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THE RADIO AMATEUR'S JOURNAL

A CQ Exclusive
CQ Interviews:
Mr. Carlos V. Roberts
Chief, Private Radio Bureau, FCC
...page 9

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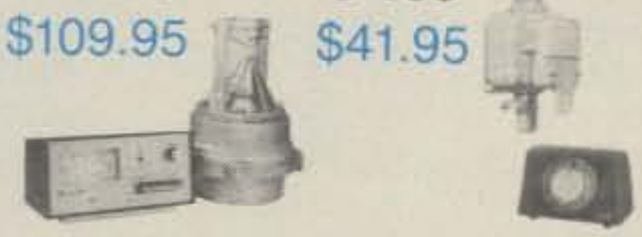

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MAY, 1980 VOL. 36, NO. 5

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

Zero Bias

an editorial

This month we're proud to bring you an exclusive interview with Mr. Carlos Roberts of the FCC. Mr. Roberts answers many questions that we've had and that you've probably asked yourself. It's an interesting perspective of amateur radio as viewed from official Washington. I think that Mr. Roberts' perception of amateur radio and its future is quite clear and succinct. It does indeed depend on us and what we are willing to do about it.

One issue that Mr. Roberts raises as a point of fact is that as the amateur population increases it tends to mirror the national population in general. Perhaps spurious commentary we've heard cluttering up the bands during recent DXpeditions and contests reflects how some of us behave in our non-amateur lives. If this behavior is approaching the behavior of the general non-amateur population, then by extension we should be facing total anarchy on the bands if we increase our ranks by an additional 50 or 100,000 amateurs. Somehow I can't bring myself to believe the logic totally, although it is enticing. The problem (if we agree that there is one) is just not that simple.

Logic tells us that most of our troubles began when we started increasing our numbers. After all, we never had some of these problems years ago when our ranks were thinner. We were self-policing, and the occasional outburst on the air was quickly dealt with on a local level. Our growing policing problems could conveniently be blamed on the type and quality of the newcomer: that generally is a euphemism for the CBer who progressed into amateur radio.

If the previous logic strikes you as correct (and I don't know why it should) then you can heap some blame on the League. The League went out of its way to pour a tremendous amount of money into training programs prior to WARC to create a growth pattern in amateur radio in order to demonstrate our viability in Geneva. The League has taken credit for the growth and therefore should bear the weight of the consequences, right? I don't think so.

First, I don't recall any training program that advocated the behavior we are experiencing today. I'd also venture a guess that most of us who consider ourselves "old timers" were never involved in a training program at all and learned or didn't learn depending on the time spent doing. Old habits are the hardest to break, which leads me to the second point. A good deal of what has been going on can be linked to calls and people who've been around for some time, and not specifically to the newcomer. The fledgling DXer is not about to jump into some of those pile-ups and get chewed up under so-called normal conditions, let alone those cat-calling forays. It's a good thing the folks in Geneva were kept busy with meetings instead of spending a little time listening-in on the amateur bands. Things might have worked out a little differently. It might be hard to prove the need for spectrum for some activities going on today.

We can all agree on what we should do about the "Woodpecker" and how we can solve the problem. And "we" does not mean our fellow amateurs. That's a job for the "government" to handle. Well what about "us"? Who handles our problems? I think in the long run we would be much better off if the "government" really didn't get involved and was not forced to get involved by our inactivity.

We don't *mirror* the population, we *are* the population. It doesn't matter how many new people come into amateur radio, even if the number reaches the millions. It's got nothing to do with technical proficiency or the lack thereof. However, these may be the things we can get a hook into or the things we are willing to deal with. The CBer was the visible target to focus our anger on a few years ago, but as they say, that was yesterday. What about today? We're doing on a regular basis what we held the CBer up to ridicule for not so long ago. Well, some of us are anyway.

We all know what can happen if we libel someone or shout "fire" in that proverbial crowded movie theatre. We know or have an idea of the consequences for most of our actions which run contrary to the societal norm. It's not so much the fear of punishment or reprisal for antisocial actions that keeps us on the straight and narrow; it's simply a matter of respect, courtesy and manners. Larry Brockman does an admirable job of discussing manners elsewhere in this issue, and I strongly suggest that you read his article.

I don't have any sure-fire solutions or profound answers to the self-policing situation. I believe it is possible to isolate, and, if necessary, socially ostracize those individuals who march to their own drums and give us the headaches. I believe we can (and have been) instilling a sense of integrity through the ARRL's formalized training programs. I don't believe that we should reward bad operating or illegal operating with either a contact or a QSL card. There are things we can do if we want to. I guess we each have to decide for ourself what amateur radio means to us and whether we want to pay the price of more government intervention rather than trying to clean up our own act.

I urge you to read both the interview with Mr. Roberts and the article by Larry Brockman. Discuss it on the air; bring it up at your next club meeting. Let your League Directors know your feelings. Most of all, I think that what I've been trying to say is that you shouldn't always wait for something to filter down to you before you notice it and do something about it. Sometimes you have to prime the pump and help that something along to make sure it does happen.

I'm sure that Mr. Roberts would agree that neither Congress nor the FCC, nor the League for that matter, should be called upon like parents to quell childish behavior and punish tantrums with more and more unenforceable legislation. Basically it's not their problem; it's ours. If we want to keep our self-policing image untarnished, let's self-police.

73, Alan, K2EEK

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• **New Jersey** – The Tri-County Radio Association's Annual Indoor Hamfest/ Flea Market will be held at the Passaic Township Youth Center, Valley Road, Stirling, NJ on Sunday, May 4th from 9 a.m. to 4 p.m. Admission is $2 and tables are $5. Many door prizes. Talk-in on 147.855/.255 or 146.52. For information, write TCRA, Box 412, Scotch Plains, NJ 07076, or call Herb, W2CHA at 201-647-3461.

• **Warminster Ham-Mart** – The Warminster Amateur Radio Club will have its Sixth Annual Ham-Mart on Sunday, May 4th from 9 a.m. to 4 p.m. rain or shine. It will be held at the William Tennent Intermediate High School, Rte 132 (Street) and Newton Roads, Warminster, Bucks County, PA. Door prizes and a special drawing for a Wilson 6 channel hand-held 2.5 watt 2 meter transceiver. Food and drink available, flea market, free f.m. clinic, auction, outdoor and indoor selling, indoor tables available. Registration is $2 per person, which includes one ticket for door prizes (YL and XYL and children under 14 free). $3 per space for sellers (tailgaters)—bring your own table. $5 per space for an indoor table. Ticket for Wilson drawing is additional. For more information call or write W.A.R.C., P.O. Box 113, Warminster, PA 18974, or call Pat Cawthorne, W3DNI, 215-672-5289. Talk-in on 146.52 simplex or 146.16/146.76 PARA Repeater.

• **Electronic Swapfest** – The Green Bay Mike and Key Club will hold its Electronic Swapfest on May 10th at the Ashwaubenon Recreation Center. Admission will be $2.00 at the door and $1.50 in advance. Door prizes and much more. Talk-in on 146.52 or 147.72-12 repeater. For more information call or write Robert Duescher, KA9BXG, 1011 13th Ave., Green Bay, WI 54304; tel.: 414-497-7880.

• **Scholarships** – The Atlanta Radio Club is offering two cash scholarships of $500 each this year. Applicants must be licensed amateurs and must be high school graduates entering an accredited college or university as freshmen in the Fall of 1980. All applications must be completed and postmarked not later than midnight, May 15, 1980. Write to Atlanta Radio Club Scholarships, P.O. Box 77171, Atlanta, GA 30357 for applications and additional information.

• **Wexaukee Amateur Radio Association Swap Shop** – The Wexaukee Amateur Radio Association's 20th Annual Swap Shop will be held on Saturday, May 17, from 9 a.m. to 4 p.m. at the National Guard Armory in Cadillac, Michigan, 415 Haynes Street. Tickets are $2 and there will be door prizes, free parking, and lunches available. Talk-in on WR8ANT 146.37/97. For more information write to WARA, P.O. Box 163, Cadillac, MI 49601.

• **Maryland** – The sixth annual Easton Amateur Radio Society Hamfest will be held May 18th, rain or shine, from 10 a.m. to 4 p.m. at the Easton Senior High School on Route 50 just south of Easton at mile marker 66. Hamfest signs on Rt. 50 north and south; talk-in on 52 simplex and 146.445/147.045 repeater. Donation is $2 with additional $2 for tables or tailgaters. For further information, contact R.C. Thompson, KA3BKW, P.O. Box 1473, Easton, MD 21601, or Easton Amateur Radio Society, Inc., Box 781, Easton, MD 21601.

• **Hamfest in Germany** – The Wiesbaden Amateur Radio Club and DOK F20 Club of Wiesbaden will hold their hamfest in Auringen (5 km north of Wiesbaden on Highway 455) on Sunday, May 4 beginning at 10 a.m. It will provide a place for amateur enthusiasts to meet and discuss their hobby and the furtherment of German-American relations. There will be a flea market, vendors, displays, computer demonstrations, technical assistance (deviation and power checks, etc.), left foot c.w. contest with 5 w.p.m. certificate, prizes, and refreshments. Mobile call on 145.55 MHz.

In addition, the Wiesbaden Amateur Radio Club of West Germany is sponsoring their 5th annual DXpedition to Lichtenstein. It will run from May 23 to May 31 with call DA1WA/HB0. Frequencies are: Phone—3.780. 7.090, 14.280, 21.350, 28.650 MHz (± 5KC); c.w.—up 25 k.c. from bottom of each band. Stateside QSL information: Send QSL and s.a.s.e. (15¢) via regular U.S. mail (15¢) to Stephen Hutchins, Box 4573, APO New York 09109. All others QSL via Hugo Jakobljevich, DJ0LC, Am Weinberg 10, 6201 Auringen, West Germany.

• **Maryland FM Association Hamfest** – The third hamfest of the Maryland FM Association will be held from 8 a.m. to 4 p.m. on Saturday, May 24th at the Greenbelt Armory at the intersection of Greenbelt Road (Md. Route 193) and the Baltimore-Washington Parkway, northeast of Washington, D.C. and just off I-95/495. Cash prizes, food, indoor displays and flea market, with separate outdoor tailgating area. Talk-in on 52.525 simplex, 146.16/76, 146.28/88, 146.52 simplex, and 449.1/444.1. Donations $3, tailgating $2, tables $5. Tables may be reserved in advance by sending remittance to Fred Siebert, K3PNL, 8357 Reservoir Road, Fulton, MD 20759. If acknowledgment is desired, please include s.a.s.e.

• **Reading Radio Club Hamfest** – The 2nd Annual Reading Radio Club Hamfest will be held Sunday, May 25 at the Hamburg Pennsylvania fieldhouse. (Take Route 22 from east or west, Route 61 from north or south.) Indoor plus outdoor sites, so no weather worries. Many cash and equipment prizes. Talk-in on 146.31/91, 146.52. For further information, contact W3BN, P.O. Box 124, Reading, PA 19603.

• **North Area Repeater Association Hamfest** – The North Area Repeater Association will sponsor the division's largest hamfest and exposition for amateurs and computer enthusiasts on May 31 at the Minnesota State Fairgrounds in St. Paul. Free overnight parking of self-contained campers on May 30. Talk-in on 16/76 and 52. Exhibits, booths, and prizes. Admission is $3. For information or reservations, write to Amateur Fair, P.O. Box 30054, St. Paul, MN 55175.

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• **Daytona Beach Family Funfest** – The Daytona Beach Amateur Radio Association will sponsor the Second Annual Daytona Beach Family Funfest on May 31 and June 1 at the Desert Inn, 900 North Atlantic Ave., Daytona Beach. The Funfest will have commercial exhibits, swap tables, forums, door prizes, ladies activities, and an auction. Admission is $3 in advance and $4 at the door. Swap tables are $8 each for both days. Rooms are $25.44 single and $29.68 double, tax included. For further information call or write Daytona Beach Family Funfest, Dave Rusler, WA4ZTT, Chairman, 1725 Hope Drive, Ormond Beach, FL 32074; phone 904-672-9536.

• **First Annual Clinton County Area Hamfest** – The Clinton County area amateurs will sponsor the First Annual Clinton County Area Hamfest 1980 on June 1st at the Clinton County Fairgrounds from 8 a.m. to 5 p.m. Admission is $3, with children 12 and under free. Free flea market space. Door prizes and free parking. Food and drinks available. Talk-in on 72/12. For more information write to CCARA, c/o Russ Eidemiller, WD8NPZ, 310 Betnel Lane, Wilmington, OH 45177, and include an s.a.s.e.

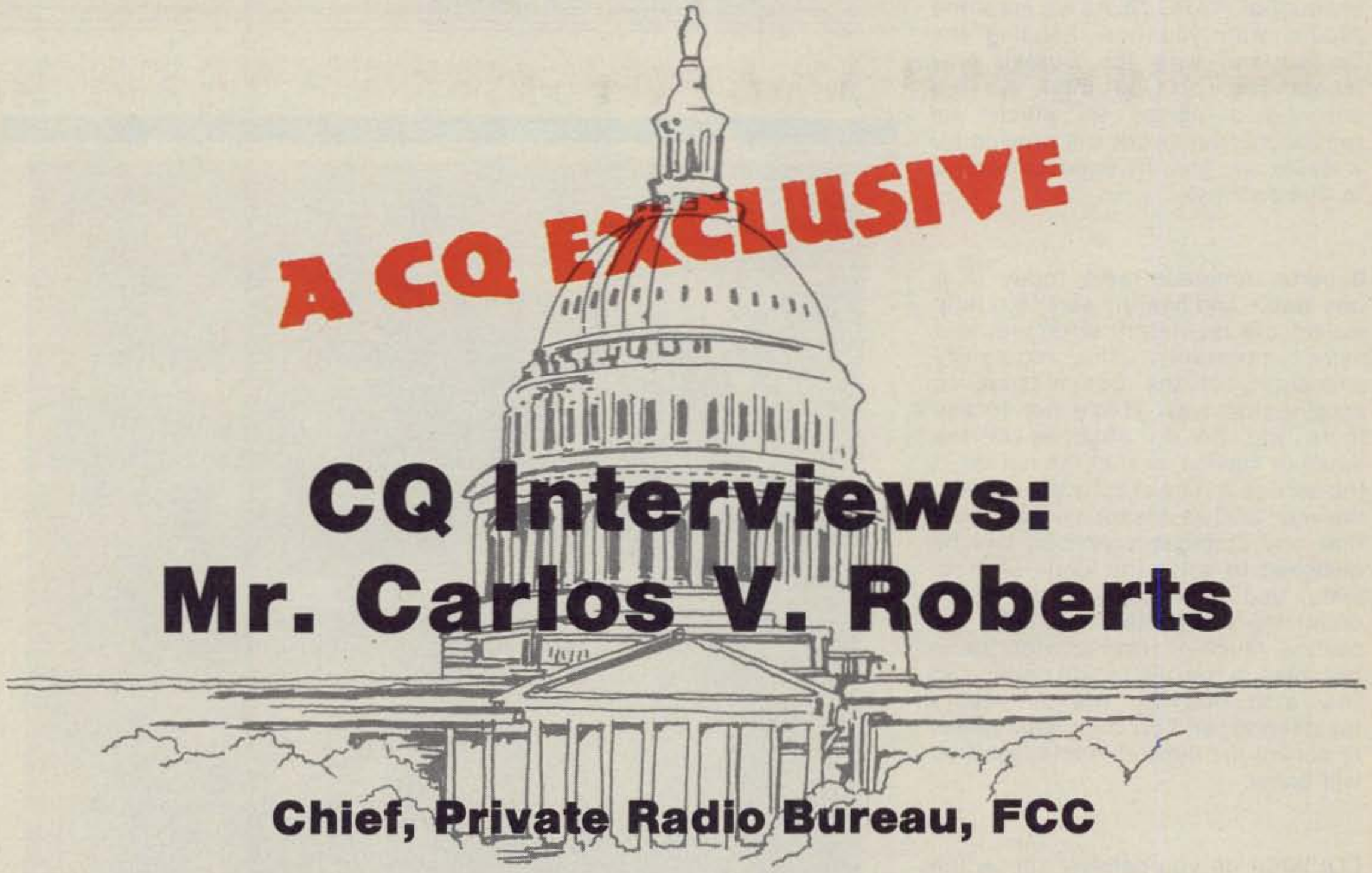
• **Manassas, Virginia Hamfest** – The Ole Virginia Hams A.R.C. of Manassas will hold their 6th annual Mid-Atlantic area "Quality Hamfest" on June 1st at the Prince Williams County fairgrounds, located off Route 234, one-half mile south of Manassas, Virginia. Talk-in on 37/97 and 52 simplex. General admission gates open at 8 a.m. Tailgating set-up begins at 7 a.m. Admission is $3 with children under 12 admitted free. Tailgaters $2 additional per vehicle. Will feature indoor and outdoor exhibit areas, dealers and manufacturers, FM clinic, YL program, breakfast and lunch available, and plenty of parking. Prizes will be awarded. For additional information, contact Dick Fredrickson, W7MPZ/4, 9511 Sudley Manor Drive, Manassas, VA 22110.

• **Missouri Single Sideband Net Picnic** – The Missouri Single Sideband Net Picnic will be held Sunday, June 8th, at Bender Lake, Jefferson City, Missouri. Covered dish dinner at noon with drinks furnished by the net. For more information, contact KØPCK, Net Manager, Prairie Home, MO 65068.

• **Lake Simcoe Hamfest** – The first hamfest in the Lake Simcoe, Ontario area will be held on June 13th, 14th, and 15th at Molson's Park, Barrie, Ontario, Canada. Registration at the gate is $5, and preregistration is $4, with children under 18 admitted free. Doors open at 12 noon on Friday the 13th with talk-in on VE3LSR 146.85, 146.52 simplex and 3780 kHz. For more information, tickets, or reservations, contact the Lake Simcoe Hamfest, P.O. Box 2283, Orillia, Ontario, Canada L3V 6S1.

• **Notices of Stolen Equipment** – Anyone desiring to list stolen amateur radio equipment may send information to the Colorado Council of Amateur Radio Clubs, c/o Charles E. Myers, WØRNT, 1120 Yosemite Drive, Colorado Springs, CO 80910. Include as much identification information as possible. Free distribution will be made to all amateur radio magazines and Colorado amateur radio clubs. Funds for postage and printing would be greatly appreciated. Stolen on January 20th was an ICOM IC 255 Transceiver, serial number 10301326, belonging to Rich Quinlinan, WØOKQ, 4621 Kipling No. 35, Wheatridge, CO 80033; phone 303-423-8497. It was stolen in the vicinity of I-70 and Kipling. If found, please notify Rich or the Wheatridge, Colorado police department.

CQ proudly presents a candid and revealing interview with Carlos V. Roberts, Chief of the FCC's Private Radio Bureau. In an exclusive interview Mr. Roberts answers some tough questions on amateur radio and gives us the FCC's view of the Service.



CQ Interviews: Mr. Carlos V. Roberts

Chief, Private Radio Bureau, FCC

BY DR. THEODORE J. COHEN*, N4XX

Carlos V. Roberts, Chief of the FCC's Private Radio Bureau, is one of the most influential Federal executives in Washington, D.C. on matters pertaining to the amateur service. Young, urban, and with a good understanding of how the "political game" is played, Roberts is taking the reins on the amateur service at a time when all nations, especially the United States, are reviewing their use of the radio spectrum.

One of his first duties upon taking over his 300-person organization in 1979 was to reorganize the Bureau and to structure it along functional lines. Roberts also moved quickly to reduce the backlog of license applications and has attempted to make the Bureau more responsive to operators in the various services for which it is responsible.

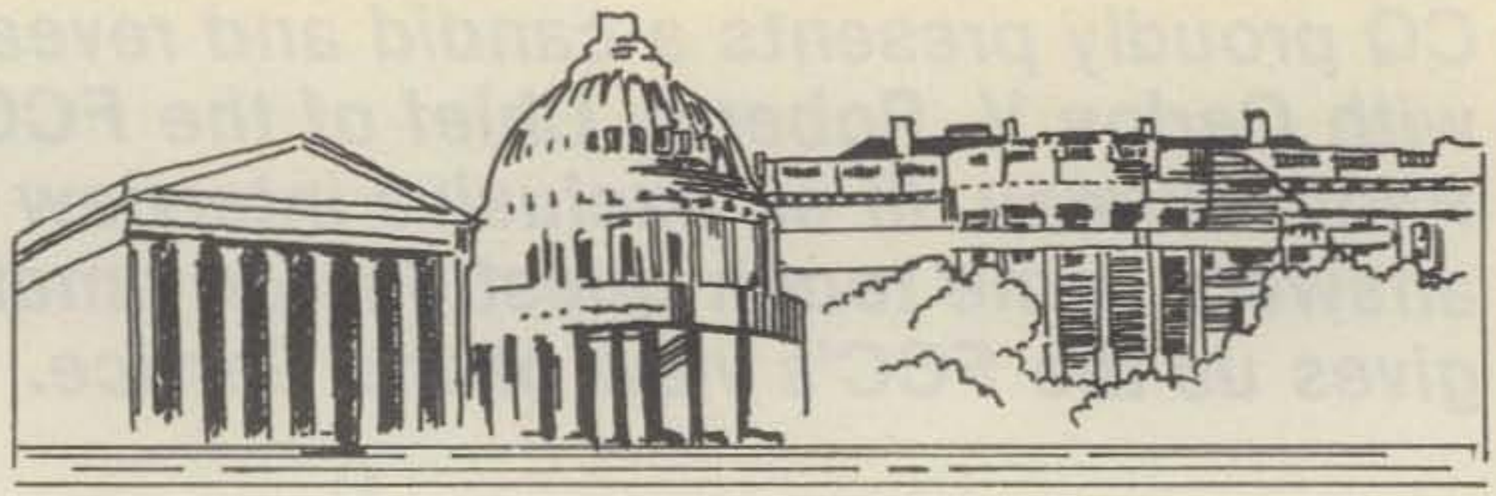
A graduate of Virginia Polytechnic Institute (BSEE, 1970), Roberts also holds an MS in Telecommunications from the University of Colorado (1975). In addition, he is a graduate of the seven-week course for senior Government executives which is given at the Federal Executive Institute in Charlottesville, VA. Before assuming his present position as Chief of the Private Radio Bureau, Roberts served in the FCC's Office of Plans and Policy, first as a staff member, and then as the Office's Chief. No stranger to radio, Roberts once served as General Manager of radio station WUVT (a.m. and f.m.), and though not an amateur, was vice president of his high school's amateur radio club. Today, as Chief of the Private Radio Bureau, Roberts has complete policy and licensing responsibility for a wide variety of private radio services, including land mobile, maritime, aviation, private microwave, amateur and CB. These services account for the majority of FCC licenses held by U.S. citizens, with a total of 16 million licenses outstanding.

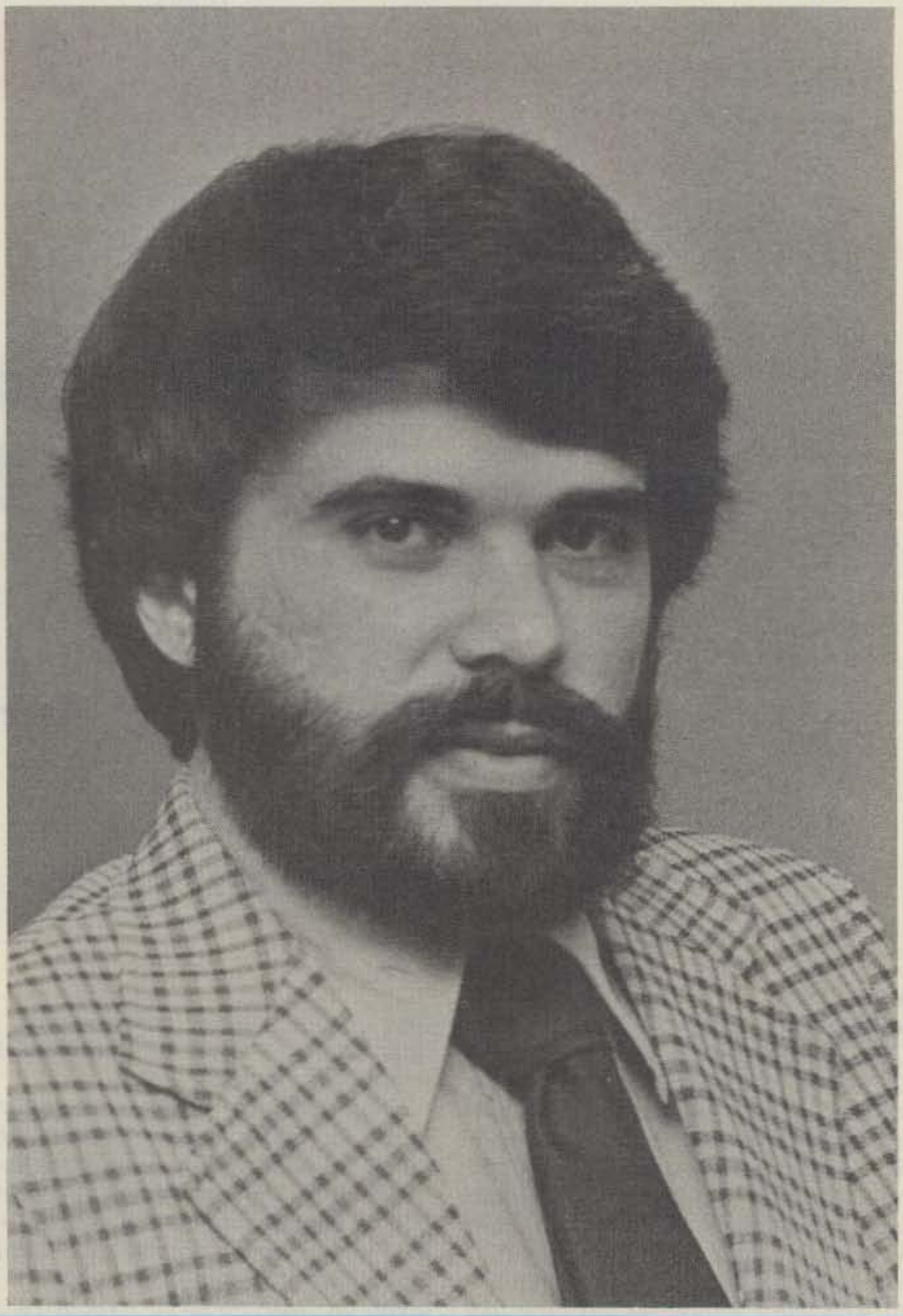
Roberts lives in Northern Virginia with his wife, Linda, and their two boys. He spends what little leisure time he can set aside working on electronic equipment, computers, and hi-fi equipment, and reading science-fiction stories.

Here, then, is CQ's exclusive interview with Carlos V. Roberts.

*Washington Correspondent, CQ.

CQ: The 1970's spawned a number of problems for the Commission and the amateur: the call sign scandal, spectrum abuses by amateurs and non-amateurs alike, an apparent lack of enforcement of the Commission's rules and regulations, and regulatory and spectrum conflicts which were associated with the preparations and conduct of WARC 79. As we enter the 1980's, with you now heading the Bureau and with the Bureau now reorganized, do you think we are entering a period in which the regulatory framework will provide for a viable and healthy amateur service in this country?





Roberts: Amateur radio today *is* a very viable and healthy service. I fully expect the regulatory structure, and more importantly, the regulatory philosophy of the Commission, to keep it that way. That's not to say there will be no changes in the amateur service, or that the nature of the service will be exactly the same in the year 1990 as it is today. But I think that any changes proposed will be designed to solve the kinds of problems you mention without compromising the overall quality of the service. Much of what amateur radio becomes in the 1980's will depend on the attitudes of the amateurs themselves, and on their willingness to accept the inevitable changes that will come.

CQ: What do you believe will be the three or four greatest problems to face the amateur service over the next 10 years or so?

Roberts: I see at least three big areas of concern. The first is the definition of the service itself. What should the amateur service be, and what should it be for? It needs a clear and unequivocal purpose and identity since from my perspective, some of the traditional purposes of Amateur Radio are also being met in other services. Formulating clear distinctions among the amateur service, the CB service, and the other personal radio services that will surely develop will be the most challenging task both for amateurs and the FCC over the next few years.

Another significant issue is what appears to be a dramatically increasing number of enforcement problems in a service that has always prided itself on being self-enforcing. The amateur community and the FCC will have to come to grips with these enforcement problems.

"Much of what amateur radio becomes in the 1980's will depend on the attitudes of the amateurs themselves."

"In my opinion, the write-in campaign on Article 41 was not the most effective way to influence the regulatory process."

CQ: You said there were *three* big areas of concern.

Roberts: That's right. The third area of concern involves the regulation of technical standards. Amateurs may find themselves trying to convince the Commission not to impose technical regulations that are too restrictive. I personally think that the amateur service should be subject to minimal technical regulation. However, it is often tempting for non-amateurs to insist on rules that will limit the power output, prescribe the design, or even call for the type acceptance of amateur equipment, all in the name of minimizing interference. My personal belief is that technical restrictions of that kind can seriously inhibit what we call "the amateur's proven ability to contribute to the advancement of the radio art." The best advice I can give amateurs to avoid such restrictions is to continue "proving" their technical abilities.

"Amateur radio is well represented in the Private Radio Bureau."

CQ: Given that it may not be easy to find solutions to these problems, what can amateurs do to help the Commission gain a better understanding of our service's concerns, desires, and needs?

Roberts: The most important thing that the amateur community can do to assure itself of the type of amateur service it wants in future years is to learn the regulatory process, to learn how that process can have tremendous impact on their service, and to learn how to use that process to influence the impact. In essence, this is a communication problem. First, the amateurs and the Commission need to communicate better about what is going on and how decisions are being made. Then, the amateur community needs to let the Commission know just what it wants or does not want in a timely and reasonable way. Amateurs have never been bashful about telling us what they want, but the messages we've received have often been contradictory or inarticulate. If amateurs want to help the Commission better understand the service's concerns, desires, and needs, amateurs themselves must first have a good understanding of the problems facing their service.

CQ: To what extent would the relationship between your Bureau and the amateur service benefit from a "local sounding board"; that is, a local group of persons with whom you could discuss matters pertaining to the amateur service?

Roberts: I think it's a good idea to have a representative of some sort in Washington for the amateur service. The representative could be a local sounding board, as you suggest, or it could be a designated spokesman from an amateur organization such as the League or from your magazine, or, perhaps from some other organization. The point is that ideas and questions about the amateur service come up all the time, and it would be helpful to have someone locally to turn to for feedback on various issues. The ARRL and the different amateur publications have been very helpful. I feel free to call any of several people when I have questions or want the reaction of the amateur community. I have done this on several occasions, and the persons I called have been very responsive and helpful. But a local representative could be a useful supplement to these contacts by providing the kind of face-to-face interaction we now lack.

CQ: What kind of representation would you want to see on such a "local sounding board"?

Roberts: If a local sounding board were to be established, I think a heterogeneous mix of amateurs would be most beneficial. I would think that the various segments of the amateur community, such as DX'ers, two-meter f.m. operators, technical experimenters, traffic handlers, etc., should be represented in the group.

CQ: How many different Federal agencies and Governmental bodies are involved in making decisions that affect the amateur service?

Roberts: I am sure there are more Federal agencies that can affect amateur radio than I know of. Some of the ones that come to mind, in addition to the FCC, are the Department of Commerce's National Telecommunications and Information Administration, the House and Senate Subcommittees on Communications, the Department of Justice, the Consumer Product Safety Commission, the Federal Trade Commission, the Environmental Protection Agency, parts of DOD, the Federal Emergency Management Agency, and others. Some of these are not actively involved in amateur radio matters now, but I think the trends are such that they could get involved someday.

"The most important thing that the amateur community can do is to learn the regulatory process."

CQ: What kinds of trends?

Roberts: Well, I can easily imagine the Consumer Product Safety Commission issuing standards for amateur antennas as they have for CB antennas, or the Environmental Protection Agency instituting rules that may limit an amateur's ability to build high-power amplifiers.

CQ: Then, the "selling" of amateur radio is not simply a matter of working with the FCC.

Roberts: That's right. And, of course, in addition to all the Federal agencies that I mentioned earlier, a wide variety of special interest groups try to affect decisions on the amateur service. For instance, trade associations concerned with regulation in broadcasting, common carrier, or land mobile services can play a significant role in deciding how the spectrum is allocated, which, in turn, can directly affect the amateur community. Many, if not all, of these associations have headquarters in the Washington area.

CQ: In this regard, how effective are local officers of national CB organizations and electronic/communication organizations (e.g., the EIA) in making known the needs of the CB service?

Roberts: Local officers of CB organizations and electronic organizations have not been very active, lately, in making known the needs of the CB service to the Com-

(continued on page 90)

You haven't lived till you've burnt your fingers on a 6L6. It's cheap and simple. It's like flying by the seat of your pants again when you build and operate this little VXO rig.

A VXO Transmitter For The Novice
(And Novice At Heart)

BY LARRY LISLE*, K9KZT

"Can ham radio operators really build their own stations?" That's a common question when someone asks an amateur about his hobby—and one that's not as easy to answer as it used to be.

In the twenties and early thirties an amateur's first station might include a home-made two tube receiver and a self-controlled one tube transmitter. In the late thirties and into the fifties store bought receivers became more common while the transmitter was still a home-brew one tuber, though crystal controlled. And today? Store bought all the way with exceptions becoming rarer and rarer.

The reason isn't too hard to find. That one or two tube crystal oscillator rig still works as well as it ever did, but the days of split-channel QSO's are almost gone. The coming of v.f.o. privileges for Novices and transceiver operation has meant that most operators on the high-frequency bands listen only on the frequency to which their transmitter is tuned. The fellow who's crystal controlled has a problem.

So, what's the answer for the new amateur who wants to roll his own simple transmitter? One solution is to invest in a hat-full of crystals. Another is to go back to the old self-controlled oscillators—the Old Man would be spinning! A third is to build a simple rig that has most of the stability of a crystal oscillator, that can be tuned across a Novice band with only a few crystals, and that's as simple to put together and fire up as any other one tube exciter. It's called a VXO.

Now VXO's *(Variable Crystal Oscillators)* have been written about sporadically for quite a few years, so far with the intent of describing an extremely stable, though—at least slightly—variable frequency oscillator. They're often used for small signal v.h.f. and u.h.f. work where even a slight drift at the oscillator frequency is intollerable at the operating frequency.

The VXO to be described here is different. Here the aim is to get *acceptable* stability—comparable to a good v.f.o.—with the simplest possible construction and using readily available parts.

The rig described here isn't as stable as it could be. It uses the wrong kind of tube (tube!), it's operated at too high a power level, the coil form isn't right and so on.

But it's stable enough!

Before getting into the nuts and bolts, let's talk about VXO's briefly. A VXO can be looked at in two ways. First: by adding inductance and capacitance in different ways, the frequency of an oscillating crystal can be raised or lowered (usually lowered) by an amount depending on the values of the crystal, coil and capacitors, and the amount of lessened stability that can be accepted. I covered this way of analyzing VXO's in detail in a previous article[1] so more won't be added here.

