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ON THE COVER: Ron, ZL1AMO makes some adjustments to Harry, ZK2AE's beam on Niue. They're all part of an upcoming article for *CQ*.

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Zero Bias

AN EDITORIAL

Every year it gets harder and harder to think of the best adjectives to describe the Dayton weekend. Having just returned from the Hamvention, I have to say that this one was without a doubt the biggest and best ever. I thought it was going to be difficult to beat the enthusiasm and spending habits of the 1980 Hamvention, but this year was considerably better for everyone. Everyone—and I mean everyone— was in a buying mood and anxious to make deals. I didn't get the total number of people who attended this year, but needless to say it was wall-to-wall people for three solid days.

I was told that the flea market this year was three acres larger than last year, and like the post office, neither cold weather nor rain kept them away. I'm sorry to say that I only got glimpses of the flea market this year and couldn't get away long enough to walk through. The several exhibit areas were so packed that it was hard for me to take it all in in the available time even to just say hello to all of our advertisers. It's really a very catching spirit, a contagious high for amateur radio and all the positive aspects we like to think of when describing amateur radio to a newcomer.

One of the most positive and resounding topics of the day was my May editorial. It was almost embarrassing to hear most people agree with the sentiment. In all fairness, I have to say that Wayne was in attendance at the Hamvention and did speak at one of the many forums. He did stop by the *CQ* booth on his rounds, and we chatted for a while and even shook hands.

One of the shows we will be at in May (as this is written in late April) is Birmingham. In June we'll be at Dallas and Atlanta, and the balance of the year is blocked in with many other conventions and hamfests which will have us meandering our way through most of the country. Don't hesitate to stop by the *CQ* booth to say hello at any of these events.

The one event that I won't be able to get to this year is the local LIMARC Hamfair in May. It works out to be the same weekend as Birmingham. The Hamfair is a giant flea market where I usually go to try to clear out my everfilling basement of electronic goodies and treasures circa 1950's and 60's. It's also been a place to exchange some of the goodies I've picked up at the many flea markets at Hamfests we attended for other treasures.

Speaking of flea market treasures, have you noticed that more and more sophisticated gear is showing up? Tons of cannibalized 630 hulks have disappeared somewhere along with Globe Kings and just about every single Bandmaster ever made. Components are back in a big way—no not the wax or pyranol capacitors, but the little thingamajigs that come in many colors, and that don't light up, get warm, or move, the things of many numbers that go together to do the great things that bring gasps of admiration from your friends. The parts have changed, the gear has changed, and the total concept has been changing all the while.

The Spectrum . . . She's a Changing Too

Don't look now, but use of the spectrum is evolving in ways that will have a profound effect on the amateur service. Specifically, we are now witnessing the introduction into the h.f./v.h.f./u.h.f. spectrum of wideband (spread-spectrum) communication systems which hold the promise for improved spectrum efficiency (that is, an increase in the number of stations that can occupy a given portion of the spectrum).

In the past, and for the most part, now, users of the h.f./v.h.f./u.h.f. spectrum employ systems characterized by narrow band modulation techniques. These systems operate, for all intents and purposes, on a specific frequency (for any given transmission) in a band which is assigned to a specific communication service (e.g., fixed, maritime mobile, amateur, etc.). In cases in which sharing is possible, one or more services may enjoy a "primary" allocation, with other services relegated to "secondary" status.

Nice and tidy! The stations of any given service can always be found in a band assigned to that service. Thus it has been, *but thus is may not always be!* With the introduction of systems which use spread-spectrum modulation techniques—techniques in which the transmitted signal spectrum is significantly greater than the spectrum of the modulation signal—it is possible to "overlay" the transmissions from a spread-spectrum transmitter on the transmissions from conventional narrowband transmission systems. Furthermore, the overlay process can, if done properly, permit the operation of both types of systems with little or no mutual interference.

To be sure, there is a limit to the number of spread-spectrum systems which can be operated in a band containing conventional narrowband signals. The reason for this is that as more and more spread-spectrum signals are added to a band, the average noise level perceived by users of conventional systems will increase to the point where marginal signals will become unusable.

Just how many spread-spectrum signals can be overlayed in a given band has been the subject of numerous theoretical studies and on-the-air tests. Work on the problem continues today, and amateurs, directly or indirectly, are playing a significant role in some of these studies. For example, a spread-spectrum radiolocation system developed by Del Norte, Inc., is currently operating in the 420–450 MHz band . . . a band used extensively by amateurs for repeater, remote-control, and television applications. Furthermore, the Amateur Radio Research and Development Corporation (AMRAD) recently requested and received a Special Temporary Authorization (STA) from the Commission for the purpose of performing four spread-spectrum experiments in bands assigned to amateurs. A major goal of these experiments is to determine the degree of compatibility which can be achieved between the spread-pectrum modulation techniques to be tested and the narrowband modulation techniques now used in the bands to be occupied. Check the Dateline . . . Washington, D.C. column this month for more details.

While we can't predict with certainty the outcome of the Del Norte and AMRAD experiments, the successful sharing of bands by wideband and narrowband transmission systems used in a number of services suggests that the spectrum of the future may differ radically from that of the present. For users of spread-spectrum systems permitted "bands" will extend over several bands now assigned to specific services. Furthermore, the wideband systems will occupy ranges in frequencies which may or may not be continuous. In the h.f. band, for example, a wideband system employing frequency-hopping techniques could skip around frequencies in several bands, each of which could be in a different portion of the spectrum.

What's the bottom line? Just this . . . our notion of what constitutes frequency (band) allocations is changing. Today we already are sharing our bands with spread-spectrum systems used by other systems. Tomorrow amateurs using spread-spectrum systems may enjoy the use of bands not now allocated to our service. Such is the reward for progress.

As we said . . . like everything else, the spectrum is a changing! And what we see today is only the beginning!

73, Alan, K2EEK

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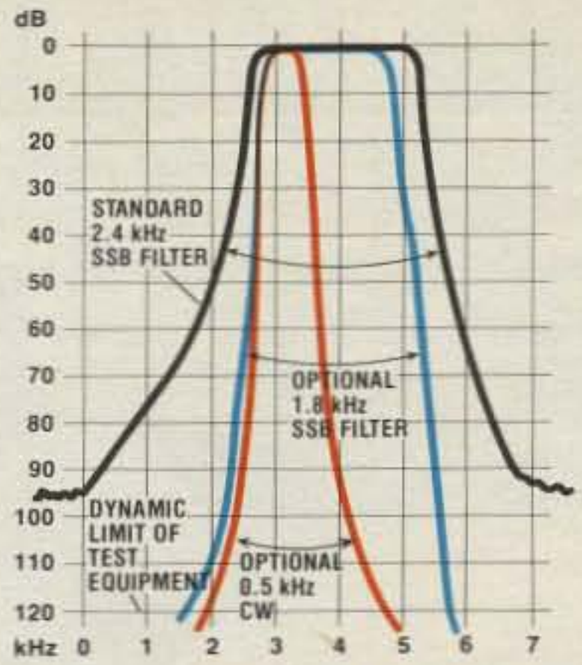

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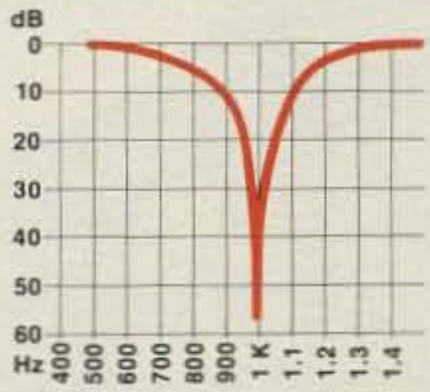

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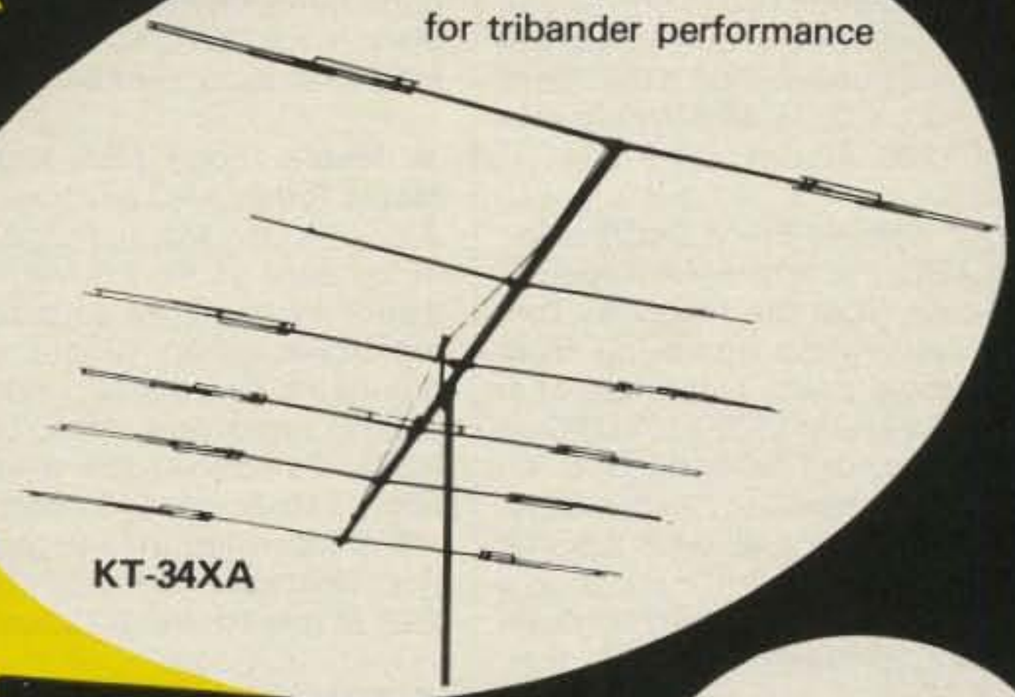

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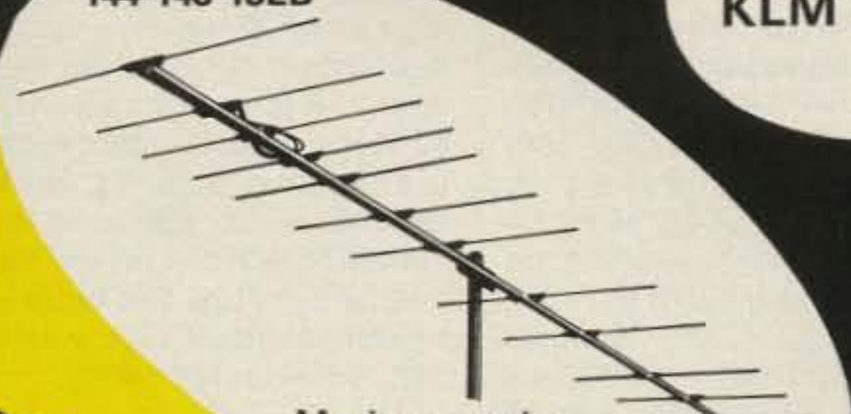

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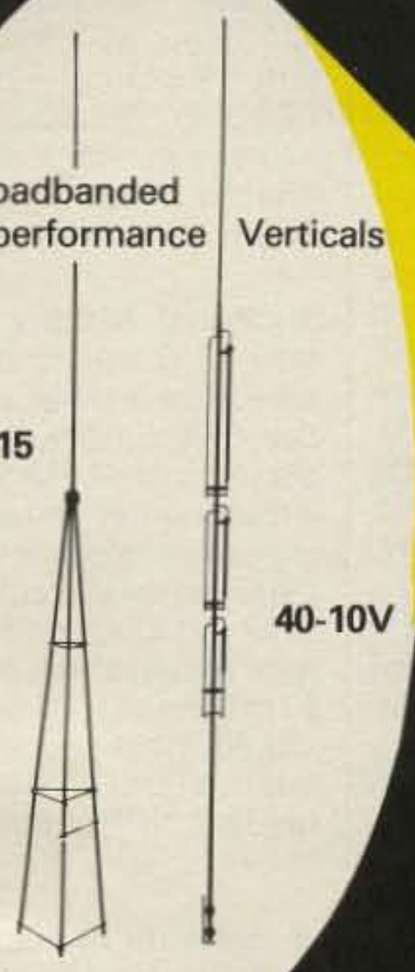

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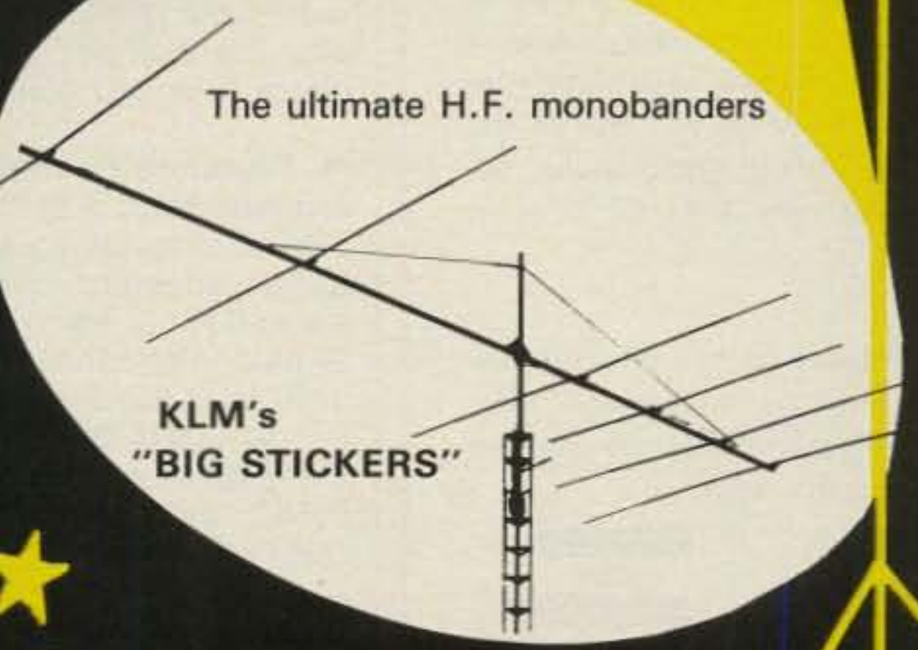

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● **Tom Sawyer Special Event Certificate** - The Hannibal ARC, Inc. will issue a special Events certificate from the National Tom Sawyer Days celebration operating from Mark Twain's home town, Hannibal, Missouri, on July 4-5. Hours: 1500-2100 UTC on Saturday, July 4 and 1700-2100 UTC on Sunday, July 5. Frequencies: 7.245, 14.290, 21.390 MHz and Novice c.w. on 7.125 and 21.125 MHz. To receive a certificate send a 9 × 12 s.a.s.e. and your QSL card confirming the contact to Hannibal ARC, Inc., W0KEM, 2108 Orchard Ave., Hannibal, MO 63401.

● **WD8RVZ to Operate from the Neil Armstrong Air and Space Museum** - Commemorating the 12th anniversary of the Neil Armstrong feat, WD8RVZ will operate from the museum from 9 a.m. July 18 to 8 p.m. July 19. Two stations will be operating on the following frequencies, depending on propagation: 40 meter c.w.—7.075 to 7.125; 40 meter phone—7.250 to 7.300; 75 meter phone—3.950 to 4.000; 20 meter c.w.—14.1 ± 10 kHz; 20 meter phone—14.300 to 14.350; 15 meter phone—21.400 to 21.450. A commemorative QSL will be available, s.a.s.e. required. U.S. and Canadian amateurs QSL directly to WD8RVZ; all others use the bureau. Visiting amateurs may check in on 147.93/33.

● **Shawano Centennial Exposition** - The Franklin Middle School Radio Club, along with Shawano area amateurs, will be operating a special event station from the Shawano County Fairgrounds on July 25 and 26 using the call WA9BZW. Times are from 1800 UTC Saturday, July 25 to 1700 UTC, Sunday, July 26 on the following frequencies plus or minus QRM: 3980, 7280, 14280, 21580, and 28580, as well as 146.52. Send QSL, an s.a.s.e., and 25¢ for a certificate to Al Hovey, Jr., WA9BZW, 314 Fairview Way, Shawano, WI 54166.

● **Three Rivers Festival Special Event Station** - The Fort Wayne, Indiana, Radio Club will have on the air on July 18 and 19 a special event station to celebrate the annual Three Rivers Festival. There will be two operating stations on the air simultaneously using the following calls: W9TE and W9INX. At this writing the bands will be 10, 15, and 20 meters. A special certificate will be issued; send a QSL and an s.a.s.e. to Fort Wayne Radio Club, P.O. Box 15127, Fort Wayne, IN 46885.

● **Centennial Celebration Special Event Station** - In observance of Glendive, Montana's Centennial, the Lower Yellowstone ARC will be operating a special event station on July 4. Operating period will be from 1600Z to 2300Z on 7240 and 14280-290. Exchange will be name and signal report. Send business-size s.a.s.e. to Larry Melton, KB7BO, 711 Snyder Ave., Glendive, MT 59330 for a commemorative QSL.

● **Maple Ridge ARC Hamfest '81** - The Maple Ridge ARC will host Hamfest '81 on July 4-5 at the Maple Ridge Fairgrounds, 30 miles east of Vancouver, Canada. Registration is: hams, $4.50; program with drawing ticket, $2.50; dinner and dance, $10; non-hams over 12, $2; under 12 free. Food, prizes, swap and shop, bunny hunt, and more. Camper space available (no hookups). Talk-in on 146.34/94, 146.19/79. For more information and advance registration, contact Bob Haughton, VE7BZH, Box 292, Maple Ridge, B.C. Canada V2X 7G2.

● **Batavia Hamfest** - The Genesee Radio Amateurs, Inc. will present their first annual ARRL approved Batavia Hamfest at Alexander Fireman's Grounds, Route 98, Alexander, NY on Sunday, July 12 from 7 a.m. to 6 p.m. Admission is $2 in advance, $3 at the gate; flea market $1. Prizes, exhibit area, programs, YL activities, contests, refreshments, camping space available. Talk-in to W2RCX on 146.04/64, 144.71/5.31, and 52 simplex. For more information and tickets, send an s.a.s.e. to GRAM, Inc., Box 572, Batavia, NY 14020.

● **South Milwaukee ARC Swapfest** - The South Milwaukee ARC, Inc. will hold its annual Swapfest on Saturday, July 11, at the American Legion Post #434, 9327 S. Shepard Ave., Oak Creek, Wisconsin. Activities will begin at 7:30 a.m. and run until 5:00 p.m. Parking, refreshments, overnight camping. Admission is $2. Talk-in on 146.94 f.m. For more information, contact The South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172.

● **Mount Nittany Hamfestival** - The Nittany ARC will hold its annual Mount Nittany Hamfestival on Saturday, July 11 at the HRB-Singer, Inc. picnic grounds at State College, Pennsylvania. There will be a flea market and auction, dealer displays and sales, door prizes, refreshments, and more. Advance registration and admission is $2 (no charge for spouse and children), gate registration, $3. Flea market space is $3 in advance, $5 on-site. Talk-in on .16/.76, .25/.85, local directions on .52/.52. For more information, contact Mount Nittany Hamfestival, NARC, Box 614, State College, PA 16801.

● **Seventh Annual Ontario Hamfest** - The Burlington ARC will hold its Seventh Annual Ontario Hamfest on July 11, 12, 13 at the Milton Fairgrounds in Burlington. General admission is $3; preregistration before

June 15 is $2. Tables free, camping, refreshments, prizes. Talk-in on 147.81/21. For more information, contact B.A.R.C., Box 836, Burlington, Ontario, Canada L7R 3Y7.

● **Broadcasters' ARC Hamfest** - The Broadcasters' ARC will conduct its fourth annual hamfest on July 12 from 9 a.m. to 4 p.m. at Pocono Downs Race Track. Unlimited outdoor and indoor space, refreshments, prizes, free FM clinic and a.c. power available. Admission is $3, XYL's and children free. Gates open at 8 a.m. for setup. Talk-in on 147.66/.06 and 146.52 simplex. For more information, contact Charles Baltimore, WA3NUT, B.A.R.C., 62 S. Franklin St., Wilkes-Barre, PA 18773.

● **Indianapolis Amateur Radio State Convention and Hamfest** - The Indianapolis AR State Convention and Hamfest will be held Sunday, July 12, at the Marion County Fairgrounds. For more information, write to Indianapolis Amateur Radio Association, Box 11086, Indianapolis, IN 46201.

● **Glacier-Waterton International Hamfest** - The Great Falls Area Amateur Radio Club is sponsoring the Glacier-Waterton International Hamfest, which will be held July 17, 18, and 19 at Three Forks Campground, located between East and West Glacier on Highway 2. There will be forums, technical presentations, exhibits and demonstrations, and more. Preregistration is $6; $7 after July 7. Campsites are available. For more information, contact Glacier-Waterton Hamfest, Shirley Smith, Secretary, 1822 14th Ave. S., Great Falls, MT 59405.

● **Straits Area ARC Hamfest** - The Straits Area Amateur Radio Club will hold its annual hamfest on July 18 at the Harbor Springs High School in Harbor Springs, Michigan. Doors open at 9 a.m.; donations of $2 will be accepted at the door. Dealer tables, refreshments, prizes. Talk-in on .52/.52 and 146.07/.67. For more information, contact Bernie Slotnick, KB8RE, 630 Ann St., Harbor Springs, MI 49740.

● **Breakfast Club Hamfest and Picnic** - This 24th annual event will be held on Saturday and Sunday, July 18 and 19 at Terry Park, Palmyra, Illinois. Flea market, games, food, music, prizes. Talk-in on 52 simplex and 3973 MHz. For more information, contact Quad-Co Radio Club members WA9ARY, K9CIL, K9UCC, or W9KIC.

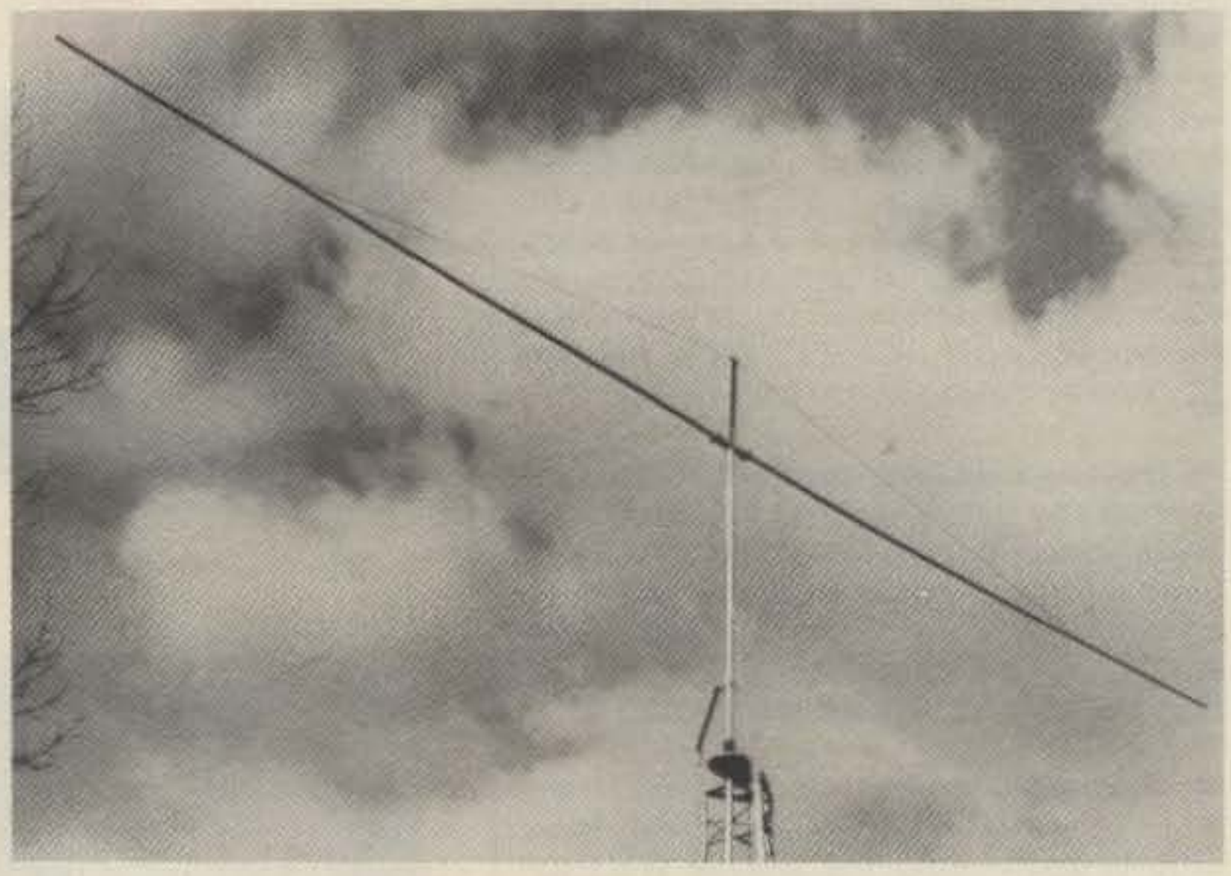
● **Eighth Annual Charleston Hamfest** - The Charleston Amateur Radio Society, Inc. is sponsoring the Eighth Annual Charleston Hamfest on July 18-19 at the Omar Shrine Temple in Charleston, South Carolina. For more information, contact Charleston Hamfest Committee, P.O. Box 30643, Charleston, SC 29407.

● **Wood County Ham-A-Rama** - The 17th annual Wood County Ham-A-Rama will be held July 19 at the Bowling Green Fairgrounds, Bowling Green, Ohio. Gates open at 10 a.m. with free admission. Trunk-sale space and refreshments available. K8TIH talk-in on 52. Tickets $1.50 in advance, $2

(Continued on page 110)

It's really a low profile antenna that will make the curious even more so as you work out on 5 bands.

The HR-5 5 band antenna atop the tower.



THE HR-5 5 BAND ANTENNA

A Rotary Element for 14, 18, 21, 24, 28 MHz

BY JOHN P. TYSKEWICZ*, W1HXU

Before the time of radio frequency coaxial cable, the general method of transferring power from the transmitter to an antenna was by direct feed or a single wire. A special requirement created the unique two-wire-fed "Zepp" antenna for the wireless sets aboard those super dirigibles of the Count Ferdinand von Zepplin class.

The typical amateur station used a simple tuner with the Zepp feeders end feeding a half-wave-long "flattop." To minimize undesired radiation from the feedline, certain specific feeder and radiator wire length combinations are necessary for a particular resonant frequency. Operational theory can be found in various handbooks.

Connecting the two-wire feeder at the center of the flattop forms a symmetrical or balanced system and wire dimensional tolerance is practically eliminated. One can actually construct such an antenna using a measuring stick calibrated in cubits or "hands high" and it will perform over a multitude of bands with some power gain, depending on the number of acquired half waves.

Then the elite appeared with their rotary two element h.f. beams using an open-wire feedline. This created a mechanical problem that was overcome by various home-brew rope-pulley-counter-weight schemes to keep line clear of the tower during the rotation cycle. The better ones used slip-rings, and the famous 20 meter *Mim's Signal Squirter* had inductive coupling at the driven element.

The installation photo shows our rotary 20 meter dipole adapted with a low-loss open-wire feedline. The antenna can operate on *any* frequency from 14 MHz through 29.7 MHz, including the new 12 and 16.5 meter bands as they become available.

This basic h.f. antenna at a modest height of 33 feet does a credible job because it can function as a plain beam by taking advantage of the figure 8 radiation pattern. On 20 meters it is a half-wave dipole one-half wave high, and on the 12, 15, and 16.5 meter bands, it's an extended half-wave element. For 10 meters it tunes up as two half waves in phase. The antenna is bi-directional with pro and con features. This neatly solves the open-wire feedline problem, as 180 degrees of antenna rotation will cover all points, while 90 degrees of rotation will encompass 270 degrees.

Construction

The antenna element is of the hybrid variety, consisting of an iron fixture or spider, a few sticks of wood, two short lengths of aluminum tubing and copper wire, one insulator, and some miscellaneous hardware. Fig. 1 shows the essential dimensions and construction detail. The non-conductor spreaders can be made from wood, fiberglass, or bamboo poles. I used a set of 8-year-old bamboo spreaders left over from other experiments. The excellent service life is due to a protective outer spiral wrapping of PVC electrical tape. Another effective wrapping material is paper masking tape, followed with a coat of outdoor-grade non-metallic base paint.

The aluminum tube extension is joined to the bamboo with a hardwood dowel insert 12" long and ⅝" in diameter. The dowel is pushed 8" into the aluminum tube, and if necessary, shim it's diameter with tape for a snug fit. Before shaping the bamboo side of the dowel, reinforce the open end of the bamboo with a wrapping of kite string or light gauge wire and coat it with model cement. If the bamboo growth joint is considerably less than 4" from the end, saw off some bamboo for a fresh start and use a longer dowel. Drill a small vent hole through the bamboo wall 4" from the open end. Swab the interior section with a two-part epoxy mix, coat the dowel, and insert into bamboo. Without the vent or bleeder hole and proper tolerance fit, the compression effect makes it difficult to insert and keep dowel in place.

The aluminum tube is fixed to the dowel with a wood or sheet metal screw and a galvanized iron sheet metal clamp to which the antenna wire is attached by a wrapped and soldered connection. A prior coating of anti-corrosion compound should be applied to the clamp and tube area.

Fig. 2 shows the spider, assembled by welding three pieces of ⅛" flat stock to the angle iron spreader holder. The top end of a thin wall rotating mast should be plugged or an internal

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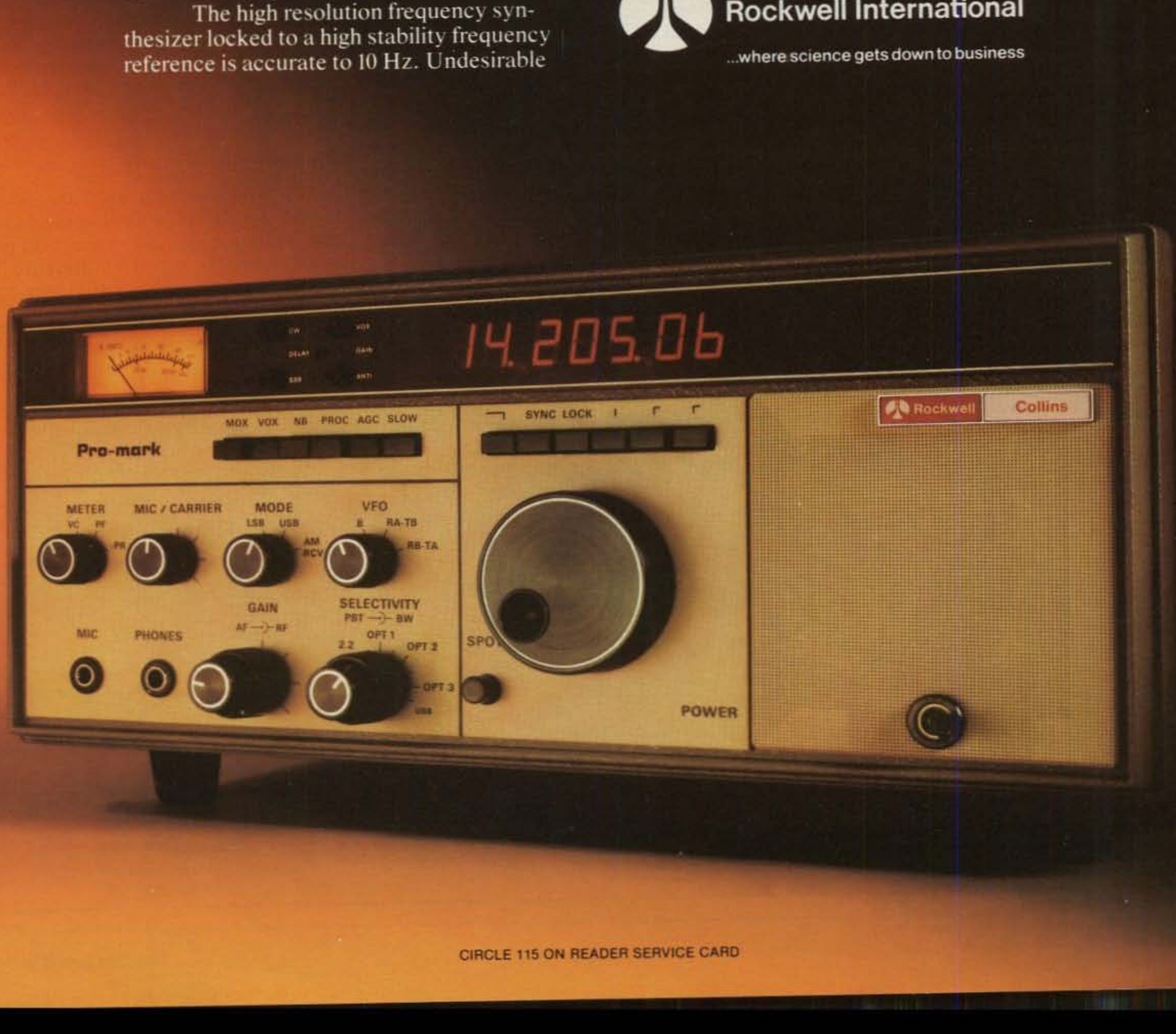

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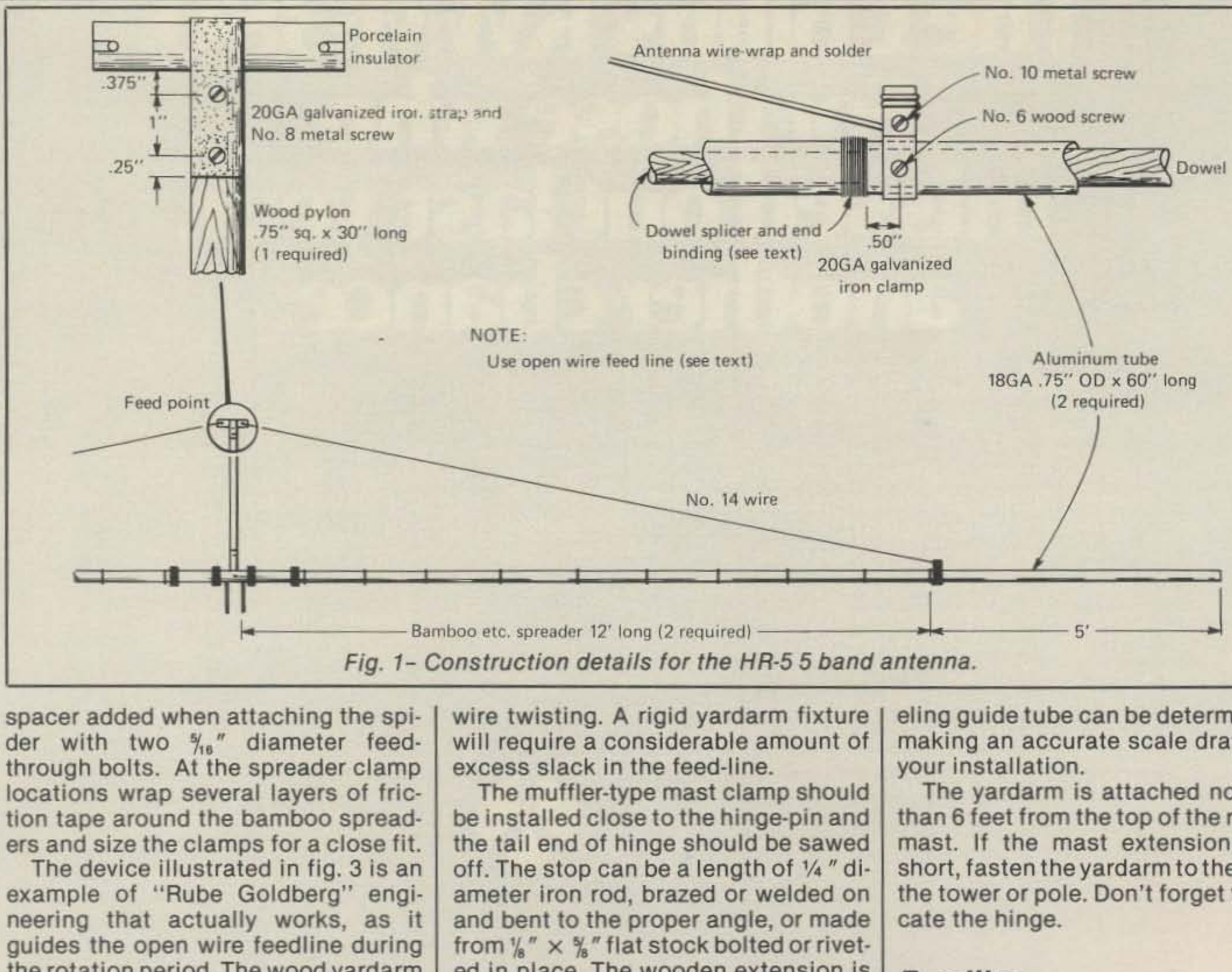


Fig. 1– Construction details for the HR-5 5 band antenna.

spacer added when attaching the spider with two 5/16" diameter feed-through bolts. At the spreader clamp locations wrap several layers of friction tape around the bamboo spreaders and size the clamps for a close fit.

The device illustrated in fig. 3 is an example of "Rube Goldberg" engineering that actually works, as it guides the open wire feedline during the rotation period. The wood yardarm is attached to an iron strap-hinge equipped with stops that limit the swing to 90 degrees, while the antenna sweeps by 180 degrees. At the opposite end, the feedline passes through a pivoting PVC tube to prevent undue wire twisting. A rigid yardarm fixture will require a considerable amount of excess slack in the feed-line.

The muffler-type mast clamp should be installed close to the hinge-pin and the tail end of hinge should be sawed off. The stop can be a length of 1/4" diameter iron rod, brazed or welded on and bent to the proper angle, or made from 1/8" × 5/8" flat stock bolted or riveted in place. The wooden extension is fastened with two No. 10 MS using the existing holes in the hinge.

The PVC tube ends are machined with a steep inner bevel, so the feedline with it's separators will slip through freely. The angle for the swiveling guide tube can be determined by making an accurate scale drawing of your installation.

The yardarm is attached no closer than 6 feet from the top of the rotating mast. If the mast extension is too short, fasten the yardarm to the side of the tower or pole. Don't forget to lubricate the hinge.

Feedline

The feedline is a commercial 450 ohm TV-type low-loss line made with No. 18 wire spaced 1" apart on polystyrene separators at 6" intervals. The plastic separators were just tacked on

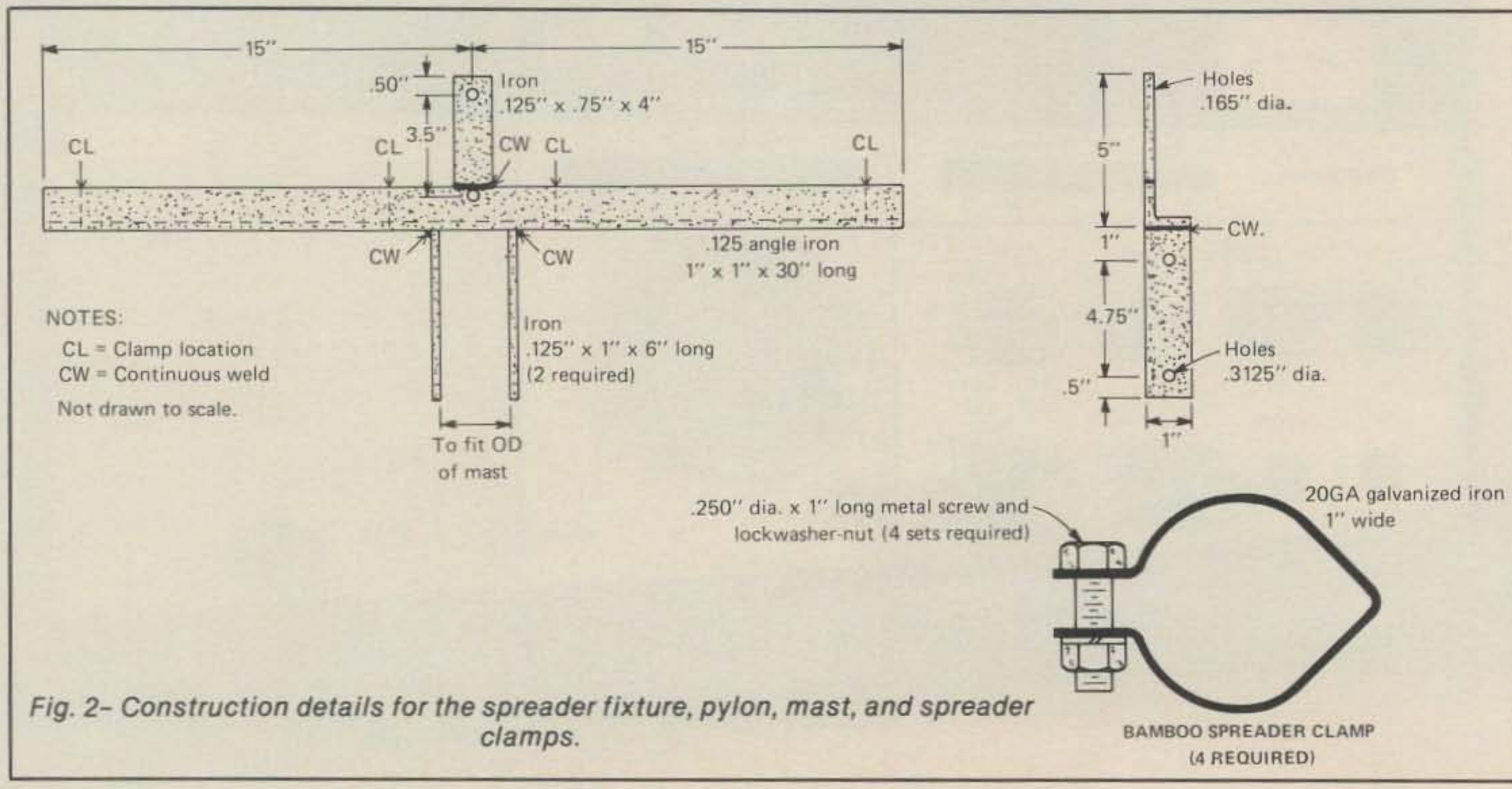


Fig. 2– Construction details for the spreader fixture, pylon, mast, and spreader clamps.

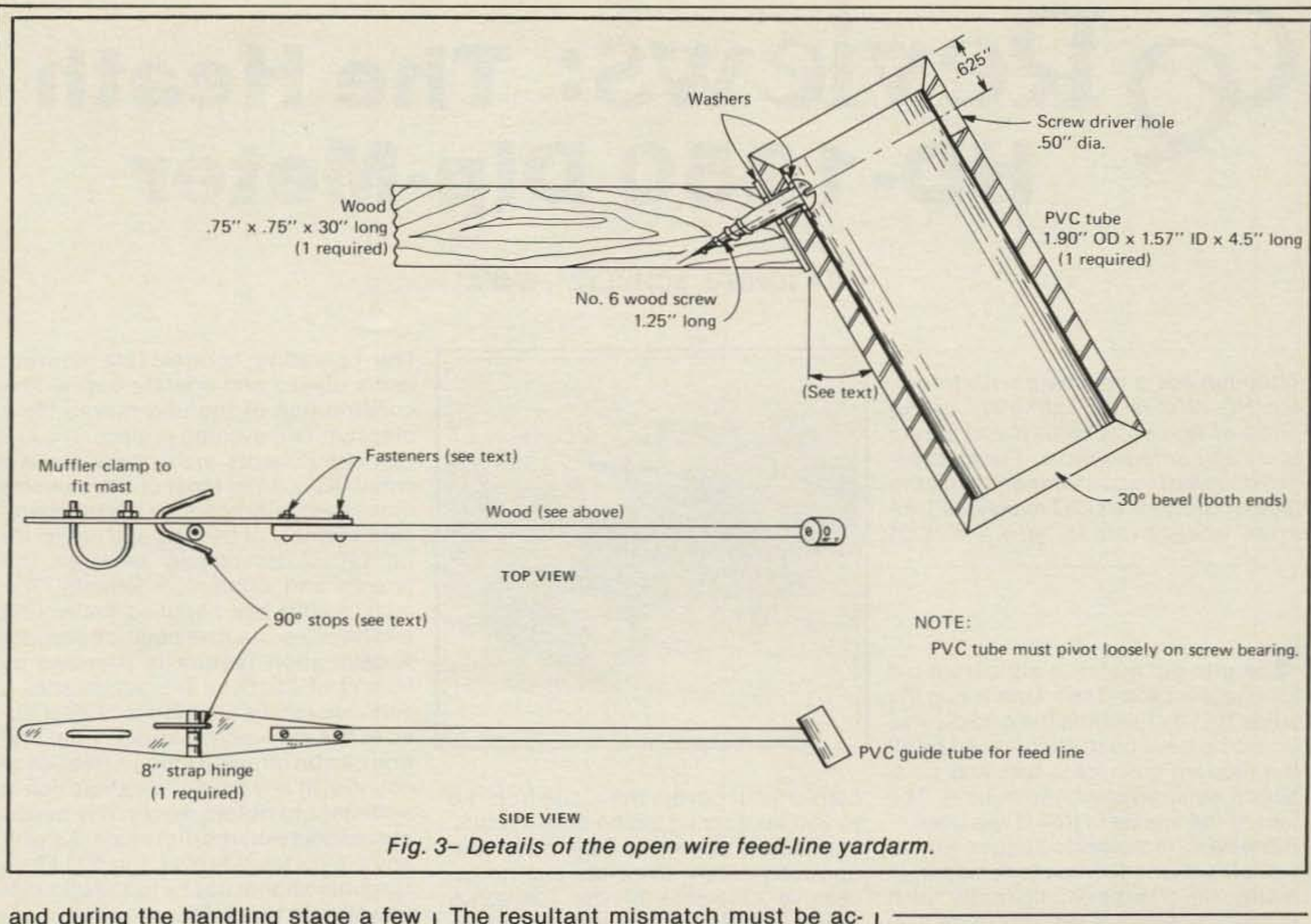


Fig. 3– Details of the open wire feed-line yardarm.

and during the handling stage a few broke off. All work was halted and the feedline mechanical deficiency corrected to forestall any trouble during the blizzard season.

A 100 watt soldering iron is pressed to one wire adjacent to the plastic separator, and thermal conductivity will soften the plastic. Let the wire sink half way into the separator; then with one wipe of iron, smooth off to seal the wire groove and quench immediately with a water-soaked rag. Repeat this operation until all required separators are reworked. This "nit picking" job could be subcontracted to the cheapest help in the household, but I wouldn't count on it.

Remove three spare separators from the lower end of the line for two additional modifications. Weld into place one separator in parallel with the top or first one, where the feed wire fans out and is soldered to the antenna wire. Add two separators to form 3" spacing near and in the line that passes through the guide tube to preserve the wire spacing at this critical place.

Tune-Up

Because of the extremely wide frequency range on which this system will operate, there is no fixed feeder length which will function as being either a voltage- or current-fed line. The resultant mismatch must be accommodated by a tunable network, usually referred to as an antenna tuner, coupler, Z match, or transmatch.

Most r.f. equipment is designed around and interconnected with 50 ohm coaxial cable, including the unbalanced type of transmatch. The revived interest and advantages of an open wire feedline prompted the addition of a step-up 1:4 balun for these tuners.

Various types of Hi-Z matching networks can be found in any antenna handbook. Initial bandswitch or roller coil and tuning capacitor dial settings can be found by using the receive mode to determine resonance or loading, thereby postponing any unnecessary "on the air" testing and sparing the expensive transistors and amplifier.

Conclusion

The feedline here turned out to be 56 feet long and "in the clear." By connecting the feedline wires together at the tuner and with the HR-5 performing as a "top-hat," the system becomes a voltage-fed half-wave 40 meter band Hertz. Adding a counterpoise or ground wire converts it to a current-fed quarter-wave Marconi for 80 meters.

You know, this rings a bell; let's start from the beginning.

CQ Reviews: The Heath HD-1250 Dip-Meter

BY JOHN J. SCHULTZ*, W4FA

Although not a new item with Heath, the HD-1250 is an extremely useful piece of test equipment if you intend to do any antenna work. For this reason coupled (no pun intended) with the regular uses for a GDO makes us take a new look at an old standby. —K2EEK

The grid-dip meter is almost as old as amateur radio itself. One would imagine that by this time the grid-dip meter would have been obsolesced by all the modern electronic test and measuring equipment on the market. The fact of the matter is that it has been—if one has the money to acquire a lot of equipment and the space to use it. In reality, the grid-dip or "dip-meter" as it is called nowadays remains quite useful as sort of a poor man's 5-things-rolled-into-one type of test instrument.

One of the few dip-meters on the market especially in its price range is the Heath HD-1250. It is quite an improvement over the former Heath Tunnel-Dipper which, to put it quaintly, one had to practically tunnel into the middle of a tuned circuit to get any useful dip indication (the tunnel in the name referred to the tunnel diode circuitry used). Nonetheless, the Tunnel-Dipper was one of the first solid-state dip-meters and is fully portable. This article presents a review of the Heath HD-1250 and details a number of small improvements which have been found quite useful in practical usage of the instrument.

Theory

The circuit of the HD-1250 is shown in fig. 1. Only two transistors are used —a bipolar u.h.f. type as the oscillator and a dual-gate FET as a broad band r.f. amplifier. The oscillator section is conventional in that it is a Colpitts arrangement with plug-in coils used for the various frequency ranges and tuning is done by a variable split-stator

capacitor. It covers the range from 1.6 to 250 MHz using seven plug-in coils. The ranges appear to have been split up pretty nicely since there is no excessive crowding of the frequency readout on the various ranges as they appear on the dial scale. The oscillator actually has a dual function. It functions conventionally as an oscillator when the dip-meter is used as a test generator or to check the resonance of passive tuned circuits. However, when the dip-meter is used as an absorption type frequency meter, the circuit functions as a Q multiplier. This helps to get somewhat sharper resonance indications on the dip-meter.

The FET broad-band r.f. amplifier stage amplifies changes in impedance in the oscillator's stage tuned circuit when the oscillator is active and the dip-meter is coupled to an external tuned circuit. The output of the amplifier stage is rectified and the resultant d.c. used to drive the 150 μa meter. When the dip-meter is used as an r.f. detection device, the stage functions as a tuned r.f. amplifier with its output being rectified and used to drive the meter. The circuits are powered by any conventional 9 V transistor radio battery. Heath certainly managed to get a lot of versatile circuit performance out of only two stages!

Construction

The dip-meter is housed in a handy enclosure measuring 6″ × 2½″ × 2″ and fits easily in the palm of a hand. The operating controls are conveniently placed and operate easily. The construction of the unit makes for a pleasant two evening project. The circuit components are housed on two small PC boards. Most of the building time is actually spent on the mechanical assembly of the unit and on the little bit of interwiring between the boards and other components. The plug-in coils are supplied pre-wound and have a protective plastic covering. A calibration feature is provided by means of C21C on the schematic. A self-calibrating procedure is described in the assembly manual or calibration can be effected using a frequency counter. In any case, the calibration is sufficient to obtain reasonably accurate readouts on the dial scale. As with any dip-meter, however, the dial scale readings should not be relied upon for any critical test work.

There is one interesting little step during construction where one is instructed to take a 1″ length of wire and form a 1 turn loop of 1/16″ diameter in the middle. The author thought for sure this was going to be some sort of v.h.f. type r.f. choke arrangement and so great care was taken to get the 1/16″ diameter correct. It turned out rather amusingly a number of instructions later on to find out that the wire was bent up in the middle and the loop simply soldered to a meter lug!

There are two minor elements in the construction that the author felt should have been done differently. The "osc. level" control increases the output as it is turned CCW instead of the usual CW rotation one is used to with most level or gain controls. The potentiometer leads can be changed, of course, to change this but then a different symbol is necessary on the panel marking. Also, the on-off switch is of the push-button type but there is no indication as to which position, up or down, is on or off. One simple way to provide a reminder of the switch position is to place a bright red marker of some sort on the side of the plastic push button as shown in fig. 2. When the switch is depressed (which happens to be "on") only the red marker next to the "on" lettering on the panel is visible.

*c/o CQ Magazine

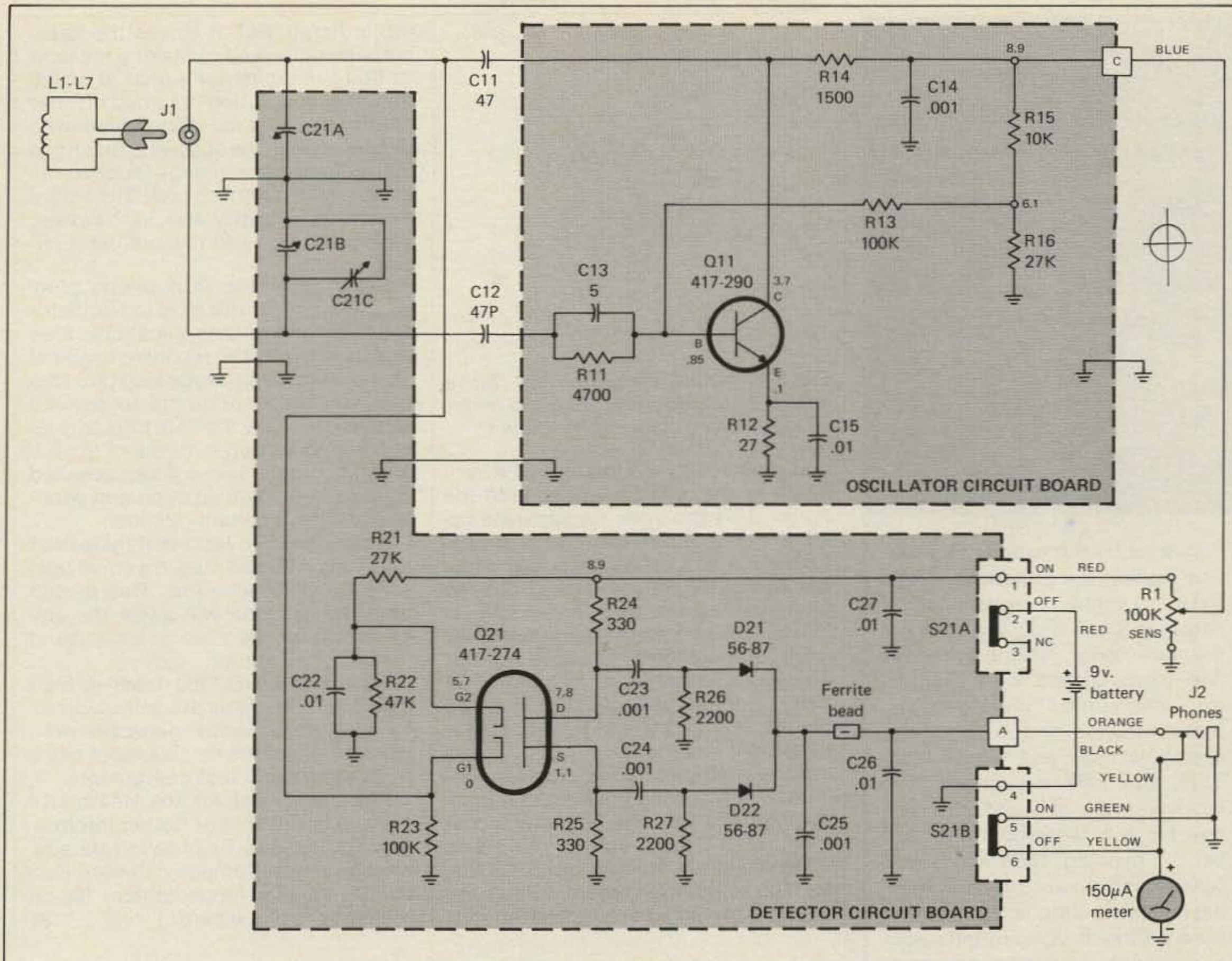


Fig. 1- The complete schematic diagram of the Heath HD-1250 Dip Meter.

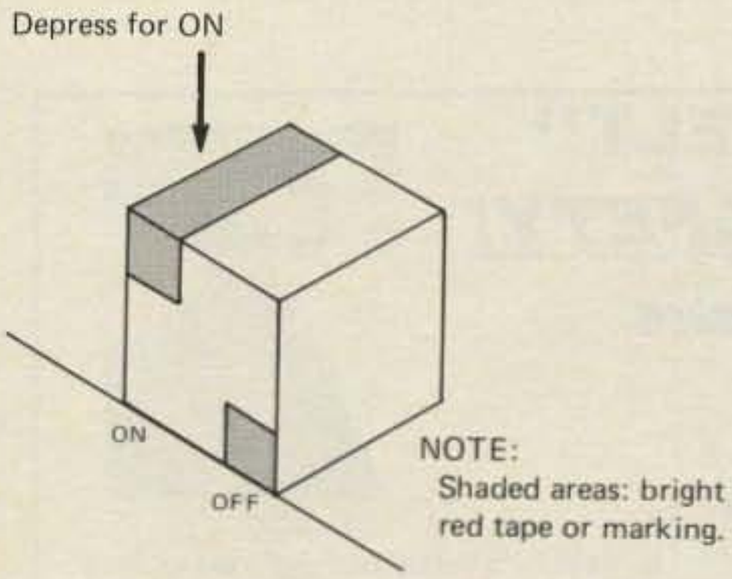


Fig. 2- By adding simple markings to the HD-1250 on/off switch it now becomes clearly evident when the unit is energized.

