style can be any one of several, including old English, Ivy open, or sportswear. Letter color choices are black, green, maroon, orange, purple, red, and royal blue. T-shirts cost \$14.30 ppd, printed both sides. Golf shirts cost \$19.50 each printed one side, and \$20.50 each printed both sides. Anne's caps have a foam front with a mesh back, and they are size adjustable. Caps sell at \$10.50 each ppd. Cap print styles are the same as for shirts, and the print can be a variety of colors. Anne Wright, N6BOP, runs this business. Her address is 2272 Kellogg Park Dr., Pomona, CA 91768 (909-629-0646).

Personalized Photo offers caps, golf shirts, jackets, T-shirts, and magnetic QSL cards. The golf shirts have your name and callsign embroidered on the left front; they sell at \$18.95 (\$2 additional for XXL size). They are available in green, navy blue, red, and white. The nylon coach's jacket is sold in black, green, navy, red, royal blue, and white. It features a drawstring waist, embroidered name and callsign (in white), lining, and snap closures at \$24.95 (\$2 more for XXL). White QSL card T-shirts are \$12.95, plus \$2 more for XXL. Caps are \$6.95 and show your name and callsign in black lettering on a white front. Black, green, light blue, navy blue, red, royal, and white are the mesh cap colors. Other specialty items being sold by Al Jordon, WB1GKO, include white QSL sweatshirts for \$18.95, plus \$2 for XXL; QSL card plastic mugs for 3.5" x 5.5" standard cards for \$5 each; and QSL cards enlarged and transferred in color to a mouse/key pad at \$10.95. Minimum s&h fee \$3.50, or 5% of total order. The address is P.O. Box 370244, West Hartford, CT 06137 (phone 860-233-7277; fax 860-236-3719). As usual, shipping charges are extra over the stated prices.

Rusprint offers personalized caps, T-shirts, and mugs, plus plastic cardholders. Their address is 26037 West 220th Terrace, Spring Hill, KS 66083 (toll-free 1-800-962-5783).

Rod Williams offers an interesting variety of personalized caps, jackets, and T-shirts. Each item can be embroidered to show your callsign, name, and other information. His address is 3303 Holland-Sylvania Rd., Toledo, OH 43615 (phone 419-843-2014). Rod offers a ten percent discount to clubs which place multiple item orders to be shipped to one address. His clothing line includes loom-run custom-embroidered

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Yaesu offers several specialty items featur-

ing their name on them. Their brushed-cotton cap has the Yaesu logo embroidered on its front side with the "LEADING THE WAY" logo on the back side. It has a velcro closure to provide size adjustment. This natural color cap has burgundy trim and it is priced at \$16.45. Their stone-washed denim jacket has khaki sleeves and trim. It has front closure snaps and slashed pockets with the Yaesu logo matching the sleeves and trim. Each jacket costs \$72.95. The Yaesu denim shirt has a single pocket and a button-down collar. It is light blue with a bur-

gundy logo embroidered above the pocket. Each shirt sells at \$34.95 (\$1.50 more for XXL). The polo shirt has a jacquard collar, navy color body, and tan trim. The embroidered logo matches the color of the trim. Each shirt costs \$33.95 with XXL costing \$1.50 more. The Yaesu T-shirt is made of 100% pre-shrunk cotton with the screened burgundy logo added to the left chest and back areas. The T-shirt is priced at \$12.22 each with the XXL size costing \$1.06 more. Shipping and handling charges are included in the stated prices. The address



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(Also see: *Antique Electronic Supply/Publications; Blue Ridge Stamp & Sign/Badges; Caps Unlimited/Patches; CQ/Backpacks; Lor-am Productions/Signs; Vibroplex/Pennants; Worldradio/Publications.*)

Coasters. See *CQ/Backpacks*.

Code Items. Larry Stamm, WB3EVL, sells a dust cover which can be left in place while a Bencher, MFJ-564, Vibrokeyer, or Vibroplex paddle is in use. The 3/16 inch plexiglas™ cover fits directly on the base of the keyer, with the paddles protruding through a window in the

cover. The cover keeps the keying contacts and the rest of the keyer free of dust. One's callsign is engraved on the lower side of the cover's top surface to be easily read from above. The price per engraved cover is \$14, including s&h costs. Larry's address is 28 Topton Road, Kutztown, PA 19530-9619 (phone 610-683-7850).

Cups. Walt Flesher, KK6RG, markets call-sign ceramic mugs showing one's name and/or callsign on one side (\$16), or on both sides (\$19). These prices include s&h charges. His address is 1651C South Heritage Circle, Anaheim, CA 92804 (phone 714-533-2575).

(Also see: *Antique Electronic Supply/Publications; Blue Ridge Stamp & Sign/Badges; CQ/Backpacks; Donovan Daily/Clothing; MFJ/Clocks; Personalized Photo/Clothing.*)

Decals. Time & Again sells international time zone map decals in two sizes. The continents are shown in silver against a blue background on these durable polyester self-adhering decals. They can be conveniently displayed on your radio equipment. The 2.25" x 4.75" decals cost \$3 each. The 1.25" x 3.75" decals cost \$2 each. A set of two decals (one each size) costs \$4. Purchasers are requested to include an SASE with the orders. The address is P.O. Box 306, Dickinson, TX 77539 (713-337-5319). Time-zone maps are based on the concept that the Sun appears to pass through 15 degrees of longitude each hour. With 24 hours in a day and 15 degrees of movement per hour, 360 degrees of apparent Sun movement occur each day. Each time zone is bracketed by a time zone to the east that is one hour ahead, and a time zone to the west that is one hour behind. World time zones became officially recognized by the International Meridian Conference in 1884. These decals are useful to anyone who regularly contacts people and groups in other parts of the world. Some of the world's major cities are shown on these decals. Full payment must accompany each order.

(Also see: *Antique Electronic Supply/Publications; ARRL/Publications; Caps Unlimited/Patches.*)

Desk Signs. Shack Attack sells call-signs hand cut in 0.25 inch thick pine wood. The letters and number are 2 inches high. The price is \$31. A desktop base costs \$2 more. The shipping fee is \$3. The address is 51 West Center Street, Orem, UT 84057 (801-225-3340).

(Also see: *Blue Ridge Stamp & Sign/Badges; Camelia Trophy Shop/Plaques & Trophies; LQV Engraving/Badges; PBB Engraving/Signs.*)

Direction Finders. Radio Engineers sells a line of handheld phase sense antennas which can be used for VHF direction finding with any FM transceiver. The prices of their VF-142 (audio only), VF-142Q (140-300 MHz), and VF-142QM (140-500 MHz) units are \$139.95, \$239.95, and \$289.95, respectively, plus s&h fees. The address is 7969 Engineer Road 102, San Diego, CA 92111 (phone 619-565-1319; fax 619-571-5909).

DX Aids. DX Publications is run by Nancy, KB4RGW, and Paul, AE4AP, Smith. They publish several periodicals which are extremely helpful to DX enthusiasts. The GOLIST provides a very complete compilation of managers who handle the QSL cards of highly desirable stations. This data is also available on diskettes and on files that can be downloaded from the DX-BBS electronic bulletin board system.

The latest 12-page GOLIST shows about 4000 of the most active DX QSL routes. It is printed monthly in a form that is easily stored in a three-ring binder. A sample copy of the GOLIST costs \$3 sent to USA addresses and \$4 sent to foreign addresses. The yearly subscription rates are \$30, \$35, and \$45 for mailings to USA, Canada/Mexico, and foreign locations. Nancy and Paul also publish *The DX Bulletin* and *The DX Magazine*, which had been published by Chod Harris, VP2ML. The 50 annual issues of the four-page *DX Bulletin* cost \$34 for second-class mailings or \$44 for first-class mailings. *The DX Magazine* is published six times annually and is priced at \$15 per year. These two publications are excellent sources

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of current and future DX activities. Nancy and Paul also publish *The Long Island DX Bulletin* (now entitled *The DX Reporter*), which is another key source of DX activities; it is issued 50 times per year. The USA, Canadian/Mexican, and foreign annual subscription rates are \$25, \$30, and \$35, respectively. The address is P.O. Box 2306, Paducah, KY 42002-2306 (phone 502-898-8863; fax 502-898-8865).

(Also see: *Wayne Carroll/QSL Aids*; *QSL's by WX9X/QSL Aids*; *59(9)/Publications*.)

Flag. See ARRL/Publications.

Flashlight. See Kilo-Tec/Pens.

HT Holders. Blaine Watkins, KB7VRD, offers a pair of alder wood bases which are designed to hold handie-talkies and antennas upright and in place. The single holder model is 6" x 3.5" x 2"; it holds up to four antennas and it sells for \$16.45, including s&h charges. The dual holder model is 11.5" x 3.5" x 2"; it stores up to six antennas and sells for \$19.45, including s&h charges. The HT drop-in slots are cut to meet the buyer's requirements with top edges of the HT and antenna cutouts routed to facilitate installation. The bottom end of the HT cutout is lined with rubber to cushion insertions. Your callsign is mounted at the front using 2 inch high letters cut from 0.125 inch thick birch. Each holder is sealed with two coats of polyurethane gloss to enhance its appearance. KB7VRD also markets a desktop-type alder wood callsign cut from 3/4 inch thick wood. The price is \$8 per sign, and gifts can be mailed directly to recipients at the purchaser's request. Their address is 51 West Center Street 325, Orem, UT 84057. The toll-free phone number for orders is 800-573-7388.

Insurance. Hamsure offers insurance for all types of amateur radio accessories and equipment, no matter where it is used. Antennas and towers are not covered, but rotators can be insured. Their address is 7901 Laguna Lane, Orland Park, IL 60462.

Key Rings. See Blue Ridge Stamp & Sign/Badges; Camelia Trophy Shop/Plaques & Trophies; R&J Fial Enterprises/License Plate Items; Geniac Technologies/License Plate Items; Andrew Plaks/License Plate Items; Vibroplex/Pennants; Paul Washa/Publications.

License Plate Items. Geniac Technologies, Inc. offers a variety of state license plate key tags (\$3.78 each), full-size car tags (\$14.95 each), and bicycle tags (\$6.95 each). Their full-size license plate frame has your choice of wording at the top and bottom; it sells at \$11.95. Key tags are also available showing professional teams, Canadian provinces, several countries, and colleges. All stated prices include s&h fees. Contact them at 8105 N.W. 33rd Street, Miami, FL 33122 (phone 305-599-7384; fax 305-599-8760).

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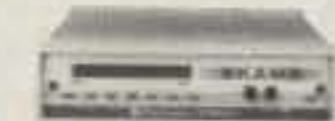
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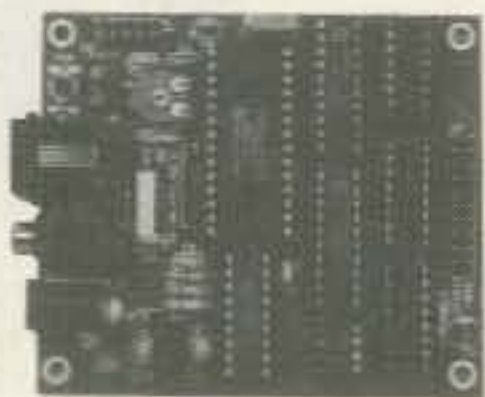
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The **Auto-Kall® AK-16 DTMF Controller Board** features 16 relay driver outputs and DTMF to X-10 house control capability! Control the relay driver outputs, X-10 modules, or both with your radio keypad! X-10 operation requires the PL-513 Power Line Interface (\$20). The **AK-16** mates readily with our **RB-8/1** (\$99) or **RB-16/1** (\$149) relay boards. The 0-12 digit security code is user programmable using your DTMF keypad. Additional features include reprogrammable CW ID and several modes of operation, including two with CW response. Printed circuit board, assembled and tested.

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CIRCLE 67 ON READER SERVICE CARD

88 • CQ • November 1996



Sonny Galvez, VE7GSG, lives in Sidney, British Columbia, Canada. He was initially licensed during 1991. Sonny is active on many bands and modes.

of engraving is included in the \$4.95 basic price. Add 50 cents more if a second line of engraving is desired. Up to six tags/badges can be shipped at the cost of \$1.00. MasterCard and Visa orders are welcome. Their address is 5366 Camino Real, Riverside, CA 92509 (phone 909-360-0961; fax 909-685-8008). Shipping charges are included in the stated prices, but sales tax is additional.

You can buy a 2.25" x 1.125" keychain showing your callsign on a miniature version of your state's vehicle license plate. The price is \$5.25 each, including s&h charges. The address is Andrew Plaks, N6RKO, 3151 Fleetwood Drive, Riverside, CA 92503.

(Also see: *ARRL/Publications; Donovan Daily/Clothing; Mike Starr/Patches.*)

Lighters. See Blue Ridge Stamp & Sign/Badges.

Lights. Littlite sells a simple variable-intensity desk lamp which can be operated on 12 Vdc or 115 Vac. It has a weighted base and color filters available as accessories. This lamp is available in a variety of forms, and it has a variety of accessories. The lamp can be secured in place using the snap mount supplied with it. Also, screws are provided for use in mounting the lamp directly to a desired surface. A printed flyer can be requested from Littlite/CAE, Inc., 10087 Industrial Dr., P.O. Box 430, Hamburg, MI 48139 (phone 810-231-9373; fax 810-231-1631).

Magnets. See Antique Electronic Supply/Publications; Blue Ridge Stamp & Sign/Badges.

Maps. Geochron Enterprises offers four models of their world time indicator. Each model displays daylight and darkness, sunrise, and sunset, correct time in each zone, day of the week, and date of the month. These models are designed to hang on walls like a picture. Prices range from \$1365 to \$2465, plus shipping charges and costs of any desired accessories. Each model is 34" x 23" x 5". Political boundary and time zone changes are updated and the Geochron map is updated yearly. Map updating kits are sold for \$150 each. Their address is 899 Arguello Street, Unit A, Redwood City, CA 94063-1308 (toll-free phone 800-342-1661; phone 415-361-1771; fax 415-361-1780).

U.S. Scanner Publications offers a 25"H x

37" W world map which includes a lot of information useful to amateurs. A few of these features are the ARRL DXCC list, international callsign allocations, radio frequency allocation bargraphs, and Novice through Extra class 2 through 160 meter operating privileges. Their address is P.O. Box 14923, Portland, OR 97293 (phone 503-203-8600; fax 503-203-8631). Price per map is \$23.90, including s&h.

(Also see: *Time & Again/Decals.*)

Money Clips. See Paul Washa/Publications.

Mouse/Key Pads. See Donovan Daily/Clothing; Personalized Photo/Clothing.

Patches. Caps Unlimited sells a 2" x 3" embroidered SKYWARN patch with heat-seal adhesive backing. It shows a black tornado inside a fluorescent orange eye and has the word "Skywatch" below the eye. This patch is also available on a black baseball-type summer cap. They sell the same kind of cap (one size fits all) with the words "Amateur Radio Communications" centered between a pair of lightning bolts in day-glo bright chartreuse. RACES decals are sold to RACES members. They are self-adhesive on the front side for attachment inside vehicle windows and windshields. It is advisable to request a copy of their sales data sheet to obtain detailed information regarding their entire product line. The address is P.O. Box 460118, Garland, TX 75046-0118 (phone 214-276-0413). They also sell identification badges and embroidered patches. As usual, your SASE would be appreciated if you request data.

Mike Starr, N8OVJ, sells 4.25 inch diameter red, white, and blue embroidered patches at \$2.50 each. "Amateur Radio Service Emergency Communications" is embroidered in red lettering on a white background. Standard-size license plates are priced at \$5 each. "Amateur Radio Emergency Communications" is shown in raised red lettering contrasted against the orange background of the plate. Postpaid prices are stated. Special orders are welcome. The address is P.O. Box 203, 3420 Hadley Road, Hadley, MI 48440-0203 (810-797-4150).

(Also see: *ARRL/Publications; Rod Williams/Clothing.*)

Pendants. See One-of-a-Kind/Pins.

Pennants. The Vibroplex Company, Inc.

Say You Saw It In CQ

offers several items which may be of interest to code enthusiasts. Each item features the famous Vibroplex logo (bug) in some way. Their baseball-type light-blue hat (\$6.95) is fully adjustable. It has the Vibroplex emblem in black, red, and gold. The key chain (\$6.95) is cast solid brass, and it features the bug logo. Their black-glaze English ironstone mug (\$8.95) shows their bug logo in 22-karat gold. An 8" x 18" black felt pennant (\$3.95) shows the Vibroplex name and logo in gold. Their light-blue T-shirt (\$11.95) is half cotton and half polyester. It is available in small, medium, large, and extra large sizes. It features the bug logo. A \$5 shipping charge applies to orders being shipped to U.S.A. addresses. The Vibroplex address is 11 Midtown Park East, Mobile, AL 36606 (toll-free 1-800-840-8873; fax 205-476-0465). Vibroplex offers several other items that are of interest to amateurs and has been in business since 1890. The history of the Vibroplex Company is covered in detail in a 91-page book that is priced at \$19.95; it includes copies of their advertisements, nameplates, and patents.

Pens. Kilo-Tec offers a variety of pens which can be engraved to show a callsign and/or name. These pens feature free engraving of up to 25 letters or numbers (including spaces), gold-tone clip and accents, high-gloss black-lacquer finish, iridium point nibs, solid-brass casings, and standard refills. Ballpoint and rollerpoint pens cost \$15.75 to \$19.95 each, depending on the quantity in which they are ordered. The ballpoint pen is also sold with a nickel silver finish. A mini-mag flashlight is sold

at \$19.95 with one's callsign engraved on it. A \$4 s&h fee applies to each order. Their address is P.O. Box 10, Oakview, CA 93022 (805-646-9645).

(Also see: *Blue Ridge Stamp & Sign/Badges; PBB Engraving/Signs.*)

Pins. One-of-a-Kind sells sterling callsign tie tac/lapel pins and pendants. The pins measure 0.25" x 1.25" and they have raised sterling letters inside a sterling silver frame. The cost per item is \$24.95, including shipping. These pins and pendants are also available in 14K and 18K gold at different prices. Their address is 145 East College Drive, Durango, CO 81301 (970-247-5884).

(Also see: *ARRL/Publications; Camelia Trophy Shop/Plaques & Trophies.*)

Plaques & Trophies. Carnor Management Systems (CMS) offers a station identification certificate which is suitable for easel or wall mounting. As desired, one's callsign, license class, name, street, city, state, zip, original license date/call, and up to four organization affiliations can be shown on the certificate. They are available in an 8" x 10" wood frame at \$21.95 for wall mounting. A deluxe frame for easel or wall mounting costs an extra \$5.95. Plexiglass is used for added safety and durability. The address is Box 147, Marion, MA 02738 (508-748-0468). Deliveries are post-paid. Allow four weeks for delivery.