The second way of looking at a VXO is from the point of view of using a crystal to stabilize a self-controlled oscillator. This method of analysis is described in detail by Cady in his excellent two volume work, *Piezoelectricity.*[2]

Both theories can be defended mathematically, and each has its good and bad points. The crystal stabilizer method makes it easy to determine values of inductance and capacitance that will work, but doesn't explain why plated crystals work so much better than pressure mounted crystals for instance, or why some circuits will make a crystal oscillate either above or below its natural frequency and not the opposite way.

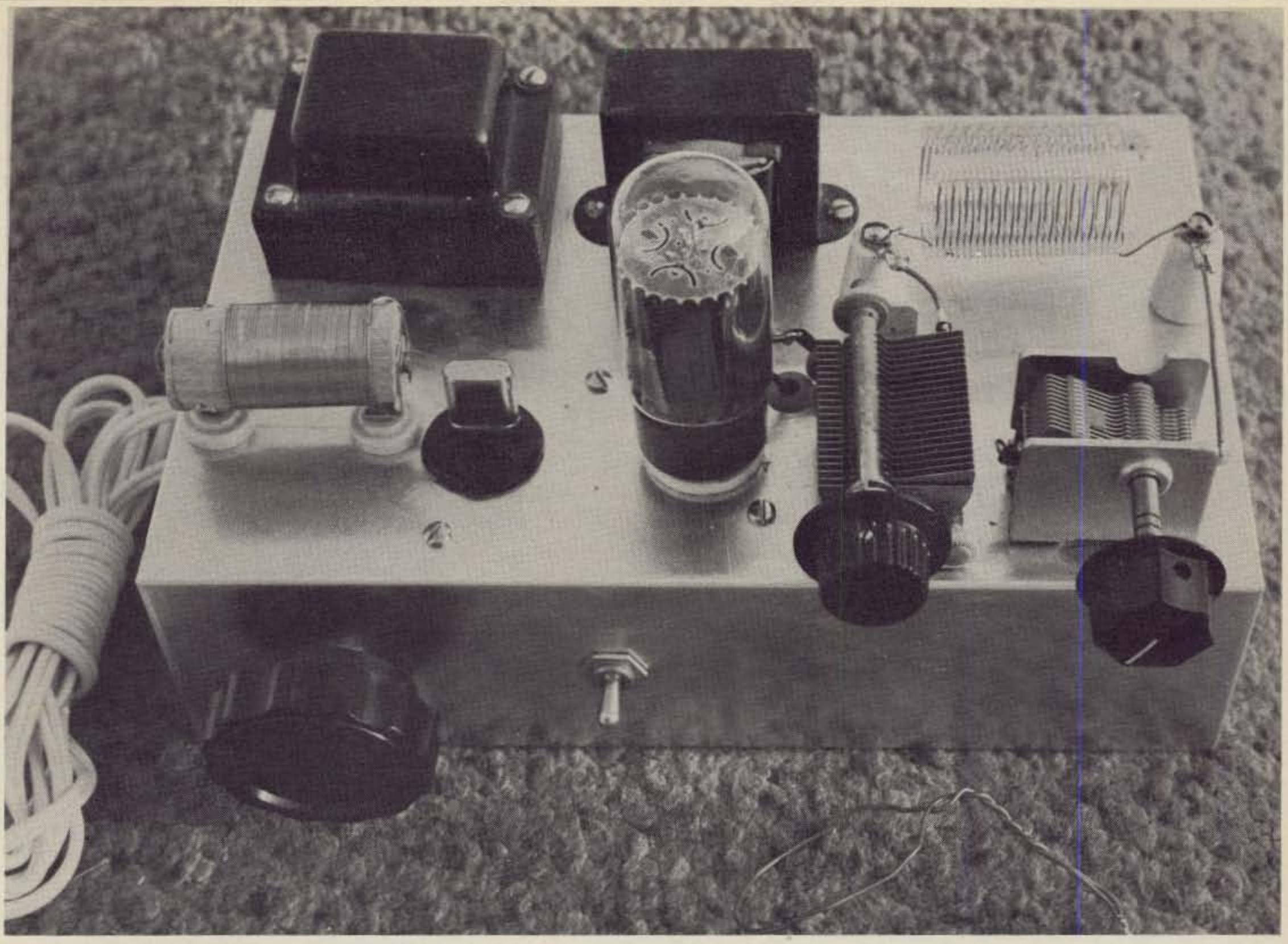
Maybe some sharp eyed amateur can combine the two or come up with a third theory!

The Circuit

OK, let's get to the circuit. First,

*3030 Rutgers Place, Rockford, Illinois 61107

[1] *Lisle, "The Tunable Crystal Oscillator," QST, October, 1973.*
[2] *Cady, Piezoelectricity (two volumes), Dover Publications, New York, 1964.*



The Novice VXO. It tunes the 80 meter Novice band with a handful of crystals, it's almost as stable as a straight crystal oscillator, and it uses only one tube!

why a tube and why a 6L6?

The reason for the tube is simplicity. To achieve the same level with transistors would require several stages while a tube can deliver 10 to 15 watts with just one. A 6L6 was chosen because it works, because it will stand abuse better than some other types, and because it's available. There are a lot of other tubes that will work as well or better—a 5763 being a good choice with somewhat less output—but they may not be available at the *Radio Shack* in Podunk. A 6L6 will be. Also, the 6L6 has been so widely used since it was introduced in 1936 that finding a replacement shouldn't be a problem for years to come.

Referring to fig. 1, the circuit is best described as a Clapp Oscillator with a crystal in parallel with the tuning capacitor. I've used other circuits, such as the Hartely, with good results, but the Clapp is well known for its stability and doesn't require a tapped coil—which is convenient if any pruning has to be done. Otherwise the circuit is fairly straight-forward.

With the values shown for L_1 and C_1 the oscillator will tune from about 2.5 MHz to 5.5 MHz with the crystal removed. (The tuning rate is much better *with* the crystal!) C_2 and C_3 should be the largest values that will let the circuit oscillate. Start with the 560 pF capacitors shown until the rig is checked out and functioning and then parallel C_2 and C_3 with other silver micas until the maximum value is reached. Then substitute the next smaller standard value single capacitors for each. C_4 should also be a silver mica.

RFC_1 and RFC_2 aren't critical. Any value around 2.5 mHz should work. If commercial chokes can't be found, try a 3 inch long piece of half inch dowel rod, wound full of a single layer of the smallest enameled wire you can find. Don't make both chokes exactly alike though or you may get a low frequency parasitic.

RFC_3 and RFC_4 are ferrite beads slipped over the wires leading to the grid and plate pins to prevent high frequency parasitics.

C_5 is a 300 pF transmitting capacitor. A smaller value can be used if you parallel with a fixed capacitor to make up the difference. A small receiving capacitor won't do the job here.

C_6 is a standard 365 pF receiving capacitor. More capacity may be needed, depending on the impedence you're trying to feed the power into. The lower the impedence, the greater the capacity required. Again, fixed capacitors can be used to make up the difference.

L_2 is a commercial coil, 2 inches long, 1¼ inches diameter, with 14 turns per inch. The inductance is about 12 uH. A single layer of #22 enameled wire, close wound on a ½ inch diameter, 1½ inch long form should work OK.

L_1 is a 33 uH coil. I used a single layer of #22 enameled wire, close wound on a 1 inch diameter form to a length of 1 3/8 inches. A ceramic form would be best—if you have one—but a piece of 1 inch dowel will work if you coat it with "Q Dope" or some other low loss coil coating before and after winding the coil. That's what I used.

The voltage divider in the screen cir-

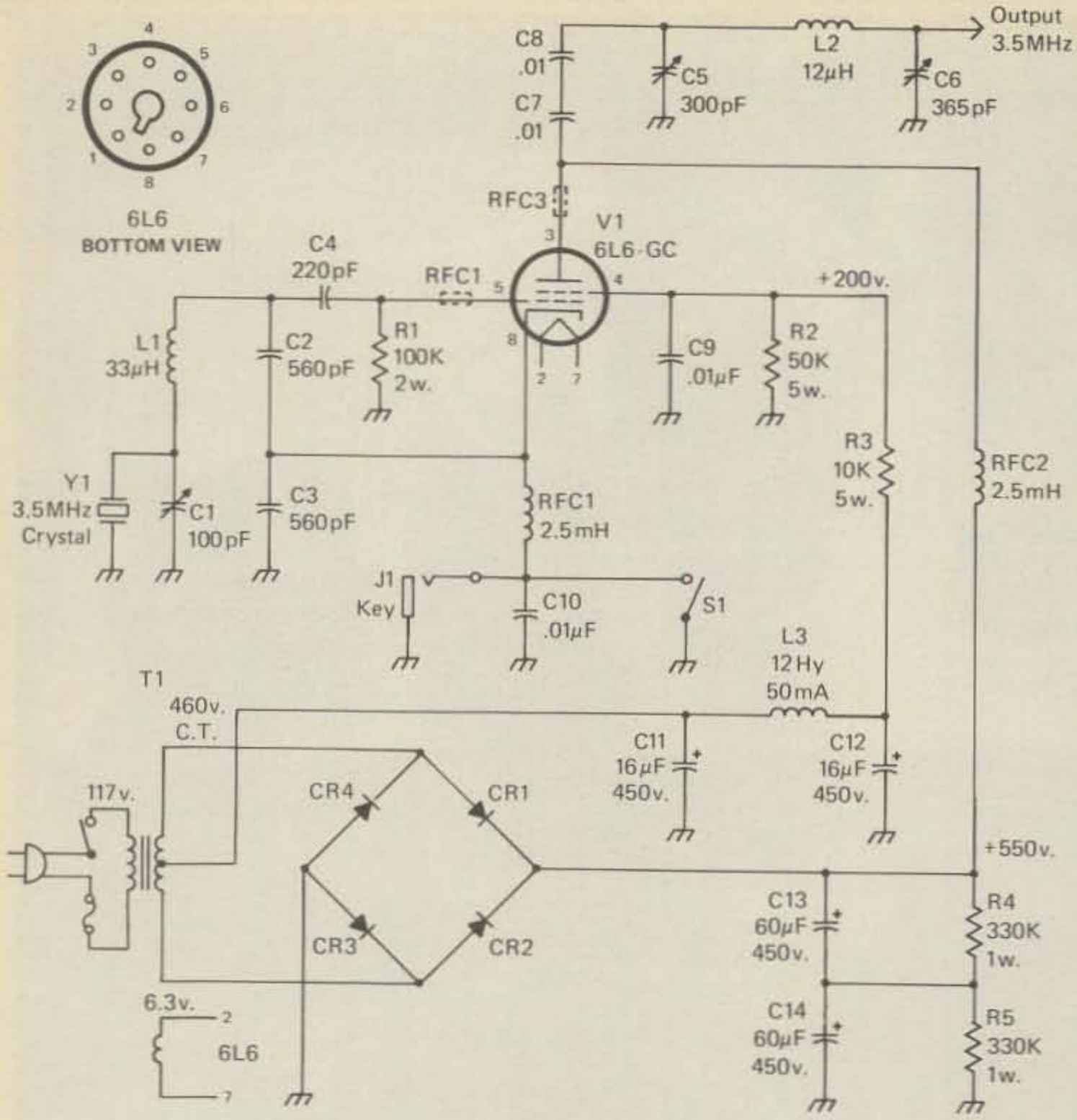


Fig. 1- Transmitters don't come much simpler these days! The circuit can be analyzed as a Colpitts crystal oscillator with L_1 and C_1 added to shift the crystal frequency downward, or as a Clapp self-controlled oscillator with the crystal added to stabilize the frequency. The rig is quite stable within 20 kHz of the crystal frequency, but can be shifted farther.

C_1 - 100 pF variable capacitor
C_2, C_3 - 560 pF silver mica capacitor*
C_4 - 220 pF silver mica capacitor
C_5 - 300 pF variable capacitor*
C_6 - 365 pF variable capacitor*
C_7, C_8, C_9, C_{10} - .01 uF 1000 V. Disc ceramic cpacitor
C_{11}, C_{12} - 16 uF 450 V electrolytic capacitor
C_{13}, C_{14} - 60 uF 450 V. electrolytic capacitor
CR_1, CR_2, CR_3, CR_4 - 1000 PIV, 1 A silicon diode, (Radio Shack RS 1114)
L_1 - 50 turns No. 22 enameled wire, close wound 1 3/8 inch long, 1 inch diameter, 33 uH.
L_2 - 28 turns, 2 inches long, 1¼ inch diameter, 12 uH.
L_3 - 12 Hy 80 mA filter choke
R_1 - 100 kilohm 2 Watt
R_2 - 50 kilohm 5 Watt*
R_3 - 10 kilohm 5 Watt
R_4, R_5 - 330 kilohm 1 Watt
Rfc_1, Rfc_2 - 2.5 mH*
Rfc_3, Rfc_4 - ferrite beads
S_1 - s.p.s.t.
T_1 - 117 volt primary, secondaries 460 volt c.t. and 6.3 volt at 1 A.
V_1 - 6L6, 6L6-GC etc.
Y_1 - 80 meter plated crystal (International Crystal #433135 or equiv.)
Misc. - Chassis box, 11 x 7 x 3 inches; 2 octal sockets, 2 ceramic feed-through insulators, 2 ceramic stand-off insulators, open circuit jack for key or meter, knobs, tie-points, wire, etc.

* See text

cuit keeps the voltage down to about 200 volts. The 50 K ohm resistor may be replaced by a lower value to reduce the output if desired.

The two capacitors, C_7 and C_8, between the plate of the 6L6 and the pi-network are an insurance against high voltage appearing on the antenna. Use capacitors with as high a working voltage as you can find here.

Any of the metal or glass bulb variations of the 6L6 can be used, and many other tubes will work as well. Try what you have.

The power supply is routine and any circuit that delivers the required voltages can be used. If you're not used to working with high voltages be careful. Don't work on the transmitter with the power on, and after you unplug the power cord, short the output of the power supply—both plate and screen circuits—to ground to make sure the filter capacitors have discharged before touching anything under the chassis.

Layout

Looking at the photo, the transformer and filter choke are at the rear of the chassis, while the r.f. circuitry is toward the front. The grid coil is mounted on a couple of little brackets on some feed-through insulators. If you don't have the brackets or the insulators, glue one end of the dowel to the chassis. A shield can over the coil would be nice but it's all right without one. There's some stray capacitance floating around and if the crystal was *rubbered* by a capacitor alone, it would cut down on the amount of swing, but in this circuit it isn't critical. Those big capacitors at C_2 and C_3 swamp out variations in tube and circuit C. An octal socket is used for the crystal. A conventional socket could be substituted. A crystal switch would probably work, but it's almost as fast to plug crystals into a socket.

The large knob on the front of the chassis is for the grid tuning capacitor. A calibrated dial could be used but would require a scale or chart for each crystal. It's as convenient and cheaper to depend on the receiver.

There's a key jack shown on the circuit diagram—but I wish you wouldn't use it. Turning a one tube oscillator on and off suddenly, as in keying, will cause it to change frequency slightly or chirp. This isn't a peculiarity of VXO's, it's just one of the facts of life of simple transmitters. The best solution is to let the VXO run all the time during transmission periods and key a following tube. The 6L6 will put out enough power to easily drive an amplifier to more than 50 watts output.

If you *do* key the VXO, the chirp will be slight—more like a peep—if you: (a) operate the VXO on 80 meters as shown; (b) operate the VXO near the crystal frequency; (c) don't load the tube too heavily or try to get the last watt of power into the antenna; and (d) detune C_5 slightly either above or below the point of maximum output.

To fire up the 6L6, make a tuning loop by soldering the ends of a 2 inch loop of wire to a flashlight bulb. Place the loop near plate tank coil L_2. Connect the output to a 25 watt light bulb or other dummy antenna. Remove the crystal and set C_1 and C_6 to about half their maximum capacity, and plug the

rig into an outlet and wait until the 6L6 warms up. Give it at least a half hour to stabilize. Close the key or S_1 and rotate C_5 through its range until the flashlight bulb lights. If it doesn't change the setting of C_1 and again swing C_5 through its range, repeating until the VXO begins to oscillate as a self-controlled oscillator.

Listen for the signal in the receiver and adjust C_1 and C_5 until the signal falls about 10 kHz below the crystal frequency. C_1 should be ½ to ⅔ closed.

Adjust C_5 and C_6 as with any other pi-network to get the maximum output into the dummy antenna. This sets the plate circuit to resonance. C_5 should be more than half closed for 80 m.

Place the crystal in the socket and adjust C_1 until the flashlight bulb lights and tune C_1 until the signal is heard in the receiver.

Note—if C_1 is adjusted too near to the minimum capacitance end of its range, the VXO may take off *above* the crystal frequency. The point at which this may happen is well away from the normal setting of C_1 so it's no problem once you become familiar with the knack of tuning, but spend some time with the dummy load to get the feel of the VXO. There's still a lot to be learned about them and each one is something of an individual, so take a little time to get used to its quirks before putting a signal on the air. A milliameter can be plugged into the key jack to read the cathode current if desired while tuning but it isn't really necessary.

As a final check before connecting the antenna, hold a neon bulb near the tank coil, L_2. It should glow with an orange light. A red glow indicates a low frequency parasitic, while a purple glow shows a v.h.f. parasitic. For the former, change the values of the r.f. chokes as a first step. For the latter, add more ferrite beads.

Tuning the rig with an antenna is the same as with a dummy load. It can be done with only the tuning loop but an output indicator is helpful if available.

Crystals for the VXO should be of the plated type. Those mounted in the pressure type holders such as the FT-243 don't work.

Order one crystal at first, and when you've gotten to know the VXO a little better you can decide how many additional crystals are needed to give the coverage and stability needed. I use a crystal every 10 kHz.

Well, there it is. It's not quite as simple as the straight 6L6 crystal oscillators of years past, and it's not quite as stable as a VXO can be, but it's a *good* compromise and it's probably the cheapest and easiest way to build a transmitter for today's conditions.

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Please send all reader inquiries directly.

San Andres Island offered HKØCOP the site for the DXpedition that won them the North American multi-operator, multi-transmitter C.W. record in the 1978 CQ WW DX Contest. Here's what went into accomplishing this feat.

The HKØCOP Operation From San Andres Island

BY L. ED MOODY*, N3ED

"Let's go on a DXpedition!" These words, spoken by Dawson Ransome, K3MBF, on the Frankford Radio Club's 2 meter repeater led to an unforgettable trip. The Frankford Radio Club was established many years ago as a group of contest enthusiasts working together to improve individual stations, learn new techniques of operation, learn about components and materials from each other, and win the club competition in major contests. Through the years the FRC has been an extremely active contest group.

One thing the Frankford Radio Club had never done was to launch a DXpedition. Several individual members have operated from near and remote parts of the world, but a multi-operator effort had never been undertaken. Dawson's suggestion was the catalyst that generated the club enthusiasm, determination, and esprit-de-corps which culminated in a new North American multi-operator multi-transmitter c.w. record for CQ Worldwide DX contests and, hopefully, a new total aggregate club record.

In order to determine the location of the operation several criteria were established. Transportation was to be a Cessna Citation two engine "business" type jet provided by Ransome Airlines. This Cessna, heavily loaded with equipment and people, would have to refuel every 700-800 miles. The final destination would have to have a runway capable of fulfilling the airplane's landing and takeoff needs. It had to be within one fuel load of Grand Cayman Island, which was a necessary intermediate stopping point. The destination also would be expected to have jet fuel available in addition to sufficient accommodations for five or six people to operate, live comfortably, eat well, and establish a multi-operator, multi-transmitter, multi-antenna amateur station. Obviously, from the perspective of an amateur operation, our choice of site had to be heavily biased toward one which would attract a lot of attention from other amateurs operating in the contest. We wanted to be the only station operating from the chosen country.

After extensive discussions we found that all of the above criteria were met by San Andres Island. San Andres is a free port and a resort area principally used by Columbian nationals and inhabitants of Central America. Since the operation would take place over Thanksgiving weekend, there would be plenty of space available for our operation and we would depart from the island well ahead of the tourist onslaught, which begins during the second week of December.

The island is approximately 21

*Box 396, RR #1, Furlong, PA 18925

San Andres Island from the air.

miles long and 4 miles wide (at the widest point). It is shaped like a seahorse with the head of the horse pointed to the northeast and the tail toward the southwest. San Andres' major center of habitation is in the northeast corner (the horse's head), where in excess of 80% of the population resides. The island is a Columbian province governed from Bogota. The principal language spoken is a native dialect made up of some Spanish, some English, some Portuguese, and several other languages. Practically all of the islanders speak English well, however, and verbal communications were never a problem during the trip. The island would provide us with excellent propagation, due to its proximity to the equator and, in fact, to all areas of the world. As active contesters we knew that for years San Andres had not been the active site of an all-out DX contest effort. From this location we could provide a number of people with a new multiplier and possibly some with a new country.

In order to get the process rolling, find out what our licensing problems were, check on available equipment, etc., letters were forwarded in mid April to all of the major Columbian radio clubs and to Francisco Velez, HKØBKX. We communicated with the latter, since he is obviously the most familiar San Andres call to the international DX community and has given many a DXer their "first San Andres" QSO. As time went on, it became obvious that sending the letter to Francisco "Pacho" Velez was the smartest (luckiest) move we had made. Without his support, help, assistance, and hard work, the trip could not have occurred. Replies to our letters began to arrive early in May. The radio clubs all gave the address of the national Columbian Department of Communication. No answer was received from HKØBKX to the point where we had almost lost hope that one would be forthcoming. Francisco, involved in several businesses on the island (not the least of which is controlling management of all gasoline on San Andres), is a very busy man, which he explained to us in his letter. The letter was delayed because, although there should have been no licensing problems, upon checking with Bogota Francisco found that due to their present backlog the licenses would be difficult to obtain in the five months we had remaining before the contest.

So that we could save time on the paperwork, Francisco would have blank license applications sent to him and he would fill in the necessary information once he obtained the exact names, passport numbers, addresses, and calls of the participating operators. Since he keeps s.s.b. schedules to the U.S. every other day and can be found somewhere on c.w. almost every night, it would be no problem to get the information to him once it was available.

At a mid June meeting of the Frankford Radio Club, the complete plan and budget were placed before the membership. Once the plan and budget were explained, a request was made for volunteers. In seconds we had an operating crew that consisted of: Dawson Ransome, K3MBF, Ed Moody, N3ED, Al Donziger, N3AD, Dave Hawes, N3RD, and John Salyer, W3MA.

Those of us who did not have passports obtained them right away and the necessary information was given to HKØBKX during what had become a weekly schedule. He got the license application forms, which he completed himself, into our hands within two weeks. The forms had to be witnessed and signed by the Columbian Consulate Office verifying that they had seen our original passports and licenses. Fortunately, the Frankford Radio Club has a Columbian national as a member, Bolmar Aguilar, WB3AOP (and HK1AMW), who is presently living in the U.S. Bolmar assisted in getting the paperwork cleared properly through the consulate. The first interesting "foul-up" occurred during this process. The papers arrived from HKØBKX on July 16. He needed them back right away since license turnaround time was beginning to concern all of us. Since I was leaving for Georgia in less than a week, my papers had to be cleared

The whole working crew: Back row (left to right) John, W3MA, Ed, N3ED, Dawson, K3MBF, Chris (co-pilot), Vennissimo Fox (climber), Alan, N3AD; Front (left to right) Walt, WA3LRO, Francisco, HKØBKX, and Dave, N3RD.

quickly. Bolmar set up the necessary appointments, only to find out that K3MBF was in the Caymans, N3RD at the Jersey shore, and N3AD in Alaska. Within three weeks (and four total visits to the consulate) the license applications were cleared and on their way to HKØBKX.

At this point we were quite concerned about the license applications clearing in time for the trip, but we were reassured by HKØBKX that no stone would be left unturned in getting the licenses cleared; and we were instructed to finalize our plans. From both HKØBKX and Barry Boothe, W9UCW, we received an excellent verbal picture of San Andres Island, its accommodations, geography, inhabitants, and the expected propagation (W9UCW visits San Andres for from two weeks to a month every year and has operated from the island many times.) The consensus was that if we operated south on the island from the city and got away from the downtown "background" noise, we would have a very quiet operating atmosphere and excellent propagation. The only potential problem was a lack of power, since the island's only power plant often shuts down. A small resort motel called the Bahia Marina was chosen as the operating QTH because the owner had a 6 kw generator on site which he would commit to our usage if needed. There were also plenty of 55 foot coconut palms for attaching our wire antennas, some clear space for installing our beams and masts, and, most of all, the owner would allow six crazy amateurs to "antenna up" his property for four days.

Selection of equipment was a problem. We were forced to take transceivers due to the limited space aboard the airplane. The operational plan called for five fully equipped stations with one rig doing double duty between 10 meters and 160 meters. Antennas would have to be shipped ahead by air freight. Early in September several club members offered to lend us transceivers, amplifiers, memory keyers, and other "inside" items we would require. Unfortunately, the antenna situation looked very bleak. Nobody seemed to have antennas on the ground that we could borrow. It was beginning to look like the operation would have to make do with wire and verticals, when a phone call came in from Jay Gerber, N3AW, instructing me to get a truck the next night since Hamtronics, Inc. of Trevose, Pa. was willing to support our DXpedition effort. Hamtronics, in fact, was going to donate three element monobanders for 20, 15, and 10 meters; 1000 feet of antenna wire; four 50 foot antenna support masts; 1500 feet of coax; and any other hardware we needed for the effort. Frankford Radio Club members came up with one transceiver and four small amplifiers that we could take with us. Since two transceivers were available from the operators going, we only needed to locate two more.

Several uneventful weeks elapsed (the first quiet weeks since we started in May) until HKØBKX told me, in what had become our bi-weekly schedule, that the licenses would clear in time and that we must ship the antennas and support equipment. This made my wife quite happy since she had not been able to get her car in the garage for over a month due to the antenna boxes, masts, etc. One Saturday afternoon in mid October, N3AD, N3RD, and N3ED packed up all of the equipment in seven wooden boxes weighing a total of 558 pounds. The shipping arrangements were to truck the equipment to Miami where it would be consigned to Flasa Exporting which does all of the shipping directly from the states to San Andres. Since Flasa is owned jointly by Bill Wilson, WB4QFH and Francisco Velez, HKØBKX, we knew the equipment was in good hands.

Walt Rakitsky, WA3LRO, committed himself to make the trip with us and decided to buy a new transceiver. This filled out our operating staff and, with both WA3LRO and N3AD buying new transceivers, we made a rush phone call to place orders for two of the new Ten Tec Omnis. Since we were within one month of leaving for the island, the large equipment was in transit, the licenses were scheduled to clear, and the inside operating equipment was all accounted for, we all started to relax and enjoy thoughts of spending Thanksgiving weekend in a warm, sunny climate instead of the cold northeast. This relaxation was actually a case of being lulled into a false sense of security because the last month turned out to be total chaos.

The first problem that occurred was the sudden changeover of customs agents on San Adres. Francisco had spent hours clearing the way for the arrival of our antenna equipment and, ultimately, for our arrival with the inside equipment. Dealing with a new customs agent required that the process start over with only a short time in which to clear the way. At the same time, the cargo plane which makes one weekly round trip from Miami to San Andres broke down and our antenna equipment was stuck in Miami for several extra weeks.

The last week in October the owner of our planned QTH, the Bahia Marina,

(continued on page 94)

Here's an antenna that just costs space instead of dollars. You can satisfy that urge to experiment, build and use an integral part of your station.

A Delta Beam Antenna For 20 Meters

BY BYRON KRETZMAN*, W2JTP

In this day of sophisticated amateur radio, the day of satellites and imported, expensive, synthesized 2-meter transceivers, there is little opportunity for the young (or old) amateur of limited means to satisfy his desire to experiment—build something—test it out—to communicate. Construction articles in some magazines require extensive, and expensive, printed circuit board facilities, access of specialized, expensive, test equipment, pushing amateur radio as a hobby into the realm of the college educated electronics engineer.

There is one particular facet of amateur radio left to the young amateur of today which doesn't require a college education; and, most important, which doesn't require a large outlay of cash. This is the field of experimentation with antennas. For the young (and old) amateur of today with that in-born insatiable desire to build, to experiment, antennas can be constructed of inexpensive material: wire, which can be scrounged from many sources—old transformers, surplus field telephone wire, electric fence wire, just to mention a few.

Antenna experimentation can be roughly classified into two categories, v.h.f. and h.f. This article describes the development of an h.f. antenna, a delta or triangle beam for 20 meters. Only three items of test equipment, one not absolutely vital, were used: a grid-dip oscillator (GDO), an Antennascope[1] (r.f. bridge) and an old Heathkit IB-101 counter, not vital if the calibration of the GDO is reasonably good. The Antennascope, with the GDO as the signal generator, provides a positive indication of the resonant frequency of the antenna, and, in addition permits the measurement of the impedance at the point of feed. The Antennascope is so simple, and effective, there is no reason for not building it!

*431 Woodbury Road, Huntington, N.Y. 11743

The Delta Beam

The Delta Beam is an off-shoot of the "Quad" antenna, a one-wavelength long closed loop. The choice of the Delta Beam over the Quad was that it was much easier for us to construct. At W2JTP, on 20 meters, it was simply hung from a catenary stretched between two trees, in the fashion of K7CW's 40-meter beam[2]. The objective was to be able to work old friends who have retired and moved to Florida, therefore rotation was not necessary but gain was. DX was of no interest so a low angle of radiation, achieved by heights of 50 feet or more above ground, was not necessary. A wide beamwidth was also not necessary -the entire State of Florida subtends a small angle from New York.

So, the Delta Beam was hung between two oak trees about 50 to 60 feet high. Of course, the trees selected had to lie on a bearing towards Florida. From an old Call Book the bearing of 202 degrees was

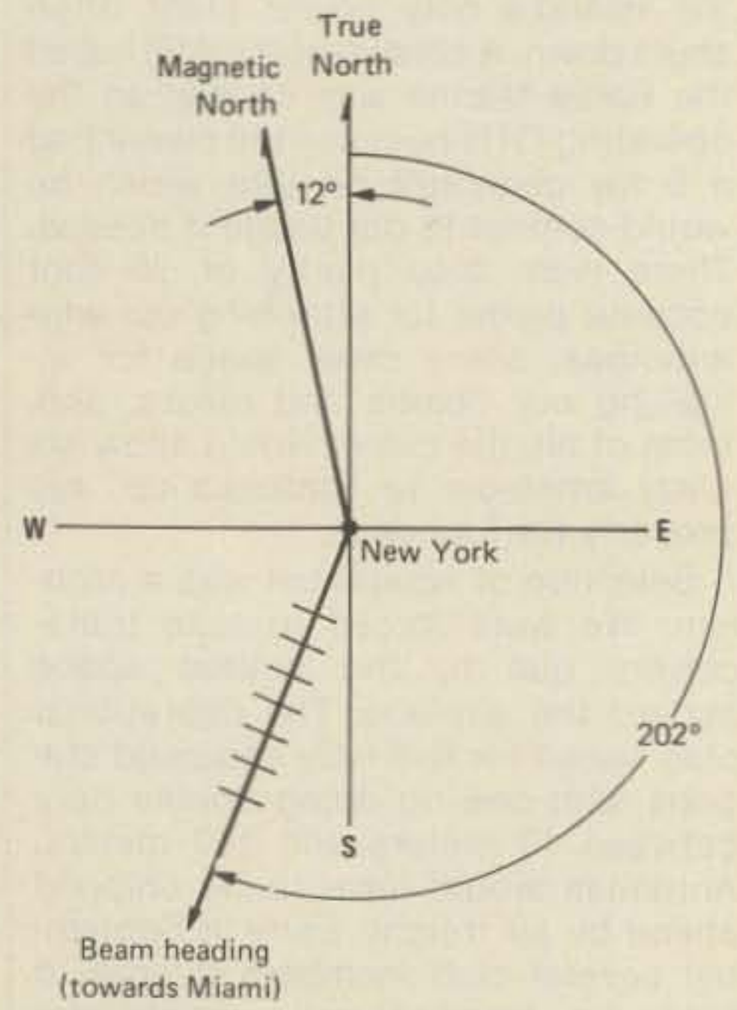

Fig. 1 - Orientation of Delta Beam centered on New York.

obtained for New York to Miami. Note that this bearing is from *True* North. Magnetic North, which we measure with a compass, is about 12 degrees west of True North in the New York area. (It is different in other parts of the country so this must be checked against a fairly recent map for your

[1] *Scherer, W.M., "Antennascope (54)", CQ, Sept. 1950, p. 13; CQ, June 1954, p. 23; CQ, July 1954, p. 23; CQ, July 1954, p. 17.*

[2] *Kiesel, P., "The Ultimate Antenna Array", Ham Radio, Aug. 1978, p. 30.*

area.) Fig. 1 illustrates the declination, the difference between True North and Magnetic North, for our area. Since our Delta Beam was designed for maximum gain (seven elements) it follows that it would be quite sharp in beam width—about 45 degrees is an estimate. 12 degrees would have been an appreciable error in orientation.

A pulley was installed on each of the two selected trees about 35-37 feet above the ground. Halyards, of 3/16" nylon rope, were threaded through each pulley. Why such thin rope? Why nylon? Nylon stretches, so effectively it is a very nice "spring" and takes up the strain as the trees sway slightly in the wind. The catenary, from which the triangle elements are hung, is #12 copperweld wire, donated by W2JND. A thin (1/32") aluminum strap, 3/4" wide, connects the apex of each element to the catenary. To compensate for sag of the loaded catenary, the straps are the longest, about 18", at each end of the beam, progressively shorter as the middle of the array is approached. Fig. 2 is a sketch (it was impossible to get a photograph showing thin wires) which should give you a good idea of the construction. The flat, bottom, of each triangle is about 12 to 15 feet above the ground. Not shown on the sketch, except at the ends of the beam, the bottom corner of each triangle is pulled into the proper position with Size 21, 34 lb. Nylon Twine (Sears #976551) to convenient trees.