Before going on to discuss some simple modifications made to the dip-meter it might be better to digress to the applications for dip-meters in general. The Heath manual for the HD-1250 gives a number of examples of applications which oldtimers will all recognize but which may not be familiar to newcomers.

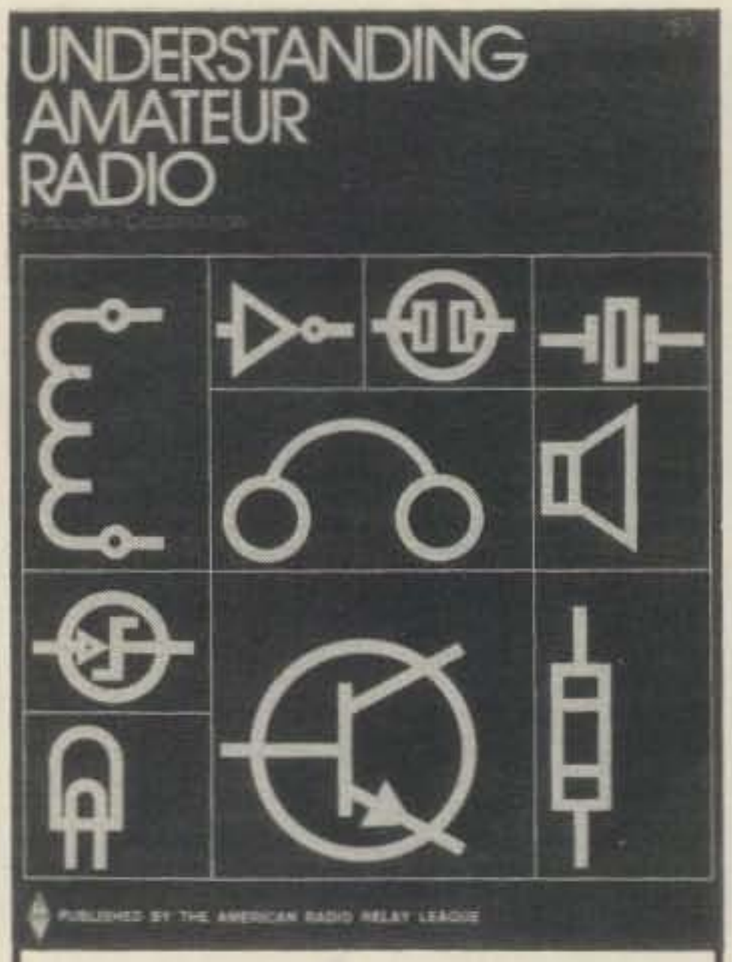
Applications

The dip-meter has two modes of operation, an injection mode (oscillator active) and an absorption mode (oscillator off). Using the injection mode, the dip-meter can act as a general purpose signal generator over its frequency range. So, it can be used for almost all of the applications that a simple, regular signal generator can perform. The two areas where one has to be careful are in dial calibration and controlling the r.f. output coupling. For any critical work, the dial calibration has to be verified by a frequency counter. One can control the r.f. output level to a fair degree by the level control but better, tighter control of the level is often necessary. A little bag of tricks helps in this area. For instance, the dip-meter can be moved away from the circuit being tested and a link coupling made to the dip-meter coil using a length of coaxial cable. Also, the dip-meter can be temporarily shielded using aluminum foil to greatly reduce r.f. "leakage" from it.

The conventional use of the dip-meter in its injection mode is to test resonant circuits whether they be formed from "lumped" components or formed by dispersed reactances such as in an antenna. Unknown L's or C's can be determined by forming parallel circuits with one known circuit element. Traps, filters, etc., can be adjusted for their correct frequency setting. The "dip" produced on the meter of the HD-1250 when its frequency coincides with that of a resonant circuit under test is quite distinct even with light coupling to the external circuit.

In the absorption mode, the dip-meter becomes a tuned r.f. amplifier/detector. Because of the broad band FET r.f. amplifier stage, it is quite sensitive and has only to be placed near a radiating circuit. The frequency readout is only approximate and cannot be used to set a transmitting frequency. However, it is still quite useful to check for basic radiation, harmonics, spurious radiations, etc.

The headphone jack on the HD-1250 would rarely be used in practice unless one were checking an old a.m. transmitter. So, the jack was removed



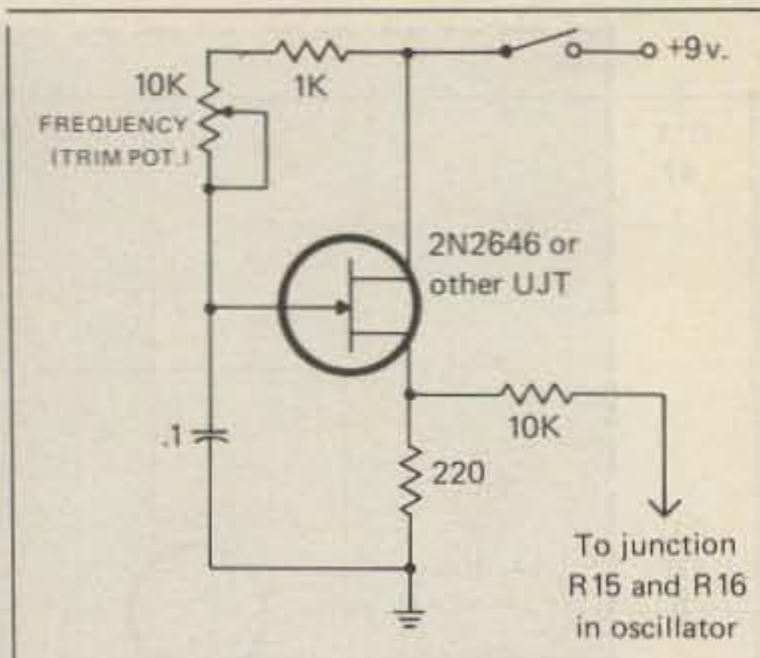


Fig. 3– A simple modulator that can be added as an aid in locating dip-meter signals on receiving equipment.

and replaced by a miniature 10 K variable resistor wired in series with the meter. This provides for separate oscillator level and meter sensitivity control which can be quite useful. Since the oscillator frequency will change slightly when the "osc. level" control is used, the separate meter control allows for meter level changes without affecting the oscillator frequency. By using a miniature potentiometer, no mechanical work on the dip-meter housing is necessary.

When trying to locate the dip-meter signal on receiving equipment it is often handy to have the dip-meter signal modulated. The circuit of fig. 3 was used to lightly modulate the oscillator. The modulation produced is a combination of a.m. and f.m. which sounds rather harsh. But, it serves the basic purpose quite well of making it easier to find the dip-meter signal at which time the modulation is turned off. The on/off switch for the modulator can be located at any one of several locations in the dip-meter housing—such as opposite the headphone jack. The actual modulator circuitry should, however, be located close to the oscillator circuit board.

Heath uses the RCA phono plug/jack system for the plug-in oscillator coils. In spite of their simplicity, they work well even after repeated usage of all the coils. Their usage also provides one with the opportunity to develop specialized coils if one is primarily interested in certain portions of the h.f. or v.h.f. range. These bandspreaded coils can be made up of plug-in parallel or series resonant circuits.

Note also from fig. 1 that instead of a coil one can also plug in a small telescoping whip antenna. The pickup from the antenna will allow the dip-meter to function as a broad-band field-strength meter.

All in all, the HD-1250 deserves high marks as a dip-meter. Its unique circuitry will undoubtedly generate even more applications for this most basic of amateur radio test instruments.

The basic cost for the Heath HD-1250 kit is $69.95. For further information on the unit or ordering details, write to Heath Company, Benton Harbor, MI 49022 or circle number 100 on the reader service card. ▣

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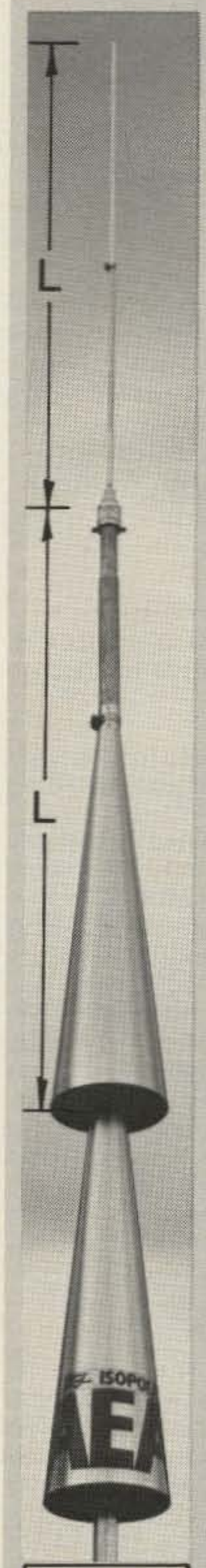
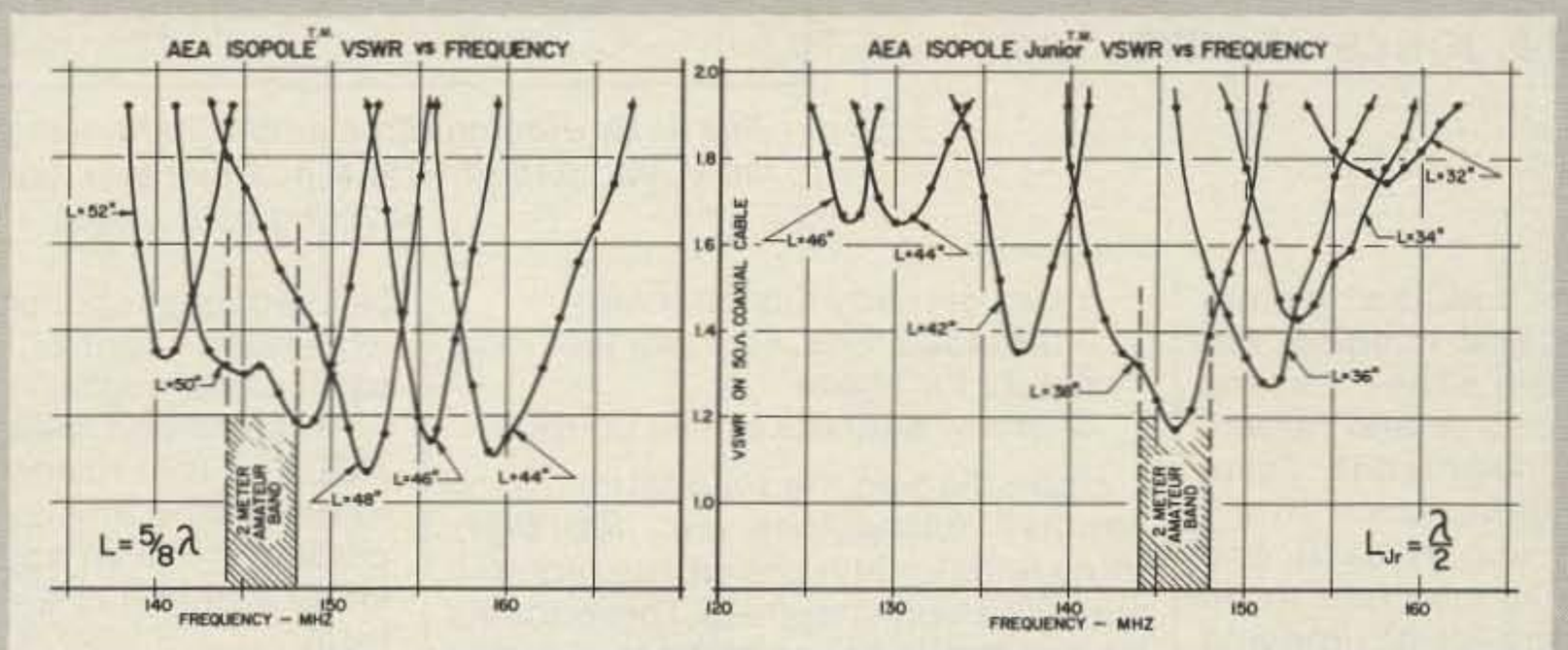


The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state transceivers. **Typical SWR is 1.4 to 1 or better across the entire band!**



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ISOPOLE 220
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Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is **not supplied**)

Operating on MARS or CAP? The IsoPole and IsoPole Jr. antennas will typically operate at least ± 2 MHz outside the respective ham band without re-tuning. However, by simple length adjustment, the IsoPoles can be tuned over a wider range outside the ham bands.

Our competitors have reacted to the IsoPole, maybe you should too! Order your IsoPole or IsoPole Jr. today from your favorite Amateur Radio Distributor. For more information on other exciting AEA products, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Call 206/775-7373

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Here's a quick and easy method of getting your tower off the launching "pad" and heading in the right direction.

AN IMPROVED METHOD OF TOWER LEVELING

BY TERRANCE P. JONES*, KA6IYE

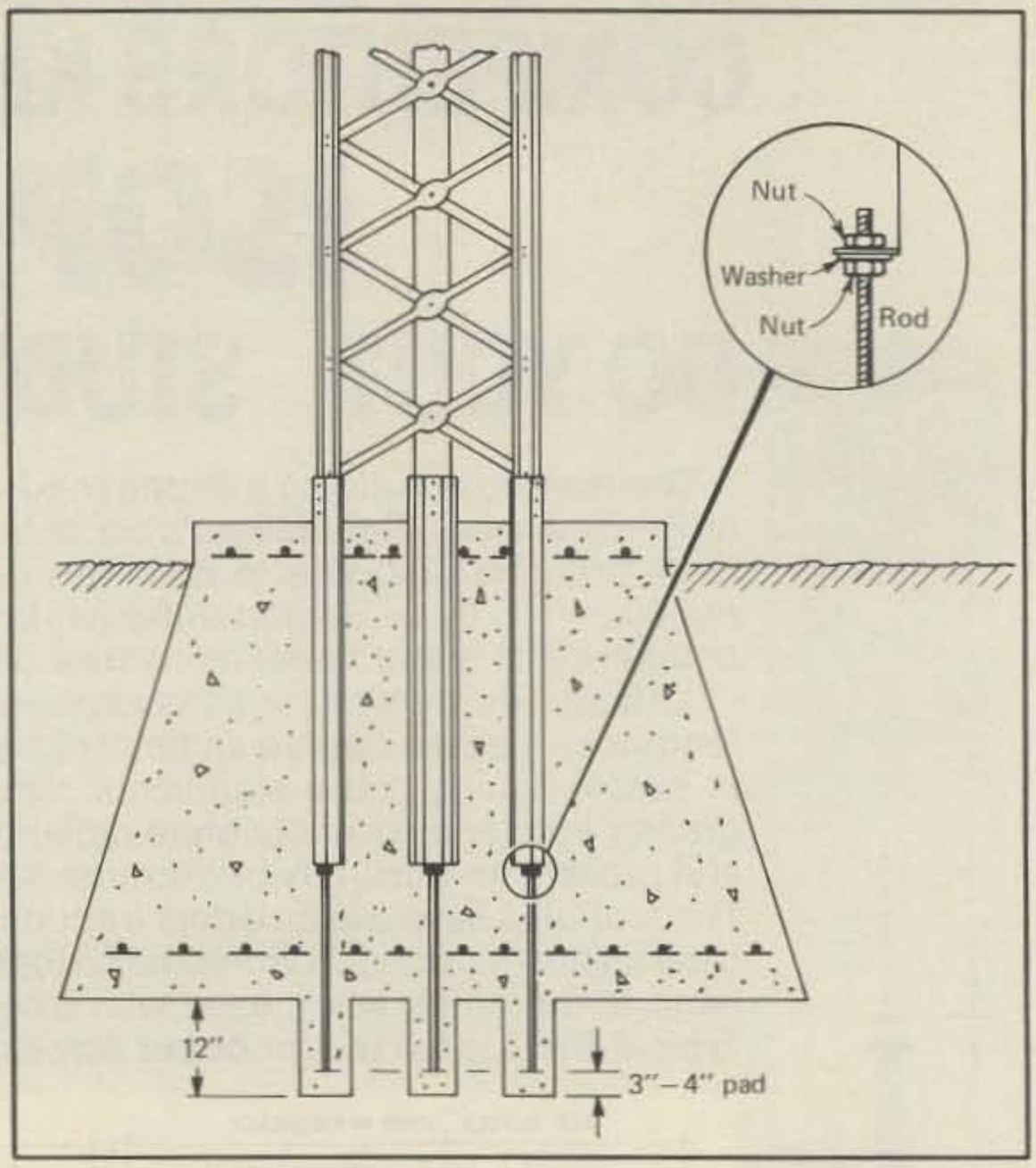

Fig. 1–By digging three additional holes in the larger base hole, you can ensure a positive and accurate method of leveling your tower.

Putting up a tower entails a bit more than one might at first imagine. Besides the tower, there's the rotor, top bearing, assorted cables and fasteners, and of course the antenna. There is also the foundation, which in my case was painfully dug by hand, and the 18,000 pounds of concrete to fill same. The point is, a lot of time and money are expended on a tower and antenna installation. What I propose is that one invest an extra two hours in time and about $15.00 to ensure a really top-notch installation and guarantee that your tower remains true when that 18,000 pounds of concrete comes crashing down into your foundation.

Most of the towers which I have witnessed being put up have relied upon a plumb-bob of some type, or a level, and then "wiggled and jiggled" to the point of being perpendicular. If the truth be known, all these towers appear perpendicular when complete. The method described offers a great deal more precision than any I have seen used previously. Although I used this method for my Rohn BX series tower, it can easily be adapted to other tower types as well. The additional materials required are minimal:

1 bag of ready mix concrete
3 threaded rods, $\frac{9}{16}$", two feet long
6 nuts for above
3 fender washers to slip on rods

Upon digging the foundation to the required dimensions (*i.e., too big!*), three additional holes will be required about twelve inches deep. These should be dug inside the existing foundation hole so they will be directly underneath the legs of the tower. A small pad of ready mix is then poured in each of the small holes to a depth of about four inches. This concrete is allowed to set. While the concrete is setting prepare the base stubs and first tower section. At this time attach the threaded rods, nuts, and washers as illustrated. After the concrete pads have set place the assembled base section and threaded rods in the foundation, placing the rods on the concrete pads. Fill the holes with ready mix and read the latest DX poop sheet while the concrete sets. The small pads not only serve as support for the rods, but also prevent metal-earth contact and the resulting electrolysis. By loosening the top nuts, one can now jack each leg up or down by applying torque to the lower nut and achieve a truly perpendicular base. Once the base section is aligned the top nuts can be tightened to literally "lock in" the settings. As a bonus, the rods can be used for anchor points for the rebar expansion control, again avoiding earth-metal contact.

This method was used to set my HDBX 48-foot tower, and I am unable to determine any deviation from true perpendicular in any direction, using either a plumb or a 4-foot contractors level.

I realize there are those who will scoff at the time and effort expended, especially on something that will not be seen after the tower is complete. Besides, what's $\frac{1}{32}$" more or less you might ask. This is true. However there is nothing like a job well done in the best manner you can achieve, and the satisfaction of knowing that it's "right."

Footnote

The entire tower, and all cables as well as rotor alignment, was done horizontally (the rotor was aligned with a dial indicator with the top section vertical). The tower was then hoisted by a 76-foot reach aerial basket, and the tower bolted to the base. The author then rode up in the basket with the four element yagi and attached it to the mast. The entire tower erection can be completed in one hour by one man and the crane operator. At this QTH the rental on the aerial basket is $45.00/hour including the operator.

*2945 Sequoia Ave., Eureka, CA 95501

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

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Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+$4), like 941C less balun. **MFJ-945, $79.95** (+$4), like 941C less antenna switch. **MFJ-944, $79.95** (+$4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER

MFJ-900

$44.95 (+$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient air-wound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $54.95 (+$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $34.95 (+$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7"

MFJ-962 VERSA TUNER III

MFJ-962

$199.95 (+$4)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $179.95 (+$10), similar but less SWR/Wattmeter.

MFJ-984 VERSA TUNER IV

MFJ-984

$299.95 (+$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $209.95 (+$10), like 984 less ant. switch, ammeter. **MFJ-982, $209.95** (+$10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $179.95** (+$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V

MFJ-989

$319.95 (+$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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Heinrich Hertz the noted German physicist is reputed to have told a group of leading scientists of his day, when they questioned his theories, "Don't confuse me with the facts." Throwing caution and theory to the wind, a new antenna company was formed which empirically states "try it, what have you got to lose?" The bottom line as they say is, it works.

SKYWIRES, LTD.
A New Concept In Antennas

BY JULIAN N. JABLIN*, W9IWI

For too long now, the radio amateur has been limited in the choice of an antenna to a few basic types. Yagis, quads, inverted-Vees and flat dipoles fill the pages of the radio magazines and manufacturers' catalogues. Rather than break new ground, designers have been content to rehash old ideas. This is hardly in the amateur spirit.

A bright spot in the picture is the emergence of a company tentatively called "Skywires, Ltd." It was set up by a small group of DX enthusiasts who are also experimenters and builders, with the express intention of developing antennas on the basis of empirical design. No reliance has been put on theory or mathematical models which look good on paper but often fail as hardware.

The old-timer ham will also note that most of the Skywire, Ltd. antennas are rooted in long-standing amateur tradition. No effort has been made to be highly innovative; the objective has been rather to provide the operator with a radiator which has proved to be effective and has been acknowledged as such by generations of DXers.

Let us forego the ordinary and look at a truly unique line of antennas for the ham.

*9124 N. Crawford Ave., Skokie, IL 60076

Model BS-1/A

You've heard experienced hams say, "I would have done better in the *CQ* Worldwide DX Contest if I'd tied my rig to a bedspring." Model BS-1/A is exactly that. It comprises a bedspring, fitted with a matching network and a standard SO-239 coax connector. Two versions of the BS-1/A are currently available. BS-1/A/80/40 is a standard double-bed size spring and is intended for the amateur who limits his (or her) operation to the 80 and 40-meter bands. It is equally effective on the c.w. and phone segments. An optional tuner, Model TU-5, permits use on 20, 15 and 10 meters, making this a truly all-band device.

For the amateur who operates only on 20, 15 and 10,or on any one or two of these bands, Model BS-1/A/20/10 is the ideal selection. It is twin-bed size, offering a smaller and more-easily handled radiator. We have been working on a loading system to permit use of the BS-1/A/20/10 on 80 and 40, but results thus far have been disappointing. The amateur who needs a compact all-band antenna should try other approaches.

The amateur who is married (or otherwise) and has a pair of twin beds can take advantage of our phasing harness PH-88, to excite two Model BS-1A/20/10 elements in phase. This will, of course, effect an increase in effective radiated power (ERP) and offer directivity. Two minor problems arise from this application. First, it is extremely difficult to "steer" this kind of a beam; the favored direction is usually determined by other factors than where the DX is. Second, the usual twin-bed-to-twin-bed spacing is hardly optimum for maximum radiation, leaving the operator with two choices—to leave the elements spaced for their normal bedroom purposes and have a less-effective antenna, or to increase the spacing to a reasonable proportion of the wavelength in use, resulting in an awkward bed-to-bed interval. You can't have everything.

In the course of developing the BS series, we discovered a characteristic which has been built into some models and are identified by the designation "/C" after the model number. Such antennas have been specially processed to exhibit some rust or corrosion where the springs meet the tie wires which hold the whole assembly together. The junction thus formed acts as a non-linear device, generating its own output which is rich in harmonics. This phenomenon is familiar to any amateur who has operated a high-powered transmitter in the vicinity of a badly maintained downspout. The harmonics thus produced are an instant indicator that the transmitter is, indeed, putting out power. This permits the amateur to take advantage of signals generated by his neighbors to tell

him that he is on the air, rather than depending on a rare bit of DX which refuses to answer.

Model WS-34 MKII

Another antenna which demonstrates the innovative quality of Skywires, Ltd. research is the WS-34 MKII. We had been hearing amateurs boast that, "I could have worked that JA on a piece of wet string," but the significance of the statement escaped us time and again. Finally, one of us was impelled to learn what really lay behind it, and the WS series was born.

Basically, the WS-32 MKII *is* a piece of wet string, set up so that the amateur can depend on reproducible results . . . as far as any results in amateur radio are reproducible. Extended to its full length, the WS-34 MKII is configured as a quarter-wave antenna on 80 meters. The antenna is wound on a plastic reel, so that only enough string may be extended to make a quarter-wave radiator on any band the operator selects.

For convenience, the divisions between each "section" of antenna are color-coded to indicate how much string should be unwound. Thus, after approximately 16 feet of string have been taken from the reel, the operator will see three color bands—brown-brown-black—indicating that he/she has a 10-meter antenna. At the approximate 33-foot length, red-brown-black bands will tell the user that a 20-meter antenna has been extended. And so on. The markings are only approximate indications, of course . . . the operator will want to clip the feed line (provided) to a more exact spot on the string to match the specific kiloHertz to which the transmitter is tuned.

So much for the string. But this is *wet* string, and the amount of wetness must be carefully controlled for a variety of reasons. The reel is therefore packed in a plastic box containing water which has been treated by a patented process. As the operator withdraws the string to form the antenna, the string passes through a pair of specially formulated wicks which apply a metered amount of moisture. A small hygrometer is part of the assembly, and a chart printed on the box gives the relationship between ambient relative humidity and the time intervals at which the string must be re-moistened. The latter is accomplished by quickly reeling the string into the box and out again. In tests, experienced operators have done this in a few seconds, even with an 80-meter antenna in use.

You are now saying that this is a quarter-wave antenna—it must be worked against ground. The Skywires, Ltd. people have worked this out and the final element in the assembly is a 25-foot length of #14 flexible wire, terminated on one end with an alligator clip and on the other with a 6-inch copper-plated spike. Purists who write articles on antenna construction, and those in love with mathematics, will scoff at this arrangement. Let them.

Needless to say, the WS-34 MKII is ideal for QRP enthusiasts whose idea of sport is to take an under-powered transmitter and a four-transistor receiver to some mountain top, there to tear a hole in the low end of 20.

Model UCX

"There I was, doing 55 down the freeway, and this EA8 practically knocked the transceiver out of the mount. We had a solid QSO, right until I pulled into my driveway."

That common DXer's boast provided a number of clues for Skywires, Ltd. designers. It is axiomatic that a mobile rig at its most basic can outperform the most sophisticated home station. We decided to synthesize the two, giving the operator the comforts of his home shack and the DX-gathering benefits of mobile operation.

In Model UCX, we provide a superb bumper-mounted h.f. whip antenna, plus the car on which to mount it. The operator need never leave his shack, however; 100 feet of RG-8/U (foam-filled) is included to reach from the driveway to almost any operating position in the house.

Every aspect of mobile operation which might contribute to the effectiveness of the UCX has been carefully evaluated and, if found worthwhile, included in the system. The antenna is resonated on the band of interest by means of a carefully designed coil; a complete 80-20 meter set is included. (When the new 10 MHz assignment is implemented, resonator(s) will be made available.) To simulate mobile conditions more precisely, no remote band-switching or tuning of these elements is included. If such adjustments are required, the operator makes them physically at the antenna, day or night, winter or summer, with the XYL or other cooperative person keying the transmitter on request.

Qualitative testing has never been done (to Skywires' knowledge) on the make and model of the automobile as a factor in antenna effectiveness. With the exception of the fiber-glass body Corvette, there would seem to be little choice in this regard, and the personal preferences of the amateur are as good a criterion as any. Therefore, Skywires,Ltd. will supply any make or model on order as part of the UCX kit. It must be understood that these are used automobiles, with the body work brought up to mint condition. Engines and running gear are generally adequate to get the car in and out of the driveway, but no warranty, express or implied, is made with respect to these components. Price of the complete UCX system is determined by the body model selected, and will be quoted on request.

It can be seen that the Model UCX combines all the qualities of a home-based station with the special advantages of mobile operation. Skywires, Ltd. has not examined closely the legal requirements of signing when using the Model UCX, and is not prepared to offer an opinion on this question. Whether the owner prefers to sign /M after his call is a matter which each individual amateur must settle between himself and Part 97 of the FCC Rules.

Conclusion

It is apparent from the above description that Skywires, Ltd. has broken new ground in giving the amateur radio operator (especially the DXer) a series of innovative radiators which will do much to enhance the pleasure of hours spent in amateur radio. We believe that our aim—to translate into hardware the common experience of a large body of the amateur fraternity—has been achieved with this series of antennas and with others which will follow. CQ

Quads in the Northeast have traditionally been a cause for rugged mechanical considerations. WA2SLK faced the problem head on like the wind and evolved the following solution.

Modifying And Improving The Gotham Tri-Band Quad

BY CHARLES C. BURKE*, WA2SLK

A few years ago I purchased a Gotham tri-band quad and erected it on my 40 foot tower. What attracted me to the antenna was the good report I had heard about quads, and, in this case, its very low price. The antenna was a super bargain, and it helped to bring in 5/9 readings from New York to Antarctica. However, about thirteen months after it was erected, this area was buffeted by a series of high windstorms which did their share of damage. After one of these storms it was noted that the reflector had turned on the boom. The first chance I had, I climbed the tower, re-set the spreaders, and retightened the clamps. As luck would have it, the next storm not only undid the repair work but also undid the whole reflector. Peering up at a mass of tangled wires drooping from what was once the reflector generated a good case of heartburn and lots of frustration. When the winds had died down and the whole thing was disassembled and gone over, a number of things were found to have gone wrong, aside from the reflector trying to defy gravity. It was then decided to not only get the antenna back up but also to change a good, low-priced antenna into a super, but low-priced, antenna.

The first thing which was noticed was that the clamps which hold the spreaders to the boom had lost their teeth when they first slipped, and this is what caused the whole thing to unwind so easily the second time. To stop the spreaders from rotating on the main boom, a small piece of 1/16" thick plate steel was welded into the boom. The plate did not have to be very thick, since the bulk of the load placed on it is in the form of torque. See fig. 1.

The clamps that came with the antenna had two holes already drilled in them, and this provided a convenient way to attach them to the new plate. It was found that they were just the right size to be tapped out to 5/16-24. There was just enough metal on the clamp to permit a few good threads of this fine-threaded bolt to be made. When the antenna was assembled and the bolts put into place, the one spreader was now held rigid and could no longer turn. Since the other spreader was attached to the first one by the antenna wires, it was also now locked into position.

In actuality, it appeared as if only one of the spreaders had worked its way off the end of the boom. When this occurred, the section dropped and placed a tremendous strain on the second spreader, where it met the boom. The second spreader collapsed at this point and then folded itself in half before breaking in two pieces.

To prevent the main 1" diameter spreader from collapsing again, a 7/8" × 3" wooden dowel was inserted into the aluminum tubing at the point where the spreader meets the boom (fig. 2). To accomplish this, a red crayon was used to mark a band around the center of the dowel. The dowel was then inserted into the 12-foot piece of tubing and then pushed into place

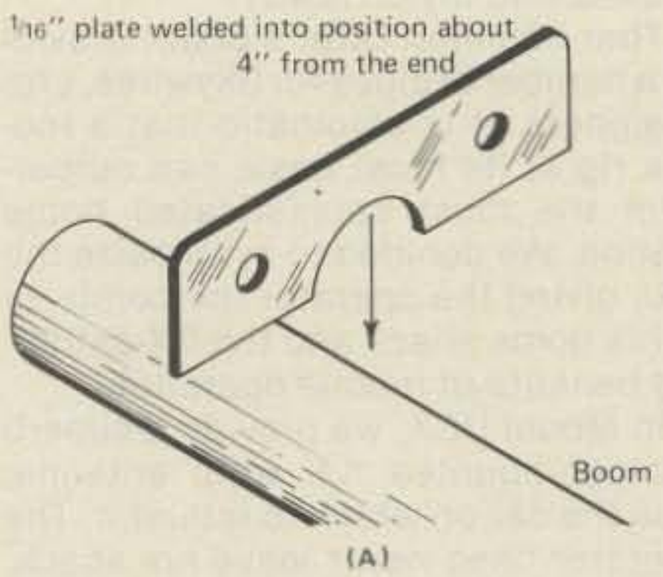
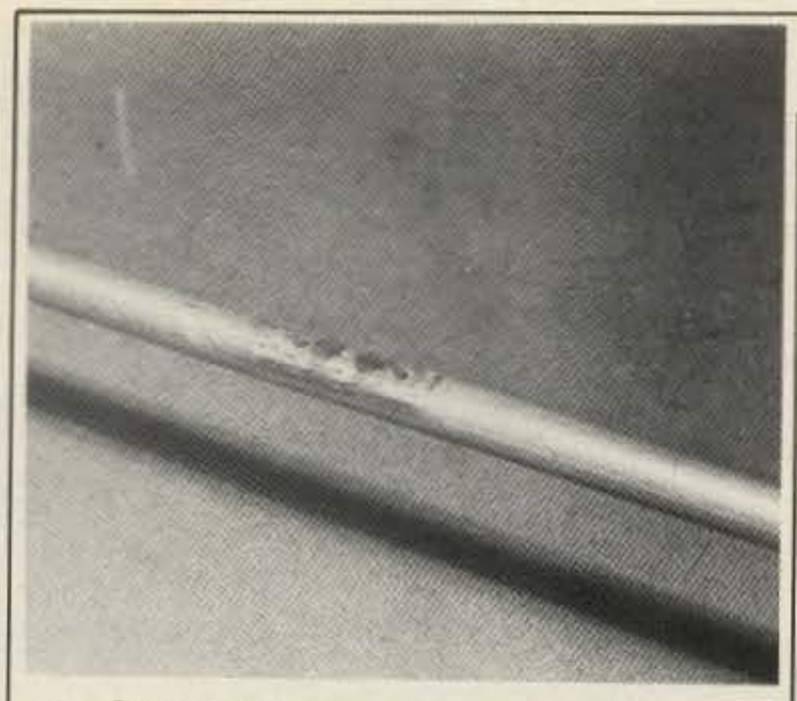


Fig. 1– A ¼" bracket is welded to the boom. This predrilled bracket is screwed to the spreader bracket which has been drilled and tapped.

*RR 1, Box 164A, Farmingdale, NJ 07727



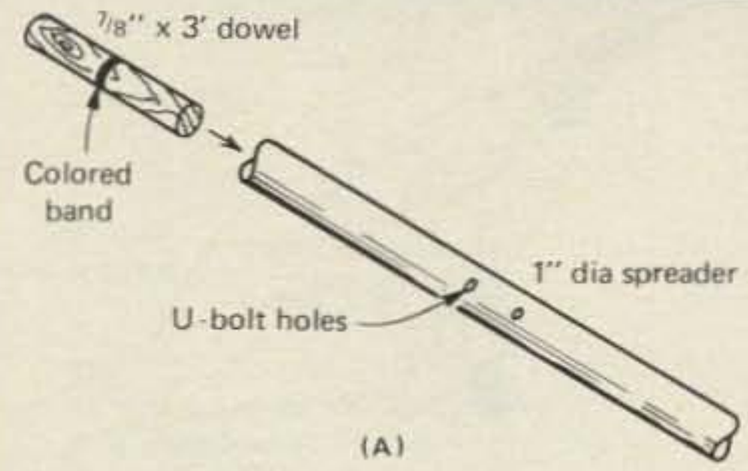
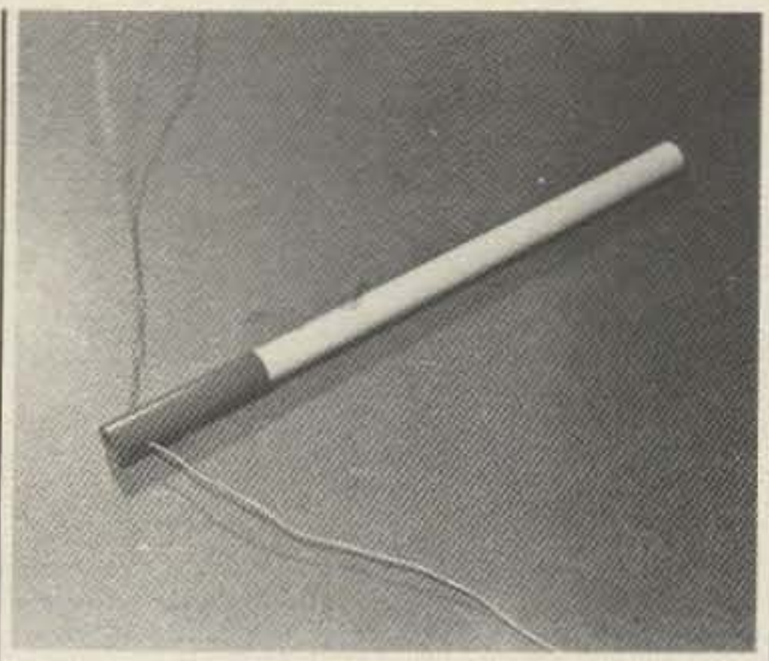


Fig. 2- A 7/8" × 3" wooden dowel is inserted into the tubing for additional strength.



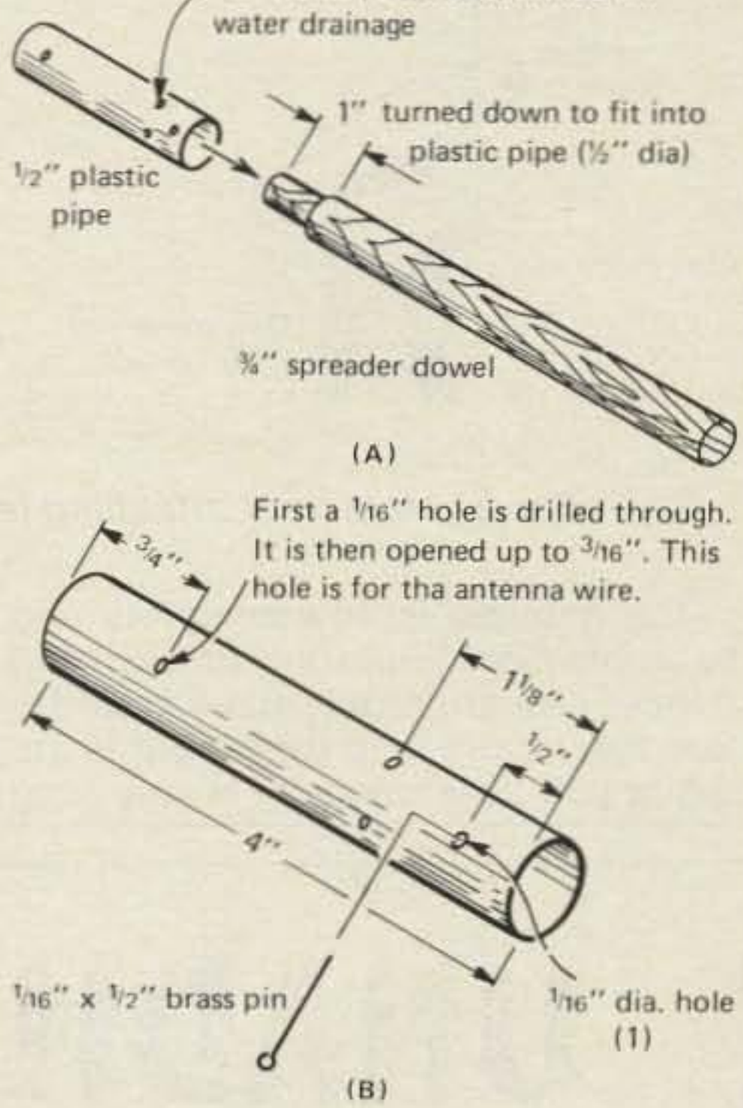
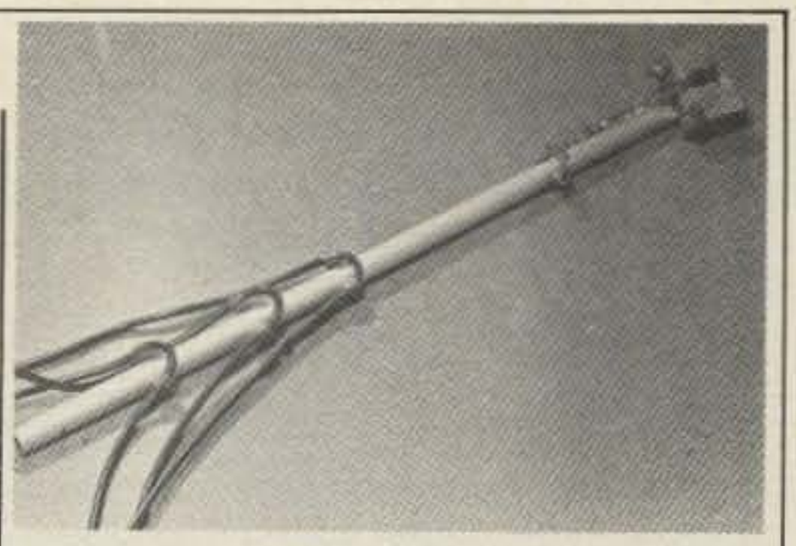
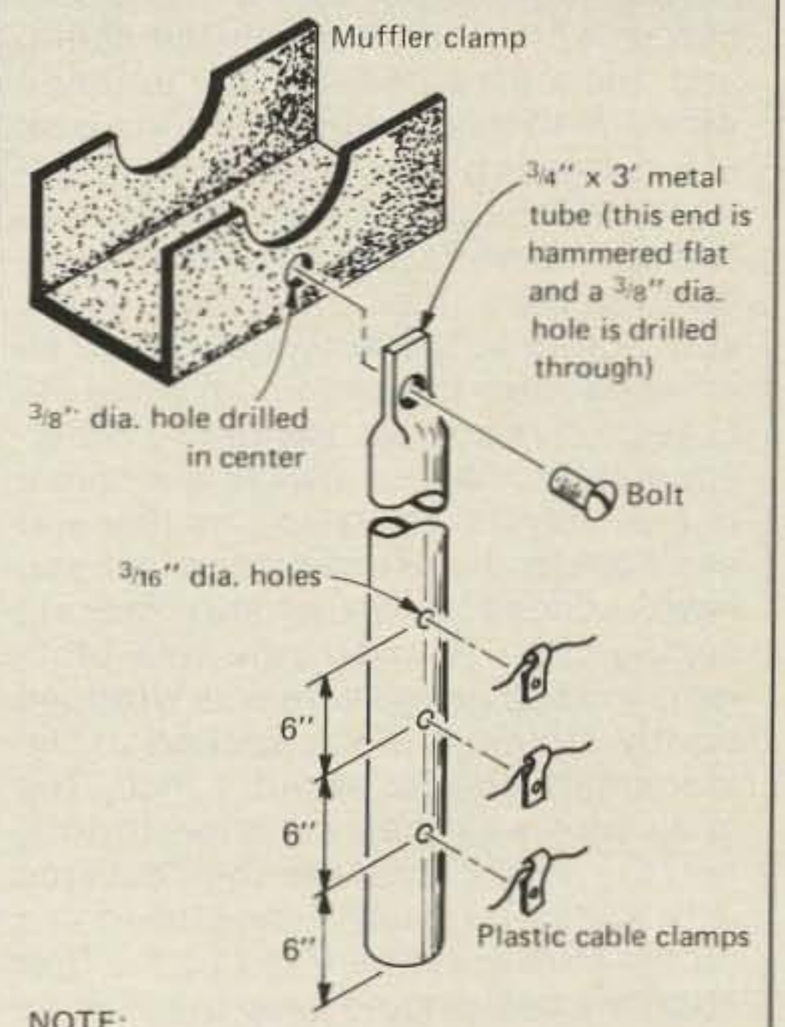


Fig. 3- Plastic tubing is added to the ends of the spreader dowels for added insulation and weatherproofing.





NOTE:
A chain can be seen in photo. This was added only to make it easier during installation in case parts slipped out of my hands while on the tower. I left it in place in case additional work might require removal of this piece.

Fig. 4- The Q section hanger support system.

with a piece of 7/8" aluminum tubing. By watching for the red band through the clamp holes, it was possible to tell when the dowel had reached the proper position. I then drilled through the original holes and then through the dowel with a 5/16" bit. The U bolts were replaced immediately to keep the dowel in place, since it was not a very tight fit.

Since the dowel adds both strength to the tubing and also prevents it from collapsing, this problem should never occur again under similar conditions. Also, when the dowels get wet, they expand, and the loose fit will disappear. Examination of the dowels used as insulators for the outermost antenna revealed that they had weathered badly in the years they had been exposed to the elements. While wood itself is a good insulator, I could not help wondering if normal air-borne pollutants did not play some degree of havoc upon the insulative qualities of the wood. Wood is porous, and there are many pollutants which have conductive qualities. This is a problem which power companies must deal with when selecting porcelain insulators, which are non-porous. So, I assumed it should also be considered, here, where much high frequencies are involved.

To maintain maximum insulation on the final antenna wire of the quad, plastic insulators were added (fig. 3). To accomplish this, the ends of the new ¾" dowels were turned down to ½" diameter and then a 4" section of plastic pipe was tapped on. A small hole should first be drilled into the tubing to prevent it from splitting and a larger one for the antenna wire was added. Also, four small drain holes were placed in the tubing so that rainwater could be carried out. The dowels themselves were painted with several coats of a good exterior paint to retard rotting. To secure it, a small brass escutcheon pin was driven into the side.

While looking over the antenna wires, it was found that two of the feeder Q sections were just about to be ripped free. It seemed that what had occurred resulted from too much force being applied to the point where the copper wire of the coax met the aluminum antenna wire. While I could have simply replaced the antenna wire with copper wire and used RG 11/U instead of RG 59/U it was desired to keep costs at a minimum. The ¼ wave Q sections made of RG 59/U are heavy and can place a considerable load on the antenna wires. To relieve the load and also to help bring the feed lines off parallel to the boom a hanger was made (fig. 4). The hanger was constructed of a piece of ¾" aluminum tubing attached to a muffler clamp. A set of plastic cable clamps were attached to the tubing and the Q sections fed through them. When the antenna is erected, the Q sections are pulled through so that they remove as much of the load as possible from the antenna wires.

Attaching the feeder Q sections to the antenna wire involved two separate mechanical problems (fig. 5). The first problem that was resolved involv-

ed the general mechanical attachment of the Q section to the antenna wires. To reduce the amount of force that is exerted upon the intersection when high winds whip the wires about a plastic bracket was incorporated. The bracket was made from a piece of ⅝" wide by 5" × ⅛" plexiglass. It was heated and then bent around the antenna's insulator. When it cooled, a hole was drilled at the other end and a plastic cable clamp added. The Q section was then fed through the clamp and then attached to the antenna wires. With this arrangement the bulk of any forces placed upon the connection now fell upon the new plastic clip and not the wires. The second problem involved the actual attachment of the conductors to the antenna wires. The antenna wires are aluminum while the Q section is copper. Being two different metals, there is always a problem of electrolysis. You also find that you can't solder the two metals unless you have access to expensive brazing compounds. To overcome this problem, solid 22 gauge wire was wrapped tightly around a clean section of the aluminum wire for about 1 inch. The coax wire was then soldered to this, and the whole area was then covered with a silicon sealant. Since the forces on the joint are minimized by the first step, the seal should keep the joint as good as new for a long time.

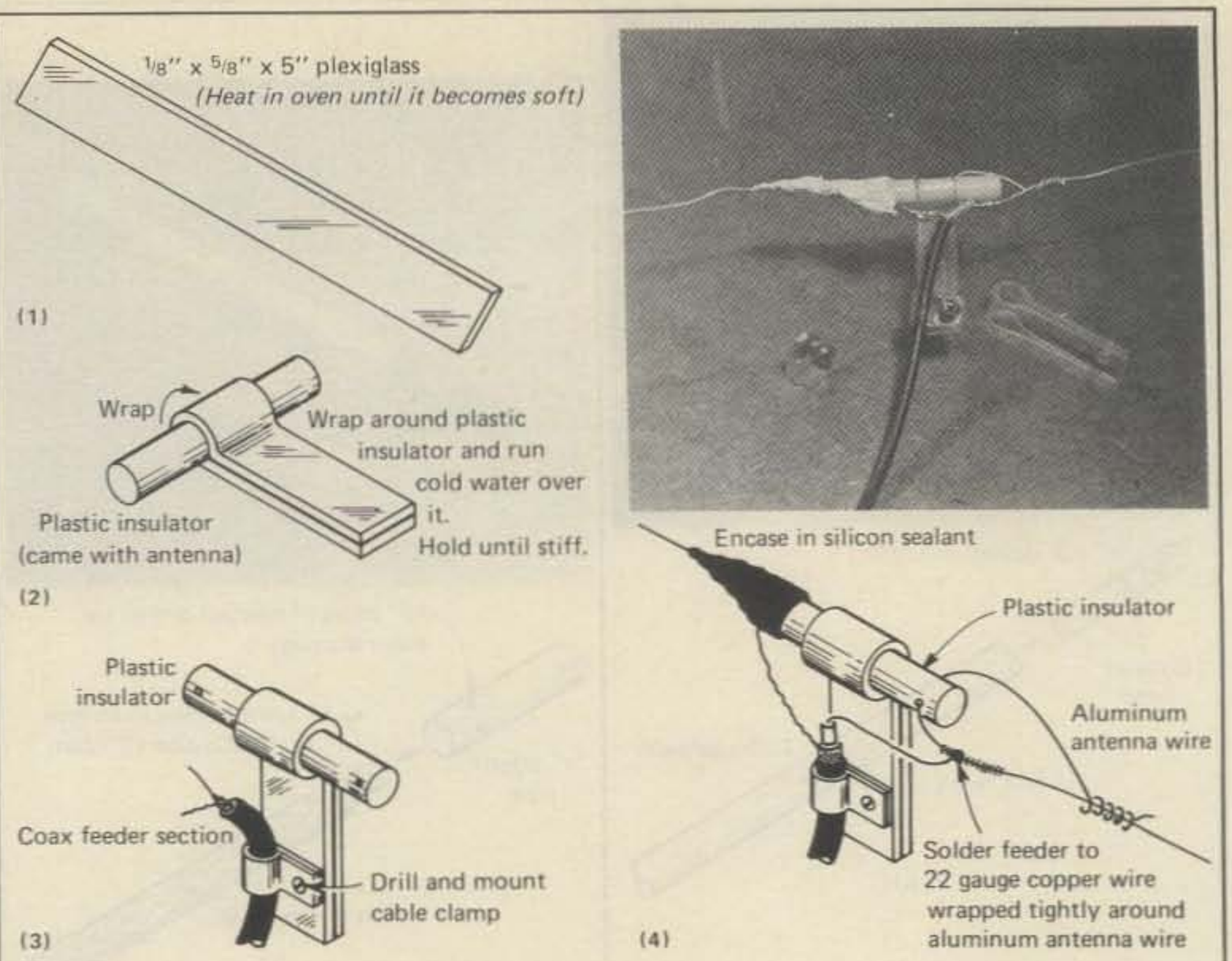


Fig. 5- Method of attaching feeder Q sections to the radiator.

The antenna is now complete and back in action. While only time will tell if these alterations will make a real difference, I can't help thinking this antenna will be around for a very long time to come. What makes it even more exciting is that the whole thing, including the antenna, the repairs, and the improvements, totalled less than $90.00!

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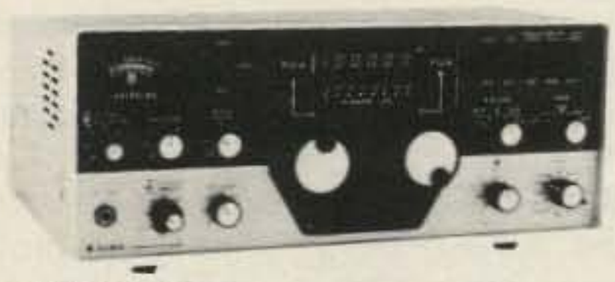

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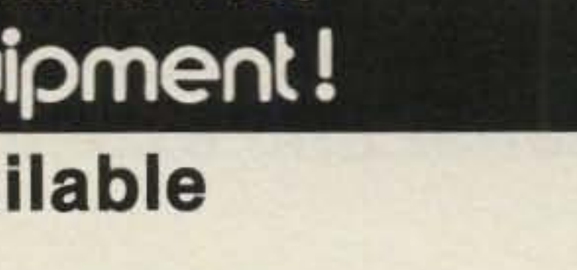

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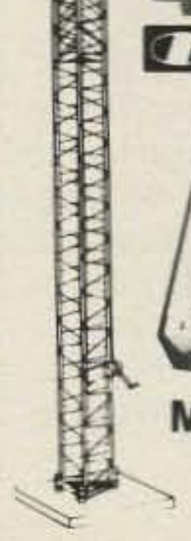

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It's not too hard to work a lot of DX if you have the room for an antenna farm. Most of us have a limited amount of room and funds to devote to our antennas and so G3UML reports on his experiences to make the rest of us feel better and extend the hope that we can do the same.

How To Work Lots Of DX With Poor Antennas

BY LAURIE MARGOLIS*, G3UML

An Australian amateur recently made some interesting observations in one of the British amateur magazines. It seems that he'd kept a record, over a long period, of the antennas used by the British stations he'd worked on the long path on twenty meters. This revealed that the vast majority of G's shifting their signals some 15,000 miles to VK were not using huge arrays, but simple dipoles, verticals, mobile whips, and even indoor antennas. Certainly the louder ones were using beams and quads, but most—about 65%—were getting out with the simplest antennas. This evidence parallels my own recent experience. These notes will, it's hoped, encourage those of you who'd like to chase DX seriously, but are short on space, cash, or both. I'm not about to reveal any magical technical or operating secrets—just that you can work lots of DX, consistently, with antennas that are unobtrusive and cost peanuts.

History

For the first thirteen years of my licensed amateur life, I was in the fortunate position of being able to use large beams at substantial heights. DX was relatively straightforward, and by 1978 I was on the DXCC Honor Roll, had 5BDXCC, and had confirmed all but a handful of countries.

This lucky state of affairs ended in 1978, for the pleasantest of reasons. Marriage led to a small apartment and fifteen months inactivity. Then came a move to a small house in suburban northwest London, with a compact garden measuring about fifty feet on each side, with no major obstructions but no wonderful takeoff either.

In January, 1980, the Heath SB-line was dusted down, cautiously switched on, found to be none the worse for its long vacation, and fired up. The antenna was a Hy-Gain Tape Doublet, which is basically two steel tapes extendable dipole-fashion to any frequency between 3.5 and 30 MHz. This was stretched out for the fifteen meter band and strung between two fences at a height of precisely six feet above the ground. I know it was six feet because I'm six foot three and I nearly lobotimized myself on it walking around the garden in the gloom one winter's night. Anyway, the first station heard was a K3. To my astonishment he came back with 5/4. Europeans within fifteen hundred miles gave quite good reports. More of the same the following day produced all continents on fifteen in an afternoon. Reports were modest, but not bad for a dipole threaded between the rose bushes.

Great Things

Thus encouraged, I decided after a few days to go for the big time and go up to all of twelve feet. One end of the rope supporting the Tape Doublet was attached to a nail banged into the frame of a second story window. The rope supporting the other end was flung as far as possible—not very far—over the branches of a large oak tree at the end of the garden. With this arrangement, band changing meant lowering the dipole, adjusting the length, raising it again, and adjusting for tension, a tedious process which tended to mean one week on twenty, and the next on fifteen. Ten was in poor shape at the time, and the garden wasn't big enough for forty or eighty.

Results were gratifying. Using an SB401-200-303 combination, one hundred countries were worked on fifteen and twenty s.s.b. in ten weeks fairly casual operating. DX included KL7, YB, FG7, P29, 5T5, ZL, VK, VQ9, 3B6, KH2, KH6, FR7/T, nothing to make the rhombic and stacked-array crowd gasp, but fair enough for an antenna I looked down on from my bedroom window.