The Camelia Trophy Shop is run by Keith Campbell, KN3A. The address is 590-B Schilling Road South, Box 96, Mobile, AL 36695 (334-342-9638). His product line includes

acrylic name/callsign desk plates, callsign key rings, callsign pins, plaques, and plastic/brass desk plates. Their standard plaques are engraved to show these operating achievements: multiband 6 continents (\$34.95), 6 continents (\$32.95), 50 countries (\$52.50), 50 states (\$49.50), and 100 countries (\$69.95). Plaques can be engraved to meet every requirement and can be engraved on black or red metal with gold or silver lettering. The 12-inch name and callsign desk plates have white lettering engraved in red, black, or blue plastic and they sell at \$16.95. They are mounted in brass holders. The acrylic name and callsign desk plate is engraved on the rear side and it sells at \$34.95. The callsign key ring with engraved plate sells at \$8.50. The hat/shirt pin has white lettering on black, blue, or red plastic, and it sells for \$4.75 each. Shipping and handling charges are not included in these stated prices.

Trophies by Edco is run by Rick Cordary, KN4CV. This is an excellent source of advertising specialties, badges, plaques, and trophies. Their address is 3702 Davie Boulevard, Ft. Lauderdale, FL 33312-3494 (phone 305-587-0137; fax 305-581-7680).

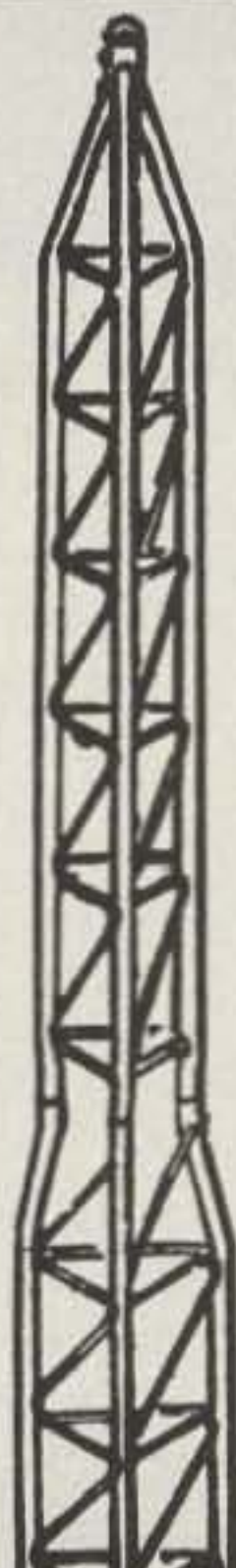
(Also see: *ARRL/Publications; Loram Productions/Signs; PBB Engraving/Signs.*)

Summary

The second part of this two-part article covers publications, QSL aids, rubber stamps, safety items, shelters, signs, software, stationery, tote bags, videos, and weather items.

73, Bill, W6DDB

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GREAT ALUMINUM TOWERS

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- Rugged strength
- Easy assembly
- Rust free

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20ft to 100ft ...

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"I'm very pleased with the performance of your DX77, and I'm totally amazed it survived a direct hit from hurricane Bertha. The bracket mounting it to the pole had shifted from the force. It only took ten minutes to loosen the bracket and pull the DX77 up straight again."

Rod Lancaster, AE4ON

- DX77 Advanced Vertical Windom Antenna**
- 7 Band Vertical • 10-12-15-17-20-30-40 Meters
 - Tilt Mount • Industrial Grade Construction
 - No Ground Radials Required
 - Height: 29' • Power Handling: Legal Limit**
 - Bandwidth at Less Than 2.1 VSWR:**
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 - 15 meters—500 KHz
 - 17 meters—100 KHz
 - 20 meters—250 KHz
 - 30 meters—100 KHz
 - 40 meters—150 KHz



hy-gain
by Telex

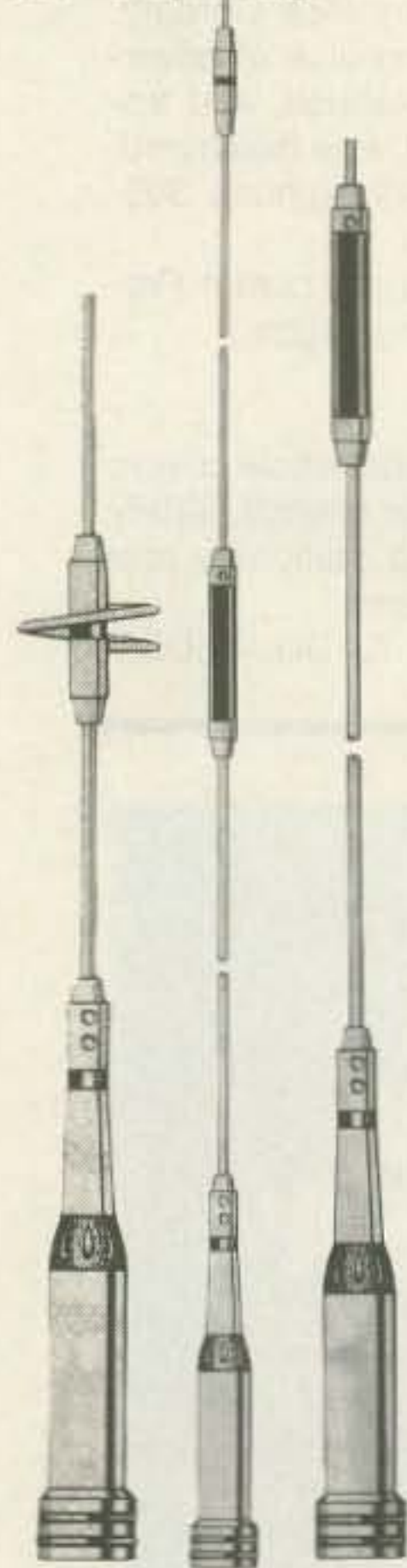
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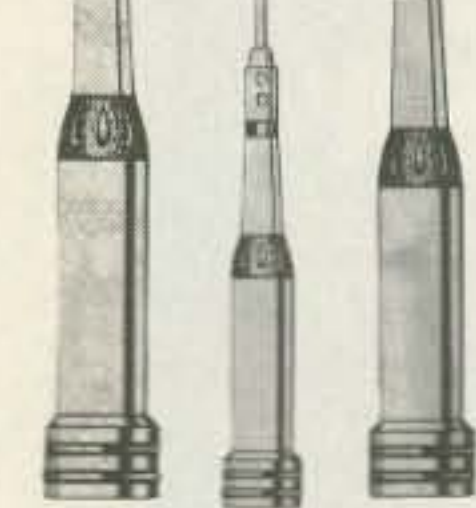
HP 2000 - HP 2000 C

VHF vehicular antennas working on the 2m amateur band without tuning adjustments. They have been made with the very best materials to ensure the maximum strength and the best performance. The whips, made of 17/7PH stainless steel, are very flexible and incorporate a custom inclination system that allows them to be tilted to 90° without using keys or tools. Also particular attention has been paid to the UHF-male antenna connector with a goldplated center pin, a Teflon insulator and a silicone rubber gasket for perfect waterproofing.



HP 2070 - HP 2070H - HP 2070 R

Dual-band vehicular antennas working on the radio-amateur frequencies of 2M 70cm, tuning adjustments are not required. They are made of stainless steel, flexible and can be turned 90° without keys or tools. Teflon insulated UHF male connectors, along with rubber gaskets ensure complete waterproofing.



HP 7000 - HP 7000 C

UHF vehicular antennas working on 430-440MHz. These antennas allow for maximum performance and strength. Made with quality materials and attention to detail.



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Full-featured, state-of-the-art computerized satellite operation of Yaesu & Emoto rotators has never been easier or less expensive... The SATTRACKER© is here!

FAST- Parallel data processing (not serial like others) that is fast enough for low earth orbit LEO Sats and digital weather satellites! Compatible with ALL popular tracking software: RealTrak, Instant Track, etc., plus it runs in the background as a TSR (Terminate & Stay Resident) program which allows the user to do other things on a computer while SAT TRACKER© is in full operation. Full support and fully upgradeable. Future upgrades could include: optional transmitter doppler shift frequency control. **EASY-** No need to use or tie-up a computer's expansion slots. SAT TRACKER© will run with laptops and notebooks which, of course, have no expansion slots. No complicated, on-board calibration adjustments required! Calibration and setup is quick & easy using the computer's keyboard, making it simple for the user to make changes at any time- allows accessing full manual override and complete manual control, in a matter of seconds! **NO EXTERNAL POWER NEEDED-** No power cubes or 12VDC hookups to fuss with as SAT TRACKER© gets its power from the rotator's control box. SAT TRACKER© is completely plug-in-and-play with models for both Emoto and Yaesu AZ/EL rotators. AZ- only mode allows full-featured computerized AZ- only control with compatible rotators.



- 8 bit multiplex A to D converter for an accuracy of .72° Elevation and 1.44° Azimuth
- Parallel interface for maximum data transfer and timely control
- Completely laptop compatible for portable operation
- Requires no slots, serial ports or power from your PC
- Fully compatible w/ "Instant Track™", "Real Track™" and other software interface specs
- Runs in the background as a TSR (Terminate and Stay Resident) program
- DOS and WINDOWS™ 3.1 compatible
- Complete user and programmer documentation available



WATSON

Scanning Antennas:

W3CK - Mobile Aerial Cable Kit.

For use with W3HM. Comes with 16 feet of cable and has SO239 & PL259 connectors.



W-30 - 2M/70 cm Base antenna, fibre glass, 3/6dB, 150W.

W-285 - 144MHz, 5/8 Wave, 200W, 3.4dB, PL259, fold over.



SWR & POWER METERS



W - 420

Highly accurate RF meter for measuring Forward Power, Reflected Power, and VSWR.

- Large meter display for ease of reading
- Forward RF power readings, switchable to indicated either average of Peak Envelop Power (PEP)
- Reflected RF power readings
- VSWR ratios
- Illuminated meter
- Convenient control layout for easy operation

• **W-220** - 1.7 - 200MHz, 5/20/200W, SO239 connectors, Light

• **W-420** - 118 - 530MHz, 5/20/200W, SO239 connectors, Light

• **W-620** - 1.7 - 520MHz, 5/20/200W, SO239 connectors, Light



SSE PSU101

Adjustable Desk Charger/ Power Supply 12VDC Version

This quality, custom-designed combination desk charger and regulated power supply unit is perfect for convenient 'Base Station' use of your handheld scanner at home or office!!

- Securely holds scanner in proper position
- Charges radio's internal NiCad w/out overcharging
- Powers radio from standard 117VAC house current



For: FIARMATE HP1000E/200E/HP2000
AOR AR1000XLT/AR1500/AR2000
YUPITERU MVT7000/MVT7100
UNIDEN BEARCAT BC50XL/BC55XLT/
BC70XLT/BC100XLT/
BC200XLT/BC205XLT
ALINCO DJX1
ICOM ICR1 Handheld
REALISTIC-TANDY-RADIO SHACK
PRO35/PRO38/PRO41



SSE PSU101T

Desk Charger/Power Supply 9VDC Version

- 9 volt version for popular REALISTIC (RADIO SHACK) handheld scanners and others that require a 9 volt DC supply
- All the same quality & features of the PSU101 12 volt version above!

For: REALISTIC-TANDY-RADIO SHACK PRO34/PRO37/PRO43 and others.

Adjustable SSE BHA3 (C)

Universal base stand for handheld scanners and transceivers

- Heavy chrome base for extra stability, even with heavy handhelds.
- Adjustable front support stop which adjusts to fit all popular handheld scanners and transceivers.
- Convenient rear panel BNC connector for external antenna attachment - Use a short jumper to your radio and remove stress of large external antenna cable from your handheld's connector.
- Deluxe felt-lined radio tray that won't hurt your handheld's finish. BHA3 C comes with cable.



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World famous Daiwa dual-band and VHF amplifiers offer quality and rugged, reliable performance! All models feature switchable low-noise GaAsFET RX preamps. The dual-band models have a preamp for each band. Front panel power output meters and built-in duplexers are standard on all dual-band models - only one cable is needed between the amplifier and your dual-band antenna or dual-band radio! With power outputs from 35 to 200 watts available, you'll find a Daiwa amplifier that's perfect for virtually every application at an exceptional value!



DAIWA



Professional Quality Preamps



Jim M-100

Specifications:
Frequency Range:
(Using bandwidth selector switch)

Gain:
Noise Figure:
Max. Transmit Power:
Power Source:
Size:
Weight:

A band 225MHz - 1500MHz
B band 108MHz - 185MHz
C band 24MHz - 2150MHz
-10 - +20dB fully adjustable
Approx. 2dB
5 Watts
9V battery PP3-006P etc.
80H x 59W x 30D mm
Approx. 110g (without battery)

M-51

Specifications:
Frequency Range:

Gain:
Noise Figure:
Power Source:

Size:
Weight:

A band 225MHz-1300MHz
B band 108MHz-174MHz
C band 24MHz-1500MHz
0 to +20dB (24-1000MHz)
Approx. 2dB at 500MHz
3V (batt. UM-4 x 2)
12V (external DC)
75H x 37W x 17Dmm
Approx. 80g (w/o batt.)

M-75

Specifications:
Frequency Range:

Gain:
Noise Figure:
Power Source:
Size:
Weight:

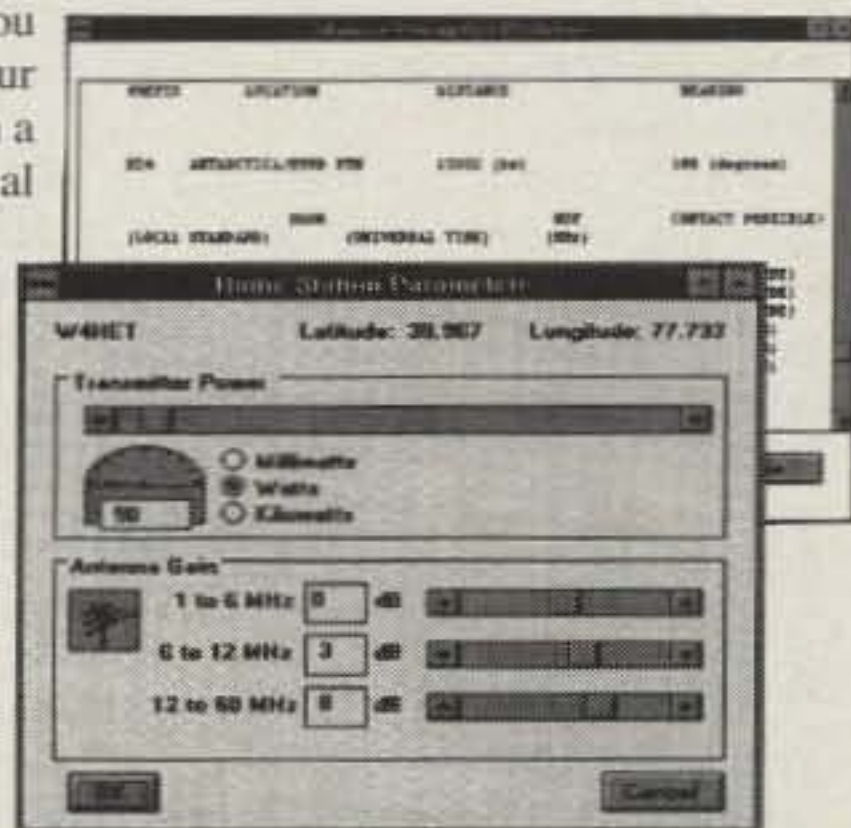
A band 225MHz - 1500MHz
B band 108MHz - 185MHz
C band 24MHz - 2150MHz
-10 - +20dB fully adjustable
Approx. 2dB
9V battery PP3-006P etc.
80H x 59W x 30D mm
Approx. 103g (w/ battery)



Skywave Propagation Prediction

Software for Windows 3.1/Windows 95

Tell SKYCOM where you are, your transmitter power and antenna gain. Enter the current Sunspot Number or Solar Flux measurement. SKYCOM's windows simplify data entry. Pick a location from SKYCOM's database of over 400 call sign prefixes, using SKYCOM's database search tools or map. You can tailor the SKYCOM database to your own needs by adding additional locations. Instantly obtain prediction reports that tell you the best time and frequency for your transmission. You can also obtain a detailed report that lists the vertical critical frequency, frequency of Optimum Transmission, Signal to Noise ratio, and other data. SKYCOM 2.0 includes an on-line beam heading reference to the direct and long path bearing and distances (in miles and kilometers) from your home station to all locations in the SKYCOM database.



CONTACT YOUR FAVORITE
DEALER TODAY



CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The CQ 1996 Contest Survey

November's Contest Tip of the Month

It seems that country prefixes are constantly changing. I still don't have all of the former Soviet republics completely figured out. Take a few minutes to review the latest country lists. It may direct your calling patterns in the next contest. Nothing is worse than calling a station for 10 minutes to eventually realize that it's not a new country. The opposite scenario (a.k.a. "lost opportunity") is even worse!

It's hard to believe, but another year has gone by, and the time has come to survey what's on your mind. There have been a number of interesting debates within the world of contesting this year. As 1999 approaches, more attention is being given to the merits of CW as a licensing requirement—a subject that's close to many a contestant's heart. And, there's the long-standing question of what it really takes, financially, to be a contest winner. The list can go on and on.

This month marks my sixth annual contest survey. Over the years, responses have come from experienced winners and newcomers alike. A goodly number of self-proclaimed "non-contesters" throw their two cents in, too—opinions that are valuable and eagerly desired. All in all, the results reflect a broad representation of the contest community at large, not just the big guns. In recent years I've tried to increase exposure to CQ's surveys by posting them on various Internet mail reflectors and other electronic repositories. Last year was the first time that I received more electronic responses than those coming via post. I guess it's just a sign of the times.

Please take a few moments to make your thoughts known. Many of the questions are intended to be thought-provoking. Others are simply there for fun. Don't forget that this year's results are to be mailed directly to my home QTH. And of course, feel free to send your replies electronically to my CompuServe or Internet e-mail addresses.

A Personal Note

There are times in our personal lives when opportunities that are simply too good to pass up present themselves. Such an occurrence happened to me. I recently joined Cerulean Technology in Marlboro, Massachusetts with the responsibility of directing product marketing for the company.