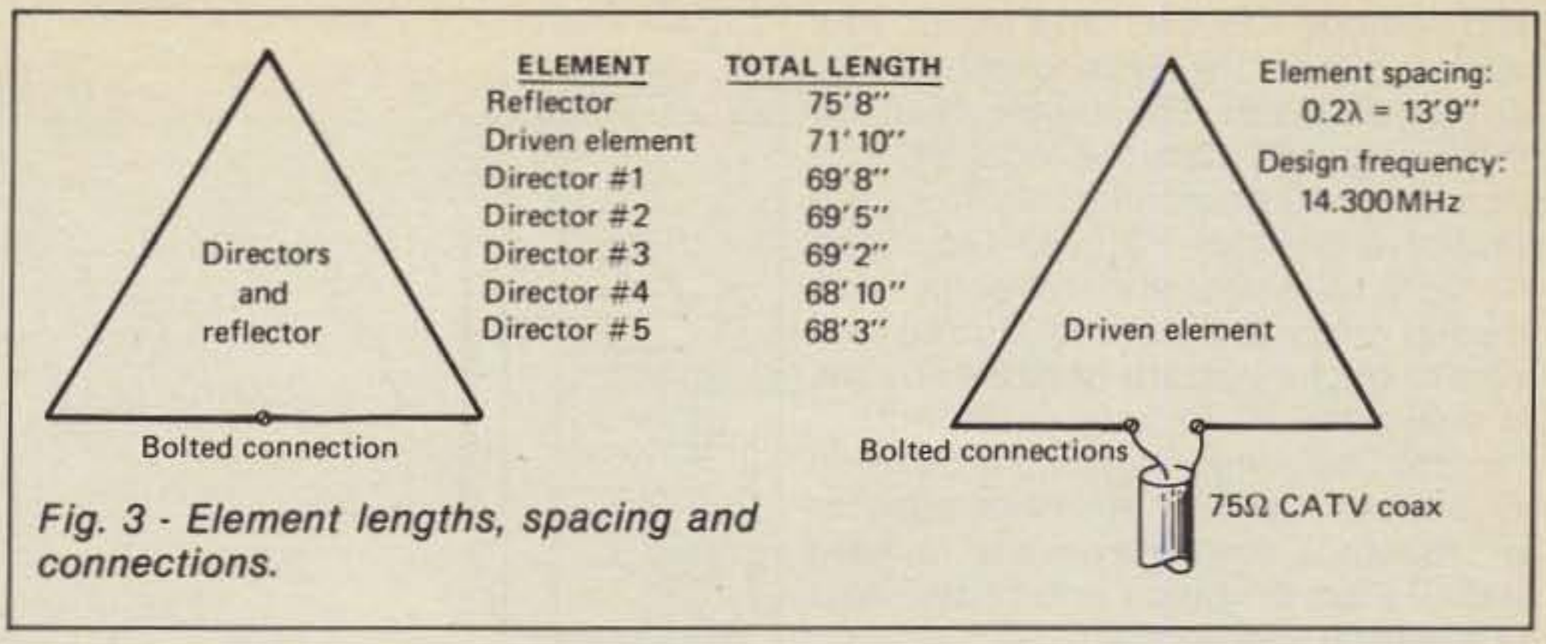

Fig. 3 - Element lengths, spacing and connections.

The corners of each triangle are also connected together with the Nylon Twine to preserve the 0.2 wavelength spacing of the elements. Because the thin wires were not easy to see, 12 inch strips of white cloth were tied to each bottom corner to aid the line-up procedure.

Also not shown in the sketch are the two trees, about the same size as the supporting oaks, growing up through the beam, between the elements. No attention was paid to the old wives' tales about foliage attenuation. In fact, leafed branches arch above and meet over the top of the beam!

Each element is made from 1/16" diameter hard-drawn aluminum wire, WWII surplus. There is no reason why #14 copper or #18 copperweld electric fence wire couldn't be used. The length of the driven element was first calculated from a widely published formula for 14.3 MHz. Do not take any formula as gospel, just take it as a starting point and check it with the Antennascope and GDO.

Tune-up Tests

We started out with just the driven element erected. It resonated about 15 MHz and had a feed impedance of 125 ohms. Adding the reflector, 3% longer than the antenna and *one* director 3% shorter than the antenna, shifted the resonance to 14.13 MHz and the feed impedance to 100 ohms. All three elements were then shortened, guessing at the amount. The three element array now resonated at 14.4 MHz and the feed impedance was still 100 ohms.

At this point it was decided to "tune the director and reflector for maximum forward gain" as recommended by several "experts." Ha. Easier said than done. First a 20-watt test transmitter was fed to a dipole about 200 feet in front of the beam,

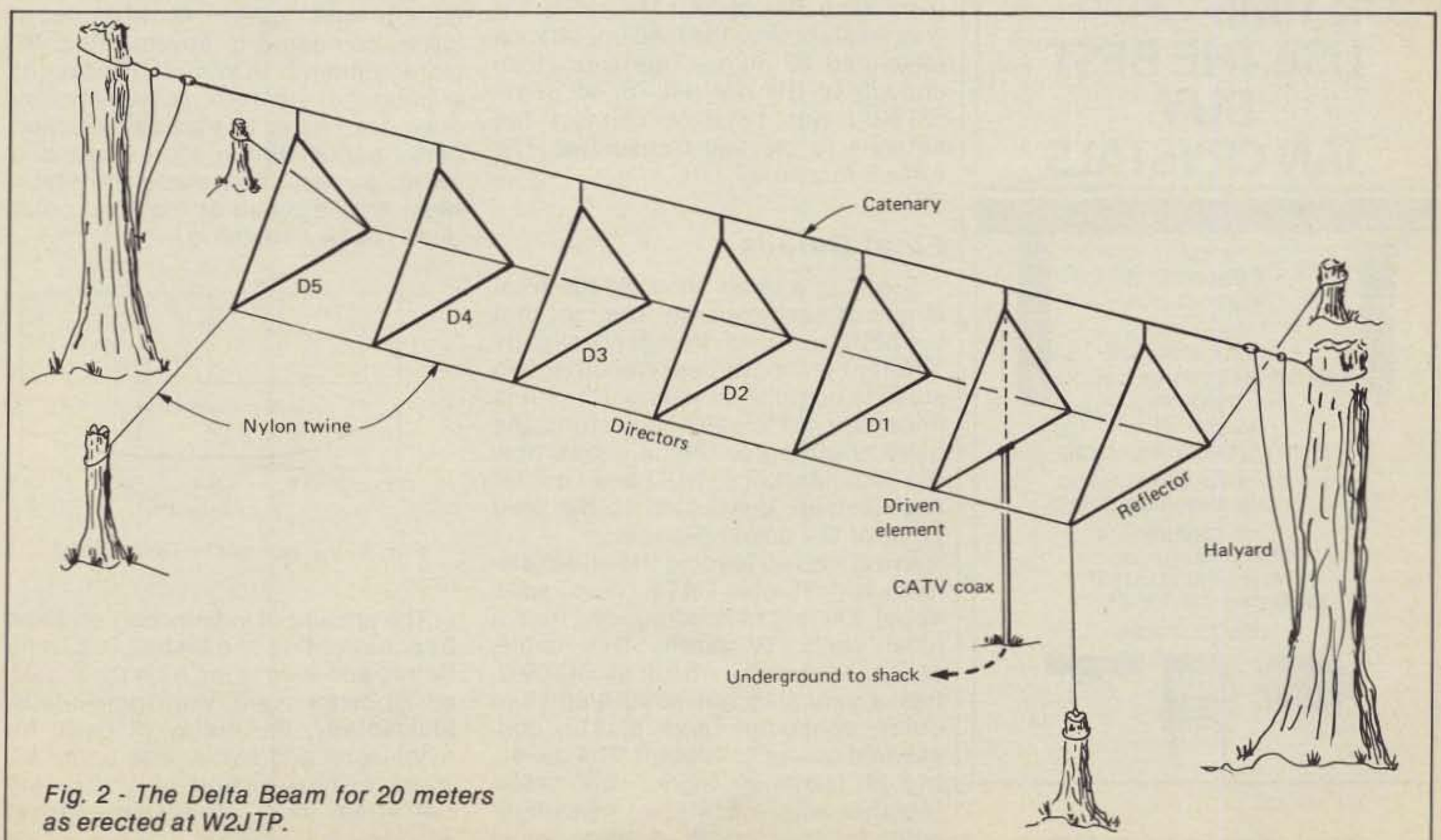

Fig. 2 - The Delta Beam for 20 meters as erected at W2JTP.

and a diode detector and meter was connected at the feed point of the driven element. The meter read 50 microamperes from the local BC station and 100 microamperes from the test transmitter. Since the loop of both director and reflector was closed with a bolt and nut at the center of the bottom horizontal side, it was easy (?) to vary each loop in length. There was *no* sharp indication of optimum length of either director or reflector for "maximum forward gain." Plus or minus one or two feet made little difference.

Since the above procedure was not clearly conclusive, it was decided to "tune" the reflector for best front-to-back ratio. (Yes, yes, I know—this is not the same as tuning it for maximum forward gain.) The dipole was now erected about 100 feet behind the antenna. The test transmitter was connected to the driven element and the diode detector and meter was connected to the dipole. Now, the reflector length was varied for minimum meter reading. Again there was *no* sharp indication of optimum reflector length. Plus or minus one or two feet made little difference.

The reflector was then set at 5% longer than the driven element and the director 3% shorter than the driven element. Spacing was 0.2 wavelength.

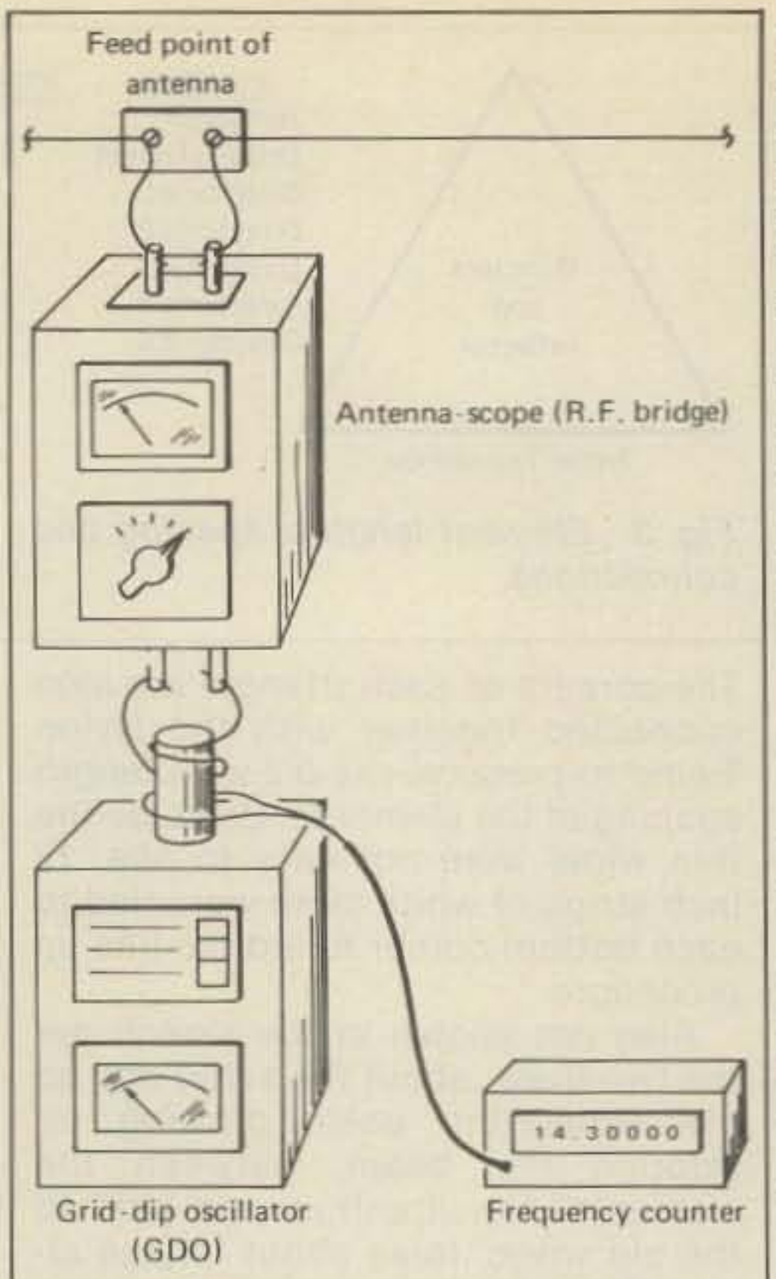

Fig. 4 - Test set-up at driven element.

Four more directors were then added, spaced at 0.2 wavelength and with the directors progressively shorter towards the front of the beam, yagi fashion. Each element was lengthened slightly, about 5 inches, so that resonance was at 14.3 MHz, where it was wanted. Now the feed impedance measured 80 ohms. This was close enough to the desired 75, so some RG-59/U was used to connect the antenna to the test transmitter. The v.s.w.r. measured 1:1!

Final Details

Fig. 3 is a chart showing the total length of each element. The fact that the bottom of each triangle is slightly different in length from the other two sides is completely unimportant. It is important *not* to use tuning stubs, the experts will agree. Fig. 4 shows how the Antennascope, GDO and counter were set up, connected to the feed point of the driven element.

We ended up feeding the driven element with 75 ohm CATV "drop" wire, about 200 feet of it, scrounged from a local cable TV outfit. This cable, about the same diameter as RG-59/U, has a very thin but solid aluminum outer conductor and a #18 copperweld center conductor. The dielectric is low loss foam. This cable, together with a #14 steel messinger wire, is encased in a tough vinyl cover. Connection was made to the delicate outer conductor by making a simple wrap clamp out of 1/32" aluminum, bolting it with stainless steel hardware. The entire connection was then waterproofed with Silastic #738 RTV.

A balun, to go from the unbalanced coax to the balanced feed point, was deemed to be unnecessary, which also agrees with the experts.

Fig. 5 shows the v.s.w.r. over the 20 meter band. We were astonished at the bandwidth -a v.s.w.r. within 1.1 to 1 over the entire band!

Performance

Unfortunately, the test equipment was not available to directly measure the gain and the beam width of the Delta Beam. From signal reports, and received signals, it appears to have more than 10 dB gain. (A reference dipole was erected, at the same height as the beam and broadside to Florida.) Beamwidth is harder to estimate, but stations in western Tennessee and Texas, to the west, are down as are stations in Puerto Rico, to the east. Hence the rough guess at 45 degrees. Central America is in line with Miami, so we hear Honduras, Costa Rica, Nicaragua, El Salvador, Swan Island and Granada fairly well although the angle of radiation is not optimum for that area. It is nice, though, to have the midwest and western U. S. QRM attenuated. (This is very obvious.)

Another unexpected fringe benefit, besides the bandwidth, is that background noise is *noticeably* lower, compared to several other 20 meter antennas at W2JTP. The lack of a balun at the feed point certainly does not inhibit this noise reduction performance either. More than one Quad "expert" has made the statement that a balun at the feed point does not buy anything.

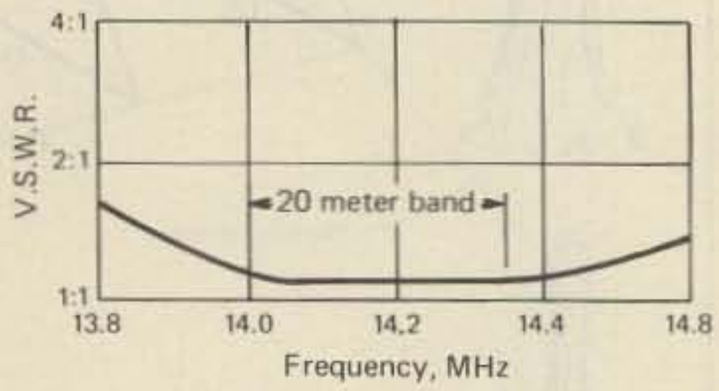

Fig. 5 - V.s.w.r. of the Delta Beam.

The amount of satisfaction achieved by constructing and testing this Delta Beam, and then using it on the crowded 20 meter band, was tremendous. Incidentally, the outlay of cash, for nylon rope and twine, was under $4. The performance completely satisfies our objective—target Florida!

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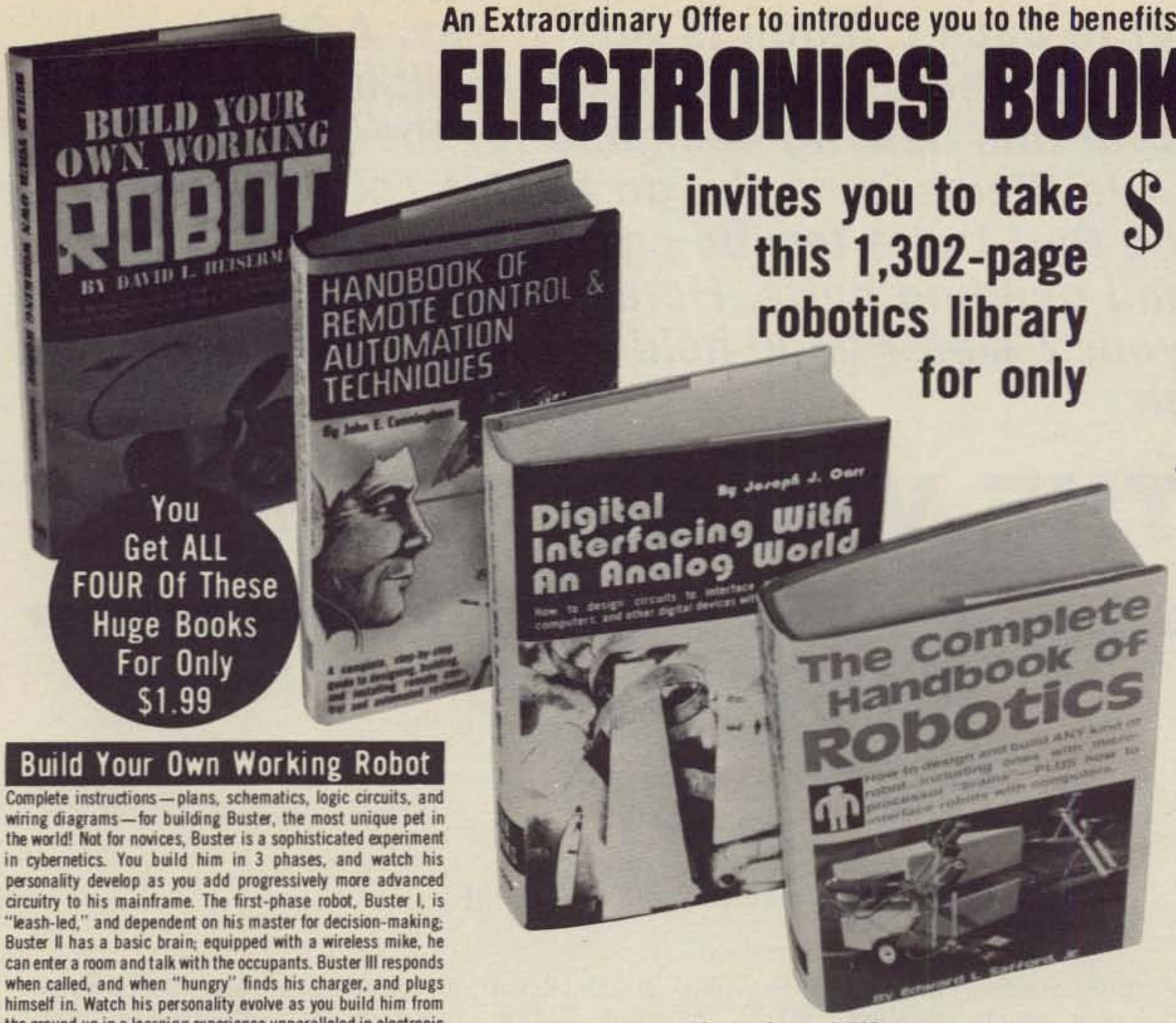

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THE VIKING 3 × 5

A Solid State 4 Watt V.F.O. Transceiver For 20 Meters

PART I

BY ADRIAN WEISS*, K8EEG/W0RSP

To many amateurs, QRPp means small, highly portable gear which allows operation from just about any conceivable location, be it a motel along the interstate, a camping site in the backwoods, the floor of the Grand Canyon, or a 12,000 ft. mountain peak. There is a sense of adventure in setting out from the home QTH, not knowing just exactly where the minirig occupying a small corner of the pack will come to life, pumping out a signal across hundreds of miles to a listening station. There is the excitement of lobing a fishing sinker with line attached over the highest branch possible, and then pulling up the simple wire antenna into place, wondering all the while if the thing will work out. There is a sense of pride in stepping back and viewing a perfectly placed wire which runs between the upper reaches off two carefully selected trees, out in the clear, staking out a claim on this specific parcel of ionospheric territory. Operating in such circumstances doubles the satisfaction that every QRPp contact provides. It is peak experience in hamming. Many QRPp buffs have responded to this call to adventure and equiped themselves with specially designed, miniature gear to get the most out of the experience. Among them, Wes Hayward, W7ZOI, Doug DeMaw, W1FB, Howard Battie, W7BBX/4, and Wes Mattox, K6EIL/2, have produced special units and shared them with us via the amateur publications. Each design seems smaller and more sophisticated than its predecessors. I've followed the appearance of these rigs with a glint in my eye and the smell of a campfire in my memory, but alas, I've always found them lacking some feature—perhaps no audio filter, too simple a receiver, only crystal or VXO frequency control, only 1/2 watt output, etc. Finally, I decided that it was time to come up with my own special unit that would incorporate all the features I considered important, and stuff the whole thing into a 1×3×5 box. It would be the "ultimate" mountaineer, highly flexible, top-notch receiver, a lot of output power. I fell in love with the Viking 3×5 from the start and ended up working about 25 countries with my vertical before hitting the road on my Honda 550F for the real excitement. The whole station hardly made a dent in the limited space in my pack. And once I pitched camp, strung up my 66 ft. #26 wire antenna and tuned it up, all the figuring paid off with repeated QSO's all over the U.S., and much to my surprise, a solid ten minute contact with a Russian station! The week of operation in the little puptent was great, except for the elbow and shoulder pains from crouching on my stomach on the tent floor while laboriously manipulating the microswitch key and holding the single earphone to my ear during listening periods. Maybe the aches added to the excitement by constantly reminding me that I was operating in the most rudimentary situation, far from the a.c. mains and permanent antenna installation. Whatever the reason, I only know that I anxiously await the next trip and the thrill of operating from some yet unknown place. I figured it was only fair to share my minirig with the rest of the gang. Perhaps it will provide other QRPp operators with a unit that will furnish enjoyable operation away from home; perhaps it will inspire someone to come up with his special design.

*83 Suburban Estates, Vermillion, SD 57069

The Viking 3×5 Transceiver Circuit

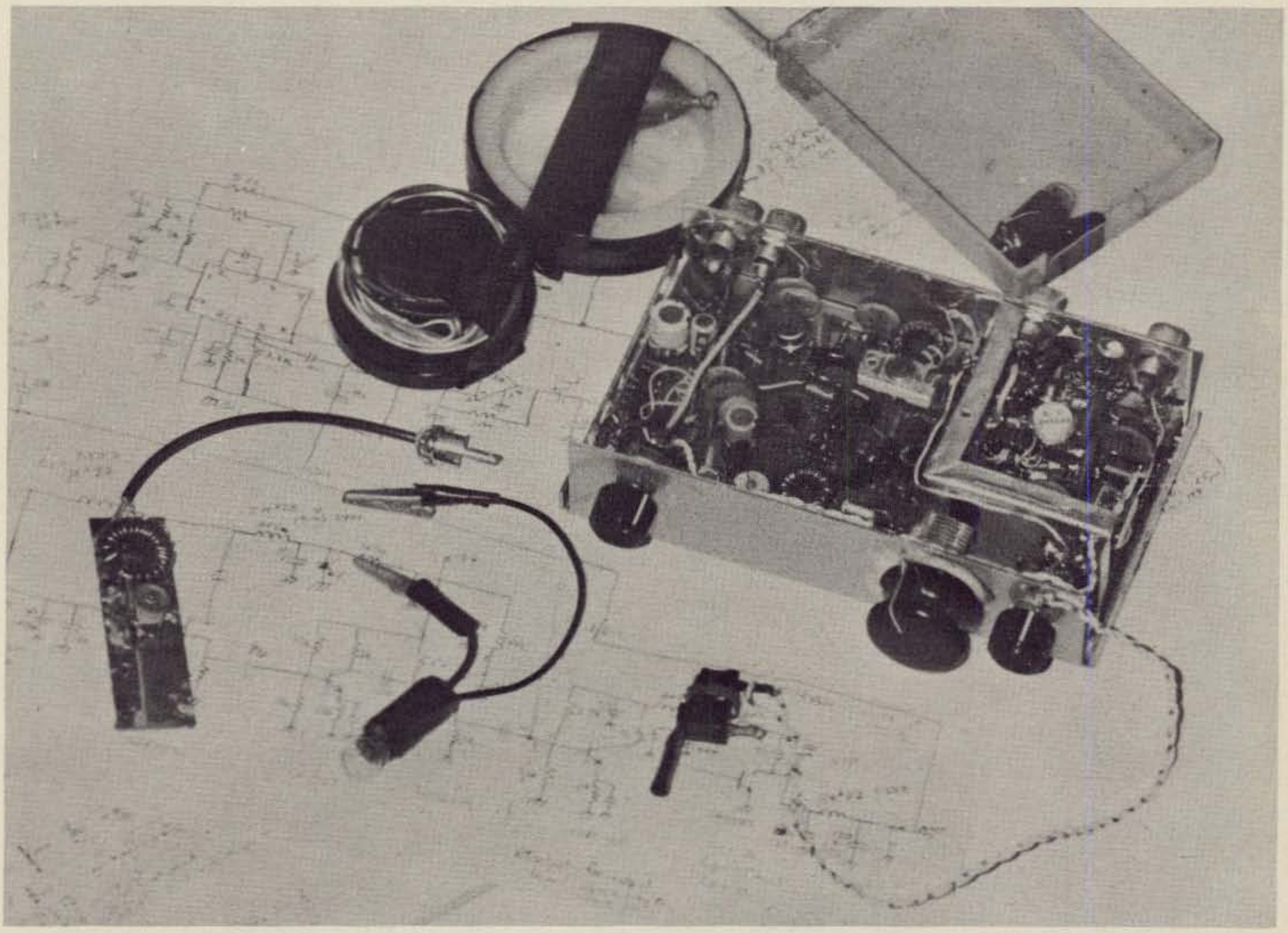
Experience in the field led to the formulation of several major design objectives in order to produce a highly effective unit. The major overall requirement was v.f.o. frequency control, applicable to all forms of QRPp operation, and especially to portable operation where flexibility is essential to offset shortcomings of that type of operation. In regard to the receiver, operation with marginal

antennas typical of portable setups called for excellent receiver sensitivity and selectivity. Audio output sufficient for driving hi-Z headphones was considered adequate for the unit, since size was a prime consideration. In regard to the transmitter section, the major objective was obtaining a healthy r.f. output on the order of 4 watts with respectable efficiency. Here again, the marginal antennas associated with portable operation gave rise to objectives. Finally, as small a size as possible was an overriding consideration which led to a high density p.c. board design.

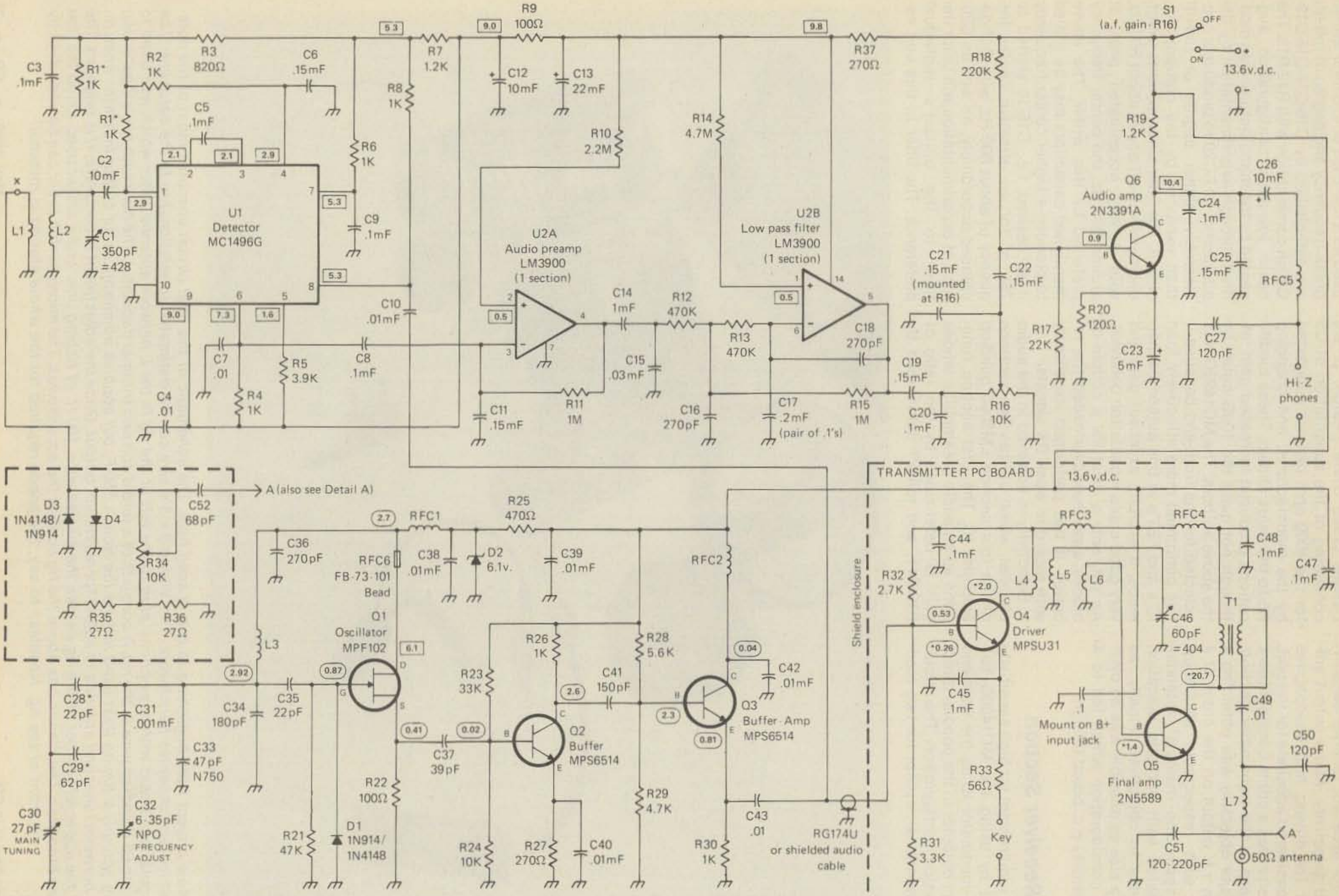
The Receiver Section

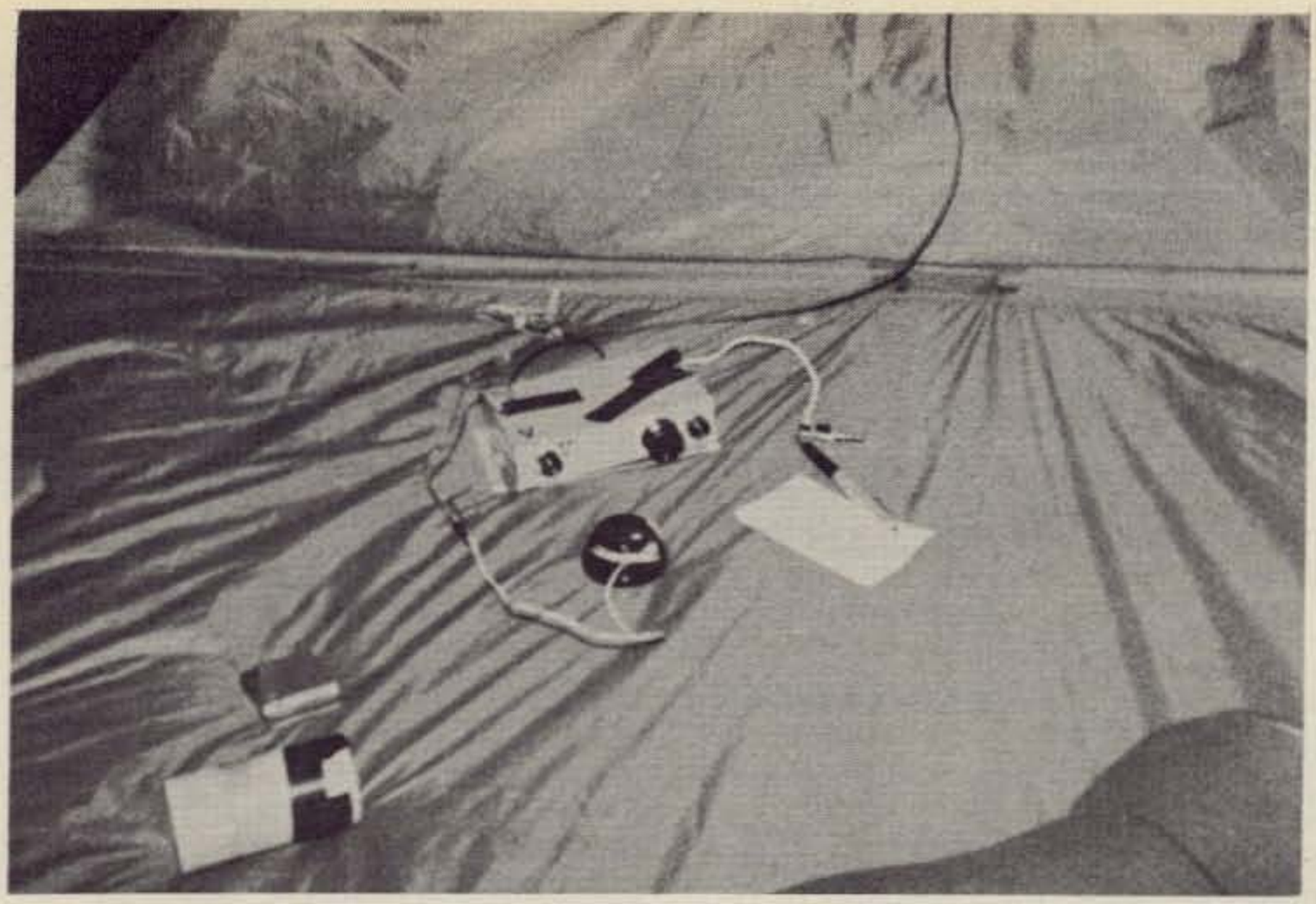
The requirement for high sensitivity is met by using the MC1496G balanced modulator IC as the front-end product detector in the popular direct conversion configuration. The circuit is conventional, except for two modifications suggested by Hayward and DeMaw (*Solid State Design*, p. 95) consisting of the substitution of C5 for the 1000 ohm resistor suggested by the manufacturer, and changing R5 to the value shown. These modifications produced increased gain, although not quite the 10dB noted by the above authors. The MC1496G was selected for the front-end because it has performed more effectively than IC's and FET's in this author's experience. It exhibits excellent gain and very good cross-modulation behavior. As yet, only a local kw a couple of blocks away has overloaded the receiver. It has performed excellently with regard to weak DX signals.

Selectivity is achieved in the audio channel, which utilizes two sections of the four section LM3900 quad-op amplifier IC. The first section functions as an audio preamplifier whose gain is determined by the ratio of R10/R11, and roll-off determined by C11-C15, and the second section is used as a low-pass active filter whose break-frequency and degree of roll-off are established by C16-C17-C18-C19-C20 in combination with R12-R13. The basic low-pass configuration suggested by the manufacturer was modified through experimentation by the addition of C17-C20 to produce a considerably higher degree of roll-off than exhibited by the conventional circuit. The filter curve exhibits a high degree of roll-off above about 800 Hz, with a very accentuated peak at around 500 Hz, the center frequency preferred by this writer. The above mentioned capacitors may be scaled to produce a higher center frequency if so desired, i.e., C16-18 shifted to 750 pf for an effective center frequency of about 800 Hz, with C17 decreased accordingly, as well as C20. A bit of experimentation will tailor the filter to the builder's individual preference. The filter in this unit ex-



The whole project from beginning to end is seen here. The schematic of the final circuit obscures most of the notebook which accompanies benchwork. The Viking 3×5's size can be estimated in relationship to the earphone. The rectangular p.c. board with coax-phono plug to the left of the rig is the L network antenna tuner which was used to match the 66 ft endfed wire to the rig. It consists of a toroid coil and trimmer capacitor. The bulb with two alligator clip leads is actually a timing light used to tune the Honda 550-F, but doubles admirably as an output indicator when inserted between tuner and antenna to adjust for maximum output. Once the adjustment is complete, it is removed. The reel at the upper left corner of the rig carries the endfed wire, 100 ft. of fishing line, and a sinker used to lob the line over tree branches. The plastic box above the rig housed the accessories. The micro-switch keyer can be seen directly in front of the rig. Needless to say, the space required for the whole station is minimal!