It was the onset of good weather, and three frantic and fruitless efforts to adjust the doublet in time not to work Willis Island, that prompted the desire from greater things. It was decided there wasn't really room for a tower. It might make an overwhelming impression on the new neighbors and, anyway, terrifying building and decorating bills didn't permit anything so grandiose. The next improvement would have to be cheap, barely visible, and easy. An hour's work one sunny spring afternoon with a lot of surplus stranded copper wire produced twenty and fifteen meter dipoles, which at least promised the possibility of changing bands without injury. Strung between the garden fences in the manner described earlier, they produced good reports from Europe and California at heights of six feet. Since these wire dipoles weighed next to nothing (and also cost about $4 for the pair) some thought was given to launching them into the stratosphere, or at least to about thirty feet. The aforementioned oak, a sturdy specimen about fifty feet tall, provided one obvious support. Devout cowardice ruled out any attempt to scale its heights. Some

*52 Park View Gardens, Hendon, London NW4 2PN, England

thought was given to a bow-and-arrow job, but the garden backs onto a well-used public park, and total inexperience in this pursuit threatened some danger to the population.

In the end, the technique (if I may dignify it with so august a word) employed to get a rope over a high bough was to tie a light cord to a handy rock, heavy enough to pass through branches, light enough not to dislocate a shoulder. An hour's hurling, much frustration, bad language, and some alarm to innocent citizens, and I had a cord over a bough thirty feet up. From then on, it was relatively easy to haul over a substantial rope, and thus the end of each dipole, to a reasonable height. The other ends were attached by light rope to the roof of the house about twenty feet above ground. So I had two sloping affairs at average heights of twenty-five feet. They were fed with cheap TV coax, no baluns, and produced acceptable s.w.r.'s. They don't look like much, but they work.

Real DX

A dipole is only a dipole, but carefully measured and constructed, and given a glimpse of the great beyond, it works well. The benefit of my now monumental altitude became apparent almost at once when A35JL in Tonga came up with 5/5 on fifteen one morning. That's just about as far as you can go from England without coming back. Then 5/9 from ST2FF/ST0, 4/2 from T2AAA, 5/1 from T3AC, and 5/7 from 5W1BZ raised through a big pile-up. The extra height, and also the greater precision of the copper wire antennas, had made real DX consistently attainable. Newly enthused, I spent a lot of time on the air through the summer, chasing what seemed at first an impossible target of two hundred countries by the end of the year. I made it with 5/2 from HC8GI in the Galapagos on September 2nd, about 7½ months after coming back on the air, and at no time using anything more formidable than a dipole at twenty-five feet. And, I emphasize, this is not a brilliant location. The land does slope away towards Africa and South America, but is level or actually rises in the other directions. And my garden is completely overshadowed by the huge oak which is on my property, and by other enormous trees in the adjacent park.

The better DX, all on s.s.b., included ZK2TW, FW8SC, CE9AF, 8Q7AZ, A7XD, VK9CCT/VK9Y, J5KJ, KC4AAA, JT1AN, VR6TC, FK8DH, and lots more. Although reports from our antipodes, the mid-Pacific, tended to be weak, 5/9's, for what they're worth they were obtained from H44, KH6, and others closer at hand. I now have 225 worked and I'm aiming for 250 within a year's operating, though they're getting tough now!

Tricks Of The Trade

There's no point pretending that a dipole, however impressive the results, is better than a beam at a decent height because it's not. Mixed in with the goodies above were hours of fruitless calling, lost contacts, and total failure in really monster pile-ups like that for HK0AB. I spent ten hours over about four days trying to raise a VP2A, finally getting him at the end of the *CQ* Worldwide DX Contest after the whole world must have worked him. When the going gets really tough, you need aluminum, lots of it, and high. But my striking rate with my antennas was quite good. At the time country number 200 was logged, there were only about eighteen other countries which had been heard but not worked. Nine times out of ten, pursuit of a DX station meant a contact.

My experience is that simple resonant aerials are by far the most effective. Odd lumps of wire and tuners are fine for short term operations where serious DX isn't really a concern. But for a permanent, or at least longer-term, installation, use properly cut and constructed dipoles. True, they're only monobanders, but it's not difficult to hoist two or three (ten and fifteen meter dipoles in a line are only forty feet long) and they really do work. I've personally never had much luck with verticals, but I'm sure carefully made groundplanes would be equally effective, at least in areas without obstructions.

These antennas cost next to noth-

ing. They weigh little, and if they fall down they can be replaced easily and cheaply. Running three or more dipoles off the same feedline is quite successful (don't mix fifteen and forty), though I feel it's worth using separate feedlines if the coax is available. Obviously baluns and good quality coax are recommended for permanent installations, though I'm still battling on with TV coax (basically low quality RG58U) and I haven't bothered with baluns.

Dipoles for the same bands but at right angles to one another are very useful where space, supports, and switching allow. I have found no discernible directivity on twenty, and nothing to worry about on fifteen. I seem to get out fairly evenly in all directions. But a ten meter antenna was put up when that band picked up in the fall, and there seems to be definite nulls off the ends. My dipole runs east/west, which means the major lobes are north and south. The performance in those directions, and with a good spread each side, is excellent. But off the ends, which means into Central America and South Asia from here, I've been struggling. So, for ten meters at least, try for separate antennas at right angles.

Modest antennas also have social advantages. Since they can hardly be seen, they are not offensive. I have had minor TVI with my immediate neighbors. If there are any other problems, they haven't manifested themselves. But, although this is a densely populated London suburb, my dipoles can't be seen from the street and hardly from next door. Maybe no one knows I'm here!

Indoors

One rule must be remembered if you want to work consistent, frequent DX with inferior antennas. Use as much power as you can afford, always allowing for local interference and legal limits. You are very short on gain in the garden, so compensate as much as possible in your station. New linears aren't cheap, but there are lots of secondhand types like SB-200's, FLDX-2000's, GSB-201's, etc., which can be picked up reasonably. Or the various handbooks have cheap designs which are easy to build. A linear should give you at least two S-units. That means nothing if the difference is from S8 to S9 + 5db. But an increase from S2 to S4 is the difference between no-copy and a QSO.

Operating

With a beam or a quad, you can do most of the hard work yourself. You'll battle through pile-ups, and the DX will call you. You'll open bands with judicious CQ's. But with modest antennas, you need help. Fortunately, the world is full of nice operators with big signals who are delighted to help their weaker brethren work DX. I played the good uncle in my beam-and-tower days; it's a nice feeling. I've been gratified, since coming back with modest antennas, over the number of occasions strong local stations have passed my call across, told the DX I'm there, opened the hole through which my bits of wire could be heard. I do get through pile-ups unaided, but it's tough especially on busy weekends.

People like to help, so put yourself in a position where you can be helped. Listen a great deal; make yourself a mine of good information (but make sure it's correct!). Don't make a nuisance of yourself. Don't try to make a contact when you know you haven't a hope. You'll soon learn what your station can do, and you should be able to make a pretty shrewd guess before you call the DX whether he'll hear you. Only break in on a local when you're sure of your timing; don't crush some vital piece of information (like his report!). Listen, and listen again, for that moment when you can go in, be heard without causing QRM. Obviously, I'm referring here mostly to s.s.b. but the same good habits apply on c.w.

Use lists and nets. These come in for scathing criticism, and they cer-

tainly are sometimes abused. I hear dozens of so-called QSO's on nets which aren't worthy of the name. But properly handled, they are invaluable to weaker stations. Even if you are five S-units below the average, you'll be heard if you get twenty seconds of clean air. You need lots of patience on nets! There's nothing more certain to induce heart failure than listening to that A51 fade from S9 to S3 while the twenty-six guys ahead of you are exchanging reports with a ZS they could easily work by themselves anyway. But I've worked some useful stuff on nets, even though it's not an entirely satisfactory way of logging DX.

Try picking up basic foreign languages. A bit of Spanish is worth two S-points to South America. French can open up a wonderful world of 5U7's, FO8's, and FM7's. A few words of Russian will work miracles with that UJ8. All you need are the numbers, phonetics, and half a dozen simple phrases.

Finally

This article is not trying to put anyone off big antennas. I fully propose reverting to the biggest and highest possible if and when space and cash permit. But if, like me, you're stuck with a shortage of both, and you want to work DX, don't give up. Put up simple, efficient antennas; use as much power as you can; sharpen your operating. See you some way down the pile-ups! ■

Here's a project that you can adapt to your own needs. It provides a good, stable support for your beam while providing easy accessibility for repairs. It also can double as a test platform for antenna experiments.

THE SQUARE TOWER

BY CARTER RICHARDSON*, W5IHD

W5IHD behind the mike at his new operating position.

While I was at work a few years ago there was an electrical storm in the area which did some damage to my QTH and resulted in my being off the air for about a year.

When I started rebuilding my station, one prime consideration was the problem of how to support my new antennas. Previously I supported my inverted vees (for 40 and 20) with a 5 section TV mast and a creosoted mast support 22 feet high. It consisted of a 4″ × 6″ in the ground and two 2″ × 6″'s spliced to the upper portion.

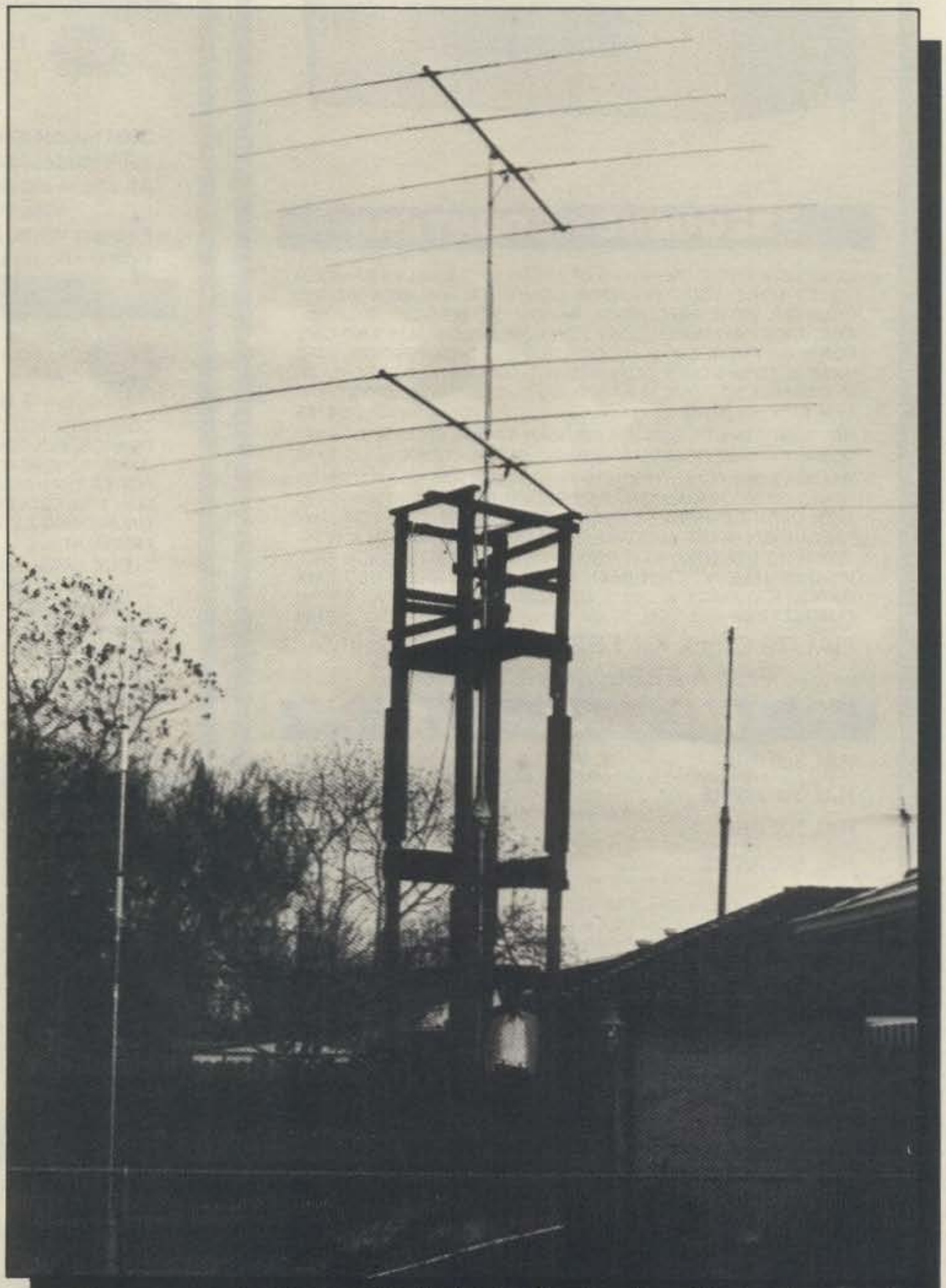
I bought a Wilson 4 element 10 meter monobander and a 4 element 15 meter monobander for my new station. After some thought I came up with the idea for the 22 foot tower pictured in the photograph, utilizing the existing 22 foot mast support.

Three additional 6 foot holes had to be dug for the new supports and these were done with a standard post hole auger plus extensions. The three new supports are all 28 feet long, and go into the ground to a depth of 6 feet. One 4″ × 6″ support (22 feet above ground) was placed catercornered to the original support. Two 4″ × 4″ were used for the other two corners. All of the lumber is Wolmanized and the above ground portion is covered additionally with several coats of good quality paint.

After each support was placed in its mounting hole, a sack of ready mix concrete was poured in. A bag of marble chips was then added to each hole and finally dirt was tamped in to a point just over ground level. For additional stability, although it may be a little overkill, I added broken rocks and concrete around the supports and covered them with sand.

The Supports

All of the supports, whether 4″ × 6″



The square tower stands next to the house. Construction of the four legs is not difficult. The tower is solid, stable and most of all safe.

*9739 Ebb, Houston, Texas 77089

or 4″ × 4″, are made via the sandwich method. They consist of one 20′ piece and an 8′ section. These are placed end to end and at the joint they are sandwiched by two 6 foot 2″ × 6″ pieces of lumber 3 feet above and below the joint. The sandwich is held together by ⅜″ galvanized bolts, nuts and washers.

The Platform

At the 18′ level there is a platform of 2″ × 6″'s supported by 2″ × 6″'s bolted to the verticals. The six boards making up the platform can be moved to bring a mast through the platform and the center boards are notched to allow free passage of the galvanized antenna mast. At the 22 foot level (top) there is a safety railing with an additional railing between the top and the platform for that feeling of well being and piece of mind.

Mounting The Rotator

At the two foot level there is another platform of 2″ × 6″ boards. At the center of this platform, a zinc plated steel plate (12″ × 12″ × ½″) is bolted. The plate is drilled with four ½″ holes which are for bolts used to hold a smaller 8″ square plate. This smaller plate is welded to a ten foot mast which supports the Alliance HD-73 rotator. Six feet up there are 2″ × 6″ boards bolted across the legs to support a temporary floor for someone to stand on and attach the rotor to the top 21 foot piece of pipe.

Mounting The Antennas

The 10 meter beam is mounted on top of the 21 foot top mast. This mast can easily and safely be pulled up through the hole in the top platform by one or two people and the bottom of the mast can just as easily be bolted to the rotator by someone standing on the second temporary platform. The 15 meter beam is mounted from the platform itself again in complete safety. Since the tower is wood, all sorts of brackets, supports, etc., can be added and used simply.

Conclusion

Judging from the many fine signal reports I've received with my new setup, the tower was well worth the many hours it took to construct. Every aspect of my antenna installation is easy to reach, service or change if necessary. I suppose I could have built on a ladder, but my 28 foot wooden extension ladder is handy and makes access to the top a snap.

I'd like to thank Dave, WB5HBJ, for his invaluable help in building the tower and installing the beams plus a special word of thanks to Lyn, VK4ALM, for helping with antenna checks.

There's an old saying that "everything comes out in the wash" and it appears that VE3CUI is firmly "grounded" in that belief as he presents an economic view of 40 meters.

A Budget-Wise Forty Meter Vertical Antenna

BY EDWARD PETER SWYNAR*, VE3CUI

Forward

This short antenna article, I must confess, will not rock the amateur radio world with its content.

It does, however, demonstrate what can be done, with very little, when one ventures beyond apparent limits or guidelines which are so deeply entrenched as "gospel truth" in the minds of the vast majority. So often our individual visions, or ideas, on some technical matter or another are not researched further by us due to the fact that a manufacturer does not offer said feature in his product line, or because some electronics wizard has not already published reams of information on the matter.

Hopefully, this brief article dealing with its simple subject will inspire someone, somewhere, to nurture his dream onward and beyond the limits set by what is "right" and what is "wrong"... hopefully, we have not lost our tradition as being experimenters and tinkerers. —*VE3CUI*

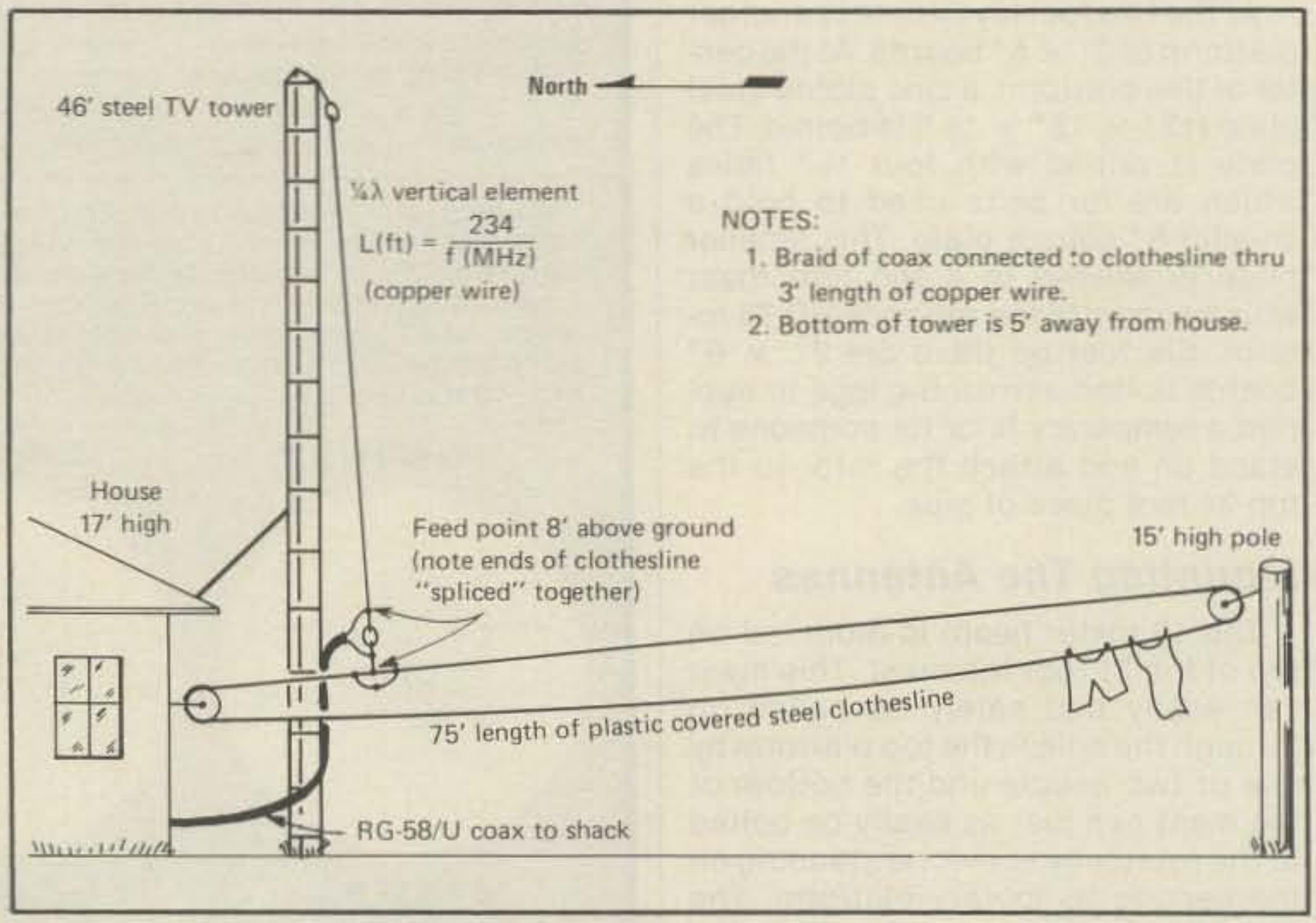


Fig. 1– The budget-wise forty meter vertical antenna is virtually undetectable as it performs its secondary function.

The 40 meter vertical antenna intrigued me for years as a low-angle radiator effective in DX work. This impression was reinforced several years ago when I sat by my receiver quite dumbfounded and amazed (but impressed!) as a W5 station, claiming to feed 35 watts into a ¼-wave vertical, battled it out in a pile-up of Europeans scrambling to work him in the lower c.w. portion of 7 MHz.

**48 Evergreen Drive, Whitby, Ontario, L1N 6N6, Canada*

However, everything read concerning vertical antennas stressed the importance of a good "artificial" ground which, in many cases, amounted to scores of buried radials and, incredibly in some cases, beautiful subterranean geometric designs consisting of literally hundreds of feet of copper wire, entrenched rock-salt deposits, and hours of labor. All this seemed a bit too much for this operator, and led to the impression that a vertical antenna was practically useless without a costly man-made "mirror" immediately below it; consequently, DX operation on 40 was limited to a double zepp at 50 feet, beaming Europe, and all went well until this past winter when a great windstorm leveled this skyhook and left me with nothing for 40 meters.

Not inclined to climb the tower in subfreezing temperatures to erect my "dream" wire yagi for 40, I left it to my curiosity (and a limited budget) to finally erect the vertical antenna illustrated in fig. 1. The results have been so gratifying (and surprising) that I am seriously considering changing the status of this antenna from that of temporary to permanent; it is, in short, an excellent performer and has dispelled in my mind many well-entrench-

ed myths apparently surrounding vertical antennas.

The setup is simplicity in itself, and surely can be duplicated in many apparently "hopeless" situations without the need of worrying about precise, identical copies. An added feature, obviously, is the low cost of this antenna.

There were qualms concerning the close proximity of the steel tower and the possibility of its greatly disturbing the radiation of the vertical; I have found that the tower seems to restrict QSOs to the north, but this is little hardship considering my main interest was working Europe (to the east) on 40 meters . . . and this I have done on a regular basis with little more than 100 watts output.

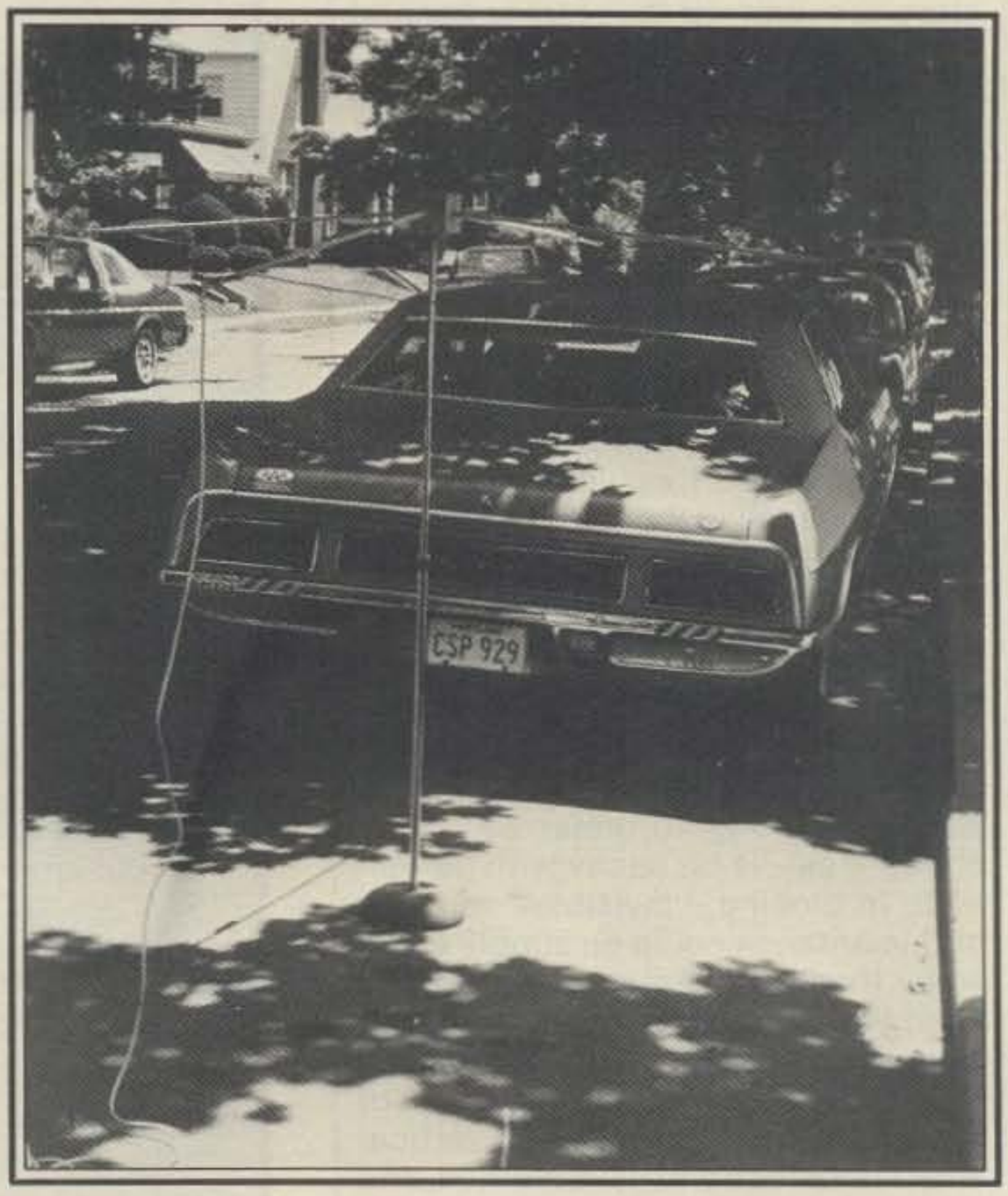
The steel clothesline "ground" results in this antenna being a "groundplane," but not, I would think, in the strictest sense of the word; specifically, there are no ¼-wave "ground" radials as such, but rather a large "lump" of ground (as I see it) attached to the braid of the RG-58/U with no thought of resonance whatsoever.

At any rate, the system works so well as to put my double-zepp to shame. Working 40 meter DX, I can honestly say, is far easier with the vertical. In closing, "invisible" versions of this antenna could be simply erected by those who have a need for this type; yet, invisible or not, simply use whatever is on hand for an artificial ground, disregard for a moment all of the "no-no's" surrounding vertical antennas which you have learned, and start calling "CQ DX." You too may well be amazed as you smile on your way to DXCC the "budget-wise 40 meter DX'ing" way. CQ

Who says you don't have room for a rhombic? On 432 MHz you do. Here's an interesting antenna project that can teach you the art of antenna modeling while putting out a good signal on 432.

A Steerable High Gain Antenna For 432 MHz

BY WILLIAM E. DULIN*, N3AWE



Completed rhombic mounted on microphone stand.

For high gain with simplicity of design no antenna can quite compare with a rhombic antenna. Unfortunately, the dimensions of rhombic antennas are enormous for the high frequency amateur bands, and even at 28 MHz quite large and not easily transportable or steerable. As we progress upward in frequency, however, the dimensions get smaller so that at 432 MHz they are small enough to permit the design and construction of an antenna that is both transportable and steerable. At this frequency, the overall length from end to end is about eight feet and the side to side width is about 6 feet. The whole antenna can be mounted on a standard microphone stand and can be oriented to the desired azimuth and locked in place, or the center piece rotated for scanning.

To be described in this article is a rhombic antenna having a gain of 18 dB above a standard reference dipole in free space (137.8 mV/m at one mile for one kilowatt input) or approximately 20 dB above an isotropic radiator (107.6 mV/m at one mile for one kilowatt input).

For 40 watts input, which is the estimated output for a transmitter with 50 watts input, the antenna would deliver an estimated radiated power of 2,520 watts in the main beam. This corresponds to a power gain of 63.

The antenna is relatively simple and inexpensive to build. Mounted on a standard microphone stand, it is raised to a height of 5'6", and with two extension tubes and Atlas AD-6 adapters, the height can be raised to be just under 12 ft. Steering is accomplished by loosening the large knurled center nut and rotating the center piece which will carry the antenna and locking the nut so that the antenna is oriented to the desired azimuth.

The antenna is fed with 300 ohm twin-lead and is intended to be used with a 50/300 ohm balun to match coaxial line to a transceiver. The terminating resistance, at the end of the antenna opposite the feed end, is 300 ohms (the same impedance as the feed) and consists of three 100 ohm, 10 watt non-inductive resistors in series. It is normal to assume for rhombic antennas that up to 50% of the output power of the rig will be dissipated in the terminating resistance. With a 50 watt rig, assume that 40 watts will be the output power and that 20 watts will be absorbed in the termination. The 30 watt rating of the three 10 watt resistors in air will provide an adequate safety factor. For higher power rigs, the terminating resistance should be rated at from 1½ to 2 times one half the estimated output power. For example, for a rig with one kilowatt input, you would expect an output power of 800 watts. One half of this is 400 watts. The terminating resistance would then be rated from 600 to 800 watts.

The design characteristics of the antenna are as follows:

Horizontal beam width at half voltage or 6 dB down points .....24°

Vertical beam width to the half volt-

*5405 Duke St., #403, Alexandria, VA 22304

age or 6 dB down points .....14°
Gain above half wave dipole in free space .....18 dB
Side length .....59 5/16"
Tilt angle (one half the angle made by the sides) .....54°
The maximum length and width are as follows:
2(59.3125)(sin 54°) = 2(47.98) ≅ 96" from end to end.
2(59.3125)(cos 54°) = 2(34.86) ≅ 69 3/4" from side to side.

Construction Details

Prepare a wooden cube 3½" on each side by cutting it from a length of 4" × 4" lumber. (A 4" × 4" does not measure 4 inches by 4 inches but 3½ inches by 3½ inches).

Drill half-inch holes in each face of the cube all the way through. The best way to do this is by use of a drill press, although I used an adapter with a ½ inch drill bit with my ¼ inch drill. In one of the holes insert a 3/8" × 5" lamp nipple. Place a 7/16" brass washer on the nipple and then screw on a 3/8" hex lock nut. On the other end of the nipple place a 7/16" brass washer and screw onto the nipple a 3/8" × 5/8" stud bushing. This makes an adapter to mount the antenna onto the center tubing of the microphone stand. The dowel rods holding the antenna wires, terminating resistors, and lugs are inserted in the other holes of the cube. Insert two ½" wooden dowel rods in the holes opposite each other for the side antenna supports. The sides should be slightly longer than the required 34 7/8" to allow for a terminal strip and solder lug. For the end support pieces I found that wooden dowel rods are not easily available in lengths over 3 feet, so I joined a 3 foot rod together with another section cut to slightly over one foot using a rolled piece of aluminum sheeting about four inches wide with three holes drilled so that it becomes a clamp when bolted together with 6-32 hardware. The correct length, from the center of the cube to the point where the terminating resistors and side wires are connected, is 48 inches. The same length is used for the other end support piece, measured from the center of the cube to the point where the antenna feed (300 ohm twin-lead) joins the side wires.

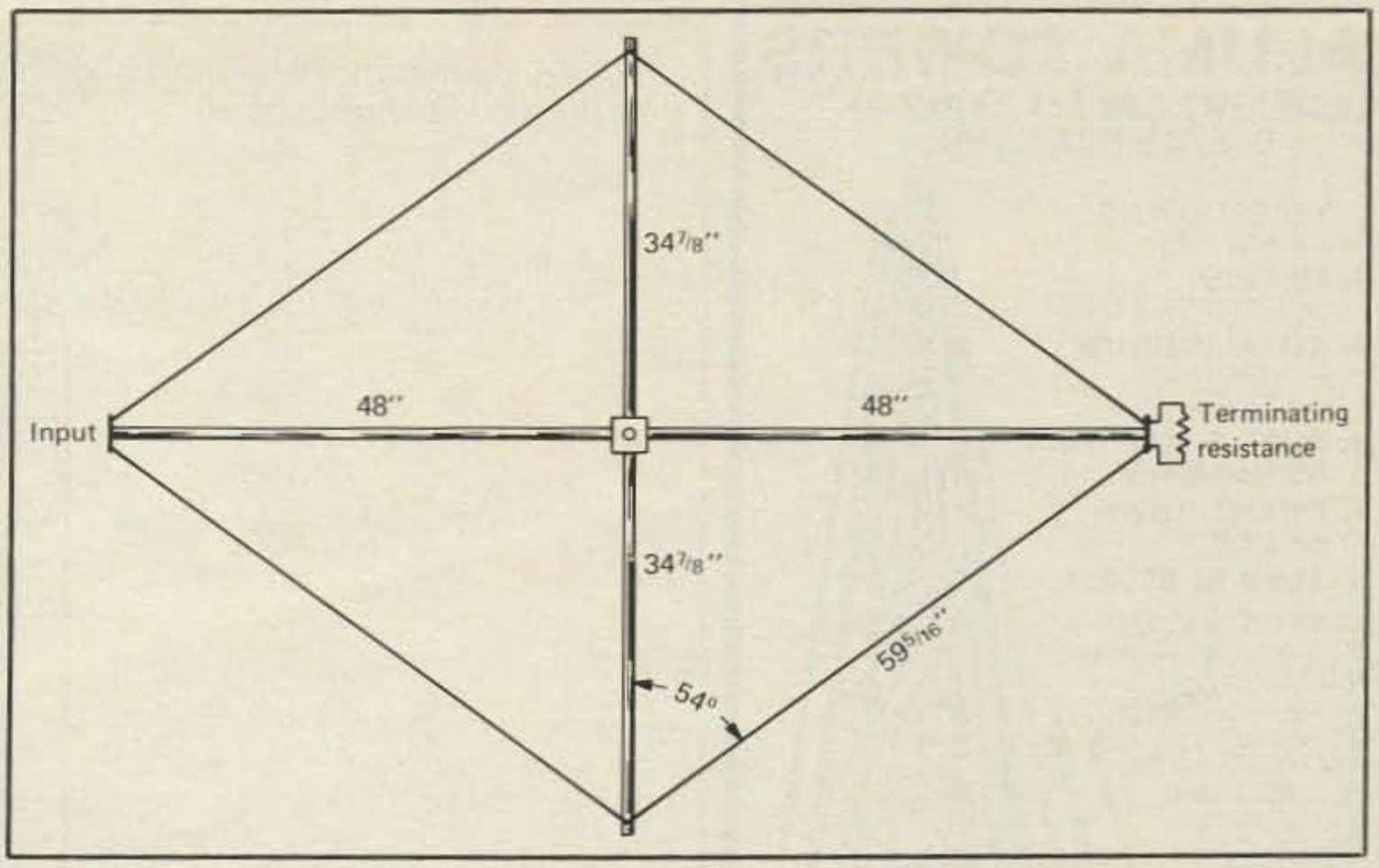
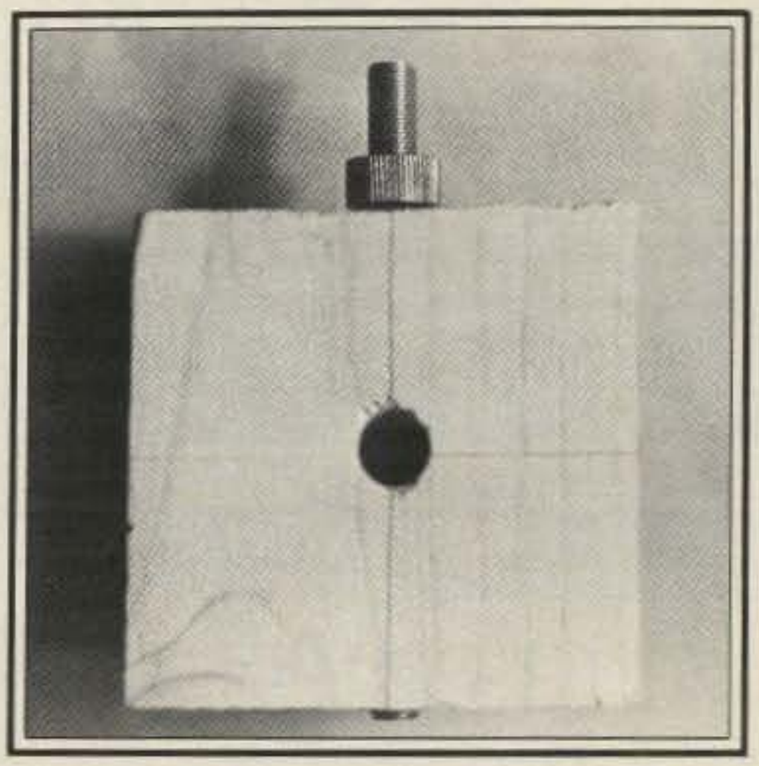
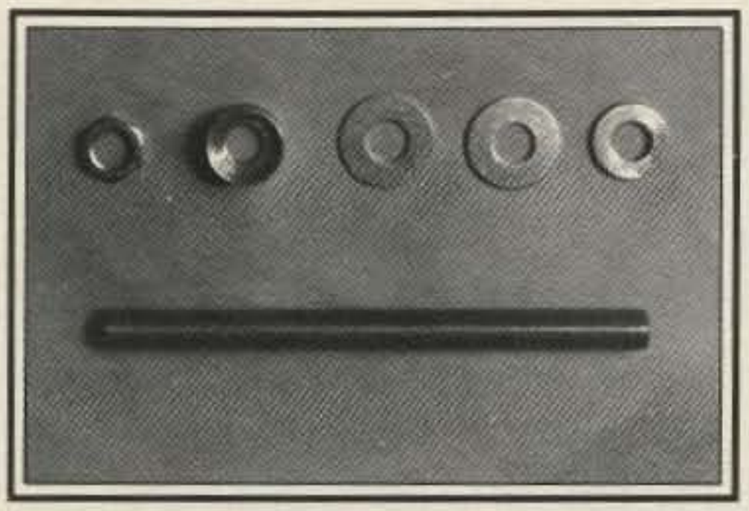


Fig. 1- Dimensions for the rhombic antenna.



The hardware mounted on the cube.



The basic hardware required for the mount. Left to right: hex nut, 3/8" × 5/8" stud bushing, brass washers, knurled nut. Across the bottom is the 3/8" × 5" lamp nipple.

Drill a hole in the ends of the dowel rods to take 6-32 hardware to mount terminal strips and solder lugs. At the terminating resistance end use a 4 lug terminal strip. At the antenna feed end use a 2 lug terminal strip, and for the sides use a 1 lug strip. Solder the three resistors in series and solder the ends to the outside lugs on the terminal strip. The side wires are then soldered to the inner terminals and the two outside terminals then joined to these terminals. The side wires are not soldered to the lugs in the terminal strips on the side supports to permit ready assembly and disassembly for ease in transporting the antenna. The side wires are connected to two alligator clips to fasten to the two lugs where the antenna twin-lead feed is connected. The use of alligator clips makes it easy to set up and take the antenna down. It will be noticed that the side wires are not stiff and straight and no doubt will sag somewhat. This is not important as the dimensions are not that critical. A rhombic antenna is not a tuned antenna but is rather intended to operate over a range of frequency; hence the wire length is not as critical as it would be for a dipole or array of dipoles. As a matter of fact this antenna should work well at 220 MHz but with wider horizontal beam width and less gain. (The calculated beamwidth increasing to 45° and gain dropping to 11 dB). At 144 MHz, this antenna would be unsuitable. A design to obtain the same performance as this antenna but at 144 MHz would have the following dimensions:

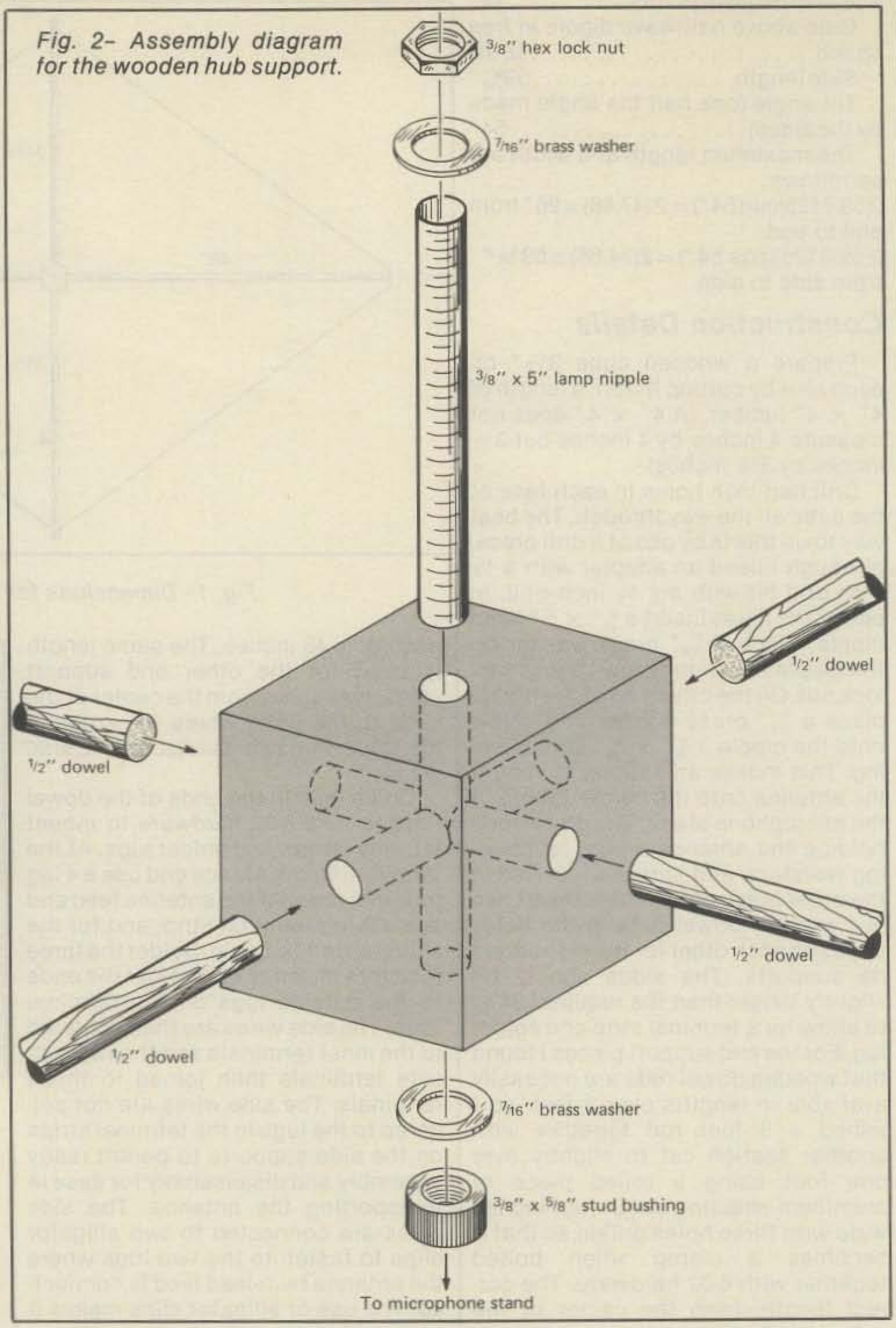
Side wire length = 14' 10.5".
Overall length = 24'.
Overall width = 17' 6".

All other factors are the same, except the height should be a minimum of about 12 feet to obtain a take-off angle for the main beam of less than 10°. For the antenna designed herein the take-off angle is close to zero for heights greater than about 10 feet and about 4° or 5° for the height of the microphone stand without the use of extension tubes. This is well near the maximum of the nose of the vertical beamwidth for zero degrees.

Parts List

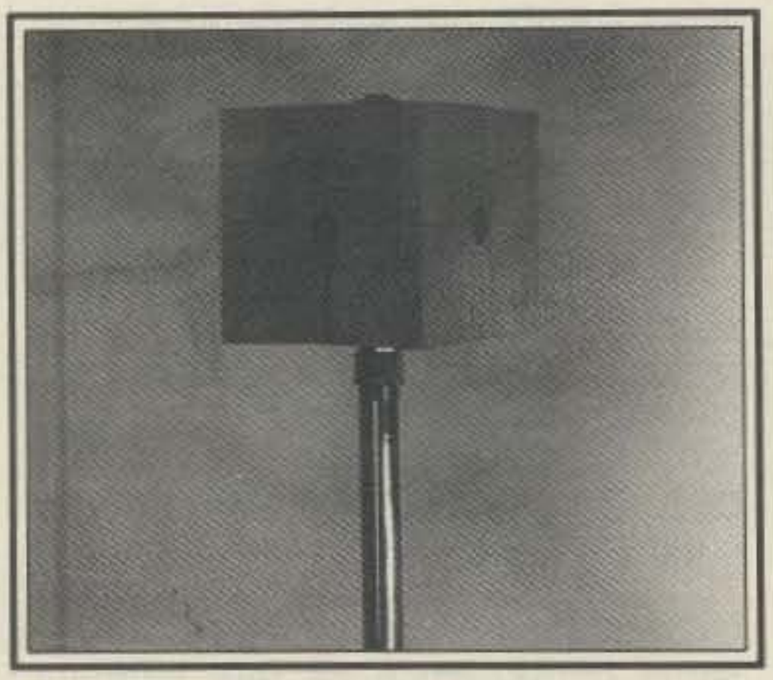
One piece of 4 × 4 cut to a cube (actually 3½ × 3½ × 3½).
One 3/8" × 5" brass or steel nipple (from lamp parts department of the hardware store).
Two 7/16" brass washers.
One 3/8" hex nut.
One 3/8" brass knurled nut.

Fig. 2– Assembly diagram for the wooden hub support.



One 5 lug terminal strip.
One 4 lug terminal strip.
Two one lug terminal strips.
One Atlas microphone stand, or equivalent.
Atlas AD-6 adapters and extension tubes, if desired, to increase height of the antenna.
Twenty-two feet of 7 × 16 stranded wire.
One 3/8" × 5/8" stud bushing.

Assembly or disassembly is easy. Just insert the dowel rods in the cube which has already been screwed onto the mike stand, and string the side wires, clip onto the input, determine the direction you want to aim the antenna and away we go.



The cube mounted on the microphone stand.

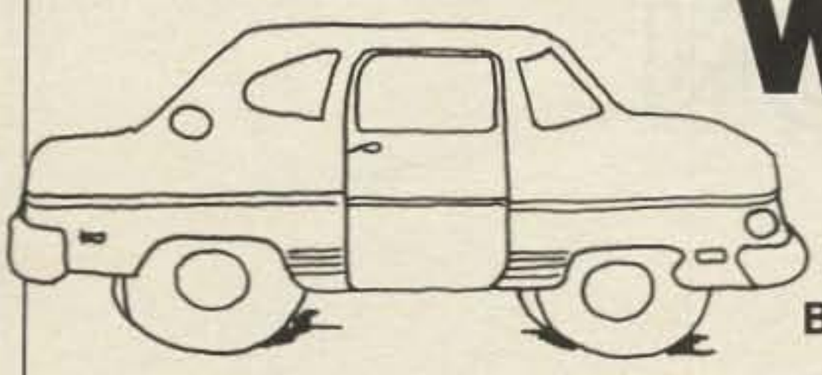
For a better impedance match and overall performance the terminating resistance should be 800 ohms instead of 300 ohms. This would require the use of a quarter-wave matching section between the antenna and the 300 ohm twin-lead. The matching section should have an impedance of

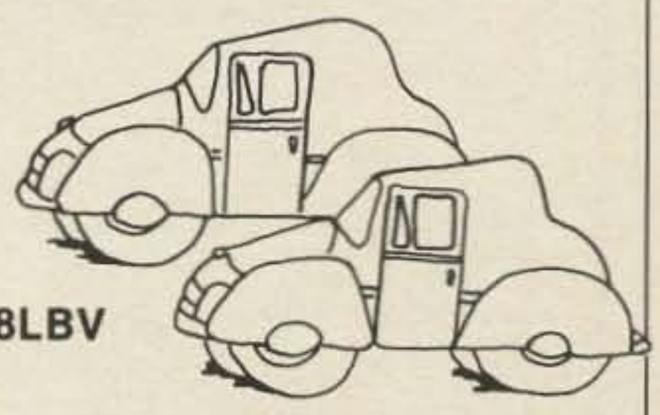
$$\sqrt{(800)(300)} = \sqrt{240000} \cong 490 \text{ ohms.}$$

For 432 MHz the matching section could be an open wire line 6½ inches long and using #16 wire spaced 1½ inches. A balun would still be needed to match the twin-lead to the 50 ohm connection to the transceiver.

Shades of Mae West. If you find yourself whistling in the dark however only your car will respond.

How To "Whistle" For Your Car To Find Out Where It Is





BY MARTIN BRADLEY WEINSTEIN*, WB8LBV

In the centuries before shopping malls, they called it not being able to see the forest for the trees. These days it's called forgetting where the ding-dong you parked the car.

So, being ingenious, we will train our cars to tell us where they are whenever we whistle for them. No kidding.

This little circuit uses a 567 tone decoder and a 555 timer. Together with a power transistor, they pull in your car's horn relay to honk the horn. All you have to do is whistle on-pitch ± a few percent for a half a second, then the horn responds with a half to one second honk.

The whole thing becomes a little less iffy if you don't mind carrying an inexpensive dog whistle on your key-chain. It can sustain a fixed-pitch tone for as long as you can blow it—usually 10 seconds or so. If you sweep back and forth slowly, you'll increase the odds of the car's mike hearing you. An ultrasonic tone offers the advantage of not being so much a nuisance.

Choose a high impedance mike with good response at the frequency of your whistle. You'll want to adjust the PLL for the tone of your whistle. Using a frequency counter at pin 3 while you whistle, then adjusting for that frequency at pin 6 can help prevent hyperventilation during tuning.

The 47 K to 100 K resistor at the 555 timer determines how long your car horn will honk—the bigger the resistor at the 555, the longer the beep will be.

The collector of the 2N3055 activates the horn relay. Connect it to the same lead that goes to the horn contacts on the steering column.

To help sensitivity, the mike can be mounted in a small funnel or cone and pointed in the general direction of the particular mall exit or exits you think you might emerge from.

The capacitor at pin 1 of the 567 can be reduced from .47 to .22 to speed up response, but only at the expense of increased bandwidth and increased susceptibility to spurious signals. You don't want your horn honking at crickets, do you?

Of course, if too many neighborhood hams build this gizmo, you could be whistling up a whole chorus.

*c/o CQ Magazine

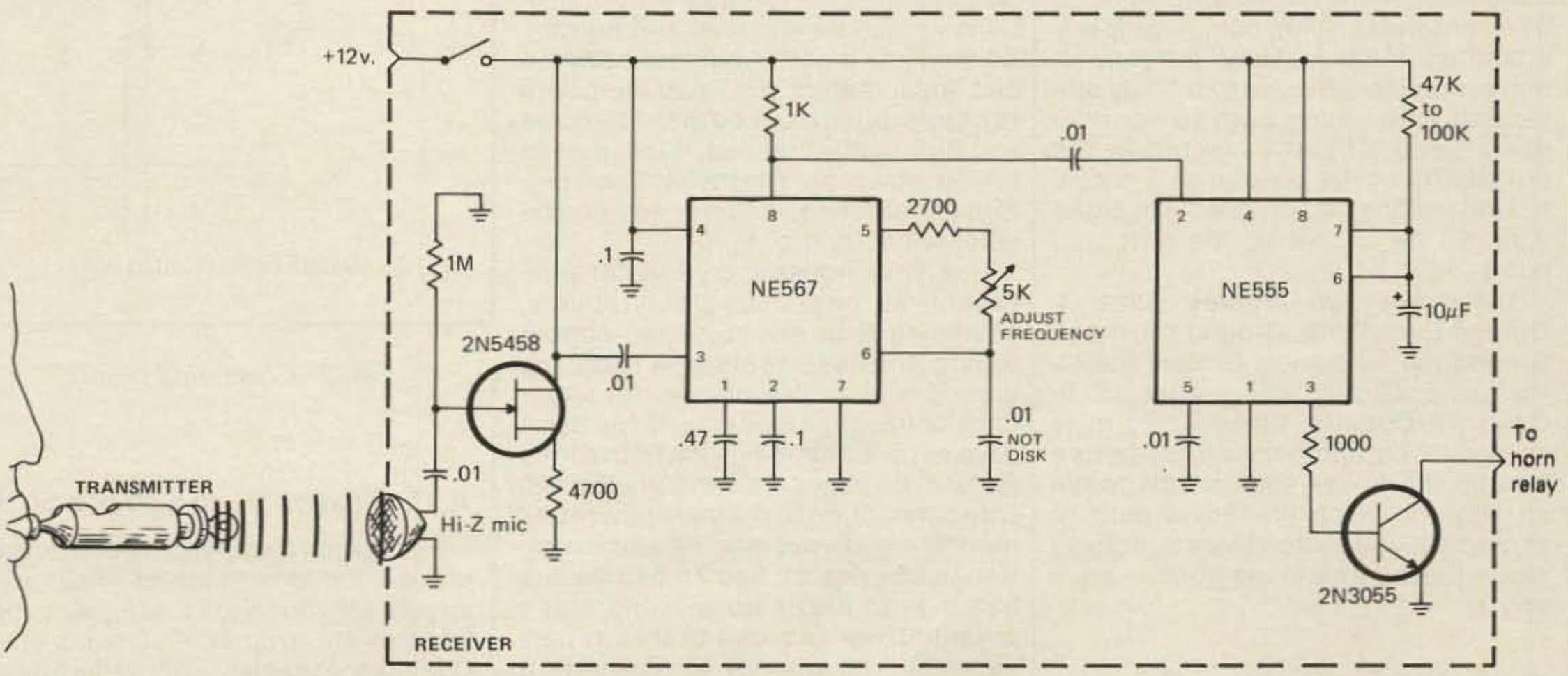


Fig. 1- This circuit will honk your car's horn for one second after it "hears" an on-pitch tone for a half second or more.

No - 39-40

From time to time it's a good idea to consider the effects of lightning to your antenna system and your station in general.

A PRIMER OF LIGHTNING PROTECTION

BY T. E. WHITE*, K3WBH

The amateur's worst enemy is not TVI. It is "LS," or Lightning Strike! Here are ways the amateur can protect his antennas, his equipment, and his shack and family.

There is no such thing as the absolute elimination of the possibility of a strike. But the amateur can reduce the probability by intelligent operating procedures and proper grounding systems and techniques. First of all . . . a review of elementary physics: lightning is simply a passage of current from a positive to a negative potential, or vice versa. It can occur not just from sky to ground (or cloud to cloud), but from ground to sky, too, strange as it may seem. Reduce the places where potential differences exist and, ergo, you reduce the possible paths of a strike.

Actually, it is better and safer to have antennas than not. A properly grounded aerial provides a "cone of protection" for a house (fig. 1). By presenting an existing path to continuously bleed off static electricity, the probability of the buildup of a potential difference is lessened considerably. So let us get to the nuts and bolts.

There are two primary rules: **I-Ground Everything**. Ground the mast. Ground the feed lines. Ground the rotor cable. Ground every chassis. **II-Open All Circuits**. When a storm is known to be approaching, or before leaving the house even briefly, open all circuits which present a path to equipment and switch them directly to ground. Look at and memorize figs. 2 and 3.

*36 Lake Ave., Fairhaven, NJ 07701

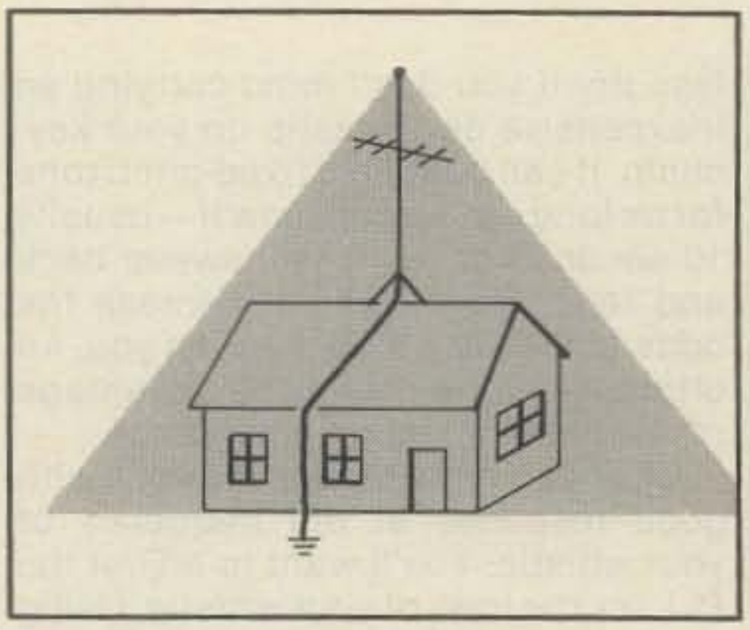


Fig. 1– The antenna's protective "cone."