The opportunity at Cerulean meets several needs for my family. Not only does it afford us

c/o CQ magazine
Internet: p00259@psilink.com
CompuServe ID: 71301,424

Calendar of Events

Oct. 26-27	CQ WW DX SSB Contest
Nov. 2-4	ARRL CW Sweepstakes
Nov. 8-10	Japan Int'l DX SSB Contest
Nov. 9-10	Worked All Europe RTTY Contest
Nov. 16-17	RSGB 1.8 MHz CW Contest
Nov. 16-18	ARRL SSB Sweepstakes
Nov. 23-24	CQ WW DX CW Contest
Dec. 7-9	Telephone Pioneer QSO Party
Dec. 14-15	TARA RTTY Sprint
Dec. 16-17	Worldwide Naval Contest
Dec. 21-22	Croatian CW Contest
Dec. 28-29	W1BB Topband Distance Challenge
Dec. 29	RAC Canada Winter Contest

the opportunity to return to our geographic roots in New England, but it also enables me to return technologically as well. While my tenure at CQ has been extremely rewarding, my fundamental background and interests have always been in high technology.

A change such as this may create some questions in your mind. For those who are interested, I intend to continue my role as CQ "Contest Calendar" column editor. In addition, my departure from CQ will have no impact on the future of CQ Contest magazine. That future will be, as it always has been, driven by your support and desire to continue to subscribe.

Finally, I can only say the highest words of praise for CQ. Professionally, the past four years have been some of the best I have ever enjoyed. On a personal level, one could not find a better group of people to work with, beginning with CQ's publisher, Dick Ross, K2MGA. I wish them continued success in the future.

Final Comments

Thanks in advance for taking the time to respond to this year's survey. Your answers (and comments) are invaluable in helping guide the future editorial direction of this column.

As always, please remember that the deadline for the February issue is December 1st.

73, John, K1AR

ARRL Sweepstakes

CW: Nov. 2-4 Phone: Nov. 16-18
2100Z Sat. to 0300Z Mon.

This is the 63rd running of the Sweepstakes, making it the oldest domestic competition going. It really stirs up a lot of activity.

Operation is limited to stations in ARRL sections. Operating periods are restricted to a maximum of 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters, it is recommended that operation be confined

to certain portions of the bands. Check out the complete rules in QST for details.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (45 cents in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO number, power class, call, last two digits of year first licensed, and your ARRL section. Stations using 150 watts or less are class "A," over 150 watts "B," and QRP "Q." The same station may be worked only once regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections.

Awards: The usual certificates are available in each class and mode for single operator stations in each section and multi-operator stations in each division.

Last year's trophy program has been expanded. In addition, taking off on last year's highly successful program, the ARRL will be offering SS pins to participants with 100 QSOs or more (cost is \$5 p.p.). Also, SS coffee mugs will be made available to participants achieving a "clean sweep" (\$10 p.p.).

Logs must be postmarked no later than 30 days after the contest and go to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

European RTTY Contest

0000Z Sat. to 2400Z Sun., Nov. 9-10

Rules for the WAEDC RTTY contest are for the most part the same as for the CW and phone sections held in August and September. There is one main difference, however. To generate more activity and increase the QSO points, contacts with stations worldwide are permitted. QTC traffic, however, is not permitted within your own continent. Only 36 hours of operating time (out of 48 possible hours) are permitted for single operator stations. Off times must be at least one hour in duration.

Exchange: RST plus a progressive QSO number.

Points: Each QSO and each QTC exchanged are worth one point. QTCs may be sent/received worldwide between continents (limit of 10).

Multiplier: Multipliers are determined from the DXCC list.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 meters by 3, and on 10/15/20 meters by 2.

Awards: Certificates will be awarded to the highest scorers (with a reasonable score) in each country. Continental leaders will receive a plaque. Certificates will also be awarded to stations with at least half the score of the continental leader.

1996 CQ Magazine Contest Survey

Your Callsign (optional):
Contesting Experience (years):
Age:

1. Do you favor the elimination of the Morse Code requirement for amateur radio licensing?

YES NO

2. From a contester's point of view, has the influx of "No-Code" Technicians in the U.S. had a positive or negative effect on amateur radio?

Positive
 Negative

3. Do you believe that amateur radio will eventually cease to exist, or are we just seeing a lull due to low sunspots and other cyclical factors?

I believe amateur radio will eventually go away.
 I believe we are just seeing a temporary lull.

4. In general, do you believe that packet radio DX spotting has had a negative or positive impact on contesting?

Positive influence
 Negative influence

5. If someone gave you \$10,000 to spend on your contest station, how much would you allocate to each of the following categories:

Radios \$ _____
Amplifier \$ _____
Antennas/Towers \$ _____
Computer \$ _____
Other \$ _____

6. Over the past 12-month period, approximately how many contests did you operate in, in which you made at least 200 QSOs?

Number of contests: _____

7. Do you feel enough recognition is given to geographically disadvantaged areas in contest write-ups/results?

YES NO

8. In your opinion, what is today's minimum "cost of entry" to build a competitive contest station from scratch (excluding land and buildings)?
\$ _____

9. How do you prefer to submit your contest logs?

Paper
 Disk
 Electronically via Internet

10. Have you ever gone on a "DXpedition" during a major contest?

YES NO

If "NO," why not? (Check the most significant reason.)

Cost
 Not sure how to go about it
 Lack of available time
 Not interested
 Other

11. There's extensive editorial coverage of contesting in amateur radio (*CQ Contest*, *NCJ*, contest write-ups, etc.). What contesting subject would you like to see covered in more detail? _____

12. As a contester, which choice below best describes your QSLing practices?

Almost always caught up
 Hopelessly behind, but trying
 I never QSL—just not interested

Additional comments (use extra sheets if necessary):

Return your survey responses to:

John Dorr, K1AR, 1996 Contest Survey, 8 Anchor Lane, Mt. Sinai, NY 11766-1200 USA

Deadline: January 31, 1997

It is suggested that you use the official DARC log forms. A large SASE (IRCs) to the address below will get you a supply.

Mailing deadline for all entries is December 15th to: WAEDC Contest Committee, Postbox 1126, D-74370 Sersheim, Germany.

CQ WW DX CW Contest

0000Z Sat. to 2400Z Sun., Nov. 23-24

Just a reminder, as if you needed one, that the CW section of our WW DX Contest is coming up the last weekend of this month. The phone section, of course, is history. Complete rules were published in the September issue. The contest trophies list has been updated, and the trophies available are covered in the rules.

All logs, both SSB and CW, must be sent to the CQ office: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA.

Deadline for logs for the SSB section is December 1st, and January 15th for the upcoming CW section. **Be sure to mark SSB or CW on your envelope.** This will avoid your log from being entered in the wrong section.

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- BLACK DACRON® POLYESTER JACKET FOR UV PROTECTION.
- STRONG DOUBLE BRAID CONSTRUCTION.
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- DIAMETERS: 3/32", 3/16", 5/16"
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FAX: (714) 630-9386

Low Cost Headset, Assembled or Kit



An established manufacturer of boom microphone headsets for aircraft, Warren Gregoire & Associates, has introduced the Model TR-2000, for Radio Amateurs. With a noise-canceling electret microphone, response said to "cut through QRM," and plush, padded ear muffs, it works well, even in noisy locations. Compatibility is claimed with most radios. Available as a kit \$44.95, assembled \$64.95, less connectors, S&H additional, both have a 30-day, **money-back guarantee**. Call them toll-free 1-800-634-0094 or (510) 673-9393, FAX (510) 673-0538. Write to 229 El Pueblo Place, Clayton, CA 94517, USA, or E-Mail to WGA@gnn.com (advertisement)

CIRCLE 94 ON READER SERVICE CARD

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we do not have an award winner of the month, but rather we go straight to a few of the awards available to amateurs. Following that, we will list those awards that have been issued in recent months.

Awards Available

The Pennsylvania "67" Award. Sponsored by the Mid-Atlantic Amateur Radio Club, Inc., this award requires confirmed amateur radio QSOs with all 67 counties in the Commonwealth of Pennsylvania. QSL cards must be in the applicant's possession. All contacts must be two-way communications made in real time. These contacts may be on any amateur radio band/mode. Contacts made using repeating devices, such as FM repeaters, amateur satellites, moon bounce, and keyboard-to-keyboard contacts through digipeaters/nodes are valid, because these QSOs are made in real or near-real time. Contacts made by storing messages on BBS stations (whether terrestrial or on-board satellites) or by forwarding messages through a network of such BBSs are not valid. In other words, this award is for QSOs between operators, not for exchange of messages.

Sending cards with the application is not required. An application form is available, but its use is not required. Applicants must submit a list of QSOs, alphabetized by county, showing the following QSO data: county, callsign of station contacted, band, mode, date, and UTC time. The name and callsign of the applicant must be printed clearly, exactly as they are to appear on the certificate.

QSL cards and the application are to be presented to one of the following for checking and verification: the president of an amateur radio club, or an official of the ARRL or DX applicant's national amateur radio society. The following statement, or equivalent language, should appear on the application: "I have examined QSL cards for all the listed contacts. The information is accurate as listed." The person who checks the cards should sign this statement and also clearly print his or her name and position/title.

Applicants in the USA should enclose a check for \$1.00, payable to the Mid-Atlantic ARC. DX applicants (including Canada) need to send one IRC. All applicants must enclose a self-addressed envelope large enough to hold an 8 1/2" x 11" (21.5 x 28 cm) certificate. Mail the completed application to: Mid-Atlantic Amateur Radio Club, Attn: Pennsylvania 67 Award, P.O. Box 352, Villanova, PA 19085 USA.

The first five recipients of the Pennsylvania 67 Award are Kay Craigie, WT3P; Carter Craigie, KD3AO; Paul Bugen, WA3TUC; John McColly, WA5TOS; Harry Bump, KM3D; and Ray Bilger, W3TDF.

Worked All Parishes Award. Since the state of Louisiana is the only state in the U.S. that uses parishes as its primary political subdivision (instead of counties), and Baton Rouge is the capital city of Louisiana, the Baton Rouge

SPECIAL HONOR ROLL

Shailer Herrick, Jr., W1NHJ
USA-CA All Counties #904
August 27, 1996

John W. Lee, K6YK
USA-CA All Counties, #905
August 27, 1996

Francis L. Rauch, KE0VB
USA-CA All Counties #906
August 30, 1996

John W. Mees, KA7AKJ
USA-CA All Counties #907
August 30, 1996

Norm Van Raay, WA3RTY
USA-CA All Counties #908
August 30, 1996

HONOR ROLL

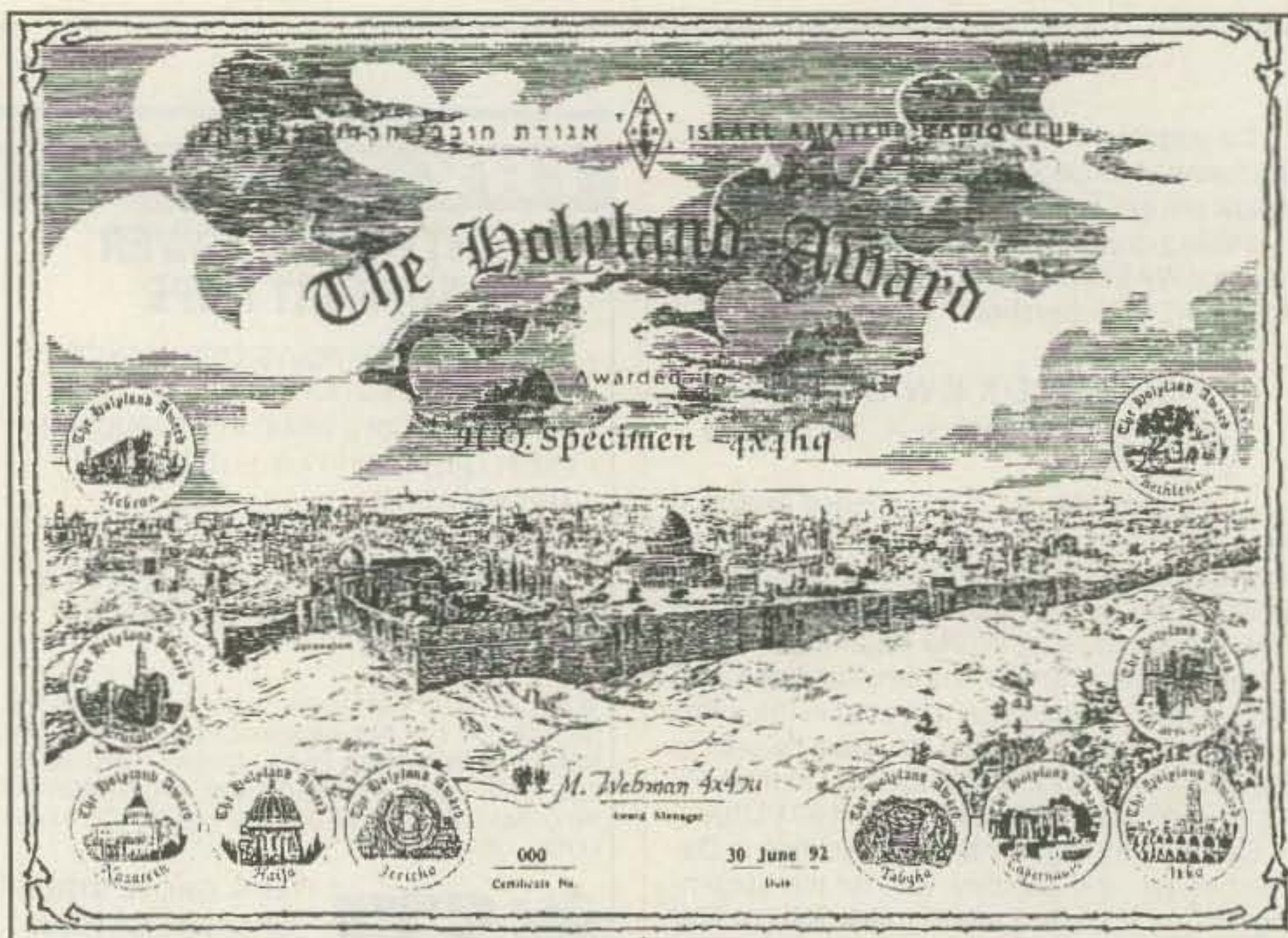
500		2000	
WA2RZJ.....	2931	W1NHJ.....	1086
N5UFR.....	2932	K6YK.....	1087
AA5EA.....	2933	KE0VB.....	1088
K7SMW.....	2934	KA7AKJ.....	1089
W1NHJ.....	2935		
K6YK.....	2936	2500	
KE0VB.....	2937	W1NHJ.....	1015
KA7AKJ.....	2938	K6YK.....	1016
		KE0VB.....	1017
		KA7AKJ.....	1018
		WA3RTY.....	1019
1000		3000	
K7SMW.....	1414	W1NHJ.....	921
W1NHJ.....	1415	K6YK.....	922
K6YK.....	1416	KE0VB.....	923
KE0VB.....	1417	KA7AKJ.....	924
KA7AKJ.....	1418	WA3RTY.....	925
1500			
K7SMW.....	1180		
W1NHJ.....	1181		
K6YK.....	1182		
KE0VB.....	1183		
KA7AKJ.....	1184		

Amateur Radio Club is sponsoring a Worked All Parishes Award certificate, suitable for framing, for qualified applicants.

Applicants must submit proof of contact with all 64 Louisiana parishes. Photocopies of QSL cards are acceptable as long as they are legible and there is no evidence of alterations. QSLs or photocopies must show the callsign of the station contacted, the parish where the contact was made, date and time of the contact, and the band and emission used to make the contact. Cards will not be returned unless sufficient postage is included with the application.

Contacts must be made on 160 through 10 meters. Any legal mode of emission may be used. Only direct contacts will be accepted. No

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is \$4.00. For nonsubscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for \$2.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.



The Holyland Award is issued by the Israel ARC to amateurs and SWLs.

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

Scanners/CB/Weather Stations

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Weather Stations



The Weather Monitor II (7440) comes complete with anemometer with 40 feet (12.2 m) of cable, external temperature sensor with 25 feet (7.6 m) of cable, junction box with 8 feet (2.4 m) of cable, AC-power adapter, detailed instruction booklet and one year limited factory warranty.

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- Davis Weather Wizard III 7425-Z \$149.95
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- Davis Weatherlink Software for Apple-Version 3.0 7866-Z \$134.95
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- Davis 6-Conductor 40' (12.2 m) extension cable 7878-Z \$21.95
- Davis 8-Conductor 25' (7.6 m) junction box cable 7880-Z \$14.95
- Davis 8-Conductor 50' (15.2 m) junction box cable 7881-Z \$24.95
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- NEW! Davis Electrostatic & RFI Protected Junction Box 7740-Z \$39.95
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- NEW! Davis aluminum Sensor Mounting Arm - 7702-Z \$54.95
- Davis Anemometer Mast Mount 7890-Z \$15.95
- Weatherlink language disks: Française, Deutsche, Italiana, Española 7863-Z \$24.95
- Barometer, Indoor Hygrometer & Thermometer, Clock/Calendar BA888-Z \$89.95
- Indoor-Outdoor Thermometer/Barometer & Hygrometer by OSI RA213-Z \$79.95
- Thermometer with transparent calendar & clock display by OSI TC188-Z \$19.95
- Thermometer with AM/FM clock radio by Oregon Scientific CR388-Z \$39.95
- Indoor/Outdoor Thermometer with Jumbo Display by OSI JB880EX-Z \$24.95



Bearcat® 9000XLT-Z Radio Scanner

Mfg. suggested list price \$769.95/Special \$357.95
 500 Channels • 20 banks • Alpha numeric display
 Turbo Scan • VFO Control • 10 Priority channels
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 Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High

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 849.0125-868.995 MHz., 894.0125-1,300.000 MHz.

The Bearcat 9000XLT is superb for intercepting communications transmissions with features like TurboSearch™ to search VHF channels at 300 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include **Auto Store** - Automatically stores all active frequencies within the specified bank(s). **Auto Recording** - This feature lets you record channel activity from the scanner onto a tape recorder. **Hi-Cut filter** to help eliminate unwanted static noise. You can even get an optional **CTCSS Tone Board** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; **MB001** Mobile mounting bracket \$14.95; **BC005** CTCSS Tone Board \$54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty.

VHF Transceiver

RELM® WHS150-Z Transceiver/SPECIAL

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Law enforcement and fire departments depend on the RELM WHS150 transceiver for direct two-way communications with their police or fire department, civil defense agency or ham radio repeater. The WHS150 is our most popular programmable frequency agile five watt, 16 channel handheld transceiver that has built-in CTCSS, which may be programmed for any 39 standard EIA tones. Frequency range 148.000 to 174.000 MHz. Will also work 144.000-148.000 with slightly reduced performance. The full function, DTMF compatible keypad also allows for DTMF Encode/Decode and programmable ANI. Weighing only 15.5 oz., it features dealer programmable synthesized frequencies either simplex or half duplex in both 5.0 and 6.25 KHz. increments. Other features include scan list, priority channel, selectable scan delay, selectable 5 watt/1 watt power levels, liquid crystal display, time-out timer and much more. When you order the WHS150 from CEI, you'll get a complete package deal including antenna, battery, belt clip and user operating instructions. Other accessories are available. A leather carrying case with swivel belt loop part #LCWHS is \$49.95; rapid charging battery charger, part #BCWHS is \$69.95; speaker/microphone, part #SMWHS is \$54.95; extra ni-cad battery pack, part #BP007 is \$59.95. The radio technician maintaining your radio system must order programming instructions part #P1150 for \$18.00 to activate this radio. FCC license required for United States operation.