R9 100Ω
S1 (a.f. gain - R16)
OFF
ON
13.6v.d.c.
C3 .1mF
R1* 1K
R2 1K
R3 820Ω
C6 .15mF
R7 1.2K
R8 1K
C12 10mF
C13 22mF
R37 270Ω
R18 220K
R19 1.2K
R14 4.7M
R10 2.2M
C5 .1mF
R6 1K
C2 10mF
U1 Detector MC1496G
C9 .1mF
C10 .01mF
L1
L2
C1 350pF =428
U2A Audio preamp LM3900 (1 section)
U2B Low pass filter LM3900 (1 section)
C14 1mF
R12 470K
R13 470K
C18 270pF
C21 .15mF (mounted at R16)
C22 .15mF
Q6 Audio amp 2N3391A
C24 .1mF
C26 10mF
C25 .15mF
RFC5
R17 22K
R20 120Ω
C23 5mF
C27 120pF
Hi-Z phones
C7 .01
C8 .1mF
R5 3.9K
C4 .01
R4 1K
C15 .03mF
C11 .15mF
R11 1M
C16 270pF
C17 .2mF (pair of .1's)
R15 1M
C19 .15mF
C20 .1mF
R16 10K
TRANSMITTER PC BOARD
13.6v.d.c.
A (also see Detail A)
D3 1N4148/ 1N914
D4
C52 68pF
R34 10K
R35 27Ω
R36 27Ω
RFC1
R25 470Ω
RFC3
RFC4
C44 .1mF
C48 .1mF
C47 .1mF
C36 270pF
RFC6 FB-73-101 Bead
C38 .01mF
D2 6.1v.
C39 .01mF
RFC2
R32 2.7K
L4
L5
L6
Q4 Driver MPSU31
C46 60pF =404
T1
L3
Q1 Oscillator MPF102
R26 1K
R28 5.6K
R23 33K
C41 150pF
C42 .01mF
Q3 Buffer-Amp MPS6514
C45 .1mF
C49 .01
C28* 22pF
C31 .001mF
C34 180pF
C35 22pF
C33 47pF N750
C37 39pF
Q2 Buffer MPS6514
Shield enclosure
Mount on B+ input jack
C50 120pF
C29* 62pF
R22 100Ω
R33 56Ω
Key
Q5 Final amp 2N5589
L7
C30 27pF MAIN TUNING
C32 6-35pF NPO FREQUENCY ADJUST
R21 47K
D1 1N914/ 1N4148
R24 10K
R27 270Ω
C40 .01mF
R29 4.7K
C43 .01
R30 1K
RG174U or shielded audio cable
R31 3.3K
C51 120-220pF
50Ω antenna
A
LEGEND:
* = C28 and C29 use single 82pF if desired
Receive mode
d.c. voltages
a.c. VRMS
Transmit mode
a.c. VRMS



The Viking 3×5 at the operating position inside the 5×7 puptent. The single earphone is at the front of the rig, with the microswitch key to the right. The antenna tuner can be vaguely distinguished at the top of the rig. Despite the aches associated with operating in the prone position, a lot of enjoyable time was spent on the air.

hibits a 3 dB bandwidth of about 180 Hz, and a 10 dB bandwidth of about 450 Hz, centered at about 500 Hz. Output 300 Hz above center frequency is down about 20 dB. The audio amplifier Q6 circuit operates Class A and boosts filter output to a level in excess of that needed to drive hi-Z phones. Further clipping of audio signals above the center frequency is added with C21-C24-C25, and the builder may choose values to suit his preference. Strong on-the-air signals will produce a maximum output of about 7 Vp-p into a 2000 ohm load. The output of Q6 is filtered at r.f. by C27-RFC5 and is necessitated by the r.f. pickup from the phone leads, as well as ground current paths.[1] C23 establishes the a.c. gain of the stage, with maximum gain occurring with a value of about 10 mf.

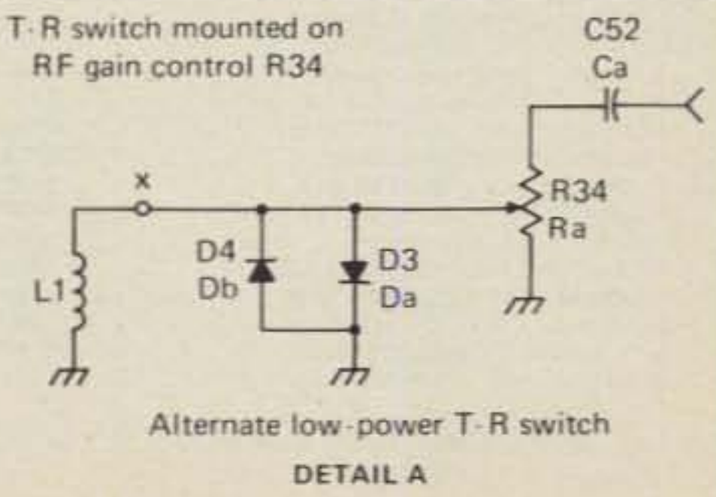
The V.F.O.

A frequency coverage of about 100 kHz is provided by the v.f.o. section of the Viking-5 which uses the Vackar configuration in a circuit discussed in an earlier article (*CQ*, April, 1979, p. 32). Incidentally, the schematic in the original article has two errors, corrected here in fig. 1 at R21 and R25, with a modification of RFC1 also shown. Briefly, the frequency determining circuitry in the Vackar configuration is connected in the drain-gate feedback path and the circuit exhibits stability of a high order. C32-33 perform a temperature compensating function, while the remaining capacitors in the drain-gate circuit establish the frequency and range of coverage. Other values for the main tuning capacitor and associated series and shunt capacitors may be shifted to make use of components that are available so long as the overall resulting capacitance remains roughly the same as shown. The oscillator stage is zener regulated, and followed by two stages of buffering and amplification by Class A stages.

[1] *C27-RFC5 may not be necessary in a different sized enclosure.*

Fig. 1 - The circuit for the 4 watt, solid state v.f.o. transceiver for 20 meters. The listing below describes specialized components and their sources.

Capacitors
pf = polystyrene (preferred for v.f.o.) or silver mica (B-A) (CS)
.001mf = 12 w.v.d.c. (B-A/DK)
.01-0.2mf = 12 w.v.d.c.-submin. disc ceramic (Mallory MAG 12015 etc); or Centralab monolithic ceramic (15CIO3M etc)-(BA) or Panasonic dipped tantalum (F-35ERI etc)-(DK)
1-22mf = 16 w.v.d.c electrolytic: Sprague 503D (BA) or Panasonic L-Series (DK)
C_1-C_{46} = Elmenco trimmers, #428, #404 respec. (CS)
C_{32} = N750 Johnson trimmer (CS)
C_{30} = 27pf Johnson panel-mount (193-0008-001, CS)
C_{33} = N750 Sprague disc-ceramic (CS)
$C_{44,47,48}$ = 0.1disc ceramic 35 w.v.d.c. (BA, DK)
Resistors
R1-36 = ¼ watt carbon composition
R33/37 = ½ watt carbon composition
R16/34 = 10K potentiometer, subminature (B1-662-CS)
Diodes
D1-3-4 = IN4148/IN914/IN456 switching (CS)
D2 = IN753 zener (CS)
IC's-Transistors
U1/U2/Q1-Q6—(CS)
Inductances
L_1 = 2t #22 hookup wire over ground end of L_2
L_2 = 13t #24, Amidon T-50-Z core
L_3 = 13t #22, T-50-Z core (Am)
L_5 = 17t #24, T-50-Z (Am)
L_4 = 3t hookup wire over collector end of L_5
L_6 = 2t hookup wire over ground end of L_5
L_7 = 8t #22, T-50-Z core. (AM)
T_1 = 16t, 2 wire twisted pairs, T-50-Z core (see coil winding detail)
RFC-1 = 22t, #28, FB-43-2401 core (Am)
RFC2= 8t, #26, FB-73-801 core (Am)
RFC3-4 = 7t, #24, FB-73-801 core (Am)
RFC5 = 3t, #24, FB-73-801 core (Am)
Enclosure 5.25×3×1.25
Calectro H4-743 (R-S)
LMB #139 (CS)
Sources-(Abbreviation)
(B-A): Burstein-Applebee, 3199 Mercier St, Kansas City, MO 64111
(D-K): Digi-key Corp, Box 677, Thief River Falls, MN 56701
(CS): Circuit Specialists, PO Box 3047, Scottsdale, AZ 85257
(Am.): Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607
(R-S): Radio Shack, local outlet.



The Transmitter

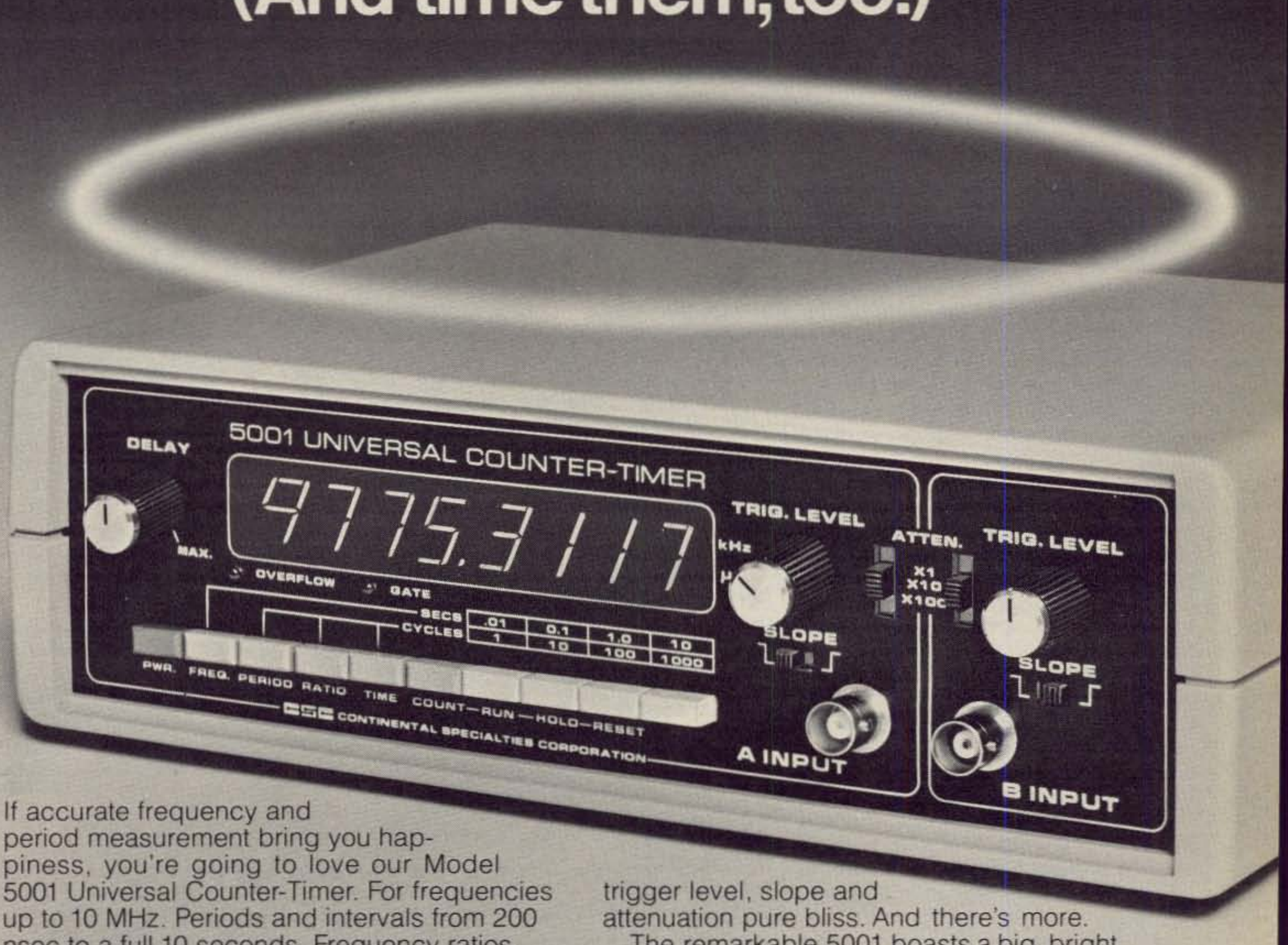
The transmitter consists of the single-band version of the Viking-5 circuit discussed in an earlier article (*CQ*, February, 1979, p. 40) with a slightly trimmed down p.c. board necessitated by the small space available in the 1×3×5 box. No changes are made in the p.c. board layout though. Briefly, a high-power Class A stage, fed by the v.f.o., drives a balanced emitter 2N5589 final amplifier to about 4 watts output. Coupling between Q4 and Q5 is through a double-link narrowband tank circuit, while the output of the final is matched to the 50 ohm antenna load through broadband transformer T1, and a pi network provides adequate attenuation of harmonics as well as a slight degree of impedance transformation. Output from the unit is very clean. The transmitter is keyed at the emitter of Q4, where the emitter resistor provides stage degeneration and stabilization, as well as controlling Q4 stage gain. The oscillator develops about 400 mw output into a 50 ohm load with a 33 ohm R33, sufficient to drive the 2N5589 to about 5 watts output. In the unit described R33 at 56 ohms provides about 4 watts output. In a larger installation, a potentiometer could be used at R33 as a gain control. Taken as a whole (both Q4-Q5) the transmitter operates at about 43% efficiency. Total current drain is 50 ma for the receiver/v.f.o. section, 590 ma for the transmitter unit, and about 520 ma for the final amplifier, representing an efficiency of over 50%.

To Be Continued

If the above discussion has whetted your appetite to duplicate the circuit, a glance at the photos will reveal the compactness of the unit described. I would not recommend duplication in this form for the inexperienced home-brewer, as considerable expertise will be required in preparing the p.c. board for the receiver/v.f.o. section, as well as squeezing the p.c. boards, shield, panel mounted components, and parts into the small enclosure. However, a larger enclosure could be used with a scaled-up version of the high-density p.c. board to be presented in the next part of this article, and a relatively inexperienced homebrewer should be able to complete the project under those conditions. For those intrepid builders who want to duplicate this miniature version, several parts sources are given for acquisition of subminiature capacitors and other components for which the p.c. board is intended. In the next installment, we will present complete construction details.

Count your blessings.

(And time them, too!)



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No-29-30

a monthly feature by

KARL T. THURBER, JR., W8FX

Antennas

Design, construction, fact, and even some fiction

In this third of a new series, author W8FX presents a plain-language summary of some common-sense "antenna wisdom" collected by the author over his 25 years in amateur radio. Nothing revolutionary, but lots of solid pointers that the beginner is sure to be able to use.

We've said previously that there is probably no facet of amateur radio that is more thoroughly confusing than antennas. This is especially true for the newcomer, who may have made his debut from the ranks of the short wave listener (s.w.l.) or from the CBer, and who may have become exposed to different rules-of-thumb for antenna design or may have no feeling at all for what makes a good amateur antenna.

Seeing a need to present some "plain facts" about antennas, we've researched our files (including that sitting atop our shoulders) to come up with nearly 50 common-sense, plain facts about antennas and transmission lines that should be particularly useful to the guy or gal who has unpacked that new transceiver and now needs to select an antenna to use with it. This compendium is especially designed for the amateur who isn't inclined to wade through the ARRL's *Antenna Book* or Radio Publications' *Radio Amateur Antenna Handbook* just to find out how to erect a simple antenna that "works out" and enables him to make contacts.

Not everyone will agree with all of the rules-of-thumb I've presented. For those more experienced amateurs reading this material, bear in mind the objective. And, we may *all* learn a bit; I certainly did in compiling the material. Who knows—other two-letter graybeards may even learn as much as I did in putting the material together.

631 N. Overbrook Drive, Fort Walton Beach, FL 32548

Let's talk first about some general antenna comments, then go on to discuss simple h.f. antennas, beams of all sorts, v.h.f. antennas, and transmission lines.

Antennas: Some General Comments

** "Keep it simple" when working with antennas is a good rule of thumb to observe. Save the fancy stuff for highly specialized applications. Cut your teeth on the basic antennas before you move on.

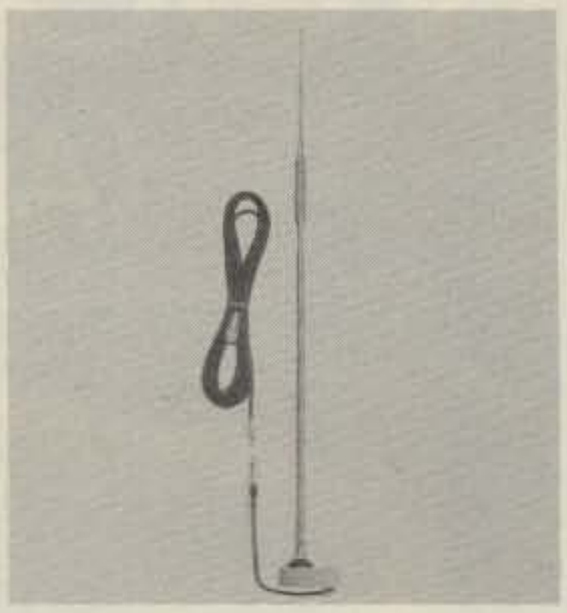
** Ground your antenna whenever you're not using it and protect it against lightning strikes. You may be sorry if you don't!

** Before erecting the antenna, install a good station ground using heavy, direct connections to ground rods driven in the earth, or to cold-water pipes. Don't rely on the a.c. "third wire" for r.f. grounding.

** Use a standing wave ratio (s.w.r) bridge or an antenna noise bridge (a.n.b.) to check your antenna's characteristics. But don't be overly concerned with s.w.r. (more on this later).

** Routinely install a lowpass filter in the antenna line between your transmitter and the antenna or antenna tuner/coupler. This will minimize the potential for television interference due to harmonics reaching the antenna and being radiated. Lowpass filters aren't terribly expensive, and models are available that provide more than 80 dB harmonic attenuation in the TV bands—representing a harmonic reduction factor of some 10^{-8}, a substantial figure indeed!

** Don't overlook the possibility of using overstocked or used CB antennas for amateur use, especially on 10 meters. Much CB hardware is interchangeable with amateur hardware, or can be easily adapted for amateur use. Mobile whips and mounts, as well as beams, in particular present good conversion targets. Ingenuity counts here.



Two-band, six- and two-meter mobile operation isn't too difficult to achieve with the Hustler trunk-mount antenna shown here. Four-section telescopic antenna permits separate adjustments for simultaneous resonance on both bands. Performance is about equal to that of separate, quarter-wave whips. (Photo courtesy Newtronics Corp.)

** Read manufacturers' antenna gain figures carefully—check to see what the figures are referenced against. The same goes for seemingly too-good-to-be-true performance claims, especially for miniaturized antennas of novel design. More on this under "Beams."

H.F. Antennas: The Simple Kind

** There is little substitute for "wire high in the air." Short, bent, tilting, wrapped-around antennas *can* be made to work, but involve some compromise. Bending dipoles in the shape of a "V" isn't too bad, but try to avoid bending the ends. Directivity will be affected in any case.

** Install horizontal antennas as high as possible, at a minimum 25 to 30 feet above the ground or buildings. Don't erect a flattop across a high-power line.

** Don't be unduly concerned with antenna orientation when installing your flattop. Look for a clear, unobstructed route for your skyhook, then worry about which way it's facing. For most dipoles and single-wire antennas, it won't make much difference *which* way it's heading.

** The center-fed, half-wavelength dipole antenna fed with coaxial cable is the *basic* h.f. antenna, and the one least likely to give you problems if you're inexperienced. Just install it high and clear and start using it—no antenna tuner or transmatch is needed.

** Single-wire antennas are fine for portable and vacation use, but often present problems in loading and matching, particularly if not "cut to frequency" but installed as a random length of wire. An antenna tuner is almost always required with the single-wire, adding to your antenna system's complexity. A good ground is also a "must."

** Thinking of installing a "long-wire"? A *real* long-wire antenna is great for increasing gain in a certain direction or directions, but can work against you in casual hamming. Remember, too, that a "long-wire" isn't *really long* until it is several wavelengths long at the operating frequency. Single-wires, long wires, and random-wires are not necessarily synonymous!

** Vertical antennas can work very well, especially for DX, since they typically have a very low angle of radiation. This characteristic can aggravate TVI, however, and they are often noisy on receiving. Consider a vertical if you are horizontal-space limited. A *good* ground or an artificial ground plane is required.

The antenna or "R-X" noise bridge is great for precise antenna adjustment. Device allows you to learn more about the actual characteristics of your antenna that can a simple s.w.r. (standing wave ratio) meter. Among its capabilities are determination of antenna resonant frequency, resistance and impedance off-resonance, and resonance of tuned circuits. The Palomar unit shown here works over the range 1 to 100 MHz. (Photo courtesy Palomar Enginners)

** Coax-fed, multiband trap antennas present a "way out" for many an amateur to operate on all the h.f. bands with the turn of a bandswitch and possibly an adjustment or two on his antenna coupler. Traps can work very well—the principle of isolating dipole segments is well established—but they can be frustrating to adjust. Don't expect a 1:1 s.w.r. to exist across all bands—it probably can't be done.

** A dipole, cut for the lowest band to be used and fed with open-wire transmission line, is a simple but time-proven multiband antenna that is hard to beat. Certain line lengths should be avoided to prevent matching and transmitter loading problems. An antenna coupler is required.

** The off-center fed Windom antenna is another "best bet" multiband antenna; versions have been developed that can be fed either with coax or parallel-wire feeders. The Windom can even be fed as a single-wire.

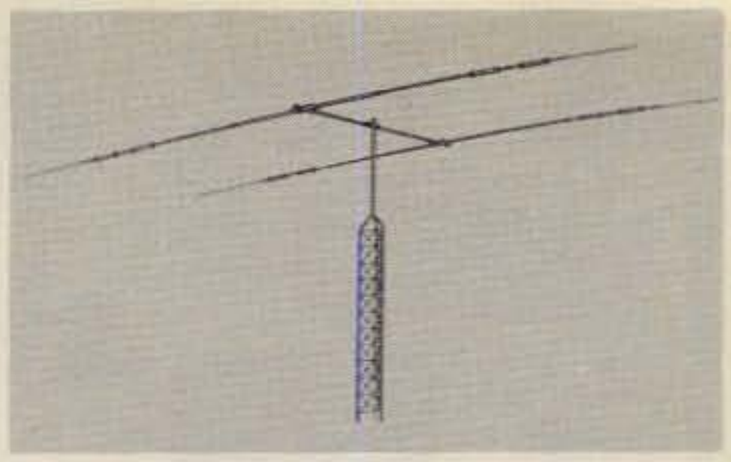
** A dipole can be made to work well and with low s.w.r. on "odd" harmonics. This means that you can operate your coax-fed, 40-meter half-wave dipole on 15 meters with good results.

Beams of all Sorts

** Rhombics, parasitic beams, quads and other exotic and advanced antenna systems are fine. But firmly ground yourself (no pun intended!) in the basics first. A Quad or beam, improperly installed or adjusted, is probably no better than, and is likely worse than, an "average" dipole antenna at 25-30 feet that's properly installed.

** Read between the lines of advertising for beam antennas; see if the gain and front-to-back figures "compute." Remember that beam gain figures may be referenced against *anything,* though usually are pitched against an isotropic radiator or a half-wave dipole. Referenced against an isotropic source, the numbers will *appear* larger; against the dipole, somewhat smaller. The difference is about 2.1 dB. This doesn't sound like much but it amounts to a power factor of 1.6 times.

** Quads are often called the "king of amateur antennas," and with good



Hy-gain 2-element triband beam covers 20, 15, and 10 meters on a 6-foot boom. Typical 2-el beam provides more than 5 dB gain when referenced against a dipole, or 7 dB gain when compared with an isotropic source. S.w.r. is less than 1.5:1 at resonance on all bands. (Photo courtesy Hy-Gain Electronics)

reason. They can provide gain figures up to about 14 dB (depending on size) over an isotropic radiator. But they can be cumbersome "monsters" to install. Make sure you're mechanically inclined if you decide you must have a Quad. And think twice if your area is prone to hurricanes and high winds!

** Keep these figures in mind! A 2-element beam gives about a 7dB gain, and a 3-element job about 10 dB, referenced against our isotropic source. A 2-element Quad will produce about 9 dB gain, a 3-element about 12 dB, and a 4-element Quad, 14 dB. (Subtract about 2 dB from these figures for comparison with a half-wave dipole, as explained above.)

** Horizontal polarization is pretty much "standard" on h.f., except on the 11-meter CB band (because of the preponderance of mobile-to-base operation), and to an extent on 10 meters. You can use vertical polarization on h.f. if you want—it *usually* won't make much difference.

** A beam won't work up to spec if it isn't mounted in a high, clear location. Buried among utility lines in an urban maze, it can't work as it's supposed to, and probably isn't worth the trouble and cost. Survey your site closely for clearance before making a big-ticket investment. Check your zoning ordinances and restrictive covenants, too.

** A rotator is required with a beam unless you want to turn it with a pipe wrench using the "Armstrong" method. Don't try to turn a heavy amateur beam with an underrated, TV-type rotator!

** Parasitic arrays—the familiar tower mounted kind—aren't the *only* kind of beams you can work with. If

you can be content with one-way or two-way *fixed* directionality, consider a much-less-expensive wire beam. Dozens of designs are available from which to choose, and you can "roll your own," too. Look up end-fire arrays, rhombics, sterbas, W8JKs, "ZL specials", long-wires, Lazy H's, and others in the antenna handbooks. You can save big bucks.

On the V.H.F. Bands

** For f.m. mobile work on 6-, 2- and 1¼-meters, the quarter-wave vertical works well and is simple to construct and install. Its effectiveness, however, leaves something to be desired since its "gain", as referenced against a half-wave dipole, is less than 1. Coverage, of course, will be omnidirectional.

** Use a 5/8-wavelength vertical or phased collinear for improved low-angle coverage and "gain" in mobile operation. You may have trouble closing your garage door with the longer antenna installed, but it's worth the resultant improved range. The 5/8-wavelength whip has about a 3.4 dB gain figure and the phased collinear about a 5.2 dB gain over the quarter-wave whip. (*Notice that we've switched references on you!*)

An unusual antenna accessory, the Kantronics "Sky Switch" economizes by allowing a single transmission line to simultaneously feed h.f. and v.h.f. antennas. Very low insertion loss is claimed for the device. (Photo courtesy Kantronics)

** If you can, stay away from magnetic mounts, rain-gutter mounts, clip-ons, and other temporary lashups. Performance almost always suffers when the mobile antenna installation isn't permanent, and may not even be consistent under different weather or road conditions. Sometimes these mounts are the only options open to operating at all.

** For fixed-station v.h.f. repeater and simplex work, a gain-type vertical antenna is little more trouble to install than a quarter-wave and will give far superior results. For example, one manufacturer (Hustler) sells a 2-meter vertical that boasts a 7 dB gain (5 times the power) compared with a half-wave dipole (*we've changed reference again!*). It's a collinear type made up of triple 5/8-wave elements in series, separated by two phasing coils for an overall length of 184"—tall indeed, but in fixed station use, it doesn't much matter.

** For 2-meter s.s.b. work, horizontal polarization is almost always used. If you try to work cross-polarization, you may find signals down by as much as 20 dB or more!

** Much larger beams are more practical on v.h.f. than on the h.f. bands, due to their smaller size. Five-, 10-and 20-element beams are reasonable, even on 6 and 2 meters, though coupling and phasing arrangements can be complicated.

** It's practical to "stack" v.h.f. beams, usually not feasible on the v.h.f. bands, to substantially increase gain figures. Watch the wind loading on your rotator and tower, though, if you do.

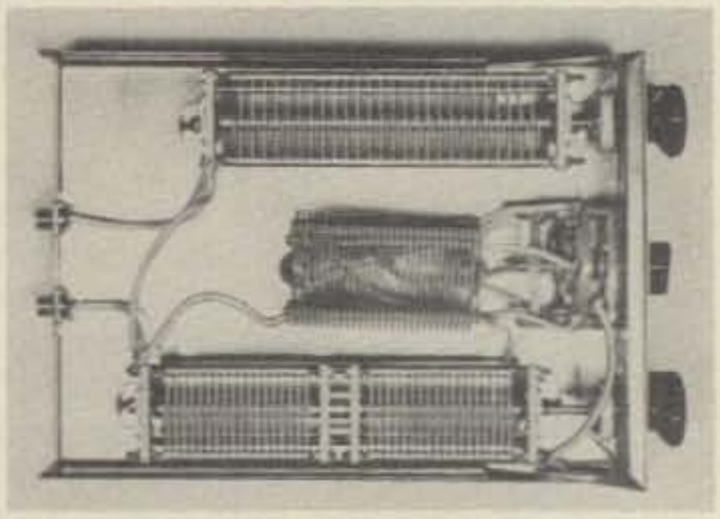
** Due to the line-of-sight characteristics of the v.h.f. bands, antenna height is much more than on h.f. For best results, especially in ground-wave work, install the antenna as high and in-the-clear as possible. It will make a *real* difference.

** On v.h.f., be especially careful of anything that you insert in the line to the antenna. R.f. switches, lightning arrestors, cable splices, s.w.r. bridges, and filters can all introduce additional losses and "impedance bumps" with resultant mismatch.

Transmission Lines

** Coax cable has the benefit of very low line radiation and hence, less chance for r.f. to get into TVs, stereo equipment, and telephone lines around your shack or your close-by neighbor's.

** Coax isn't immortal—it *does* become "weathered out" in a few years. Inspect it regularly and replace

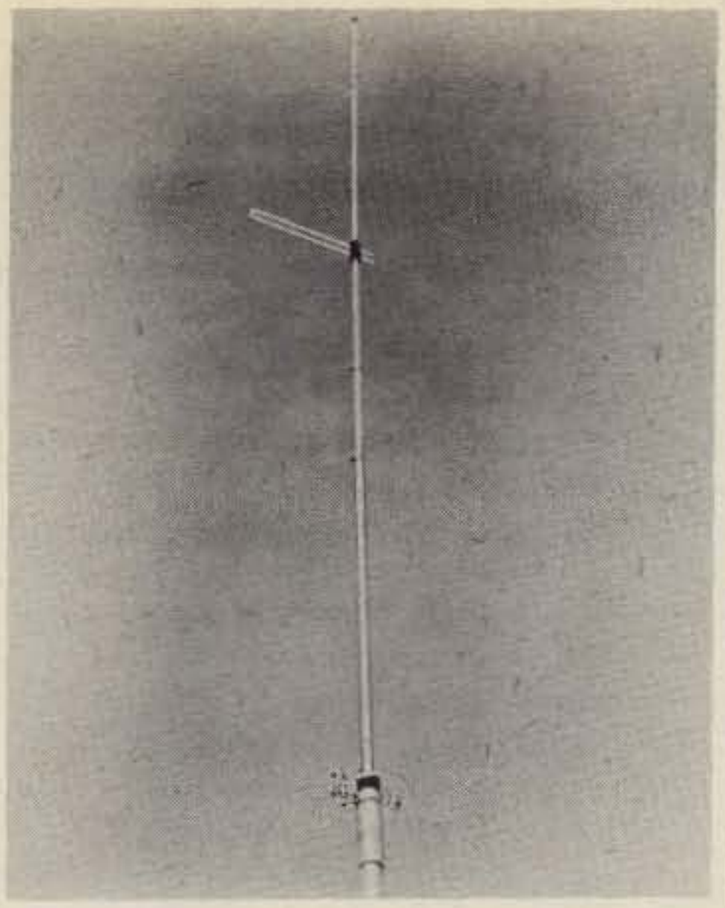


Heavy-duty construction is important in designing, constructing or purchasing antenna tuners and couplers, especially for high-power work in the h.f. bands. Particularly important are the capacitor plate spacings and coil size if "oddball" antennas are to be loaded up and appreciable power run through the tuner. (Photo courtesy Apollo Systems, whose transmatch innards are shown here)

as required. Look for "non-contaminating" dielectric materials for long life and especially if you plan to bury it.

** Parallel-conductor lines such as 450-ohm and 600-ohm open-wire types are excellent for feeding certain multiband dipoles and driven arrays. Loss is extremely low (much lower than with coax), though line radiation can be high and the line must be carefully installed and routed to avoid close proximity to other objects. Going through windows and walls usually presents a problem.

** Generally avoid using TV-type twin line for transmitting purposes. The loss can be very high, and the line's characteristics are affected by weather as well as dirt and dust.



For fixed-station v.h.f. repeater and simplex operation, it pays to install a gain-type vertical antenna. Such an antenna is little more trouble to install and adjust than is a ¼-wave and will outperform the latter by a wide margin. Shown here is the omnidirectional Cushcraft "Ringo Ranger" which consists of two ½-wavelength radiators in phase with an 1/8-wave matching stub. Manufacturer claims a 6 dB gain over the ¼-wave whip. In addition, this configuration results in a very low angle of radiation for extended groundwave coverage.

Transmitting-type 300- and 75-ohm lines are available if you want to use this kind of feedline.

** When you use a single-wire antenna, the antenna and feedline are as one. This means that "live" r.f. will be in your shack, and may present real difficulties with respect to cabinets, mikes, and keys that are "hot" to the touch. Adjusting the length of the antenna and/or feedline can help minimize these effects, but it's difficult to eliminate if you're working on more than one band with this kind of antenna.

** Antenna tuners, couplers, or transmatches are normally required when you are using anything other than coax to feed your skywire. Early pi-network transmitter tank circuits could directly feed almost any antenna, but the requirements of present-day solid-state final amplifiers usually mean a rigid 50- to 75-ohm load must be maintained for proper transmitter operation.

** Using an antenna coupler isn't a bad idea, even if you are using coaxial cable as your feedline, to tune out any reactance present and present a better match to your transmitter on the band edges where s.w.r. may be a bit ragged and loading a problem. Antenna tuners also add a measure of harmonic suppression as well—especially important if you are using a multiband antenna that radiates harmonics easily. If you're running high power, look for heavy-duty construction inside the pretty case.

** For fine-grain antenna adjustment, use an antenna noise bridge (a.n.b.) for accurate resonance determination and the like. This device will tell you a lot more about your antenna system than will an s.w.r. bridge.

** Use an s.w.r. bridge for routine antenna system monitoring and for antenna coupler/tuner adjustment. But don't get "hung up" on s.w.r.—it usually doesn't make sense to try to lower s.w.r. below 2:1 on coax lines, and we don't worry about it at all on open-wire lines. However, a very high s.w.r. on coax will significantly increase power loss, especially on the v.h.f. bands.

** An antenna tuner can't change the s.w.r. *at the antenna*—that's fixed. It affects only the impedance seen by the transmitter. The coupler's adjustments are for the purpose of helping the transmitter load up the antenna system, not change the antenna's characteristics.