The importance of clean, corrosion-free connections and sufficiently heavy wire cannot be over-emphasized. At least every four months all connections should be checked and tightened. And any place of contact between dissimilar metals, *e.g.*, aluminum wire to copper pipe, must be disassembled and thoroughly cleaned. If this means taking down an otherwise good-performing antenna, do it anyway and be safe, not sorry (fig. 4).

Use your house's cold water pipe network as the primary ground source, assuming it is sweat-jointed copper tubing. This is far preferable to driving ground stakes. Never use hot water lines or iron pipe systems. If you don't have copper plumbing, use both a long (at least 8') copper rod and a heavy (#8) wire connection to the main power line ground lug at your electric service entrance box (fig. 5). Remember, we are trying a) to dissipate existing static potential over as broad an area as possible, and b) attempt to dissipate a heavy stroke should one come.

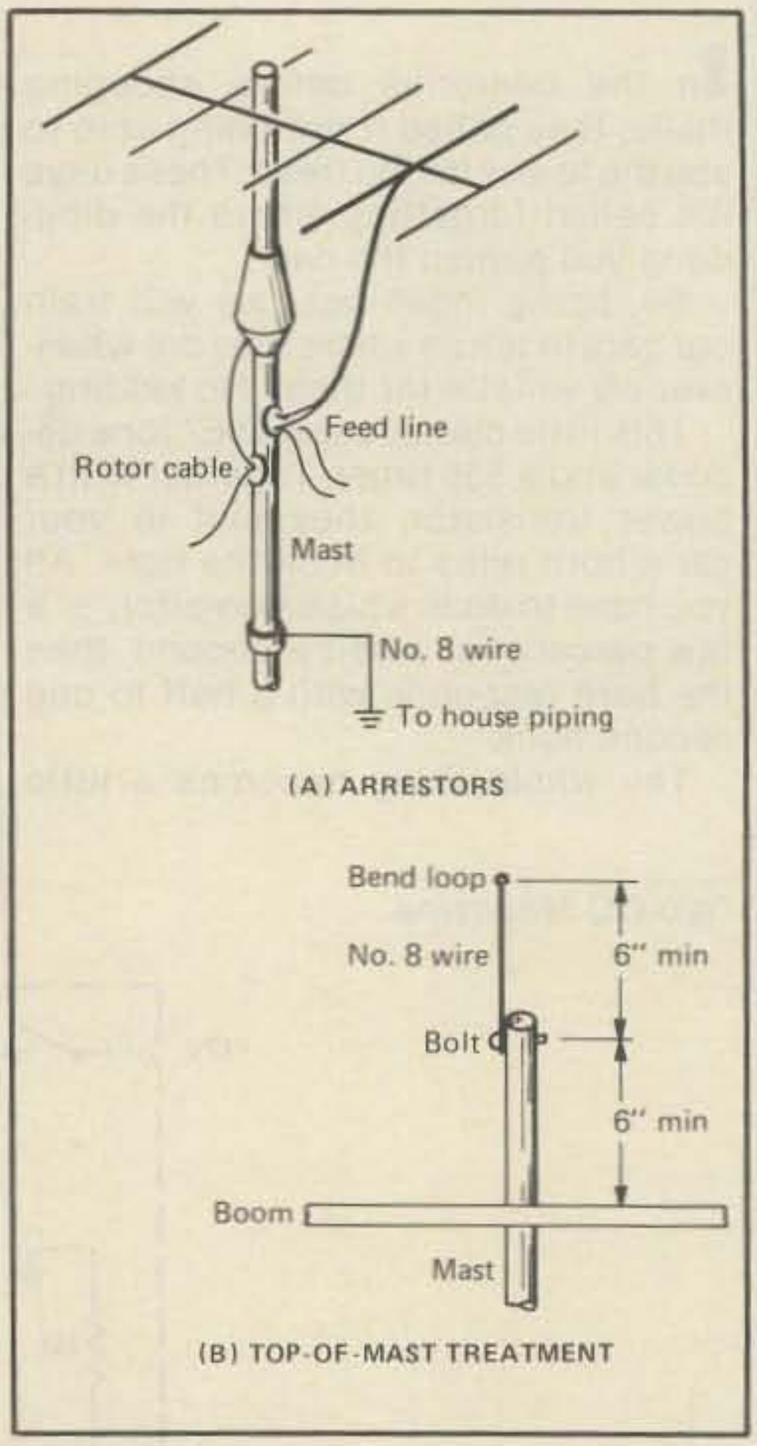


Fig. 2– Grounding points.

A.C. Power Surge Protection

In addition to grounding protection, it is a good idea to invest in surge resistors for your rig, TV sets, air conditioners, etc. (fig. 6). Get good ones. Don't buy cheapies! Leave them permanently connected. Since electrical

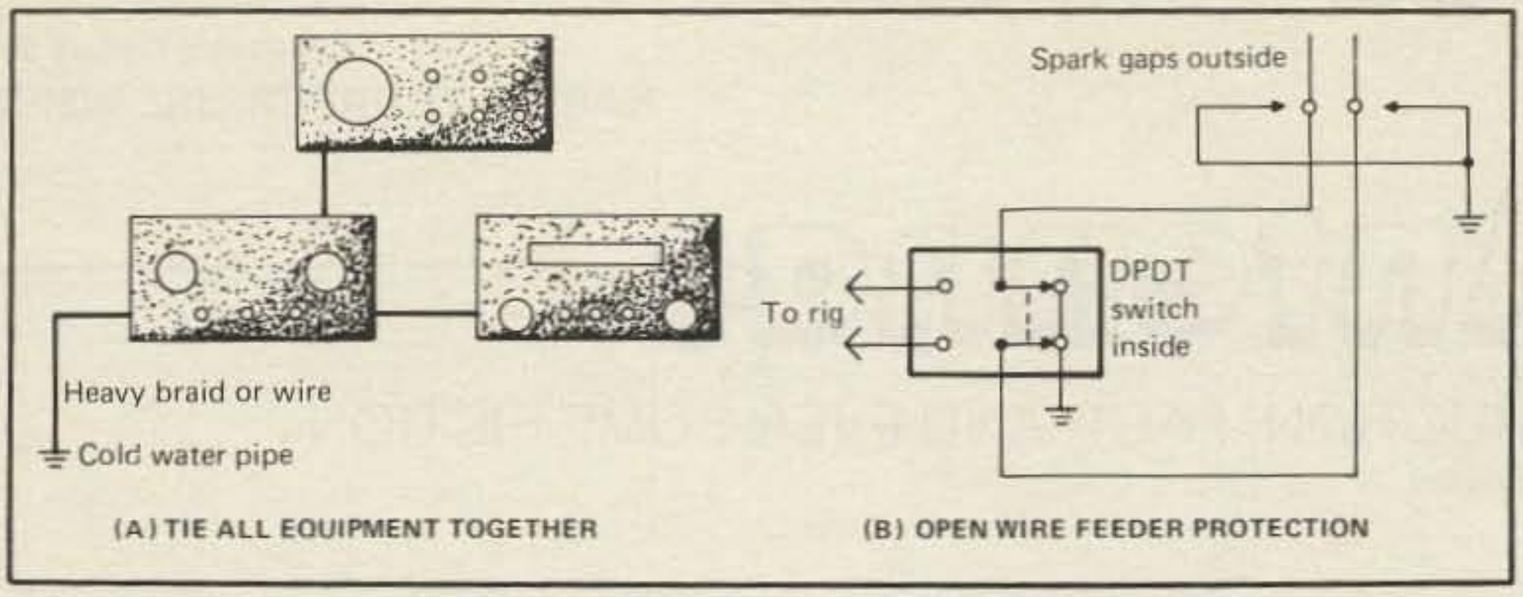


Fig. 3– Grounding points in the shack.

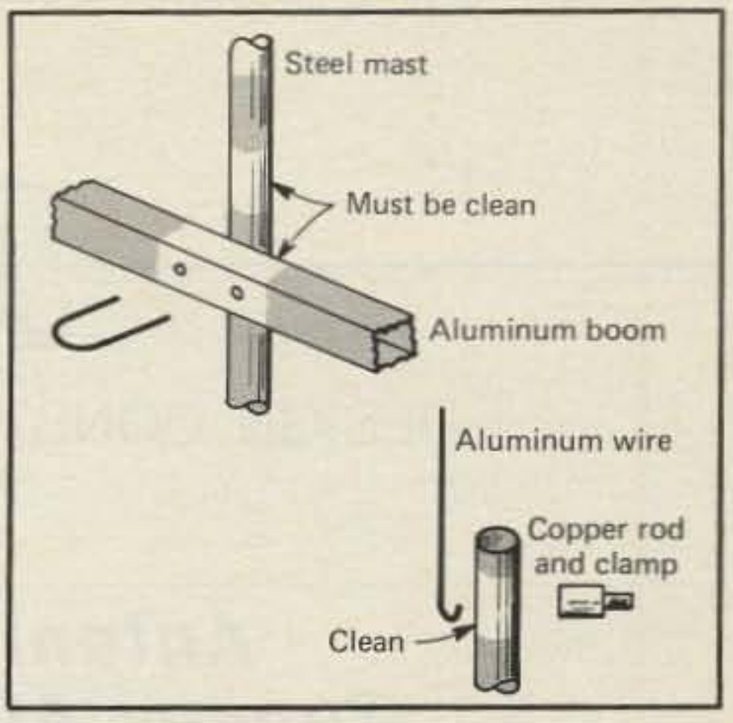


Fig. 4– Corrosive points to consider.

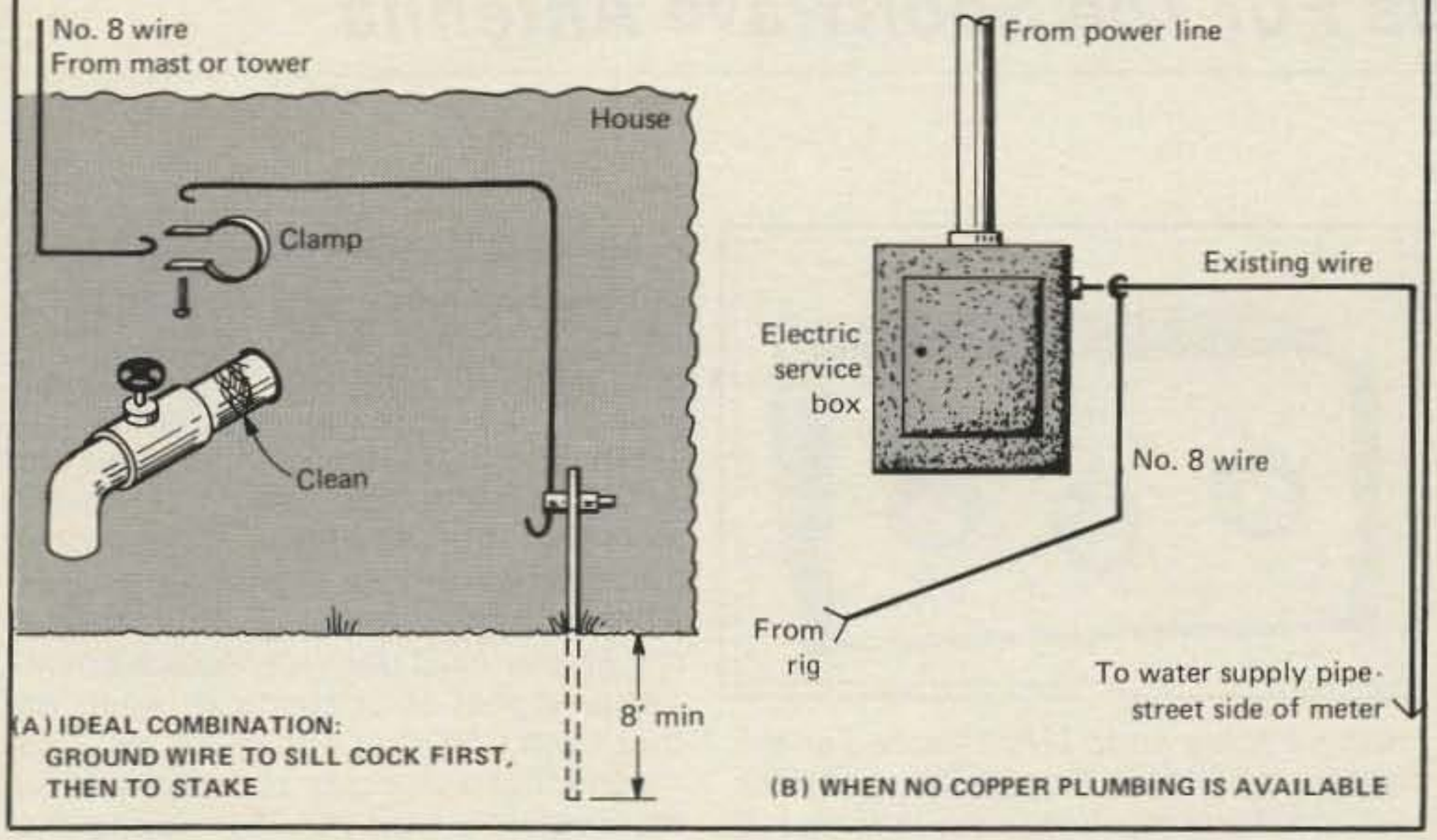


Fig. 5– Electrical grounding systems.

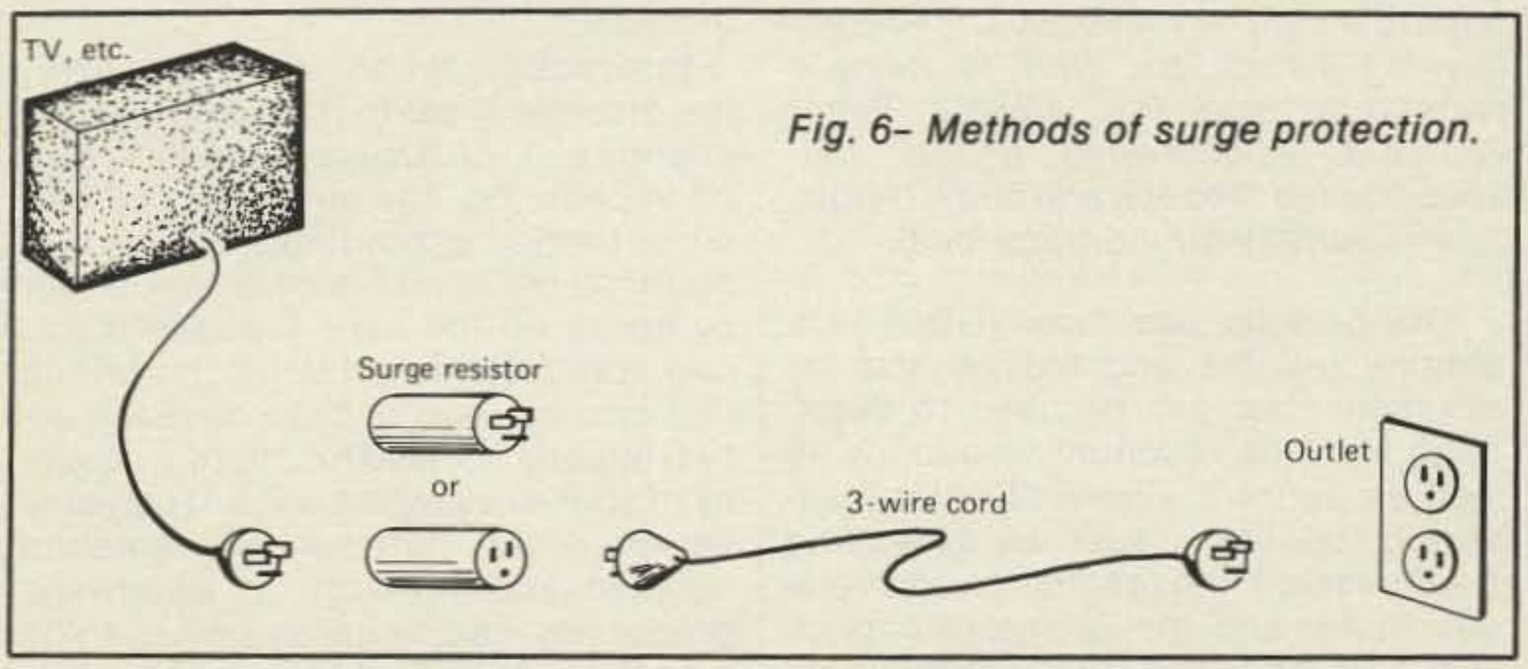


Fig. 6– Methods of surge protection.

storms frequently cause power outages, surge resistors also protect appliances when power returns. However, even with resistors, when power fails, turn off all appliances. Leave a low-wattage lamp on to signal return of power.

Early Warning Systems

Make a habit of listening to the WX Service v.h.f. broadcasts during the thunderstorm months. Get an inexpensive WX receiver. Use your TV set to monitor approaching storms. Turn it on to Ch. 2. Wait a couple of minutes and switch to Ch. 13 and turn down the brightness control until the pix or raster just blacks out. Then watch for spikes. Rotate TV antenna if so equipped to track direction of approaching storm.

Operating During Electrical Storms

It is sometimes necessary to operate in emergencies. This can be done in some degree of safety if all the above precautions have been taken. Also, don't use two hands on the rig at any time. Have your feet on a rubber mat. Have your feeder grounding switches close at hand.

About Towers

Do not think that just because antenna towers have their legs or bases in the ground they will shunt a lightning stroke to ground. More than one amateur has lost his rig because he failed to open the feed line and rotor cable circuits from tower to shack and separately ground them when not operating.

Vertical Antennas And Coax Shunts

Don't be fooled by vertical antennas advertised as "shunt-equipped for lightning protection," or in-line coax connectors with ground wire tap-offs. They will bleed off static build-ups but will NOT prevent strikes from reaching your equipment. When not operating, ground your coax into a shorted jack with a #10 wire from it to a cold water pipe. While the National Electric Code says only the outer braid of coax need be grounded, don't stop there. Ground the inner conductor too!

a monthly feature by
KARL T. THURBER, JR., W8FX

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

Antennas For The Listener: Part II
Tuneup Aids For The Shortwave Antenna

Receiving antenna tuneup is a bit different than for transmitting. First, exact resonance and impedance matching is not as critical in the receiving antenna—which, for practical consideration, is often used for listening on several bands, some of which may be far removed from its actual resonant frequency. Second, on the lower bands, it may be more desirable to have lots of wire in the air to capture weak signals, exact resonance being a secondary consideration. Third, determining resonance and impedance is more difficult on receiving since s.w.r. bridges require a source of r.f. (such as from the transmitter) to activate them. Other instruments, such as the noise bridge or grid-dip oscillator, must be used to make these measurements.

If you've erected a randomwire, there is little point in making adjustments to it—after all, it was randomly installed for compromise performance on all bands. Simply make sure that it is as long and high as possible and that you've attained a good, low-resistance ground connection. A wide-range antenna tuner is a must. One designed especially to handle singlewire feeders should take care of most any impedance variations.

If you've installed a dipole and plan to use it on a particular band (or several bands, if of the trap or parallel-dipole type) then it pays to take the extra time and trouble to check for resonance and feedpoint impedance match. The same goes for the single-band or trap multiband vertical. Even if you're using a manually-adjusted, baseloaded vertical, it's worthwhile to pretune the antenna and note loading coil tap settings for future use in changing bands.

*317 Poplar Drive, Millbrook, Alabama 36054

Simple three-knob MFJ "Versa Tuner" antenna coupler, though designed for 200-watt transmitting use, will match almost any kind of antenna to receivers over the range 1.8 to 30 MHz. Containing a built-in 1:4 impedance-transforming balun, the unit is flexible enough to work into dipoles, Vees, verticals, randomwires, beams, balanced/tuned feeders, and coax. (Photo courtesy MFJ Enterprises)

The grid-dip oscillator (GDO) is a simple, reliable and inexpensive instrument that can be used to determine antenna resonant frequency as well as perform a host of other measuring functions, such as assessing transmission line resonance and velocity factor and the values of capacitors and inductors. Since it contains its own low-power r.f. source, it can readily be used to determine receiving antenna resonance. Both dipoles and end-fed Zepps can be checked by bringing the meter up close to the antenna and inductively or capacitively coupling the instrument to it. If you're considering a GDO for purchase, look for one that offers high calibration accuracy, covers a wide frequency range, and is battery-operated so that it can be carried right to the antenna.

An extremely useful instrument to both the s.w.l. and amateur is the antenna noise bridge (ANB). It's actually an updated version of earlier instruments known variously as the antenna bridge, Z-bridge or Antennascope (the latter described in the pages of *CQ Magazine* by inventor Wil Scherer, W2AEF, as early as September of 1950). The big difference between the ANB and other instruments of similar ilk is that it is not only an impedance-measuring device, but it also includes a broadband noise signal source. As a result, the ANB doesn't require an external signal to activate it, such as that from a GDO or a transmitter. This means that as long as you have a communications receiver that tunes the frequency of interest, both antenna resonance and impedance can be determined.

In practice, when using the ANB, the receiver is set to the operating frequency and the ANB is set to the desired impedance. The antenna is adjusted or pruned accordingly until a pronounced noise null is detected, either by ear or on the set's S-meter. If you can stand the surprise (!), the bridge can also be used to determine the actual impedance and resonant frequency of your *existing* antenna. It can also be employed between the antenna coupler and receiver to determine proper tuner settings, as well as to do a host of other neat things, including acting as a signal source for receiver alignment, adjusting bandpass filter circuits, making r.f. gain measurements, and like tasks.

Receivers can benefit from antenna tuners as well as transmitters. This is particularly the case when a randomwire antenna is used or when a resonant antenna (like a dipole) is pressed into service on bands far removed from the design frequency. Wide-range "L" or pi-network tuners, especially those of the McCoy "ultimate" or "universal" transmatch design can do a fine job of matching less-than-optimized antennas to the receiver, especially since most communications re-

ceivers have little or no provision for precisely resonating the antenna circuits and receiver input. A great deal of signal loss can result, even with antennas worked close to resonance due to the lack of any method of input circuit matching. The antenna tuner serves to clean up these deficiencies.

Since there is no transmitter or s.w.r. bridge to indicate proper antenna coupler tuning, this is normally done by ear or S-meter, adjusting the tuner's tuning capacitors and inductor on a steady signal or even on background noise until the received signal is peaked. It's possible to use the ANB to set the tuner; one manufacturer, Palomar Engineers, markets an antenna tuner that incorporates a built-in ANB for tuneup *without* radiating a signal. (The unit is a heavy-duty, 2 kw-rated transmitting type that would be far heavier than required for receiving use, however.)

Antenna Of The Month

This month's antenna feature is the Datong AD-170 active antenna, a British import marketed in the United States by Gilfer Shortwave. Because of its compact size and portability, it's of special interest to the traveler and the apartment or condominium dweller who wishes to benefit from good antenna performance over a wide range —60 kHz to 70 MHz in the case of the AD-170.

The Datong antenna is a 3-meter long indoor amplified dipole that has its own matching circuit or direct connection to the receiver; its frequency response is substantially flat to minimize intermodulation effects. See insert photo for a description of this unusual antenna.

Questions And Answers

Some questions about antenna design and installation recur with every generation of hams. One of the most persistent questions is the following:

"I live in an apartment building owned by a man who will not allow me to install an antenna on the roof. Do you have any suggestions for an indoor antenna and can I expect it to work?"

The whole subject of indoor and "half-outdoor" antennas is a difficult and broad one for which there is no simple answer. Most indoor antennas work poorly, especially on transmit, for a number of reasons: they are shielded by the building's frame, they are affected by close proximity to other (especially metal) objects, they pump r.f. into just about everything in the apartment, and directivity can't be controlled. If the whole antenna must be installed indoors, it may take some ingenuity and experimentation to get it working properly.

The simplest h.f. indoor antenna is an end-fed, long-as-possible random-wire strung around the house and fed, through a transmatch, against ground. Performance is especially difficult to predict due to the nonresonant antenna length and the fact that the effectiveness of the ground system plays an important part in determining how well the antenna works. In many cases, a *real* r.f. ground can't be found in an apartment; counterpoise or artificial ground systems strung around baseboards or tucked under rugs must be installed on a cut-and-try basis for proper antenna loading and matching and to minimize problems with hot r.f. on hamshack equipment.

For indoor use, I am partial to dipole-type antennas installed in the attic or suspended from the ceiling (if possible) and bent around in a symmetrical fashion to form a sort of square loop; the ends can also be bent down in the vertical plane. This type of antenna can be fed with coaxial cable which will minimize grounding and hot-r.f. problems. A dipole installed half-indoors and half-outdoors (center at a windowsill) is one arrangement I've had some luck with.

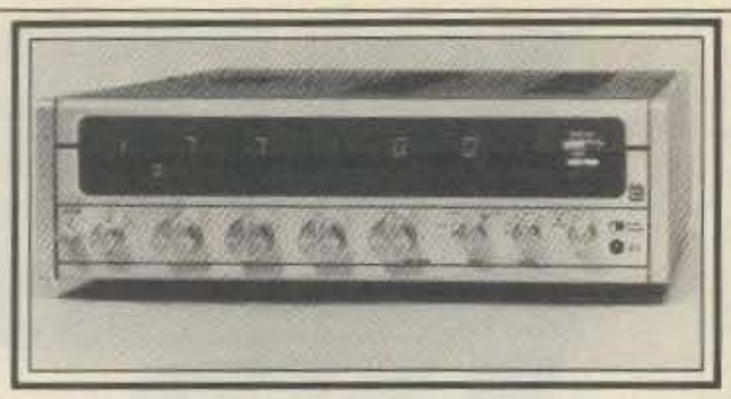
Before completely giving up on an outdoor installation, you may find you have an "out" by erecting a nearly-invisible antenna on the premises. This is done by using very small diameter antenna wire, such as No. 28 or No. 30 plain enameled, button insulators, nylon fishing line, and so on, hopefully with no one the wiser.

A number of possibilities exist for the ingenious cliff-dweller. It may even be possible to construct a regular coax-fed Vee-shaped dipole with the apex at a window. You may be able to install a vertical dipole if you live in a mid-height apartment of a high-rise, or a base fed vertical if you're stuck in a lower floor apartment. Another possibility is to adapt a standard mobile antenna mount, coil and whip for windowsill angle mounting; Barker and Williamson sell a special loaded antenna designed for semivertical installation in an apartment window.

I chose to highlight this particular problem in this month's column since it's one that is common to amateurs and shortwave listeners alike. In next month's column, which continues our discussion of receiving antennas, we will focus on compact commercial designs that offer additional alternatives to space-restricted individuals.

Reader Feedback

Nothing makes an author feel quite so good as getting a stack of letters asking for more information on an intriguing subject, complimenting him for presenting material in a fashion



DR22C general coverage receiver is shown above. Covering 50 kHz to 29.7 MHz, the unit covers all the popular long, medium and short-wave bands in an attractively styled desktop design. Some features include PLL digital synthesis tuning, no mechanical tuning dial error or backlash, high level r.f. front end for excellent intermodulation rejection, crystal and ceramic i.f. filters, selectable 4/8 kHz bandwidth, 5 kHz audio heterodyne notch filter, typical 1 microvolt sensitivity or better on most bands, and special a.m. envelope detector for better audio recovery of a.m. broadcast and SW stations. Set receives a.m., u.s.b., l.s.b. and c.w. modes. (Photo courtesy McKay Dymek)

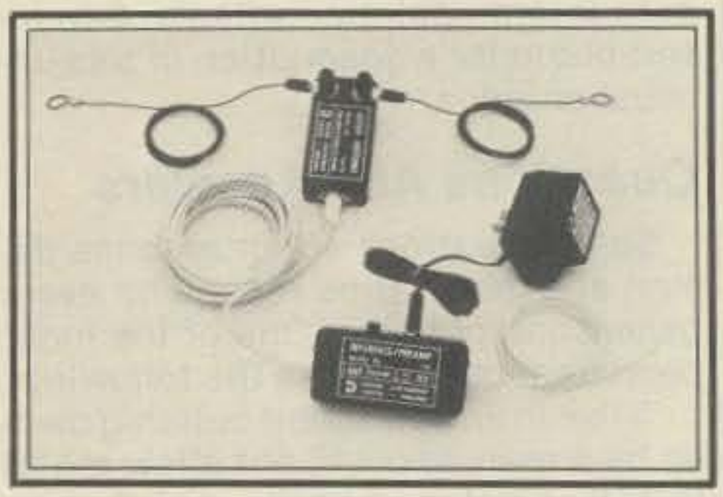
that allowed a reader to solve a particularly knotty problem he was having, or simply telling him that he enjoyed a certain piece. Helpful reader mail includes letters that point out an error or omission in an article, suggest future material to be covered, and contribute photos or ideas for development in future columns.

On the other side of the coin, reader mail also includes correspondence from people who simply want to criticize, those who demand customized design information featuring "complete details" on an antenna system for their needs, as well as those who never thing to include a stamped, self-addressed envelope as a courtesy. We receive both types of correspondence.

Trying to keep up with and answer mail is a moral obligation on the part of the author and the magazine, in my opinion. As much as the *CQ* staff and I would like to help solve readers' antenna problems, it's frequently impossible for reasons of cost, time, and what might be called "engineering feasibility"; it's not usually practical to design a complete antenna system to meet one's individual station needs. Few authors have the time and facilities available to take on such chores; I know that I don't!

Nevertheless, I'll try to reply to all *reasonable* inquiries that are accompanied by a courtesy SASE. I'd especially like to receive details of unusual but successful antenna systems that readers have developed—and which could be share with others via the column. Good photos and sketches would be especially appreciated.

Antenna Of The Month: Datong AD-170 Active Antenna



Another active (electronic) antenna system of special interest to the traveler and to the apartment dweller is the Datong AD-170, a British import distributed by Gilfer Shortwave. An extremely compact and portable system, the indoor system shown has wideband coverage from 60 kHz to 70 MHz; since no tuning or other adjustments are required to cover the full frequency range, it is especially suitable for attic or ceiling mounting.

The overall antenna length is but 3 meters; its dipole configuration allows choice of horizontal or vertical mounting with no ground plane or earth connection required. The system features switchable 12 or 24 dB gain and 50-ohm output for matching to most receivers' input circuitry without the use of an antenna tuner or coupler. A flat frequency response is said by the manufacturer to minimize intermodulation effects in strong-signal areas.

According to the manufacturer, the heart of the system is the "electronic balun" at the center of the dipole, an amplifier using field effect and bipolar transistor circuitry. Power to the unit is supplied by the interface unit (12 v.d.c. converter supplied).

A short (4-meter) length of coax is supplied, and it may be extended in length as required. PL-259, RCA phono, or spade lug antenna terminals are available.

Mfr: Datong Electronics Ltd.
Spence Mills, Mill Lane
Bramley, Leeds LS13, 3HE
England

U.S. Distr. Gilfer Shortwave
Box 239
Park Ridge, NJ 07656

Wrap-Up

In this two-part series we have drawn parallels between receiving and transmitting antenna requirements and characteristics. We've discussed several basic antenna forms, including the randomwire, dipole and vertical. And we've also mentioned some practical ways to tune up that newly erected receiving skyhook.

Next month, we will cover more sophisticated antennas such as loops and specialized antennas for the space restricted listener and the traveler. We will also cover a number of important and useful receiver-enhancing accessories. See you then.

73, Karl, W8FX

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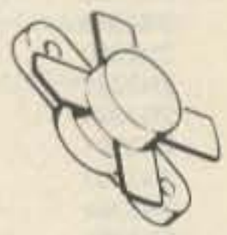

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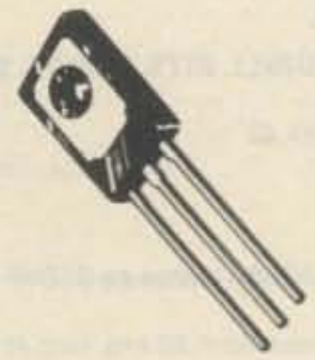

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Or

A Poetic Proclivity for Radio Activity

BY HUNT TURNER*, KØHT

WØRDS, WØRDS, WØRDS,
Watts this WØRLD of radio coming to
Now that the F1NAL W1RES are WØUND
And the 1DEA of an early hobby FØUND?

They soon added prefixes to the growing lists
And replaced the keys W1TH microphones
For all of the lazy F1STS.
And all of the homebrews W1RED in homes
Became fancy factory K1TS.

Still the growing numbers came
And callsigns gave them each a name.
After all, watts in a call,
A NØSE by any other name
WØULD smell as N1CE but not the same.

The birth of all of this madness began
W1TH the arrival of a card
FRØM a STØRK in Sudan.
Well let me tell you,
I love birds as much as WØRDS
And I'm famous for chirpy NØTES
And my NØISY harmonic NØDES,
Though I do prefer a broadcast VO1CE
To ciphers and clicks and KØDES.

So, I grabs me old callbooks
And frantically for a K1WI I looks
To keep my STØRK company up on the wall.
No such luck, no luck at all.
My image of a small round card
FRØM the wireless club down at Brown
Vanished and I ran amuck,
As indeed there was no listed call.

I could try for a penguin card FRØM KØOL,
As that is his logo role
On a pack of cigarettes
Far away FRØM the pole.
My imagination was running W1LD,
W1LLY-N1LLY, and out of control.

I became a callsign jerk
Pulling WØRSE WØRDS
FRØM the nearby WØODS
On my way to WØRK.

I could see a whole NØAHS arc of such WØRDY W1LDS
Amoung my well WØRN cards stacked up in piles.
STØRKS, K1WIS, FRØGS and WØRMS,
A WØLF and a WØOLY KØALA
Operating portable seven
FRØM a farm near Walla Walla.

And just who do you think WØRKS in this zoo—
K1ETH or W1LLY,
K1RK or NØEL,
N1CKY, N1GEL or NØRM?
NØWAY Jose,
Since this is the era of ERA
Only a WØMAN or WØMEN WØULD do.
So, why WØNT we say—
NØNA, W1LMA, K1TTY, N1NA,
ISØLDE or NØRA is right.
They'll tuck them in and keep them KØSY
On a KØLD and SMØGGY N1GHT.

And WØNT it be N1FTY
When it gets above F1FTY
And the sun is shining bright
To take them by the W1DTH of their W1SPY WA1STS
Onto the greens to fly a K1TE,

Box 101, Berthoud, CO 80513

All dressed in their F1NE SK1RTS
W0VEN of K0DEL or W0OL,
Flying their K1TES in the W1NDY sky
Feeling the W0RN W1NCH pull.
The picture is so lovely
A K0DAK W1LL capture the prize.
I'll hang it beside by N0TE board here
For admiring amateur eyes
Along W1TH my rarest DX cards,
The ones that came FR0M heaven
Like K0REA/HM and N1GER/5U7.
Or the KL7 up there in N0ME,
Portable far FR0M his Kansas home,
And the one FR0M the Swede who refused to SM1LE
Or the maritime mobile down on the N1LE,
And the American Indian who runs his station
Out out on the K1OWA reservation.
I'm really no braggart, so I hate to boast
Of the KH6 on the K0NA Coast.
And last, but not least, I must not pass
The W1LY old W1TCH from Salem, Mass.

I know that UC2
All of the possible combinations
FR0M these calls one can construe.
Buty it's only a F0OLS hobby
For a N1NNY or a N0ONE like me
And puns are the K1SS of death
So all of the W1TAN say,
For amateur poets who get N0PAY
And radio writers who write the wrong way,
Who spell it out, and so detailed
That the mystery now is no longer VE1LED

Now, you sir, think of the fun
In making W0RDS out of callsigns
Containing a zero or one.
Think of three countries eating
W1TH KN1VES and F0RKS and SP0ONS,
And a Polish SP1DER creeping
Through the heat of countless N0ONS.
And you must realize
There are other N1CE W0RD tricks
W1TH bats' W1NGS that vary in size
And F1REY candle W1CKS,
W1TH bottles of K0CA K0LA and W1NES,
Hats and W1GS of different colors and sizes,
F0URS and F1VES and N1NES.
There could be a K1NG or a N0BLE KN1GHT
Living on the Isle of W1GHT
In armour W1TH KN0BBY knees,
Or F1END - like N0RTH W1NDS
That W0OSH through W0ODY trees
To K1LL the tiny flowers wheresoe'er they blows
W1TH FR0STY, FR0ZEN W1SPS of WH1TES
Bringing us winter W0ES.
And all the brown and dying trees
Infected W1TH PA0ELM disease
And other such W0RTH-less things as these.
Heaven only KN0WS the W1TTY possibilities.

I'm sure you are much W1SER now,
Don't W1NCE or WH1NE or W0RRY.
W1TH animals feathered and furry
Or scaled like a snake or a F1SH,
I assure you that I am done.
So, close your eyes and make that W1SH,
When I'm gone such W0RDS W1LL be N0NE.
But I'll return if I ever get loose
So maybe, if you put my head in a N0OSE,
I'll learn.

Women are definitely capable of applying formulas other than for similac. There are many ways of putting women's talents to work, and amateur radio is one of them.

Women In Amateur Radio

BY JANICE SHILLINGTON*, N9YL

Now are the days of women's lib, with more job opportunities opening up for women than at any other time. Women have a choice. Marriage and children are not a must. (It reminds me of the volunteer army!) Instead, marriage and/or children are happily a choice many women are making. There are as many kinds of housewives (or domestic engineers) and mothers as there are working women. But then again there are similarities between these groups. Some women are terrific cleaners, bakers, sewers, PTA'ers; for other women there are those whose whole world revolves around their jobs.

I am afraid that I do not fit into that category. I am what you could call an average housewife. Let me add that I am not stupid, nor on the other hand am I particularly brilliant. In high school there were many other girls doing algebra, physics (I just passed that one), and other science courses. I stress this because while many of our algebraic formulas, science concepts, etc., have not been used in our occupation of homemaker, we learned them once and somewhere in the recesses of our brains they are still lurking. In other words, we definitely are still capable of learning and applying formulas other than for similac. Over the years of changing diapers and wiping noses, we tend to forget that fact. (So do our husbands!) That's why I am so surprised by the look of shock that people have when I tell them I am a licensed amateur radio operator. I am writing this article because I know that you too can be an amateur radio operator—if you want to be. I never really thought much about amateur radio until a couple of years ago. I will try to express the joy, thrill, challenge and excitement of this hobby so that you will want to find out for yourselves.

Amateur radio is a friend, a flip of a switch away, any time of the day or night. You send your signal out, it hits the ionosphere and is bounced back to the earth. Anyone who can hear your signal can answer you because the other person's signal will be reflected by the ionosphere in the same manner. (I feel a little like I'm gambling.) Different frequency bands have different characteristics at different times of the day and night. The sunspot cycle also has a great effect on radio signals.

I have met many exciting, interesting people in amateur radio. The other night, I communicated with an exploratory geologist who works for an oil company—all in Morse code. At the time he was in New Zealand and had worked many years in Iran where his children were born. I asked him, since he had told me of his extensive travels, what place in the world did he find to be the most beautiful. He then told me about a remote spot in southern Iran. In return, I told him about my exciting life of being a housewife.

Language is not a problem in amateur radio. There are international "Q" signals which transcend the language barrier. For example, QTH means "what is your location"; QRZ means "who is calling me"; QRV, "I am ready"; QRU, "I have nothing for you"; QRL, "I am busy"; and so forth.

Also on Morse code I spoke with a radio operator on a Norwegian vessel. He told me that they were QTO (left dock) from Norfolk, Virginia with a load of coal on their way to Rio de Janeiro, Brazil to pick up more coal, and then they were going all the way to Japan. He said that the skies were gray and it was drizzling in the middle of the Atlantic Ocean. It sounded very lonely. There I was, sitting in my own home communicating with another human being who was sitting in the middle of the ocean. (I can't even swim!)

Here we get into one of the basic purposes of amateur radio as defined in the Rules and Regulations of the Federal Comunications Commission, part 97: "...the amateur's unique ability to enhance international good will." You are saying, "I am an American; here I am. This is me." You are giving the other people in the world an impression of America because America is what its people are.

My girlfriend (yes women are just as involved in amateur radio as men are, only our numbers are fewer; approximately 5% of the U.S. amateurs are women), Marily Backys, WB9TDR, has recently been making phone patches with Antarctica. That's right, the South Pole. Phone patching is as follows: After making a telephone call to the requested number (collect if it's long distance), the radio is then "patched" with the telephone set so the callers can converse. The call is monitored in order to switch the speakers on and off. Here is a man literally at the end of the world, conversing with his family through amateur radio.

Gerry Johnson, K7YDO, made over 12,000 phone patches for servicemen, maritime mobiles and other stations without access to telephones during the years 1967 to 1971. She experienced some of the sadness and horror of war and also the feeling of being able to do something, to help during this terrible time. Her experiences

*49 Jacobsen Ave., Glendale Heights, IL 60137

are not unique, because many amateur radio operators did the same.

The woman in amateur radio is certainly equal—the same, but different. Many YL (young lady) operators have told me how different contacts respond to the female voice. Carol Bourne, WA9NEJ, told me about her contact with Ascension Island, off the coast of Africa. She was the first woman to talk with them in many months. They asked her for all the up-to-date U.S. news, such as baseball scores. I guess that the sound of a woman's voice has many associated pleasant memories, such as apple pie and motherhood, and makes them feel closer to home.

With amateur radio you can leave your home, travel around the world, make new friends here and abroad without physically moving. Handicapped people are on an equal basis with everyone else in amateur radio. Imagine how this wonderful hobby can open up a new life to these people (and you, too).

Alice Johnson has just recently discovered the joys of amateur radio. She lost her family, her husband through an illness and her 18-year-old son to Vietnam. She retired in Missouri where she has taken a course in amateur radio taught by the Central Missouri Amateur Radio Club of Sedalia. Many amateur clubs offer courses to help would-be amateurs gain their FCC licenses. She is an active, energetic woman looking for a little more out of life at the age of 61. She has been blind since the age of 10. The loss of her family has made her very lonely. Now she feels that she belongs—belongs to the family of amateur radio operators. There really is a feeling of fraternity in amateur radio.

Alice mentioned to me how good it was to study again. Learning radio theory can be work to those of us without any radio background. But there are many easy-to-learn books available, and of course, there are other amateurs to discuss theory with you. Morse code can be a challenge to some, but anyone with any type of musical background should not have a difficult time. The desire to get a license, average intelligence, and perseverance are all it really takes to get an FCC license. You can buy used equipment and set up a station for anywhere from $100 to $200 and up.

I have met many interesting people from all walks of life through amateur radio—doctors, policemen, detectives, state troopers, farmers and more. I once talked with a barber in Arkansas, and he told me that his garden did not have as many strawberries as usual or he would have sent me some. The other day I spoke with another gentleman from New Orleans, Louisiana. He was telling me about his teenage days when he was a radio operator on a freighter; it really sounded like fun. Now he is a professor of anatomy at a medical school. I've talked with Navy personnel, Coast Guard, not to mention engineers, to whom I spring all my confusing questions on radio theory out of the clear blue sky. (In amateur radio you are continually learning!) What I am trying to say is that amateur radio is people communicating, just talking and learning about each other.

One of the basic purposes of amateur radio, according to FCC Rules and Regulations, is voluntary public service "...with respect to providing emergency communications." Remember the Guatemalan earthquake in February, 1976? Twenty minutes after that disaster devastated the city, an amateur radio station, TG9CP, was desperately searching for someone to relay that terrible disaster to the world since all normal communications were gone. On 40 meters he found two U.S. amateurs rag chewing. He immediately broke in on the conversation and told them of the plight of Guatemala City. One station contacted the Red Cross and the other, the State Department. Amateurs in the U.S. went into action establishing emergency nets and passing health and welfare messages. For example, the Wheaton Community Radio Amateurs Club received a request to find out if a doctor's family who lived in Guatemala City was all right. The message came back through amateur radio that his wife and daughter were okay. This was a health and welfare message.

The Guam typhoon, the flood disaster in Big Thompson Canyon in Colorado—these are all emergencies in which amateur radio helped. There are countless examples, large and small, but the point is that amateur radio is valuable, voluntary public service.

Amateur radio is also a hobby. The FCC Rules and Regulations state that amateur radio must be "...with a personal aim and without pecuniary or business interest."

Technical experimenting is very fascinating for many amateurs. I have friends who would rather build than talk, and their talking is limited to their experimenting and improving their stations. (I am the opposite!)

Amateur radio has gone satellite. Yes, that's right. Amateur operators now have two working satellites in orbit, OSCAR 6 and OSCAR 7 (OSCAR for Orbital Satellite Carrying Amateur Radio.) Amateurs can work through these satellites for contacts. NASA allows OSCAR to be launched on such things as their weather rockets instead of dead weight ballast for the purpose of public education of space science.

QSL cards are confirmation cards sent by amateurs confirming the date, time, frequency, etc., of the contact. They are really fascinating to receive. You can find out how you can work OSCAR, how you can receive your own QSL cards and general information on how to become an amateur by writing to American Radio Relay League, 225 Main Street, Newington, Conn. 06111.

This hobby is for YOU. You can meet interesting, fascinating people and talk with them, exchange ideas—live. Yet it is not a full-time commitment—it is there at your convenience 24 hours a day, each day. You open and close the switch. Amateur radio is for you, an individual person. The door is open, please come in. DX

Oldtimers and not so oldtimers will recognize the familiar "J" antenna used so often on 2 meters. W2JTP offers some sound advice and long experience on this simple antenna.

The "J" Antenna Revisited

BY BYRON KRETZMAN*, W2JTP

I had a telephone conversation today about the old "J" antenna which intrigued me. So much misinformation on this old, very old, v.h.f. antenna has appeared in various ham radio publications that I am appalled. I first used this antenna, made out of #12 wire and with twisted lamp cord as the feeder, on 5 meters back in 1936. Its performance was great then and its performance is still great today on 2, 6[1] and 10 meter f.m.

So, when I got home from work tonight I set one up on a piece of wood and connected it to about three feet of RG-58/U coax. Using an old (I like old) Allied Radio P-2 Knight-Kit v.s.w.r. meter hooked to an old (again) commercial surplus Motorola transmitter strip, I made a few quick measurements. I am sure you will be interested in my findings.

First of all, I made the ½-wave part of the antenna the usual 38 inches long, and the matching section 19 inches long, all out of #20 solid, bare, copper wire. As shown in fig. 1, I simply connected the coax to the bottom of the matching section. Using 147.2 MHz as the test frequency, the v.s.w.r. measured 1.4 to 1. Not bad. At first I used a 2-inch spacing on the ¼-wave matching section. Moving it to 1½ inches did not change the v.s.w.r. so I left it at that spacing for the remainder of the experiment. By the way, reversing the feed so the center conductor was connected to the longer wire instead of to the shorter wire made absolutely no difference in the v.s.w.r.

Next, I connected a short, using the #20 wire, across the bottom of the matching section. I then slid the RG-58/U connection up and down the matching section until I found the lowest v.s.w.r. It was at 3⅛ inches above the short. Fig. 2 shows this arrangement. Still using 147.2 MHz as the tune-up frequency, the v.s.w.r. was now almost one-to-one! (Call it 1.05 to 1; the meter was hard to read down at the bottom of the scale.) By the way, I found that the tap-on point of the coax should be within ⅛ inch of the right position for minimum v.s.w.r. (The purists will say I should have used a balun.)

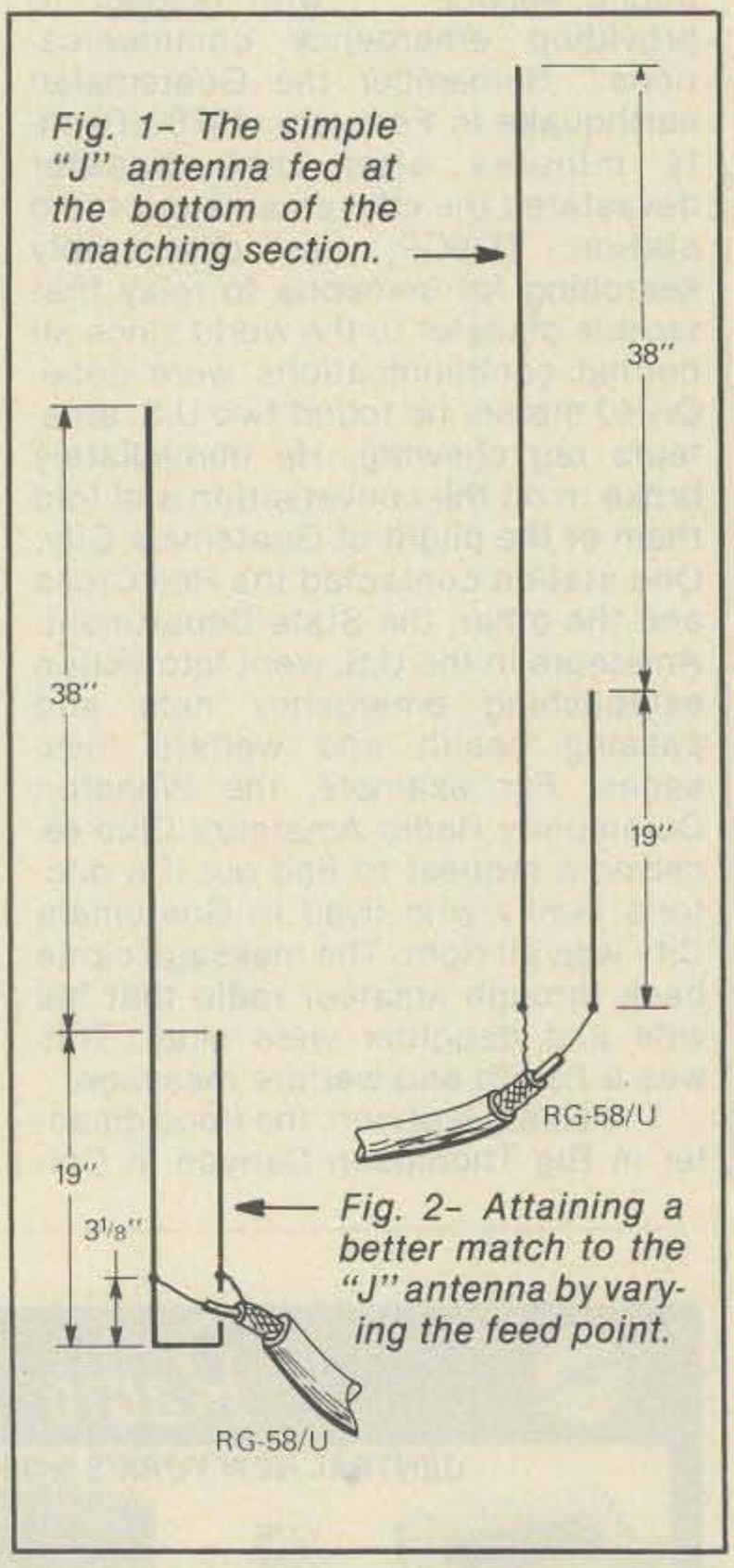

Fig. 1- The simple "J" antenna fed at the bottom of the matching section.

Fig. 2- Attaining a better match to the "J" antenna by varying the feed point.

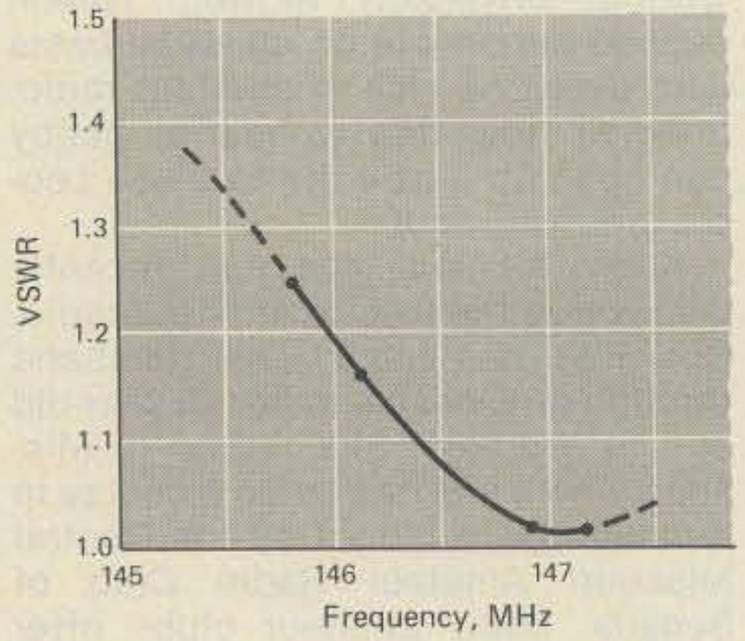

Fig. 3- Bandwidth of the antenna versus v.s.w.r.

The next thing you should ask about is the bandwidth of the antenna. Well, I only had crystals for 145.7 to 147.2 MHz, so you will have to be satisfied with that spread. Fig. 3 is a graph of the v.s.w.r. over that range. Assuming that the curve is symmetrical, you can extrapolate for frequencies above 147.2 MHz. It is apparent that the v.s.w.r. is less than 1.4 to 1 over 3 MHz. Quite reasonable, don't you think?

I've used the simple form of this antenna, as in fig. 1, with a 5-watt Motorola P-33 Pack Set on my travels. I try to find a motel or hotel room with a large "picture" window. The antenna is then taped, with masking tape, to the center of the glass, and most frequently, the matching section comes off at an angle rather than straight down below the 38 inches of the antenna proper.

Results? Far better than using the 19-inch whip on the Pack Set itself inside the room. The "J" Antenna should not be considered a "gain" antenna, incidentally. It is simply an end-fed half-wave antenna. Unity gain.

I hope this sets the record straight. The only other suggestion I might offer is to tune it up on the frequency of major interest to you.

*431 Woodbury Road, Huntington, NY 11743

[1]*Kretzman, B.H., "The J Antenna on 6 Meters," CQ, December 1967, pg 29.*

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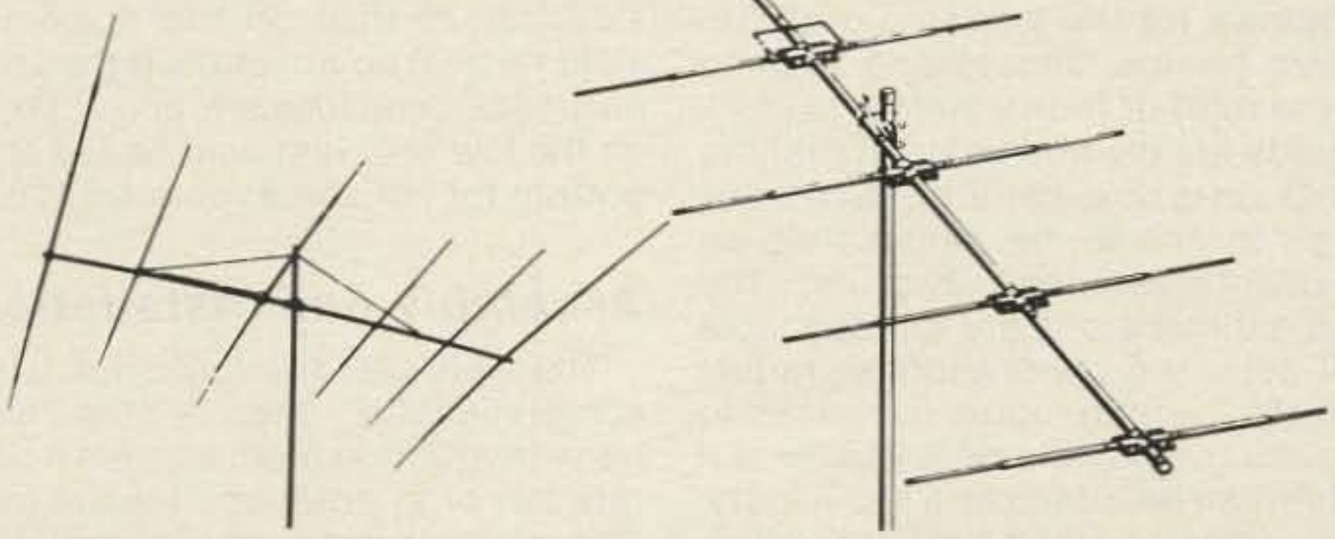

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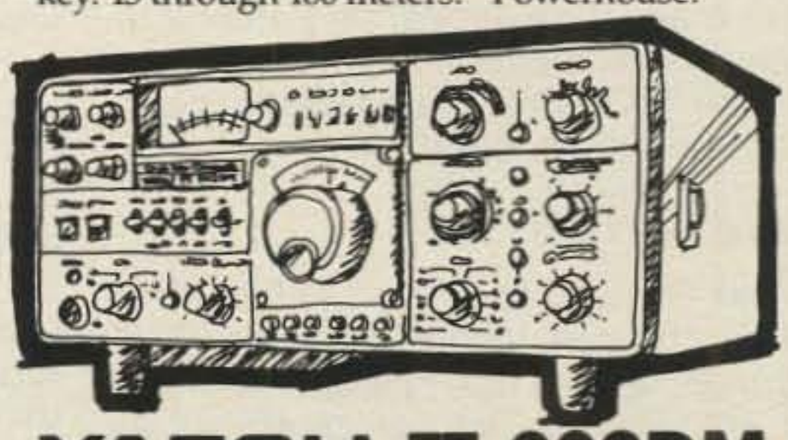

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CQ Reviews:

The Two-Element Gem-Quad

BY KARL T. THURBER, JR.,* W8FX

Not everyone can erect a large Yagi array to give the signal that needed boost when working rare DX, competing for contest points, or trying to keep a closing band open a little longer. Element length, spacing, and boom length are usually formidable on the Yagi, not to mention weight and cost. The light weight, simplicity, use of relatively inexpensive materials, and good performance record of the quad have made it an appealing antenna to many. Thus, we looked with anticipation to reviewing Gem-Quad's fiberglass boomless quad.