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 Cobra HH40-Z CB 40 channel handheld transceiver \$79.95
 Maxon GMRS210+3-Z GMRS transceiver/SPECIAL \$166.95
 Ranger RC12950-Z 25 watt 10 meter transceiver \$219.95
 Uniden GRANTXL-Z SSB CB Mobile \$139.95
 Uniden PRO538W-Z CB & Weather \$59.95



Bearcat Scanners

- Monitor police, fire, weather, marine, medical, aircraft and other transmissions with your Bearcat scanner.
- Bearcat 9000XLT-Z base/mobile \$357.95
 - Bearcat 3000XLT-Z handheld \$333.95
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Now, anyone can record and archive their telephone calls and scanner radio traffic with our affordable Eventide brand digital communications loggers. Model VR204DAT4 give you powerful performance with a single DDS-2 DAT drive that records more than 500 channel hours of storage on four channels. For monitoring trunking systems, the Eventide VR240 Mark III digital logger gives you over two months of unattended recordings on up to 24 channels when ordered with dual 8 mm. high density CT tape drives. All systems include 60 channel hours (250 & 500 hours optional) of instant recall. Ideal for quickly replaying fast breaking radio action. FCC approved telephone interface is built-in and beeps are selectable on a channel-by-channel basis. Other options include GPS time sync. Order your tape logger from CEI today.

- VR204DAT4 4 channel, single DAT drive, 500+ channel hours \$7,395.95
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- VR240DAT24 24 channel, single DAT drive, 500+ channel hours \$16,685.95
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- Option-add 8 more record channels to a VR240 8 or 16 channel \$2,095.95
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- Option-add 2nd 8 mm. drive to a VR240 Mark III 8 mm. system \$5,699.95
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 Emergency Operations Center
 PO Box 1045, Ann Arbor, Michigan 48106-1045 USA
 For information call 313-996-8888 or FAX 313-663-8888

contacts made via repeater will be accepted; transponder satellite contacts will be accepted. Only contacts made on or after September 1, 1996 will count for this award.

All contacts must be made by the same individual using callsigns assigned to him/her. If multiple callsigns have been used, the applicant should state these and declare that they all were assigned to him/her.

Applications must be submitted to: Baton Rouge Amateur Radio Club Awards Committee, P.O. Box 4004, Baton Rouge, LA 70821. A \$2.00 fee must accompany the application to cover the cost of mailing the certificate. Additional fees for return postage of QSL cards should be included if return of the QSLs is desired. Fees must be submitted in the form of check or money order only. Stamps will not be accepted; cash is discouraged.

Decisions of the Awards Committee will be final. The BRARC Awards Committee reserves the right to modify these rules as necessary to more efficiently administer the award.

The Holyland Award. The Israel Amateur Radio Club (IARC) has announced the Holyland Award, a special plaque issued to both licensed radio amateurs and SWLs. (The basis of a national award was introduced in the UK by the late John Morris, G3ABG, in 1969. The idea was adopted by the WAB group for the UK national awards. The Israel ARC found this idea suited their needs, and adopted it for their new awards program.)

The award is given for working or hearing stations in the Holyland "areas." There are three categories:

- (A) Amateurs working in the Holyland.
- (B) Amateurs operating from IARU Region I.
- (C) Amateurs operating from IARU Regions II & III.

In category B, 100 "areas" from 13 regions are required for the basic award. An additional 12 "areas" plus one extra region are required per sticker. In category C, 50 "areas" from 13 regions are required for the basic award. An additional six "areas" plus one extra region are required per sticker. Ten stickers exist.

The award is based on the geographical and administrative division of the Holyland. The country is divided geographically by the Survey of Israel Department into a grid system resulting in 10 x 10 km squares. These squares are defined by a letter and two numbers which are the relevant coordinates—i.e., E-14, H-08, etc. For administrative purposes the country is divided into 23 regions. The boundaries of these regions are drawn arbitrarily. An "area" is made up of the square and the region—i.e., E-14-TA (Tel Aviv), G-18-JS (Jerusalem), etc. The "area" is the basis for the Holyland Award.

The IARC plaque's base is a gold anodized aluminum sheet 17" x 12.4" (44 x 32 cm). The two-color art shows an old panorama of Jerusalem from the Mount of Olives. It is awarded for achieving basic requirements after the first of January 1992. For further achievements, stickers can be attached to the basic award. QSL cards are not required; only log entries.

To help with the logging and for submission purposes, a special record book is available. The book includes the aims, explanations, and requirements of the award; a list of regions and

squares within the region; and a summary of the achievements necessary to claim the award.


In addition to the book, the following items are available: a country road map (scale of 1:250,000) and a list of settlements and their location squares. Price of the book only is \$10. Price of the book with additional material is \$18. The book and the additional material may be obtained from: M. Webman, 4X4JU, P.O. Box 8181, Petah Tiqwa, 49651 Israel.

Expeditions & Mobile Awards. The Holyland Award for activating areas (and the stickers) is issued for operating HF from areas in the Holyland. A specially engraved trophy will be awarded for activating 300 and 400 different "areas," available to all radio amateurs working HF while operating mobile or portable in the Holyland.

Operating Frequencies: To concentrate the efforts, specific frequencies are recommended for the award. Mobile and portable stations will use following frequencies (\pm QRM): 28.655, 21.320, 14.265, and 7.060 MHz.

The Holyland Contest. A contest is held annually in April. More details can be requested from the contest manager, IARC, P.O. Box 17600, Tel Aviv 61176, Israel (SASE required).

The Israel Amateur Radio Club invites all radio amateurs to participate in the Holyland Awards program. They are making every effort to increase the activity of radio amateurs in the country, and to encourage mobile and portable operation. If you have a plan to visit the Holyland in the near future and wish to operate your radio station, mobile or fixed, you can take part in the "Holyland Expedition & Mobile" plan and perhaps win the available award and trophies. The IARC is willing to assist all radio amateurs who wish to operate in the Holyland.

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USA-CA 500: Michael Weber, WA2RZJ, #2931; Robert H. Jones, N5UFR, #2932; Wallace C. Foster, AA5EA, #2933; A. Douglas Berry, K7SMW, #2934; Shailer Herrick, Jr., W1NHJ, #2935; John W. Lee, K6YK, #2936; John W. Mees, KE0VB, #2937; Francis L. Rauch, KA7AKJ, #2938.

USA-CA 1000: A. Douglas Berry, K7SMW, #1414; Shailer Herrick, Jr., W1NHJ, #1415; John W. Lee, K6YK, #1416; John W. Mees, KE0VB, #1417; Francis L. Rauch, KA7AKJ, #1418.

USA-CA 1500: A. Douglas Berry, K7SMW, #1180; Shailer Herrick, Jr., W1NHJ, #1181; John W. Lee, K6YK, #1182; John W. Mees, KE0VB, #1183; Francis L. Rauch, KA7AKJ, #1184.

USA-CA 2000: Shailer Herrick, Jr., W1NHJ, #1086; John W. Lee, K6YK, #1087; John W. Mees, KE0VB, #1088; Francis L. Rauch, KA7AKJ, #1089.

USA-CA 2500: Shailer Herrick, Jr., W1NHJ, #1015; John W. Lee, K6YK, #1016; John W. Mees, KE0VB, #1017; Francis L. Rauch, KA7AKJ, #1018; Norm Van Raay, WA3RTY, #1019.

USA-CA 3000: Shailer Herrick, Jr., W1NHJ, #921; John W. Lee, K6YK, #922; John W.



Mark Behrens, WB9OOG's car on the county/state line of Southampton, Virginia and Hertford, North Carolina. Hertford was WA3RTY's last county for USA-CA #908, Aug. 30, 1996.

Mees, KE0VB, #923; Francis L. Rauch, KA7AKJ, #924; Norm Van Raay, WA3RTY, #925.

On A Personal Note

August 30th was a momentous day in Pleasant Mount. WB9OOG arrived in Hertford County, North Carolina and gave me a 59 for my last

county to complete my six year effort to contact all 3076 counties of the United States. I now join 907 other amateur radio enthusiasts in receiving one of the more prestigious awards in amateur radio. My thanks to all the other amateurs (mobile and fixed stations) who helped during the past six years. Now, after a deep breath, I may try to go around again.

73, Norm, WA3RTY

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WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC Updates RF Safety Guidelines

"We find it to be the duty of the licensee of an amateur station to prevent the station from transmitting from any place where the operation of the station could cause human exposure to levels of RF radiation that are in excess of the limits we are adopting."

FCC in ET Docket 93-62

The FCC has adopted new guidelines and methods for evaluating the environmental effects of radio frequency ("RF") emissions from FCC-regulated transmitters, including cellular telephone, amateur radio, radio and television broadcast, and satellite communications antennas.

The Commission said the updated guidelines generally are more stringent than the current rules, and are based on recommendations of the federal health and safety agencies. The Commission stated that the new rules will protect the public and workers from strong RF emissions.

History of The Proceeding

The RF portion of the electromagnetic spectrum is generally considered to range from 3 kHz to 300 GHz. All transmissions by amateur operators, of course, occur in this range. As a general rule, the higher the frequency, the greater the energy content and potential for damage through heating of biological tissue. There is disagreement over exactly what levels of RF radiation are "safe," particularly with regard to low levels of exposure.

Under the National Environmental Policy Act of 1969, the Commission is required to consider environmental effects when performing its licensing and regulatory functions. However, the FCC is not a proficient health and safety agency and therefore must rely on expert organizations for guidance on appropriate standards to use to ensure the safety of equipment that emits RF radiation. These expert health and safety agencies are the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the National Institute for Occupational Safety and Health (NIOSH), and the Occupational Safety and Health Administration (OSHA).

The new guidelines (ANSI/IEEE C95.1-1992) were developed to replace those which were previously used by the FCC for environmental evaluation (ANSI/IEEE C95.1-1982). The Commission adopted the 1982 ANSI standard in 1985, noting that the ANSI standard was widely accepted and was technically and scientifically supportable.

The 1982 safety recommendations were meant to alert everyone of the possible harm-

ful effects in human beings of RF fields between 200 kHz and 100 GHz and made wide use of a term called "specific absorption rate," or SAR. This basically is the time frame in which RF is absorbed into the human body. While complex formulas apply, the guidelines say that low-power transmitters with 7 watts or less input power are safe.

Since then the FCC has used this standard as its processing guideline for determining the potential environmental impact of RF emissions. Applicants for certain radio facilities had to prepare an Environmental Assessment (EA) if the transmitter could expose the general public or workers to levels of RF radiation that are in excess of the 1982 ANSI guidelines. Many low-power and intermittent RF transmitters (including amateur radio) were "categorically excluded" from routine evaluation for RF radiation exposure based on data indicating that they would not normally cause exposures in excess of the guidelines.

In 1990 the FCC and EPA completed a joint measurement study of amateur radio installations in southern California. The objective was to obtain information on the potential impact of RF fields on amateur operators and others who might be present in the immediate vicinity of the station. The results of the test showed that while some field strengths at HF frequencies can be relatively high, the potential hazard may be less than for lower field strengths measured at VHF frequencies where the highest specific absorption rates (SARs) occur in human beings. Ground-level field strength readings at HF frequencies were relatively low. You had to get into the main "beam" path to obtain significant radiation levels.

It appears that vehicle-mounted amateur antennas which are closer to the ground create the greatest possibility for significant exposure in publicly accessible areas. There were several cases where the peak levels of RF exposure exceeded limits recommended for "uncontrolled" environments. Generally, RF field strengths encountered inside amateur shacks were well below IEEE recommended exposure limits.

New, Updated RF Safety Standards Proposed

On March 11, 1993 the FCC issued a Notice of Proposed Rulemaking which looked toward using the RF guidelines adopted in 1992 by the American National Standards Institute (ANSI) and the Institute of Electrical and Electronic Engineers (IEEE) as their standard for evaluating environmental radio-frequency (RF) radiation from FCC-regulated transmitters. The 1992 ANSI/IEEE standard generally is more restrictive in the amount of environmental RF exposure permitted. It also extends the frequency range under consideration to cover frequencies from 3 kHz to 300 GHz.

The 1992 ANSI/IEEE standard specifies two tiers of exposure criteria—one tier for "controlled environments" (usually involving workers) and another, more stringent tier for "uncontrolled environments" (usually involving the general public). Since they are usually in residential environments, amateur radio installations can be both in a "controlled" and "uncontrolled environment."

The 1982 ANSI standard specified only one set of exposure limits, regardless of whether the individual exposed was a worker or a member of the general public. The 1992 ANSI/IEEE standard for the first time also includes specific restrictions on currents induced in the human body by RF fields.

The 1992 ANSI/IEEE standard also is generally more restrictive in the evaluation of low-power devices, such as hand-held radios and cellular telephones, than the 1982 standard which permitted exclusion from compliance with the MPE limits if the input power of the radiating device was 7 watts or less. The new guidelines also proposed to eliminate the categorical exemption for radio amateurs, which could result in amateurs having to prove that their transmissions do not expose anyone to RF radiation in excess of the 1992 ANSI/IEEE guidelines. The new standard is five times more strict for devices operating in "uncontrolled" environments and includes all hand-held radios where the antenna is located close to body of the user.

The deadline for comments on the new proposed RF safety guidelines was January 25, 1994, later extended to April 25th. The EPA did not like the terms "controlled" and "uncontrolled" environments. They preferred "workers" and the "public," with all amateur operators being part of the "public." This would have subjected all of amateur radio to the more stringent guidelines.

ARRL Dispute Over RF Safety Standards

The ARRL wanted continuation of the categorical exemption for radio amateurs and said that "... the FCC should rely on amateur self-training and educational efforts to ensure RF safety in the service." Their blue-ribbon Committee on the Biological Effects of RF Energy consisted of recognized experts in the field biological hazards of RF radiation (Ivan Shulman, M.D., Chairman (WC2S, Malibu, CA), W. Ross Adey, M.D. (K6UI, Redlands, CA); David J. Rodman, M.D. (KN2M, Buffalo, NY); Samuel Milham, M.D.; Thomas Rozzell, ScD (WA4ZTT, Fairfax, VA); and Wayne Overbeck, Ph.D. (N6NB, Tustin, CA).

The ARRL saw the primary job of the Bio-Effects Committee to be an advisor to the ARRL Board on RF and health. But they never said that the board would take their advice—and they didn't. The Committee disagreed with the

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board's position that amateur radio should continue to be categorically exempt from compliance with any FCC-adopted radiation safety standard, and they charged that the ARRL Board ignored their recommendations in their comments.

The Bio-Effects Committee ended up filing comments on their own behalf as the "Amateur Radio Health Group" and not as ARRL representatives. The group argued that all hand-held transceivers with power outputs exceeding 1.4 watts should be required to have prominent warnings mounted on the unit itself, about the "probable hazards associated with their use."

It said, "Education alone cannot work if a large percentage of radio amateurs neither read the publications nor join the organizations that endeavor to educate them." The Health Group recommended that the FCC publish a guide "... showing required separation distances between antennas and inhabited areas for each amateur band and each major antenna type, with transmitter power levels of 10 watts, 100 watts, and 1000 watts, for example."

"The FCC should not subject all amateurs to the requirements of environmental studies and processing, because it would be too expensive and would inundate the FCC with paperwork. Instead the FCC should place in Part 97 a chart showing the calculated field intensities at various distances from antennas having various directive patterns, driven by transmitters of various power output levels. This chart might indicate the thresholds set by the 1992 ANSI guideline, if the FCC chooses to adopt that guideline as a standard exposure to RF energy. The FCC could also add questions about electromagnetic safety to license exams, and require applicants to certify that they have read and understand the FCC guidelines and agree to comply."

After the board learned that members of the Bio-Effects Committee had filed comments in this proceeding, the League required that Committee members sign a statement—to be attached to the ARRL's reply comments—intended to soften the disagreement between the board and the Bio-Effects Committee. They were even told what the statement should say.

When it became apparent that committee members were unwilling to comply, the primary author of the comments, Wayne Overbeck, N6NB, was dismissed. The ARRL's Bio-Effects Committee said, "This sequence of events would suggest that in the board's view, the Bio-Effects Committee exists not to provide expert advice to the board, but instead to lend credibility to whatever position the board chooses to adopt."

The ARRL Bio-Effects Committee Quits!

On June 1st the ARRL's entire hand-picked committee of internationally acknowledged experts in the field of potential health risks from exposure due to RF radiation resigned! The League's Bio-Effects chairman, Dr. Ivan Shulman, WC2S, wrote a stinging 5-page letter to League President George Wilson, W4OYI, telling him why the Committee resignation was necessary.

The current ARRL Bio-Effects Committee was appointed in January 1990 by then ARRL Pres. Larry Price, W4RA, "... with the distinctive charge of revitalizing organized amateur radio's concern for the limitation of bio-

effects hazards that might arise from the participation of individuals in the hobby of amateur radio." Wayne Overbeck, Ph.D (then ARRL Southwestern Division Vice-Director) was appointed Board Liaison.

"Since that time, the Committee has worked to rewrite virtually all the sections pertaining to bio-effects hazards in all the ARRL publications offered to the public. In addition, the Committee has monitored and reported to the board on current projects that the Committee has been involved in, including the FCC/EPA study of field strength measurements at various amateur radio installations in southern California.

"The new proposed 1992 ANSI guidelines are more restrictive and could require equipment manufacturers to demonstrate compliance in workplace (controlled) and residential (uncontrolled) environments where people are inadvertently exposed to RF energy. The impact of the new guidelines to amateur radio is massive, since ham operators are exposed to RF radiation on a voluntary (controlled) basis and their neighbors are exposed on an involuntary (uncontrolled) basis. The new guidelines also extend the frequency range under consideration from 3 kHz to 300 GHz—every ham band! Hand-held transceivers also are scheduled to come under new scrutiny. Previously, hand-held transceivers radiating under 7 watts were excluded.

"Unbelievably, as important as this proposal was to amateur radio operations, the League's Board of Directors chose to exclude participation by its own chosen panel of experts, the ARRL Bio-Effects Committee.... The members of the ARRL Bio-Effects Committee plan to continue to contribute to an understanding by amateur radio operators of the issues relating to the potential bio-hazards of our activities as radio operators, and as such will remain active in our continued review of information and research in this field as it becomes available.