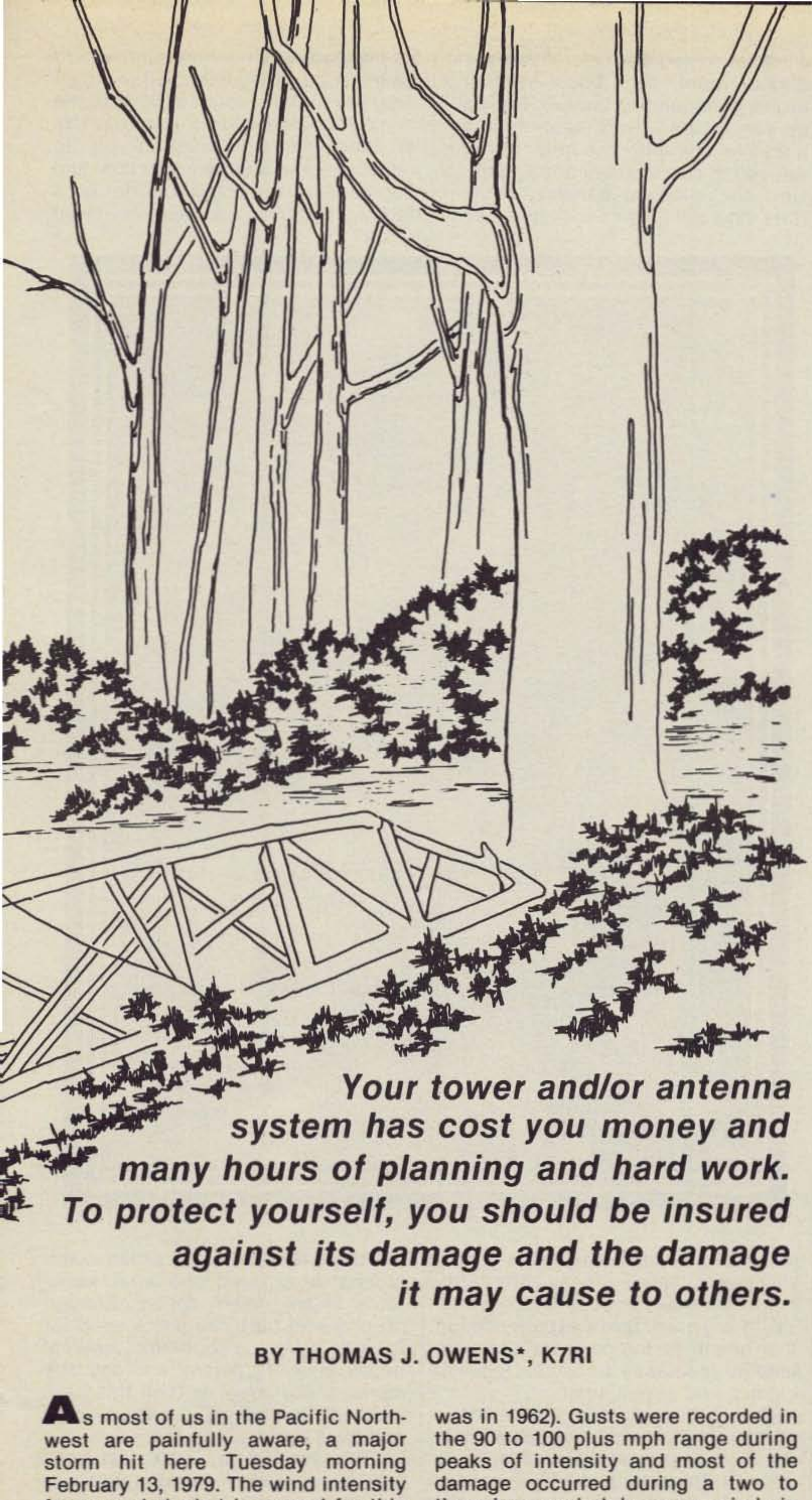
** Balun coils are helpful in reducing the potential for problems encountered in feeding "balanced" type antennas (such as dipoles and beams) with "unbalanced" coaxial cable, but are by no means required. Inexpensive baluns can have a high insertion loss, as well.

That's about it for this month's "plain talk." Hopefully, we've provided some information that will be useful to the beginner in ensuring that the antenna choices he makes will be wise ones. And, we may have challenged the more experienced and knowledgeable amateur with our statements.

We haven't covered everything, so next month we will present some more "antenna wisdom" in this column. See you then.

73, Karl, W8FX

"Radio Insurance": Necessary Evil or Blessing In Disguise?



Your tower and/or antenna system has cost you money and many hours of planning and hard work. To protect yourself, you should be insured against its damage and the damage it may cause to others.

BY THOMAS J. OWENS*, K7RI

As most of us in the Pacific Northwest are painfully aware, a major storm hit here Tuesday morning February 13, 1979. The wind intensity far exceeded what is normal for this area (the last, and only, storm of such wide-spread destructive magnitude was in 1962). Gusts were recorded in the 90 to 100 plus mph range during peaks of intensity and most of the damage occurred during a two to three hour period; however, winds in the 40 to 50 mph range raged for several more hours.

Destruction of the Hood Canal Floating Bridge was the most publicized loss...with nearly 3,700 feet of the 7,100 foot span resting at the bottom of Hood Canal. Without the bridge, thousands of people were isolated from Seattle and other major population centers. Repair estimates on the bridge ranged from 26 to 50 million dollars...with up to two years to complete repairs. Along with the bridge, major communications truck lines to thousands were severed, leaving them without phone service. Since then, emergency ferry service has been established to link the isolated areas with the mainland (and most, if not all, phone service has been restored).

Many other Northwest residents were left without power for several days, some for weeks. People were stranded from the outside world by large numbers of trees which fell across remote roadways. Boats, moorages, bulkheads, and waterfront homes were damaged by flooding and debris; large trees fell into and through several homes. At least two people died as a result of the storm. In general, not a very pleasant picture; in particular, disaster for many...including hams.

One doesn't have to look far to see how amateurs were affected. One of the last persons to get off the Hood Canal Floating Bridge, minutes before it sank, was a ham. When he arrived home early that morning, he found his 60 foot tower and antennas smashed to the ground. What a way to start the day!

Several Western Washington DX Club members, and others too, of course, sustained extensive damage to their towers, antennas, rotators, etc. Fortunately, I heard of no members suffering personal bodily injury. However, property losses were in the hundreds of thousands of dollars. Although several others had losses in various degrees, I'll mention six of whom I am aware and discuss the range of severity. These examples will provide a starting point from which to examine various insurance concepts important to all of us.

First, Danny Eskenazi, K7SS, had a TH6DX about 70 feet in a tree. The antenna and rotator survived the storm, but the supporting mast bent about 45° and had to be replaced. In such a case, whether or not casualty insurance covered the loss is a moot question, as almost any of us can bear the cost of a new mast without undue financial hardship. Danny simply replaced the mast and all is back to normal. However, had the antenna fallen and injured someone, liability insurance would be a most pertinent issue!

Second, Al Johnson, W7EKM, had a 55 foot tower secured to his house. The rotator and mast supported a TH6DX and a 2 meter antenna. The

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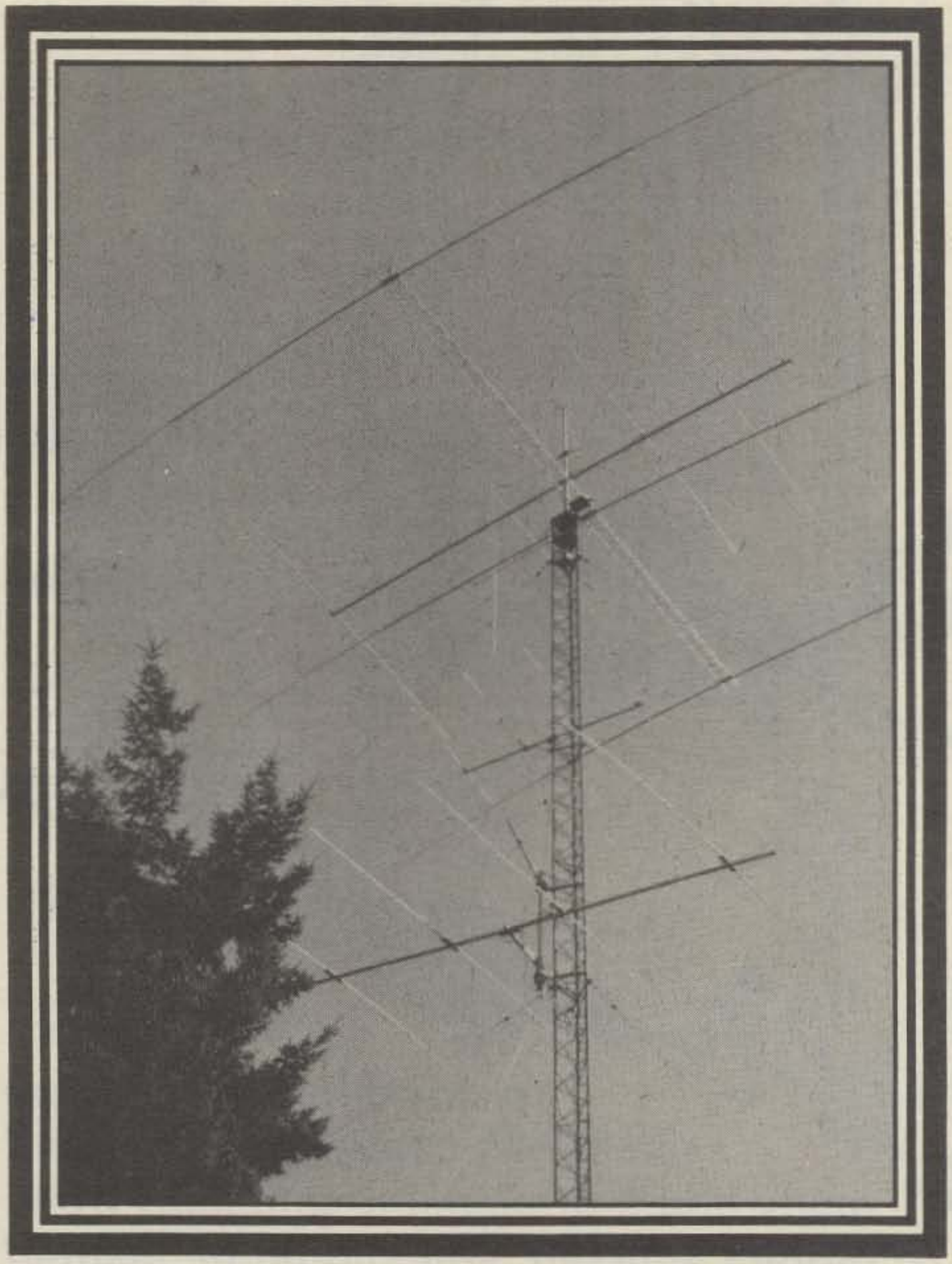
high wind pulled the tower free from his home and smashed it into his neighbor's roof. The tower installation was destroyed and, on its way to final rest, broke windows and damaged a car in the process. In this case, obviously there was damage to both Al's house and tower/antennas *and to his neighbor's roof*. Imagine how *you* would feel to see *your* tower penetrating through your neighbor's roof!

Inasmuch as the tower (an appurtenant structure) was attached to his house, Al was covered for damage to his tower/antenna installation; and, of course, the house damage was covered too. Whether or not such coverage would relate to the initial installation cost, depreciated initial installation cost, or current replacement value would hinge on the wording of his insurance policy. In any case, without a special rider specifically insuring the radio tower installation to some maximum dollar amount (a supplemental appurtenant structure endorsement), the maximum indemnification would be no more than 10% of the insured value of the home. (Of course, if the loss was less than the 10% figure, that is what the insurer would pay.) If the loss exceeded the 10% figure, Al would have to absorb the difference himself! In such case, he could complete the proper schedules on his income tax return and claim a deduction for an unreimbursed casualty loss; but, that consolation doesn't quite make it.

As far as the damage to his neighbor's house is concerned, that is a matter of *Personal Liability* insurance. If his policy afforded such protection, the insurer would pay to repair the neighbor's house. *Without such insurance,* Al would be in the unenviable position of restoring the damaged house to its former condition *at his own expense*. Hence, a pretty darn good reason for adequate liability insurance. In Al's case, the section of his policy dealing with liability insurance *specifically excluded* from coverage such a windstorm as an "Act of God." Al had to pay for repair to his neighbor's roof out of his own pocket. Fortunately, repairs were completed for less than $100.

Third, Don Kuehne, K7DK, lost a 54 foot self-supporting crank-up tower with a Ham M rotator and monoband yagis for 10 and 15 meters. The entire installation was wiped out; and the insurance company paid Don for full replacement cost. He put up another tower. The point of interest in this case stems from the fact that the neighbor, a renter, appears to have an overactive imagination. She has alledged the antennas (on the way down, the boom grazed and broke her window) ruined her color TV set and dining room set. Upon receiving notice of impending lawsuit, Don called his insurer. They sent their adjuster to talk with the lady, but she refused to cooperate or allow them to view the alledged damage. At this time, one can only speculate on what really happened. Perhaps the yeasty yagis were yearning for an early morning snack and dropped by to watch TV. In any case, Don's experience further amplifies the need for adequate liability insurance to protect against claims, real or imagined.



Fourth, Tony Santos, W7ISX, lost a 160 foot tower when it buckled near the top. Destroyed were yagis on 2, 10, and 40 meters, rotators, control and coax cables, and, of course, the tower itself. The tower wasn't attached to the house or any other fixed structure; yet it still would likely qualify as an appurtenant structure and be covered up to 10% of the insured value of the house. If it were not so covered, it almost certainly would be included as unscheduled personal property in the amount of 50% of the home's insured value. Since Tony has an endorsement insuring up to replacement cost, the initial cost and depreciation thereof would not be a factor. The policy was being reviewed by Tony's attorney to ascertain exactly what is covered and what exclusions, if any, might apply. Although no one was hurt, the same need for liability coverage (both for physical bodily injury to person and casualty damage) obviously exits in this case as in all the others...*and in yours and mine too.*

Fifth, Joe Naylor, N7XX, lost a 130 foot tower when it buckled part way up the tower. Destroyed were yagis on 2, 10, 20 (5 over 5), and 40 meters, two prop pitch motors, all the phasing circuitry, control, switching and coax cables, support arms, and much more.

Like Tony, Joe's tower was not at-

tached to the house. When it fell, it went back into the woods. No one was hurt and, other than the installation itself, there was no other casualty loss. The same comments relative to insurance apply to Joe's situation. He likely would be covered for insurance purposes either as an appurtenant structure or unscheduled personal property. Whether any depreciated values or exclusions came to bear depends on the wording within the policy. The limits of coverage are in question.

Sixth, Rush Drake, W7RM, noted Northwest contest station, experienced the greatest loss. He had four 175 foot towers with multiple stacked and phased arrays destroyed as they crashed to the ground. In Rush's case, tress fell on the guy wires and snapped them, allowing the towers and antennas to fall all around the Drake house. Although no one was hurt, one tower did graze the gutter of the house on the way to its final demise. It must have been a terrifying experience to hear your towers crashing all around and wonder if the next one might be coming through your home! Although the particulars of Rush's insurance situation aren't known, the general principles discussed herein would apply equally to him or any W6.

At one time or another in preceding years, I've had the pleasure of seeing all the fine stations described herein. All were well-designed and had withstood many previous wild windstorms. In considering the systems that died in the storm, three major causes of failure stood out. One, *trees* fell over the guy wires and either broke them or transmitted undesigned-for forces down the structures, resulting in careening, and ultimate failure. Two, *guy wires snapped* due to the constant pressures exerted on them by the wind and the loading of the towers and antennas themselves. Three, *screw anchors* that were not below the freezing level of the earth heaved and pulled out of the ground (it was freezing in many areas during the storm). One would be well-advised to keep these points in mind when designing any tower installation. *Overdesign it!* Then, be certain you are adequately insured. **Read your policy and understand it,** even if that requires explanation by the agent. Know what is insured, and for how much; and, know what is not insured!

Fortunately, most of the storm victims were totally or partially covered by insurance. But some were not, and they had to absorb the decrease or total disappearance in the value of their assets with nowhere to turn except their financial resources. Again, a compelling argument for transferring risks to someone else—the insurance company.

But, one should fully understand *exactly* what the risks are, what risks are being transferred (and what risks are not), what perils will be covered, what perils will be excluded, what deductibles apply. One should know company requirements in case of a loss, what options the company has with respect to indemnification of losses, when the loss will be payable, and a host of other information too. In short, the insured should *understand* what the language in the policy really means!

(to be continued)

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Guidelines for Conducting Amateur Radio Shows - Part I of IV

CQ editorial personnel added a few pictures of a Burbank Hamfest to the December 1977 Novice column. When they did this, I received several questions from club groups about running amateur radio shows. I promised those people that I would publish answers to their questions in some future sequence of Novice articles; that time has finally come and this is the first of a four part article intended to help groups that want to run such shows. I have helped run shows for a long time and I have held every post at some time during the last 14 Burbank Hamfests.

Introduction

Experience is a great teacher. The information on these pages is based on many years of being involved in running amateur radio shows. You can get similar information by reading show articles which have been printed in prior issues of the major American amateur radio publications. The League has printed materials, programs, and speakers that can enhance any show.

The show committee members should evaluate all available show data to help them produce a good event. Sad experiences of your predecessors produced advice intended to save you from similar predicaments. It is hoped that this set of guidelines will make your task a little bit easier.

Webster's *New Collegiate Dictionary* shows that -fest is noun combining form extracted from the German word (fest) and the Latin word (festum) for celebration. In plain language, a hamfest is an event featuring amateur radio activities and interests. Similarly, a dictionary definition of convention is that it is an assembly of people who have met for a common purpose. Consequently, an amateur radio convention can be construed to mean an assembly of people interested in amateur radio. It makes very little difference whether you call your show a hamfest or a convention.

The information on the following pages has been separated by subject matter for easier use. The subject breakdown is as follows:

Part I of IV
- Introduction
- **People**
  - Chairman
  - Coordinators
  - Experience
  - Cooperation
- **Planning**
  - Meeting Schedule
  - Objectives
  - Date Schedule
  - Pre-registration Cutoff
  - Location
  - Profit or Non-profit
- **Location**
  - Access
  - Basic Requirements
  - Charges
  - Space

Part II of IV
- **Banquet**
  - Responsibility
  - Purpose
  - Emcee
  - Invocation
  - Time
  - Program
  - Banquet Prize
  - Recognition
  - Seating
  - Other Prizes
- **Communications**
  - Responsibility
  - Talk-in Station
  - Telephone
  - 2-Meter f.m.
  - Public Address System
  - Announcements

This is Bill Wolf, KA2EEV, of Newark, New Jersey. Bill runs a Johnson Viking Valiant Transmitter and a Hammarlund HQ-100 Receiver. He uses an inverted vee antenna on all Novice bands. Bill is 30 years old and he has been a radio enthusiast since he was in grammar school. He advises young people to get licensed and to start operating without waiting until they are settled down and married. Bill worked 29 states and several foreign countries during his first two months of operation on the Novice bands and he reports that his wife is about ready to get her Novice ticket.

- **Contests**
  - Responsibility
  - Types
- **Exhibits**
  - Responsibility
  - Paid Booths
  - Exhibit Details
  - Merchandise Payment
  - Free Booths
  - Exhibit Aids
  - Show Layout
  - Outside/Mobile Displays
  - Registration and Information Booth

Part III of IV
- **Publicity**
  - Responsibility
  - Exhibitor Contacts
  - Exhibitor List

2814 Empire Ave., Burbank, CA 91504

People

The primary requirement for the show chairman, coordinators, and all other workers is that they must be willing to put in the effort required to produce a good show. It is a sad fact that the show workers usually have the least chance to enjoy the event. You need dedicated people who are willing to aid our amateur radio service by doing this job.

Chairman. The sponsoring group should select the most capable amateur to serve as show chairman. The show chairman should have prior experience in this type of event and he/she must want to do this job. The show chairman must have authority over all aspects of the show to be effective.

Coordinators. The sponsoring group should suggest the best prospective coordinators for consideration by the chairman. All coordinators should be appointed (and if necessary, replaced) by the chairman. If it becomes apparent that a coordinator is not getting the job done, replace him/her without delay. It is the responsibility of each coordinator to locate and appoint any and all required assistants. The tasks of each coordinator are detailed under the subject headings. In alphabetical sequence, a typical set of coordinators is: banquet, communications, contest, exhibit, finance, flea market, prize, publicity, seminar, and ticket coordinators.

Experience. If you conduct a show more than one time, it is beneficial to have experienced coordinators serve in the same posts to minimize errors associated with inexperienced personnel. Experience can improve the performance of every show worker. The show chairman should not shift coordinator assignments from one year to the next without cause. However, if past performance has proven that someone cannot (or will not) do a particular job, the chairman should state his/her reasons and make the indicated change to improve the show. It is usually possible to shift someone out of a coordinator post which he/she did not handle well and to appoint this person to a less-demanding assignment. The most capable people should serve in the most critical coordinator positions, which are those of the finance, publicity, exhibit, prize, banquet, and seminar coordinators, listed in their relative sequence of importance to the success of the show.

Cooperation. Team effort is essential to a good show and every coordinator must keep in touch with his/her counterparts to avoid misunderstandings and wasted effort. Contact should not be limited to planning meetings; coordinators must maintain frequent communication among themselves and with the chairman. It

This is Milt Coop, KA8ESA, a 50-year-old machine shop foreman who lives in Rockwood, Michigan. Milt received his Novice license in March 1979 and he upgraded to Technician in May 1979. He has worked 198 contacts, including contacts with amateurs in 32 states and 8 countries. His first contact was with Barry Oberling, KA9BDB, of Clayton, Illinois. Milt credits Fred Lux, WD8ITZ, and Dave Smith, W8YZ, with helping him get a good start in amateur radio.

is often possible to obtain highly qualified volunteers and they usually work harder and longer for you than they could ever be paid (or forced to do) in their jobs. Recognize and appreciate the capabilities of the chairman, coordinators, and all other show workers.

Planning

Meetings Schedule. Hold planning meetings once a month. They should be held at the same time and in the same location each month. These meetings should start about six months before the show date and they should end one month after the show.

Objectives. General and specific show objectives should be determined at the first planning meeting. If a specific interest is to be stressed as the show theme (such as contests, DX, f.m. repeaters, RTTY, satellite communications, SSTV, traffic handling, or training), it should also be established during the initial planning meeting.

Date Schedule. Minimize conflicts with similar shows by checking *CQ*'s announcement column and similar columns in the other amateur journals. Check previous issues of the major amateur radio publications to learn when shows were held during the previous year. Select a weekend which offers the least conflict and suits your own needs.

Pre-registration Cutoff. Establish a pre-registration cutoff date as one to two weeks prior to show.

Location. Form a temporary committee to determine where your show will be held. The show chairman should be joined on this committee by the banquet, exhibit, finance, and seminar coordinators. This committee should have full authority to select the show location and to sign related legal papers without waiting for approval at a subsequent planning meeting.

Profit or Non-profit. If the show is to be run to make a profit, determine a reasonable objective as well as a maximum amount. If the show is to be non-profit, establish a contingency margin (at 10-20% of total income) and decide which groups will benefit financially from money left over after the show is completed. Do not try to operate without a contingency margin because unexpected expenses always occur. Also, your show may as well be used to provide financial aid to worthwhile amateur radio projects.

Almost all of the preceding things can be done at the first planning meeting. Coordinators should be advised to come to this meeting prepared to discuss these items and backed with facts to support their positions.

Permit free expressions of ideas at all planning meetings and require each attendee to speak. The chairman must maintain firm control of these meetings to keep the discussions isolated to show matters. Meetings must be pleasant as well as productive and this means that all attendees must make conscious efforts to stick to the business at hand. It takes several productive planning meetings to set up a successful show; the lack of proper planning will certainly result in chaos, bad feelings, and a poor show.

Hold a wrap-up meeting on your normal planning meeting night and hold it about one month after the show. Strongly urge each coordinator to be present at this wrap-up meeting and advise them to come prepared to discuss ideas for improving the show, if you plan to conduct it again the following year. As usual, the show chairman conducts this meeting to evaluate the show which has just been concluded and to start planning for possible future shows. This wrap-up meeting can provide several tips to improve future shows and it is extremely important to summarize all major items in writing for future use. Set aside sufficient show funds to cover the cost of this wrap-up meeting. It is advisable to have some special item imprinted as a show memento for the coordinators and the chairman, and to distribute it at the wrap-up meeting. It is also a good idea to have some item of lesser value imprinted as a show memento for all other show workers and to have each coordinator distribute this item to his/her own workers. The final financial report should be made during this meeting since all bills should have filtered in by then.

Location

Carefully select a show site that comes closest to meeting your specific requirements. If this is the first time you have conducted this show, you should check and list all factors concerning the major considerations detailed in the following paragraphs.

Access

(1) Site should be close to public transportation.
(2) Site should be near the center of the amateur radio population being served, if possible.
(3) Adequate parking is required. It helps if the parking is free and if the parking area is paved, lighted at night, and close to the show.
(4) If camper and trailer areas are available, they are of interest to a small percentage of potential attendees.

(5) Unassisted loading and unloading is important to exhibitors and your own show workers. This zone must be convenient to the show area but easy to control to avoid congestion.
(6) Display areas must be easy to secure and protect when they are not supposed to be open to attendees.
(7) Access to display, seminar, and all other show areas must be easy to control.

Basic Requirements

(1) An adequate number of suitable nearby hotel rooms should be guaranteed, preferably at a discount rate for show attendees.
(2) The facilities for combination meals and meetings must be adequate to meet anticipated needs and costs must be reasonable.
(3) Lighting, heating, cooling, furnishings, and general appearance must be satisfactory.
(4) Emergency exits, fire protection (sprinklers, fire extinguishers, and smoke detectors), and security provisions must be excellent.
(5) Money handling area must be unobtrusive and safe with cash deposits and withdrawals easy to accomplish with financial office of hotel/motel.
(6) Prize storage area should be both secure and close to the prize booth.

Charges

(1) Establish in writing whether quoted costs are per day, or for the show weekend.
(2) Obtain a detailed list of charges for items and services such as electric power, tables, chairs, ash trays, waste baskets, booths, separators, booth signs, and telephones. This information should be sent to exhibitors with the booth registration form.
(3) Determine availability and charges related to storage and handling of materials used in show exhibits. Each hotel/convention group usually has one outside organization providing this service and your exhibitors need this information.
(4) Arrange to employ janitorial and security services which normally service the hotel/convention center.
(5) Get meal costs for breakfasts, luncheons, and dinners.
(6) Get all price data in writing.

Space

(1) Seminar (technical presentation) room (or rooms) must be large enough to hold anticipated crowds.
(2) Inside display area and mobile display area must be large enough to house exhibits but should not be so big that your show looks too small.

When the show committee has been established, the basic decisions have been reached at the initial planning meeting, and the show site has been determined, the show is well underway. The following information is arranged alphabetically by subject headings and these headings generally correspond to the duties of specific coordinators.

(To Be Continued)

This completes the first part of this four part article. Each part is presented in such a way that it contains useful information by itself. However, maximum benefit will be derived from reading all parts of this article.

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscription (or renewal) to *CQ*. A brief description of operating activities and some personal background information are needed with your picture.

73, Bill,W6DDB

This is 39-year-old Jerry Tibbitts, KA6ESS, of Waterford, California. He operates an RME receiver, Heath DX-40 Transmitter, and a dipole antenna that is about 30 feet above ground. Jerry worked more than 600 contacts on 40 meters and has received 47 QSL (confirmation) cards in his first five months on the air.

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

Vocal Minority Proposes Boycott Of Russian Stations

A small but vocal group of amateurs is proposing that U.S. amateurs not engage in contacts with amateurs in communist-bloc countries until Russian troops withdraw from Afghanistan. These amateurs argue that with U.S. athletes likely to boycott the 1980 Summer Olympics in Moscow, and, therefore, to sacrifice their participation in the world games, amateurs should be willing to sacrifice their contacts with many rare DX stations.

There are several fallacies with this argument. First, there is little question that the Olympics are politicized, and that they have a history of being used by some governments as vehicles for propaganda. One need only consider the German Olympics of 1936 to see this. Second, to boycott communist-bloc amateurs would politicize amateur radio to an extent we would come to regret. That the amateur and amateur-satellite services were successful in their efforts at the 1979 WARC was due in large part to the fact that amateurs from ITU countries "pulled together" and presented a united front to the world telecommunications community. A boycott would destroy this unity.

If, despite the material set forth above, some amateurs still decide to boycott amateurs in communist-bloc countries, it is hoped that they will respect the rights of those who choose to do otherwise, and who choose to keep amateur radio on a person-to-person basis for the good of the service.

* *8603 Conover Place, Alexandria, VA 22308*

CQ Publishes Exclusive Interview With Carlos V. Roberts

Elsewhere in this issue of *CQ*, readers will find an exclusive interview with Carlos V. Roberts, Chief of FCC's Private Radio Bureau. Roberts, who heads the 300-person bureau which is responsible for the amateur service in this country, is one of the most influential Federal executives in Washington, D.C., on matters pertaining to our service.

In the interview, Roberts provides us with his thoughts on a number of issues considered important by amateurs. Included are opinions and attitudes on Government regulation, Article 41 (the Morse code provisions of the Radio Regulations), the Commission's view of the amateur service, and alleged radio-frequency interference (RFI) to electronic home-entertainment equipment.

The interview is *must* reading for anyone who is concerned about the amateur service and the directions the service will take in the 1980's.

Roberts Comments On Narrow-Band Voice Modulation (NBVM)

There has been some confusion regarding alleged tests that were made by the FCC on the much-touted narrow-band voice modulation technique. When asked whether the Commission did indeed examine this spectrum-conversation technique, Carlos V. Roberts, Chief, Private Radio Bureau, responded:

"The Commission did have some tests run which were conducted by Dr. Bruce Lusignan, Stanford University; the tests focused on a v.h.f./u.h.f. single-sideband amplitude compandered voice modulation technique. The tests were very limited in scope, and at present, work is being directed at areas other than the frequency compression or 'narrow-band voice' technique.

"The Commission has no official position on the use of the NBVM technique or on the merits of its use in the amateur bands."

Roberts added that he thought the area of narrow-band voice modulation was "ripe" for experimentation by interested amateurs.

Personnel Shortage Exists In Telecommunications

According to *Electronic Engineering Times* (21 Jan. 80), many companies are still finding it difficult to fill positions in the area of telecommunications. Furthermore, the shortages experienced are driving salaries in the industry to new highs.

According to EET, "job applicants in all aspects of telecommunications, except those in the upper salary brackets, are finding new jobs relatively easily." Further, "it's no longer unusual to see a technician with a base salary of $20,000 or more, or a telecommunications analyst at $30,000."

Job categories experiencing critical shortages of trained personnel include, but are not limited to: hardware/circuit design engineers,

technical writers, radio and data technicians, junior voice and data-user telecom analysts, and switching engineers. In addition, manufacturers of telecommunications equipment are looking for design and applications engineers, salespeople and product planners, as well as field-service personnel.

The findings above are major points revealed by an annual survey from Personnel Resources International, a New York-based firm which specializes in the placement of personnel in the telecommunications industry.

WARC 79—A Post-Mortem

According to *Region 2 News*, the Journal of The International Amateur Radio Union, Region 2, the greatest lesson to be learned from the 1979 WARC is the need for every national amateur radio society to establish stronger ties with it's government administration.

Region 2 News noted that if there is to be an amateur service in the 21st Century, frequencies will be needed in which to carry on activities. These frequencies must be allocated to the service by the governments of the world. Thus, unless a sufficient number of these governments continue to perceive the amateur service as a valuable national resource, amateur radio will cease to exist.

In sum, it was clear that in preparing for future world conferences on telecommunications, we, as amateurs, must make greater efforts than ever before to assure that our government officials are aware of the many benefits which can derive from the Amateur service and that they understand the frequency needs of the service.

FCC Concerned About Misuse Of 40 Meter Band

It has come to the attention of the FCC that a number of radio stations in the Miami, Florida, area are illegally using frequencies in and about the 40 meter amateur band for the transmission of political messages. The messages contain material of an anti-Castro nature, and are apparently intended for reception in Cuba.

Most of the complaints made to the FCC about the operation of the illegal "broadcast" stations came from amateur operators, and any actions taken by the Commission in this matter will be reported when information is available.

Stop Press

As this issue was going to press we learned that U.S. Marshalls raided and closed the principle anti-Castro station that was operating from Miami on the 40 meter amateur band. A large quantity of high-power amateur equipment was seized in the raid. The FCC's direction finding network and Miami office worked closely with U.S. Marshalls in this operation.