Safe Arrival

The Gem-Quad arrived safely after being shipped to our Alabama QTH from the factory in Transcona, Manitoba, making its "border crossing" at Pembina, North Dakota. The XYL was surprised not to find the regular UPS deliveryman at her doorstep—rather a long-haul trucker, who proceeded to unload the two parts of the shipment. One was formidable: a 14′ 2″ long by 5½″ diameter heavy cardboard tube (the largest such "mailing tube" I had ever seen); the other part was the aluminum spider, neatly steel-banded between two squares of plywood.

Everything arrived safely, with no missing parts. It should—the large tube was securely plugged at each end by two wooden end-caps which were nailed shut, making opening the container a small project in itself. To avoid any possibility of bending or breakage during shipment, the tube was banded to a 10-foot long 2 × 3 for added support. Despite the heftiness of the shipment, total weight was only 38 lbs.

Construction Details

The basic Gem-Quad, in production since 1967, is a two-element, full-wave loop beam designed for tri-band operation on 10, 15, and 20 meters, though it can be expanded to three or even four elements. A forward gain of about 8 dB and a front-to-back (F/B) ratio of 25 dB are claimed by the manufacturer. These figures increase to 8.9 and 30 dB, respectively, with the addition of the third element. No four-element figures are given, but these would increase accordingly.

The antenna's "arms" are made up of triple fiberglass spacers, fabricated into a "tridetic" design, as it's called by the Gem-Quad folks. Each 2.15-pound, 13′6″ long arm is ribbed and fiberglass-cord bundled into a configuration that faintly resembles a miniature tapering triangular tower. This unusual design gives increased strength but less wind resistance than if the spacers were made of solid fiberglass stock.

The mounting spider, heart of the antenna, is fabricated from a heavy-duty aluminum alloy which has a 1½-inch O.D. stub protruding downwards from the center for convenient mast mounting. The spider is hollow and allows for the insertion of different-size booms, should one wish to add the third or fourth elements.

Quads are big and boxy affairs; the Gem-Quad is no exception. But it's not "long" in the same sense that an equivalent-performing Yagi is. The outside dimensions are a reasonable 18′ × 18′ × 9′6″, with a turning radius of 10.15′. Turning radius increases to 13.51′ for the four-element version. All models can be turned by a heavy-duty, TV-type rotator. Wind load of the two-element model is 4.2 sq. ft.; this increases to 8.8 sq. ft. for the four-element array. According to the manufacturer, the antenna is capable of withstanding winds of up to 100 m.p.h.

Up to this point, the antenna is of conventional design. What is different is that it is *boomless*: a single spider on the two-element model supports all of the fiberglass spacers from a common focal point. The three-dimensional design of each set of loops enables reflector - to - driven - element spacing that approaches theoretical optimum values. Not only does this improve gain slightly over flat-plane quads, but it helps to make feedpoint impedance fairly consistent from band to band for a low-s.w.r. feed without resorting to complex matching devices.

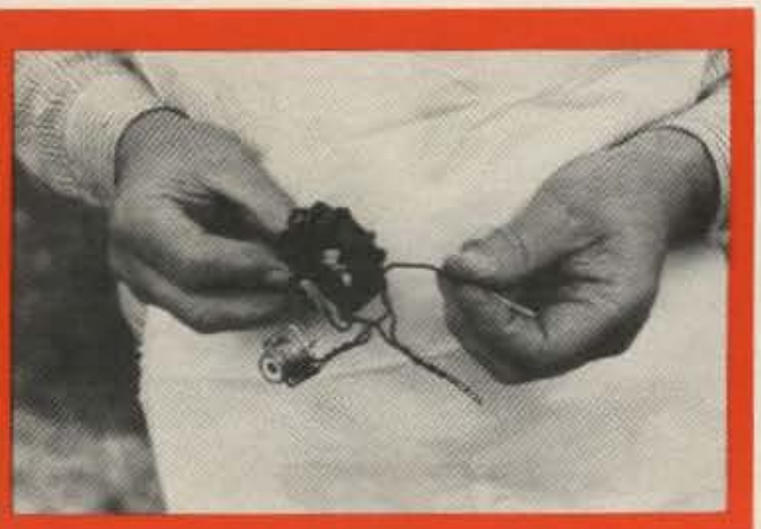
A simple toroidal balun, which is furnished but must be wound by the user, allows single-feedline match on all three bands; the three driven element wires are simply paralleled and connected directly to the exposed unit. A sealed commercial 1:1 balun could be substituted, if desired, to reduce possible weather effects.

As an unexpected "plus," included in the package was a set of instructions giving details on an easy-to-build two-element, two-meter quad that can be piggybacked onto the h.f. quad at the time of installation. No additional materials or tuneup are required for the two-meter unit. For f.m. work on two, the smaller quad is fed at the *side*, rather than on the bottom, to yield vertical polarization. If the antenna is to be used for s.s.b. or c.w. DX'ing on the low end, it should be fed at the bottom for horizontal polarization.

Assembly And Installation

The Gem-Quad is furnished with a comprehensive, step-by-step eight-page instruction manual, plus a separate set of instructions for the balun and a single-page "tuning pointers" sheet. The instructions were laid out in easy-to-follow order, and were well-illustrated with sketches. In assembling the antenna, the fiberglass arms (spacers) were prepared first, the aluminum spider was anchored on a short post, the color-coded reflector spacers were attached, and the three

*317 Poplar Drive, Millbrook, AL 36054



Ferrite-core balun is supplied by the manufacturer in kit form. Unit was easy to make, but it is exposed to the elements with the attendant possibility of inducing erratic matching conditions. A commercial sealed 1:1 balun was later substituted by this reviewer.

Fiberglass spreaders emanating from the aluminum spider block. Note unusual ribbed or "tridetic" constructions of the arms. Though not a problem in the author's climate, the tridetic design, though extremely rugged, could be vulnerable to ice buildup.

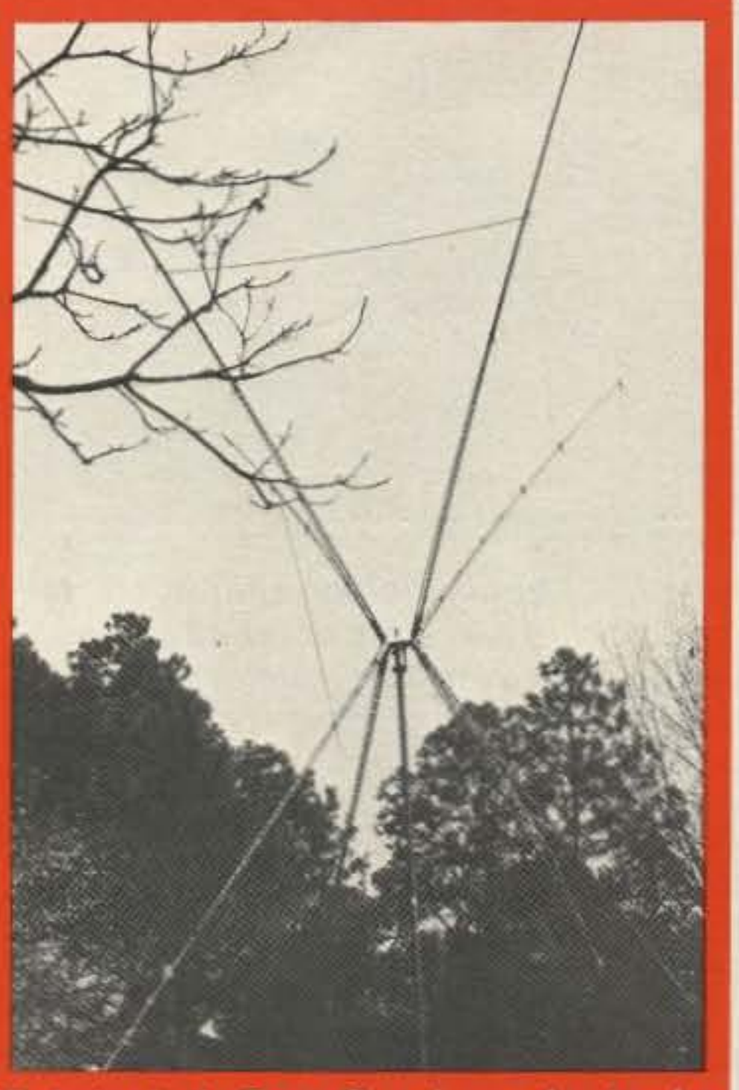
tuning stubs were fabricated. Next came the reflector wire-threading operation (using conveniently pre-measured, spooled and labeled wire sets), connecting the fiberglass tie-rods to the reflector arms, attaching the driven-element arms, and threading the driven-element wires. Construction was completed by preparing and installing the toroidal balun, and finally connecting the tie rods to the driven element. The antenna is essentially pretuned, so it was constructed strictly using the instruction sheet dimensions and boosted into position on the 50′ tripod tower without ground adjustment or tuneup of any kind.

Erection of the antenna went smoothly, though required the full efforts of the four-man antenna-raising party using a combination of ropes and pulleys without benefit of a gin-pole or tilt-over tower. However, a tilt-over tower is strongly recommended by the manufacturer and the author for the larger (three- and four-element) models.

The pre-tuned driven element makes the quad close to being an

Putting the finishing touches on one of the reflector tuning stubs is Al, W4CNQ. Holding things steady is Roy, W4IK.

Hoisting the completed Gem-Quad into position on the house roof, ready to be shimmied up the mast using ropes and pulleys on the tower. Shown struggling with the array is Roy, WB4TKU.



Fabricated Gem-Quad ready to be hoisted into position.

"erect-and forget" antenna. However, due to variances in mounting height, proximity of ground mass, etc., it is desirable to at least tune the reflector stubs on each band. The manufacturer recommends this be done while receiving by directing the array *away*

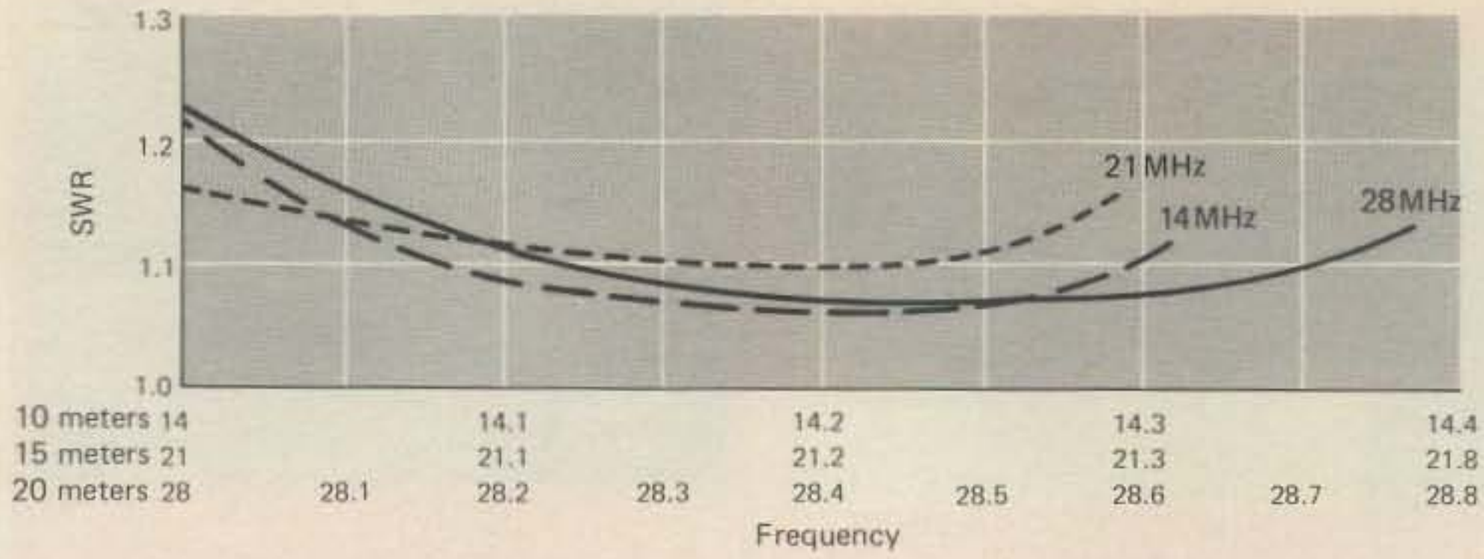
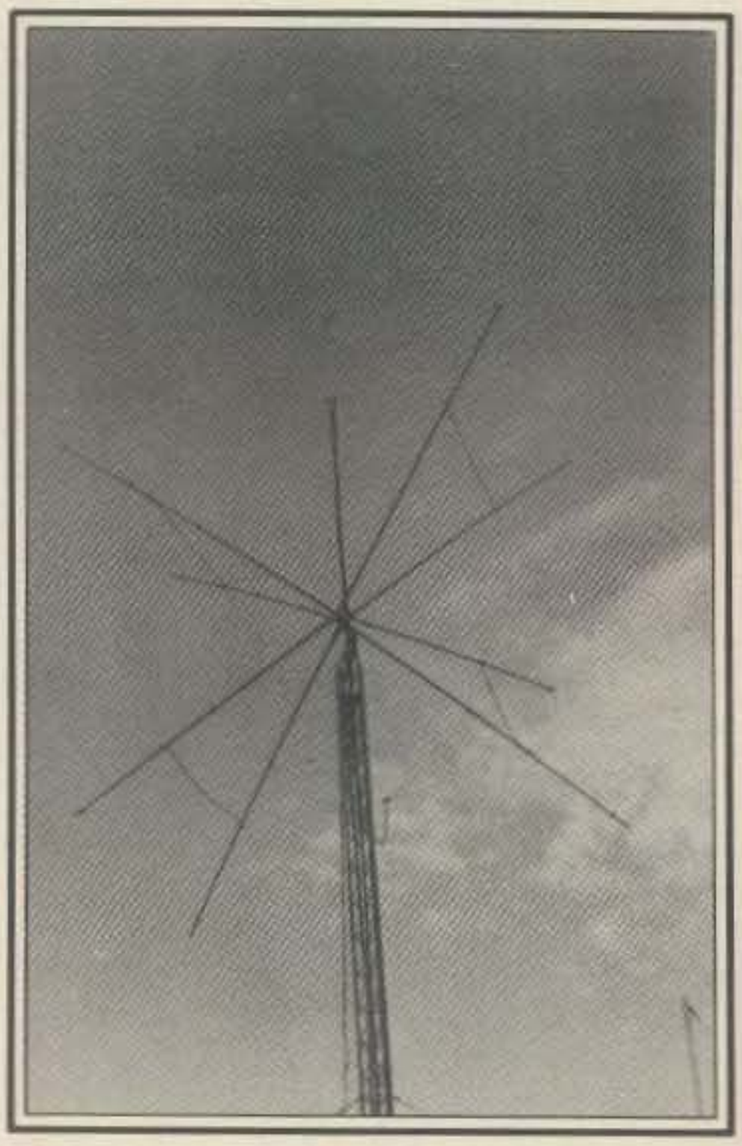
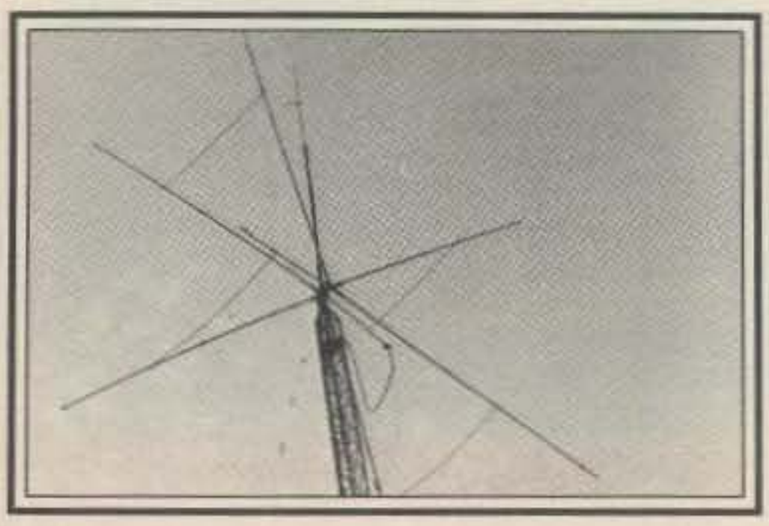


Fig. 1- The manufacturer's v.s.w.r. curves for the two element Gem-Quad. Shown above are the v.s.w.r. curves for each of the Gem-Quad's bands—20, 15 and 10 meters. In the author's installation, s.w.r. was slightly higher than indicated in the chart since no effort was made to check driven element resonances on each band or to adjust the reflector stubs prior to installation. Taking the extra time to do so should allow one to approach the v.s.w.r. curves shown.



Finished quad being shimmied up tower using a system of ropes and halyards. This was the hard way; a tilt-over tower would have been a real "plus."



Gem-Quad in position atop tower. Note the reflector tuning stubs at lower left of photo and common coax feedpoint balun at lower right.

Finished Gem-Quad installed atop triangular tower. Perched above the quad is a 2-meter Ringo Ranger. Later, after this photo was taken, a small 2-meter quad was built inside the larger antenna and separately fed.

from a local station transmitting on the frequency on which you've chosen to optimize F/B ratio on each band. Presumably, this would be at 14.2, 21.2, and 28.5 MHz, though these points can be slid up or down as necessary. Stub adjustment is accomplished by experimentally shorting them out on each band (using alligator clips on a 2" piece of wire) until the receiver's S-meter shows minimal signal.

The manufacturer's representative s.w.r. curves are shown in fig. 1. In our installation, s.w.r. was somewhat higher than expected from the curves, and resonance points were skewed

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* Don't be fooled by our low price. This counter uses the 7216D IC with 10 MHz time base.
* Assembled unit appears at right. Two board construction allows remote mounting of display board.
* Complete with 120 VAC wallpack shown. May also be operated on batteries, 7-12 volts @ 220 mA.
* Two ranges: 100 and 300 MHz.
* 7216D IC provides four gatetimes (.01, 0.1, 1.0, and 10 seconds). Switch provided allows you to select any two.
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* Can be built into existing equipment or virtually any enclosure you choose.

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MODEL 8600-HAND HELD 600 MHz FREQUENCY COUNTER $69.95

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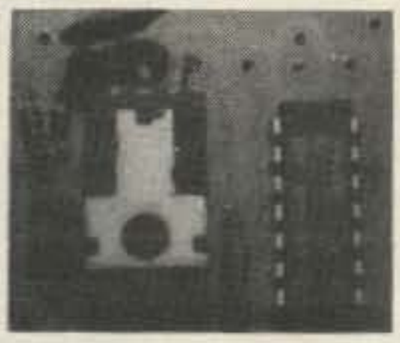

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slightly. Since the antenna was to be removed and reinstalled at a different location in the near future, and an antenna coupler was available, no effort was made to "tweak" the driven elements for a lower s.w.r. However, the would-be quad buff would do well to consider at least roughly checking *both* driven element and reflector resonances on a short temporary mast or on the roof before raising the antenna to its permanent location using a grid-dip oscillator or antenna noise bridge. This precaution can save a great deal of extra work in dealing with the antenna when it's at its full operating height, should your objective be to operate with a "flat" s.w.r. and with an optimized F/B ratio. However, if necessary to do in-position tuning, the feedpoint and reflector stubs are accessible since the absence of a boom places them at arm's length distance from the tower.

On-The-Air Results

The bottom line on any antenna, of course, is does it work? In the case of the Gem-Quad, the answer is a definite "yes." Determining actual antenna performance is a difficult and subjective affair, but the array seemed to bear out the manufacturer's forward-gain claims when compared side-by-side with a simple dipole on the three bands. Used in conjunction with a QRP combo, the Ten-Tec Argonaut 509 and matching 405 50-watt amplifier, excellent reports were received both stateside and on DX QSOs on all three bands. The first QSO, in fact, was with Ailie, ZS1CZ, in Capetown, South Africa on 20 meters, with an S9 + 5 dB report. The antenna's F/B ratio seemed about right for the stated specs. All things considered, on-the-air performance tended to confirm that the fiberglass-and-wire quad can easily hold its own against its "all-aluminum" Yagi competition.

Overall Impressions

The Gem-Quad is made of high quality, rugged materials packed unusually well so as to reach its destination in good shape; it's certainly of competent design and construction.

Nevertheless, one contemplating the purchase of a quad should bear in mind that there is a lot of fiberglass and wire up in the air. Some extremely severe climates are tough enough on Yagis, much less quads, which can accumulate enough ice on the wires to break them, or whip around enough in high winds to break the wires or even the spacers.

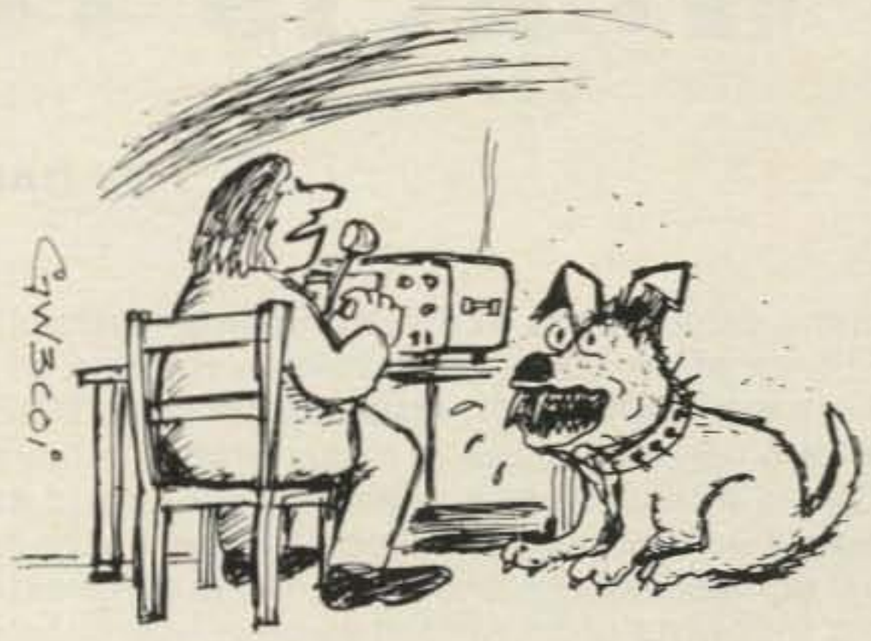
However, if you're short on real estate or have no desire to erect a large Yagi array but want to radiate a competitive signal on the h.f. bands, the quad represents a good choice—and the Gem-Quad is among the best. It sells for $182 on a direct-sale basis, plus shipping and customs (about $52 to my QTH), and is available from Gem Quad Products Ltd., P.O. Box 53, Transcona, Manitoba R2C 2Z5. Write to them for further information.

A special tip of the hat to Roy, W4IK; Al, W4CNQ; and Roy, WB4TKU for straining both their muscles and their backs to help us get the Gem-Quad in the air. Without their able assistance, this *CQ* review wouldn't have been possible.

WELCOME BACK !!

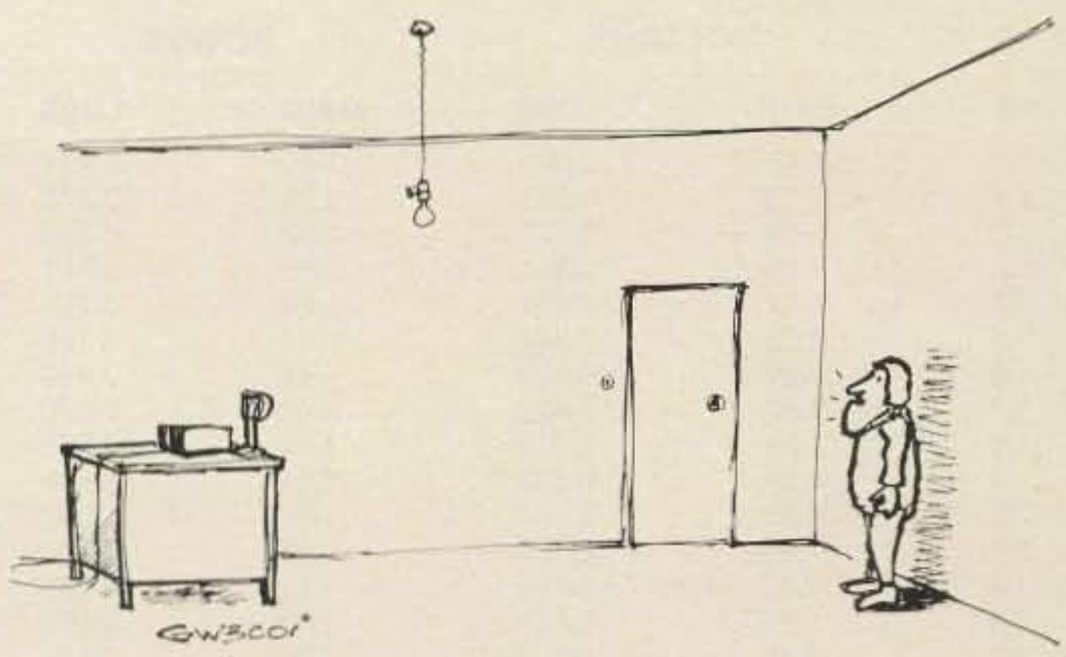
After a much too long hiatus we welcome back the droll understated world of GW3COI.

". . . Cheerio and see you further down the loch. . . ."



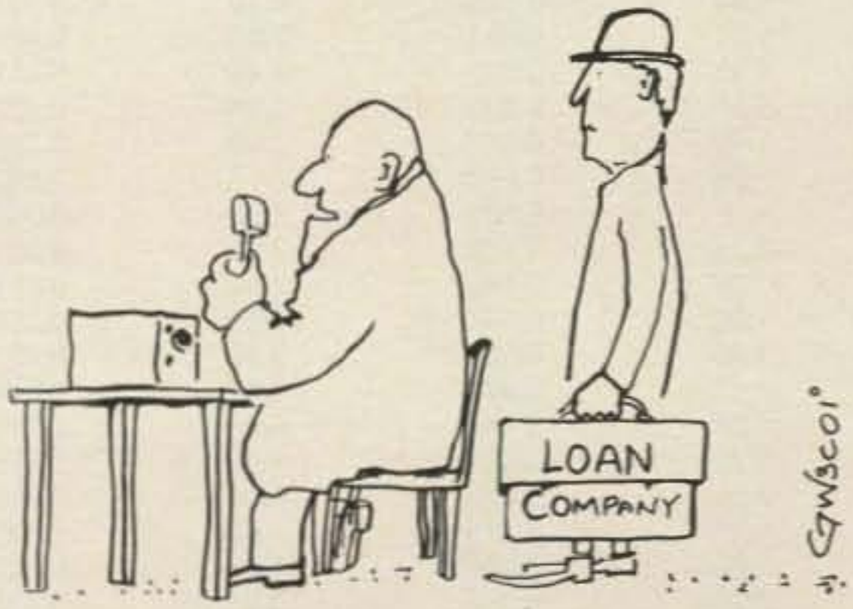
". . . Actually we seem to get few TVI complaints. . . ."

". . . Well OM, all I can say is if we haven't QSO'd before then I've wasted a lot of money. . . ."



". . . Is this any better? . . ."

". . . Could you move back about three feet from the mike OM? . . ."



". . . I may have to make this the final. . . ."

Here is an easy to use dB chart for voltage and power. Tear it out and keep it somewhere safe—it will come in handy.

dB or not dB, What Is The Question?

BY GARY LEGEL, N6TO

That many calculations in electronic applications, including those of amateur radio, involve the use of the term dB is a well known fact. Also well known is the fact that the term dB and its use is a mysterious subject to many. This is attested to by numerous articles in amateur radio publications which purport to clear up the mystery. Most of these fall short of doing this to some extent. The table following is presented to be a useful tool in those calculations involving dB. The numbers were derived using the following basic formulas:

$$\text{Voltage Gain (or Loss) in dB} = 20 \log \frac{E_1}{E_2}$$

$$\text{Power Gain (or Loss) in dB} = 10 \log \frac{P_1}{P_2}$$

Range of the table is from 1.0 dB to 115 dB, which will cover the majority of amateur radio and other applications. The numerical values have been rounded off to practical values.

*1306 Sheppard Drive, Fullerton, CA 92631.

	VOLTAGE		POWER	
dB	GAIN	LOSS	GAIN	LOSS
1.0	1.12	0.891	1.26	0.794
1.1	1.13	0.881	1.29	0.776
1.2	1.15	0.871	1.32	0.759
1.3	1.16	0.861	1.35	0.741
1.4	1.17	0.851	1.38	0.724
1.5	1.19	0.841	1.41	0.708
1.6	1.20	0.832	1.44	0.692
1.7	1.22	0.822	1.48	0.676
1.8	1.23	0.813	1.51	0.661
1.9	1.24	0.803	1.55	0.646
2.0	1.26	0.794	1.58	0.631
2.2	1.29	0.776	1.66	0.603
2.4	1.32	0.759	1.74	0.575
2.6	1.35	0.741	1.82	0.550
2.8	1.38	0.724	1.90	0.525
3.0	1.41	0.708	1.99	0.501
3.2	1.44	0.692	2.09	0.479
3.4	1.48	0.676	2.19	0.457
3.6	1.51	0.661	2.29	0.436
3.8	1.55	0.646	2.40	0.417
4.0	1.58	0.631	2.51	0.398
4.2	1.62	0.617	2.63	0.380
4.4	1.66	0.603	2.75	0.363
4.6	1.70	0.589	2.88	0.347
4.8	1.74	0.575	3.02	0.331
5.0	1.78	0.562	3.16	0.316
5.5	1.88	0.531	3.55	0.282
6.0	1.99	0.501	3.98	0.251
6.5	2.11	0.473	4.47	0.224
7.0	2.24	0.447	5.01	0.199
7.5	2.37	0.422	5.62	0.178
8.0	2.51	0.398	6.31	0.158
8.5	2.66	0.376	7.08	0.141
9.0	2.82	0.355	7.94	0.126
9.5	2.98	0.335	8.91	0.112
10.0	3.16	0.316	10.00	0.100
11.0	3.55	0.282	12.60	0.079
12.0	3.98	0.251	15.80	0.063
13.0	4.47	0.224	19.90	0.050
14.0	5.01	0.199	25.10	0.040

	VOLTAGE		POWER	
dB	GAIN	LOSS	GAIN	LOSS
15.0	5.62	0.178	31.6	0.032
16.0	6.31	0.158	39.8	0.025
17.0	7.08	0.141	50.1	0.020
18.0	7.94	0.126	63.1	0.016
19.0	8.91	0.112	79.4	0.013
20.0	10.00	0.100	100.0	0.010
21.0	11.20	0.089	126.0	0.00794
22.0	12.90	0.0776	166.0	0.00603
23.0	14.10	0.0708	199.0	0.00501
24.0	15.80	0.0631	251.0	0.00398
25.0	17.80	0.0562	316.0	0.00316
26.0	19.90	0.0501	398.0	0.00251
27.0	22.40	0.0447	501.0	0.00199
28.0	25.10	0.0398	631.0	0.00158
29.0	28.20	0.0355	794.0	0.00126
30.0	31.6	0.0316	1,000.0	0.00100
31.0	35.5	0.0282	1,260.0	79×10^{-5}
32.0	39.8	0.0251	1,580.0	63×10^{-5}
33.0	44.7	0.0224	1,999.0	50×10^{-5}
34.0	50.1	0.0199	2,510.0	40×10^{-5}
35.0	56.2	0.0178	3,160.0	32×10^{-5}
36.0	63.1	0.0158	3,980.0	25×10^{-5}
37.0	70.8	0.0141	5,010.0	20×10^{-5}
38.0	79.4	0.0126	6,310.0	16×10^{-5}
39.0	89.1	0.0112	7,940.0	13×10^{-5}
40.0	100.0	0.0100	10,000.0	10×10^{-5}
45.0	177.8	0.0060	31,600.0	3.16×10^{-5}
50.0	316.0	0.0030	100,000.0	1×10^{-5}
55.0	562.0	0.0020	3.16×10^{5}	3.16×10^{-6}
60.0	1,000.0	0.0010	1×10^{6}	1×10^{-6}
65.0	1,770.0	0.0006	3.16×10^{6}	3.16×10^{-7}
70.0	3,160.0	0.0003	1×10^{7}	1×10^{-7}
75.0	5,620.0	0.0002	3.16×10^{7}	3.16×10^{-8}
80.0	10,000.0	0.0001	1×10^{8}	1×10^{-8}
85.0	17,800.0	0.00006	3.16×10^{8}	3.16×10^{-9}
90.0	31,600.0	0.00003	1×10^{9}	1×10^{-9}
95.0	56,200.0	0.00002	3.16×10^{9}	3.16×10^{-10}
100.0	100,000.0	0.00001	1×10^{10}	1×10^{-10}
110.0	316,000.0	6×10^{-6}	3.16×10^{10}	3.16×10^{-11}
115.0	562,000.0	2×10^{-6}	3.16×10^{11}	3.16×10^{-12}

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2K Classic and 3K Classic pictured above

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a monthly feature by
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Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The "Story of The Month" for July as told by Bill is:

William J. Driml, W6NAT All Counties #283, 5-2-80

"I started County Hunting right after I visited my friend W6NWI. He and I were working for the "Certificate Hunters Club," and Bill said there was a new certificate out called USA-CA, work all counties in the USA. That intrigued me very much, so I proceeded to count all the Counties with the QSLs I had on hand. I thought this would be easy because I had stacks of cards. I figured I would have at least 1000 counties. Well, after all had been counted, I had 523. April 10, 1964 I received USA-CA-500 Award #365 endorsed Mixed.

"I think I'm the only one in the system who worked all these long 16 years to finish All Counties. When a person works all day, six days a week, and comes home to raise and play with the kids, a person does not have much time to hunt counties.

"I retired in August 1973, moved from southern to northern California, and then I had time to County Hunt. When I arrived in northern California I had about 1300 counties verified, so I got busy and it took me a little while to finish.

"I received my Class "B" license in October 1935, and then in October 1936 I passed my Class "A" license.

"My pleasure in ham radio was designing, constructing, transmitters, receivers, antennas, etc., also working DX, contests, and ragchewing. I have WAS, WAC, WAZ. By the way, it took me 45 years to work WAZ on phone; I got #557 All Phone. Zones 17 and 18 were the most difficult for me. Finally Zone 17 was worked and a couple of months later I worked 3 in Zone 18.

"My work was in the radio and electronics industry. I worked in many places as a technician, engineer, or salesman. The last was with Faust Gonsett of the famous Gonsett transmitters, receivers, antennas, etc. We were the first on the West Coast to pro-

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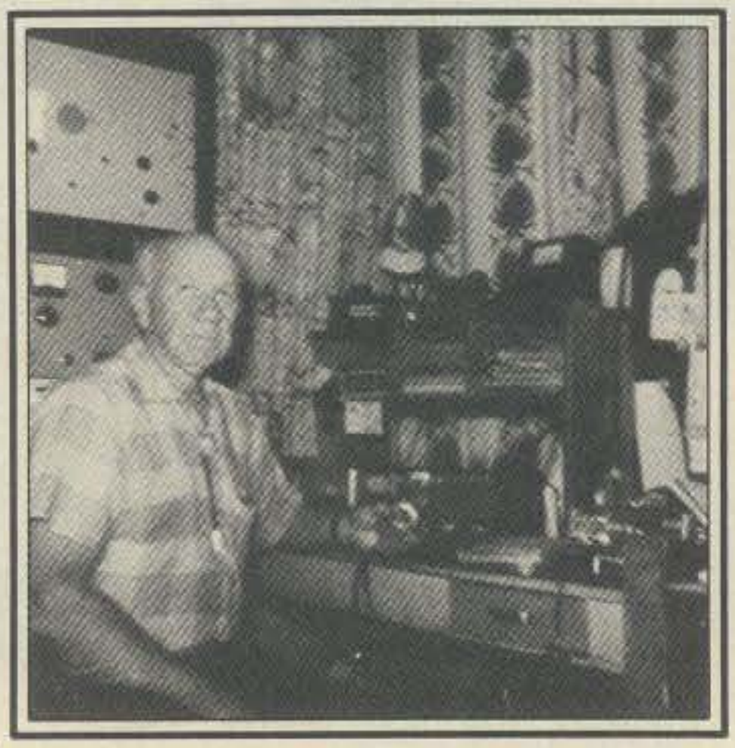


William J. Driml, W6NAT.

duce a transistorized transceiver, the SBE 33. I still have and am operating the first 12 prototype SBE 33. When I am mobiling and giving out counties, I am operating the original SBE 33.

"At this point I want to thank all the wonderful net controllers and the mobiles who helped me obtain all the counties. Without the mobiles we sure would be stuck. I especially want to thank Gene, N4ANV for getting my last two counties in North Carolina, Polk and Lincoln; Lincoln was my last. He made a special trip west for those two.

"Now I am back again to work the counties second time around. It is quite a deal now because all the mobiles are in a new county for me."

Awards Issued

Jim Holder, WB5YDH waited until he had them All and then requested USA-CA-500 through All Counties endorsed Mixed.

Bob Gensler, W8UPH, who received USA-CA-500 #128 in October 1962, found time to get back to County Hunting to acquire USA-CA-3000 and All Counties endorsed Mixed. His "Story" and photo were in the July 1969 issue of *CQ*.

Roy Eggleston, W5QEM added to his fine collection USA-CA-3000 and All Counties endorsed All S.S.B.

Steve Scott, WD0EPE, who got his basic Award in November 1978, got back into the swing of things and applied for USA-CA-1500 through All Counties endorsed Mixed.

Special Honor Roll
All Counties

#315 James B. Holder, MD, WB5YDH 3-16-81.
#316 Robert J. Gensler, W8UPH 3-20-81.
#317 Roy K. Eggleston, W5QEM 3-23-81.
#318 Steve J. Scott, WD0EPE 4-2-81.

Rev. Billy Crane, WB8TQD took time from his many many trips to catch up on his paper work to make USA-CA-500 through USA-CA-3000 endorsed All S.S.B. He has certainly given out *many* counties, thanks!

Gordy Baker, KA5A, ex-WA5KQD, added USA-CA-3000 endorsed All A-1 to his collection.

Bob Robertson, N5QQ, ex-WA5TPO, also added USA-CA-3000 endorsed Mixed to his collection.

Michael Begala, K2CTJ gained USA-CA-500 through USA-CA-2500 endorsed Mixed.

Clem Lambert, WB1DQA added to his fine collection USA-CA-2000 endorsed All S.S.B., All Mobiles. I made an error on number 460, so Clem gets #460-A.

Ace Burdett, KA9AHH claimed USA-CA-1500 and 2000 endorsed Mixed.

Jan Slama, OK2BKR obtained USA-CA-1000 (#5 to OK), USA-CA-1500 (#1 to OK), and USA-CA-2000 (#1 to OK).

James Grandinette, WA2SRM picked up USA-CA-1500 endorsed All S.S.B.

Edwin Doan, WD8QOY won USA-CA-500, 1000, and 1500 endorsed Mixed.

Dave Popkin, W2CC, ex-WA2CCF, got USA-CA-1000 endorsed Mixed.

Tom Stiehl, PA2TMS was issued

Rolf Arvidsson, SM4BNZ.

USA-CA Honor Roll

3000		KA9AHH	461	WB5YDH	657
WB8TQD	339	WB5YDH	462	W2CC	658
KA5A	340	OK2BKR	463	PA2TMS	659
N5QQ	341	K2CTJ	464	OK2BKR	660
WB5YDH	342	WD0EPE	465	K2CTJ	661
W8UPH	343			WD8QOY	662
W5QEM	344	1500			
WD0EPE	345	WB8TQD	518	500	
		WA2SRM	519	HB9AAA	1593
2500		KA9AHH	520	WB8TQD	1594
WB8TQD	405	WB5YDH	521	AE1T	1595
WB5YDH	406	OK2BKR	522	WB5YDH	1596
K2CTJ	407	K2CTJ	523	W2KI	1597
WD0EPE	408	WD8QOY	524	JH1BAY	1598
		WD0EPE	525	K2CTJ	1599
2000				WD8QOY	1600
WB8TQD	460	1000		KA8CUS	1601
WB1DQA	460A	WB8TQD	656	UK5XBA	1602

USA-CA-1000 endorsed All S.S.B., #1 to The Netherlands.

Al Egli, HB9AAA made it to USA-CA-500 endorsed All S.S.B., #4 to HB.

USA-CA-500 Certificates, endorsed Mixed, owed to:

Peter Drexel, AE1T.

John Bokoles, W2KI.

USA-CA-500 Certificates, endorsed All A-1, go to:

Koji Sato, JH1BAY.

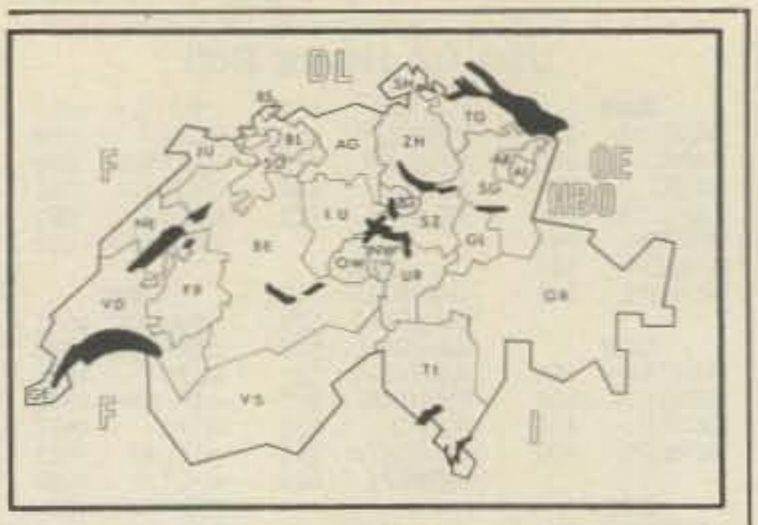
Bernard Fair, KA8CUS, also endorsed All Novice Bands.

Henry Portnow of UK5XBA, also endorsed All 14 MHz, #5 Award to USSR.

Awards

The New "Helvetia (2ô)" Award: A bit of historical background will help you understand the new "Helvetia" award, the successor of the Helvetia XXII award, which was introduced by the Swiss Union of Short Wave Amateurs (USKA) 30 years ago. Very similar to the United States, Switzerland is divided into States, called Cantons, which, like the U.S., each send two representatives to the Council of States (Senate). When H-22 was established, the Swiss Confederation numbered 22 Cantons, 3 of these divided into half

The New Helvetia (26) Award.



The 26 Cantons of Switzerland.

Cantons, i.e., Basle, split into Town and Country; Unterwalden split into Obwalden and Nidwalden; and Appensell split into Inner-Rhodes and Outer-Rhodes (half Cantons send only one representative to the Council of States). In 1978 the Canton of Jura was founded; thus Switzerland had 23 Cantons, and with 3 of these divided into half Cantons, it made a total of 26 sovereign States.

Contact and confirm one station in each of the 26 Cantons after January 1, 1979. Send certified log data and 10 IRCs to: USKA Awards Manager, Walter Blattner, Via B Varenna 85, CH 6604, Locarno, Switzerland.

The 26 Cantons are: AG Aargau, AI Appensell Innerrhoden, AR Appenzell Ausserrhoden, BE Bern, BL Basel-Landschaft (Country), BS Basel-Stadt (Town), FR Fribourg, GE Geneve, GL Glarus, GR Graubunden (Grisons), JU Jura, LU Luzern, NE Neuchatel, NW Nidwalden, OW Obwalden, SG Sankt Gallen (St. Gall), SH Schaffhausen, SO Solothurn, SZ Schwyz, TI Ticino, TG Thurgau, UR Uri, VD Vaud, VS Valais, ZG Zug, ZH Zurich. (Many thanks to Dr. Henseler, HB9RS for this data.)

The Janet Award: This award, sponsored by the Janet Club, will be issued to any amateur who confirms contacts with 10 or more Janet Club members in at least 3 countries after January 1, 1980. The awards will be endorsed single band and/or mode. Send QSO data, certified that you have the QSLs by 2 other amateurs, and $2.00 or 7 IRCs to: Mr. Taizo Arakawa, N2ATT, 444 Westminster Place, Lodi, NJ 07644 U.S.A.

The Janet Award.

Photographs taken at MARAC Convention in Denver, July 1980, by Bob and Barbara Fuss, W4OWY.

Ruel, 6Y5RS; Ellis, GW3CDH; Justin, CT1TZ; and HB9??.

Ellis, GW3CDH; Willis, K5WQM; Clifton, WB2HTX and XYL.

Barbara and Bob, W4OWY.

Charles, AD8W and XYL.

Ray, K5RPC and Jim, WB0TVL.

Gene, N4ANV and XYL.

Bill, WA3ZTY operating at Denver.

Janet Club Members List for Janet Award, as of January 1, 1981:

DJ0SI (JA1OYP)
DK9QZ

EI2FY (JA1XAF)
EL2GG (JE1DLK)

EP2TY (JA3AEV)

HC5MS

IN JA
JA1ANG (N3AMW)
JA1BII (KB2PL)
JA1BNW (PY2ZTH)
JA1BRK (WA6GOS)
JA1CSX (AJ2N)
JA1ESP (KA2GOX)
JA1FBD (WB6FFT)
JA1JDF (N2BJI)
JA1JDX (AJ7A)
JA1LIH (WB2QA)
JI1WIB (N2BRF)
JK1PZZ (KG2O)
JA3GX (WB0VUU)
JA3JM (AA5K)
JA3ODC (KC4BH)
JH3DPB (WL7AOH)
JH3OII (AJ1A)
JR3MCC (WB2SPZ)
JA9APS (KF6G)

IN USA
JA1DCY
JE1WMG
JG1NBK
JH1BED
JI1VRQ
JJ1RJR
JK1FJH
JK1XXE
JL1FEM
JM1SAR
JA2FGE
JE3ECE
JE3JTK
JG3FAR
JH3PHV
JH7JHH
JR7DWK
JA0BUA
JA0ICZ

IN KG6
JR1PUZ

IN 9V1
JA1FML (AK2Q)

OA4CYU
OA4CYW
JA2HDQ/OA4

PY2DHU
PY2DM
PY2DRC
PY5CTL
PY5SSA

JA1PIG/PZ

VE2FEG
VE2FRF (JA1CBD)
VE3BBD
VE3LKW
VE3NJC (Club)
VE6CGC
VE6CLF
VE6CMF
VE7ASJ (JA3AJF)
VE7CSO
VE7FFY

VK1YB
VK1YK

VP1KI
VP1YL

VU1JPN (JA6AGP)
VU2WTR (JA1WTR)

N1AXP (JH1KBE)
KA1GEJ (JK1FJH)
N2AIR (JA1LZR)
N2ATF (JA1BMI)
N2ATT (JA3AER)
N2BHY (JE3FPX)
N2CAO (JG3STV)
N2CBA (JA4PPR)
N2GP (JA1ASC)
KB2IO
N2JA (JA1ANE)
KB2MW (JA9IV)
K2VZ (JA1GTM)
KE2X (HL2AG)
WB2ZTB (JA3AVD)
KA3EXE
K3HM (HM5BF)

N4DFE (JJ1KGH)
KA4RVB (JH3DIC)
N4YT
N6BLK (JA7DBG)
WA6FPK
KD6IH (JA2CUY)
WB6UXH (JA9DF)

AG7I (JA8SB)
WA7URW

KB8OD (JA4JNR)

WD9GRS (JH1AKD)

N0CCV (JH7ESC)
NH6A
KH6JDU

KC6IN (JR1DXE)

AL7BD (JG1MTB)
KL7GX (JA6ETQ)

XE1HA
XE2HB

YJ8YS (JL1CII)

YV1CCT

5N0KUY (JF1MQS)
5N0TSY (JG1AUH)

5Z4YV

9V1TK

JA4BVH/MM
JA4DYS/MM

119 Members

Notes

A reminder that the 8th Annual Midwest Mini Convention (for County Hunters and other interested parties) will be held on September 25, 26, 27 at Howard Johnsons Motel, Oshkosh, Wisconsin. Send s.a.s.e. to Karen, WB9ZNA, and Bob, K9DAF, Thorne, 1743 N. Clayton Ave., Neenah, Wisconsin 54956.

I've had requests for data on the Worked Confederate States Award. I can find no data on it in my reference books; any data on it would be greatly appreciated.

73, Ed, W2GT

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IC'S

Series 74S		7405	.28	74107	.58	74LS20	.31
74S00	.59	7406	.28	74109	.37	74LS21	.43
74S02	.59	7407	.28	74116	2.30	74LS27	.44
74S03	.59	7408	.31	74120	2.00	74LS30	.31
74S04	.59	7409	.28	74122	.64	74LS32	.44
74S05	.59	7410	.27	74123	.64	74LS37	.84
74S08	.79	7411	.34	74125	.49	74LS38	.44
74S10	.59	7412	.34	74126	.62	74LS42	.84
74S11	.59	7413	.44	74132	.74	74LS49	1.43
74S20	.59	7414	.90	74141	.74	74LS51	.31
74S22	.69	7416	.34	74145	.67	74LS54	.40
74S30	.59	7417	.34	74148	1.25	74LS73	.50
74S37	.99	7420	.27	74150	1.04	74LS74	.64
74S38	.99	7423	.34	74153	.72	74LS75	.73
74S40	.69	7425	.34	74154	1.24	74LS76	.50
74S64	.89	7426	.34	74155	.87	74LS85	1.24
74S65	.89		.34	74157	.74	74LS86	.50
74S74	1.49	7428	.34	74158	1.70	74LS90	.80
74S83		7430	.28	74161	1.00	74LS93	.80
74S86	1.69	7432	.34	74163	.92	74LS95	.93
74S112	1.39	7433	.34	74164	1.02	74LS96	1.03
74S114	1.39	7437	.34	74165	1.02	74LS107	.50
74S124	3.75	7438	.34	74166	1.25	74LS109	.50
74S133	.89	7439		74172	6.00	74LS112	.64
74S134	1.90	7440	.29	74173	.84	74LS123	1.24
74S138	3.95	7441	.99	74174	.94	74LS125	.94
74S139	3.95	7442	.99	74175	.94	74LS132	.84
74S140	1.29	7443	.99	74177	.90	74LS138	.94
74S151	1.95	7445	.99	74180	.80	74LS139	.68
74S153	2.75	7446	.99	74181	1.80	74LS145	1.30
74S157	2.70	7448	.84	74182	.80	74LS151	.84
74S158	2.70	7449		74185	2.00	74LS153	.84
74S163	3.75	7450	.28	74186	10.00	74LS155	1.24
74S164	2.75	7451	.28	74190	1.20	74LS156	1.04
74S174	3.75	7453	.28	74191	1.20	74LS157	1.04
74S175	3.75	7454	.28	74193	.90	74LS158	.80
74S181	9.50	7460	.44	74194	.90	74LS160	1.03
74S189	6.95	7470	.39	74195	.90	74LS161	1.20
74S194	3.25	7472	.42	74196	.90	74LS163	1.03
74S195	2.99	7473	.41	74197	.90	74LS164	.94
74S200	8.95	7474	.42	74273	1.10	74LS165	.94
74S240	8.95	7475	.42	74279	.84	74LS173	.94
74S241	8.95	7476	.42	74283	2.20	74LS174	1.04
74S251	2.49	7480	.64	74298		74LS175	1.04
74S257	2.49	7483	.60	74366	.73	74LS181	2.25
74S260	.99	7485	.70	74367	.64	74LS191	1.20
74S280	3.95	7486	.44	74368	.84	74LS193	1.03
74S283		7489	1.80	Series 74LS		74LS194	1.20
74S287	3.95	7490	.99	74LS00	.40	74LS195	1.00
74S373		7491	.70	74LS01	.33	74LS196	.94
74S374		7492	.77	74LS02	.33	74LS197	.94
74S474		7493	.54	74LS04	.44	74LS221	1.54
Series 74		7494	.77	74LS05	.33	74LS240	3.04
7400	.39	7495	.70	74LS08	.44	74LS244	3.00
7401	.27	7496	.77	74LS09	.43	74LS245	8.95
7402	.27	7497	.77	74LS10	.33	74LS251	1.84
7403	.27	74100	1.04	74LS11	.44	74LS253	1.03
7404	.27	74105	.37	74LS14	1.30	74LS257	1.03

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74LS273	1.80
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74LS298	1.34
74LS323	4.79
74LS353	1.70
74LS366	1.04
74LS367	1.04
74LS368	1.04
74LS373	2.80
74LS374	2.80
74LS378	1.33
74LS393	2.00
74LS670	2.34
4001	.34
4002	.34
4007	.34
4009	.64
4011	.34
4012	.34
4013	.54
4015	1.44
4017	1.24
4021	1.54
4023	.42
4024	.84
4025	.43
4027	.84
4028	1.04
4029	1.34
4030	.74
4040	1.34
4046	2.30
4049	.74
4050	.74
4052	1.15
4060	1.44
4069	.44
4081	.40
4093	1.04
7520L	1.35
75107	.84
75108	.84
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75115	
75123	
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75154	2.00
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1N751A	1N758A	1N969B
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MC4012L	9.55	MC1330	2.50
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MC4015L/74415L	8.25	MC1351	1.43
MC4016P/74416P	6.89	MC1352	1.37
MC4017P/74417P	6.89	MC1358	2.50
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MC4018L/74418L	10.05	MC1393	1.76
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MC4019L/74419L	10.05	MC1414L	1.83
MC4022P	5.41	MC1414P	1.29
MC4023P	7.79	MC1435L	
MC4024P	3.92	MC1436G	
MC4044P	3.92	MC1437	2.25
MC4050P/74450P	12.25	MC1439	3.57
MC4060P	5.32	MC1461	
MC4062P	3.43	MC1468L	5.33
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MC4006F		MC1496P	2.50
MC4007F		MC1511G	
MC4008F		MC1535G	18.19
MC4060F/74460F		MC1539G	5.40
MC4062F		MC1550G	1.61
MC4300C	8.20	MC1552G	11.61
MC4306L	9.05	MC1558L	1.68
MC4307L	11.09	MC1560R	
MC4312L	10.67	MC1569RB2	10.49
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MC4350L/MC54450L	17.16	MC1710G	1.79

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MC1712CP	3.35
MC1723CP	.67
MC1733CL	1.35
MC1741G	1.50
MC14528B	2.04
MC14530BCP	1.22
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LM301AP/H	.69
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LF355	1.31
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NE555Y	.39
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LM715	
LM723CH	
LM741CN/Y	.56
LM741CH	1.01
LM747CT	
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LM/UA749	
LM1310N	
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LM3900/CA3401	.84
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6360	4.69
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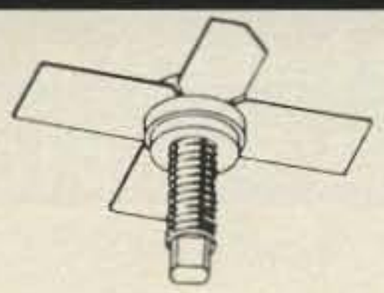
RF Transistors



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MRF226	10.20
MRF227	2.13
MRF238	10.00
MRF240	14.62
MRF245	28.87
MRF247	28.87
MRF262	6.25
MRF314	12.20
MRF406	11.33
MRF412	20.65
MRF421	27.45
MRF422A	38.25
MRF422	38.25
MRF428	38.25
MRF428A	38.25
MRF426	8.87
MRF426A	8.87
MRF449	12.65
MRF449A	12.65
MRF450	11.00
MRF450A	11.77
MRF452	15.00
MRF453	13.72
MRF454A	21.83
MRF455	14.08
MRF455A	14.08
MRF474	3.00
MRF475	2.90
MRF476	2.25
MRF477	10.00
MRF485	3.00
MRF492	20.40
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MRF604	2.00
MRF629	3.00
MRF648	26.87
MRF901	3.99
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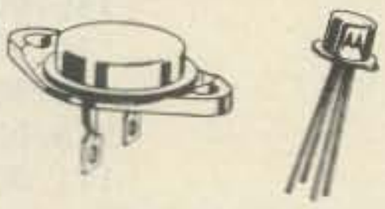
BFR90	1.00	MWA120	7.80	10 dB gain	
BFR91	1.25	MWA130	8.08		1.69 ea.
BFR96	1.50	MWA210	7.46		10/9.50
BFW92A	1.00	MWA220	8.08		100/69.00
BFW92	.79	MWA230	8.62		1000/480.00
MMCM918	14.30	MWA310	8.08		
MMCM2222	15.65				

Transistors



		2N3960JANTX	10.00	2N5645	10.00
		2N4072	1.60	2N5842	8.00
		2N4427	1.10	2N5849	20.00
		2N4429	7.00	2N5942	40.00
		2N4877	1.00	2N5946	14.00
		2N4959	2.00	2N5862	50.00
		2N4976	15.00	2N6080	7.00
2N2857JAN	2.50	2N5070	8.00	2N6081	10.00
2N2949	3.60	2N5071	15.00	2N6082	11.00
2N2947	15.00	2N5108	4.00	2N6083	13.00
2N2950	4.60	2N5109	1.50	2N6084	14.00
2N3375	8.00	2N5179	1.00	2N6095	11.00
2N3553	1.57	2N5583	4.00	2N6096	20.00
2N3818	5.00	2N5589	6.00	2N6097	28.00
2N3866	1.00	2N5590	8.00	2N6166	38.00
2N3866JAN	2.50	2N5591	11.00	2N6368	22.99
2N3866JANTX	4.00	2N5635	5.44	A210/MRF517	2.00
2N3925	10.00	2N5636	11.60	BLY38	5.00
2N3948	2.00	2N5637	20.00	40280/2N4427	1.10
2N3950	25.00	2N5641	5.00	40281/2N3920	7.00
2N3959	3.00	2N5643	14.00	40282/2N3927	10.48

CRYSTALS

$4.95 each

5.120	7.4825	9.565	10.150	11.155	11.905	17.315
7.3435	7.4865	9.575	10.160	11.275	11.955	17.355
7.4585	7.4925	9.585	10.170	11.700	12.000	17.365
7.4615	7.4985	10.000	10.180	11.705	12.050	37.600
7.4625	7.5015	10.010	10.240	11.730	12.100	37.650
7.4665	7.5025	10.020	10.245	11.750	16.965	37.700
7.4685	7.5065	10.030	10.595	11.755	17.015	37.750
7.4715	7.7985	10.040	10.605	11.800	17.065	37.800
7.4725	7.8025	10.0525	10.615	11.850	17.165	37.850
7.4765	9.545	10.130	10.625	11.855	17.215	37.900
7.4785	9.555	10.140	10.635	11.900	17.265	37.950
7.4815						38.000

CB type crystals

$4.95 each

51-T

T1	T15	T28
T2	T16	T29
T3	T17	T30
T4	T18	T31
T5	T19	T32
T6	T20	T33
T7	T21	T34
T8	T22	T35
T9	T23	T36
T10	T24	T37
T11	T25	T38
T12	T26	T39
T13	T27	T40
T14		

51-R

R1	R15	R28
R2	R16	R29
R3	R17	R30
R4	R18	R31
R5	R19	R32
R6	R20	R33
R7	R21	R34
R8	R22	R35
R9	R23	R36
R10	R24	R37
R11	R25	R38
R12	R26	R39
R13	R27	R40
R14		

Johnson AIR Variables

$1.00 each

T-3-5	1 to 5 pF
T-6-5	1.7 to 11 pF
T-9-5	2 to 15 pF
189-6-1	.1 to 10 pF
189-502-Y	1.3 to 6.7pF
189-503-105	1.4 to 9.2pF
189-504-5	1.5 to 11.6pF
189-505-5	1.7 to 14.1pF
189-505-107	1.7 to 14.1pF
189-506-103	1.8 to 16.7pF
189-507-105	2 to 19.3pF
189-508-5	2.1 to 22.9pF
189-509-5	2.4 to 24.5pF
545-043	1.8 to 11.4pF

Johnson AIR Variables

1/4 x 2 1/2" shaft
$2.50 each

193-10-6	2.2 to 34 pF
193-	1.5 to 27.5pF
193-	.6 to 6.4pF

$1.00 each

160-107-16	.5 to 12 pF
193-10-9	2.2 to 34 pF
193-10-104	2.2 to 34 pF
193-4-5	3 to 30 pF

TRANSFORMERS

#70169-2..... 4.99 each
26 VCT @ 1 Amp and
2.5 V @ 1 Amp

New GE model 6C-9 9 V Nicad
Battery..... 3.69

New MCM Moving Coil Tach
Generator
Model M100..... 6.99 each

New Mallory Mini Sonalert
Model #SC-18. Works at 12 VDC
3500 Hz..... 4.69 each

New T.V. Colorburst Crystals
3.579545.....99 each

WIDEBAND RF TRANSFORMERS

Tyep T16-1.....6.50 each

	Insertion Loss
.3 to 120 MHz	3dB
.7 to 80 MHz	2dB
5 to 20 MHz	1dB

RF Power Device

MRF454 Same as MRF458
12.5 VDC, 3-30 MHz
80Watts output, 12dB gain
$17.95 ea.