"We plan to remain available to any and all amateur radio operators who seek our counsel. We further plan to continue to speak out in matters that concern us as individuals and as private citizens as they pertain to our deep and fundamental interest in amateur radio.

"We will, however, not allow our names to be subject to the political machinations and narrow views of individuals who seek to use us for their own aims as 'window dressing' for you or the League."

Ruling by FCC on RF Exposure Guidelines

Acting at the express direction of the Congress, the Commission has now adopted the new guidelines and methods for evaluating the environmental effects of radio-frequency (RF) radiation from FCC-regulated transmitters—including amateur radio. The new standards were adopted essentially as proposed.

The FCC believes that the new guidelines will better protect the public and workers from exposure to potentially harmful RF fields. The FCC especially took the comments of the U.S. Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and other federal health and safety agencies into consideration to develop what they believe to be a consensus view of the federal agencies responsible for matters relating to the public safety and health.

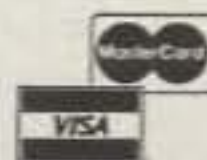
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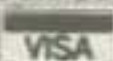
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CIRCLE 36 ON READER SERVICE CARD

The Telecommunications Act of 1996, which was enacted on February 8, 1996, required that: "Within 180 days after the enactment of this Act, the Commission shall complete action in ET Docket 93-62 to prescribe and make effective rules regarding the environmental effects of radio frequency emissions." The new rules were released on the 175th day.

The Commission also adopted limits for specific absorption rate (SAR) for evaluating certain hand-held devices, such as cellular and PCS telephones, based on ANSI/IEEE and NCRP recommendations. The new RF guidelines will apply to applications for stations filed with the FCC after January 1, 1997.

The Commission said this should provide a reasonable transition period for parties to come into compliance with the new requirements. Guidelines and requirements for evaluation of hand-held devices will apply immediately. Here is what the FCC had to say about amateur radio. This is a direct quote from ET Docket No. 93-62:

Amateur Radio

"Amateur stations present an unusual case with respect to compliance with RF exposure guidelines. First, over 700,000 amateur stations in the United States are authorized by our rules to transmit from any place where the Commission regulates the service, as well as on the high seas. The Commission does not pre-approve individual amateur station transmitting facilities and no additional application is made for permission to relocate an amateur station or to add additional stations at the same or other locations.

"Second, the granting of a license is solely conditional upon the applicant passing an examination demonstrating that the examinee possesses the operational and technical qualifications required to perform properly the duties of an amateur operator under our rules.

"Third, amateur stations vary greatly. Amateur stations are located in dwellings, in air, surface and space craft, and carried on the person. Many of these stations transmit from residential or other areas where individuals may be in close proximity to an RF radiator. In addition, amateur station transmissions are made intermittently and may involve as many as 1,300 different emission types—each with a distinctive on-off duty cycle.

"Finally, most amateur stations engage only in two-way communications. Thus, even when in operation, the station is usually transmitting but half of the time. There are many variables, therefore, to be considered in determining whether an amateur station complies with guidelines for environmental RF radiation.

"Measurements made during a Commission/EPA study of several typical amateur stations in 1990 indicated that there may be some situations where excessive exposures could occur. Furthermore, among amateur operators themselves there appears to be varying degrees of knowledge concerning the potential hazards of RF radiation. At least one prominent amateur radio publication has a comprehensive section dealing with potential RF hazards at amateur stations.

"Comments on continuing to exempt amateur stations from demonstrating compliance are divided. The ARRL opposes inclusion, and claims that most amateur operators adopt the philosophy of prudent avoidance—that is, they avoid unnecessary exposure to electromag-

netic radiation as a common-sense response to potential, but not yet proven, health hazards.

"The ARRL also states that its publications, which include sections on RF safety, urge amateur operators to practice prudent avoidance wherever possible and are sufficient to keep the amateur community informed of the hazards of RF radiation. The ARRL and the ARRL Bio-Effects Committee support 'prudent avoidance' and state that most amateur operators do not possess the requisite equipment, technical skills, and/or financial resources to conduct an environmental analysis if the categorical exclusion for Part 97 were eliminated.

"The ARRL argues that amateur stations, because of their intermittent operation, low duty cycles, and relatively low power levels, rarely exceed the 1992 ANSI/IEEE standard. Further, the ARRL suggests that the risk of exceeding those levels would only be relevant for a licensee and his or her family. The ARRL maintains that in this experimental service it is better to rely on education and testing of licensees than on submission of a complex environmental assessment which would not be valid for long in most cases since much amateur station transmitting equipment, especially antennas, is constructed and designed by the licensee and often changes. Therefore, the ARRL argues that amateur service licensees should not be subjected to routine environmental processing.

"The ARRL states that if the Commission applied these rules to the amateur radio service, it then must facilitate the installation of amateur station antennas in configurations that will permit compliance with the RF exposure guidelines by issuing a more comprehensive preemption statement with respect to amateur station antennas than now exists, and must completely preempt the judicial enforcement of restrictive covenants which result in amateurs installing station antennas indoors or at locations on a horizontal plane with human occupants of residences. Indeed, the ARRL continues, such an order is overdue anyway; but the combination of adoption of a strict RF exposure standard and continuation of a hands-off attitude with respect to antenna covenants is tantamount to a license revocation, as it would preclude the operation of any amateur station subject to both restrictions.

"The ARRL Bio-Effects Committee claims that amateur operators normally would be exempted from environmental review requirements, since most engage in operations that would not cause the ANSI/IEEE guidelines to be exceeded. However, it notes, a 100 watt VHF 'vehicular installation' may produce higher fields inside the vehicle than the ANSI/IEEE standard would allow. Furthermore, hand-held transceivers, facilities employing indoor antennas, and facilities engaging in specialized activities such as 'moonbounce' communication, may produce significant localized fields near the antenna.

"Further, the ARRL Bio-Effects Committee notes that a comprehensive environmental review would be too burdensome both for the amateur operators and the Commission staff. It therefore recommends that a tabular chart showing the calculated field intensities at various distances from antennas having directive patterns, driven by transmitters of various power output levels common in the amateur service, be added to Part 97.

"The ARRL Bio-Effects Committee also recommends inserting questions about electro-

magnetic radiation safety in each amateur operator license examination and requiring certification on the license application that the applicant has read the Commission guidelines, understands them, and agrees to comply. Under this scheme, the ARRL Bio-Effects Committee argues, amateur operators would follow the policy of 'prudent avoidance' that the ARRL publications now advocate.

"Professor Wayne Overbeck, N6NB, filing comments as an individual, believes that few amateur operators are aware of the electromagnetic radiation levels present near their own amateur stations and that rather than being excluded from our requirements, the amateur service should be subject to the standard for 'uncontrolled environments' through language added to Part 97.

"Professor Overbeck points out that vast numbers of amateurs are neither members of the ARRL nor subscribers to any amateur service magazines and consequently these educational sources are not sufficient to ensure adherence to our guidelines. Because actual measurements would be financially prohibitive for most amateur operators, Professor Overbeck recommends that we promulgate a rule requiring amateur operators to adopt operating and antenna-placement practices calculated to meet the exposure limits and that they be required to certify on their application forms that they have read and will adhere to the guidelines for antenna placement.

"Finally, Professor Overbeck suggests that we promulgate an amateur service version of OST [Office of Science and Technology] Bulletin No. 65 that would include charts and tables showing required separation distances between antennas and inhabited areas for various power levels. He also suggests that amateurs be tested on this topic as part of operator license examinations.

"**Decision.** The Commission expects all its licensees to comply with the RF guidelines specified in our rules, or, if not, to file an Environmental Assessment (EA) for review under our NEPA procedures. After a thorough review of the comments and the results of an FCC/EPA measurement study, we conclude that, although it appears to be relatively small, there is a potential for amateur stations to cause exposures to RF radiation in excess of these guidelines.

"Amateur stations can transmit with up to 1500 watts peak envelope power on frequencies in specified bands from 1,800 kHz to over 300 GHz. Certain of the emission types permitted have high duty cycles—for example, frequency or phase shifted digital signals. Amateur stations are not subject generally to restrictions on antenna gain, antenna placement, and other relevant exposure variables.

"Even though situations where exposures are excessive may be relatively uncommon and even though most amateur stations transmit for short periods of time at power levels considerably lower than the maximum allowed, the possibility of human exposure to RF radiation in excess of the guidelines cannot be disregarded. Therefore, a blanket exemption for all amateur stations does not appear to be justified, and we will apply our new guidelines to amateur stations.

"We will rely upon amateur licensees to demonstrate their knowledge of our guidelines through examinations. We will also rely on amateur licensees to evaluate their own stations if they transmit using more than 50 watts of out-

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put power. Applicants for new licenses and renewals also will be required to demonstrate that they have read and that they understand our applicable rules regarding RF exposure.

"We find it to be the duty of the licensee of an amateur station to prevent the station from transmitting from any place where the operation of the station could cause human exposure to levels of RF radiation that are in excess of the limits we are adopting.

"We concur with the ARRL that amateur operators should follow a policy of prudent avoidance of excessive RF exposure. We will continue to rely upon amateur operators, in constructing and operating their stations, to take steps to ensure that their stations comply with the MPE limits for both occupational/controlled and general-public/uncontrolled envi-

ronments. In this regard, we recognize and agree with the ARRL's position that the occupational/controlled limits generally can be considered adequate for situations involving amateur stations considering the most commonly used power levels, intermittent operation, and frequencies involved.

"We recognize that operation in the amateur radio service presents certain unique conditions. Nonetheless, we are concerned that amateur radio operations are likely to be located in residential neighborhoods and may expose persons to RF fields in excess of the MPE guidelines. We will consider amateur radio operators and members of their immediate household to be in a 'controlled environment' and will apply the occupational/controlled MPE limits to those situations.

"Neighbors who are not members of an amateur operator's household are considered to be members of the general public, however, since they cannot reasonably be expected to exercise control over their exposure. In those cases general population/uncontrolled exposure MPE limits will apply.

"We believe that the burden for action to assure compliance with RF exposure limits should fall on the relatively few licensees who operate stations that can potentially cause individuals, knowingly or unknowingly, to be exposed to RF energy in excess of these guidelines. We want the licensees of such stations to provide adequately for RF safety.

"We do not believe, however, that a detailed EA or other routine environmental filing is practical or necessary. To make the complex determination of possible excessive exposure as simple as possible, we are specifying a threshold limit for transmitter power that will apply regardless of frequency used.

"Below 50 watts transmitter power, the licensee will not be required to take any action, unless requested by Commission staff pursuant to Section 1.1307© or 1.1307(d) of our rules. Above this power threshold, the licensee must perform a routine evaluation to predict if the RF radiation could be in excess of that allowed by the criteria listed in §1.1310. If so, the licensee must take action to prevent such an occurrence.

"The action could be in the form of altering operating patterns; relocating the antenna; revising the station's technical parameters such as frequency, power, or emission type; or combinations of these and other remedies. To assist with routine evaluation of exposure levels in accordance with the guidelines, we encourage the amateur community to develop and disseminate information in the form of tables, charts, and computer analytical tools that relate such variables as operating patterns, emission types, frequencies, power, and distance from antennas.

"We also intend to provide straightforward methods for amateur operators to determine potential exposure levels. This information could be included in our updated version of OST Bulletin No. 65, or we may follow the suggestion to develop a separate bulletin tailored for the amateur service community.

"As a result of the adoption of a transition period, which was discussed earlier, the new guidelines will apply to amateur stations beginning January 1, 1997. This should provide sufficient time for the amateur community and the Commission staff to prepare the necessary information to help amateur operators comply with these requirements.

"As suggested by the ARRL, the ARRL Bio-Effects Committee, and Professor Overbeck, we are amending our rules to require the operator license examination question pools to include questions concerning RF safety at amateur stations. We are requiring an additional five questions on RF safety within each of three written examination elements. We also are adopting the ARRL's proposal that amateur operators should be required to certify, as part of their license application process, that they have read and understand our bulletins and the relevant FCC rules. We will rely on our Wireless Telecommunications Bureau to develop suitable methods for obtaining this certification."

73, Fred, W5YI



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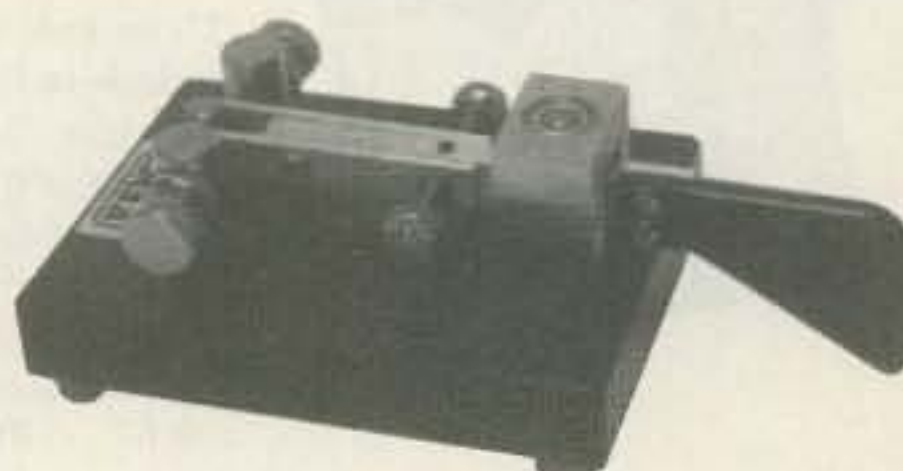
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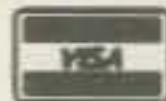
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SL-11R	•	•	7	11	2 ⁵ / ₈ x 7 x 9 ³ / ₄	12
SL-11R-MC		•	7	11	5 ³ / ₄ x 7 ¹ / ₄ x 9 ³ / ₄	13
SL-11R-GE	•		7	11	5 ³ / ₄ x 7 x 9 ³ / ₄	13
SL-11R-RA		•	7	11	4 ³ / ₄ x 7 x 9 ³ / ₄	13
SL-11R-EFJ		•	7	11	5 ¹ / ₈ x 7 ¹ / ₄ x 9 ³ / ₄	13
SL-11MG		•	7	11	5 ¹ / ₈ x 7 ¹ / ₈ x 9 ³ / ₄	13
SL-15R	•	•	12	15	2 ⁵ / ₈ x 7 x 9 ³ / ₄	13
SL-15R-GE	•		12	15	5 ¹ / ₈ x 7 ⁵ / ₈ x 9 ³ / ₄	14
SL-15R-RA		•	12	15	4 ³ / ₄ x 7 ¹ / ₄ x 9 ³ / ₄	14
SL-15R-EFJ		•	12	15	5 ¹ / ₈ x 7 ¹ / ₈ x 9 ³ / ₄	14

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RM-35A	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50A	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60A	50	55	7 x 19 x 12 ¹ / ₂	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 ¹ / ₄ x 19 x 8 ¹ / ₄	16
RM-35M	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50M	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60M	50	55	7 x 19 x 12 ¹ / ₂	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
	Gray	Black				
RS-3A		•	2.5	3	3 x 4 ³ / ₄ x 5 ³ / ₄	4
RS-4A	•	•	3	4	3 ³ / ₄ x 6 ¹ / ₂ x 9	5
RS-5A		•	4	5	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	7
RS-7A	•	•	5	7	3 ³ / ₄ x 6 ¹ / ₂ x 9	9
RS-10A	•	•	7.5	10	4 x 7 ¹ / ₂ x 10 ³ / ₄	11
RS-12A	•	•	9	12	4 ¹ / ₂ x 8 x 9	13
RS-12B		•	9	12	4 x 7 ¹ / ₂ x 10 ³ / ₄	13
RS-20A	•	•	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 ³ / ₄ x 11	46
RS-70A	•	•	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-12M	9	12	4 ¹ / ₂ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 ³ / ₄ x 11	46
RS-70M	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

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VS-20M	16	9	4	20	5 x 9 x 10 ¹ / ₂	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 ³ / ₄ x 11	46
VS-70M	57	34	16	70	6 x 13 ³ / ₄ x 12 ¹ / ₂	48
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
VRM-50M	37	22	10	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50

NEWS OF COMMUNICATION AROUND THE WORLD

Resolutions Revisited

As most of you know by now, I've turned over the reigns of *The DX Bulletin*, *The DX Magazine*, and *The Long Island DX Bulletin* to KB4RGW and AE4P. Last month I also described an almost 12 year schedule of deadlines and activities required to bring the information to all of you. Basically, it came down to two choices for me, either burn out or step back, and I chose to step back. Consequently, this month is really an abbreviated DX column. All of the award boxes are here, but I'm not. I've decided to take a bit of time off and regroup without the usual monthly deadline. I'll be back on schedule next month.

I'd like to get a slight jump on the holiday season and the winter contest/DX season by going over a few resolutions we all could make and try to keep. I brought up these plus a few more ideas several years ago, and it really doesn't hurt to go over them again, especially this month as we prepare for the 1996 CQ WW DX CW Contest. If you're looking for DX, contests are a great place.

I resolve not to tune up on top of a DX station. Few operating habits are as annoying to the DX station and to those trying to work the DX station as the long tuner-upper on frequency. Everyone winces as the operator slowly, painstakingly twiddles the knobs on the amplifier to eke out the last couple of watts. What is worse than the torture to the poor tubes in the amplifier is that the practice is totally unnecessary.

Even if the DXer does not own a dummy load (for which there is little excuse), the DXer certainly can move a few kiloHertz away from the DX station to tune up. Better yet, on a day when the bands are shut down, a considerate DXer will tape paper behind the knobs of the amplifier, and tune up the amp on common DX frequencies on each band. By marking the position of each knob on the paper, labeled with the frequency, the DXer can then move to a given band or frequency, and preset the amplifier controls. This can eliminate on-the-air tune-up completely.

I resolve to listen more and transmit less. A good DXer spends more than 90% of his or her operating time listening. Listening not only helps the individual DXer by providing information about the band conditions, callsign of the DX station, QSL information, operating schedule, etc., it also helps every other DXer by eliminating those repetitive questions. DXpeditions in particular are plagued by the frequent "What's your QSL information?" "When are you going to be on 80 meters (RTTY CW, 160, 10, etc.)?" and the worst, "What's your call?" If most DXers simply listened for a few moments, they would not only get the desired information, they would also permit more DXers to contact the DX station.

I resolve to stay well-informed. The well-informed DXer is the successful DXer. By keeping up to date with accurate DX information, a



BG4TBD, who is 23 years old, put China on the map in last year's CQ WW DX SSB Contest.