*Your Washington editor thanks Messrs. Vic Clark, W4KFC (*Region 2 News*); Art Simonsen, WA3ZWP; and Jeffrey Young, FCC, for their contributions to this month's column.*

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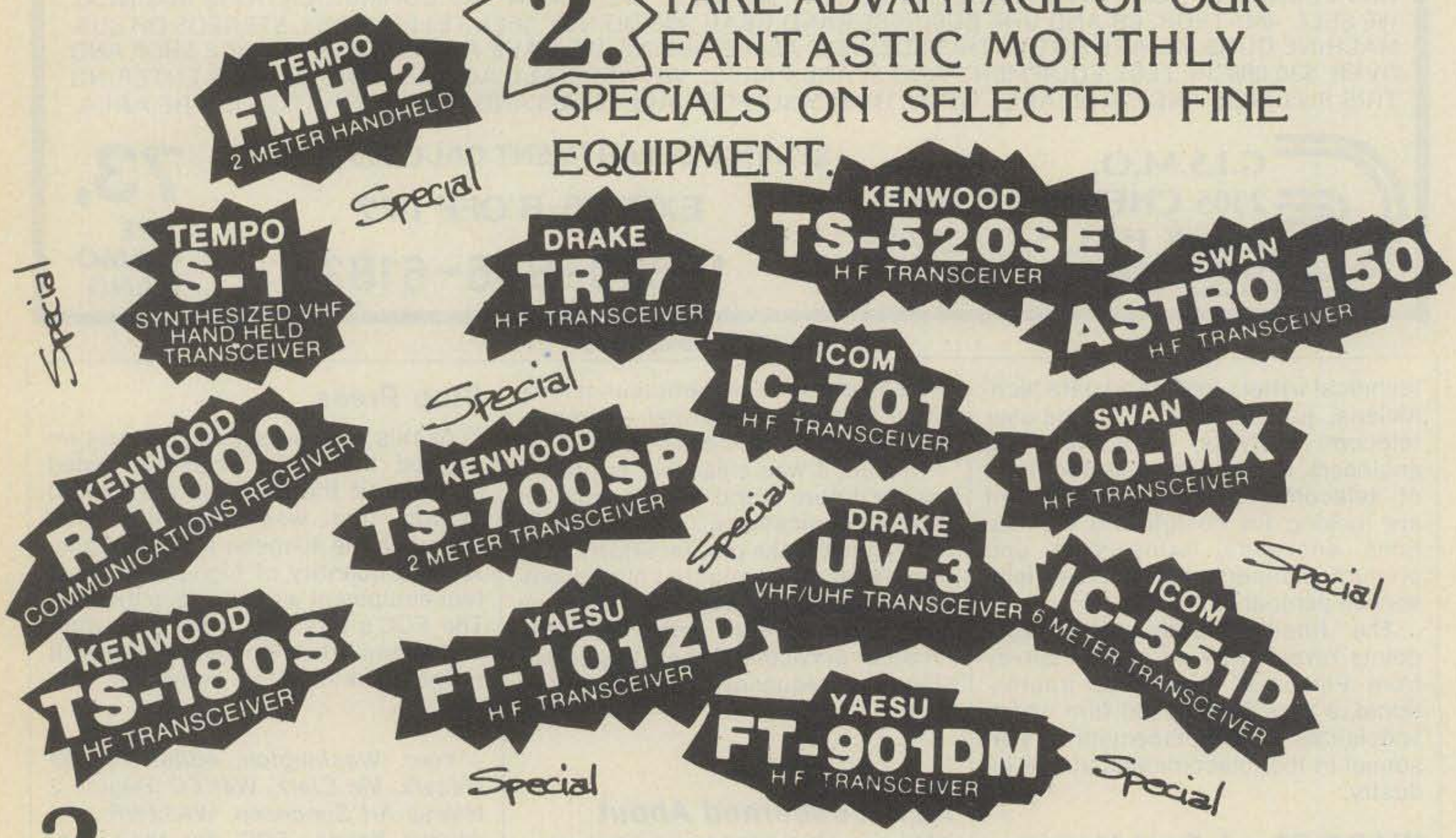

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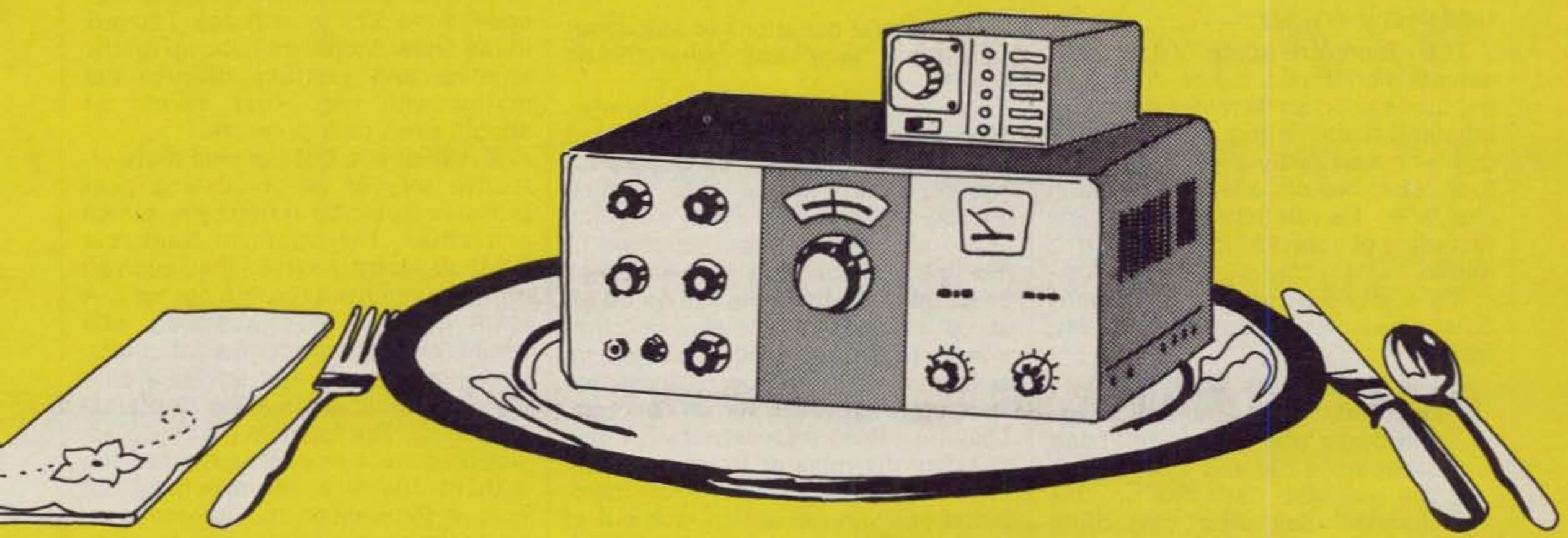
CIRCLE 31 ON READER SERVICE CARD

Larry has a penchant for making us look at things some of us would rather ignore. We can shake our heads or tsk tsk but they're still there. Well Larry has some interesting alternatives and possible remedies to weed out our petulant few.



Whatever Happened To Our Manners?

BY LARRY BROCKMAN*, N6AR

I have watched with interest the metamorphosis in operating manners that has taken place on the amateur bands in the last ten years. Indeed, things are very different now than they were then. It can all be summed up as follows—it seems we have lost our manners.

The Problem

DX has been my bag for 20 years, so that's my primary source of observation. But, a casual brush with 2 meter f.m., 80 meter rag chewing nets, WESTCARS, emergency nets, etc., reveals that the problem is by no means restricted to DXing. Let's take a look at some operating behavior in a few specific instances.

*7164 Rock Ridge Terrace, Canoga Park, CA 91307

You are anxious to work the SV1/A, Mount Athos. It's one of the last ones on your DXCC need list. As you arrive home from work, you tune across 14.195 and there he is, weak but readable. This is what you hear next:

"W5's only, listening 14.2 to 14.215. SV1JG/A is QRZ."

"What happened to the fours?"

"Shut up."

"OK, for God's sake cut it out guys."

"You're out of the band, you're out of the band."

Enter the Russian Woodpecker right on top of the SV1.

"He's right here, Joe—dahhh...."

Bedlam of policeman breaking in.

"Welcome to the wonderful world of Amateur Radio."

"You too, fella."

"W5....," "dahhhhhh di di di," "you're 5," di di di di di di....."

"OK, let's listen for sixes if there are no more fives."

"Hell, you — — sixes have done it again!"

"Don't worry, we'll fix them."

As an old timer, you recoil in revulsion. "Well, I'll just hop down to c.w. —phone is the only place where that kind of balloney happens." Think twice and read on.

You run down to c.w. to work the SV9 on Crete. He's working by call areas and listening up five. When he gets to your district, this is what you hear.

1. Somebody else starts using your call on the SV9's frequency.
2. Two or three other guys tell you to QSY.
3. Another European calls CQ on the frequency.
4. Another guy makes like the SV9 and gives you a report.
5. You hear the SV9 call someone—*but who*?

Pretty bad. But it could have been worse. The mess on some of our repeaters is worse. The "W6JAM" scene on one Los Angeles Repeater in 1978 was the most disgraceful display of foul language I've ever heard on the air. Yet, come to think of it, repeater jamming is quite commonplace. Carriers, tape recordings, fillibusters, all these things occur on repeaters every day.

Then there are some of the other activities on the h.f. bands. After having tuned in on an 80 meter rag chewing net the other night, I discovered a guy who was rattling off a string of four letter words. His buddy didn't like it, so he retaliated with a tape recording of John Philip Sousa march music.

It's a pity that there are so many other examples, too. Here's a few more.

1. The SSTV guys who are right there calling CQ whenever someone dares tread in "their" band between 14.230 and 14.240.
2. The guy who calls CQ on "his channel" day after day, night after night, no matter who or what was there first.
3. The simplex/repeater wars on 2, such as the 76 mess in some localities.
4. The DX nets who want ± 10 kHz about the net frequency from an hour before the net begins till the net completes. It's always in the middle of the busiest part of the band, and they don't care about who or what was there first—not even the ZL who's been there for 30 minutes on his schedule.
5. The WESTCARS war on 40.
6. The "goings on" between two closely spaced locals who splatter or key click each other to death.

But there's one to beat them all, and that's the absolutely inconscionable behavior of the guys who jammed the "hurricane" emergency net that was set up when David tore up the Caribbean. That was rock bottom. Shame, Shame.

Of course, nobody is perfect. All of us have a tendency to get irritated once in a while. The real test of our manners is whether or not we maintain our composure when we get irritated.

The other day an East Coaster was taking a list for an African. The East Coaster sounds like a gentleman I can think of in the sports broadcasting industry. Maybe that's why he attracts such a wasp's nest of controversy and jamming. But in any event, he blew his cool when the jamming started. All in all, his responses just helped kindle the mess, and as a result, an even more sordid chapter developed for all those listening. We don't need that kind of thing on the bands. We can be grateful that the African station went down the band and ran his own pileup right while the worst of the mess was going on. He might have QRT.

Why?

The natural questions to ask about all this are "why" and "what can be done?"

Everybody has a theory on why. "Those converted CBers," "crowded bands," "redneck 4's and 5's," "California Killowatts," etc. I think it's just a sign of our society's decline in morals. It's a perfect example of the "me first" or "do your own thing" philosophy that's being ladled on all of us throughout society. In other words, there are enough selfish individuals out there now who respect absolutely no authority or decorem. They take it on themselves with glee to break the rules or to ignore them, especially if someone irks them. Some of them get a real kick out of what they do, and most of them are reinforced when they get a response —any response. It's then that things get really bad.

Please don't misunderstand. No one has said that *you* are responsible for these bad manners. Just that *someone* is, and that they respond with impatience, harshness, cunning, contention, pride, selfishness—in short, with bad manners. No matter what the reasons are for their actions, they do exist and the examples cited are real. Maybe you are partially responsible.

What Can Be Done About It—Short Term

Besides the obvious answer that persons responsible for the jamming ought to mend their sinister ways, what can or should be done about the situation? Well, the most effective short term thing we can all do is to completely ignore any form of jamming. That means no "policeman" on the air. Yes, even your comment, "Report that jammer to the FCC," right in the middle of the jamming. Don't say or do anything on the air that indicates a response to the jamming. Nothing whatsoever!

In the example given for the SV1/A, eight or more of the lines spoken were totally unnecessary. They added additional jamming on the channels, and they just spawned more sick or misguided behavior from those who were doing the jamming. In fact, these comments are probably just as bad if not worse than the jamming itself because they breed the mess. While you make your comment, someone else is being deprived of their contact, and they may very well retaliate with a comment of their own when your turn comes.

We need to self police ourselves, but not over the air. For example, someone out there knew who Joe was and who the insensitive clod was that spoiled the SV1 to help Joe. The guy in the know should call Joe up on the landline and tactfully discuss the matter with him. That means he should exert peer pressure.

A less direct, but perhaps more effective way of accomplishing peer pressure would be action by an ethics committee. The Southern California DX Club recently established such an ethics committee for this purpose. A team of guys was assigned who would (as a group) act on a complaint, and then contact and advise a club member about a violation of ethical standards. The intent is that such advice be done in a constructive fashion without the use of invectives. Of course, frequent or abusive continuation of such behavior might result in club sanctions or other actions against the offending member.

Another approach, which is particularly applicable in some circumstances, is restraint. So, somebody rips our knickers. We don't always have to demand revenge on the offending party. It may be accidental, anyway. But even if it's not, whatever happened to old-fashioned, charitable behavior?

Many times the local feuds between nearby amateurs can be avoided if we assume we may actually be part of the problem. If someone complains about our splatter or clicks, maybe we ought to check our rigs. Just because you buy a $2,000 hunk of electronics doesn't mean it's working properly. In any event, is that extra .1 dB you think you get with the higher mike gain setting or extra 10 dB of clipping really necessary? Suppose your neighbor did the same thing to you.

Long Term Solution

In the long run, though, our corrective action is going to have to center on legal means. It just doesn't look like we can count on peer pressure and self policing. Right now, much of the problem can be attributed to the fact that nobody involved fears FCC action, even when they are reported. So, if we can't be trusted to "scout's honor," or if we can't police ourselves, then we must somehow reestablish respect for the authority of the FCC. That means pressure on Congress and on the FCC to re-

establish priorities and to enable an effective way of funding their monitor efforts. Right now, there are no license fees. Even if there were, they would go into the U.S. general fund. FCC budgets are determined by Congressional appropriation. So, the long road to a better FCC regulation includes:

1. Re-establish FCC priority for more attention to ham radio.
2. Re-enact a fee structure with fees earmarked for amateur radio.
3. Modify appropriations to fit needs, but especially so that all of our fees are directed for our services.
4. Implement an effective course of action when violations occur.

Recently, progress has been made along the above lines. After lots of hard work and research, some Los Angeles area amateurs have managed to get the attention of FCC Chairman Ferris and his staff on this problem. We can all thank U.S. House of Representatives member James C. Corman (D, California), who was instrumental in bringing the amateurs together with the FCC. Your favorable comments to him would be a step in the right direction.

More FCC priority on action against amateur radio jamming violators was solicited at the meeting. The appeal seemed to be well received, too. Further, it has been followed by some action of late. With more such action, we may find a reestablishment of the "traffic cop" image the FCC once had. Hopefully, that will make some think twice about the flagrant violations that are occurring today. Otherwise we may be deluged with a litany of jamming and the mess of vigilantes that seem to follow it.

Parting Comment

Once and a while, all of us get our chain pulled too hard and it is then that we might contribute to the bad manners discussed above. However, things are really worse now than they were ten years ago. If we want to save amateur radio from the same horrible mess that one hears on CB, then we're going to have to solve this problem. The problem is like the gas crisis, too. There's a very fine line between stable and unstable. We are walking up that fine line now, and all of us who are active share the blame.

So, let's see if we can't do something about it—self policing, self restraint, appeals to the FCC or Congress—whatever the circumstances call for. What we least need, though, is apathy from the majority. Think about it, but please, then act on it.

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Other accessories not shown:

- YK-88C CW filter (500 Hz)
- PC-1 phone patch
- HC-10 world digital clock
- HS-5 and HS-4 headphones
- TL-922A linear amplifier
- AT-120 compact antenna tuner
- MC-30S and MC-35S noise-cancelling hand microphones
- MB-100 mobile mounting bracket

CQ Showcase

Heath 2 kw Antenna Tuner Kit

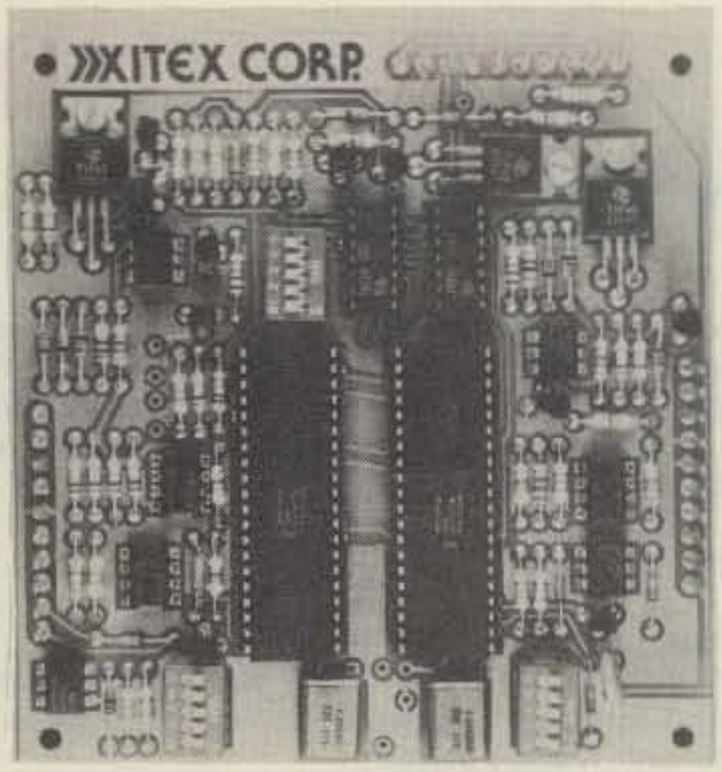
A new 2 kw Antenna Tuner in kit form has been introduced by Heath Company. Featuring a built-in balun, the Heathkit SA-2040 Antenna Tuner can be used with any type of balanced or unbalanced feedline. It tunes continuously between 3.5 and 30 MHz. a continuously variable inductor is said to give an infinite number of impedance settings for precise antenna matching. By noting settings on the eraseable front panel, the operator can return quickly to a specific frequency, especially helpful for net operations or contesting.

The tuner is capable of handling up to 2000 watts p.e.p. on sideband and 1000 watts on c.w. Housed in a black and gray metal cabinet measuring 5-5/8" H x 14-13/16"W x 13-15/16"D, the Antenna Tuner kit sells for $139.95. For more information, contact Heath Company, Benton Harbor, Michigan 49022, or circle number 105 on the reader service card.

MFJ 24 Hour Digital Clock

The MFJ-101 is a new 24 hour, solid state digital clock featuring blue .6 inch digits that are easy on the eyes yet bright enough to see from across the room. It has an ID timer that alerts you every nine minutes after you tap the ID/doze button.

The alarm feature will remind you of an important sked or wake you in the morning with a pleasant but persistant sound. The fast/slow set buttons make setting time and alarm simple. The alarm has an indicator which lights up when the alarm is on. The MFJ-101 operates on 110 v.a.c. with switchable 50/60 Hz for operation in Europe and Asian countries as well as the US. The cabinet is black with a brushed aluminum front and top panel is 6" x 2" x3". It is available for $29.95 plus $3.00 shipping and handling. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 103 on the reader service card.



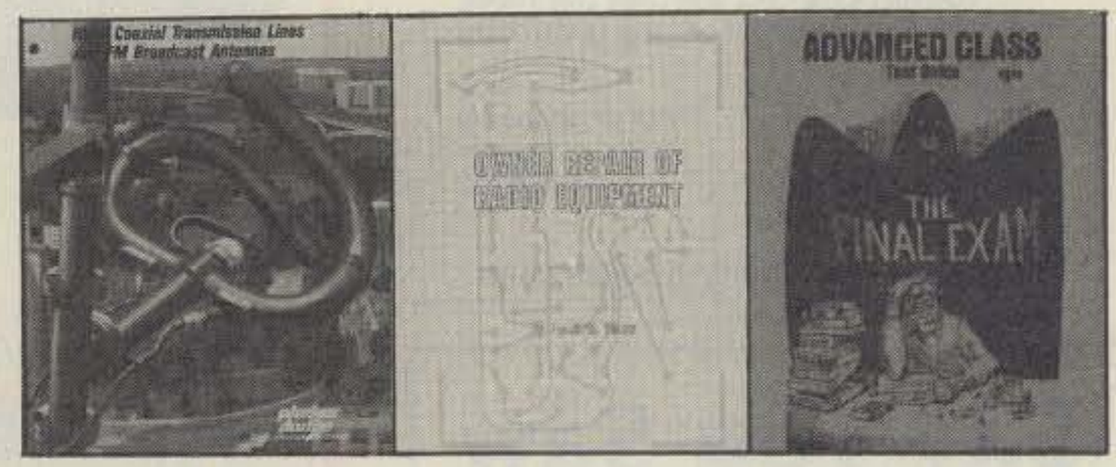
ABM-100 Universal Converter From Xitex

The potential applications for the ABM-100 Universal Converter extend well beyond the simple interfacing of ASCII and Baudot equipment. It allows the computer hobbyist to use an inexpensive surplus Baudot Teletype™ as a printer, and allows the amateur radio operator to send Baudot RTTY with a home computer. The ASCII Teletype ASR-33 can be used for Baudot on the air RTTY, or can be used as a speed converter (60 or 100 wpm). For the hard of hearing, the ABM can be used to allow interface with any ASCII computer or terminal through their current modem. For persons just learning Morse

Code, the ABM-100 will allow them to send to a mechanical or video terminal, see the decoded results, and make corrections of sending style.

The ABM-100, a completely wired and tested board, sells for $129. For further informaton, contact Xitex Corp., 9861 Chartwell Drive, Dallas, TX 75243, or circle number 108 on the reader service card.

The Printed Word: new reading material



Transmission Line and FM Broadcast Antenna Catalog. Phelps Dodge Communications Company has published a new catalog describing their rigid coaxial transmission line and FM broadcast antennas. The 24-page catalog describes the standard lengths in which the rigid line is available, along with information on end fitting configurations, components, hardware, and installation accessories, plus more. FM broadcast antennas are featured and a section of the catalog is devoted to randoms, low pass filters, and directional couplers. For a copy of catalog 1179, write to Phelps Dodge Communications Company, Route 79, Marlboro, NJ 07746, or circle number 114 on the reader service card.

Owner Repair of Radio Equipment. This book is a "how-to" book written for radio operators who are remotely located from repair facilities, or for those people who want to know more about how radio equipment works . . . and fails. Its instructional material provides a knowledge bridge bet ween the technical levels of the license-type manuals and the more complicated level of radio handbooks. This bridge is especially helpful for the recently licensed operator. This volume by Frank W. Glass is soft cover, 8½ × 11, 71 pages. The book is priced at $7.95 plus $.75 for mailing in the U.S. and $2.19 overseas book airmail, and is available from RQ Service Center, 14910 Los Gatos Blvd., Los Gatos, CA 95030, or for more information circle number 115 on the reader service card.

Advanced Class Test Guide. The Advanced Class Test Guide by Dick Bash, KL7IHP, is a study guide for the FCC Advanced Class Examination. It contains questions and answers representative of the type of questions currently on the FCC exam, with a section on how to take the exam. The book is constantly updated with revisions sent in by the readers, which include questions amateurs have found on their tests. The author is working on making the volume available to blind amateurs through cassettes. A "feedback" section is provided for the readers' input. The book sells for $9.95 plus $1.25 postage and handling (add $.65 sales tax California only) and is available from Bash Educational Services, P.O. Box 382, San Leandro, CA 94577, or for more information circle number 116 on the reader service card.

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

Solar activity during January, 1980 makes it almost certain that the present sunspot cycle will be the second highest ever recorded!

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 162 for January, 1980. Daily levels varied from a high of 262 on January 9th to a low of 107 recorded on the 25th. January's mean level results in a smoothed sunspot number of 156, centered on July, 1979. Cycle 3 peaked out at 156 in April, 1778, but the present cycle, Cycle 21, is expected to climb further. While it will take several more months yet before we know for sure, Cycle 21 probably peaked during November, 1979 at a level slightly greater than 160.

A smoothed sunspot level in the lower 140's is expected for May, 1980. This is about the same level of solar activity observed last May, so conditions on the h.f. bands this month should be quite similar to conditions during the same period last year.

May Conditions

During the daytime hours, from just after sunrise and continuing through sunset, expect DX conditions to most areas of the world on the *10, 15* and *20* meter bands. Twenty meters should be optimum for a two-to-three hour period following sunrise. *Fifteen* meters should take over as best DX band during the late morning and early afterncon hours. During the late afternoon all three bands should be at their best for DX propagation.

From sundown to Midnight, *20* meters is expected to be the optimum band for DX, with strong signal openings possible to most areas of the world. Good DX conditions are also expected on *15* meters for openings towards Latin America, the South Pacific, Asia and the Far East, and on *40* and *80* meters towards Europe, Africa and Latin America. From Midnight to sunrise, DX honors are expected to be shared between *20* and *40* meters, with some good openings also possible on *80* meters. Seasonally higher static levels and the longer hours of daylight are expected to reduce considerably chances for DX openings on the *160* meter band, but some may be possible during the hours of darkness towards the Caribbean and Central American areas.

For specific times of DX openings, refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains a *Short-Skip Propagation Chart* valid for May and June, as well as Charts centered on Alaska and Hawaii. The Short-Skip Chart contains propagation forecasts for openings varying in distance between approximately 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May, see the "Last Minute Forecast", which appears at the beginning of this column.

V.H.F. Ionospheric Openings

May should be a good month for short-skip ionospheric openings on the v.h.f. bands.

Look for F-layer openings on the *6* meter band during the daylight hours. Peak conditions should last from shortly before Noon through the afternoon hours, with openings likely towards southern Africa, Latin America and the South Pacific. Transcontinental openings, and openings towards Hawaii should also peak during the late afternoon hours. Be sure to check the *6* meter band for F-layer openings when conditions are HIGH NORMAL or better.

Sporadic-E ionization is expected to increase sharply during May, and frequent *6* meter short-skip openings should be possible. These are most likely to occur over distances of approximately 800 to 1400 miles. Although sporadic-E openings can take place at about any time of the day or night, the best time to check for them is between 10 a.m. and 2 p.m., and again between 6 and 10 p.m., local daylight time. With both short and long skip openings expected on *6* meters, this should be an interesting band to watch during May.

During periods of intense and widespread sporadic-E ionization, short-skip openings between approximately 1200 and 1400 miles may also be possible on *2* meters.

A seasonal decline in trans-equatorial propagation (TE) conditions is expected during May, but an occasional opening may still be possible on the *6* meter band towards South America from the southern tier states and the Caribbean area. The best time to check for *6* meter TE openings is between 9 and 11 p.m., local daylight time, on north-south paths which will cross the geomagnetic equator at an approximate right angle.

Some fairly good meteor- burst ionospheric openings should be possible on both *6* and *2* meters between May 4th and 6th as a result of the *Eta Aquarids* shower. This is a major meteor shower and is expected to peak on May 5th a count of approximately 20 meteors an hour. Intermittent openings over distances between approximately 800 and 1200 miles are likely to result from this meteor shower.

A seasonal decline is expected in

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for May 1980

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 3, 30	A	A	B	C
High Normal: 1, 4, 9-11, 18, 21-22, 28-29, 31	A	B	C	C-D
Low Normal: 2, 5, 8, 12-13, 17, 19-20, 23, 26-27	A-B	B-C	C-D	D-E
Below Normal: 6-7, 14-16, 24-25	B-C	C-D	D-E	E
Disturbed: None	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 (B) on May 1st, good-to-fair (B-C) on the 2nd, excellent (A) on the 3rd, good again (B) on the 4th, good-to-fair (B-C) on the 5th, etc.

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auroral activity during May, but some may occur during periods of radio storminess. Check the "Last Minute Forecase" which appears at the beginning of this column for those days that are expected to be BELOW NORMAL or DISTURBED. These are the days when there may be a chance for short-skip openings on the *6* and *2* meter bands resulting from ionized regions associated with auroral displays. Auroral-type openings generally range from several hundred miles up to a maximum distance of approximately 1300 miles.

Shortwave Propagation Handbook

There are still available a limited number of personalized copies of *The Shortwave Propagation Handbook* signed by both authors, George Jacobs, W3ASK and T.J. Cohen, N4XX. This book explains the many facets of shortwave propagation in simple, understandable language. It is also full of do-it-yourself data for predicting propagation openings to all areas of the world on the shortwave bands, as well as forecasting day-to-day conditions. The book is the first of its kind for the radio amateur, shortwave listener, commercial user and all others who derive pleasure or profit from the shortwave spectrum. Personalized copies can be obtained directly from the authors by sending $7.50 (postpaid) to:

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73, George, W3ASK

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.

CQ Short-Skip Propagation Chart
May & June, 1980
Local Daylight 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 (0-2) 14- 18 (0-1) 18- 22 (0-2) 22- 00 (0-1)	08- 10 (1-2) 10- 14 (2-3) 14- 18 (1-2) 18- 22 (2) 22- 00 (1) 00- 08 (0-1)	06- 10 (2-0) 10- 14 (3-1) 14- 16 (2-1) 16- 19 (2) 19- 22 (2-0) 22- 08 (1-0)
15	Nil	07 -10 (0-2) 10- 14 (0-3) 14- 18 (0-2) 18- 20 (0-3) 20- 00 (0-2) 00- 07 (0-1)	07- 10 (2) 10- 14 (3) 14- 18 (2-4) 18- 20 (3-4) 20- 22 (2-3) 22- 00 (2) 00- 07 (1)	07- 10 (2-1) 10- 14 (3-2) 14- 16 (4-3) 16- 20 (4) 20- 22 (3-2) 22- 00 (2) 00- 07 (1-0)
20	10- 13 (0-1) 13- 19 (0-2) 19- 01 (0-1)	07- 10 (0-2) 10- 13 (1-3) 13- 19 (2-4) 19- 21 (1-3) 21- 01 (1-2) 01- 07 (0-2)	07- 10 (2-3) 10- 13 (3-4) 13- 19 (4) 19- 21 (3-4) 21- 23 (2-4) 23- 01 (2-3) 01- 07 (2)	07- 10 (3) 10- 16 (4-3) 16- 23 (4) 23- 01 (3-4) 01- 03 (2-3) 03- 07 (2)
40	07- 09 (1-2) 09- 12 (2-4) 12- 20 (3-4) 20- 22 (2-3) 22- 01 (1-2) 01- 07 (0-1)	07- 09 (2-4) 09- 10 (4-3) 10- 16 (4-2) 16- 18 (4-3) 18- 22 (4) 22- 01 (2-3) 01- 07 (1-3)	07- 09 (4-3) 09- 10 (3) 10- 16 (2-1) 16- 18 (3-1) 18- 20 (4-2) 20- 22 (4) 22- 07 (3-4)	08- 10 (3-1) 10- 18 (1-0) 18- 20 (2-1) 20- 22 (4-3) 22- 06 (4) 06- 07 (4-3) 07- 08 (3)
80	08- 11 (4) 11- 19 (4-3) 19- 23 (4) 23- 08 (3-4)	08- 11 (4-1) 11- 17 (3-0) 17- 19 (3-1) 19- 21 (4-2) 21- 06 (4) 06- 08 (4-3)	08- 09 (1) 09- 11 (1-0) 11- 17 (0) 17- 19 (1-0) 19- 21 (2-1) 21- 23 (4-3) 23- 06 (4) 06- 08 (3-2)	08- 09 (1-0) 09- 19 (0) 19- 21 (1-0) 21- 23 (3-2) 23- 04 (4-3) 04- 06 (4-2) 06- 08 (2-1)
160	06- 09 (4-1) 09- 10 (2-0) 10- 19 (1-0) 19- 21 (3-1) 21- 23 (4-2) 23- 06 (4-3)	06- 09 (1) 09- 19 (0) 19- 21 (1-0) 21- 23 (2-1) 23- 01 (3-2) 01- 04 (3) 04- 06 (3-2)	08- 09 (1-0) 09- 21 (0) 21- 23 (1) 23- 01 (2-1) 01- 04 (3-2) 04- 06 (2) 06- 08 (1)	08- 21 (0) 21- 01 (1) 01- 04 (2) 04- 06 (2-1) 06- 07 (1) 07- 08 (1-0)

HAWAII
May & June, 1980
Openings Given In Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	15-17 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-15 (1) 15-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-07 (2)	19-20 (1) 20-23 (3) 23-02 (1) 20-21 (1)* 21-23 (2)* 23-01 (1)*
Central USA	12-15 (1) 15-17 (2) 17-18 (1)	05-07 (1) 07-12 (2) 12-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	08-12 (1) 12-16 (2) 16-18 (2) 18-22 (4) 22-00 (3) 00-02 (2) 02-06 (3) 06-08 (2)	19-20 (1) 20-21 (2) 21-01 (4) 01-02 (2) 02-04 (1) 20-21 (1)* 21-00 (2)* 00-03 (1)*
Western USA	09-12 (1) 12-17 (2) 17-19 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	06-08 (4) 08-16 (3) 16-22 (4) 22-02 (3) 02-06 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 19-20 (1)* 20-21 (2)* 21-03 (3)* 03-04 (2)* 04-05 (1)*

ALASKA
May & June, 1980
Openings Given in GMT

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil	18-20 (1) 20-22 (2) 22-01 (1) 01-03 (2) 03-05 (1)	20-22 (1) 22-02 (2) 02-06 (3) 06-08 (2) 08-10 (1) 10-14 (2) 14-16 (1)	05-10 (1)
Central USA	Nil	18-21 (1) 21-23 (2) 23-01 (1) 01-04 (2)	02-08 (3) 08-14 (2) 14-22 (1) 22-02 (2)	05-07 (1) 07-10 (2) 10-12 (1)
Western USA	00-03 (1)	18-20 (1) 20-23 (2) 23-02 (3) 02-05 (2) 05-07 (1)	02-04 (3) 04-08 (4) 08-14 (3) 14-18 (4) 18-20 (3) 20-02 (2)	04-06 (1) 06-08 (2) 08-12 (3) 12-15 (2) 15-16 (1) 08-12 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

* 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 (2), or higher.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 2300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

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CIRCLE 3 ON READER SERVICE CARD

CQ Reviews: Heathkit's Series Of Electronic Courses

BY JOHN J. SCHULTZ*, W4FA

The Heath company offers what they call an Electronics Fundamentals Program. The program consists of a series of individual electronic technology courses, starting with a course on DC/AC fundamentals and progressing up to a course on digital electronics. In between, there are courses on transistors, integrated circuits, etc. Two circuit breadboarding units—one designed for linear circuits and one for digital circuits—are available to do experiments described in the courses.

One could take the whole series of courses and thereby gain a very solid background in the basic theory and practical application of almost every solid-state active device used in modern electronics. However, many amateurs might well be interested in just one or two of the individual courses. This is especially true for amateurs who feel a bit left behind by all the solid state technology around today and wish to "catch-up" a bit. For instance, there are many amateurs who build numerous circuits using bipolar transistors, FET's and digital IC's, but who still do not have a good fundamental grasp on how these devices operate. One then becomes confined to just being able to duplicate a circuit of interest rather than being able to logically modify or trouble-shoot a circuit. Taking one or more of the Heath courses will not turn you into a circuit designer. But it certainly will allow you to far more enjoy any solid-state circuit construction work by taking the basic mystery out of today's solid-state devices.

Two of the Heath courses were purchased and were reviewed in detail. These were the Semiconductor Devices Course (EE 3103, $44.95) and the Digital Techniques Course (EE 3201,$59.95). The breadboard trainer/experimenters (ET-3100, $69.95 and ET 3200, $84.95), which Heath recommends one use with these and others of the courses in the program, were also constructed and used with the two courses. These two courses were reviewed because it was felt they would be of the greatest appeal to most amateurs who have a reasonably good understanding of electronic circuit fundamentals and who wish to learn a bit about transistor technology. However, all of the courses have the same basic makeup as the two which were reviewed, so the comments made about them should apply, in general, to all of the courses in the program.