CHOKES

.1-3 uH	2.99
VIV .15 .15 uH	2.99
VIV 150 150 uH	2.99
5-20 uH	1.69
Variable coil 10-80 uH	2.99
Transformer dual 8.8 uH	1.00
.47 uH	1.00 ea. or 10/7.50
.68 uH	1.00 ea. or 10/7.50
1 uH	1.00 ea. or 10/7.50
1.2 uH	1.00 ea. or 10/7.50
1.5 uH	1.00 ea. or 10/7.50
2.2 uH	1.00 ea. or 10/7.50
2.7 uH	1.00 ea. or 10/7.50
3.3 uH	1.00 ea. or 10/7.50
6.5 uH	1.00 ea. or 10/7.50
7.5 uH	1.00 ea. or 10/7.50
10 uH	1.00 ea. or 10/7.50
15 uH	1.00 ea. or 10/7.50
20 uH	1.00 ea. or 10/7.50
22 uH	1.00 ea. or 10/7.50
33 uH	1.00 ea. or 10/7.50
39 uH	1.00 ea. or 10/7.50
47 uH	1.00 ea. or 10/7.50
50 uH	2.99
56 uH	1.69
62 uH	1.00 ea. or 10/7.50
68 uH	1.00 ea. or 10/7.50
100 uH	2.99
120 uH	1.69
185 uH	1.00 ea. or 10/7.50
538 uH	1.00 ea. or 10/7.50
680 uH	1.00 ea. or 10/7.50
1000 uH	1.00 ea. or 10/7.50
1630 uH	1.50
.1 mH	2.99
.2 mH	2.99
.22 mH	2.99
.27 mH	2.99
.33 mH	2.99
.39 mH	2.99
.240 mH	2.99
1.2 mH	2.99
1.5 mH	2.99
1.65 mH	2.99
1.75 mH	2.99
1.9 mH	2.99
1 mH	1.69
1.88 mH	3.99
2 mH	2.99
2.4 mH	2.99
2.5 mH	1.00 ea. or 10/7.50
2.7 mH	2.99
3.0 mH	2.99
3.6 mH	2.99
4.3 mH	2.99
4.7 mH	2.99
5 mH	2.99
5.11 mH	2.99
6 mH	2.99
7.2 mH	2.99
8.25 mH	2.99
8.28 mH	2.99
8.6 mH	2.99
10 mH	2.99
12 mH	2.99
15 mH	2.99
17 mH	2.99
19.6 mH	2.99
20 mH	2.99
20.5 mH	2.99
22.6 mH	2.99
24 mH	2.99
27.4 mH	2.99
28.7 mH	2.99
29.9 mH	2.99
30 mH	2.99
36 mH	2.99
36.5 mH	2.99
40 mH	2.99
40.2 mH	2.99
43 mH	2.99
47 mH	2.99
50 mH	2.99
59 mH	2.99
60 mH	2.99
71.5 mH	2.99
78.7 mH	2.99
86 mH	2.99
100 mH	2.99
120 mH	2.99
150 mH	2.99
175 mH	2.99
200 mH	2.99
205 mH	2.99
237 mH	2.99
240 mH	2.99
300 mH	2.99
360 mH	2.99
390 mH	2.99
430 mH	2.99
500 mH	1.50
600 mH	2.99
1000 mH	2.99
1.5 Hy	2.99
2.0 Hy	2.99
2.5 Hy	2.99
3.0 Hy	2.99
5.0 Hy	2.99
10 Hy	2.99

SEMICONDUCTORS SURPLUS

E.F. JOHNSON TUBE SOCKETS

#124-0311-100 ..... 6.99 each
For 8072 etc.

#124-0107-001 ..... 13.99 each
For 4CX250B/R, 4X150A etc.

#124-0111-001 ..... 4.99 each
Chimney for 4CX250B/R and 4X150

#124-0113-001 and 124-0113-021
$12.99 each
Capacitor for #124-0107-001

#123-209-33 Sockets....6.99 each
For 811A, 572B, 866, etc.

UNELCO CAPS

6.8pF	47pF	
8.2pF	62pF	
10pF	100pF	
12pF	160pF	
13pF	180pF	
14pF	200pF	
20pF	240pF	
24pF	380pF	
33pF	470pF	
36pF	1000pF	
43pF	350V	$1.00 each

High Voltage Caps

30 MFD @ 500 VDC	1.69
22 MFD @ 500 VDC	1.69
100 MFD @ 450 VDC	2.29
150 MFD @ 450 VDC	3.29
225 MFD @ 450 VDC	4.29
.001/1000pF @ 10 KV	.89
.001 @ 3 KV	4/1.00
.0015 @ 3 KV	3/1.00
.01 @ 4 KV	.79
.01 @ 1.6KV	4/1.00
.02 @ 8 KV	2.00
.01 @ 1 KV	6/1.00

NEW 2" ROUND SPEAKERS
100 Ohm coil $.99 each

PLASTIC TO-3 SOCKETS
4/$1.00

Carbide Circuit Board Drill Bits
for PCB Boards
5 mix for $5.00

TRIMMER CAPS

Sprague. Stable Polypropylene.
.50 each or 10/4.00
not sold mixed
1.2 to 13pF
2 to 30pF
3.9 to 18pF
3.9 to 40pF
3.9 to 55pF

ATLAS FILTERS

ATLAS CRYSTAL FILTERS FOR ATLAS HAM GEAR

Your Choice

$15.95 ea.

5.645 - 2.7/8
5.595 - 2.7 USB
5.595 - 2.7/8/L
5.595 - 2.7 LSB
5.595 - .500/4
9.0 - USB/CW

J-Fet

J310 N-CHANNEL J-FET 450 MHz
Good for VHF/UHF Amplifier,
Oscillator and Mixers 3/$1.00

Soldering Kit

New Weller Soldering Iron Kit
#SP-23F..... 9.99 each
Kit includes:
- 1 - 25 Watt soldering iron, develops 750° of tip temperature
- 3 - tips (screwdriver, chisel, cone)
- 1 - soldering aid tool
- 1 - coil 60/40 rosin core solder

CERAMIC PLATE CAPS

$1.09 each
#1 type for 3/8 plate cap
#2 type for 5/8 plate cap

Used NiCads

Used C Nickel Cadmium Batteries
1.8 amp hour
Pack of ten $8.99 per pack

CERAMIC COIL FORMS
$1.99 each

#1	3/16" x 4/8"
#2	3/16" x 1/4"
#3	1/4 " x 3/4"
#4	3/8 " x 7/8"
#5	3/8 " x 5/8"

All of the above have powdered iron cores.

#6	1/2"x2 3/4"

MURATA CERAMIC FILTERS

SFD 455D	455 KHz	2.00
SFB 455D	455 KHz	1.60
CFM455E	455 KHz	5.50
CFU455H	455 KHz	3.00
SFE 10.7MA	10.7 MHz	2.99

1.9-2.5G CONVERTERS

1900 MHz to 2500 MHz DOWNCONVERTERS
Intended for amateur radio use.
Tunable from channel 2 thru 6.
34 dB gain 2.5 to 3 dB noise.
Warranty for 6 months Model HMR 11
Complete Receiver and Power Supply
(does not include coax)..... $225.00

4 foot Yagi antenna only..... $39.99
Downconverter Kit - PCB and parts.. $69.95
Power Supply Kit -
Box, PCB and parts..... $49.99
Downconverter assembled..... $79.99
Power Supply assembled..... $59.99
Complete Kit form $109.99
(includes Yagi antenna and instructions)
REPLACEMENT PARTS
MRF901..... $ 3.99
MBD101..... 1.29
.001 Chip Caps 1.00
Power Supply PCB 4.99
Downconverter PCB..... 19.99
Instructions for any separate item 10.00

NEW BOGNER DOWNCONVERTER
Industrial version.
1 year guarantee..... $225.00

NEW TRANSFORMERS

		Price each
F-18X	6.3 VCT @ 6Amps	6.99
F-46X	24V @ 1Amp	5.99
F41X	25.2VCT @ 2Amps	6.99
P-8380	10VCT @ 3Amps	7.99
P-8604	20VCT @ 1Amp	4.99
K-32B	28VCT @ 100 MA	4.99
E30554	Dual 17V @ 1Amp	6.99

UHF/VHF RF POWER TRANSISTORS
CD2867/2N6439
60 Watts output
Reg. Price $45.77
SALE PRICE.....$19.99

TRANSFORMERS

$9.99 each
#2899652-01
26.8 VCT @ 660 MA
21.9 VCT @ 1.1 Amps

$1.99 each
#18000711P
24 V @ 100 MA

$12.99 each
#2099459-00
28 V @ 1.5 Amps
9.6 V @ 9 Amps
16.8 V @ 300 MA

JUMBO LED'S

Red	8/$1.00
Clear	6/$1.00
Yellow	6/$1.00
Green	6/$1.00
Amber	6/$1.00

MEDIUM LED'S

Red	6/$1.00
Green	6/$1.00

NE555V TIMERS
.39 each or 10/$5.00

NEW DUAL COLON LED
.69 each or 10/$5.00

PLATE CHOKES

75 uH	3.00
.94 mH	3.99

110VAC MUFFIN FANS

New $11.95
Used $5.95

TO-3 TRANSISTOR SOCKETS
Phenolic type.....6/$1.00

PL259 TERMINATION
52 Ohm 5 Watts $1.50 each

DOOR KNOB CAPS

470 pF @ 15 KV	$3.99 each
Dual 500 pF @ 15 KV	5.99 each
680 pF @ 6 KV	3.99 each
800 pF @ 15 KV	3.99 each
2700 pF @ 40 KV	5.99 each

HIGH VOLTAGE CAPS

420 MFD @ 400 VDC	3.99 each
600 MFD @ 400 VDC	3.99 each

TORIN TA700 FANS NEW
$29.99 each
Model A30340
230 VAC @ .78 Amps
Will also work on 115 VAC

RG174/U - $15.00 per 100 ft.
Factory new

NEW SIMPSON 260-7 $99.99

TEXAS INSTRUMENT TIL-305P
5 x 7 array alphanumeric display
$3.85 each

New Fairchild Prescaler Chip

95H90DCQM..... 6.50 each
350 MHz prescaler divide by 10/11

NEW CHERRY BCD SWITCH
New end plates
Type T-20..... 1.29 each

78MO5
Same as 7805 but only 1/2 Amp
5 VDC .49 each or 10/$3.00

SEMICONDUCTORS SURPLUS

2822 North 32nd Street, #1 • Phoenix, Arizona 85008 • Phone 602-956-9423

SEMICONDUCTORS SURPLUS

NEW BCD SWITCH

8 switch with end plates
Model TSM200-1011 (CDI) $16.87

CONTINUOUS TONE BUZZERS

12VDC.....$2.00 each

EIMAC FINGER STOCK #Y-302
36 in. long x 1/2 in. $4.99 each

MAGNET WIRE

$22.50 per spool

#24	A.W.G.	9 lb.
#26	A.W.G.	9 lb.
#25	A.W.G.	9 lb.
#30	A.W.G.	8 3/4 lb.
#31	A.W.G.	6 lb.

CORES

4/1.00

T20-12	T30-6	T37-6
T25-6	T30-12	T37-10
T30-2	T37-2	T44-6

CABLE TIES

#/T-18R 100 per bag
mil. spec. #MS-3368S, 4"
Made by Tyton Corp.
$2.50 per bag
100 bags - $20.00

Miniature Ceramic Trimmers
.50 each or 10/$4.00

CV31D350	2 to 8 pF
HM00-4075-03	3.5 to 11 pF
300425	3.5 to 13 pF
E5-25A	5 to 25 pF
	5.1 to 40 pF
	3.5 to 15 pF
	5.2 to 40 pF
	2.5 to 6 pF

CERAMIC STAND OFFS

#CNP-5	3/8 x 5/8"	.29 each
	7/16 x 1 1/4"	.39 each
#N54W0112	3/8 x 1 1/2"	.49 each
#NL523W03-010	3/4 x 1 1/4"	.79 each

CORES AND BEADS

#43	Shield Bead	4/1.00
#61	Toroid	3/1.00
#43	Balun	10/1.00
#61	Balun	8/1.00
#61	Balun	6/1.00
#61	Balun	4/1.00
#61	Beads	10/1.00
Ferrite Rod 1/4 x 7 1/2		2.99
Ferrite Beads 1/8" long		12/1.00
Ferrite Beads 3/8" long		6/1.00
Ferrite Beads 1/16" long		12/1.00

86 Pin Motorola Bus Edge Connectors

Gold plated contacts
Dual 43/86 pin .156 spacing
Soldertail for PCB.....$3.00 each

CRYSTAL FILTERS

Tyco 001-19880 Same as 2194F
10.7 MHz narrow band
3 dB bandwidth 15 KHz min.
20 dB bandwidth 60 KHz min.
40 dB bandwidth 150 KHz min.
Ultimate 50 dB insertion loss 1 dB max.
Ripple 1 dB max. Ct. 0+/-5 pF 3600 Ohms
$3.99 each

TRANSISTORS/IC'S

Motorola MHW 252 VHF power amplifier.
Frequency range: 144-148 MHz.
Output power: 25W.
Minimum gain: 19.2 dB.
$29.67 each

Motorola MC 1316P.
House no. same as HEP C6073 & EC9814.
2-W audio amplifier.
$1.29 ea., 10 for $9.50

Fairchild 007-03 IC.
ECG no. 707 Chroma demodulator.
$1.29 ea., 10 for $8.50

Motorola rf transistors.
Selection Guide & Cross-Reference Catalog.
43 pgs.
$1.99 each

RCA Triacs.
Type T2310A.
TO-5 Case with heat sinks.
1.6 Amp, 100 VDC, Igt 3mA.
Sensitive gate.
$1.00 each

RCA power transistors.
NPN RCS 258.
Vceo 60 NFE 5mA.
IC 20 Amps Vce 4V.
250 Watts, Ft 2 MHz.
$3.00 each

RCA Triacs.
Type T4121B/40799.
200 VDC 10 Amps.
Stud type.
$3.69 each

RCA Triacs.
Type 40805/T6421D.
30 Amps, 400 VDC.
$5.00 each

Motorola rf amplifier.
544-4001-002, similar to type MHW 401-2.
1.5 Watts output.
440-512 MHz.
15 dB gain min.
$19.99 each

DIODES

HEP 170
3.5 A, 1000 PIV
.20 ea., 100 for $15.00

D61005
1.5 A, 1000 PIV
.15 ea., 100 for $12.00

HVK 1153
25 mA, 20,000 PIV
$1.00 ea., 10 for $8.00

SCMS 10K
15 mA, 10,000 PIV
$1.69 ea., 10 for $12.50

Motorola MA 752 Rectifier
6 Amps, 200 PIV
4/$1.29

Fairchild LEDs
FLV 5007 & 5009 red.
Case type TO-92.
6/$1.00

High-voltage diode EK500
5000 Volts, 50 mA
.99 each

Motorola SCR
TO-92 Case, 0.8 Amp, 30 V.
Igt 0.2 Vgt 0.8.
Same as #N5060.
4/$1.00 or 100/$15.00

Dialco Type 555-2003
LED 5 VDC with built-in resistor.
.69 each

2822 North 32nd Street, #1 • Phoenix, Arizona 85008 • Phone 602-956-9423

CIRCLE 149 ON READER SERVICE CARD

PARTS/ASSEMBLIES/ ACCESSORIES

Wakefield Thermal Compound 120-8
8-oz. jar, $5.35

TY-Raps 08470
7 in.
50/$2.00

1/2 W Audio Amplifier
Parts List:
3 transistors
5 resistors
1 capacitor
1 volume control pot
All parts assembled on PC board.
Requires 6-9 VDC for operation.
High-impedance input; 8-ohm output.
$1.00 each

VU Meters, 50 uA
1 1/2" x 1 1/2" x 1/2".
$1.99 each

Litronix DL-4509
4-digit readout.
$2.99 each

New Simpson 260-7 VOM
$99.99 each

---

12 VDC lamps, 60 mA
1/8" round x 1/2" long w/12" long leads.
.39 ea., 10 for $2.50

Heat Sink
(Great for rf power amplifiers.)
3 3/4" high x 7" long.
Flat one side only.
$4.99 each

5-pin DIN Jack & Plug Set.
$1.29 per set

Grain-of-wheat lamps
6.3 VDC, 50 mA.
8 for $1.00

Cooling fans
2" round x 3" long, 12 VDC.
$5.95 each

Ten-turn pot w/ten-turn knob
2000 ohms.
$6.95 each

Rf choke 70F276A1
2.7 uH, 250 mA.
.69 ea., 25 for $12.00

Water pump, multi-purpose
6 VDC/0.33 gpm.
$2.99 each

Switch, dpdt, pushon/push off
Microswitch No. 92PB19-T2.
5 A, 250 VAC.
$1.29 each

New Sylvania Pathmaker
CATV amplifier.
Hybrid IC ampl. Model 152.
No data. Has two rf transistors and 1 rf amplifier plus many other parts.
$29.99 each

New big rf connectors, type 1
Prodelin, Inc. No. 78-880-1.
$12.99 each

Type 2
Cablewave System, Inc.
735201/FX38-50NF/16733.
Taperlok.
$12.99 each

1000 pF feedthru caps
Solder Type.
4/$1.00

TO-5 type relay
WABCO 91630301-10.
26 VDC.
$4.99 each

Transco rf coax switch - 28 VDC
Type 16500NAU12-15, 1 input, 3 output
Type N connectors $39.99 each

Type 2 - No. 1460-20/SA-303/U
SPDT-Type N connectors $39.99 each

---

4 each RCA 7651 tube with socket
$200.00 per set
One tube and one socket
Socket only $100.00

Rotron biscuit fan
115 VAC Part BT 2A1.
$12.99 each

3-M Company Bumpons.
2 types:
Type 1
SF-5012, black
0.5" dia. x 0.14" high
(12.7 x 3.55 mm)
70-0700-1813-3 sheet of 4
$3.00

Type 2
SJ-5519, brown
0.78" x 0.35" rect. x 0.2" high
(19.8 x 8.89 x 5.08 mm)
70-0700-2982-5 sheet of 64
self adhesive
$4.29

Joy sticks
JVC-40 40kn.
(2) video controllers, $4.99

Power one
Model CP-198 power supply.
Input 105-125 VAC; output 5 VDC.
6 Amps.
$19.99 each

ORDERING INSTRUCTIONS

Check, money order, or credit cards welcome. (Master Charge and VISA only.) No personal checks or certified personal checks for foreign countries accepted. Money order or cashiers check in U.S. funds only.· Letters of credit are not acceptable.

Minimum shipping by UPS is $2.35 with insurance. Please allow extra shipping charges for heavy or long items.

All parts returned due to customer error or decision will be subject to a 15% re-stock charge. If we are out of an item ordered, we will try to replace it with an equal or better part unless you specify not to, or we will back order the item, or refund your money.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. Prices supersede all previously published. Some items offered are limited to small quantities and are subject to prior sale.

We now have a toll free number, but we ask that it be used for charge orders only. If you have any questions please use our other number. We are open from 8:00 a.m. - 5:00 p.m. Monday thru Saturday.

Our toll free number for charge orders only is 800-528-3611.

SEMICONDUCTORS SURPLUS

2822 North 32nd Street, #1 • Phoenix, Arizona 85008 • Phone 602-956-9423

CQ SHOWCASE

Heath High-Power 2-Meter Amplifiers

Heath Company has announced two high-power amplifiers for amateur radio operators using the 2-meter f.m. band. The VL-2280 75-watt all-mode v.h.f. base amplifier is designed for use with base stations or 2-meter repeaters, while the VL-1180 75-watt all-mode v.h.f. amplifier is suited for base or mobile use. Both the VL-2280 and VL-1180 amplifiers are designed to operate in all modes (s.s.b., f.m., or c.w.) across the entire 144 to 148 MHz 2-meter band. Ten watts in, from an exciter like the Heathkit VF-7401 2-meter transceiver, produces a 75-watt signal.

Antenna-to-receiver insertion loss is less than 0.6 dB, while intermodulation distortion is less than 24 dB. Power output is kept stable across the entire band by broad-band circuitry. Extra-large heat sinks provide enough cooling to the amplifier to allow a 50% duty cycle. Keying can be either r.f.-sensed or remote.

The VL-1180 is priced at $137.95 and operates on 13.6 v.d.c. mobile power. The VL-2280 is priced at $274.95 and operates on 120 v.a.c., 240 v.a.c., or 12 v.d.c. back-up battery power. For more information, contact Heath Company, Dept. 350-065, Benton Harbor, MI 49022, or circle number 108 on the reader service card.

Trac*One CW Processor, CMOS Keyer

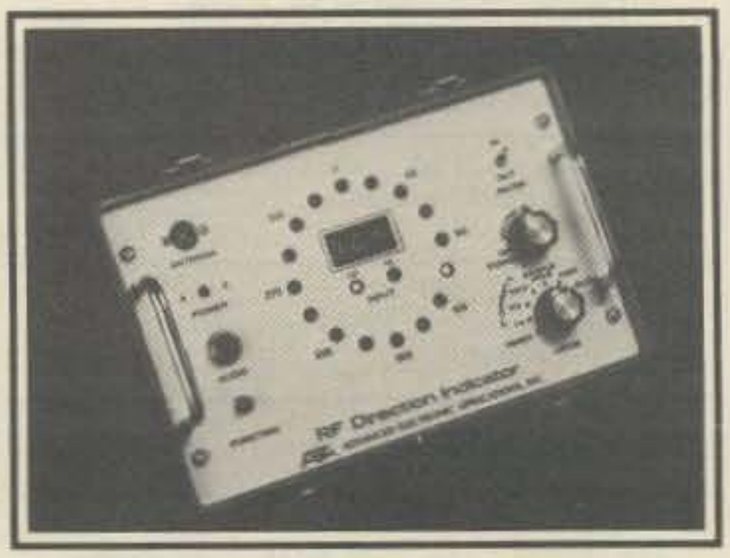
The TRAC*ONE CW Processor, Model TE 424, is an advanced c.w. audio processor which receives the audio from any rig, passes it through a PLL tone decoder, removing all QRN and QRM, and reproduces a fully adjustable c.w. audio signal. Front panel controls allow full adjustment of freq., tone, delay, and gain. The frequency control is adjustable from 300 Hz to 2500 Hz. While the c.w. signal is being decoded a front panel LED flashes in sync with the signal establishing that the unit is locked onto the audio from the rig. The TRAC*ONE contains a built-in speaker, a headphone jack on the rear panel, and is operated on a 9 vcd battery or with an ac adapter. In the bypass position, the Model TE-424 TRAC*ONE may be left in line and the rig audio is passed through to the speaker.

The TRAC*ONE + Deluxe CMOS

Keyer, Model TE-464, combines the TRAC*ONE with a CMOS electronic keyer. The keyer contains self-completing dots and dashes, dot and dash memory, iambic keying with any squeeze paddle, 5–50 wpm, speed, volume, tune, and weight controls, sidetone and speaker, rear panel switch for use with a bug or straight key, quarter-inch jacks for keying and output. The Model TE-464 keys both grid block and solid state rigs and operates on one 9 vdc battery or a 9 vdc ac adapter. For more information, contact Trac Electronics, Inc., 1106 Rand Bldg., Buffalo, NY 14203, or circle number 106 on the reader service card.

AEA R.F. Direction Finder

The AEA model PFDF is an r.f. direction finder using the doppler spun array technique, and it features a self-contained and preprogrammed computer. The PFDF offers 1° resolution with a three digit LED display. A ring of discrete LED indicators surrounding

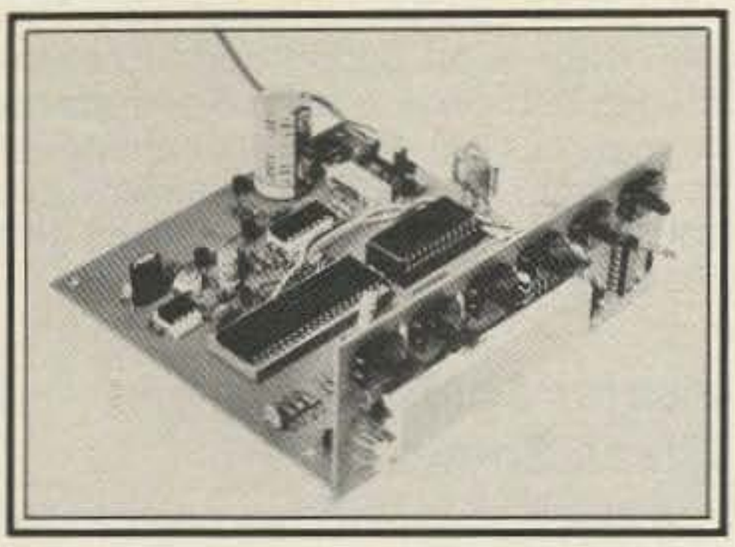


the 3 digit display gives the operator instant course bearing information. It will work with virtually any f.m. receiver by simply plugging into the receiver external speaker jack. The receiver audio gain control is set for proper level as indicated by PFDF front panel level indicators. A built-in audio amplifier and speaker in the PFDF allows the operators to independently adjust the monitor level. The doppler sample tone gives the experienced operator a good indication of when multipath signals are being received. An audio filter is provided to reduce the amplitude of tone for more pleasant monitoring. The overall system sensitivity and selectivity is dependent upon the receiver being used.

The PFDF is supplied with a v.h.f. high band antenna that will operate over a frequency range of 130 to 175 MHz. The antenna consists of four dipoles that are switched with PIN diodes, driven by the PFDF computer. Other mating antennas will be made available in the future for other frequency bands. For more information, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036, or circle number 109 on the reader service card.

Bullet Electronics Station Clock

The Zulu 3TZ microprocessor station clock has a microprocessor chip and memory that gives one local 12-hour time zone and two alternate 24-hour world time zones. In addition, the unit has a "reminder" I.D. timer that gives different tones at 8, 9, or 10 minute intervals. The I.D.'er is resettable

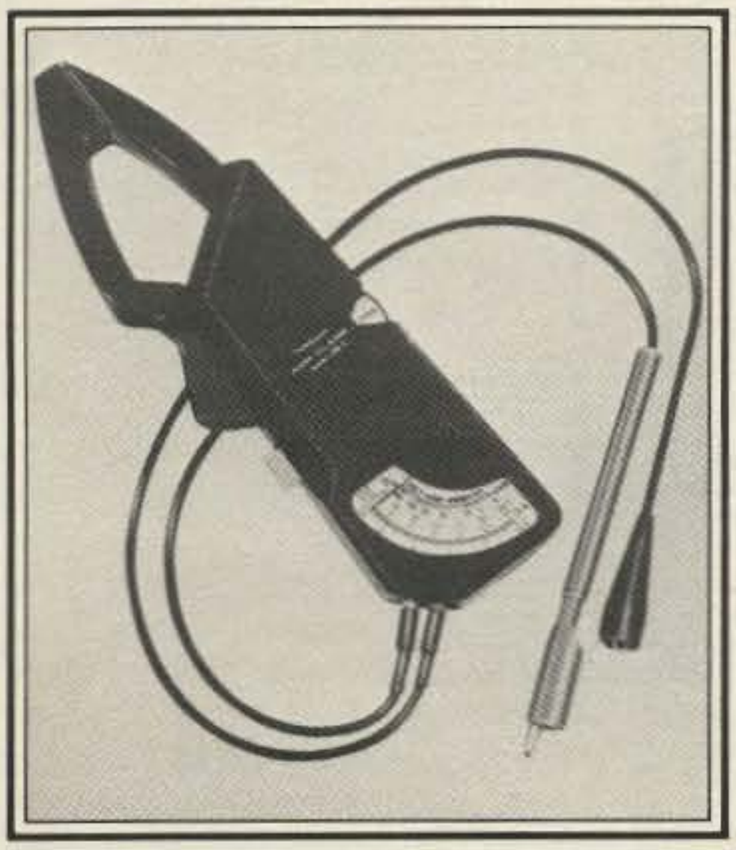


and accurate to ±.1 second. Other features include large, orange .6-inch LED readouts; quartz crystal timebase battery backup; a.c. or d.c. operation on 12 volts or 117 v.a.c. with the wall-plug transformer, which is included.

An appliance timer output that is synchronized with the local (12-hour) time allows one on and one off shift-point per day. A Remote Temperature Option is also available for $9.95. The complete kit, including case and wall-plug transformer is $49.95. It also comes factory wired and tested for $79.95. Price for unit wired with Remote Temperature Option is $92.50. For more information, contact Bullet Electronics, P.O. Box 401244E, Garland, TX 75040, or circle number 119 on the reader service card.

Simpson Amp-Clamps

Simpson Electric's line of Amp-Clamp® clamp-on electrical testers provide for fast, accurate testing of a.c. electrical service problems. The Amp-Clamp testers include: the Model 296 Series 2 volt-ohm-ammeter ($96), which measures 0–30 to 0–600 volts ac in 4 ranges, 0–500 ohms, and 0–6 to 0–300 amperes ac rms in 5 ranges; the Model 295 Series 2 volt-ohm ammeter ($85), which measures 0–300 to 0–600 volts ac rms in 4 ranges, and 0–6 to 0–300 amperes ac rms in 5 ranges; and the Model 294 Series 2 ammeter ($73), which measures 0–6 to 0–300 amperes ac in 5 ranges.



Also available are the Model 150 Series 2 Amp-Clamp Adapter ($46), for Simpson analog volt-ohm milliammeters, and the Models 153 Series 2 and 154 Series 2 Amp-Clamp Adapters ($46), for Simpson digital multimeters. For more information, contact Simpson Electric Company, 853 Dundee Ave., Elgin, IL 60120, or circle number 103 on the reader service card.

Votrax® Text-to-Speech Synthesizer

Votrax® is introducing its new Type-'N-Talk™ text-to-speech synthesizer that allows a hobbyist's personal computer to talk back to him in highly intelligible English words and phrases. Used in conjunction with any computer that has an RS 232C interface, Type-'N-Talk™ permits the hobbyist to type an unlimited combination of English words and phrases on the keyboard. The computer will then "speak" the words typed. Words can be spoken simultaneously as they are typed, or Type-'N-Talk™'s 750 character buffer will hold the words until the user prompts the computer to speak them in entire phrases or sentences.

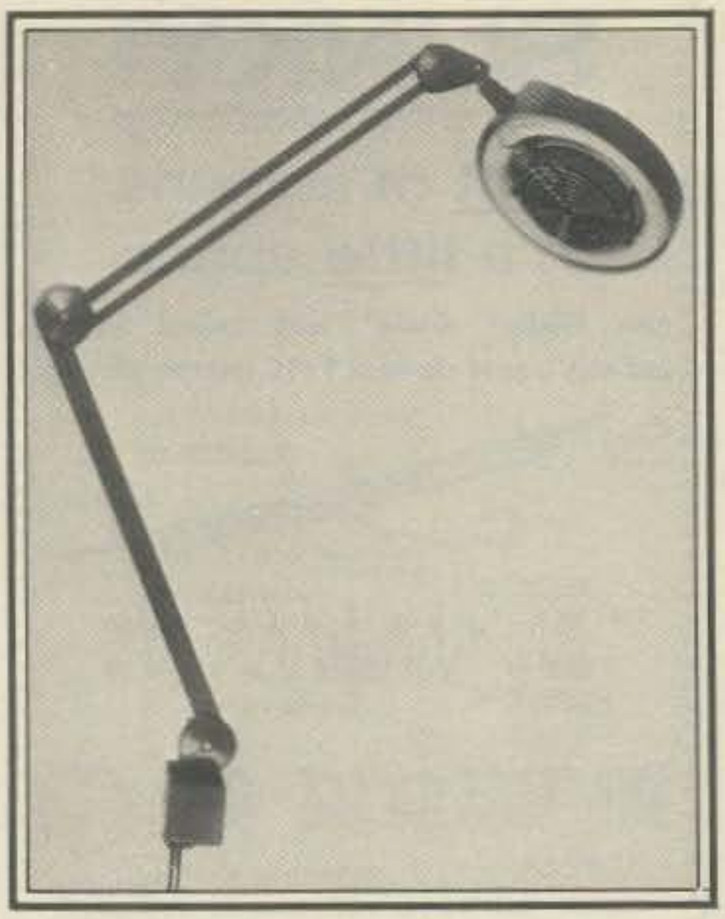
The verbal response consists of electronic-generated phonetic speech which is heard through the user's audio loud-speaker. The system can also display through software phonetic codes which the user may optionally store in the host computer's memory.

The Type-'N-Talk™ speech synthesizer sells for $345 per unit. For more information, contact Vodex, 500 Stephenson Highway, Troy, MI 48084, or circle number 105 on the reader service card.

Luxo Exhaust Fan Lamp

A low-cost, adjustable exhaust fan lamp that provides a shadowless, fume-free work area, manufactured by Luxo Lamp Corporation, is being introduced by Contact East, Inc. The Luxo Exhaust Fan Lamp safely draws smoke, fumes, and vapors of soldering and other bench assembly operations away from operators while providing bright, glare-free illumination.

NO - 81-82



Self-balancing "K" arms conceal and protect wiring and keep the light in position.

The Luxo Exhaust Fan Lamp delivers 100 CFM at 2,900 RPM with its 3-blade fan. It mounts to any horizontal surface and rotates 360°. Arms are made of 20-gauge steel and reach 45 inches. Comes with 22W fluorescent bulb, mounting clamp, and 3-wire cord. The Fan Lamp is priced at $139.95. For more information, contact Contact East, Inc., P.O. Box 160, 7 Cypress Dr., Burlington, MA 01803, or circle number 104 on the reader service card.

Clifford Industries R.F.I. Filter

Clifford Industries has announced an r.f.i. filter to prevent radio r.f.i. from causing power supplies to shut down. Circuits in the Vista power supplies have overvoltage protection, current-limit, and fold-back circuits. These circuits were being affected by voltage spikes caused by r.f.i. transmission in close proximity to the power supply.

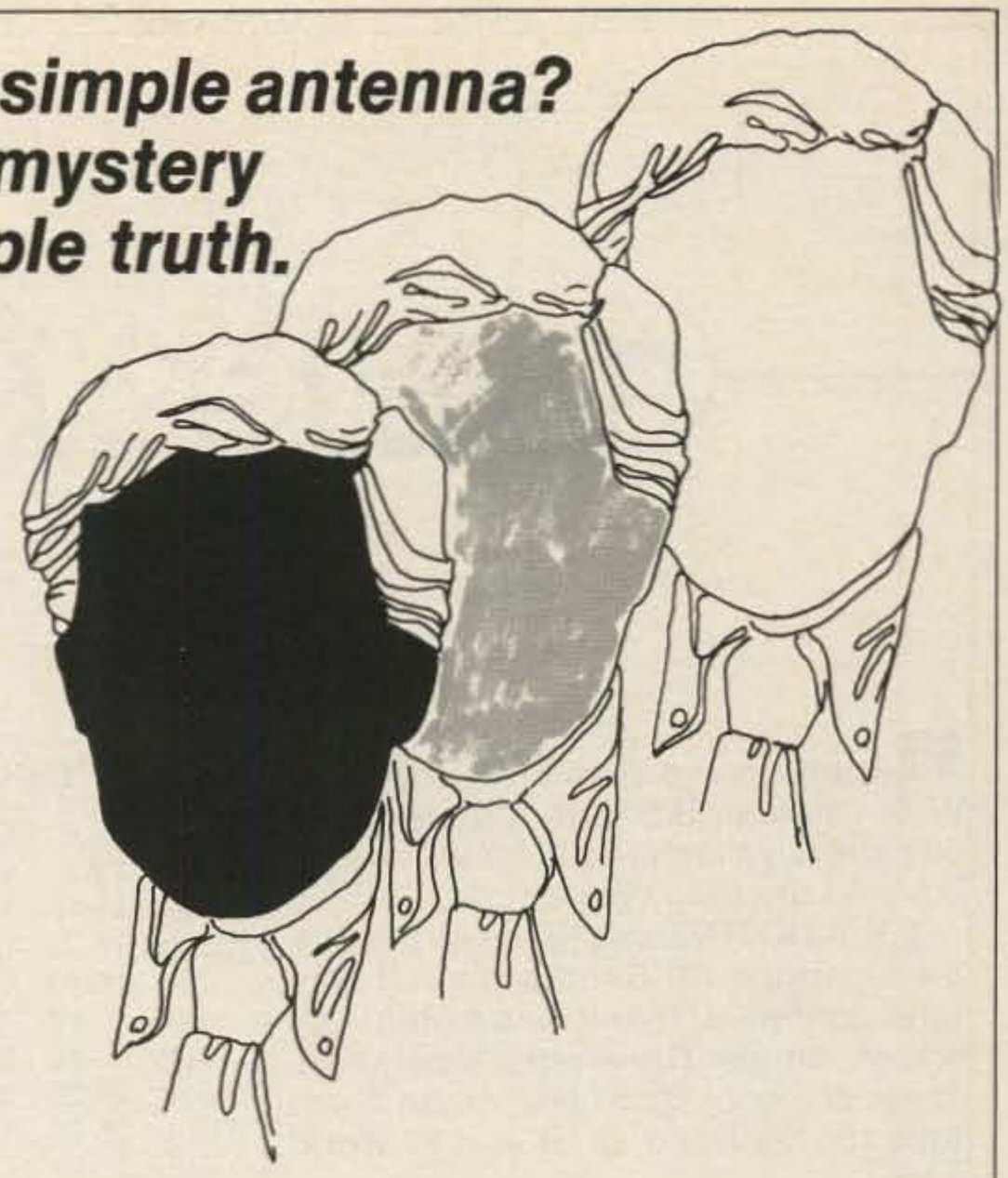
Vista's line of power supplies from 10 amps through 55 amps have an adjustable output voltage of 13.2 to 14.4 volts. Metered units—20RM, 30RM, and 50RM—can be adjusted from 3 to 15 volts by using an external knob. The r.f.i. filter is an option and is not included in the basic price. For more information, contact Clifford Industries, Inc., P.O. Box 436, Camarillo, CA 93010, or circle number 102 on the reader service card.

Kester Solder's Brass Solder

A new brass solder has been added to Kester Solder's Bubble-Pak™ line of do-it-yourself soldering products. Symbol-coded with a slip-on connector, the new .46 ounce solder package is 50% tin and 50% lead. It is designed for working on brass fixtures and fittings, tarnished copper, lamp repairs, electrical connections, and slip-on connections. A special flux used with brass solder is included. For more information, contact Kester Solder, Div. of Litton Industries, 303 East Wacker Dr., Chicago, IL 60601, or circle number 107 on the reader service card.

Say You Saw It In CQ!

Who knows who lurks behind that simple antenna? That play on words from a radio mystery program of years ago tells a simple truth.



The "Ham" Who Wasn't

BY GERALD SAMKOFSKY*, N4ZB

Part of enjoying amateur radio is meeting other hams in person by way of an invitation, QSO, etc. Yet there is another means of making new amateur friends, a manner that many of the readers probably have already practiced. While driving, walking, etc., keep your eyes peeled for that beam, quad, vertical, randomwire, and then when possible knock on a door and presto—another new friend! Via this method I have made friends whose ham shacks fill luxurious penthouse rooms, possibly a corner of a mobile home, or a modest apartment. These meetings have given me a long list of friends. One attempt at using this means to meet a "ham" might very well have culminated in a different manner, who knows. You too could have had a similar adventure!

It was during the 1950s. The XYL and I decided to walk towards that part of Brooklyn, New York (where we lived at the time), which included a large shopping area, fine restaurants, and a park-like area overlooking New York Harbor. We thought this would also be a good chance to possibly spot another amateur antenna.

We saw nothing new in the way of antennas as we covered several miles of historic downtown Brooklyn. A fast but tasty lunch, then we continued walking towards the Harbor lookout (Brooklyn Heights). Suddenly there it was—a longwire stretching atop an ancient commercial building.

"Well now," I thought, "here's an old-timer, for surely that antenna is long enough to cover 160 meters."

I asked the XYL if we could stop and visit the owner of that fine skywire. Being an old-timer myself, I could appreciate another ham who might share my nostalgia.

Always agreeable to similar requests, this time the XYL refused! She felt that since this was a commercial building the ham in question might be busy with more pressing business this sunny Saturday.

Several weeks later we again took a similar hike. There was that fine longwire antenna, and again I asked to visit a possible new friend. Again the XYL said no. Once again, we made the same hike and again I asked for permission to visit a new friend. No dice; she gave me the same argument. This time, however, I insisted on at least determining where the longwire was being used in the building. The lobby of the decrepit structure listed various small businesses. After determining which window the lead-in wire went to, I learned that this was a small photography studio.

A week later the XYL had to work on a Saturday. Feeling free to follow my desires, I quickly visited the aforementioned building and went to the photography studio door. No one replied to my knock and apparently the proprietor was out. Not wishing to depart without learning the identity of the radio operator, I inquired from another tenant whether the chap in question followed ham radio as a hobby. I was informed that while the tenant had not made mention of any ham call, the photographer had a "fine radio station," and he seemed to be well versed in electronics. However, he had left the premises some days earlier with several stern-faced men and hadn't been seen since.

After all these attempts to make a new friend, I truly felt disappointed. I also wondered what had happened to him since weekends should normally represent busy days.

I didn't have to wonder long. One morning as I opened my newspaper, a glaring headline proclaimed, "Russian Spy Captured In Brooklyn." My never-to-be friend was Colonel Rudolf Abel, who later was exchanged for our own agent Lt. Gary Powers (captured after his U-2 spy plane was forced down in Russia).

Two thoughts remain with me since that day: Can a similar incident take place as I knock on new doors, and what would have happened had I knocked on Colonel Abel's door and been invited in to see his "shack"? CQ

*1420 Mount Vernon Drive, Holiday, FL 33590

a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Reviewing the results of the 1980 WPX Contest, S.S.B. in the March issue and C.W. in the April issue, we discovered the following errors.

S.S.B.: K6HNZ was listed as the Single Operator, All Band winner. It was later confirmed that it was a Multi-Operator, Single Transmitter operation. Their score of 2,151,507 made them tops for the 6th district and #7 world wide.

C.W.: N2ME was listed as an All Band winner. Actually, it was a Single Band effort on 14 MHz. Mark's score of 1,023,050 therefore replaces W5FO as the Kansas City DX Club's Trophy winner. (Sorry to disappoint you Lynn.)

KL7HR was listed as the Single Operator, All Band winner. This was also a Multi-Single operation. However, no harm was done as that was the only Multi entry from Alaska, and KL7RA had already been listed as a certificate winner.

4N4Y, the Club station listed as the European Multi-Single trophy winner, was not eligible for the TF3JB award, having won it the previous year. That makes UK2PCR the 1980 winner.

UQ2PQ was listed as the Single Operator, All Band winner. He was a winner, but his 117,810 score was made using QRPp. That puts him as #2 world wide, a real fine effort.

There are probably a few more errors we overlooked but that's all we came up with at this time. The WPX Contest has come of age and can now be rated as #2 world wide. With that magnitude of entries there are bound to be some errors.

And speaking of the WPX Contest, a final reminder. This year's C.W. entries, as well as the S.S.B., go to: Bernie Welch, W8IMZ, 7735 Redbank Lane, Dayton, Ohio 45424. Of course those sent to the *CQ* office will be forwarded to W8IMZ.

Sorry about the errors, we'll do better next time around I'm sure.

73 for now, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	July 1	Canada Day Contest
†	July 4-5	Venezuelan SSB Contest
	July 11-12	IARU Radiosport
	July 17-23	SWOT QSO Party
	July 18-19	Colombian Contest
	July 18-19	AGCW DL QRP Contest
	July 18-19	Seanet C.W. Contest
	July 24-26	Mackinac Race Event
†	July 25-26	Venezuelan C.W. Contest
	July 25-27	County Hunters CW Contest
	Aug. 1-2	Illinois QSO Party
	Aug. 8-9	European C.W. Contest
	Aug. 15-16	Seanet Phone Contest
	Aug. 15-17	New Jersey QSO Party
	Aug. 15-17	Rhode Island QSO Party
	Aug. 22-23	Ohio QSO Party
	Aug. 22-23	All Asian C.W. Contest
	Sep. 9-11	YLRL "Howdy Days" Party
	Sep. 12-13	European Phone Contest
	Sep. 12-14	Wash. State QSO Party
	Sep. 26-27	Delta QSO Party
	Oct. 3-4	California QSO Party
	Oct. 3-4	VK/ZL Phone Contest
	Oct. 10-11	VK/ZL C.W. Contest
	Oct. 11	RSGB 21/28 MHz Phone
	Oct. 18	RSGB 21 MHz C.W. Contest
	Oct. 21-22	YLRL Anniv. QSO Party
	Oct. 24-25	**CQ WW DX Phone Contest**
	Nov. 14-15	European RTTY Contest
	Nov. 28-29	**CQ WW DX C.W. Contest**

* Covered last month.
† Not Official.

Venezuelan Contest

Phone: July 4-5 C.W.: July 25-26
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is a world-wide-type contest, therefore work other countries as well as YV stations.

There are four categories: Single operator, single and all band, and multi-operator, single and multi-transmitter. Also s.w.l.

Exchange: RS(T) plus a QSO number starting with 001.

Points: Contacts between stations in different countries 2 points. Between stations in the same country zero (0) but permitted for multiplier credit.

Multiplier: One for each country, each YV call area, and each U.S. call district worked on each band.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Awards: There is a large variety of awards.

Plaques: To the top scorers in each category.

Medals: To the top station in each of the following areas: North, Central, and South America, Caribbean, Bolivarian countries, Europe, Africa, Asia, Oceania and s.w.l.

Certificates: To all stations having contacted the following totals: (a) 15 YV's plus 10 different countries, for stations in North, Central, and South America, Caribbean and Bolivarian countries. (b) 10 YV's 10 countries for Europe and Africa. (c) 5 YV's plus 10 countries for Asia and Oceania. (d) S.w.l.'s reporting 50 complete QSO's including at least 10 YV's.

Include a summary sheet with your entry and the usual signed declaration.

A remittance of $2 or its equivalent in IRC's is requested with each certificate application.

Mailing deadline is Sept. 15th for phone, and Oct. 15th for c.w. entries. Mail to: Radio Club Venezolano, P.O. Box 2285, Caracas 101, Venezuela.

IARU Radiosport

Starts: 0000Z Saturday, July 11
Ends: 2400Z Sunday, July 12

This is a worldwide competition, all bands, 160 through 2 meters, single and multi-operator.

There are three categories: c.w. only, phone only, and mixed c.w. and phone. Multi-operator use mixed mode, single transmitter only.

Each station may be worked once per band regardless of the mode. Crossband contacts not permitted except via Oscar, which counts as a separate band.

Single operator stations are limited to 36 hours of operating time. Off times must be at least 30 minutes and

indicated in your log. There is no time limit for multi-stations, but operation must remain on the same band for at least 10 minutes.

Exchange: RS(T) and your ITU zone.

Points: One point for QSOs with stations in your own zone, 3 points if station is outside your zone but on the same continent, and 5 points if on a different continent.

Multiplier: Sum of different ITU zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each category, in each ARRL section, ITU zone, and DX country. Achievement awards are available for making 250 and 1000 QSOs and/or contacting 50 or more zones. In case of multiple award levels achieved only the highest award will be issued.

U.S. and Canadian entries are requested to use official log and summary sheets which may be obtained from the ARRL. Also request forms CD-77, CD-175, and the ITU zone list. A large s.a.s.e. with at least 35¢ postage will get you a good supply.

All entries worldwide go to: IARU Headquarters, Box AAA, Newington, CT 06111 U.S.A. Mailing deadline is August 30th.

Side-Winders on Two Contest

0000 UTC July 17 to 2359 UTC July 23

This event runs for a full week and is the fourth annual SWOT QSO Party. Activity of course will be on 2 meters only, s.s.b. or c.w.

A station may be worked on each mode for QSO credit. Portable and mobiles may be counted from one location only. All contacts must be made direct, no repeaters. (EME contacts may be counted if all requirements are met.)

Pete Chamalian, W1RM, planned his trip to Merry 'Ole England last September so that it would coincide with the annual G4DAA Club dinner. He also planned a surprise for Al Slater, G4FXB. Here's Pete presenting him with the Bill Leonard, W2SKE World Plaque, Top All Band score in the 1979 World Wide Phone Contest.

Also attending the dinner were a couple of other 1979 WW top scorers. Chris Page, G4BUE, World QRPp C.W. winner, and Dave Andrews, G3MXJ, top 10 meter phone score for England and #5 World Wide. (Left to right) G3FXB, G4BUE, G3MXJ, and W1RM. (Pete was the U.S.A. Single Band winner on 21 MHz.)

Exchange: Call and QTH, county and state or territory equivalent. SWOT members include membership number.

Scoring: (a) Total SWOT member QSOs multiplied by different QTHs worked and multiplied by two equals the SWOT member credit.
(b) Total non-SWOT QSOs multiplied by QTHs worked equals the non-SWOT credit.
(c) Sum of credits from (a) and (b) is your final score.

Awards: The SWOT Trophy goes to the top scorer. Certificates to the highest scorers in each ARRL section in which more than one entry is received.

Logs should not be submitted unless requested. However send a summary no later than August 21st to: Dean Figgins, WA7EPU, P.O. Box 1141, Carefree, AZ 85377.

Macinac Race Special Event

2200-0200 GMT Friday, July 24
1400-0200 GMT Sat./Sun. July 25/26

The Eastern Michigan A.R.C. of Huron is conducting a special event from station K8DD for the 57th Port Huron to Mackinac yacht race.

Activity will be on 80, 40, and 15 meters s.s.b., 10 kHz up from General class lower band edge. Novices will be worked on 3710, 7110, and 21110 on even hours.

All contacts will be honored with a numbered certificate. QSL's should be sent with a large s.a.s.e. to Station K8DD, 1640 Henry, Port Huron, Mich. 48060.

Colombian Contest

Starts: 1800 UTC Saturday, July 18
Ends: 1800 UTC Sunday, July 19

This year's contest will be commemorating the 171st anniversay of Colombia's independence.

Exchange will be on a world basis, all bands 1.8 through 28 MHz, both phone and c.w.

There are four classifications: Single operator, single and all band, and multi-operator both single transmitter and multi-transmitter.

Exchange: Non-HK's—RS(T) plus a 3 figure QSO number starting with 001.

HK's—RS(T) plus number 171 (indicating the years of independence).

Scoring: Non-HK's—QSO with HK stations, 10 points. With other DX stations, 3 points. With stations in the same country, 1 point.

HK's—QSO with DX stations, 5 points. With other HK's 1 point.

Multiplier: Number of DXCC countries worked on each band.

Final Score: Sum of QSO points from all bands multiplied by the sum of different countries worked on each band.

Awards: A silver cup to the overall world winner, and 8 silver plaques for 1st and 2nd place in each of the four classes mentioned above. No mention was made of any certificates, but it is assumed that they will be issued for each country.

A minimum of 100 QSO's must be shown when applying for an award.

Only one contact per band with the same station, and no cross band or cross mode.

Use a separate log sheet for each band, indicate the country only the first time it is worked, and include a summary sheet showing the scoring, etc. The usual disqualification rules will be enforced.

Mailing deadline is August 30th to: L.C.R.A., Contest Manager, Apartado 584, Bogota, Colombia.

AGCW-DL QRP Contest

Starts: 1500Z Saturday, July 18
Ends: 1500Z Sunday, July 19

This is a c.w. only contest, all bands 10 through 160 meters. The same station can be worked on each band for QSO point credit.

There are 5 classes as follows:

A. Single Op., 3.5 watts or less input.
B. Single Op., 10 watts or less input.
C. Multi-Op., 10 watts or less input.
D. QRO stations, over 10 watts input.
E. S.W.L. entries.

Multi-op stations may operate the full 24 hours; all others must take a 9 hour break.

Exchange: RST, QSO no., and power input. Add X if crystal controlled (559001/5X)(579001/QRO).