DXer can work more countries in less time and reduce QRM. For example, DXpedition stations may work many stations without giving their callsign, listening frequency, QSL information, etc. A DXer who is knowledgeable about the details of the DXpedition already knows this information and can work the station more quickly and refrain from cluttering the bands with questions.

There are several ways a DXer can stay on top of DX news. One is by sitting in front of the rig much of the time, listening. Much DX news eventually finds its way to the airwaves. (Beware the rumor mills, however, especially on DX nets; the vast majority of information is simply wishful thinking.) For those DXers without the time to listen to the bands all day, there are several DX newsletters available which provide comprehensive DX information. Classified ads in *CQ* contain ordering information on these types of publications. Send them a business-size SASE for samples and prices. Another way to keep up with happenings is via your local PacketCluster® DX spotting network. If you don't have a DX packet spotting network running in your area, get together with some of the local amateurs and start one. Such networks are excellent sources of DX information.

I resolve not to be a "DX policeman." Nor to police the policemen. DX policemen are self-appointed masters of ceremony on the DX station's frequency. These so-called DXers tell those stations transmitting on top of the DX station that the DX station is listening split, give out QSL information, and provide helpful hints

5 Band WAZ

As of July 31, 1996, 446 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

YO3APJ LA2QM YU1AB

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	OE6MKG, 199 (31)
AA4KT, 199 (26)	HA8IB, 199 (2 on 15)
K7UR, 199 (34)	DK1FW, 199 (31)
NA0Y, 199 (26)	OH2DW, 199 (1)
W0PGI, 199 (26)	IK1AOD, 199 (1)
W2YY, 199 (26)	DF3CB, 199 (1)
W9WAQ, 199 (26)	UA3AGW, 198 (1, 12)
W1JR, 199 (23)	VO1FB, 198 (19, 27)
VE7AHA, 199 (34)	EA5BCK, 198 (27, 39)
W1FZ, 199 (26)	KZ4V, 198 (22, 26)
IK2GNW, 199 (1)	K4PI, 198 (23, 26)
W9CH, 199 (26)	G3KDB, 198 (1, 12)
AC0M, 199 (34)	DK2GZ, 198 (1, 24)
IK8BOE, 199 (31)	KG9N, 198 (18, 22)
JA2IVK, 199 (34, 40m)	KM2P, 198 (22, 26)
K1ST, 199 (26)	GM3YOR, 198 (12, 31)
AB0P, 199 (23)	DK0EE, 198 (19, 31)
KL7Y, 199 (34)	K8SR, 198 (22, 23)
UY5XE, 199 (27)	K3NW, 198 (23, 26)
NN7X, 199 (34)	WB6OKK, 198 (22, 37)
DL3ZA, 199 (31)	S57J, 198 (2, 26)

The following have qualified for the basic 5 Band WAZ Award:

EA5GRC, 155 Zones	KA2CDJ, 157 Zones
LA2QM, 200 Zones	DF3CB, 199 Zones
YT7TY, 192 Zones	

Endorsements:

KG6LF, 162 Zones	OE1ZL, 197 Zones
YZ7AA, 181 Zones	K5PC, 196 Zones
YO3APJ, 200 Zones	S57J, 198 Zones
WB9YXY, 192 Zones	YU1AB, 200 Zones

1016 Stations have attained the 150 Zone level as of July 31, 1996.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

such as "Shut up. He's transmitting." Every one of these comments is totally unnecessary, and all simply QRM the pile-up. If the DX station is listening off frequency, this quickly will become apparent to all but the most obtuse DXer. And there are sources of QSL information other than DX policemen.

I resolve to be courteous at all times. Even when the actions of other DXers are obnoxious, objectionable, or downright illegal, the good DXer keeps his or her temper and refrains from telling the other amateur what he or she really thinks about the activity. Write a letter instead, and wait at least one day before mailing it.

I resolve to follow proper QSL procedures. Another chronic complaint of DX stations and DXpeditioners is bad QSLing. What

The WPX Program

SSB

2603JA1SWL 2605EA5GCX
2604K5YAA

CW

2924LW2EUB 2926K5YAA
2925JR3TOE

Mixed

1750WD8ANZ 1752HP1KZ
1751AB5SE 1753K5YAA

Mixed: 450 WD8ANZ, K5YAA, 500 K5YAA, 550 K5YAA, 600 K5YAA, 650 K5YAA, 700 K5YAA, 750 K5YAA, 800 K5YAA, 850 K5YAA, 900 K5YAA, IK2VUE, 950 JR3TOE, IK2VUE, 1000 JR3TOE, IK2VUE, 1250 OE1-0140, 1400 JA7FFN, 1550 KF4BU, 1600 KF4BU, 1650 KF4BU, 1700 KF4BU, 1750 KF4BU, 2850 KF2O, 2900 KF2O, 3950 W2FXA.

SSB: 350 JA1SWL, K5YAA, 400 JI6URU, K5YAA, 450 JI6URU, HP1DGX, EA5GMB, 500 JI6URU, HP1DGX, EA5GMB, 550 JI6URU, EA5GMB, 600 JI6URU, EA5GMB, 850 JR3TOE, 1950 K5RPC, 2100 KD9OT, 2450 KF2O.

CW: 350 LW2EUB, K5YAA, EA5GCX, 400 LW2EUB, K5YAA, EA5GCX, 450 LW2EUB, K5YAA, EA5GCX, 500 LW2EUB, K5YAA, EA5GCX, 550 LW2EUB, N2FKE, K5YAA, EA5GCX, 600 LW2EUB, N2FKE, K5YAA, EA5GCX, 650 LW2EUB, F5TFS, K5YAA, EA5GCX, 700 LW2EUB, K5YAA, EA5GCX, 750 LW2EUB, EA5GCX, 800 LW2EUB, EA5GCX, JA9NPS, 850 LW2EUB, 900 LW2EUB, 1100 LA3GI, 2700 N2AC, 3650 N6JV.

10 Meters: IK2VUE
20 Meters: HP1DGX, JA9NPS
40 Meters: IK2VUE
80 Meters: KF4BU
Asia: JR3TOE, JI6URU, EA3AHO
Africa: IK2VUE
Europe: HP1DGX
Oceania: JI6URU

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY,

DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE8DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWW, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DE0DAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, I5ZJK, JA0SU, S51NU, K9XR, W0ULU, HB9DDZ, F6HJM, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, K0IFL, IN3NJB, WT3W, S50A, AA6WJ, W3AP, W9IL, OE1EMN, IK1GPTG, K0DEQ, DL5ARS.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE8DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCY, I2MQP, I0RIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HJM, HB9DDZ, K9XR, K0JN, ZS6EZ, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, K9LJN, WT3W, IN3NJB, S50A, AA6WJ, W3AP, K0DEQ.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

The WAZ Program

Single Band WAZ

20 Meter SSB

989LU2ANN

80 Meter CW

48LA2QM

All CW

94EA3CB 95EA6BD

RTTY

98N4VZ 994X6UO

160 Meter WAZ

81N4XR (32 Zone endorsement)

All Band WAZ

SSB

4342IK5CMR 4344IK4THK
4343K8EK 4345W6ROO

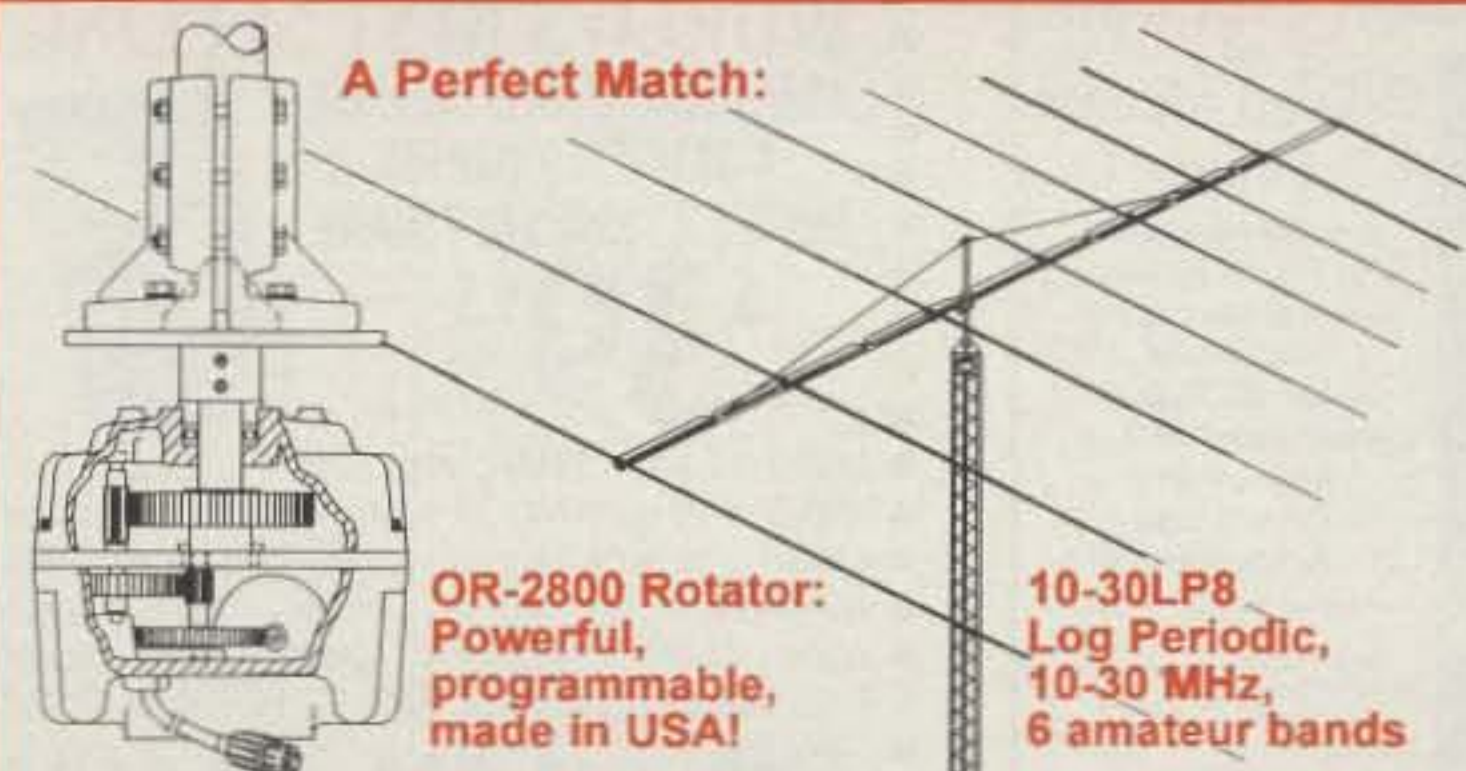
CW/Phone

7697N0AX/GRP (CW) 7700KA2CDJ
7698EA3BHK 7701KN6AH
7699N6MZU (CW)

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

EXTREME

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- VERSATILITY
- RELIABILITY



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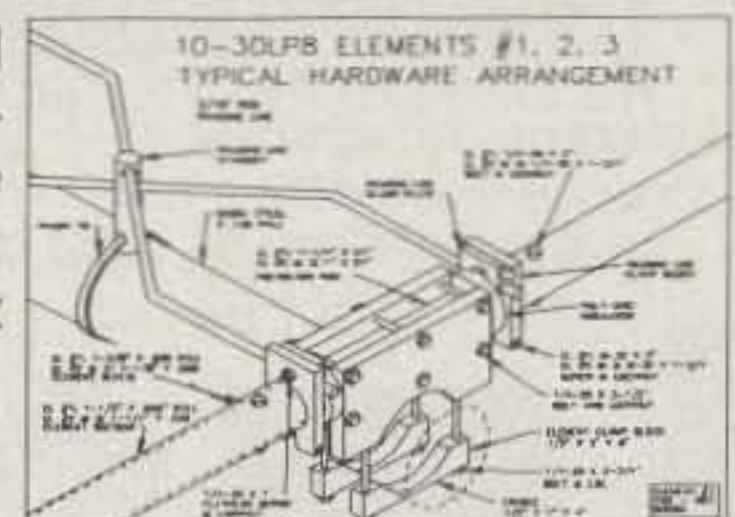
Actually, it starts long before the sale with **real-world specifications.** Your ham station is only as good as its antenna. So its important to know if an antenna's performance matches its claims. **Ours do!**

Fair price: We're not the cheapest, but if you compare construction and materials you'll see the reason: M² uses machined parts, space-age weatherproofing, and stainless hardware to ensure top performance, season after season. **You get what you've paid for!**

Easy assembly: detailed instructions, clear illustrations, and a complete parts list. **The objective: to help you get it right and get it up, ASAP!**

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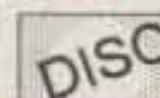
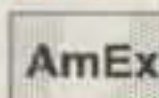


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CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 326 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

CW

K2TQC.....328	N4MM.....327	K9IW.....326	F3TH.....324	W1WAI.....322	W3BBL.....315	K4CXY.....309	W6YQ.....301	DJ1YH.....288
K1MEM.....328	W9DWO.....326	YU1HA.....326	K8LJG.....324	K2JLA.....322	N4AH.....315	K4JLD.....309	YU1TR.....300	YU7FW.....286
K2FL.....328	DL1PM.....326	ISXIM.....326	IT9QDS.....324	AA5NK.....321	K2JF.....314	VE9RJ.....309	YU2TW.....299	F6HJM.....284
K9BWO.....328	K9MM.....326	IT9TOH.....326	W6DN.....324	ON4QX.....321	AA2X.....314	I1EEW.....307	YV5ANT.....299	KF5PE.....282
K2ENT.....328	K2OWE.....326	WA4IUM.....326	W0JLC.....324	K9QVB.....321	4N7ZZ.....314	N1HN.....307	N4OT.....299	I2EOW.....278
DL8CM.....328	K4CEB.....326	WA8DXA.....326	W7CNL.....324	HA5DA.....321	W5OG.....313	N3DQN.....306	W7IIT.....296	W4UW.....277
N7RO.....328	K6LEB.....326	N5FW.....326	KB4HU.....324	WB5MTV.....321	KA7T.....313	N5HB.....306	K0HOW.....296	KB8O.....276
W0IZ.....328	KD8V.....326	EA2IA.....326	W7ULC.....323	IK2ILH.....321	K9DDO.....312	I4LCK.....305	KH6CF.....294	WG7A.....276
G4BWP.....328	9A2AA.....326	W7OM.....326	WA4JTI.....323	IT9ZGY.....320	K1VHS.....311	HB9DDZ.....305	YU1AB.....294	LU3DSI.....275
K6JG.....327	N4KG.....326	W0HZ.....326	W4OEL.....323	K1HDO.....320	G3KMQ.....311	CT1YH.....305	K7EHI.....293	
I4EAT.....328	OK1MP.....326	N6AR.....325	KU0S.....323	N5FG.....319	W8BYTM.....311	OZ5UR.....304	KE5PO.....293	
SM6CST.....328	PA0XPO.....326	K8NA.....325	DJ2PJ.....323	N6AV.....318	N6AW.....311	G2FFO.....303	K8JJC.....290	
W2UE.....328	W2FXA.....326	KZ4V.....325	AG9S.....322	VE7DX.....318	WB4DBB.....311	K7JYE.....302	IK8ADY.....290	
K3UA.....327	N4JF.....326	I1JQJ.....325	K4IQJ.....322	VE7CNE.....317	WB4UBD.....310	WA4DAN.....301	LA7JO.....289	
N7MC.....327	W9WAQ.....326	IT9VDO.....325	NC9T.....322	N6CW.....316	OH3NM.....310	HA5NK.....301	9A2AJ.....289	
KB8DB.....327	AA4KT.....326	W8XD.....325	DL3DXX.....322	KA5TQF.....316	WB6OKK.....310	WG5G/QRPp.....301	G4MVA.....289	