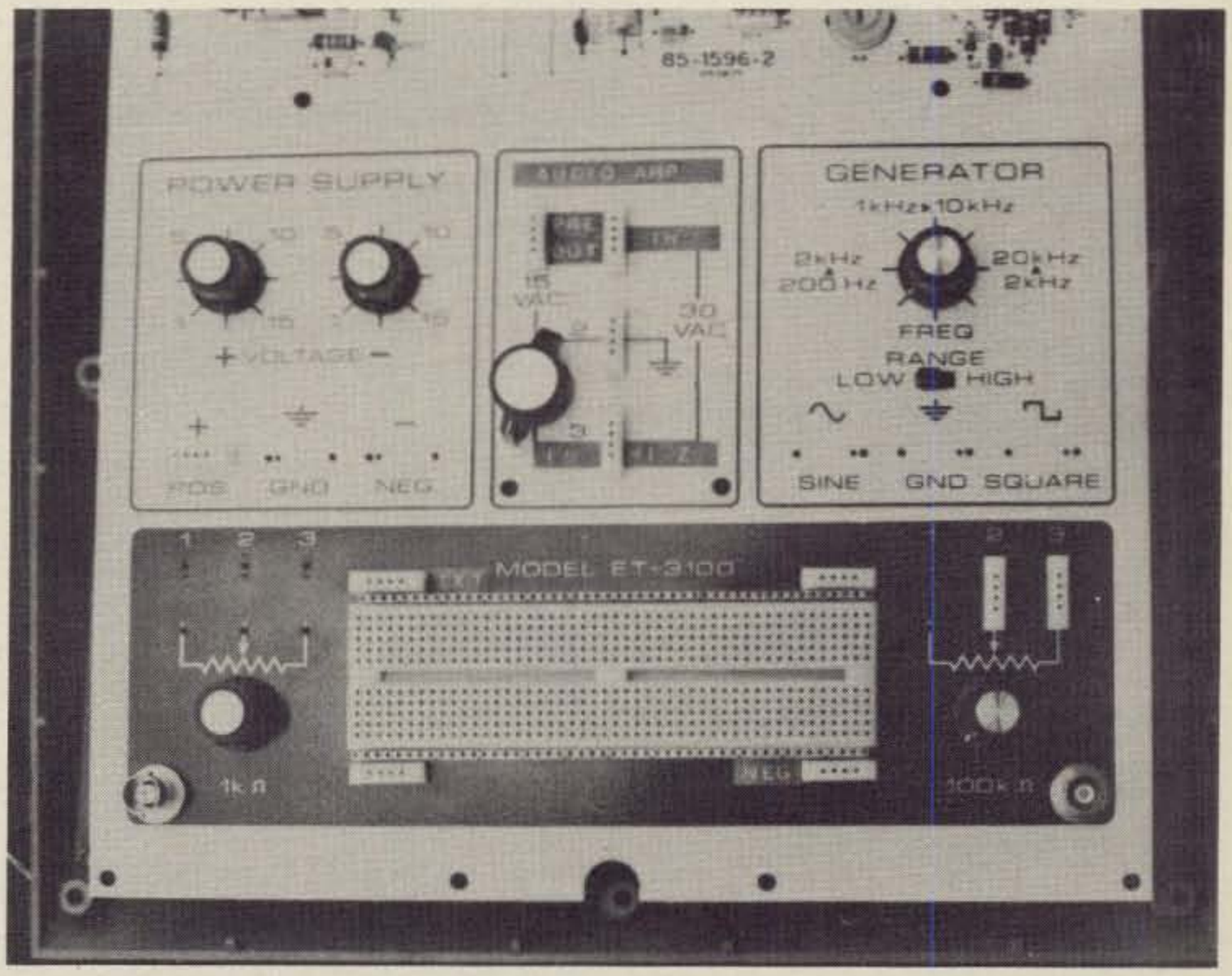

Fig. 1 -This is a partially completed ET-3100 Trainer/Experimenter. An audio preamplifier/amplifier combination has been added in the center panel to facilitate circuit experimentation as discussed in the text.

The Semiconductor Devices Course (EE 3103)

This course consists of a one volume text, several recordings and a number of small components to carry out experiments outlined in the text. The text has 10 chapters, starting out with one on diodes and then progressing to bipolar transistors, FET's,

*c/o CQ Magazine

Linear IC's, Thyristors, etc. and ending up with a chapter on Optoelectronic Devices.

As with any self-study course, the layout and composition of the text is all-important if one is going to not only learn from the course but enjoy taking the course. On this score, Heath deserves a big plus mark. The text binder is a large loose-leaf type. It opens easily to lie flat and the text pages are printed in large type with plenty of white area. The text itself is of the programmed course type with frequent self-test and review questions and answers to emphasize the main teaching points. Elaborate theory is avoided although there is a good explanation of the basics relating to holes, electron flow, majority carriers, etc. However, the main emphasis is on the practical operation of semiconductor devices expressed in simple language. The recordings emphasize the main teaching points again and lend a sort of personal teacher-student relationship to the course. But, strictly speaking, one can do without the use of the recordings and still learn using the text only.

Bipolar transistors receive the heaviest emphasis with two long chapters devoted to them. A single experiment accompanies each chapter — one relating to the testing

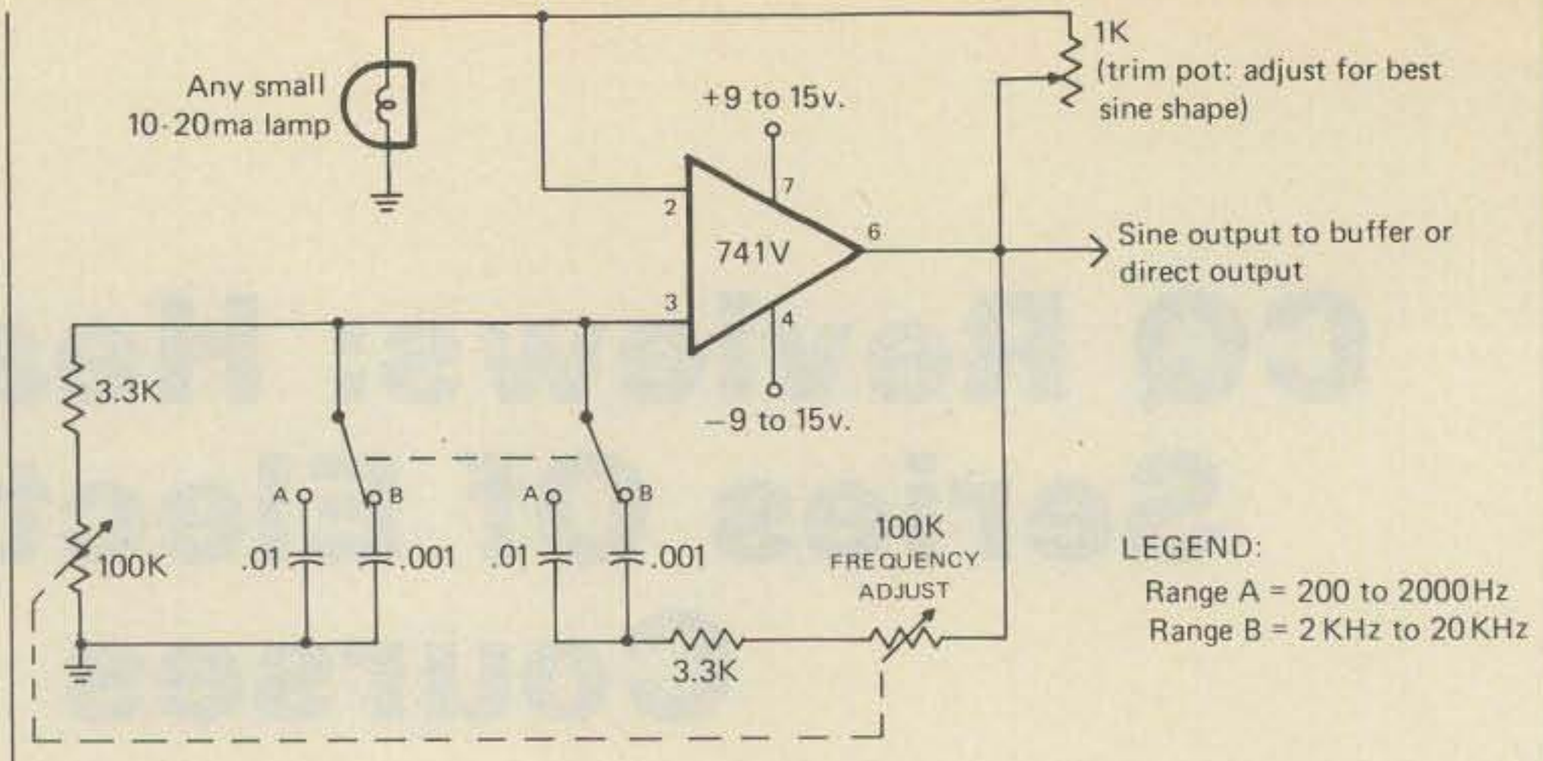

Fig. 2 -A simple, stable, wide-range, single-IC audio oscillator is used in the ET-3100. The circuit uses standard value parts and should be useful for many audio oscillator applications.

of bipolar transistors using an ohmmeter and one in which a simple one-stage audio amplifier is constructed. FET devices are nicely covered in one long chapter and there are two simple experiments using an insulated gate FET and a junction type FET. SCR's and uni-junction transistors are covered in the chapter on Thyristors. There is a chapter on integrated circuits but no experiments are performed. The chapter on Optoelectronic Devices includes simple experiments on an LED and on a phototransistor.

In general, as one goes through the course, there is a feeling that the experiments described are either too simple in relationship to the text or that certain experiments are lacking. For instance, there is a good text description of varactor and tunnel diodes and simple IC's, but no experiments to illustrate their operation.

The experiments described are too simple to absolutely require the use of the ET 3100 breadboard trainer/experimenter recommended for use with the course. One can easily perform all of the experiments described in the text without the trainer by the use of simple hookups using batteries and clip leads. The investment in the ET 3100 trainer/experimenter would only seem to be justified if one is going to progress on to the next Heath course on solid-state circuit technology or if one intends to develop one's own experimental circuits. The latter can be done, of course, from the basic knowledge gained from the course.

All in all, the Semiconductor Devices course presents a very clear, applications-oriented coverage of all of the most common, discrete semiconductor devices in use today. If one has at least a good understanding of only ohm's law and if the "old-timers" who take the course can temporarily forget what they know (or think they know) about vacuum tube operation, one can gain some very solid, solid-state knowledge from the course. As a check on how much one has learned, a "final exam" can be sent in to Heath for grading. However, if one honestly completes the self-checking exams at the end of each chapter, there should be little doubt left about one's progress by the end of the course.

The Digital Techniques Course (EE 3201)

This course consists of a two-volume text, several recordings and a number of IC's and other components for circuit experimentation.

The two-volume text has 10 good-sized chapters, starting out with one to explain binary numbering and then progressing on to transistor switches, gates, digital IC's, flip-flops, registers, counters, decoders, memories, etc. The general layout of the text is the same as that used for the Semiconductor Devices course. Again, the recordings are used to emphasize the main teaching points, but their use is not essential. Frequent self-tests and tests at the end of each chapter ensure a good check on one's understanding of the functions described.

Because of the nature of digital devices, a logical development of the chapters for such a course is possible, which one cannot do when dealing with other semiconductor devices. At any rate, the Heath editors took excellent advantage of the possibility to logically organize the chapters. Although one probably should have a basic knowledge of how transistors work as linear devices before taking the course, one could actually take the course

without such a background! The chapters build very smoothly on each other (with one possible exception mentioned below) and the course is really fun-learning.

After one learns how the various types of gates work one progresses to the operation of flip-flops, registers and decoders. The operation of all of these devices is then tied together very nicely towards the end of the course when one goes through a detailed study of how a frequency counter works. The explanations and illustrations given for the operation of various digital IC's, such as JK Flip-Flops, are the clearest the author has yet seen in print.

The experiments to a large extent provide excellent support for the text. One constructs various gates and flip-flop arrangements and towards the end of the course the experiments culminate with the construction of a simple, single digit counter circuit using a seven segment LED readout. The last experimental circuit uses all of the IC's supplied with the course and which were used in previous experiments to study their individual operation. So, the last experimental circuit is a very satisfying experience in that one clearly understands how a fairly complex circuit can be built up from individual IC "building blocks".

There are only two minor points about the course which detracted a bit from its overall excellent quality. One was the Chapter on Boolean Algebra which seemed a bit out of place not only in its placement between the chapters on digital IC's and flip-flops but in its being included in the course at all. The latter remark will probably bring forth some screams from instructors and with real justification when one considers involved digital circuit design where one must minimize the number of gates used to perform a given circuit function. But, it makes little difference to the average small circuit builder if he wastes a few gates, and learning and using Boolean Algebra is of little value to him.

Also the course "touches" on digital computers and microprocessors. Unfortunately, the "touch" is such a light one that it is of little real value. No experiments are done in either area and it seems that the material was only included as an afterthought to make the course sound more attractive. It would have been better to recognize that one relatively small course on digital circuits cannot cover every application aspect and leave it go at that.

One does not absolutely need the ET-3200 trainer/experimenter associated with the course but it is very handy to have and far more useful with this course than the ET 3200 trainer/experimenter is with the Semiconductor Devices course. Also, someone who takes the digital course is far more likely to be interested in going on to do some individual circuit experimenting and the ET-3200 unit can be very handy for such an application.

All in all, the EE-3201 course is a very worthwhile undertaking for someone who would like to get started in digital electronics. Its rather minor shortcomings (in the author's view) are far outbalanced by its clear, logical presentation of the subject matter.

The ET-3100 and ET-3200 Trainer/Experimenter Units

These units are designed with a dual function in mind. They can be used to carry out the experiments outlined in the various course text books. Also, they can be used later for continuing individual circuit experimentation and development. For the former purpose, the trainer/experimenters are, of course, complete and need no modifications to be used with any of the Heath courses. However, for continuing use as one experiments with more elaborate circuits or as one tries to develop one's own circuits for a particular application, a few modifications will turn the trainers into more useful accessories. In fact, even if one does not take the Heath courses but likes to do circuit experimentation work, the separate purchase of one or the other of the trainer/experimenter units might be considered.

The ET-3100 Trainer

The ET-3100 is meant for use with discrete transistor or linear IC circuits. It provides a breadboarding socket; regulated, independently variable and current limiting positive and negative 1-15 volt power supplies; and a built-in sine/square wave oscillator covering from 200 Hz to 20 kHz.

Fig. 1 shows a view of the partially assembled ET-3100 unit. The top cover has been removed, as can be seen by comparison with Fig. 3 which shows a completed ET-3200 trainer. Both units utilize the same type of housing. All of the components for the ET-3100, except the power transformer, mount on a single PC board and construction is a matter of several hours work.

The main modification necessary to the ET-3100 in order to make it more versatile is to reduce the long lead lengths, especially those used for grounding connections. For sim-

ple audio circuits the trainer will work without modification but if high-gain IC's are used or if low-frequency r.f. circuits are tried, any long lead lengths will cause havoc. As can be seen in Fig. 1, a separate grounding plug-in strip is installed immediately above and below the central breadboarding socket. These strips (Vector Klip-Bus J45-48 or similar) are soldered directly to the foil underside of the PC board and provide a very direct grounding connection for bypass capacitors, etc. To facilitate the connection to external generators, scope, etc., a BNC connector is installed by each of the two potentiometers and the "hot" lead from each goes to separate 4 hole terminal strips mounted on the top right and left of the central breadboarding socket immediately above the added grounding strip. The one on the left in the photo is marked "EXT." To facilitate the wiring of circuits which require a negative as well as a positive supply voltage, the negative power supply output is wired to two 4 hole terminal strips mounted below the central breadboarding socket. The right one in the photo is marked "NEG". The 4 hole terminal strips used were the same as Heath supplied for various other panel connections (e.g. the potentiometers).

The central panel position in the trainer originally supplied just an a.c. voltage output from the secondary of the power supply transformer. This a.c. output is used for some course experiments but is not of too much use for further circuit work. The connection points available were taken

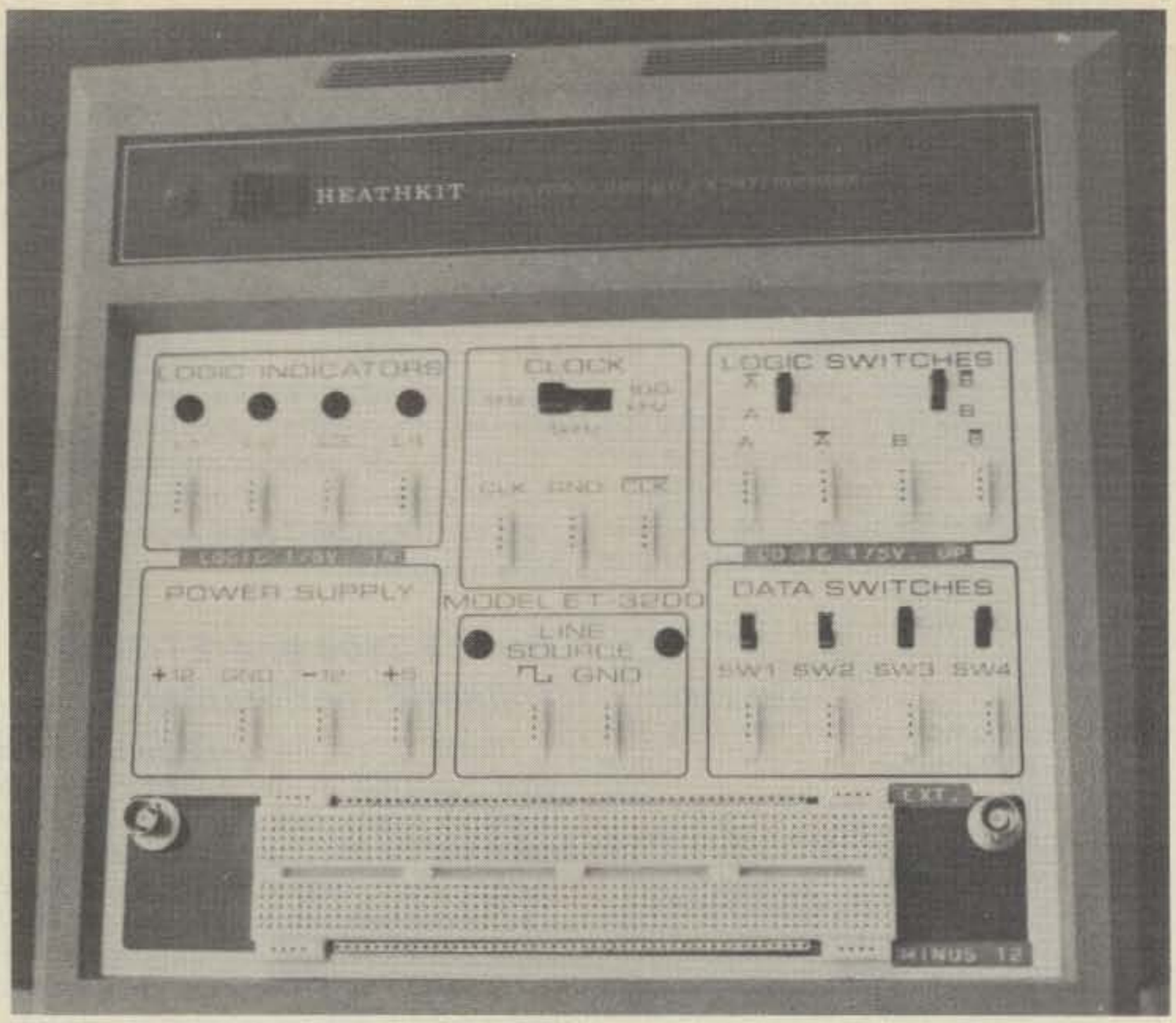

Fig. 3 -The completed ET-3200 Digital IC Trainer/Experimenter. Note the added, continuous type plug-in grounding strips located immediately above and below the central breadboarding socket.

advantage of to build a small audio pre-amplifier and 2 watt audio power amplifier into the trainer. A small speaker was mounted in the base of the trainer along with a headphone jack on the side of the base. The built-in audio amplifier has proved very useful to conduct a number of audio circuit experiments. Since the trainer already has a built-in audio generator, this addition makes the trainer a pretty well self-contained unit for audio circuit experimentation. The preamplifier and power amplifier used were of the module type, although a wide variety of circuits could be used.

A later addition made to the trainer which is not shown in the photo was the addition of a rectangular 0-100 mA panel meter directly below the lettering "voltage" on the power supply panel. This helped facilitate circuit experimentation especially when a circuit was being tried which would eventually be battery operated and the current drain had to be minimized.

Fig. 2 shows the diagram of the audio oscillator Heath uses in the trainer. It is a particularly simple but stable circuit which one might find useful for other applications.

The ET-3200 Trainer

The ET-3200 is shown in Fig. 3. Although clearly meant for training and experimentation with digital IC's, it could also be used for some discrete transistor and linear IC experimentation. This is especially true if it is used with an external audio oscillator and RC substitution box. It supplies only fixed voltages of plus 5, plus 12 and minus 12 volts. The 12 volt supplies can, of course, be divided down by resistor networks on the central breadboarding socket to experiment with linear IC's requiring lower voltages.

The main modification to this trainer was the addition of a grounding strip immediately above and below the central breadboarding socket. BNC connectors were added along with 4 terminal sockets at the top right and left of the central socket to facilitate the connection of external test equipment. Also, 4 terminal strips were added at the bottom left and right of the central socket to bring the internal minus 12 volt power supply line closer to the central socket. Later on, a front panel rectangular 0-1 amp meter was added to the trainer in the space immediately below the lettering "Power Supply".

Both trainers have proven extremely useful for circuit experimentation work. They appear to be virtually "goof-proof" in the sense that false interconnections between terminal points on the panels will not damage the internal components. Of course, this does not apply to falsely connected external components used in the breadboarding sockets.

This system may be used to protect any transceiver and any external amplifier from damage due to high s.w.r. operation. You can reduce replacement costs and increase your rig's operating life.

High S.W.R. Protection For Transceivers And Amplifiers

BY PROFESSOR MARK MANDELKERN*, K6BE/5

Along with the fun of operating a modern transceiver, one often experiences the following troubles with the power amplifier stage.

1. When operation is attempted with a high s.w.r., damage often occurs to the loading padder capacitors. This can happen even when the transmitter is operated for only a second; for example, if a few dits are accidentally keyed into the wrong antenna. The problem is especially serious when the transmitter is equipped with broadband circuits.

2. When tetrode tubes are used, there is a special problem. Under high s.w.r. conditions, or during tune-up while loading adjustments are being made, the screen current often rises far beyond the maximum allowable limit. This causes tube failure, internal arcing, and driver and power supply damage.

3. *Even under normal operation* into a proper load, there is often a spike in the r.f. output, occuring at the beginning of a transmission, which causes arcing in the PA circuit components. This arcing can cause burnt contacts in the bandswitch, requiring extensive repairs.

4. When used as a driver for a linear amplifier, the amplifier relay is often *slower* than the transceiver circuits. This means that while the amplifier is switching, the transceiver operates into an open circuit, causing all the above problems associated with high s.w.r. This problem is especially likely to occur when the transceiver incorporates break-in.

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System Performance

With this system, the transceiver may be used with any antenna, or even *no* antenna *(signal reports may be low!),* with no damage to the radio, in either the broadband or the manual mode. It allows on-the-air operation with high s.w.r., at automatically reduced input. Tuning is greatly simplified; instead of the usual method of gradually increasing the drive while constantly monitoring the screen current and adjusting the loading, the drive may be turned up and the PA controls quickly adjusted for maximum output, while the new circuit automatically keeps the screen current under control.

This system, while developed for the Signal/One CX7, will function as well in any modern transceiver. The circuits shown need no changes; the installation and connection to the existing transceiver circuitry will of course be adapted to the particular model.

The system is presently in use in more than a dozen transceivers, with uniformly excellent results.

Theory of Operation

The system consists of the following three components:

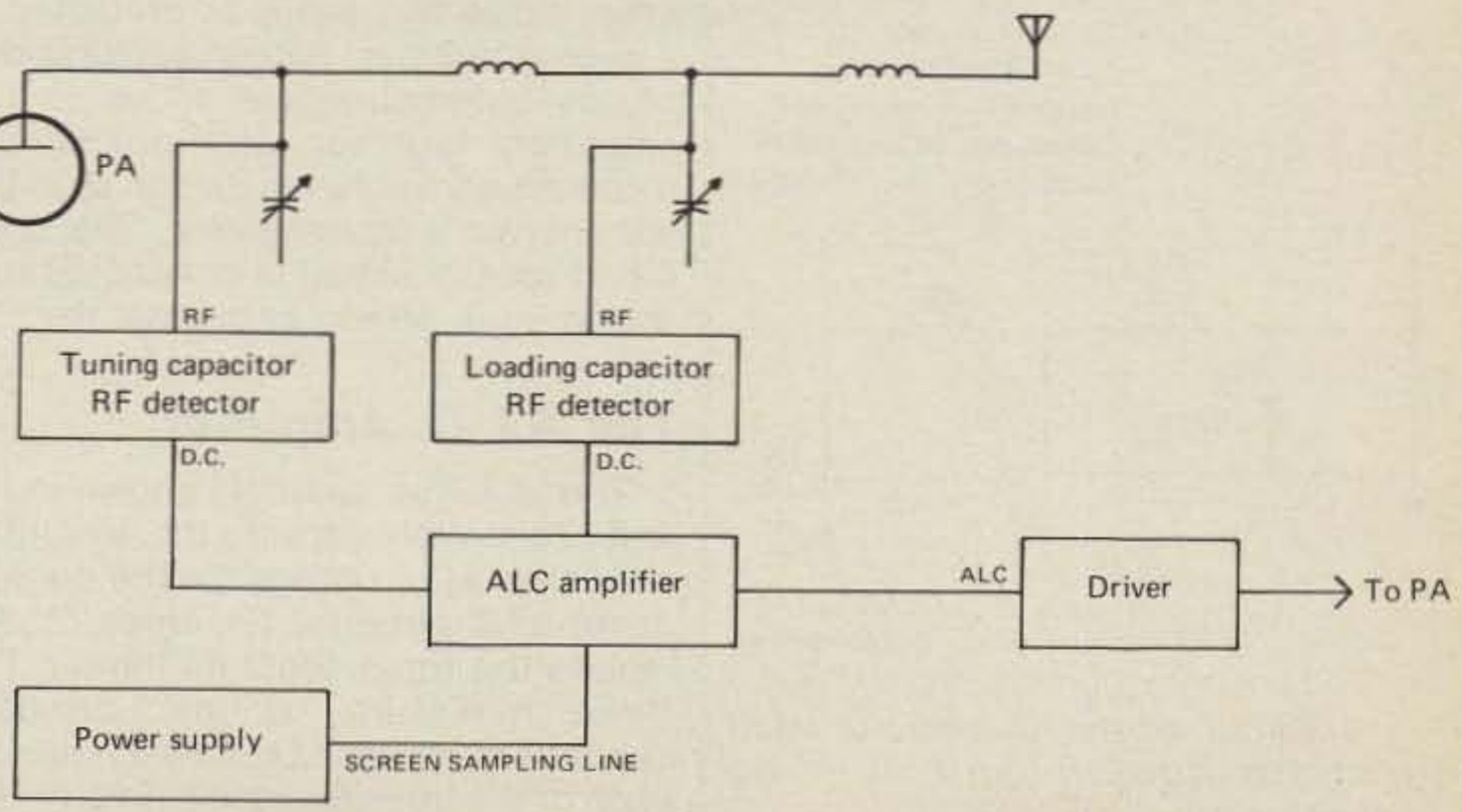

Fig. 1- Simplified block diagram of the system.

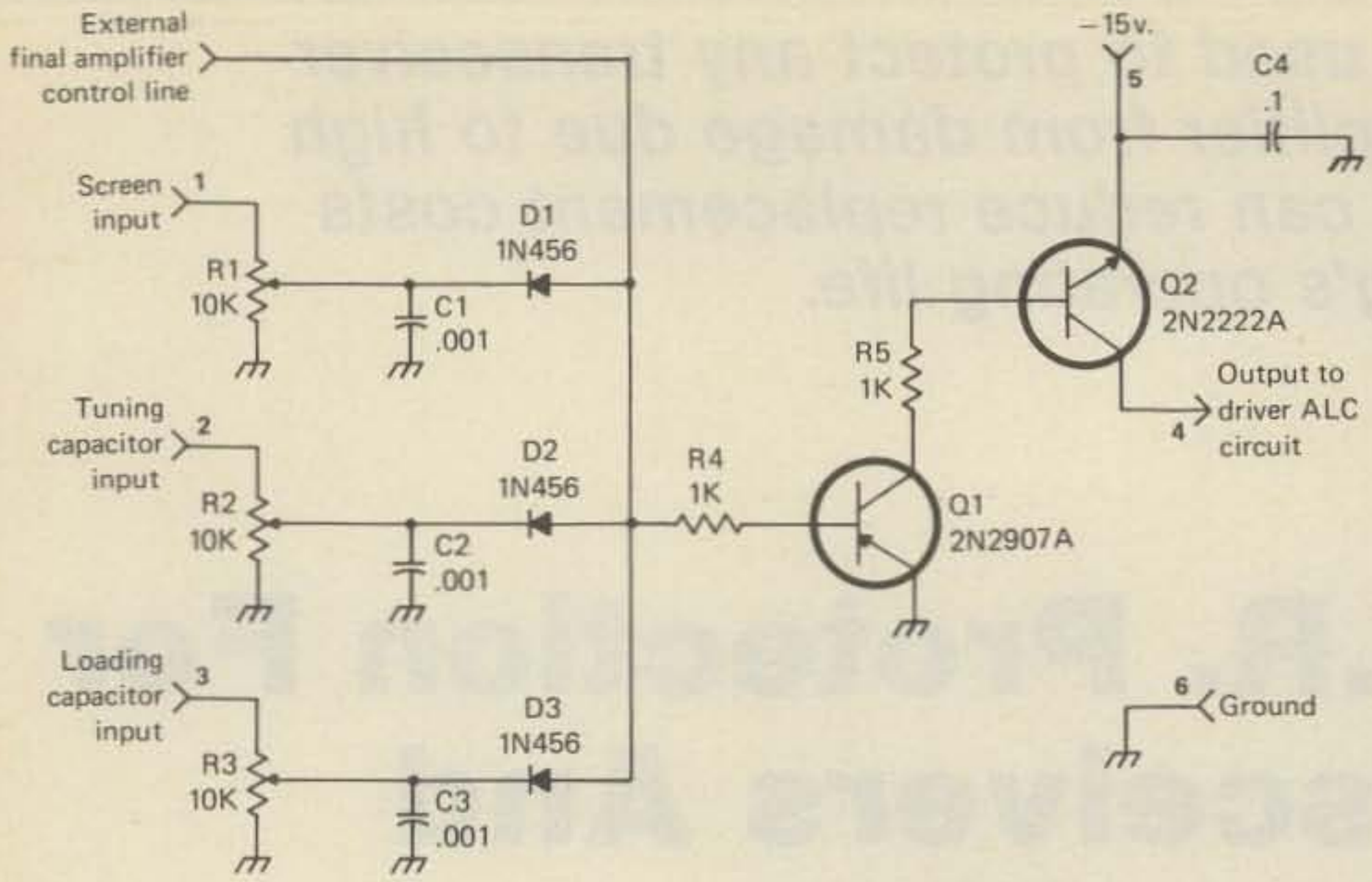

Fig. 2- The a.l.c. amplifier.

1. A d.c. amplifier added to the a.l.c. circuits.
2. An r.f. level detector added to the power amplifier manual and broadband tuning capacitors.
3. An r.f. level detector added to the power amplifier manual and broadband loading capacitor.

The d.c. amplifier increases the sensitivity of the a.l.c. circuits, and allows the driver to control the r.f. levels in the PA, and also to control the screen current. This eliminates the arcing and component damage. The control signals for the tuning and loading capacitor r.f. levels are provided by the added PA detectors. A block diagram of the entire system is shown in fig. 1.

The CX7 design includes a "screen a.l.c. circuit" which, however, never functions, due to the currents and voltages involved. The d.c. amplifier added in this protection system corrects this situation by adding the necessary gain. The control signal for the screen current is provided by the power supply circuit in the original design.

For transceivers other than the CX7, a screen current control circuit must be added to the power supply. This is merely a shunt in the negative screen lead; it requires a separate screen supply. Alternatively, this portion of the protective system may be omitted; the r.f. level limiting will do much to protect the screen also. If the screen protection is included, the shunt is selected so that about 3 volts appear across the shunt at the maximum allowable screen current. This value is not critical, since the fine adjustment for maximum screen current is made by the screen trimmer on the a.l.c. amplifier. The shunt should have a 3 watt rating, as its failure would damage the a.l.c. amplifier.

If an external final amplifier is utilized, it may very easily be protected in a similar manner. Screen sensing and r.f. level detecting are added to the amplifier, together with adjustment trimmers and isolating diodes as in the transceiver a.l.c. amplifier. The combined control signal is connected to a fourth input on the a.l.c. amplifier.

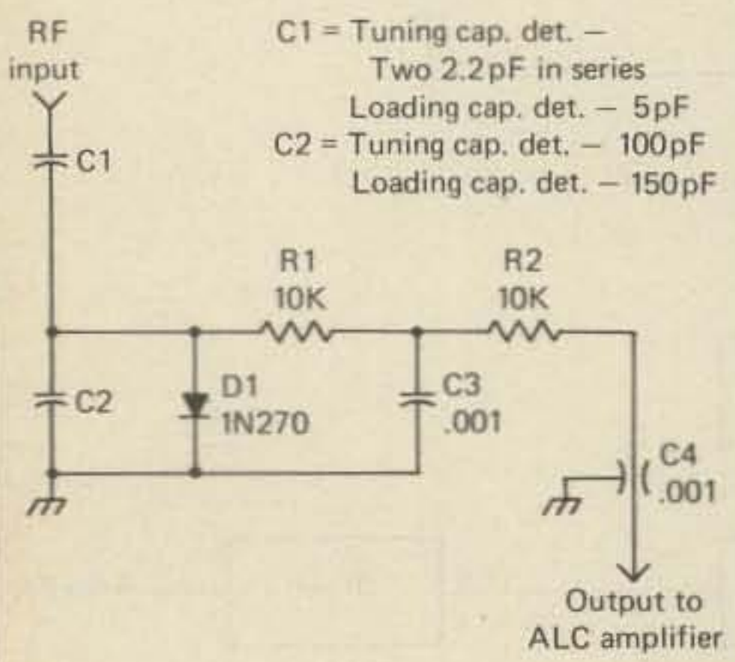

Fig. 3- Circuit of the r.f. detector used for both tuning and loading capacitors.

The A.L.C. Amplifier

The amplifier circuit is shown in fig. 2. It is a straight-forward d.c. amplifier, providing a.l.c. voltage for the original driver a.l.c. circuits. The three diodes isolate the three separate inputs. The three miniature trimmer controls separately set the a.l.c. threshholds for each of the three operating parameters controlled. The PA grid a.l.c. functions as originally designed, with no modification. R1 is adjusted so that at the maximum allowable screen current, the voltage on the screen sampling line from the power supply is reduced to the voltage level needed to turn on transistor Q1. Trimmers R2 and R3 function similarly.

The amplifier is constructed on a small circuit board. It is installed wherever space is available. If the power supply does not include a low voltage negative supply, the bias supply may be utilized using a voltage divider. The voltage and regulation are not critical. (In the CX7, the amplifier board is epoxy cemented to the driver board. Diode A5-CR2, which is in the screen a.l.c. line, is removed, and the amplifer is connected into the circuit in its place, using the circuit board pads to which the diode had been connected. Operating voltage for the amplifer is obtained from the driver board.)

R.F. Level Detectors

The circuits for the r.f. level detectors are shown in fig. 3. They are identical except for the r.f. voltage dividers. The dividers were chosen to provide approximately 3 volts at the amplifier trimmers, which requires about 10 volts at the detector diodes. Thus dividers providing 100 times and 30 times attenuation were chosen, corresponding to 1000 volts and 300 volts peak r.f. at the tuning and loading capacitors, respectively. These levels are merely nominal; the exact threshholds are set by the trimmers, and depend on the capabilities of the transceiver's PA components.

Construction Details

Amplifier. The amplifier is constructed on a 2″ by 1.3″ piece of *Keystone* type 4230 glass epoxy board, P pattern, 0.1″ grid. The trimmers are *IRC* type X-201-R103B. Transistors are mounted in sockets, *Augat* type 8059-2G1. The circuit board layout is shown in fig. 5. (In the CX7, the circuit board is epoxy cemented to the driver along a line extending from R19 to pin 262. Terminals 2 and 3 are fitted with *Amp* connectors as used throughout the CX7. The other four terminals are fitted with leads connecting to the driver board.)