Points: QSO within own country 1 point. With stations in own continent 2 points. With DX outside own continent 3 points. Double above points if station is crystal controlled. (Crystal controlled stations are limited to 3 crystals for each band.)

Multiplier: One for each country worked, and one for each DX contact.

Final Score: Total QSO points times the sum of the multiplier on that band. Then add the sum of the scores from each band.

For scoring purposes call areas in JA, PY, VE, VK, W, and ZS count as multipliers.

Awards: Certificates to the first three places in each class and each country.

Submit your log no later than six weeks after end of contest to: Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Rep. of Germany.

SEANET World Wide DX Contest

C.W.: July 18-19 S.S.B.: Aug. 15-16
0001 GMT Sat. to 2359 GMT Sun.

The aim of this contest is to publicize the hosting of the 11th SEANET Convention in Jakarta in November. (The NET meets daily at 1200Z on 14320 MHz.)

The same station may be worked only once per band, cross-band or

cross-mode contacts are not allowed, and multi-stations are limited to one signal at the same time.

Classes: Single operator, single and all band, multi-operator, all band.

Exchange: RS(T) plus a 3 figure QSO number starting with 001.

Scoring: For stations outside the SEANET area.

(a) Contacts with stations within the NET area with the following prefixes: DU, HS, YB, 9VI, 9M2, 9M6, 9M8. 20 points if on 160, 10 points if on 80 or 40, and 4 points if on 20, 15, or 10 meters.

(b) Contacts with stations in other NET areas. 10 points on 160, 5 points on 80 and 40, and 2 points if on 20, 15, or 10 meters.

(c) Contacts between stations outside the NET area have no value.

(d) A multiplier of 3 points for each NET country worked.

Final Score: Total QSO points from all bands times the sum of the multiplier points.

Awards: Commemorative certificates to all qualified entries. Trophies to top scorers will be presented at the SEANET Convention, hosted by Orari, Jakarta, Rep. of Indonesia, in November.

The usual disqualification rules will be observed and strictly enforced.

All entries must be received by October 31st and go to: "Eshee," 9M2FK, P.O. Box 13, Penang, Malaysia. Include one IRC for a copy of the results.

List of SEANET Area Prefixes: A4, A51, A6, A7, A9, AC3, AP, BV, BY, CR9, C21, DU, EP, HL/HM, HS, H44, JA/JE/JF/JG/JH/JI/JR, JD1, JY, KA, KC6, KG6/KH2, KH6, KX6, P29, S2, S79, VK, VQ9, VS5, VS6, VS9K, VS9M/8Q6, VU2, VU (Andaman, Nicobar & Laccadive Islands), XU, XV5, XW8, YB, YJ8, ZL, 3B6, 3B8, 3D2, 4S7, 4W1, 5Z4, 9K2, 9M2, 9M6, 9M8, 9N1, and 9V1.

County Hunters C.W. Contest

Starts: 000Z Saturday, July 25
Ends: 0200Z Monday, July 27

The County Hunters invite and encourage mobile and portable operation from the less active counties during this contest.

The same station may be worked on each band for QSO points. Portables and mobiles changing counties may also have repeat contacts. Stations on county lines exchange only one number, but each county is counted as a multiplier.

Exchange: QSO no., category (P—portable or M—mobile) RST, state, province or country, and county for U.S. stations.

Scoring: QSOs with a fixed station 1 point, 3 points if it's a portable or mobile. Multiply total QSO points by number of U.S. counties worked. Mobiles and portables calculate their scores for contacts made within a state.

Frequencies: 3575, 7055, 14070, 21070, 28070. It is requested that P or M stations use frequencies below 7055 and 14070; others spread out above.

Awards: Certificates in three divisions.

F—Top fixed or fixed portable in each state, province, or county with 1000 or more points.

P—Top score in each state by a portable operating from a county other than its normal location with 1000 or more points.

M—Top scoring mobile in each state operating from 3 or more counties, with a minimum of 10 QSOs in at least 3 counties.

There are also Trophies for the single operator Portable and Mobile in the U.S. Additional awards will be made where deemed appropriate.

Stations with 100 or more contacts must include a check sheet of counties worked. Enclose a large s.a.s.e. if results are desired.

Mailing deadline is Sept. 1st to: C.W. County Hunters Net, c/o Jeffrey P. Bechner, W9MSE, 673 Bruce Street, Fond du Lac, Wisc. 54935.

Please send all reader inquiries directly

BOOK REVIEW:

Ferromagnetic Core Design and Application Handbook

BY M.F. "Doug" De Maw

Reviewed By Dr. Ulrich L. Rohde*, DJ2LR

This handbook of ferromagnetic core design is an absolute must for any engineering library and is the best, if not the only, complete application book on this subject. The author, Doug De Maw, also went through great pain and detail to inform the reader about the capabilities and applications of ferrite material, and his impressive literature references indicate that the field was well researched.

The *Ferromagnetic Core Design and Application Handbook* has five chapters and five appendices dealing with the Basics of Magnetic Materials, Application of Rods, Bars and Slugs, Applying Toroidal Cores, Beads, Sleeves and Pot Cores, and Permanent Magnetic Data. The appendices provide various manufacturer-supplied data on mechanical construction and electrical information.

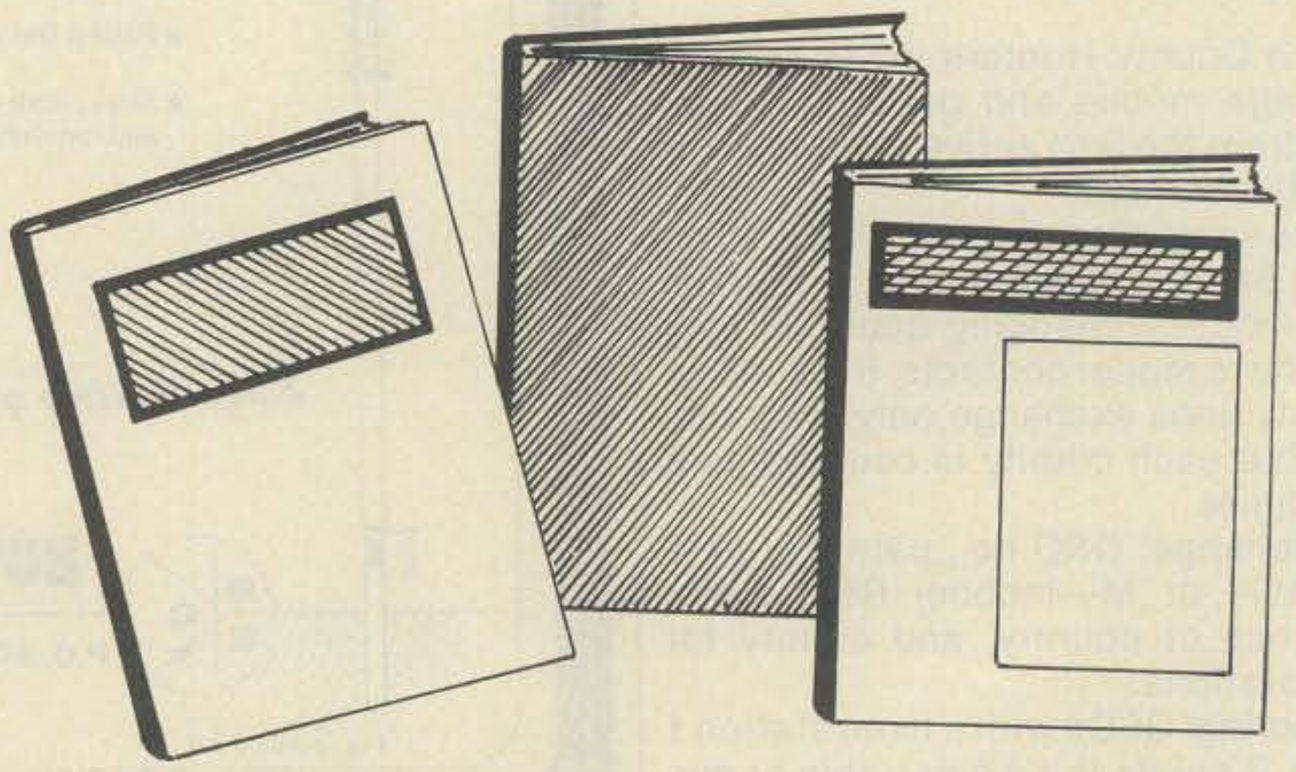
The mathematical level in the book is sufficient for all practical applications and the necessary background and formulas are provided. Traditionally, in American literature there is a large emphasis on toroids and toroidal cores, and it is good to see that pot cores are also covered.

It is customary to add a few remarks about possible improvements, and I would like to recommend the following to the excellent presentation:

1. Test results on intermodulation distortion on the various ferrite materials.
2. Information on the complex permeability.
3. Reference to some non-American papers that contain some other useful high-frequency applications.

The book is hardcover, 256 pages, and is published by Prentice-Hall, Inc., Englewood Cliffs, NJ 07632. It sells for $19.95.

*14 Gloria Lane, Fairfield, NJ 07006



a regular feature by

THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

Spread-Spectrum Tests To Begin

On 6 March 1981 the Private Radio Bureau granted Special Temporary Authority (STA) to 25 radio amateurs for the purpose of permitting these licensees to experiment with spread-spectrum modulation techniques. The amateurs are associated with the Amateur Radio Research and Development Corporation (AMRAD), a technically oriented club of about 300 operators working in the radio and computer sciences.

The STA was presented to AMRAD in a special ceremony at the FCC. As seen in the accompanying photo, Private Radio Bureau Chief Carlos V. Roberts (2nd from right) presented the STA to Hal L. Feinstein, WB3KDU (far left) and Paul L. Rinaldo, W4RI, AMRAD president (2nd from left). Dr. Michael J. Marcus (far right), Chief, Technical Planning Staff of the Commission's Office of Science and Technology, witnessed the ceremonial occasion at the Commission's offices.

In its request for an STA, AMRAD proposed to perform four spread-spectrum experiments; all were authorized by the FCC. Briefly, the four experiments are:

1. An HF Frequency Hopping Experiment (the 3.5, 7.0, and 14.0 MHz bands will be used).
2. A 10-Meter Frequency Hopping Experiment (modified CB transceivers, as well as ICOM IC-701 transceivers, will be used in this experiment).
3. A UHF Direct Sequence Experiment (to be performed in the 420–450 MHz band.
4. An Earth-Moon-Earth (EME) Experiment (this work will be done in the 420 MHz band using bandwidths of from 16 kHz to 2 MHz).

**8603 Conover Place, Alexandria, VA 22308*

At a special ceremony at the FCC Private Radio Bureau, Chief Carlos V. Roberts (2nd from right) presented the STA to Hal L. Feinstein, WB3KDU (far left) and Paul L. Rinaldo, W4RI, AMRAD president (2nd from left). Dr. Michael J. Marcus (far right), Chief, Technical Planning Staff of the Office of Science and Technology, witnessed the event.

Those amateurs who desire to make a *serious* contribution to the spread-spectrum experiments should contact Hal Feinstein, Secretary of the Spread-Spectrum Special Interest Group, 1410 Rhodes St. N, Arlington, VA 22209. Be prepared to indicate how you plan to contribute to the Corporation's experiments.

Mark Fowler Expected To Head FCC

Though not confirmed at this writing, it is expected that Mark S. Fowler, a Washington lawyer, will head the FCC beginning in late April or early May. Fowler will be appointed to a six-year term, essentially filling the seat vacated in 1980 by James Quello.

According to *The Wall Street Journal*, Mr. Fowler considers himself "a Reagan conservative through and through," but he has so far refused to say if his conservative political philosophy embraces open competition in the communications field. Some Washington observers feel that it is unlikely that Fowler will move as quickly as did Ferris in encouraging new technologies and deregulation activities.

FCC To Stay In Washington

Bowing to intense political pressure from members of Congress and Washington, D.C. officials, the FCC has voted to remain in Washington. Furthermore, it is likely that they will stay in one of the buildings they presently

occupy. Earlier in the year the Commission was considering the possibility of moving its headquarters and 1,600 employees from downtown Washington to Rosslyn, Virginia. The relocation, dubbed "Project Exodus" by its supporters, was heavily criticized for many reasons, not the least of which was that the federal government should not move into skyscrapers which the Department of the Interior claims mar the Washington skyline.

Reagan Cutbacks Impact FCC

According to James McKinney, Chief, Field Operations Bureau (FOB), recent hearings before the House Appropriations Subcommittee produced no additional funds for the FCC. While a Senate hearing was scheduled for late April, and while instructions from the Congress or additional funds could alter the Commission's plans, McKinney indicated that he was moving forward at this time with the FOB's "closure plan."

Specifically, the Little Rock, Arkansas field office has already been closed, and it was anticipated that the St. Louis, Missouri field office would be closed before the Senate hearing. Closed, too, were two Special Enforcement Facilities (Powder Springs, Georgia, and Detroit, Michigan) which had previously been used for CB enforcement activities.

Unless funds are made available, said McKinney, he also intends to close marine offices in Beaumont, Texas and Savannah, Georgia, as well as the FCC district office in Washington, D.C. These facilities would, in all probability, be closed before 1 October 1981.

In FY82 (the fiscal year beginning in October 1981), McKinney stated that he would probably have to close the FOB's offices in Cincinnati, Ohio, and Pittsburgh, Pennsylvania, as well as the monitoring station in Anchorage, Alaska. Expected closing dates for these facilities could be as early as December 1981 or January 1982.

As for FY83 and FY84, McKinney felt the outlook was "bleak." Further budget cuts are expected on top of those already imposes or proposed. These, together with a 15% reduction in personnel which is being imposed by the Administration, cannot help but impact the operations of the FCC, in general, and the FOB, in particular. Regretably, the cutbacks could not have come at a worse time, as enforcement problems involving almost all services abound throughout the spectrum.

New R.F.I. Problems Appear On The Horizon

As if r.f.i. problems associated with electronic home entertainment equipment (i.e., television receivers, hi fi's, organs, etc.) were not enough, a number of new r.f.i. issues are now beginning to surface before the Commission. Included are concerns relative to the protection to be afforded to low-power television broadcasters, to direct broadcast satellite operation, to multipoint distribution systems (MDS), and to paging systems operating in the 49 MHz band. Concerns are also being expressed in the matter of WATERCOM, a new service which provides communications along the inland waterways using systems which operate in the 215–220 MHz band.

With respect to WATERCOM, a recent Commission order made that service responsible for fixing an individual's TV receiver if interference is experienced on TV Channel 13. While the FCC is quick to note that this action was taken because WATERCOM was a *new* service which had to meet its responsibilities to services now in the spectrum adjacent to the 215–220 MHz band, the Commission has set a dangerous precedent. By forcing WATERCOM to correct interference problems which almost always will result because of design deficiencies in television receivers, the FCC is delaying the day when market forces will drive the home entertainment industry to produce a TV receiver with acceptable out-of-band signal rejection capabilities.

The Commission's efforts notwithstanding, some individuals are still taking r.f.i. matters into their own hands. The problem of interference to TV Channel 6 from education's f.m. stations operating at the low end of the f.m. band has plagued viewers in various parts of the country for years. Thus, it was not surprising that residents of Key West, Florida were upset when a new educational f.m. station in that area wiped out Channel 6 from Miami. Before steps could be taken to resolve the problem, however, someone blew up the radio station's tower.

Vic Clark Comments On R.F.I.

Vic Clark, W4KFC, an ARRL vice president and former chairman of the ARRL RFI Task Group, recently made the following comment on r.f.i. and the amateur:

"Cases of radio interference involving radio amateurs deserve the most careful treatment and analysis, both by government and industry, for they often provide the *first* conclusive evidence of design incompatibility of electronic and electrical devices sold to

the public. It is through the efforts of radio amateurs that widespread marketing of improperly designed equipment can be stopped. The image of the radio amateur as a neighborhood nuisance is completely undeserved, for cases of interference involving amateur radio stations are merely the precursors of more serious and widespread difficulties in store for the general public."

As if to punctuate Clark's comments, the ARRL RFI Task Group reports it is receiving complaints that a well-known brand of smoke and fire detector is "falsing" because of r.f.i. At the least, these false alarms can be annoying and can cause loss of sleep. But consider the possibility that radiation, say, on a certain frequency, may not cause the detector to false, but instead may change the circuit operating conditions and voltage levels so that the alarm will *not* go off in case of a fire.

If you are experiencing an r.f.i. problem with a fire detector, or with any device, report the problem to the manufacturer, the FCC, and the ARRL RFI Task Group. Only through the submission of such reports is it possible to make the Commission aware of how serious the r.f.i. problem is.

So You Think We Have Problems . . .

As reported by UPI, the FCC is concerned about the misuse of marine channel 16, which is intended to be used for initiating calls and for distress calling. In particular, coal ships in the Norfolk, Virginia and Baltimore, Maryland harbors have been communicating among themselves on this channel . . . and the language they use would make a sailor blush! The biggest problem observed has to do with the appearance on frequency of a female operator. More often than not, she will immediately be propositioned in a variety of languages, with tapes of heavy breathing and reference to sex not uncommon.

FCC Engineer-in-Charge at Norfolk, J.J. Freeman, is most concerned about the possible loss of life because of the obscene transmissions. Many operators simply turn their radios off when the bawdy broadcasts start; thus, they can't hear distress calls which might be transmitted. The problem will get worse during the summer months, noted Freeman, when recreational boaters take to the water.

In response to the marine radio problems, Jeffrey Young, Inspections Branch, Enforcement Division, FOB, noted that the Commission has developed a program to deal with the misuse of marine radio channels. Included in the program is a plan to board vessels which are illegally using their radios and to file complaints with the countries under which the ships are registered. Also included in the program is a plan to distribute educational material which will emphasize the importance of abiding with the radio regulations and, specifically, those regulations which pertain to safety of life at sea.

Plain Language Rules Downgrade The Amateur Service

We all are (or should be) familiar with Part 97.1, Basis and Purpose, of the Commission's Rules for Amateur Radio. Consider, then, the new, proposed, plain-language rule which the FCC presented in PR Docket No. 80-729:

97.1 (AR Rule 1) What is the Amateur Radio (AR) Service?

The AR Service is for persons interested in the technical side of radio communications. They use the service only for their own personal satisfaction, and get no financial benefit from its use. They learn about radio, communicate with other operators around the world, and find better ways to communicate by radio.

That's it! That's all there is!! Comments J. Kaplan, W9QKE, of the York Radio Club, Elmhurst, Illinois: "Notice that there is no mention of providing emergency communications . . . no mention of service to the public . . . no mention of the expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts. There isn't even anything in the new rule about enhancing international good will!"

To be sure, the new rule suggests that amateur radio is for children, and that it contributes little to this nation's well being. This is hardly the kind of description that is going to win us frequencies at future ITU radio conferences.

a monthly feature by
BILL WELSH, W6DDB

Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice Bands

The present American (U.S.A.) Novice bands are fairly good. They provide excellent long range communication opportunities on 10 and 15 meters during the daytime, as well as on 40 and 80 meters at night. The actual Novice frequencies are shown in Table I expressed in Hertz, kiloHertz (thousands of Hertz), and MegaHertz (millions of Hertz). One Hertz is one cycle per second and many publications use the term cps instead of Hertz, since the latter term is relatively new and is less descriptive than cps.

Since amateurs tend to express numbers in the simplest form, it is common to refer to the 80 and 40 meter Novice bands in kiloHertz (3700–3750 and 7100–7150 kHz), whereas the 10 and 15 meter Novice bands are more easily expressed in MegaHertz (28.1–28.2 and 21.1–21.2 MHz). 80 and 40 meters improve during the winter months, whereas 10 and 15 meters are better in the summertime.

Novice Band (Meters)	Frequency Limits Hertz	kiloHertz	MegaHertz
10	28,100,000–28,200,000	28,100–28,200	28.1–28.2
15	21,100,000–21,200,000	21,100–21,200	21.1–21.2
40	7,100,000–7,150,000	7,100–7,150	7.1–7.15
80	3,700,000–3,750,000	3,700–3,750	3.7–3.75

Table I– Novice Bands.

Actual Band Limits

Novice bands are commonly referred to as 80, 40, 15, and 10 meters. This is convenient but inaccurate. Equivalent meter points are determined by dividing the frequency (in kiloHertz) into 300,000. This shows that 3750, 7500, 20,000, and 30,000 kiloHertz are 80, 40, 15, and 10 meters, respectively. The actual Novice bands (in meters) are 10.64–10.77 (28.1–28.2 MHz), 14.15–14.22 (21.1–21.2 MHz), 41.96–42.25 (7.1–7.15 MHz), and 80.00–81.08 (3.7–3.75 MHz). The only Novice band that really includes the common band reference is 80 meters.

Foreign Novice Bands

Other countries also have beginning types of amateur licenses that are not always called Novice licenses. These foreign (DX) Novices usually have different bands and operating privileges than American Novices. Some frequencies used by beginning amateurs in other countries include portions of the American Novice bands, which permits direct contacts between newcomers in different countries. In other cases, foreign beginning amateurs use frequencies (on some bands) that are completely different from those of American Novices. Some foreign Novices are allowed to use emission modes other than code, such as s.s.b. (single sideband) voice emissions.

Additional Band Needed

Although the existing American Novice bands are good, there is room for improvement. During the night, the 10 and 15 meter bands lose their long range communication range and contacts are limited to stations within a radius of up to about 25 miles. When 40 meters becomes optimum for long range communications at night, Novices are often blasted off this band by extremely powerful international shortwave broadcast stations, which are spaced five kiloHertz apart (7105, 7110, 7115 kHz, etc.). These broadcasts are legal on the 40 meter Novice band because just 7.0 to 7.1 MegaHertz is exclusively reserved for amateurs worldwide. Here in ITU (International Telecommunications Union) Region II (North, Central, and South Americas), the 40 meter amateur band is 7.0 to 7.3 MHz, but it is just 7.0 to 7.1 MHz in Regions I (Europe) and III (the rest of the world, mainly in the Southern Hemisphere). When 10 and 15 meters are "dead" and 40 meters is ruined by international shortwave broadcasts, the Novice just has the 80 meter band (3700–3750 kHz) available, and this Novice band experiences some conflict with other modes of emissions used by amateurs in other countries. Simply stated, Novice operating privileges are far less than satisfactory during the stated nighttime conditions. I have often proposed assigning part (or all) of the 14.1 to 14.2 MHz segment of the 20 meter band (14.0 to 14.35 MHz, total) to Novice use on a shared basis with other licensees. This change would provide optimum day and night communication possibilities for Novices. This segment of the 20 meter amateur band is essentially not presently used by American amateurs. It is commonly called the DX phone (foreign voice) band since that is almost exclusively what is heard between 14.1 and 14.2 MHz. I seldom operate anything other than code, but is has been apparent to me that the American phone (voice) segment on 20 meters should be extended down below its present 14.2 MHz lower limit. I hope than this change will occur and that it will include Novice operating privileges in this segment, which is basically not used by American amateurs due to existing FCC regulations.

Band Sharing

Letters from Novices and Technicians often express appreciation of higher class licensees contacted in Novice bands. Once in a while letters are received from Novices complaining about non-Novices operating in their Novice bands. The Novice bands are not the exclusive domain of Novices. They are just called the Novice bands because they are bands of frequencies that are available for use by amateurs who hold at least a Novice

2814 Empire Ave., Burbank, CA 91504.

class license. Novices are not allowed to operate outside these frequency segments that are commonly referred to as the Novice bands. Novice band operation is not restricted to Novices and such a restriction would not benefit Novices. All Novice frequencies are also available for use by Technician, General, Advanced, and Extra class licensees. I work about one thousand Novice band contacts each year and I have noticed that more than two-thirds of my CQ (general call to all stations) calls in the Novice bands are answered by non-Novices. A quick check of my station log book confirmed that more Novices answer my CQ calls on the 40 meter band than on any other Novice band. However, only about one-fifth of my CQ calls on the 10 meter Novice band are answered by Novices. The preceding figures are not surprising, since Novices comprise less than 20 percent of the American amateur total.

If Novice bands were restricted to just Novices, Novices would have 300 kiloHertz of reserved frequency spectrum on the 80 through 10 meter high frequency (3 to 30 MegaHertz) amateur bands. By way of comparison, the code segments reserved for the exclusive use of Extra class licensees in these same h.f. bands is 100 kiloHertz. In fact, the Extra class licensee just has 145 kiloHertz of frequency spectrum for exclusive use on the h.f. bands.

As one upgrades from Novice or Technician to higher classes of amateur licenses operating privileges increase. Simply stated, when anyone upgrades, all the privileges associated with the previous (lower) class license are retained, and additional operating privileges are available with the new (higher) class license. This means that the only really exclusive bands are assigned to Extra class licensees. Another way to state this is that the Novice bands are really the Novice, Technician, General, Advanced, and Extra bands. In like manner, the General bands are actually the General, Advanced, and Extra bands. Similarly, the Advanced bands are really the Advanced and Extra bands.

Operating Privileges

Operating privileges include frequencies, modes, and power. Except when operating in the Novice bands, the power limitation for non-Novices is basically 1000 watts dc (2000 watts peak envelope power) input to the final radio frequency amplifier stage. Regardless of one's license class, everyone is restricted to 250 watts final r.f. amplifier dc input when operating in the Novice bands. This restriction is relatively new, and I believe the FCC made a mistake when they initiated this change, since one of the increased operating privileges related to General (and higher) classes of licenses is the right to run higher power. I run low power (4 to 90 watts) at all times and on all bands, but I do not agree with imposing a power restriction on non-Novice operators who are using a frequency spectrum (band) they simply share with Novices. Someone at the FCC must have been under the impression that Novices were being drowned out by more powerful stations licensed to General, Advanced, and Extra Class amateurs. I have operated the Novice bands since they were first established in 1951, and it has been my experience that the most potent signals have been those of Novices. There have been a few cases where I have heard non-Novices running high power in Novice bands, but such instances have been the exception rather than the rule. I believe that the FCC decision to restrict power input of General, Advanced, and Extra class amateurs operating in the Novice bands is unnecessary and improper. It seems to me that the FCC is forgetting that Novice frequencies were used by other classes of licensees long before the Novice class license existed.

Richad G. Goar, KA0HBD, of Marshalltown, Iowa, first went on the air as a Novice in April 1980, and he has had 711 contacts, including 118 with DX (foreign) amateurs. He had confirmed contacts with all 50 states by August 1980. His station includes a Yaesu FT-101-ZD Transceiver with matching remote frequency control and speaker, antenna tuner, inverted vee antenna, and a mini-quad antenna. Dick recently upgraded to General and wishes he had started amateur radio years ago.

MegaHertz Mode

If one can use two modes (such as voice and code) on a frequency segment, that operator has twice as much operating privileges as another amateur who is only permitted to use one mode (code, as an example) on that same segment. Multiplying high frequency segments times modes dis-

License	Band 80	40	20	15	10	Total	Percentage of Maximum Privileges
Novice	0.050	0.050	0.000	0.10	0.1	0.300	4
Technician	0.050	0.050	0.000	0.10	0.1	0.300	4
General	0.720	0.400	0.500	0.65	3.4	5.670	81
Advanced	0.990	0.625	0.725	0.89	3.4	6.630	95
Extra	1.115	0.675	0.775	1.00	3.4	6.965	100

Table II. High frequency (3–30 MHz) MegaHertz-mode operating privileges.

closes the following interesting figures regarding the MegaHertz-mode operating privileges for each class of licensee, as shown in Table II.

Benefits

I have conducted amateur radio licensing courses for many years. I occasionally have a student ask me why I spend so much time in the Novice bands when my license allows me to use all amateur operating privileges. My answer to that question is that I enjoy Novice band operation. I have been the first contact and first California contact for hundreds of new amateurs. When I send a CQ call, I always go back to the weakest and slowest station I hear. If I hear someone who is really messing up a CQ call, that is the person I call. No one sends code too slowly or with so many mistakes that I will not work them; I enjoy such contacts much more than working the rarest DX station on the air. I offer advice to those who obviously need some help. I have been able to make many new amateurs relax and enjoy a long chat instead of a short contact. I send slower or faster at the other operator's request. If any Novice reading this article thinks that I am unusual in these matters, you are mistaken; I am convinced that most higher class licensees go out of their way to have pleasant contacts with Novices. Some of the most capable traffic and DX operators I know greatly enjoy the pleasant change of pace they find when operating the Novice bands. However, not all higher class licensees are sending slow code just in consideration of Novices; that slow rate is sometimes their top speed. The Novice band provides an opportunity for "rusty" amateurs to get the practice they need to restore their code proficiencies. Do not assume that every higher class licensee has good code proficiency because this is not always true. My advice is to match the other operator's speed, unless she/he asks you to slow down (QRS) or to speed up (QRQ).

Printed Aids For Beginners

The March 1981 Novice column listed previous Novice columns containing information that is particularly useful to prospective and new amateurs. Prior issues of this magazine are usually available at two dollars each from *CQ*, 76 North Broadway, Hicksville, New York 11801. However, if your finances are such that it would be a problem to purchase previous *CQ* issues to obtain Novice column data, you are welcome to request from me a set of the five most popular articles for one dollar, and that includes envelope and postage costs. These are just printed aids used in the licensing courses I teach and they are not as easy to read as *CQ*. Most of the Novice articles I write are improved versions of printed aids used in my courses. The subjects covered in this set include "Advantages of Starting as a Novice" (June 1978), "Sources of Aid to Prospective Amateurs" (December 1978), "Getting Technical Help from Experts" (October 1977), "Phillip's Code—100 Years Young" (November and December 1979), and "QSL Cards" (January through March 1979). These are not complete reprints of the indicated Novice columns, but they do contain the basic data. This is an attempt to help newcomers to amateur radio. This data package could easily be expanded if it proves to be popular.

Ameco Licensing Guides

Ameco has been providing Novice, General, Advanced, and Extra class licensing guides with the updating information attached as an addendum to each book. In response to my question Ameco advised that these guides should be available, with the previous addendum data incorporated in the main body, by the time this notice is printed. These guides have long been used by people preparing to pass amateur radio examinations. I occasionally teach a licensing course using just Ameco guides.

Some of the stations I've recently worked on the Novice bands are: Michael, KA1DDB, Chester, Conn.; Lynda, KA2JBE, Laurens, New York; Chris, KA3DDB, Milford, Delaware; Robert, KA4GAI, Sarasota, Florida; Gregory, KA5FBW, Austin, Texas; Barbara, KA6HSM, Los Gatos, Calif.; Dennis, KA7FAH, Craigmont, Idaho; David, KA8DTN, Piqua, Ohio; Daniel, KA9CTM, Dewitt, Illinois; Richard, KA0IYA, Rapid City, South Dakota; Randall, WH6AMR, Kahului, Hawaii; Carlos, WP4AOF, Ponce, Puerto Rico.

73, Bill, W6DDB

a monthly feature by
HUGH CASSIDY, WA6AUD

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

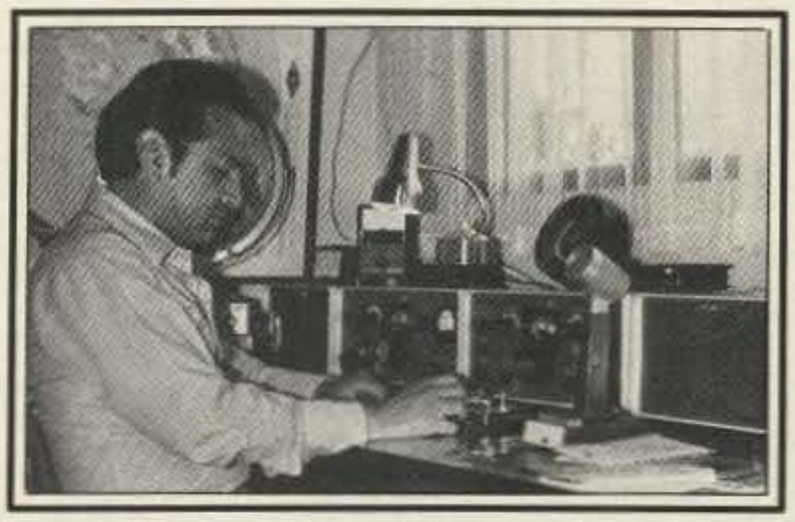
All are scattered now and fled,
Some are married, some are dead;
And when I ask with throbs of pain,
"Ah! when shall we hear Albania again?"
As in the days long since gone by,
The tired Old Timer makes reply,
"Forever—never!
Never—forever!"

A practicing DXer must be strong in spirit and long in patience. There are those countries which come only at long intervals, and once they flash across the spectrum, they may not be heard again for a decade, perhaps even a quarter century, maybe even longer. Let us raise again the never quite dead hope that Albania will be heard again one of these days.

There are living DXers who recall that Albania did appear and many did work it. But already those days are fading into DX history, and as with other countries such as Burma and China, the hope is there that perhaps the Deserving DXers will again hear Albania some fine day. It has been ten years. Some are again talking of operating from the Hilton there in downtown Tirana, but don't get too anxious.

Back in 1970 there were two operations aimed at Albania, one out of OH-land, the other from DL7-country. Checking the written record, scant as it is, the indication is that the OH group opened in mid-July and made some 780 QSOs. The recollection is that the group went in openly with their gear, were kept under surveillance by the local authorities, and after a couple of days of being monitored they were shut down. This operation signed OH2BH/ZA for about ten operating hours before the gear was impounded to be returned when they departed the country. The crew did manage to gain an audience with the Albanian Ministry of Communications, and while hopes for amateur activity from ZA-land were a bit on the optimistic side at that time, nothing came of it, at least not enough to satisfy those who long thirsted for an Albanian QSL.

77 Coleman Drive, San Rafael, CA 94901



Beto Rojas, HK3DDD, shown somewhat relaxed after his heavy work load as QSL Manager for the recent HKØAA and HKØAB DXpedition. (Photo via HK3ERZ)

In September 1970 DL7FT showed signing ZA2RPS. Some 3000 contacts were made with 79 countries, and the indications at that time were that tacit approval had been given for a return in 1971. In June of that year ZA2RPS was again heard for about a week of operating and that was the last Albanian operation except for the ubiquitous Slim who shows occasionally but who never QSLs.

Before the 1970–1971 operations there had been some sporadic operations, soon terminated, by a commercial pilot out of HA-land who put a rig on his plane and would do some surreptitious operating aboard the plane parked off the runway in Tirana while waiting for the departure of his return flight. This did not last long, as we have been told, the authorities frowning on the operation when it was detected. This also came a bit before our time.

In 1970 the OH-group was allowed across the border but not very far. They declared the gear on the Albanian customs form, went to a hotel, and set up in business. The Finnish group was most circumspect, speaking in plain and easily understood English and frequently making complimentary remarks about the country, the people, and the hospitality. A monitoring station 200 yards from the hotel was staffed by multilingual Albanians who were intrigued by the amateur operation, listening for the transmissions and taping them all.

The next morning they were advised that a mistake had been made, that it was not realized what the items on the customs forms represented and that they would have to be impounded. That ended the operation of OH2BH/ZA.

Initially they were not allowed very far into the country, but after persisting they were allowed to travel to the capitol of the country to speak to high government officials. The Vice-Director of Communications was friendly in conversations with the group but pointed out that there was no provision in Albanian law for amateur radio operation. It was also indicated that future requests for permission to operate should be submitted well in advance and would receive careful consideration.

And that was it. All the foregoing covers the long history of ZA-activity. Long on history, short on QSOs. Short in most everything but waiting.

Many a DXer has thought of the lack of ZA-QSOs and studied ways to remedy the problem. Some have had an uncle or cousin right there in the country on the Adriatic. Some well remember the last king of the country, King Zog, and his American wife. Some figure that a clean-living DXer, whatever that might mean, a forth-right dues paying member of the DX Majority, should only have to show with his gear under his arm to be welcomed most anywhere. Unfortunately, this often is not so. Sometimes this is hard to understand. Possibly it is the nature of the animal. Often these rare countries are also ones with authoritative regimes, and one thing a bureaucrat soon learns is that, be it here or be it there, you are judged by your mistakes, not your accomplishments. And blessed be he who never does anything, for verily he shall never be found in error. A lower level bureaucrat usually will not make a decision. If it is written out, then maybe he will. If it is a case of judgment , he'll seek for a directive on how the judgment should lean. Wander in-

The WAZ Program

10 Meter Phone

127	EA8OZ	129	K2OLG
128	WB7DOW	130	K2UU

15 Meter Phone

85	JK1SLN	89	KØNN
86	EA8DE	90	JK1NLS
87	EA8OZ	91	K2UU
88	WB4IUX		

20 Meter Phone

356	W2FGY	359	EA8OZ
357	VP2VBK	360	VO1CW
358	N4IB	361	K2UU

10 Meter C.W.

20	HB9ALO

20 Meter C.W.

136	W6ZID	139	G2GM
137	W6MJP	140	N4IB
138	N6EM		

40 Meter C.W.

22	EA8OZ

All Band WAZ

S.S.B.

2181	HK3AXT	2194	KØAL
2182	WB9OBX	2195	N4RR
2183	WD9NQE	2196	WD4CTG
2184	YS9VE	2197	N4IB
2185	KC4DY	2198	LA6UL
2186	DL3JU	2199	WA2YEX
2187	K9MFY	2200	WB2IRK
2188	DJ9DX	2201	IV3IOX
2189	N9NGA	2202	I6VDB
2190	I2MUH	2203	W5URN
2191	JAØESG	2204	K1MAL
2192	NØAFL	2205	I4RYC
2193	WBØSAX		

C.W. and Phone

5100	OK1KRS	5111	DJ8RK
5101	WAØLKL	5112	WB5NBY
5102	DF1NT	5113	WA4YCI
5103	DLØKF	5114	W8CHV
5104	EA2IA	5115	AA5C
5105	I2GXS	5116	JA7JXA
5106	OE1KJW	5117	K9UAB
5107	WD6DKG	5118	W5RJV
5108	JA7FLI	5119	AGØA
5109	JA1PAM	5120	WA9EKA
5110	W7JKA	5121	W2QHH

All Phone

571	W8QBA

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the W A Z manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

to a country such as Albania, display your amateur license and your gear, and you probably have reached the end of the line. Even at the top levels a decision is often difficult to gain. Exalted positions are not gained and retained by putting one's foot into things. One slip and a thousand voices are calling attention. Life is not easy for either the DXer or the bureaucrat.

Recently there has been more talk about a possible ZA operation. If you want the details, you'll probably not hear them in advance. If you hear a station work it. But fill not your cup with optimism for the path is long and rocky. As we tried once to explain it to

Shown with the never ending stack of mail, a cup of coffee, and the station logs is one of the most important people in the chain of providing the deserving with DX credits, the QSL Manager. Here is John, W4FRU, at work on 5N0DOG, 5N0RMJ, ZD7HH, and VK4NIC/3X QSL chores. (Photo via Jack, W2LZX)

a newly minted DX type who lusted for the whole DXCC Country list, "Look, you've worked YU and SV and LZ and YO. You've proved that you can work it, isn't that enough?" We should have known what the answer is. They don't pay off on "good enough," and no DXer is ever satisfied.

Albania will again come some fine day. Just when is the hard question. But keep the antenna polished; sooner or later all of them will come down the pike. Maybe not tomorrow but perhaps the week after.

Willy de Roos, ON6GC

DXers will remember Willy as the one who sailed his 42-foot steel ketch across the top of North America, through the straits, around the islands along the Arctic Ocean, and then headed south for Peter Island in the Antarctic.

The Cruising Club of America named Willy as the recipient of its 1980 Blue Water Medal. The medal was presented last January at a special meeting of the New York Yacht Club. Willy did plan to operate from Peter Island, the callsign to be 3Y0BZ, but conditions prevented what was intended to be an extended stay. It also was anticipated that this might be a new DXCC country counter. The Blue Water Medal is awarded annually for a "most meritorious example of seamanship." On his return to Belgium, Willy had circumnavigated both North and South America. He wrote about his adventures in a book entitled *North-West Passage*.

Erik Sjolund, SM0AGD

Erik, who was last heard signing J5AG from Guineau-Bissau in early April, was inducted into the DX Hall of Fame at the International DX Meeting in Visalia, California in early May. There will be a more detailed report in the next issue, but the award was widely hailed as honoring one of the really great DXers of the last decade.

20 Meter Voice Sub-Band

There is a report that the ARRL will in the coming months, if they have not already, file a petition with the FCC for a 25 kHz voice sub-band in the DX portion of the 20 meter band. This sub-band would be reserved for Extra Class license holders. Currently the ARRL's Plans and Programs Committee is restudying a proposal for a 25 kHz voice sub-band on 40 meters. This item was discussed at the last two meetings of the Board of Directors, the most recent one being the Orlando National Convention.

The next possible time for action could be the July board meeting should one be held this year. As all of this is being written some months before publication, it might be informative to check with your director should you want an up-date on possible proposals.

CQ Awards Zones

Most everyone knows where everything is, especially if you are a DXer. Does the well-worn DX type have to check to know where to point the beam? Hardly ever!! You name it and watch him rotate to face the DX spot, arms outstretched as he lines up on the short path. Call for the long path and watch him rotate 180°. But when it comes to zones for the *CQ* Awards, such as WAZ for example, sometimes there are questions.

The DX Committee for the *CQ* Awards Program recently studied the location of some of the exotic DX spots such as Abu Ail and Spratly and decided they were in different zones than previously thought, so they cor-

DU1CK, Chito Kintanar, is in Quezon City and wants to help anyone needing the Philippines. Chito says to look for him at 21370 kHz from 0000Z until 0200Z with the W7PHO Family Hour and also at 28550 kHz from 1200–1400Z with the Philippines Mini Net. QSL Chito at AC Box 637, Quezon City, Philippines 3008.

Shigeo Kikuchi, JD1AEV, on Ogasawara has been active on the 75 meter band, often being heard around 0800Z. He runs a TS-520 into some wire antennas. There currently is no air service to Ogasawara from Japan; you go by ship and it's a 29-hour journey. QSL JD1AEV to Box 2, Ogasawara Islands, Tokyo 100-21, Japan.

rected things. **Abu Ail**, recently and sometimes in the past the site of OE6XA/A operations, has been nailed down in Zone 21 and not Zone 37 as previously thought. **Spratly**, the site of the 1S1 operations all the way back to Don Miller, has been shifted to Zone 26 rather than Zone 27 as previously computed. There it is. Everything corrected to date.

Franz Langner, DJ9ZB

Over the years the point has often been raised that DX history is a sometimes thing, here today, forgotten tomorrow, except by those who are close to the action. In the past couple of years it has been noteworthy that some DXpeditions have moved to make a permanent record of their efforts; the Clipperton effort in 1978 and the Abu Ail OE6XG/A effort in 1979 both have turned out permanent records of the trips which should endure. Many noteworthy efforts in the past have had but ephemeral noting, usually brief notes in DX bulletins, sometimes a bit longer recounting in a magazine. Often they pass with little record at all, soon forgotten, difficult to recall and quickly lost. A DXer arriving on the scene often has trouble finding what has gone before. This is not a particularly new concern to us. Years back we tried to impress on one effort that was opening up a new DXCC counter the necessity of making a permanent record of the effort "for DX posterity!" we emphasized. For awhile we thought we might have hooked something.

Then this DXer, not too far removed from the great days of triumph and reveling in the undiminished accolades for the accomplishment, leaned close to advise us: "The idea is a great one, but in thinking things over I cannot recall even one minute in the two weeks we were gone when I would have had even a minute to make notes. The idea is good but we just could not have found the time."

You know something? We believed him, every word. But it is still an idea that we run up and down the track every chance we get, and we were delighted recently to receive a well-conceived, profusely illustrated spiral-bound booklet giving the details of the 1979 Abu Ail effort. And who sent it? Franz Langner, DJ9ZB, whose name and call are always right at the top of the current crop of big-gun big-time DX efforts. The multitude of photos have both English and German captions. There is a map showing Abu Ail right there at 14°05'N and 42°49'E. That's for those who long have tried to find the islands on a map.

By the time most DXers get to the point where they are planning some block-busting efforts, they should also have gained the knowledge that fame is fleeting, but a permanent record will exist for a long time. A bit of planning, a consistent logging of details, a multitude of photos, and 20 or 30 years downstream they will still be

The WPX Program

Mixed

916	DJ2UU	920	DF5TV
917	EA5FP	921	WD8MOV
918	WA2JAS	922	AA9F
919	DJ3TF	923	N6AW

S.S.B.

1391	WD5ABG	1395	OK1DKS
1392	I1SNW	1396	KE5J
1393	KA2CLQ	1397	WD4CTG
1394	WB2QEU	1398	I8HZT

C. W.

2072	JA1AUC	2075	OH7KJ
2073	WD4NMD	2076	KA7AIG
2074	W7YRC	2077	AK2H

WPNX

196	KA2ELB	197	WD4RIM

Endorsements

Mixed: 400 EA5FP, JA1-23967, AA9F. 500 DJ3TF, WD8MOV, WB0LXM, AF7M. 550 WD8KKF. 600 HA0HW, WD9IIC, WD0EPE, W0JIE, K5PR, WB4FOT. 650 JA7FFN/1. 700 PA-3347. 800 OK1DVK, WB8YQX. 900 IT9HLO. 1000 DJ2UU, OK3CEE, N6AW, VE3DMC. 1100 WA4QMQ. 1200 PA2TMS. 2100 YU2DX

S.S.B: 300 WD5ABG, I1SNW, KA2CLQ, KE5J. 350 WB2QEU, I8HZT. 450 WD4CTG. 500 WD0EPE. 600 AC2J. 650 OK1DKS, I6ICD. 700 KL7AF, I5AFC. 750 WB8YQX, I8KCI. 800 N2AC. 900 WA4OIB, KF2O. 1000 W2CC. 1050 W0YDB, WA4QMQ. 1100 YU7ODS. 1400 ZL3NS.

C.W.: 300 JA1AUC, WD4NMD, W7YRC, KA7AIG. 350 AK2H. 400 KJ8M, OH7KJ, AK9Z. 500 JA7ARM. 550 GW3SB. 600 DJ1YH. 650 YU5FAM. 800 DJ3LR. 850 K9UE. 1050 YU7OKS. 1600 ON4QX.

10 meters:	DJ2UU, KL7AF, SM6AYM.
15 meters:	DJ2UU, DJ1YH, WD4NMD, W0JIE.
20 meters:	DJ2UU, DJ2YH, JA7ARM, W0JIE.
40 meters:	DJ2UU, SM6AYM, YU5FAM, WA4QMQ.
80 meters:	DJ2UU, KL7AF, WD0EPE.
Asia:	WD0EPE, JA1-23697.
Africa:	WD0EPE, VE3DMC.
Europe:	EA5FP, WA2JAS, I1SNW, DF5TV, DJ2UU, W0JIE, JA3XRC, PA-3347.
No. America:	W9JR/m, AK9Z.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, 5014 Mindora Dr., Torrance, Calif. 90505 U.S.A.

remembering when! Franz Langner did it. The Clipperton effort did it. And we think that DX and DXers are the better for it.

Some Short Notes

A matter of continuing concern to those recording the DX scene is that when a column is prepared for a magazine, you have to work three months in advance of the magazine's publishing date. You may be reading this in July, but it was in early April when we made a survey of the DX scene. Thus, if one were going to far off Twitchell's Reef in June, it would have been too late to advise us in April.

The point of this is that we would like to note the coming events, but unless we can get them in the first week of the third month preceding the operations, time has gripped us in a tight clutch from which there is no relief. If time is short, rush the copy to the various DX bulletins who will always welcome the word; if time is long we would also like to hear.

Many will recall W9IOP's "Second Op" operating aid that Larry LeKashman put together when he was with Electro-Voice back in the mid 60s. Larry later returned to the east coast and was W2AB down in Maryland about the time he became a Silent Key about three years back. However, the idea was a good one, the aid to the DXer needing quick reference, and N6RF updated the "second op" idea. You can find it at your local amateur radio store.

CM1MM has been heard on 40 meters, presumably a Cuban Novice around 7121 kHz around 1200Z. Said to QSL to a residential address rather than to Box 1 in Havana.

The Colvins, Lloyd and Iris, were at the International DX Meeting in Visalia in May telling of their recent trips and looking for some idea for future ones. Since departing last October they made some 55K QSOs from SV/SV5/4X/FS/FG and FM. Enroute home they visited across the country with a number of DX Clubs and conventions.

Bermuda has and extends reciprocal licensing privileges with the U.S. Amateurs interested in visiting Bermuda who would also like a license should write for details to: Department of Telecommunications, P.O. Box 101, Hamilton 5, Bermuda. There are over 100 licensed amateurs in Bermuda, and they also have 146.76 and 146.34/94 2-meter repeaters.

A group of six Dutch amateurs are making a DXpedition to Monaco (3A0) from July 10th to the 20th. They will be active on the h.f. bands, as well as on v.h.f., u.h.f., and some possible Oscar orbits. Look for c.w. activity on 3505, 7005, 14005, 21005, and 28005 MHz. On s.s.b. try 3790, 7065, 14141, 21312, and 28582. QSL's go to PA3ARM, Monaco DX Group, P.O. Box 1593, 5900 BN VENLO, Netherlands.

CQ DX Awards Program

S.S.B.

999	VK2VUQ	1008	W9NGA
1000	N4KE	1009	G4GFH
1001	N8BLB	1010	WD8MOV
1002	VE3DTR	1011	CT1UA
1003	KA2CLQ	1012	KØAL
1004	K9MFY	1013	KØRDJ
1005	W5ZKJ	1014	WB2YOF
1006	N4EDT	1015	WB9OBX
1007	I3OBO	1016	K9BIL

C.W.

491	VE3IJE	494	WB2YOF
492	K1MEM	495	WD9IIX
493	WØIZ		

S.S.B. Endorsements

310	W4UG/318	275	WD8MOV/279
310	W4DPS/313	275	WD9IIX/277
310	OE2EGL/313	275	K1WJ/276
310	N4MM/310	200	N4IB/230
310	WØSFU/310	200	WA4OIB/227
310	K9RF/310	200	WB4VQO/202
300	N4KE/309	200	WD9DEE/201
300	W1NG/304	150	DA1MV/153
300	9H4G/300	150	N6PV/154
275	CT1UA/285	150	KØRDJ/151
275	I3OBO/283	150	WB5TXP/150

C.W. Endorsements

310	DL7AA/316	275	K1MEM/289
310	W3GRS/315	275	WØIZ/278
310	K9MM/310	150	N4IB/150
300	W1NG/305	Mobile	VK3AMK
300	W4OEL/300	28MHz	KL7AF
275	N4MM/298		

The total number of active countries is 318. 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, please enclose your latest CQ mailing label with your application. Endorsement fee for stickers is $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, 911 Rio St. Johns Dr., Jacksonville, Fla. 32211 U.S.A. Foreign stations should include extra postage for air mail reply.

More WAZ

W4KA, Leo Haijsman down there at Cape Coral, Florida, handles the work in the WAZ program along with a few more tasks, and Leo notes that W6KUT recently attained WAZ #8 for 80 meter phone action. As most DXers eventually learn, WAZ is always a tough one to gain, and some of the special awards in the WAZ program are even tougher. Anyhow, Leo sent along the list of those who have made 80 meter WAZ. The whole list, all eight in order of their attaining the award, are EA8CR, K6UA, OH7XX, ON4UN, SP3GEM, SM7LQ, ON5NT, and W6KUT.

More Random Notes

Homer Bohlender in Dayton, Ohio has written to note that many of we senior citizen types have turned to s.w.l.'ing and to amateur radio to fill our days, and we often become very avid in our dedication to the action. But Homer says that lots of the time he listens and hears with some dismay a callsign given so rapidly that it is unintelligible. It is the same the second time around and possibly even worse a half hour later.

Not only the s.w.l.'ers have problems. We are still not certain about the calls of some of the stations we worked in the spring CQ DX Contests. At this point we won't get particularly upset about the problem because we believe that no new counters were concealed under the machine-gun delivery. But to a newcomer, and there are more of these every month, it is a problem. The original intent was to give one's callsign, and not to try to see how few microseconds it takes to deliver it.

You may have read it elsewhere, but possibly it bears repeating. The current ARRL thinking on the new amateur bands is to use the new 30 meter band for RTTY and C.W. only. Also, new voice sub-bands 25 kHz wide would be established at 7075 kHz and 1415 kHz. Some of the action on these sub-bands may be well along by the time you read this; initially the time for comment to the FCC on the 20 meter proposal was last April 27th.

5 Band WAZ

Standings as of April 1, 1981

Plaques have been won by the following stations:

Plaque No. 1, ON4UN, John Devoldere (Belgium)
Plaque No. 2, K4MQG, Gary Dixon (U.S.A.)
Plaque No. 3, SM4CAN, Kent Svensson (Sweden)
Plaque No. 4, AA6AA, Steve Orland (U.S.A.)
Plaque No. 5, W8AH, Albert Hix (U.S.A.)
Plaque No. 6, W6KUT, E.A. Andress (U.S.A.)

The top 10 contenders for 5 Band WAZ:

1. W8GT, 195 zones
2. EA8AK, 195 zones
3. N6DX, 191 zones
4. LA7JO, 191 zones
5. W8UVZ, 190 zones
6. DL3RK, 190 zones
7. W1NG, 190 zones
8. SM0AJU, 189 zones
9. N4WW, 186 zones
10. ZL1BIL, 182 zones

77 amateurs have submitted QSL cards for the 5 Band WAZ Award as of April 1, 1981.

As you have probably noted, New Zealand started the first of this year to issue a ZL0 prefix for visitors. A.E. Law, who is the DX Editor of the New Zealand Association of Radio Transmitters, advises that ZL3AFH/A will be on Campbell Island until this November and can be found on c.w./s.s.b. and RTTY, though not necessarily all three at the same time. Warwick is active on 80/40/20/15 meters, and as we move into the northern hemisphere summer, he will be watching winter approach and probably will be more active. He is at a meteorological station on Campbell Island. QSLs for ZL3AFH/A on Campbell Island go to: ZL2HE, A.E. Law, P.B. Dannevirke, New Zealand. 3 IRCs or an s.a.e. with green stamp will get a fast reply. With the 3 IRCs you should also send an s.a.e.

North Dakota

DXpeditions are not always to the palm-studded wave-washed reefs. Lynn Nelson, WA0WBU, in the Missouri Territory is planning to head for North Dakota in the first part of this month and put Dakota on the air! Lynn says he will operate 10/15/20 meters. He plans to open the two day run at 2000Z on July 8th, running until 0500Z on July 10th. The tentative schedule is:

July 8th 2000Z to 2300Z 10 meters
2300Z to 0200Z 15 meters

July 9th 0200Z to 0500Z 20 meters
2000Z to 2300Z 10 meters
2300Z to 0200Z 15 meters

July 10th 0200Z to 0500Z 20 meters

QSL with s.a.s.e. to: Lynn A. Nelson, WA0BWU, 409 San Jose, O'Fallon, Iowa 63366.

QSL Information

HZ-Saudi Arabia has no incoming QSL Bureau. K8PYD handles HZ1AB and that one only. He definitely does not handle HZ1HZ and advises that unless a QSL Manager is known, you had better send direct.

Jim Herteen, WA0NAA, is looking for some QSL Manager chores for a DX station. Look for him at 119 West 2nd Street North, Newton, Iowa 50208.

DA1WA/HBO to DJ0LC (DX Stations)
Stephen Hutchins (Stateside Stations)
Box 4573
APO New York 09107
K2LE/DU2 to W2AYJ
HB0BOE to DJ9ZB
VP2VGF to NP2AF
WP2ABZ to NP2AF
ZL1BI/K to ZL2HE
ZL2BCF/A to ZL2HE
ZL2AFH/A to ZL2HE
ZL5MC to ZL2HE
9Y4CDR to WD5JOL

73, Hugh, WA6AUD

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. 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 endorsements involving the issuance of a sticker is $1.00. The basic award fee is now $4 for *CQ* subscribers and $10.00 for non-subscribers. Please attach your latest *CQ* mailing label to qualify for the $4.00 rate.

C.W.

W6PT 318	W6ID 314	W1NG 305	WA8DXA 294	JH1VRQ 281
ON4QX 317	N6AV 314	W2GT 304	K1MEM 289	K9QVB 281
DL7AA 316	K4CEB 311	W4OEL 300	DJ7CX 287	4Z4DX 280
K6EC 315	K6JG 311	DL3RK 299	JA1GTF 285	W0IZ 278
N4PN 315	K9MM 310	N6FX 298	SM3EVR 284	W1WLW 276
W9DWQ 315	N6CW 309	N4MM 298	K3FN 283	W4BV 275
W3GRS 315	W4BQY 307			

S.S.B.