SSB

K4MZU.....328	VE3MRS.....327	CX2CB.....326	K8NA.....325	K9HQM.....323	K4CXY.....320	W8AXI.....317	EA3CB.....308	K2EEK.....291
K2TQC.....328	OE2EGL.....327	TI2CC.....326	IK8CNT.....325	KC5P.....323	G4ADD.....320	XE1XM.....317	AB4IQ.....307	N6ITW.....291
K2FL.....328	K8CSG.....327	WA4ECA.....326	A18M.....325	WD0GML.....323	I4WZK.....320	N5HSF.....316	W9IL.....307	YB1RED.....291
DJ9ZB.....328	K1UO.....327	I0ZV.....326	W4UW.....325	WW1N.....323	I4SAT.....320	KV2S.....315	N6AV.....306	DJ2UU.....291
EA2IA.....328	DL9OH.....327	I4LCK.....326	WB6OKK.....325	K4SBH.....323	I8LEL.....320	WA9RCQ.....315	TI2TEB.....306	WA3KKO.....290
K2ENT.....328	K7LAY.....327	K7EHI.....326	VE2PJ.....325	WB2JZK.....323	K4JLD.....320	N3ARK.....315	VE3DLR.....306	N5QDE.....290
OZ5EV.....328	W9DWO.....326	IK8IOL.....326	I8LEL.....325	CE7ZK.....323	WE2L.....320	KA4RAW.....315	W3YEY.....306	OE7KWT.....290
VE1YX.....328	W9SS.....326	IT9TGO.....326	K7LAY.....325	K2ARO.....323	EA3EQT.....320	K2AJY.....315	KF8UN.....306	4X6DK.....290
W6EUF.....328	WA4IUM.....326	ZL1HY.....326	IT9ZGY.....325	LU7HJM.....323	WS9V.....320	K7TCL.....315	XE1MDX.....305	IK2PZG.....289
K2JLA.....328	WB1DQC.....326	YU1HA.....326	YU1TOH.....325	KA9I.....323	KU9I.....320	N8AMI.....314	W6SHY.....305	KF7VC.....288
N7RO.....328	XE1AE.....326	W4NKI.....326	K6LEB.....325	4N7ZZ.....323	KE3A.....320	OE6CLD.....314	DK5WQ.....305	OK1AWZ.....287
K6YRA.....328	KA3HXO.....326	KZ4V.....326	I2EOW.....325	N5FG.....323	KD8IW.....320	W5RUK.....314	EA5OL.....305	IK2DUW.....287
W6BCQ.....328	VE3XN.....326	VE3GMT.....326	IK1GPG.....325	WN5IJZ.....322	AB7AU.....320	N6RJY.....314	G4NXG/M.....304	W5OXA.....287
K5OVC.....328	YS1GMV.....326	W4EEE.....326	I1JQJ.....325	YV5IVB.....322	ON5KL.....319	DL3DXX.....314	KJ6HO.....304	IK8BMW.....286
K2ZP.....328	K9MM.....326	KE4VU.....326	VE7WJ.....325	XE1CI.....322	WA4DAN.....319	OH5KL.....313	VE3CKP.....304	TU2QW.....286
VE7DX.....328	ZL1AGO.....326	AG9S.....326	A18S.....325	WB4PUD.....322	KI3L.....319	WD0DMN.....313	WB2NQT.....303	NM5O.....285
AA6BB.....328	KF7SH.....326	WA4WTG.....326	KC8EU.....324	LZ1HA.....322	VE3HO.....319	KD9CN.....313	EA3CWX.....303	EA1AYN.....285
EA4DO.....328	ZS6LW.....326	WD8PUG.....326	N4KEL/M.....324	ZS6AOO.....322	XE1MD.....319	K1VHS.....313	WA9BDX.....302	EA3BT.....285
ZL3NS.....328	NK4LC.....326	W2CC.....326	IK8BOE.....324	K1HDO.....322	KB1JU.....319	OA4QV.....313	WA8MEM.....302	LU3HBO.....284
K6JG.....328	YV1AIP.....326	VE2WY.....326	AA5NK.....324	N2VW.....322	WA5HWB.....319	EA1JG.....313	KD4YT.....302	KQ4WD.....284
WA6OET.....328	K9IW.....326	WB4UBD.....326	K2JF.....324	TI2JJP.....322	YV1AJ.....319	W1LQQ.....313	CT1YH.....302	KE6CF.....283
SM6CST.....328	WA4JTI.....326	IT9TGO.....326	WB5TED.....324	W5XQ.....321	PY2DBU.....319	I4CSP.....313	RA2YA.....301	N6CFQ.....283
W3GG.....328	YV1AJ.....326	AA4KT.....326	W2FGY.....324	KA5TQF.....321	VE4ACY.....319	K4LR.....312	W2LZX.....301	Y3OSE.....282
I4EAT.....328	YV1KZ.....326	PT2TF.....326	YV1CLM.....324	TI2HP.....321	I0SGF.....319	ZL1BOQ.....312	XE2DU.....301	VE7HAM.....281
W4UNP.....328	W9OKL.....326	KM2P.....326	YV5CWO.....324	I8XTX.....321	K9QVB.....318	WA9IVU.....311	AB4NS.....301	WN6J.....281
YU1AB.....328	9A2AA.....326	N5FW.....326	W5LLU.....324	I8YRK.....321	KB5FU.....318	ZS6BBY.....311	WP4AFA.....300	YU1TR.....280
F9RM.....328	KD8V.....326	I1EEW.....326	I8KCI.....324	K4POV.....321	AA4AH.....318	IN3ANE.....311	YU2TW.....300	KK4TR.....280
PY4OY.....328	DL6KG.....326	K9HDZ.....326	I1POR.....324	KS2I.....321	G4GED.....318	F1OZF.....311	AB4UF.....300	KN4RI.....280
OZ3SK.....328	KS0Z.....326	WA3HUP.....326	VE4AT.....324	OA4OS.....321	W6NLG.....318	E16FR.....311	WB4UHN.....300	W0IKD.....279
XE1L.....328	OE3WWB.....326	LA7JO.....326	DU9RG.....324	W7ULC.....321	IK8GCS.....318	WA2FKF.....311	KB8NTY.....300	WZ3E.....279
4Z4DX.....328	W2FXA.....326	YV1CLM.....326	KD5ZM.....324	W3AZD.....321	W6MFC.....318	YZ7AA.....311	YT7TY.....300	EA3CWT.....278
CX4HS.....328	N4KG.....326	N6AW.....326	K0HQW.....324	W0ULU.....321	KF5AR.....318	KD5ZD.....310	KG6LF.....300	WN5MBS.....277
N4MM.....328	OK1MP.....326	ZP5JCY.....326	W7FP.....324	KB8O.....321	I8IYW.....318	KA5RNH.....310	WB6GFJ.....299	VE2DRN.....277
K3UA.....327	W6DN.....326	K5TVC.....326	KA5TTC.....324	OE7SEL.....321	N15D.....318	I2MQP.....310	VE3CKP.....299	G0LRX.....277
K9BWO.....327	I2QMU.....326	KB7VD.....326	KE5PO.....324	VE2GHZ.....321	WA8YTM.....318	HA6NF.....310	EA5GKE.....298	KA6AWX.....276
W0YDB.....327	PA0XPO.....326	WB3DNA.....325	WB4DBB.....324	WD0BNC.....321	W6SHY.....318	KQ4GC.....310	KJ9N.....298	OA4EI.....276
W7OM.....327	N4JF.....326	I8ACB.....325	K4JLD.....324	CT1EEB.....321	F6BFI.....318	KF7RU.....310	KB5WQ.....294	NC3C.....275
WB3CON.....327	KB4HU.....326	N6AR.....325	EA3BKI.....324	LU1JDL.....320	WB6PSY.....317	EA5RJ.....309	IT9VDO.....293	F5NBX.....275
KB8DB.....327	KC4MJ.....326	WD8MGQ.....325	K8YVI.....323	KF8VW.....320	9H4G.....317	CT1AHU.....308	KJ5LJ.....293	VE2AJT.....275
VE3MR.....327	SV1ADG.....326	K8LJG.....325	NC9T.....323	I0AMU.....320	WA6DTG.....317	K4JDJ.....308	TI2LTA.....292	US1IDX.....275

RTTY

K2ENT.....321	NI4H.....288	EA5FKI.....284	K3UA.....282	I1JQJ.....273	KE5PO.....263	G4BWP.....256	KB8DB.....255	W4EEU.....250
WB4UBD.....300								

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This was the multi crew at FK5DX for the CQ WW DX SSB Contest in 1995. Left to right are FK8HC and FK8GM.

drives QSL managers crazy is DXers who put local time or date on the card, who don't have their callsign on the same side of the card as the QSO data, who don't provide an SASE or SAE and postage, who send a follow-up QSL within a few weeks, or whose handwriting makes doctors look like calligraphers. QSL managers are a dedicated and hard-working breed, and a DXer should try to make their task as easy as possible.

I resolve to send my complete call. The practice of sending the last two letters of one's callsign has dramatically reduced pile-up effi-

ciency. While the practice may have some value in nets, it hampers DX pile-ups. The DX station must ask for the complete callsign, rather than giving a report. This extra exchange cuts into the number of DXers the DX station can work in an hour, and thus the total number of DXers who work that DX station. A DXer has nothing to lose by sending the entire callsign in a pile-up, and everything to gain in increased efficiency.

With a little help from DXers around the world, every amateur can work more DX, with less frustration, and everyone can enjoy DXing more.
73, Chod, VP2ML

CQ DX Awards Program

SSB

2199 VE3BBZ 2201 EA3BHK
2200 BV5DR 2202 EA3BK1

CW

949 EA3BHK 25 EA5FK1

RTTY

SSB Endorsements

320 N4MM/328	320 EA3BK1/324
320 CX4HS/328	310 VE4ACY/319
320 PY4OY/328	310 I8SGF/319
320 K6JG/328	310 N6RJJ/314
320 WA6OET/328	310 EA1JG/314
320 OZ3SK/328	300 CT1YH/302
320 4Z4DX/328	300 KG6LF/300
320 XE1L/328	275 VE7HAM/282
320 DL9OH/327	275 EA5GWB/280
320 K7LAY/327	250 EA3BHK/263
320 DL6KG/326	250 LU5EWO/254
320 W9OKL/326	150 VE3BBZ/168

CW Endorsements

320 G4BWP/328	300 CT1YH/305
320 K6JG/328	200 EA3BHK/209
320 N4MM/327	150 F5JUD/158
320 IK2ILH/321	

RTTY Endorsements

275 EA5FK1/284	250 G4BWP/256
----------------------	---------------------

Total number of active countries is 328. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are free when an SASE is enclosed for confirmation of total. Rules and application for the CQ DX Awards may be obtained by sending a business-size, No. 10 SASE to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Make checks payable to awards manager.

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PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Low To High Normal Conditions Expected For Most of CW Contest

CW DX Contest Special Bulletin

Since this issue of *CQ* should reach most subscribers prior to the start of the CQ World-Wide DX SSB Contest weekend of October 26-27, here is an updated forecast made at press time for the general propagation conditions expected during the SSB weekend.

Based on the 27- and 54-day recurrence tendency for HF propagation conditions, there is a high probability for at least Low Normal conditions during the entire SSB contest weekend, rising to High Normal over paths to lower and equatorial latitudes. There could be minor periods of radio storminess during the nighttime hours on circuits passing through the auroral and polar regions.

Check on-the-air conditions on October 27th and 28th, which would be just one 27-day cycle prior to the CW contest weekend, for a more probable recurrence pattern.

During the contest, be sure to check with the forecast sources discussed in last month's as well as this month's column for up-to-the-minute reports on ionospheric conditions.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for November 1996

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 1, 8, 11, 21, 29	A	A	B	C
High Normal: 2, 5, 10, 20, 24-25, 28	A	B	C	C-D
Low Normal: 3-4, 6-7, 9, 12, 15-19, 23, 30	B	C	D	D-E
Below Normal: 13, 20, 26-27	C	C-D	D-E	E
Disturbed: 14	C	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find propagation index associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the propagation index, use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a propagation index of 3 will be excellent (A) on Nov. 1st, good (B) on the 2nd, fair (C) on the 3rd and 4th, good (B) on the 5th, etc. During the CW DX Contest weekend, fair (C) conditions are expected on Nov. 23rd and good (B) conditions on the 24th.

level of 71 was reported for July by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 72 centered on January 1996. A smoothed level of approximately 73 is expected during this November.

It is unlikely that any DX records will be broken during the 1996 CW contest period, even though DX conditions may be somewhat improved this year. However, even during this low period of solar activity interesting and exciting DX possibilities exist.

Updated Propagation Data

Updated propagation data is always useful to HF communicators, but it becomes invaluable during DX contests. I covered the major sources of updated information in last month's column. A single, perhaps more convenient, Internet source for such material is my web page: <<http://www.clark.net/pub/gjacobs/gja.html>>.

Hyperlinks are provided to the NOAA, the Solar Terrestrial Dispatch, and the Australian IPS sites. These sites provide a wealth of geomagnetic, solar, ionospheric, and propagation data, much of which is in real or near real time.

If you do not have access to Internet, the best source of similar information is the NOAA

1. running SSN = 12.0 on 08/03/96
2. path endpoints (32N 90W) and (30N 1W)
3. path length is 5106 statute miles
4. bearing from Point 1 is 64 degrees

* please wait a few moments *

Time	MUF (MHz)	Time	MUF (MHz)
0000Z	19.7	1200Z	20.1
0100Z	17.9	1300Z	21.8
0200Z	16.4	1400Z	23.2
0300Z	15.0	1500Z	24.3
0400Z	13.9	1600Z	25.3
0500Z	13.0	1700Z	26.0
0600Z	12.9	1800Z	26.5
0700Z	14.2	1900Z	26.6
0800Z	13.2	2000Z	26.2
0900Z	12.9	2100Z	25.6
1000Z	15.6	2200Z	24.3
1100Z	18.1	2300Z	21.9

Fig. 1— Sample of MUF prediction available from SESC/NOAA modem bulletin board in Boulder, Colorado at 303-497-5042. Information for receiving similar geomagnetic, solar, ionospheric, and propagation data from Internet sites was discussed last month.

Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado, which can be reached with a computer modem at 303-497-5042. More complete information, including a view of the main menu, appeared in last month's column. Fig. 1 is a sample of MUF data that can be obtained in seconds from the SESC bulletin board by selecting MUF Predictions from the main menu. This example is for a path from the east coast USA to West Africa. Remember that in MUF predictions of this type where power and absorption are not taken into account, the optimum amateur band to use is the one closest to the MUF but below it.

Moon Reflected Ionizing Radiation (MRIR Effect)

September's article on the MRIR effect has created quite a lot of interest. Unfortunately, an incorrect e-mail address was given for Chuck Bolland, KA4PRF, who is coordinating research on the possible effects of the moon on the ionosphere. His correct e-mail address is: <chuck@flinet.com>.

Contest Tips

Midnight to Sunrise: Check 20 meters for openings to the South Pacific until midnight, or perhaps as late as 1 AM in the EST and CST time zones, and until 3 AM in MST and PST zones. The band may also remain open for an hour or so after midnight to deep South America and Antarctica. The best band during this time period should be 40 meters. Look for openings

The CW weekend of the 1996 CQ World-Wide DX Contest will take place on November 23-24. The initial forecast for that weekend looks good. Low Normal conditions are expected on the 23rd, with High Normal periods possible. Chances are good for generally High Normal or better conditions to take place on the 24th. A fine-tuned presstime update for the CW contest weekend will appear as a bulletin in next month's column.

DX Propagation Charts for use during both the SSB and CW weekends appeared in last month's column, along with valuable tips and suggestions for increasing scores. Be sure to refer to last month's column if you plan to participate in the CW contest weekend. Additional tips are discussed in this month's column.

Sunspot Cycle Progress

The Royal Observatory of Belgium reports a monthly mean sunspot number of 9 for July 1996. This results in a 12-month running smoothed sunspot number, upon which the cycle is based, of 11 centered on January 1996. There was no significant change in the smoothed sunspot level from the previous two months.

The highest daily value of sunspot count during July was recorded on the 9th with a count of 27. The sun was completely devoid of any spots between July 14th and 25th.

A smoothed sunspot number of approximately 10 is predicted for November 1996. This is approximately the same level observed during last year's CW contest weekend.

A corresponding 10.7 cm mean solar flux

11307 Clara Street, Silver Spring, MD 20902
<g.jacobs@ieee.org>

towards Europe, the Middle East, and parts of Africa until 3 AM in PST zones. Good openings from all time zones towards South America should be possible, with signals strongest to the Caribbean area, Central America, and the northern countries of South America between midnight and 5 AM in EST and CST zones and to 4 AM in MST and PST zones. The path towards the South Pacific looks good on 40 meters between midnight and sunrise in MST and PST zones. Weakish openings to the Far East and Asia may be possible from the PST zone from midnight to sunrise. There's also the possibility of a 40 meter opening to Antarctica between 2 and 5 AM in MST and PST zones. Eighty meters should open from EST and CST zones to Europe, parts of Africa, and the Middle East until 2 AM, possibly for an hour or so longer in the EST zone. Eighty also looks good from PST and MST zones to the South Pacific from midnight almost to sunrise, and from the EST and CST zones from about 3 AM to almost sunrise. Check for good 80 meter openings to the Caribbean, Central America, and the northern countries of South America between midnight and 5 AM, and to 3 AM for deeper openings into South America, in all time zones. There's also a possibility of an opening to the Far East and Asia from the PST zone between 1 and 5 AM. Openings on 160 meters should be possible from the EST and CST zones to Europe between midnight and 2 AM. In the PST zone check for 160 meter openings towards the South Pacific between 2 AM and sunrise. Openings towards the Caribbean, Central America, and the northern countries of South America should be possible from all time zones from about 2 AM to 4 AM.

Sunrise to Sunset: Check for possible 10 meter openings to Europe from EST and possibly CST zones between 9 and 11 AM, and for openings to Africa between 9 AM and noon. Ten meter openings into South America should be possible between 9 AM and 3 PM from all time zones. Check for openings towards the South Pacific between 1 and 5 PM in the PST zone, and possibly MST as well. Look for openings from the PST zone to the Far East and Asia between 2 and 5 PM. Conditions may have to be at least High Normal for the 10 meter band to open. DX conditions on 15 meters should hold up well during the entire daylight period. Check for openings towards South America as early as 8 AM, with the band peaking in this direction between noon and 4 PM. Good openings are expected towards Africa between 10 AM and 2 PM in EST and CST zones, and until noon in MST and PST zones. The band should open to Europe from EST and CST zones between 8 AM and noon, and until 10 AM in MST and PST zones. Check for openings towards the South Pacific between 2 and 6 PM in all zones, with the band remaining open for an hour or so longer in the PST zone. Fifteen meters may also open towards the Far East and Asia between 4 PM and sunset in the PST and MST zones. Twenty meters should open to almost all areas of the world just after sunrise, and remain open with strong signal levels to at least 10 AM. From 10 AM through the early afternoon, signals will probably weaken, with the band only open towards Europe, northern Africa, the Caribbean, Central America, the northern countries of South America, and short openings towards the South Pacific. After 2 PM signals should begin to peak again on 20 meters towards Africa, and remain strong to 3

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1RU12	19 x 12 x 1.75	46.75	61.00	2RU10	19 x 10 x 3.25	52.75	65.00
1RU15	19 x 15 x 1.75	50.00	63.25	2RU12	19 x 12 x 3.25	58.00	74.50
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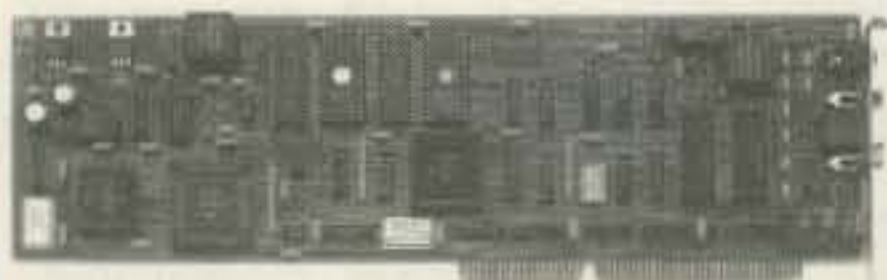
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CQ Short-Skip Propagation Chart November & December 1996 Local Standard Time At Path Mid-Point (24-Hour Time)

Band (Meters)	Distance Between Stations (miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	11-16 (0-1)	11-16 (1-0)
15	Nil	10-16 (0-1)	09-10 (0-1) 10-12 (1) 12-16 (1-2) 16-17 (0-1)	09-10 (1) 10-12 (1-3) 12-14 (2-4) 14-15 (2-3) 15-16 (2) 16-17 (1) 17-18 (0-1)
20	Nil	09-11 (0-1) 11-16 (0-2) 16-19 (0-1)	08-09 (0-1) 09-11 (1-4) 11-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-19 (1) 19-21 (0-1)	07-08 (0-1) 08-09 (1-3) 09-11 (4) 11-15 (4-3) 15-16 (4) 16-17 (3) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1-2) 18-20 (0-1)	07-09 (1-3) 09-10 (3) 10-15 (4-3) 15-16 (3-4) 16-18 (2-4) 18-20 (1-2) 20-00 (0-2) 00-07 (0-1)	07-09 (3) 09-14 (3-1) 14-15 (3-2) 15-16 (3) 16-18 (4) 18-20 (2-4) 20-22 (2-3) 22-00 (2) 00-04 (1-2) 04-07 (1-3)	07-08 (3-2) 08-09 (3-1) 09-14 (1-0) 14-15 (2-0) 15-16 (3-1) 16-17 (4-2) 17-18 (4-3) 18-20 (4) 20-22 (3-4) 22-00 (2-3) 00-02 (2) 02-04 (2-3) 04-06 (3)
80	08-16 (4) 16-18 (2-4) 18-20 (1-3) 20-06 (1-2) 06-08 (2-3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-2) 18-20 (3-4) 20-06 (2-4) 06-07 (3-4) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-06 (4) 06-07 (4-2) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4-3) 04-06 (4-2) 06-07 (2-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-06 (4-3) 06-07 (4-2)	06-07 (2-1) 07-09 (1-0) 17-19 (1-0) 19-20 (4-2) 20-21 (4-3) 21-04 (4) 04-06 (3-2)	06-07 (1-0) 07-19 (0) 19-20 (2-1) 20-21 (3-2) 21-04 (4-2) 04-06 (2-1)

HAWAII Openings Given In Hawaiian Standard Time#

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	09-12 (1)	07-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	16-18 (1) 18-21 (2) 21-02 (3) 02-03 (2) 03-04 (1) 18-20 (1)* 20-02 (2)* 02-03 (1)*
Central USA	09-10 (1) 10-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-08 (3) 08-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-05 (1) 18-20 (1)* 20-02 (2)* 02-04 (1)*
Western USA	09-11 (1) 11-13 (2) 13-15 (1)	07-09 (1) 09-10 (2) 10-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-18 (2) 18-20 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-02 (4) 02-05 (3) 05-06 (2) 06-07 (1) 17-18 (1)* 18-20 (2)* 20-04 (4)* 04-05 (2)* 05-06 (1)*

ALASKA Openings Given In GMT

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	20-22 (1)	18-20 (1) 20-22 (2) 22-23 (1)	12-14 (1) 17-20 (1) 20-23 (2) 23-01 (1)	00-11 (1) 11-13 (2) 13-14 (1) 07-12 (1)*
Central USA	20-23 (1)	18-20 (1) 20-23 (2) 23-00 (1)	13-15 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (2) 01-02 (1)	01-12 (1) 12-14 (2) 14-15 (1) 07-13 (1)*
Western USA	21-23 (1)	19-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	17-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-02 (2) 02-03 (1)	00-01 (1) 01-02 (2) 02-03 (3) 03-14 (2) 14-16 (3) 16-17 (1) 04-09 (1)* 09-12 (2)* 12-14 (1)*

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances use the preceding Short-Skip Propagation Chart.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in () after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate standard time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to standard time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

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Time EST	Time UTC	Meter Band	Areas to Which Openings are Expected
7-10 PM	00-03	20	Southern Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America, Antarctica
10 PM-1 AM	02-06	40, 80, 160	Europe, Africa, Central & South America
1-4 AM	08-10	40, 80	Europe, Central & South America, South Pacific, New Zealand, Australasia
4-7 AM	10-12	40, 80, 160	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central America
7-10 AM	12-15	20	Europe, Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central & South America
10 AM-2 PM	15-19	10, 15, 20	Europe, Africa, Central & South America
2-4 PM	19-21	15	Africa, Central & South America, South Pacific, New Zealand, Australasia, Antarctica
4-7 PM	21-00	15	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America

Table 1- A sample all-band operating schedule for Eastern QTH derived from DX Propagation Charts appearing in last month's column. Similar schedules can be derived for individual bands and time spans.

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PM in the MST and PST zones, and to as late as 5 PM in the the CST and EST zones. In the EST and CST zones, check also for long-path openings to Australasia between 3 and 5 PM, and look for short-path openings to Australasia from the PST and MST zones between 4 PM and sunset. Expect strong signal openings to all of Latin America from about 4 PM onward.

Forty meters should begin to open towards Europe and to the Caribbean, Central America, and the northern countries of South America about an hour or so before sunset in all time zones, but signals will be weakish. **Sunset to Midnight:** Twenty meters is expected to hang in for an hour or so after sunset to parts of Africa from the EST and CST zones.

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In the PST zone check for long-path openings to Europe and Africa on 20 meters beginning at about 10 PM. The band looks good to most of Latin America to about 8 PM, and to Antarctica and the deep areas of South America almost to midnight. Twenty meters should remain open to the South Pacific to midnight, and to the Far East and Asia until 10 PM in all time zones, but openings favor MST and PST locations. Expect some fairly good openings on 40 meters to Europe and parts of Africa throughout this entire time period, and to most of Latin America as well. In the PST zone check 40 meters for openings towards the South Pacific beginning at about 10 PM. Eighty meters should open towards Europe, Africa, the Caribbean, Central America, and the northern countries of South America during most of this time period. Check for possible 160 meter openings toward the Caribbean area and Central America, and possibly into northern South America, between 10 PM and midnight in all time zones. Openings may also be possible on 160 from the EST zone to Europe between 10 PM and midnight.

Remember that the contest period starts at 7 PM EST, Friday night, November 25, so be sure to use the sunset to midnight forecast to get started.

CW Contest Work Plan

Table I is a sample work chart for the CW contest section. It was devised from the DX Propagation Charts which appeared in last month's column. This particular example is for multi-band operation in the EST zone. Similar work charts can be devised for other bands, for other operating conditions, and for other time zones.

Short-Skip Charts

This month's column contains Short-Skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Alaska and Hawaii and the continental area of the USA. Instructions for using this information are given in this column.

VHF Ionospheric Openings

Two short but significant meteor showers are expected during November, which should make possible some meteor-scatter-type openings on the VHF bands. The *Taurids* shower, occurring during the first week of November, should peak between the 2nd and 4th, with a count of about 15 meteors an hour. A second shower of about the same intensity, called the *Leonids*, should begin on November 14th and peak on the 15th.

Some auroral VHF ionospheric openings should be possible during November, especially when HF conditions are Below Normal or Disturbed as a result of a radio storm. Check the Last-Minute Forecast at the beginning of this column for the days during November that are most likely to be in these categories.

Despite low sunspot activity, this still can be a good contest period. However, it will require more operating skill and patience than during the previous years of higher sunspot count.

Good luck on the CQ WW DX CW Contest weekend. Be sure to let me know how these special contest propagation forecasts work out. For the past 46 years the contest forecasts have held up with an accuracy better than 90%.

73, George, W3ASK

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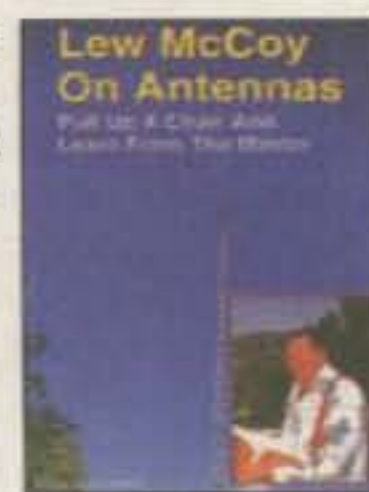


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ANNOUNCEMENTS

(from page 6)

Nov. 9, **19th Annual Montgomery Hamfest & Computer Show**; Garrett Coliseum, South Alabama State Fairgrounds, Montgomery, Alabama. Contact Hamfest Committee, c/o 2141 Edinburgh Drive, Montgomery, AL 36116-1313; or phone Phil at 334-272-7980 (after 5 PM); fax 334-365-0558; or e-mail <WB4OZN@worldnet.att.net>. (Exams.)

Nov. 9, **The Grand Strand ARC Hamfest**, Myrtle Beach High School, Myrtle Beach, South Carolina. Call Matt McGuire, KF4AIT, 803-215-0474; or David Berry, KE4OOW, 803-248-9401.

Nov. 10, **9th Annual Tri-State Hamfest & Computer Fair**, Chartiers-Houston High School, Washington, Pennsylvania. Call Ted Lockman, WB3BZK, 412-222-6473; Bill Hill, W3IBT, 412-746-5944, fax 412-746-4374; or write to W.A.COM, P.O. Box 1386, Washington, PA 15301. (Exams.)

Nov. 10, **SouthCentral Connecticut ARA 17th Annual Fleamarket**, Branford Intermediate School, Branford, Connecticut. Send SASE to SCARA, P.O. Box 705, Branford, CT 06405-0705, or call 203-483-0856. (Handicapped accessible; exams.)

Nov. 16, **10th Annual Hamfest**, Oconee County Civic Center, Watkinsville, Georgia. Call 1-800-959-8273; or e-mail George Kelley, WB4VNT at <wb4vnt@mindspring.com>.

Nov. 16-17, **The Fort Wayne Hamfest & Computer Expo**, Allen County War Memorial Coliseum, Fort Wayne, Indiana. Call Don Gagnon, WB8HQS, 219-484-1314; send an SASE to ACARTS, P.O. Box 10342, Fort Wayne, IN 46851; or visit the ACARTS www site at <<http://pwp.usa.pipeline.com/~dagagnon/>>. (Exams.)

Nov. 17, **JARSFEST96**, American Legion Complex, Benson, North Carolina. Contact Bill Lambert, AK4H, 8917 NC 50 N., Benson, NC 27504 (919-894-3352 eves. 7-10 PM). (Exams.)

Nov. 22, **Fair Lawn ARC Annual Auction**, Fair Lawn Cultural Center, Fair Lawn, New Jersey. For more information, call 201-791-3841; or e-mail <asavio@venus.hili.com>.

Nov. 22-23, **West Jackson County ARC Hamfest/Swapfest**, Latimer Community Center, Ocean Springs, Mississippi. Contact C.F. Kimmerly, N5XGI, 601-826-5811; or Mike Gurley, KC5QXE, 601-475-6161 (after 5 PM).

Nov. 23-24, **21st Annual Suncoast Amateur Radio & Computer Convention**, Florida State Fairgrounds, Tampa, Florida. Call Jean at 813-525-5178 (leave evening phone number if you get machine); or write to her at 1556 56th Ave. N., St. Petersburg, FL 33703. (Exams.)

Nov. 30, **4th E.A.R.S. Evansville Winter Hamfest**, Vanderburgh County Fairgrounds, Evansville, Indiana. Call Neil, WB9VPG, at 812-479-5741, or write to E.A.R.S., 1506 S. Parker Dr., Evansville, IN 47714; or e-mail <earsham@aol.com>.

Nov. 30, **Newtonville Amateur Radio & Electronics Auction**, Newton Masonic Hall, Newtonville, Massachusetts. Contact Eliot Mayer, W1MJ, phone 508-664-0773, <w1mj@amsat.org>. Or auction web page <<http://ourworld.compu serve.com/homepages/emayer/auction.htm>>.

Nov. 30, **Central Illinois/St. Louis Area Amateur Television Club 10th Annual Banquet**, Ariston Restaurant, Litchfield, Illinois. Contact Scott Millick, K9SM, 907 Big Four Ave., Hillsboro, IL 62049; phone 217-532-3837; or e-mail <smillick@cnmnet.com>. Reservations required.

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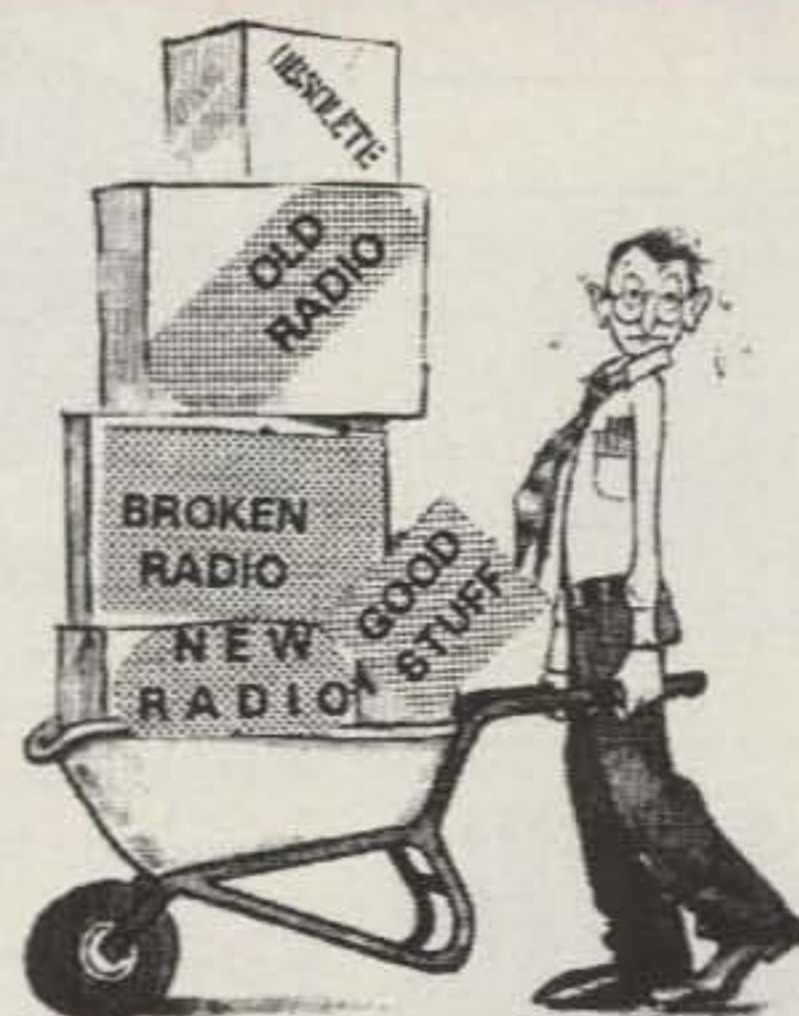
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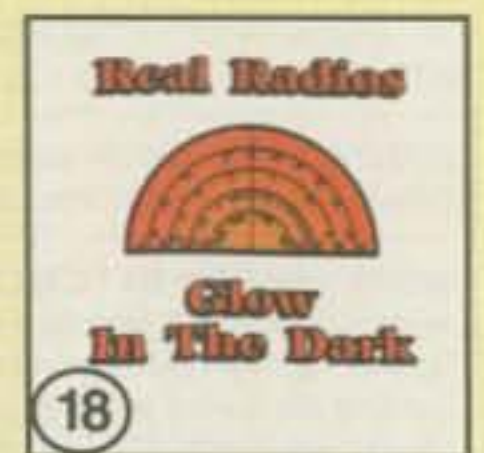
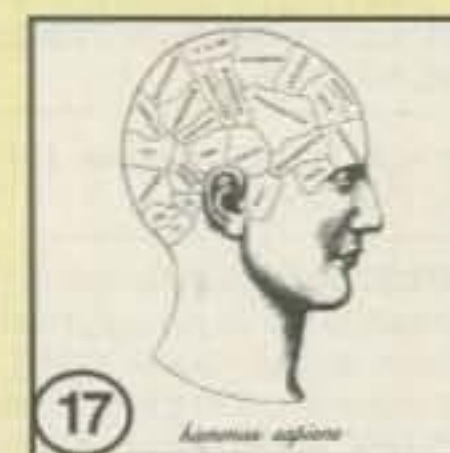


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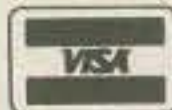
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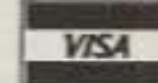
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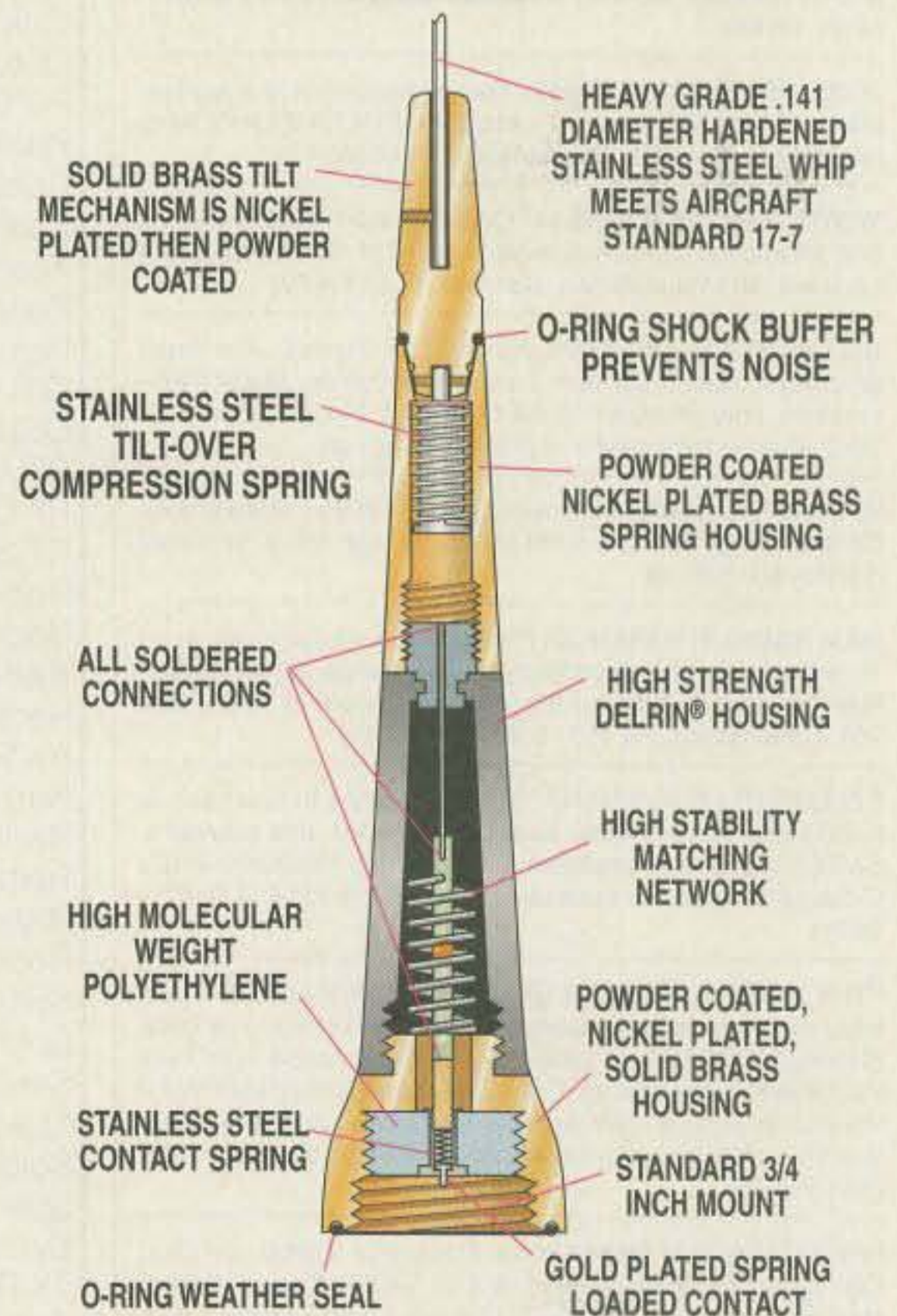
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