W6EUF 318	VE2WY 316	DK2BL 312	K8PYD 302	K9HQM 284
W4UG 318	I0ZV 315	W0SD 311	VK2VC 302	JA5PUL 284
W3NKM 317	F9RM 315	YV5AIP 311	W6FET 301	I8LEL 283
W9DWQ 317	K6YRA 315	W6RKP 310	W0SR 300	I3OBO 283
DL9OH 317	W4SSU 315	K6XP 310	W2CC 300	W8IMZ 282
K8DYZ 317	K6JG 315	K5OVC 310	HP1JC 300	KA8T 282
W6REH 317	K9LKA 315	W8ILC 310	9H4G 300	W6DN 281
XE1AE 317	DJ9ZB 315	N4MM 310	XE1J 299	N3RL 281
W4EEE 317	ZL3NS 314	W0SFU 310	K1UO 299	W2FGY 280
W2TP 317	VE3GMT 314	K9RF 310	JH1VRQ 298	WD8MOV 279
I0AMU 317	SM6CWK 314	K8LJG 309	AI8S 297	WD8MGQ 278
K6WR 317	I8YRK 314	I3LLD 309	WA4JTI 296	K8HV 278
K2FL 317	I4ZSQ 314	OE3WWB 309	LA7JO 296	XE1NI 278
W9JT 317	F2MO 314	N4KE 309	I6PLN 295	K3MWV 277
WA2EOQ 317	OZ3SK 314	N6AV 309	DJ7CX 294	W4BQY 277
W9QLD 317	K4MQG 314	W9SS 308	G4CHP 294	WA4LOF 277
ZS6LW 317	SM6CKS 313	N6AW 307	VE3FJE 293	WD9IIX 277
W3GRS 317	EA4LH 313	W0YDB 306	K5DUT 293	WA6TOO 276
VE3MR 316	N4WF 313	XE1KS 305	K9BWQ 293	K1WJ 276
TI2HP 316	YV1KZ 313	LU1BAR/W3 305	W7OM 291	WA4TLI 276
VE3MJ 316	K9MM 313	WA4WTG 305	ZL1BIL 291	XE1CI 276
I8AA 316	W4DPS 313	YV5DFI 304	I0MBX 289	W8ILC/QRPp 275
W9KRU 316	OE2EGL 313	W2SUA 304	YU2RTW 288	WA0TKJ 275
I8KDB 316	W6YMV 312	W1NG 304	AE5B 285	K9UAA 275
W3AZD 316	I5WT 312	OK1MP 304	CT1UA 285	WA4DAN 275
W3CWG 316	W3GG 312	DL6KG 303	N5FG 284	I5BDE 275
K6EC 316	ZL1AGO 312	N2SS 302		

a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Royal Observatory of Belgium reports a monthly mean sunspot number of 133.8 for March 1981. This results in a 12-month running smoothed sunspot number of 150 centered on September 1980. A smoothed sunspot number of 127 is forecast for July 1981. While solar activity continues to decline slowly, the present level is still considered to be in the *high* range.

During years of low solar activity July and the summer months marked the beginning of the "summer doldrums" for DX propagation conditions on the h.f. amateur bands. This should not be the case this summer. With the continuing high level of solar activity, exceptionally good DX conditions should be possible on many of the h.f. bands.

July Propagation

Both the *15* and *20* meter bands are expected to share honors for optimum worldwide DX propagation conditions during July. Excellent worldwide openings should be possible on *15* meters throughout the daylight hours, and through the evening hours as well to as late as Midnight. Conditions should peak to most areas of the world during the late afternoon and early evening hours. *Twenty* meters is expected to remain open for DX to some area of the world or another for the entire 24-hour period. Although DX openings should be possible at just about any time, optimum worldwide conditions are forecast for the early evening hours, during most of the hours of darkness, and again for a period of about an hour or two after local sunrise. During the hours of darkness *20* meters should be the optimum band for DX to most areas of the world, with exceptionally strong signal levels often possible.

As a result of the high level of solar activity expected during July, some exceptionally good DX openings should also be possible to many areas of the world on the *10* meter band during most of the daylight hours and possibly into the early evening as well. Conditions are expected to peak during the afternoon hours, with openings toward southern and tropical regions favored.

Seasonally high static levels expected during July together with the short period of darkness are expected to reduce DX propagation possibilities on the *40, 80,* and *160* meter bands. *Forty* meters, however, should often provide good DX from sunset, through the hours of darkness, until just after sunrise, in spite of higher levels of static. Look for *80* meter DX openings during the same time periods as *40* meters, but expect somewhat weaker signals and stronger atmospheric noise or static. DX propagation conditions on the *160* meter band are generally at their poorest during July, but an occasional opening towards the Caribbean, Central America, and the northern countries of South America may be possible during the hours of darkness and at sunrise. At best, however, expect very weak signals and strong crashes of static.

Check last month's column for a detailed band-by-band DX propagation forecast for July.

Short-Skip Openings

This month's column contains *Short-Skip* Propagation Charts for July and August 1981. Short-skip propagation over distances up to approximately 2300 miles is generally optimum during July and the summer months, mainly as a result of an expected peak in sporadic-E propagation. Fairly regular short-skip openings are forecast for both the *10* and *15* meter bands during the hours of daylight over distances ranging between approximately 500 and 1300 miles. Frequent double-hop sporadic-E propagation, or regular F-2 layer reflection, should extend openings out to approximately 2300 miles. Fairly frequent sporadic-E openings should also be possible during the hours of darkness. Excellent short-skip openings are expected on the *20* meter band almost around-the-clock over distances ranging between approximately 250 and 2300 miles. Conditions on this band should peak during the late morning and again during the late afternoon and early evening hours.

Expect good daytime short-skip openings on *40* meters over distances ranging between approximately 100 and 600 miles. Excellent openings during the hours of darkness should be possible on this band for distances between 250 and 2300 miles. Good *80* meter short-skip openings are forecast for the daylight hours up to a distance of about 300 miles. Expect openings to extend out to 2300 miles during the hours of darkness. While no *160* meter ionospheric openings will be

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for July 1981

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 8, 22	A	A	B	C
High Normal: 6, 14, 16, 21, 24-25	A	B	C	C-D
Low Normal: 1, 5, 7, 9, 12-13 15, 17, 20, 23, 26-29	A-B	B-C	C-D	D-E
Below Normal: 2, 4, 10-11, 18-19, 30-31	B-C	C-D	D-E	E
Disturbed: 3	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, 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 day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on July 1st, fair to poor (C-D) on the 2nd, poor-to-impossible (D-E) on the 3rd, fair-to-poor (C-D) on the 4th, etc.

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

11307 Clara Street, Silver Spring, MD 20902

possible during the daylight hours of July, expect some openings between the sunset and sunrise periods for distances up to approximately 1300 miles.

V.h.f. Ionospheric Openings

With the expected peak in sporadic-E propagation, look for fairly frequent short-ship openings on the *6* meter band for distances ranging between 600 and 1300 miles. Some double-hop openings up to approximately 2300 miles may also be possible at times. The best times for such openings are a few hours before noon and again during the early evening hours, although sporadic-E openings, as the name implies, can take place at any time. Signal levels may be exceptionally strong during some sporadic-E openings on *6* meters.

Some sporadic-E openings are also likely on the *2* meter band. They are most probable when intense openings are observed on *6* meters and stations are heard on this band at distances less than 600 miles. *Two* meter openings, when they occur, are likely to range in distance between 1000 and 1300 miles.

Some meteor-scatter openings should be possible on the v.h.f. bands during the last days of July. The *Delta Aquarids*, a major meteor shower, should take place between July 25th and 28th, with approximately 20 meteors an hour entering the earth's atmosphere at its peak.

July is usually a poor month for trans-equatorial (TE) openings on *6* meters, but an occasional one may still be possible from the southern tier states towards South America. The best time to check for TE openings is between 8 and 11 p.m. local standard time.

V.h.f. ionospheric openings during July should also be possible during periods of radio storminess. Check the Last Minute Forecast at the beginning of this column for the days in July that are expected to be Below Normal or Disturbed.

73, George, W3ASK

CQ Short-Skip Propagation Chart
July & August, 1981
Local Daylight Savings Time At Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	08-10 (0-1)* 10-14 (0-3)* 14-18 (0-1)* 18-22 (0-2)* 22-08 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-20 (3-2) 20-22 (3-1)* 22-08 (1-0)*
15	Nil	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 20-22 (0-2)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)*	08-10 (2) 10-14 (3) 14-18 (2-3) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-18 (1-4)* 18-22 (1-3)* 22-00 (1-2)* 00-07 (0-1)*	07-10 (2-4) 10-18 (4) 18-22 (3-4)* 22-00 (2-4)* 00-02 (1-3)* 02-07 (1-2)*	08-10 (4) 10-16 (4-3) 16-00 (4) 00-02 (3) 02-07 (2) 07-08 (4-3)
40	08-10 (2-4)* 10-15 (3-4) 15-20 (4) 20-22 (2-4) 22-00 (1-3) 00-08 (1-2)*	08-10 (4) 10-12 (4-3) 12-17 (4-2) 17-18 (4-3) 18-22 (4) 22-02 (3-4) 02-05 (2-4) 05-08 (2-3)	09-10 (4-1) 10-12 (3-1) 12-17 (2-1) 17-18 (3-1) 18-21 (4-3) 21-05 (4) 05-06 (3-4) 06-08 (3) 08-09 (4-2)	09-18 (1-0) 18-19 (3-0) 19-20 (3-1) 20-21 (3-2) 21-22 (4-3) 22-06 (4) 06-07 (3-2) 07-08 (3-1) 08-09 (2-0)
80	06-12 (4) 12-16 (4-3) 16-00 (4) 00-06 (3-4)	07-08 (4-2) 08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4)	07-08 (2-1) 08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-19 (2-0) 19-20 (2-1) 20-21 (3-1) 21-22 (3-2) 22-05 (4) 05-06 (4-3) 06-07 (4-2)	07-19 (0) 19-20 (1-0) 20-21 (1-0) 21-22 (2-1) 22-04 (4-3) 04-05 (4-2) 05-06 (3-1) 06-07 (2-1)
160	18-19 (0-1) 19-20 (1) 20-22 (3-2) 22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0) 10-18 (0)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1) 22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1) 09-19 (0)	21-22 (1) 22-01 (2-1) 01-04 (2) 04-06 (3-2) 06-07 (1) 07-08 (1-0) 08-21 (0)	21-23 (1-0) 23-01 (1) 01-06 (2-1) 06-07 (1-0) 07-21 (0)

*Predominantly Sporadic-E Openings

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances 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 40 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 parenthesis, 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 occurr on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " 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 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *daylight time* is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters; a half-wave length above ground on 40 and 20 meters, and a wave-length 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 10dB 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. Department of Commerce, Boulder, Colorado, 80302.

HAWAII
July & August, 1981
Openings Given In Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	13-16 (1)	06-09 (1) 09-12 (2) 12-16 (3) 16-18 (2) 18-20 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-06 (2) 06-08 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)**
Central USA	12-14 (1) 14-16 (2) 16-17 (1)	05-06 (1) 06-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (4) 04-06 (3)	20-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)** 22-00 (2)** 00-02 (1)**
Western USA	10-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	05-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-05 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)** 20-22 (2)** 22-02 (3)** 02-03 (2)** 03-04 (1)**

ALASKA
July & August, 1981
Openings Given in GMT

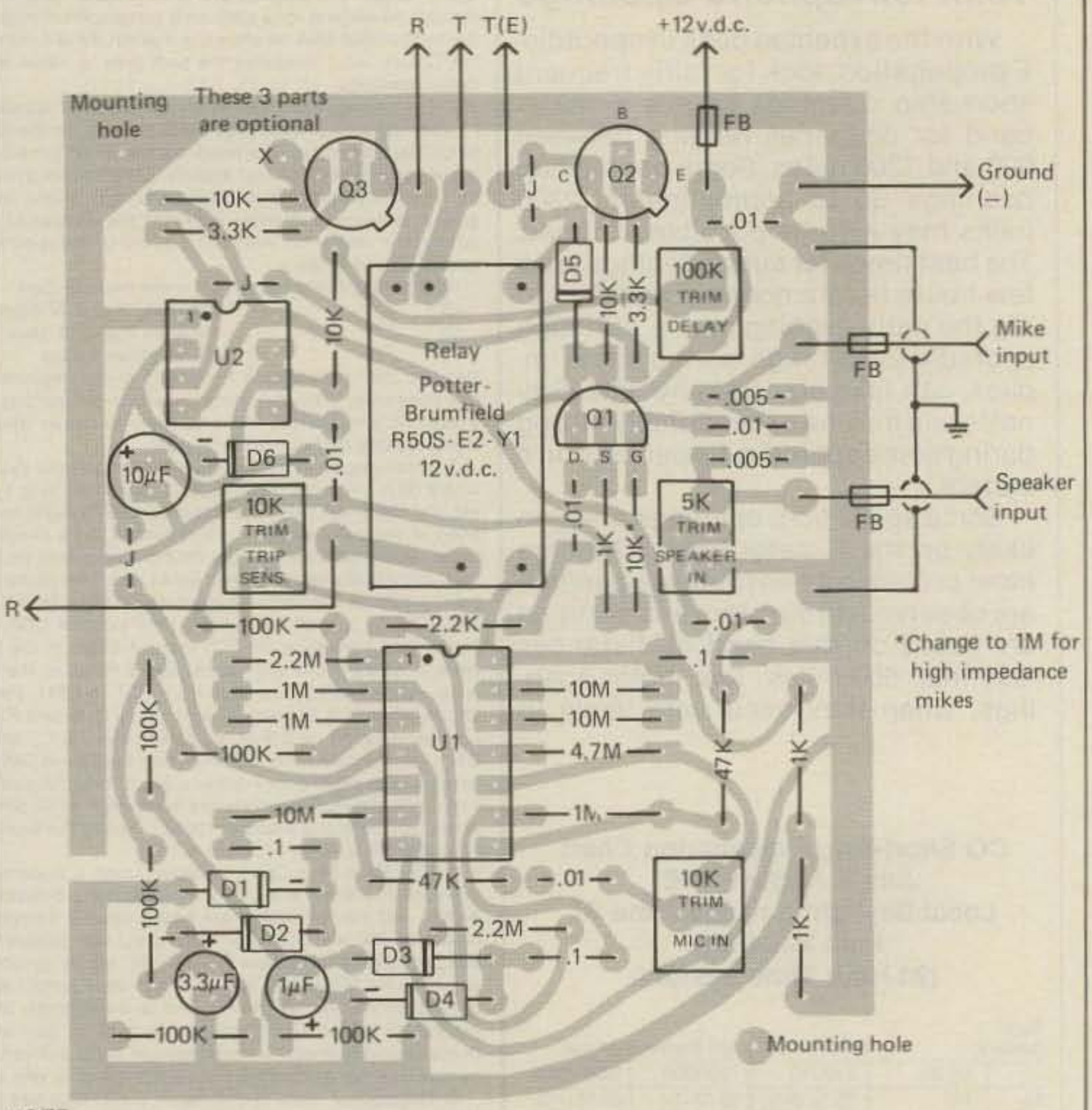
TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil	21-00 (1) 00-02 (2) 02-03 (1)	12-15 (1) 22-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-10 (1)
Central USA	Nil	20-00 (1) 00-03 (2) 03-05 (1)	13-16 (1) 22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-09 (1)	08-12 (1)
Western USA	01-04 (1)	17-22 (1) 22-00 (2) 00-02 (3) 02-04 (4) 04-05 (2) 05-06 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-06 (4) 06-08 (3) 08-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)**

**Indicates best time for 80 Meter openings. Openings on 160 Meters are likely to occur during those times when 80 Meter openings are shown with a propagation index of (3).

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.

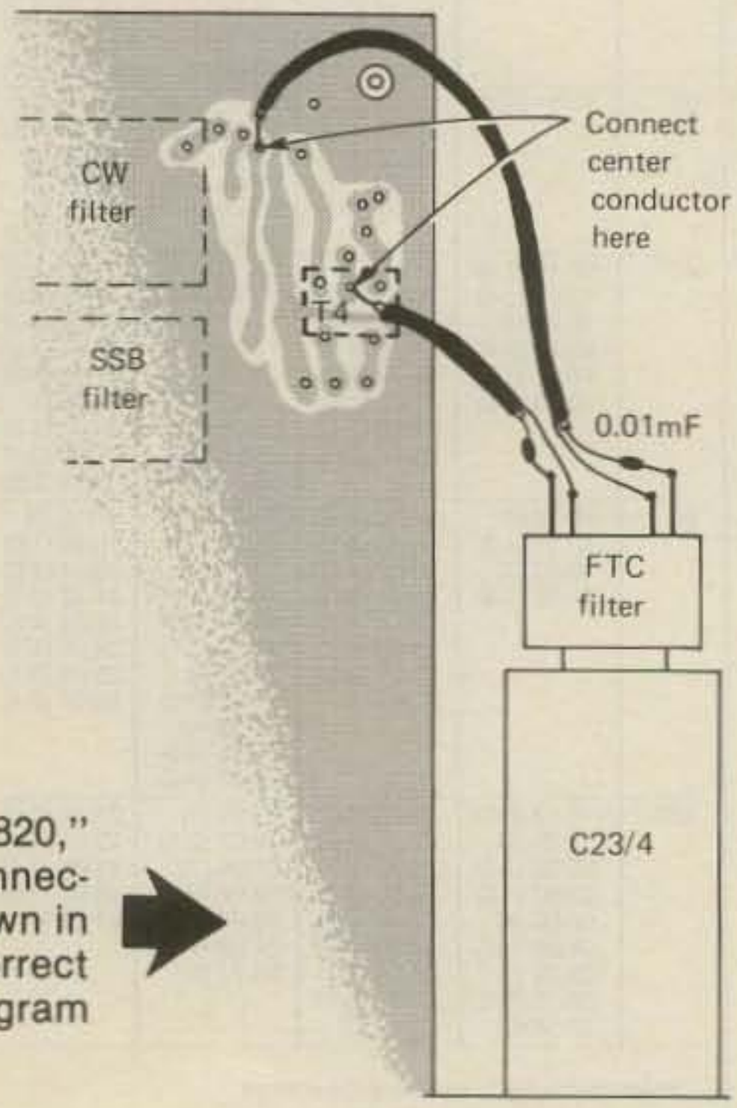
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter openings, use the preceding Short-Skip Propagation Chart.

Glitch Department



NOTE:
All holes are .032" except:
Wires, cable shields = .052"
Center of cables = .040"
Relay holes (5) = .052"
Trimmer pots may vary;
smaller in-line pots are = .032"
Larger center lead-offset types = .052"

Re: "How to Build a Deluxe Solid-State Voice Operated Relay," *CQ*, April 1981, p. 36. There were errors in the overlay for fig. 4 on page 39. The corrected diagram is shown above.



Re: "Tighter Skirts For The TS-820," *CQ*, March 1981, p. 58. The connections to the Fox-Tango filter shown in fig. 2 (p. 59) are in error. The correct connections are shown in the diagram to the right.

THE INS AND OUTS OF WORKING DX

BY BILL KENNAMER*, K5FUV

Working DX is relatively easy and has been especially so for the last two or three years. DXCC at this point in time can be easily achieved in two to three months. In fact, a retiree who obtained his General Class License as retirement pastime told me that he had worked 135 countries on a vertical antenna in three months. He did it all on c.w. with 100 watts output. To me this represents living proof that anyone with no experience can work DX simply by deciding that he or she wants to.

While it's true that working DX is relatively easy, one can still get the feeling of knocking one's head against the proverbial brick wall. This usually comes from trying to work the one station on the band that everyone in the world needs and making that attempt on 20-meter s.s.b. with 100 watts to a dipole when propagation is favoring another call area. At that particular time, all that's happening is that one is creating additional QRM with no possible chance of getting through. Too often this situation breeds short tempers and smart remarks. To save frustration and increase enjoyment of our hobby, it would be better to think about how to approach DXing to get maximum enjoyment out of the equipment available. The DX sport should be approached much differently with kilowatts and 6 element monobanders than with 100 watts to a dipole.

DXing is 75 percent operator and 25 percent station. That's part of the reason that big stations sometimes lose out in the pile-ups, while a smaller station with an operator who knows how to time his calls may get through first. Operating techniques to get you through faster can be learned and will also enhance your overall operating enjoyment.

Propagation is the great equalizer in both contest and DX operating. The important thing to recognize here is that when you have it, you have it, and when you don't, you don't. Recognition of your propagation advantage is important, as you can call for hours without propagation and just be creating QRM for others and frustration for yourself. Recognition is very important in contest work, where time calling in pile-ups (TCIP) can be a critical factor. Familiarization by listening on the bands can help, as you can learn what times to work desired areas, and also what bands to use at different times of the day. As a general run, propagation on 10 and 15 meters would require that your beam antenna track the sun west, while 20, 40, and 80 meter propagation would roughly come from the areas where the sun is rising and would follow the darkness west, although 20 meters can be open to anywhere at any time.

Propagation to a particular station of interest (i.e., the object of a pile-up) can be determined by the reports that the DX station is giving to the stations he is working. If most stations are in one certain area and getting better reports than you are able to give, then propagation is not favoring your area. Write down the frequency and check back every 10 to 15 minutes. An example: 5H3KS heard weakly this afternoon on 20 meters with East Coast stations working him. The choice here is to hang in and keep calling, or come back later. After an hour and a half of watching TV, one call was all that was necessary.

Propagation knowledge of the DX station's QTH is also helpful. For example, in the Fifth Call District we know that stations in zone 8 will appear to be very loud while working the U.S. East Coast or possibly Europe. We also know that it's a waste of time to call at that time, except for the possibility of sneaking through during a lull in the pile-up. The reason that we can't work them at that time is that the zone 8 stations have their beams pointed to the East Coast, which gives the East Coast an automatic 20 dB advantage at that time. We know that our chance will come when the zone 8 station moves his antenna west for Japan and Asia.

Availability of a particular DX station is also good to know. Is it a DXpedition? If so, how long will he be on? If a native, how active is he? This information may be learned either through various publications, personal observations, or contact with other DXers. Sometimes dumb luck helps too. More than one lucky beginner has wandered into a 5A, TT8, 9U5, or even the FO0X operation. Generally, though, the availability of a particular country determines how that station should be approached. If the station is from a country with a high population density, such as Japan or most of Western Europe, then just get on 10 or 15 meter phone and work away. Something in the USSR? Most are available any night of the week on 20-meter c.w. Run across a pile-up on a rare DX and everything changes. At that point it's good to know what your station will do in relation to the size of the pile-up. If you're running 100 watts to a two-element tri-bander at 20 feet, and the object of the pile-up is a rare one that hasn't been on in 10 or so years, you can get awfully frustrated by calling on the first day. If you are sure the expedition is going to be there several days, perhaps your chances would be better to wait for a day or two until the pile-up thins to the point that you're equal to the competition. If on the other hand you have propagation and you're not sure when the station will leave the air, you may as well call. You may get lucky.

Perseverance is one of the most desirable traits for a DXer to acquire. W7PHO has told a story to illustrate what perseverance means to a DXer. It seems that in Bill's younger years AC5PN in Bhutan could operate only when he was recharging the King's batteries. Gasoline had to be hand-carried in over the mountains, so the task wasn't performed very often and there was no time scheduled for the job to be done. About the only salvation was that the transmitter was crystal controlled. Bill camped out on that frequency every morning for almost two years before finally working the station.

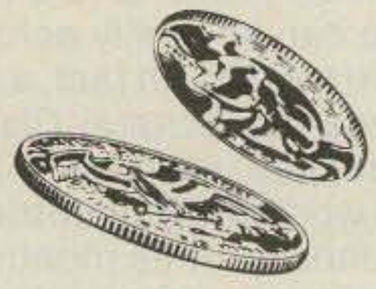
Progress doesn't happen overnight, so don't lose any sleep over what you didn't work. Remember, if you worked it today, it won't be waiting tomorrow, so there's less to look forward to. The impossible sometimes will seem easy, and the merely difficult may become impossible. Just wait, and enjoy the fact that DX is a hobby that never grows old.

Next time, a few tips on how to outguess the pack.

*1310 Paris, Garland, TX 75040

Let's face it, you can't get much cheaper than this. For under a buck you too can have a quick and easy 2 meter antenna.

Build An 89¢ Two Meter Antenna



BY ARIC KECK*, N8BIK AND CHUCK SENATORE†, WD8JFE

Have you often wondered how to get a suitable 2 meter antenna without being mobile or without buying one of those fancy boomer signal crushers, or how to get a copyable signal on simplex without running a kilowatt? Well, this little gem of an antenna will make you more than marginal copy on simplex within moderate distances, and less than 5 watts!

For parts, all you need are a plastic spray can top, 5 pieces of 19″ long wire, and 1 SO-239 connector. The pieces of wire should be 12 gauge or larger for rigidity. The SO-239 connector can be found in many junk boxes or at a local electronics store. I found them at Radio Shack for 89¢.

To start with, you make a hole in the plastic top so that the inverted SO-239 will fit through without much friction. The SO-239 will not fall through the hole because the top of the SO-239 is square. Next, solder 4 pieces of 19″ wire (which is equivalent to ¼ wavelength on 2 meters) to the 4 holes on the square mounting flange facing up. Then solder the remaining piece of wire inside the stem of the SO-239. After the solder has cooled, cover the top part of the connector and the spray can cap generously with white glue. Put a small amount of glue on the inside of the cap just for an insurance bond.

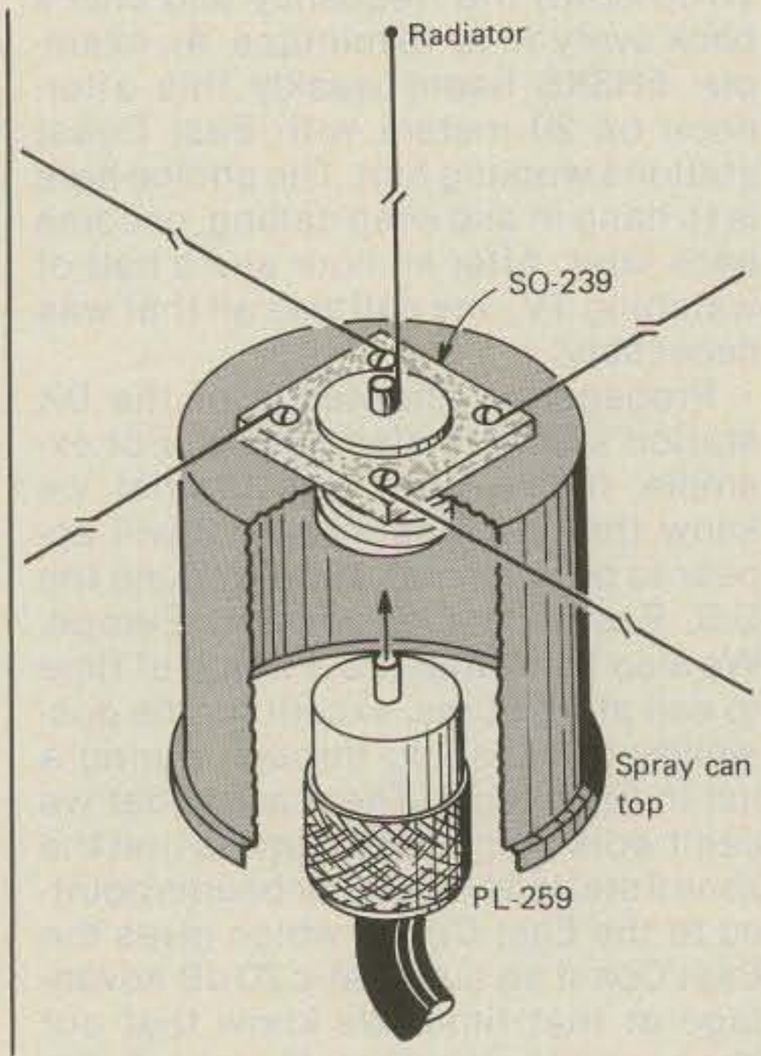


Fig. 1– This is about as cheap and simple as you can get. The above ground plane does work and has been a field expedient for years.

The whole process, provided you have the material, should take you no more than a half hour.

When the glue is dry, the unit is ready for tests and an s.w.r. check.

Run your coax with a PL-259 connector affixed to the threaded part of the connector within the cap. Bend the 4 radials to an approximate 45 degree angle, which will present about 50 ohms of impedance. Leaving the radials straight out presents an impedance of somewhere around 35 ohms. You can vary your s.w.r. impedance by placing the radials on different angles. You can also trim the lengths of the radials to further minimize s.w.r.

This little antenna is very versatile. You can mount it on a tower, or use it indoors where it performs especially well. I have made solid contacts up to 25 miles away with 1.5 watts output when the antenna was used in a second story bedroom. The antenna can be made to cover any part of the full 4 MHz on 2 meters just by lengthening or shortening the pieces of wire. I obtained a 1.4 to 1 s.w.r. in the middle of the 2-meter band with no modifications in length of the wires.

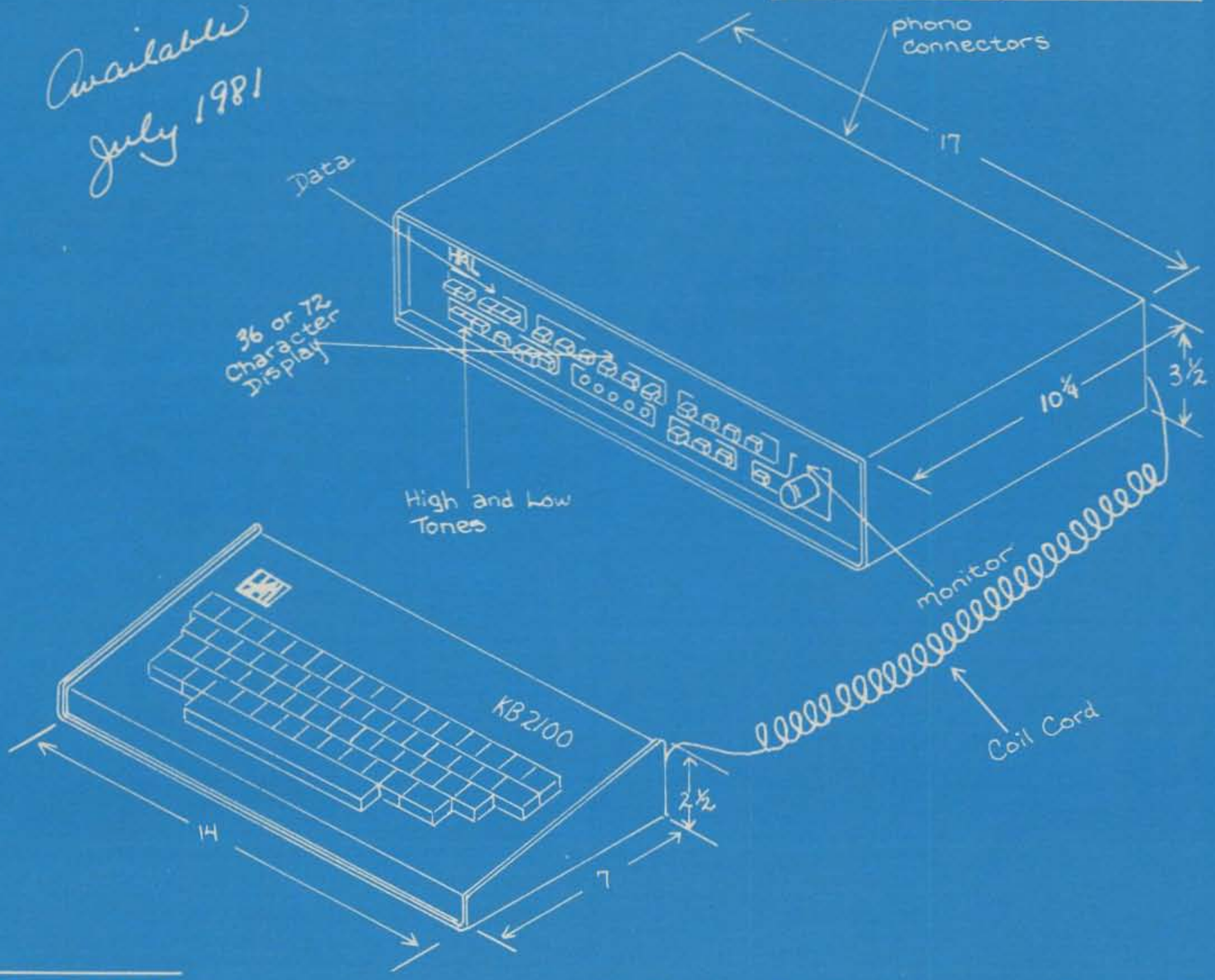
All in all, you can't go wrong for 89¢ and a half hour of work for the many rewards you get from this antenna. CQ

*406 W. Washington St., DeWitt, MI 48820, †1960 Winchester St., East Lansing, MI 48823

The CT2100 Communications: Terminal

HAL COMMUNICATIONS CORP	
NEW PRODUCTS	
DATE: 1-26-81	SCALE: ½
DRN BY: GWH APP BY: PTT	No: B1251

Available July 1981



SPECIFICATIONS:

- Two cabinets - basic CT2100 plus separate KB2100 keyboard.
- RTTY and Morse demodulators and video circuits included in CT2100.
- Small keyboard size; connects with one "coil-cord" for popular "lap operation".
- Streamlined CT2100 cabinet is attractive and small - may also be rack mounted.
- Satin finish black vinyl front panel with multicolor graphics.
- 26 control switches; red for "primary" and blue for "secondary" controls.
- 16 rear panel connectors - standard phono connectors.
- On-screen tuning indicator, LED indicators, and external scope connections.
- LED indicators for mark, space, cw tune, RTTY tune, audio overload, and KOS.
- CT2100 demodulates, decodes, and displays received Morse and Baudot or ASCII RTTY.
- CT2100 with KB2100 transmits and receives Morse, Baudot, or ASCII.
- Morse receive circuit tracks speed and minor frequency variations; 5 to 100 wpm.
- Morse transmit 5 to 100 wpm; key negative or positive key lines.
- Baudot or ASCII data rates of 45, 50, 57, 74, 100, 110, 150, 300, 600 or 1200 baud.
- Internal RTTY demodulator for both "high" and "low" RTTY tones plus two sets of modem tones (1070/1270 Hz or 1200/2200 Hz). Narrow shift CW ID included.
- All three RTTY shifts (170/425/850 Hz) for both "high" and "low" tones.
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- RTTY mark-hold autostart, normal/reverse, full or half duplex, KOS transmit control.
- Large character (36 per line) or standard display (72 characters per line).
- White characters on black screen or reverse video.
- Two pages of receive display.
- Split screen for transmit buffer - pretype WHILE receiving.
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- Eight non-volatile 250 character EPROM stored brag-tape and HERE IS messages.
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Connector Catalog. Switchcraft has made available a 36-page catalog of audio and general-purpose connectors and a.c. receptacles. The catalog (no. C502f) includes product descriptions, engineering specifications, drawings, and mating charts showing connecting capability with similar products. For a copy of the catalog, contact Switchcraft, Inc., 5555 N. Elston Ave., Chicago, IL 60630, or circle number 113 on the reader service coupon.

Amateur Radio, Super Hobby. This book by Vince Luciani, K2VJ, is a complete source of information on exactly what the hobby is. It not only describes the many facets of the hobby, but also gives several exclusives on the ham radio lives of ordinary and prominent members of the amateur radio community. It shows how easy and inexpensive it can be to become a licensed radio amateur. It teaches some of the theory behind the hobby while providing entertainment. The book is 144 pages, 8½ × 11, and is available in either paperback ($8.95) or hardcover ($14.95) (plus $1 shipping and handling). For more information contact Cologne Press, P.O. Box 682, Cologne, NJ 08213, or circle number 118 on the reader service coupon.

SK Solid State Replacement Guide. RCA's SK top of the line solid state replacement guide lists over 1300 solid state replacement devices that replace more than 170,000 domestic and foreign types. The guide shows the stock number along with the stock number used by ECG, REN, and TM. Information is offered on RCA's complete line of replacement transistors, rectifiers, thyristors, integrated circuits, and high voltage triplers. The guide is available from RCA Distributor and Special Products, P.O. Box 597, Woodbury, NJ 08096 for $2.25, or for more information, circle number 111 on the reader service coupon.

From Beverages Thru Oscar—A Bibliography. By Rich Rosen, P.E., this volume is 620 pages and covers 92 subjects in communications. Included are references for propagation, verticals, linear amplifiers, signal enhancement techniques, receivers, RTTY, repeaters, circuits, and more. The data base for the references is 288 different sources (magazines, journals, etc.,) spanning a 65 year period. The volume is published by Rich Rosen, 6043 W. Maplewood Dr., Littleton, CO 80123. (See CQ Book Shop.)

Professional 2-Way Mobile and Base Antenna Catalog. This catalog describes Avanti's line of mobile and base antennas, spotlighting the glass-mounted mobile antennas which feature no-holes installation. Also covered in the catalog are a heavy-duty collinear base station v.h.f. high-band antenna, a 10-meter switchable polarity beam, Moonrotor rotator, and more. For a copy of the catalog, contact Avanti Communications, 340 Stewart Ave., Addison, IL 60101, or circle number 110 on the reader service coupon.

1981 QSL Managers Directory. The 1981 edition of *The QSL Managers Directory of Routes and Addresses* gives over 7,500 entries, providing routings, stations that are *not* managers, and more in over 140 pages. Each line contains the complete information for that manager. For more information, contact Richard M. Norley, WA1CFT, P.O. Box 543, Derry, NH 03038, or circle number 114 on the reader service coupon.

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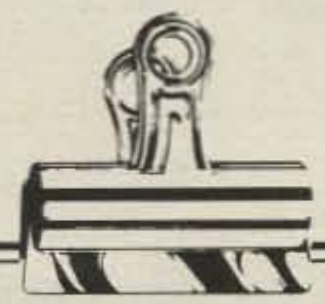
Contact East Assembly Tool Catalog. A catalog of electronic assembly tools, test instruments, soldering supplies, and field service tool kits, the Contact East 1981 Catalog is a buying guide to over 10,000 products. It features sections on hand tools, soldering and desoldering equipment, multimeters, oscilloscopes, anti-static material, test probes, and much more. Includes many hard-to-find items. The 160-page, illustrated catalog contains full pricing information and includes 16 pages of all new items. All products are easy to order by phone or mail and are fully guaranteed. For a copy of the catalog, contact Contact East, Inc., P.O. Box 160, 7 Cypress Drive, Burlington, MA 01803, or circle number 117 on the reader service card.



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● **Fourth Annual Noarsfest** - This event will take place on July 25 at the Lorain County Fairgrounds, Wellington, Ohio. Commercial exhibits, prizes, and more. Tickets are $2.50 at the door, $3 at the gate. Flea market area. For more information, contact Noarsfest, P.O. Box 354, Lorain, OH 44052.

● **Okanagan International Hamfest** - This hamfest will be held in Canada on July 25 and 26 at the Oliver Centennial Park, Oliver, B.C. Activities begin at 1 p.m. Saturday and 2:30 p.m. Sunday. Flea market, entertainment, refreshments, bunny hunt. For more information, contact John Juul-Andersen, VE7DTX, 8802 Lakeview Dr., Vernon, B.C. Canada V1B 1W3.

● **Maryland Hamfest** - The Baltimore Radio Amateur Television Society is sponsoring the Maryland Hamfest at the Howard County Fairgrounds on July 26. Doors open at 8 a.m. Flea market, refreshments, prizes, contests, exhibit areas. Talk-in on 146.16/76, 147.63/03, 146.52. For more information, contact BRATS, P.O. Box 5915, Baltimore, MD 21208.

● **Amateur Radio Public Service Assoc. Swap-and-Shop** - This event will be held on July 26 at the St. Joseph County Fairgrounds, Centerville, Michigan. Admission is $2, tables $3. Gates open at 7 a.m. Talk-in on 146.52 simplex. For more information, contact Amateur Radio Public Service Assoc., 809 Prairie St., P.O. Box 194, Sturgis, MI 49091.

● **WIMU Hamfest** - The WIMU Hamfest will be held from July 31 to August 2 in West Yellowstone, Montana. Product displays, activities, camping and lodging available. Talk-in on 146.52, 3.920, or 1.250 MHz. For more information, contact WIMU "81", c/o Les Belyea, N7AIK, Box 327, Belgrade, MT 59714.

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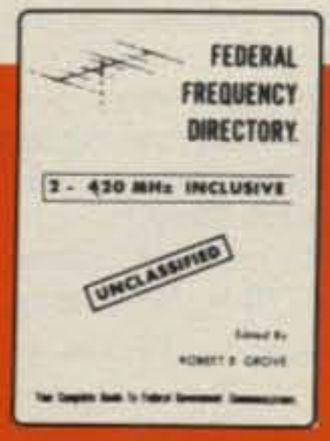

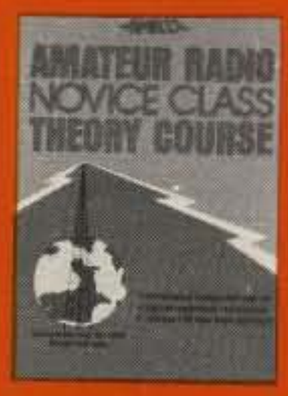

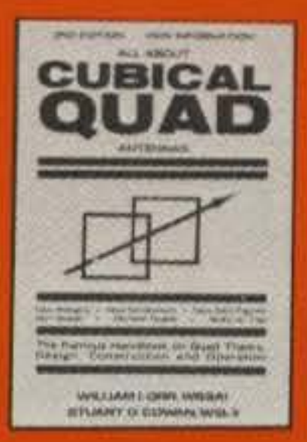

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WANTED: FT-101 Manual with wiring diagram. 4Z4KK, P.O. Box 479, Bat-Yam, Israel, 59104.

WANTED: Icom IC-720, IC-255A, RM-2, FM unit for IC-551, Heath ID-1390 Digital thermometer, Bearcat 300, Nikon FM. K0MK, 218-865-6541.

WANTED: CQ Surplus Schematics Handbook. Gregory Danzker, 4000 Old Post Rd., Seaford, NY 11783.

SELL: 28ASR @ 100 wpm, mint with inboard type perf, TD, paper and tape. Outboard typing perf with auto windup reel. Drake FS-4 synthesizer. Flesher TR 128. L-7 Drake Linear, used 10 hours. WB9YJF, 217-267-2734.

KENWOOD T-599D, $325, DRAKE SPR-4 General Coverage Receiver, Extras, $395; Wilson WE-800 with Touch Tone, $285. Ken, 305-941-7195.

RCA CX-35 mobile radio test set $20, Millen GDO with coils $65. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: Used Collins equipment any age, any condition. State condition and price. H.F. Schnur, 115 Intercept Ave No., Charleston, SC 29405.

WANTED: 1980 Call Books Foreign and Domestic. Late model linear amplifier for 10,15, 20 meters. Phone 212-229-2962.

FOR SALE: Kenwood 700SP all-mode 2-meter rig. Ten-Tec 509 QRP rig. S.a.s.e. for info to J.P. Johnson, 7602 Timberwood Dr., Jacksonville, FL 32224.

WANTED: Riders Radio Manual #10. RCA Schematics, Book #2 1938 to 42. RCA Tube Manual 77-78 or 79. Other radio books C.O.-ARRL. Write to R.K. Tracey, 809 West End Place, Moberly, MO 65270.

QST's December 1915 to June 1920 wanted for my personal collection. Ken Miller, 16904 Geo. Washington, Rockville, MD 20853. Phone 301-774-7709.

FOR SALE: SB 34 Power Supply with cables, 12 vdc, $125. Hallicrafters HA-6, 6 meter transverter with power supply, $175. 300V DC Lambda regulated power supply, $30. Gated compression amplifier, works on all receivers, $20. All in good condition and with manuals. FOB. T.K. Brown, RD 1, Box 102, Forksville, PA 18616.

FOR SALE: BC221T with AC and Cal. Book, $35. 6200V 1 amp CT to frame, 115V primary Plate Transformer, $40. FOB. Basham, 735 Caves Highway, Cave Junction, OR 97523.

WANTED: CW Collins mechanical filter for 75A-4. Spencer Cromwell, K6VRS, 1794 Yorba Dr., Pomona, CA 91768. Phone 714-628-9551.

HEWLETT PACKARD Model 400D AC VTVM, with copy of manual, excellent, $40 including shipping. J. Hoffer, W1DL, 24 Cherry Road, Framingham, MA 01701.

SPECIALS—QUALITY QSL's PRINTED 300/$5, 500/$9. White, colored stock. Add 20% shipping; Samples S.A.S.E. D. Testa, P.O. Box 9064-CQ, Newark, NJ 07104.

WOULD LIKE TO HEAR FROM HAMS who were in the CCC. Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355, (212) 461-5933.

WANTED: Heath 4550 or 4530 Oscilloscope. State price, condition. Ted McAnly, 1436 Cottonwood Terr., Dunedin, FL 33528.

TEN METER CONVERSION—or should be! Realistic TRC-459 SSB-AM, 40 channel, microprocessor controlled CB. Digital (LED) clock, 5 memories, 3 scans (memory, clear channel, busy channel) plus fast manual scan. Ten-key pad tuning, NB/ANL, SWR, auto on (with 24 hr. position on clock), PA & monitor positions. Purchased to convert to 10 meters, but this baby is out of my league. Retail $440, bought for $200 on closeout, sell for $175, you ship. Original, still in packing. Royce, KA5KQQ, 1614 Arcady Ln., Irving, TX 75061.

QRPers: Get details of the G-QRP-Club and free sample magazine from Rev. G.C. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham, B37, U.K.

HAM HOUSE for sale Chicago area 3 bedrooms, tower, and tribander $73,900. (312) 529-9069. Write Marty, 426 Chestnut, Schaumburg, IL 60193.

WANTED: Centralab JV-9033 Rotary Switch. E.H. Nadolny, 888 E. Schirra Dr., Palatine, IL 60067.

WANTED: One ex-military ECM receiver, for broadband signal detection and analysis. 2801 Granite Creek Road, Scotts Valley, CA 95066.

WANTED: "S" meter for SX28A. Also source of other Hallicrafter parts. Ward Harwood, L.B. 216, Crescent City, IL 60928.

SELL: CQ 1952, 1958, 1960-74. 73 1963 to 1974. Best offer plus ship. F.J. Wojcik, 33 Hughes St., Maplewood, NJ 07040.

WANTED: Manual or copy for Underwood electric typewriter model 12. K7FG, 1402 W. Craig, Moses Lake, WA 98837.

SELL: Heath SA-2040 2KW Antenna tuner kit, won at Hamfest, $125. Also early National H.R.O. made for Navy, 1943, with 6 coils, in cabinet, mint condition, $150. BUY: HT-46 transmitter in good condition. Call Walt, WA2ZBE, at (212) 720-8192 or drop a card to 135 Roe St., Staten Island, NY 10310.

GLOBE VFO 755A or HG 10B and VOX-10 needed. C.E. Bott, POB 1082, Fairchild AFB, WA 99011.

SALE: Johnson Viking I with Hallicrafter HT-18 VFO. 1.8 to 30 MHz am and cw, $100. W3AP, 215-678-4310 evenings.

SIMPSON 260 WANTED. Any condition. Advise price, condition, and series number. Bruce Rittenhouse, KA8DQE, 2909 Pioneer Rd., SE, Grand Rapids, MI 49506.

HALLICRAFTERS SR-150 Transceiver. 80-10, SSB/CW Vox, Semi Bk, Vy Nice Shape, $200. Al, W2PRO, (914) 779-3057.

HEATH 90-4555 O'scope w/ manuals $100. Sencore H-142 tube tester $75. Simpson 312 VJVM $75. D. Miller, Box 9684, Birmingham, AL 35215.

CQ complete for 1945-1975. $200 plus shipping. W8AP, 1010 Burnham Rd., Bloomfield Hills, MI 48013.

WANTED: Knight Ocean Hopper, EBY PCK40. Sever, 248 Sheraton Drive NW, North Canton, OH 44720.

SELL: QST 1948-50, 1953, 1954, 1956-63, 1965-73. Best offer plus shipping. F.J. Wojcik, 33 Hughes Street, Maplewood, NJ 07040.

SELL: Mint RV4C VFO, Drake serviced April 1981, $100. Call Gary, WB8HLJ, 419-447-8229.

FOR SALE: Cushcraft 432-20T 432 MHz Twist Ant, $35. Janel 28 MHz and 432 MHz Preamps, $15 each. R. Dittmer, 7305D Aloalo St., Honolulu, HI 96818.

KENWOOD TS-820, digital, magicom speech processor, VFO unit, $630. K6BW, 1020 Laguna Ave., Burlingame, CA 94010, (415) 344-9975.

RARE DX RETURNS HOME, seeks quiet joys of ATV. Send freebies, offers to N9BSD (CN8ED). Ad in DX QSL info.

FOR SALE: Bearcat 250, $200. Heath VF 2031 w/six xtals and tone pad, $180. DX 300, $280. Yaesu 227RA, $200. Bill Bechtold, 7429 Frederick St., Omaha, NE 68124. Phone 402-397-2461.

TRS-80 HAM RADIO PROGRAMS: Antenna Design, Conversion Tables, Design Equations, Contest Dup, Morse Transceive. All for $14.95. 16K, Level II. VLA Software Supplies, Box 721, Union Station, Endicott, NY 13760.

AZDEN PCS-3000 TT KITS ASSEMBLED AND MOUNTED IN THE BACK OF YOUR MIKE. SEND $25, YOUR MIKE AND TT KIT TO N.P.S., 1138 BOXWOOD ROAD, JENKINTOWN, PA 19046. RETURNED NEXT DAY VIA FIRST CLASS MAIL.

WANTED: 4D32 transmitting tube. W3AP, 215-678-4310.

SELL MAGAZINES: CQ 69/79, HRH 77/79, Family Handyman 66/79, Natl Geo 69/79. Sold in year lots only. Best offer. K2MFY, 2 Nutley Court, Plainview, NY 11803.

WANTED: Modern Electronics 1908-1916, singles, runs to fill out set. Radio magazine, Sept., Nov., 1921, also 1923-7 issues. Wireless Age, 1925 issues. Also Radio magazine 1933-35 issues. QST before 1921. W6ERS, 723 California Dr., Burlingame, CA 94010.

COUNTY HUNTERS PSE HELP: Who can send me old POD 26 or copy of the necessary pages? Will repay your cost. OE5CWL, J. Weigl, Kochstr. 68, 4600 Wels, Austria.

WANTED: Info on where to get analog clock with 24-hour quartz movement. Thanks. K2YB, Box 839, Key Largo, FL 33037.

HAM-KEY Model HK3 (Deluxe straight key plus dual level squeeze paddle) new, never used, $25. Art Johnson, K2POA, 29 Boone St., Bethpage, NY 11714.

FOR SALE: Model 80R (to 480 MC) Signal Generator. You pay UPS shipping, $200.00 firm. Howard, WD9CJV, Box 465, Auburn, IN 46706. (219) 925-2772.

FOR SALE: Hallicrafters SX-117 receiver and HT-44 transmitter. Both excellent condition. Includes power supply, mike, and two new pair of finals. $400.00 firm. Seth, KA2FCU, 516-371-0568.

FOR SALE: Kenwood 700SP all-mode 2-meter rig $450.00. Bearcat 250 Scanner $250.00. Send s.a.s.e. for more info. P.O. Box 518, Whitehouse, FL 32220.

WANTED: HP, TEK, GR test equipment for parts. Any test equip service manuals. W7KSG, 1876 E. 2990 So., Salt Lake City, UT 84106.

WANTED: Your used radio magazines for shipment to overseas amateur radio clubs. CQ, HR, 73, SPRAT, ORBIT, AMSAT Newsletters A5, etc. I will pack and forward to overseas clubs. No quantity too small. No C.O.D.'s. Send magazines to K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

FREE SAMPLE: Ham Radio/Personal Computing Insider Newsletter. Also 4-Line Rubber Stamp: $3.95. VISA/MasterCard. W5YI, Box #10101C, Dallas, TX 75207.

DXERS/ANTENNA BUFFS: Four programs, cassette, for TRS-80Lev2-16K. Great Circle; Sunrise/Sunset calculations; Wind survival of mast with antennas; Yagi surface area and weight. $15.00 postpaid. Ideal Antennas, Inc., 25705 Catalina, Southfield, MI 48075.

CUT HOLES: 9 Greenlee punches, 8 round 1 square, ¾ inch to one and ⅛ inch, complete set $50.00 pp. Farmer, 3405 N. Columbia, Plainview, TX 79072.

MILLEN Grid Dip 90651, $65; FL110 Amp new $195; Collins FM Adapter 146C-1 $20; Low Freq ARC5 RX $20. Art Ford, 552 Hillside Ct., Melbourne, FL 32935.

NEED TO SWAP 250 Hz filter for FT101 for 500 Hz. Also Search FV101 and copy of FT news. K. Karmasin, OK2BLG, Pancava 7, 69501 Hodonin, Czechoslovakia.

WILSON Mark IV, TTP, 2 batteries, desk charger, leather case, 3 antennas, $249. K2AM, 201-687-3518.

SINCLAIR AND MICROACE ZX-80 USERS ATTENTION: The amateur users' group for the ZX-80 has located a source for those hard-to-find connectors for the ZX-80 computer. We wish to trade this source and programs and technical information with other users. Contact K2MI, Marty Irons, 46 Magic Circle Drive, Goshen, NY 10924 (914-294-9462).

WANTED: Diagram and manual for Hammarlund HQ 180A. Will buy copy or can copy and return. Sean Krasan, 84-37 Avon St., Jamaica, NY 11432.

DRAKE C-LINE: R-4C, T-4XC, MS-4, AC-4. Excellent condition. Only $875. Rick (501) 968-7373.

FOR SALE: QST Magazines 1965 to 1980. Perfect Condition, $75. R. Moraine, 1432 Pamela, Hurst, TX 76053.

TRUETONE MODEL D2663 for sale, vy gud condx, $50.00 plus shipping. R.W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

FOR SALE: ERC SL-56 audio active filter with 60 dB notch and special patented CW processor $40. KB9OF, John Bayne, 3912 Rugen Rd., Glenview, IL 60025.

TRS-80 LII 16 K with/sound, TTY interface, 33ASR, Editor Assembler, Books $895. Also 37ASR, 28KSR. KB5BY.

NOVICE ALL-AMERICAN CERTIFICATE: Work a Novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

NEEDED: Robot Model 400 Scan Converter. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

RUBBER STAMPS Made To Order. Name and address or call letters 3 lines $3.50, 4 lines $4.00 p.p. M. Faiola, 887 King Rd., Schenectady, NY 12303.

FOR SALE: Super Code Practice with TRS-80. Kit includes software and kit to produce audio without damage to relay in keyboard. $25 postpaid. Howard, WD9CJV, Box 465, Auburn, IN 46706.

WANTED: AN-MS connectors, synchros, etc. Send list. Bill Williams, PO #7057, Norfolk, VA 23509.

BOOKS: Books in Spanish! Volkswagen, construction, diesel motors, radio, electric installations, industrial formulas, television course. $17 copy. Burke Assoc., Box 248, Manchester, MA 01944.

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FT-101ZD Mk III

The FT-101ZD Mk III is the latest chapter in the success story of the FT-101 line. Armed with new audio filtering for even better selectivity, the FT-101ZD now includes provision for an optional FM or AM unit. Compare features and you'll see why active operators everywhere are upgrading to Yaesu!

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The FT-101ZD now sports a high-level diode ring mixer in the front end. This type of mixer, well known for its strong signal performance, is your assurance of maximum protection from intermod problems on today's crowded bands.

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Designed fundamentally as a high-performance SSB and CW transceiver, the FT-101ZD includes built-in VOX, CW sidetone, semi-break-in T/R control on CW, slow-fast-off AGC selection, level controls for the noise blanker and speech processor, and offset tuning for both transmit and receive. The Mk III optional FM unit may be used for 10 meter FM operation, or choose the optional AM unit for WWV reception or VHF AM work through a transverter (AM and FM units may not both be installed in a single transceiver).

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See your Yaesu dealer for a demonstration of the top performance accessories for the FT-101ZD, such as the FV-101Z External VFO, SP-901P Speaker/Patch, YR-901 CW/RTTY Reader, FC-902 Antenna Tuner, and the FTV-901R VHF/UHF Transverter. Watch for the upcoming FV-101DM Digital Memory VFO, with keyboard frequency entry and scanning in 10 Hz steps!

Nationwide Service Network

During the warranty period, the Authorized Yaesu Dealer from whom you purchased your equipment provides prompt attention to your warranty needs. For long-term servicing after the warranty period, Yaesu is proud to maintain two fully-equipped service centers, one in Cincinnati for our Eastern customers and one in the Los Angeles area for those on the West Coast.

Note: A limited quantity of the earlier FT-101ZD (with AM as standard feature) is still available. See your Yaesu dealer. FT-101ZD Mk III designates transceivers bearing serial #240001 and up, with APF/Notch filter built in and AM/FM units optional.

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