Tuning Capacitor R.F. Detector. Parts C3, D1, R1, and C4 are mounted on a miniature terminal strip and installed inside the PA cage. Capacitors C1 and C2 are connected between the terminal strip and the tuning capacitor; they are 1000 volt NPO discs, *Sprague* type 10TCC-V22. C3 is a silver mica. C5 is a feed-thru mounted on the PA cage. Resistor R2 is attached directly to C5

with a short lead, for good filtering. (In the CX7, the detector is installed on the left side of the upper PA cage, above the insulator for tie point E29, and C1 is connected to this tie point.)

Loading Capacitor R.F. Detector. Parts C2, D1, R1 and C3 are mounted on another miniature terminal strip inside the PA cage. Capacitor C1 is a 1000 volt NPO disc, *Sprague* type 10TCC-V50, connected between the terminal strip and the PA loading capacitor. Capacitor C2 is a silver mica. Feed-thru C4 is mounted near the terminal strip, and resistor R2 is connected directly between the terminal strip and the feed-thru. (In the CX7, the detector is mounted on the front of the upper PA cage, near the broadband switch. C1 is connected to the wiper on the loading capacitor (front) section of the broadband switch, the lug with wire 493 leading to tie point E32.)

Power Supply Modification

When the a.l.c. amplifier is installed in the CX7, diode A5-CR7 should be checked. If there has been any trouble in the screen supply, this diode will probably be open and must be replaced. To prevent similar damage to the a.l.c. amplfier, change R6 on the power supply board to 3 watts, and add a 100 ohm, ½ watt, resistor between the screen supply rectifiers and pin 152. Also, a 1/8 a. fuse in the screen lead to the PA is recommended.

Adjustment

1. Screen current. In the receive mode, use a bench power supply to apply approximately −3 v.d.c. at the screen input on the a.l.c. amplifier. Adjust the bench power supply voltage to a level corresponding to the maximum allowable screen current. Measure the a.l.c. voltage produced by the a.l.c. amplifier and adjust R1 to obtain full limiting in the controlled stages of the transceiver; this setting will vary with different models. An a.l.c. meter, if provided, will facilitate the adjustment. (In the CX7, switch the meter to a.l.c. and adjust R1 to obtain a reading of 1.0.)

2. R.f. levels. Turn R2 and R3 to minimum. Realign the broadband circuits. On each band, running full power in broadband into a 50 ohm dummy load, measure the d.c. voltage obtained at the two r.f. level amplifier inputs. Select the band which produces the highest tuning capacitor r.f. level. On this band, while running full power, advance R2 until the output just begins to drop, then back off R2 so that there is no reduction in output. Select the band which produces the highest loading capacitor r.f. level, and repeat the procedure for R3.

Operation

The drive should be set at a level so that normal a.l.c. meter indications are obtained when the radio is keyed, or under normal voice conditions. The a.l.c. meter will indicate whenever a grid current, scren current, tuning capacitor r.f. level, or loading capacitor r.f. level threshhold has been reached, whichever of the four is reached first. For manual tune-up, advance the drive somewhat beyond the point where a.l.c. indication is normally obtained, and adjust the PA controls for maximum output.

This month by

ROD LINKOUS, W7OM

DX

News of communications around the world

After nine years, I am no longer the QSL manager for one of the most active DX stations in Oceania. It was a great experience with a lot of fine memories. A few are shared here.

Still Rare After 35,000 QSL Cards

In January 1971, a Seattle DXing friend asked if I'd like to be a QSL manager. In a weaker moment, I said "sure". That quick answer started a truly great time in DXing.

The DX station was KG6SW, operated by another old friend, Dr Len Kaufer, W7DXH, of Seattle, Washington. In the early seventies, the Mariana Islands was on the top of everybody's most wanted list. Except for a couple of DXpeditions and the activity of a few others, KG6SW was a rare DX call. (*Ed.- Don Miller, W9WNV, made his first DXpedition to Rota in the Marianas in 1963.*)

Len became very active in the early days, primarily working the United States and some Europe. His popularity was beyond his and my expectations. So the log sheets filled faster than I could supply them.

In 1973, Len hosted a DXpedition crew from the Seattle based Western Washington DX Club. Rex Maner, K7QQ and Don Walter, W7NG, set a new *CQ* World Wide record in the multi operator - single transmitter class for Oceania. A record that held for several years. The request for QSL cards ran over 70%.

In August 1976, Chip Margelli, K7JA, visited Len. During his stay he worked the All Asia C.W. Contest. This was the first major c.w. effort from the Marianas in several years. Needless to say, Chip set the current record for the All Asia C.W. Contest. He also gave the non-Asians a c.w. contact or two.

Chip returned to Saipan again in October 1977 to try for the world phone record in the *CQ* World Wide contest. The flu took its toll, sending him to bed under doctor's orders, but not until after more than 4,700 contacts were in the log.

With the addition of the c.w. segment to the *CQ* WPX contest in 1979, Chip returned to visit the KG6SW shack. This time armed with a FT-901 he took a stab at the record. (The results are pending as I write this.)

The contest efforts helped to relieve the everyday pilup situation. Then with the addition of several more active amateurs to Saipan, the demand got almost tolerable.

During this time, Len got more active to meet the demand "for a new one". The Radio Club of Saipan was formed and grew. The activity from the island increased to where some west coast stations heard Saipan often.

The dawn of 1980 brought about new calls for the Marianas as the U.S. FCC took charge of the administration. Also came the retirement of the call KG6SW and the birth of KH0AC. This provided an excellent point to transfer the QSL chores to a mutual friend and eager DXer, Jon Zabel, K7ZA. At this point the KG6SW log books contained over 100,000 contacts. The shack contained several awards and trophies. The QSL card collection was sizeable.

Len's prime interest was handling traffic for the islanders, both within Micronesia and with the United States. Yet, he always enjoyed working another new one too. His country total (not counting the countries worked during a contest) is 244.

One can readily understand the demand of a country on different bands and different modes. The event of 5BDXCC and 5BWAZ made five contacts a must for the more avid DXers. The mode awards added another understandable demension. Yet, the amount of requests for a card to confirm a new one keep coming in, even today.

Of the last fifty cards received direct, 22 stated this was a new country. No notes were included with the others. Some of them may have been for a new one too.

A recent review of several "most wanted lists" prepared by DX clubs and smaller groups was interesting. The Mariana Islands were in the top 25 most needed countries in 4 of 7 lists. In a poll run nationally, KG6S (the Marianas) ranked 123 of 319 countries.

This story is not told to impress you with the numbers and history of a well known DX station. But, to point out a couple of things that many never think about. When the next

*5632 47th Ave. SW, Seattle, Washington 98136

CQ DX Awards Program S.S.B.

803	I0SGF	813	K0CN
804	JA1VDJ	814	WD4GSF
805	WD9IIX	815	PT7TP
806	WD4HYH	816	VE3JKZ
807	N0AJZ	817	VE2EVO
808	WB3CFD	818	WD9DEE
809	KB8O	819	WA2YEX
810	DK9XD		
811	WB7UXK		
812	W4CEB		

C.W.

411	KB8O	413	I8WY
412	N2AGM		

SSB Endorsements

310	W4EEE/318	200	K0CN/204
310	W3GRS/317	150	I0SGF/160
310	OE2EGL/313	150	WA4OIB/151
310	F2MO/310	150	WD9IIX/151
300	W8ILC/304	150	WB0RLY/150
275	K8PYD/297	28 mHz	WB0RLY
275	I6PLN/296		
275	K5DUT/287		
200	VP9CP/216		

C.W. Endorsements

310	W3GRS/314	150	WA2ORX/154
275	W4OEL/284	150	KB8O/150
		28 mHz	JH1VRQ

Total number of active countries is now 319. All rankings were adjusted to reflect the deletion of Canal Zone (KZ5) Complete rules and application forms for the *CQ* DX Awards Program can be obtained by sending a business size, No. 10 envelope. . . self-addressed and stamped to *CQ* DX Awards; 911 Rio St. Johns Dr.; Jacksonville, Fla. 32211 USA.

The 2:30 a.m. departure of the Spratly group. The Hong Kong-Brunei-Spratly team (l. to r.)—Bob, N2OO; Stew, K4SMX; Austin, N4WW; Bill, K1MM; Carol and John, KP2A; Judith and Jack, TI7JB; and Harry, VK2BJL. The entire DXpedition made over 30,000 QSO's. (Photo via W2LZX)

batch of QSL cards go to the outgoing bureau, there will be over 35,000 KG6SW cards in circulation. And many still need The Marianas for a new one.

The interest in DXing and the availability of good equipment makes our portion of this fantastic hobby very dynamic. Improvements in the sun spot cycle increased the range and possibilities. DXing has been real fun.

To be on a small island country with lots of continuous activity spread over an extended period of time can be a very rare experience. It is all a matter of point of view. *It is rare until you have worked them and have the card on the wall.*

DX Contest Olympics

With all the current debate about the 1980 Olympiad, I should probably avoid this subject. When considering the nasty note I got from a fellow DX contester about an item I wrote, I should be doubly cautious. Maybe I should leave this to the contest column. But the following letter received about my February 1980 DX column deserves printing. I will protect my fine VE3 friend for now by not giving credit to the author.

"I would like to express my compliments and thanks for your very nice words about contesters and contribution of contesting to the art of amateur radio and DXing. It very nicely summarizes the advancement and progress that we bring in to the otherwise 'applianced' hobby. Reprint of the comments...should be sent to all those who complain about the QRM during the contest. There is much more garbage going on during the 'normal' operation and DXing on the bands and sometimes it is just sickening. People will go on the DXpedition, risk their lives just getting there only to get garbage on the frequency and wild behavior.

"The article in the January 1980 *QST* on the ARRL DX contest is an insult to the world of contesting, claiming the ARRL DX contest to be 'the Olympics of contesting'. I would like to hear from others on this issue."

It should be noted that there is always room for improvement. The change in the ARRL format for their contest is a step in the right direction. But to call it "the Olympics" of DX contesting is a bit much. When specific countries have an obvious 3 to 2 point advantage, there is some doubt. What do you think? Haste makes waste and probably caused a lot of foreseeable problems. Maybe I should have passed this up. But I seldom get a nice note about the column, so I had to take advantage of the situation. Now I'll catch heck for mixing politics with the Olympics. HI!

DX News Bulletins

DXers in their outstanding way come to the rescue of fellow DXers in time of need. With the retirement of Hugh "Cass" Cassidy, WA6AUD, from the DX publication business last July came a cry for DX news. Timely news.

With *The DX Bulletin* under the control of Jim Cain, K1TN, the new version of *The West Coast DX Bulletin* came to life. Suffering some production problems initially, the bulletin is now extremely punctual and informative.

The Richardson, Texas DX gang got together and started *QRZ DX*. This ten page weekly bulletin, including photo(s) is a good parallel to the old *West Coast DX Bulletin* too. Bill Kennamer, K5FUV, is the editor. It has a byline that catches your eye and gives an insight to its content: "DX Tips for Big Guns and Little Pistols".

Geoff Watts is still at it. The RSGB is now printing and circulating the *DX News* weekly. It has taken on a new look and an increase in content. It is nice to still receive probably the most concise weekly DX publication from England. It is quite regular when the post office in Great Britain is working.

The bi-weekly *Long Island DX Bulletin* remains at its high standard. It gives its readers a consistent look at DX, east coast style.

The old DXer himself, Gus Browning, W4BPD, keeps the presses rolling and the news flowing with the *DXer's Magazine*. The mini magazine issued its 500th issue on January 14th, 1980. The magazine is published with the byline "DX News for the Serious DXer". It is followed by a small but modest comment "An Aver-

A fine DXpedition to the Red Sea Island of Abu Ail gave us OE6XG/A. The operation from this rock island gave over 12,800 QSOs both on c.w. and s.s.b. (Photo TNXS to DJ9ZB)

The WPX Program
Mixed

806...WB8UIA
807...IN3QBR
808...I1IGI
809...OK1AWZ
810...K7AGJ

S.S.B

1228...WB0LXM
1229...WB4KSQ
1230...KB5DQ
1231...N8AC
1232...HM1QD
1233...I8XIU
1234...K0DEQ
1235...N0AJZ
1236...OK1AVE
1237...K9UAA
1238...G4CPJ

C.W.

1910...JH7CKF
1911...DK9KJ
1912...EA7OH
1913...JH6WOC
1914...K8KPM
1915...JA7AXB

WPNX

168...KA0ADN
169...WB0VKY
170...KA0BOT

Endorsements

Mixed: 400 WB8UIA, IN3QBR, I1IGI, K7AGJ. 500 JA7FFN/1, WB4FOT, WB8YQX, W0JIE. 550 N0ZA. 600 OE1KJW. 650 I5ZUF. 750 K9UQN. 800 OK1AWZ, W1CNU. 900 K0DEQ. 950 WA4QMQ. 1000 ON4XG, SM5CMP. 1250 I2PHN. 1300 N2AC. 1600 W2NC.

SSB: 300 WB0LXM, KB5DQ, N8AC, HM1QD, I8XIU, K0DEQ, N0AJZ, OK1AVE, K9UAA, G4CPJ. 350 WB4KSQ. 400 W3GXK, JA1RCE, I6MRD. 450 I6PQO, WB8YQX. 500 WD8CRY, KB8JF, KL7AF. 550 WD8CRY. 600 WD8MGQ. 700 ON4XG. 750 N2AC. 800 WA2AUB. 900 WA4QMQ. 950 YU7ODS. 1050 I2PHN. 1700 I0AMU.

CW: 300 JH7CKF, DK9KJ, JH6WOC, K8KPM. 350 DM5QG. 400 I5YGB, JA7AXB. 450 EA7OH. 500 DJ4EJ. 550 OE1KJW. 650 I1YRL. 700 DJ3LR, W9NO. 800 ON4XG, K0DEQ, I5IZ, PI1PT. 900 YU7ODS. 1450 W2NC.

10 meters: ON4XG, DJ3LR, I5IZ.
15 meters: OK1AWZ, K7PJO.
20 meters: OK1AWZ.
40 meters: OK1AWZ.
80 meters: OK1AWZ.
Africa: ON4XG, OK1AWZ.
Asia: ON4XG, DJ3LR, JA1RCE, OK1AWZ, DM2GFL.
Europe: IN3QBR, JA1RCE, OK1AWZ, DM5QG.
No. America: JA7FFN/1, WB8YQX, ON4XG, DJ3LR, K0RDJ, OK1AWZ.
Oceania: OK1AWZ.
So. America: ON4XG, K0DEQ, OK1AWZ.

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.

The Yugoslavian call 4N4Y during the WPX contest was the result of the horse drawn crew shown here. (l to r) Ljube, YU1QBC; Rajko, YU4VFB; Sejo, YU4FRS, Mata, YU1NVZ; Sande, YU4FRS; Dubo, YU4FRS, Goc, YU4FRS and Edib, YU4VKW. The man next to YU1QBC is the driver and not an amateur. Using mono-band beams on a 165 foot tower, put a good signal into all hemispheres. Especially the 3 element 40 at 165 feet. (Photo TNXS to YU4FRS)

One of East Germany's avid SWLs is Peter Stocker DM-9460/F. Peter is also a member of the GDR Club DM4KF in Hayerserda. The QTH is where they produce steam, briguettes, electricity and thermal energy from brown coal, coke and sewer gas.

age Issue-DX News Etc." on the cover of the 500th issue. Good luck Gus on another 500.

For your possible inquiry, you can write these DX publications at:

The DX Bulletin
306 Vernon Avenue
Vernon, CT 06066
DXer's Magazine
Drawer "DX"
Cordova, SC 29039
Geoff Watts' DX News
Radio Society of Great Britain
35 Doughty Street
London WC1N 2AE, England
The Long Island DX Bulletin
P O Box 173
Huntington, NY 11743
QRZ DX
P O Box 494
Howe, TX 75059

Remember - the key to the quality of a DX bulletin's content is the *input*. So if you are aware of DX happenings, share them with your fellow DXers via your favorite DX bulletins. PS: Don't forget us DX column guys!!

Five Band Worked All Zones (5BWAZ)

As previously announced there have been a few changes to the 5BWAZ program. It should be noted that the 5BWAZ rules have been ammended to require a regular WAZ certificate as a prerequisite for the award. Also a beautiful certificate will be issued for 150 zones confirmed. All QSL cards go to the WAZ manager, W4KA, for verification. All contacts must be dated January 1, 1979 or later.

CQ DX Awards Program

Except for the 5BWAZ and WPX programs, verification of QSL cards is done by checkpoints. The use of checkpoints for the *CQ* DX Awards allows the local verification and a big savings in postage fees and time.

We wish to welcome another DXer to the *CQ* checkpoint team. He is:

Jack Swiney VK6JS
59 Collova Way 6166
West Australia

DX Extras

DE P29KK BT Just a word to let you know that P29KK is QRV on the low end of 7 and 3.5. Have been up about one month now with an IC-701 and trap vertical. Usually around 7003 at 1100 GMT and QSY to 3508 at 1200 GMT. If no joy back to 7 MHz. No MCee operation, no lists, no nets. Just trying to work DX the traditional way. AR You may recognize my old DXing buddy as: KC6SK, KC6BK, KR6SK, KL7CLI, DL4JY, W6TNV or W0DJO and others. He is Stan Kohn. Some remember his KC6BK cards better. Come to think of it, better go look at that card again.

DE DL7SU BT HELP! From my in-laws in the States I learned that Callbook Inc. listed me as QSL manager of 4U1ITU in the 1979 Callbook without my consent or knowledge. In September 1978 we operated 4U1ITU during a 4-day period and sent out QSLs for all contacts made, like everybody going there is supposed to do. I understand that some people don't though, and am willing to forward all the stacks of QSLs, SASEs and IRCs I get to Geneva, as I do not have any logs of 4U1ITU besides my own.

Here is a tip to those working 4U1ITU in the future: Ask for the operator's home call, and QSL to that operator, not to 4U1ITU and not to any QSL manager. Each guest operator who has been give the privilege of operating 4U1ITU is also expected to take the responsibility of confirming his QSOs by himself. Otherwise the Geneva staff would have to be expanded considerably at taxpayer's expense. Signed: Gotz Linke, DL7SU. AR

From the Pileups

KP4AM, FB8XV, BV2B, JR1ZZC, YB7AAU, W6KG and xyl W6QL are at-

Visitors Al Curley, exTR8AC and xyl Gail, exTR8GDC, sit in the shack of WA7ZLC/mm aboard the SS Joseph Lykes. (Photo by WA7ZLC)

CQ DX Honor Roll

The *CQ* Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Total number of countries on the DXCC list as of this listing is 319. 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 submitted at any time, in any number. Updates indicating no change will be accepted to meet the annual requirement.

The fee for endoresements involving the issuance of an endorsement sticker is $1. Other updates require an SASE for confirmation. The basic award fee is $5.

C.W.

W6PT 319	W9DWQ 314	N6AV 307	K4CEB 303	JA1GTF 286
ON4QX 318	W3GRS 314	W2GT 304	N6FX 298	W4OEL 284
K6EC 316	N4PN 312	K9MM 304	DL3RK 294	K3FN 283
W6ID 315	K6JG 309	N6CW 303	WA8DXA 289	N4MM 279
DL7AA 314	W8KPL 308	W4BQY 303	DJ7CX 287	

S.S.B.

WA2RAU 319	WA2EOQ 316	W4DPS 313	K6XP 301	VE7CE 289
W6EUF 319	W9KRU 316	W6YMV 313	W0SFU 301	WA4WTG 289
W9DWQ 318	K6YRA 316	OE2EGL 313	WB6DXU 301	OK1MP 289
K8DYZ 318	W4SSU 316	EA4LH 312	DL6KG 300	YV5DFI 289
W3NKM 318	W3CWG 316	YV1KZ 312	HP1JC 300	VE7HP 288
W6REH 318	W3AZD 316	W6RKP 311	K8LJG 299	K5DUT 287
XE1AE 318	W4UG 316	VE2WY 310	I5WT 299	WA4JTI 286
W4EEE 318	K9LKA 315	N4MM 308	DJ7CX 295	I0MBX 279
W2TP 318	I8KDB 316	ZL1AGO 310	N6AV 299	W7OM 285
K2FL 317	K6JG 316	DJ9ZB 310	K8PYD 297	YS1O 285
VE3MR 317	ZL3NS 315	F2MO 310	N6AW 296	VE3FJE 284
DL9OH 317	VE3GMT 315	K5OVC 309	OE3WWB 296	K1UO 282
I0AMU 317	K4MQG 315	I4ZSQ 309	I6PLN 296	VK4VC 281
TI2HP 317	SM6CWK 315	W0SD 307	F9MS 294	JA6GDG 276
K6WR 317	I8YRK 314	W9SS 306	W9DQ 294	ZL1BIL 276
I0ZV 317	SM6CKS 314	XE1KS 306	W6FET 293	AA4A 275
W3GRS 317	QZ3SK 314	W3GG 304	LU1BAR/W3 292	DJ2AA 275
W9JT 316	ZS6LW 314	W8ILC 304	JH1VRQ 292	K9PPY 275
W9QLD 316	K6EC 314	VE7WJ 303	W0YDB 292	G4CHP 275
VE3MJ 316	K9MM 313	I3LLD 303	K4LSP 291	
I8AA 316	G3FKM 313	DK2BL 302	K9RF 290	
F9RM 316	N4WF 313	N2SS 302	9H4G 290	

The WAZ Program

Single Band WAZ

10 Meter Phone

36 .....W6QWF
37 .....I2ZLG
38 .....K5MBE

15 Meter Phone

42 ....WB8FIW
43 .....WB8IFP

20 Meter Phone

279 ...WA6TOO
280 .....K8ZR

40 Meter Phone

2 .....JA2BAY

15 Meter C.W.

23 .....F6DBX

10 Meter C.W.

6 .....DL1PM

20 Meter C.W.

94 .....K4SE
95 ....JH1NMO
96 .....JA3GM
97 ....SM3EVR
98 .....K4XO
99 .....JA2DTE

All Band Worked All Zones S.S.B

1820 ...JH2PRU
1821 ...W6OHS
1822 ..WA7LAG
1823 ....KB9OU
1824 ..WB5TEE
1825 ..WB4RFZ
1826 ....G3VOF
1827 ....DJ7QB
1828 ....DF2RG
1829 ....I2MOV
1830 ....DF5TH
1831 ..WA9QDO
1832 ...DK1QH
1833 ...W9DDX
1834 ...JA1PUK
1835 ....EA6DE
1836 .....K7UT
1837 .....K0CN
1838 ...JA9CZF
1839 ....KB5DO
1840 .....AG1J

C.W and Phone

4716 .....K4SE
4717 .....K6QM
4718 ...YB7AAU
4719 ....DJ1PT
4720 ....DK2QJ
4721 ....EA5QR
4722 ..WA1VTA
4723 ....KB4BU
4724 ...JF1CCH
4725 ....N0ALL
4726 ..WB5PLD
4727 ....ZL1TB
4728 ..WB5ZGP
4729 .....AF7S
4730 ....OH2CE
4731 ...N4AMV
4732 ...W7QAS
4733 ..JH1EYM
4734 ....K5JUC
4735 .....AA6O

The complete rules for WAZ are found in the January 1980 C.Q. Magazine. Application blanks and reprints of the rules may be obtained by sending a self addressed stamped envelope, size 4½ × 9½ to the WAZ Manager, Leo Haijsman 1044 S.E. 43.Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards direct to the WAZ Manager or to a check point should include sufficient postage for the safe return of their QSL Cards. Please note that effective June 1, 1979 the processing fee for all C.Q. certificates was raised to $5.00. This fee must accompany all applications.

tending the 1980 ARRL Convention in Seattle July 25-27, 1980. Most will be part of the Big DX Meeting program. (*N7CY*) Rag Otterstad, LA5HE, opened the Northern California DX Club meeting recently with some slides of the recent Bouvet operation and some other garden spots around the world. (*The DXer*) WE made over 9,000 contacts in 130 countries from J6LOO. Our QTH was in Vieux Fort on the southern tip of St Lucia. (*W6KG*) For the remainder of his stay on Marion Island, ZS2MI hopes to continue his daily sessions on 21.241 from 1700 UTC and on 14.240 from 2030 UTC. (*LIDXB*) It never rains, the saying goes, because there are three stations active on Franz Josef Land. UA1PAL, UK1PAA and UK1PGO are all available these days on both 20 c.w. and s.s.b. (*Long Skip*) Bill, W7PHO, is a a member of the hospitality crew for the Big DX Meeting at the 1980 ARRL Convention. He is also assisting with the program. Should be great show. (*Totem Tabloid*) New officers for the KC DX Club are: Pres -Stu Conrad VP - Bill Henderson, K0RWL; Sec - Rick Barnett, WB0TNY and Tres - Bill Boekenhaupt, AK0A (*WB0TNY*) Have over 300 countries maritime mobile. Hope to make the Honor Roll before I retire from sea duty. (*WA7ZLC*) Even with all the other events, EP2TY still finds time to show - both on 20 and 80. (*QRZ DX*) OS7 and OR7 prefixes are being used by Belgian amateurs to celebrate the Brussels Millenium. (*HRR*) HS1WR is getting ready to put up a Mosley 40 meter beam at 140 feet along with a six element 20. (*HS1ABD via TDXB*) ET3PG continues to be quite active. J28AZ who has relatives in Ethiopia, reportedly called by telephone to authorities there, and found that no license had been issued. But as Cass would say - workem, worry later. (*QRZ DX*) ZS2MI can also be found regularly around 28.600. (*G Watts*)VP8SU -South Georgia. Phil will be on this island for the next 18 months. Hopes to have a FT-101. He should be active on all the usual bands instead of just 40 c.w. and 20 s.s.b. like he has been. (*Gus DXM*) You 5BWAZ chasers take note of new address. I am available with QSLs. (*VK6HD*) You 5BWAZ chasers take note of new address. I am available with QSLs. (*VK6HD*) VE3FCU is behind the Barbados call -8P6MI. (*VE3JTQ*) I am still seeking a DX station to be a QSL manager for. (*WA4WQL*) The PY2 gang including: JY, JO, BPH, BW, AH and EHV commemorate Carnaval 1980 by a DXpedition to Arvoredo Island. The island is a small spot in the South Atlantic Ocean off the Eastern coast of Brazil. It will be exactly the fifth anniversary of the first DX-pedition which has taken place on the same island. (*PY2AH*) *SOS* Regardless of listings, I handle all my QSL cards direct. (*HL9TF*) Those Dxers chasing the "Worked All Delaware" award should note a change of managers. I am now handling the program. (*KA3CFZ*) WA7UWE/C6A is now C6ACY. (*K4ZGB*) Those Y calls are merely East German amateurs using the new calls announced last summer. This year's WPX test will be a riot. (*HRR*) RK2, RK3, RU2, RV3, RX1, RX3, RZ2, RZ3 and other special calls commemorating the 1980 Olympiad in Moscow are used by the Russians this year. They can be found daily on 10 and 15 c.w. (*G Watts*) VO2CW is regular on both 40 and 80. Zone 2. (*G3ATU*) Some still claim Washington state hard to work from the DX side, yet almost 200 DX stations have qualified for the

A big signal from Rabat, Morocco, originate at this beautiful QTH of CN8AK. Greg Calkin, CN8AK, is with the Canadian Embassy in Rabat. (Photo by WA7ZLC)

Bill Trayfors, CN8CW, is shown at the station controls in his Rabat, Morocco shack. Bill poses proudly with his xyl Ingrid, CN8DO, and their daughter Miya. Miya is dressed in a native Nepalese gown. (Photos by WA7ZLC)

Totem award; including A4, 9X5, ZS, FB8X, A9, 9M8, and other rare ones. (*Totem Tabloid*) I recently wrote a letter and received a reply from the government of India, Ministry of Home Affairs. The subject was permission to operate amateur radio station from Lakshadweep (Laccadives). The essence of the letter was that neither Indian citizens or foreign nationals are allowed to operate amateur radio stations from the Laccadives. (*DJ9ZB*) Our spies tell us an award has been offered to those working 8Z4A on 5 bands and N4AR is reported to have done so. (*QRZ DX*) It is with a great sadness that I note that Takeo JA8AA is a silent key. I first met Takeo in the early 1950's while in Japan. He was an avid DXer who operated the rig from bedside in the hospital up until his death. (*W7OM*) Peter S2BTF has been showing up for the family hour with W7PHO. (*Long Skip*) Father Moran, 9N1MM, has resumed almost daily activity from 2300 UTC around 14.210. Need VU on 75? VU2BX/VU2DPK has been authorized to operate c.w. in the 3890 - 3900 kHz span. (*LIDXB*)

73, Rod, W7OM

Mary, KL7JEF, "160 meter DX/YL of the year" - 1979 - with her 660 ft. long wire ant. partly erected, thought she'd try a CQ with her FT101. 5W1BZ/ Western Samoa replied!!! Her very first 160m QSO! Sez, "No pileup, no sked, just chance. Its great to get DX for my very first contact - I hope I can do it often, and make KL7 not so rare. Just another of 160 m's thrilling surprises. (Photo TNX W1BB)

QSL Information

A7XA to DJ9ZB
A7XAH to DJ9ZB
A7XD to WA4PYF
A22DW to VK7CH
AE0L/KH2 to K0LST
AK0I/6Y5 to 6Y5RA
AP2HQ to N0RR
AP2TN to W8QFR
C5AAP to G3LZZ
C5AAS to G3LQP
C6AAQ to W3HNK
C6ACY to K4ZGB
C21AA to P29JS
C21AP to F9AP
C31MK to EA3WZ
C31UN to EA3AOC
CN8AK to WA3HUP
CT2QN to W2KF
CT3BZ to OH2BH
CT4RH to AB1U
CT9MAD to CT3AR
D68AP to WB2OHD
D68AR to F6ACB
DU1DBI to DJ8CV
DU1DBT to N6ATS
EA6BH to DL7FT
EA6EU to WD5BIF
EA8AK to EA8CR
F0DV/FC to HB9BEI
F79WARC to F6ARC
FB8XV to F5VU
FB8XY to F6CIU
FB8ZO to F6EYB
FG7TD to F6AZN
FG0AMR/FS7 to K8ND
FH8OM to DJ1TC
FK8AU to I0PQ
FK8CW to K2IJL
FO0DP to N7RO
FO0HR to DK6XR
FP0MD to VO1FB
FP0NN to WA3KCO
FY0EOO to F6DQM
FY0FIL to F6ACI
GW6GW to GW4BLE
H7Z to K4CLA
H31LR to WB3KGY
HC8RS to HC5EE
HH2BM to W7RQ
HH2MC to KB4IT
HH2VP to N4XR
HI8LC to W2KF
HS1AMG to KA7DQQ
HS4AMA to VE3DPB
HS5AID to AG6D
HT9TM to K2TV
J3AAG to K1EM
J3ABX to DF3GX
J6LCT to WA1ZXF
J6LIM to VE2EWS
J6LJA to VE3GWV
J6LOO to YASME
J7DD to W2BP
JT0DJT to I8YGZ
JW1SO to LA4DM
JW5IJ to LA5NM
JW7FD to LA5NM
JW8FG to LA5NM
JX9WT to LA9WT
JY5ZM to WB4RRJ
K6LPL/KH5 to WA6YQW
K7JVR/VP2A to AA7A
K8CC/HR1 to K8CC
KC4AAD to W6MAB
KC4USR to K9VFY
KC6MJ to W7PHO
KH0AC to K7ZA
KP2A to WB2VFT
KV4AA to K6PBT
KX6PP to WD4NVH
M1Y to I0MWI
N2RM/6Y5 to N2MM
N6CW/VP2A to AA7A
NP2AB to K8OHC
OA4AWD to VE2AQS
OD5FB to WA2QAU
OD5LX to SM0GMG
OR7WW to ON7EJ
OY1R to W2KF
OY3H to W3HNK
OY9R to K2IJL
P29HS to AH6I
PJ2CC (Nov 79) to K4BAI
PJ2CR to K2TJ
PY0ZAE to W1DA
S2BTF to K5OA
ST0RK to DJ3ES
SV5JH to DJ9ZB
SV0WEE to WB5WRY
T3KC to W5RBO
T4AEC to ZS6AEC
T4YL to K9KXA
TG9ML to K5BDX
TL0BQ to I8KDB
TN8AJ to DM2XLO/WB9TTM
TR8GM to F6ESH
TU2AQ to F6FPF
TU2IR to VE3ECP
TZ4AQS to ON6BC
VE2EWI/C6A to VE2UN
VE3BVD/ST2 to VE3FRA
VK0KH to VK5WV
VP1A to WB0TNY
VP1AB to W0AR
VP1CRW to K1VKO
VP1CS to K0CS
VP1CW to K1VKO
VP1DD W0AWA
VP1JEC to W4BSO
VP1JSW to K1VKO
VP1KS to DL1KS
VP1MRW to K1VKO
VP1NLB to W0FNO
VP1RLB to WB0TNY
VP1SWC to KA0BCW
VP1WT to DL6WT
VP2EES to K4TVE
VP2EEU to WA4ZSX
VP2EEV to K8ND
VP2MBA to W7FP
VP2MDD to W3ZZ
VP2MEE to N8BM
VP2MFL to K5BDX
VP2MFY to W5FBM
VP2SA to AB1U
VP2SAX to YASME
VP2SX to AB1U
VP2VEC to KB0XU
VP2VEG to W0DVZ
VP2VEJ to WB3KHY
VP2VEQ to N6ZZ*
VP2VFW to K2TJ
VP2VJ to VE3MJ
VP5NX to K8ND
VP5WJR to WB5UEP
VP8AI to WD8AHZ
VP8VN to G4CHD
VQ9CC to W5RU
VQ9DM to K1BZ
VQ9LN to W4XQ
VQ9PC to K9KLR
VQ9RM to WB2GTW
VQ9TC to W3HNK
VS6BF to G3KDB
VS6FH to K4ZLZ
VU2UH to SP9AJT
W1GNC/PJ2 to AB1U
W3WYP/DU2 to WB0MSZ
W6ENK/KH4 to WB9WMF
W7KEU/OA to WB7TAZ
W8NMK/KH0 to K4AVU
WA4CEH/KH8 to N4AA
WA4YVG/KH2 to W4XQ
WD8QGQ/KH7 to KH6JEB
XF4EH to XE1IX
XT2AU to WA1ZEZ
YB9X to JA1UT
YB0ADW to G8BNR
YB0WR to WA0TKJ
YN1Z to K4CLA
YS1JWD to W3HNK
YS9RVE to WA0JYJ
YV5AMW to K4BUF/
ZB2BL to W9JYF
ZD8AI to N3WM
ZF2AD to N3ED
ZF2DD to KA5Q
ZK1CI to G3ZXD
ZK2VE to W7PHO
ZS1XR to N7RO
ZS2CW to W6RIA
ZS2MI to WA2IZN
ZS6BGS to WB4RIS
ZS6N to WA1UVX
3B8DB to K5BDX
3C1AC to EA7FY
3C1PP to EA1QF
3D6AG to K9KXA
3D6AX to WA5IEV
3D6AZ to G3NOM
3V8AA to IS0LYN
4S7JA to VE3IPR
4S7MX to SM3CXS
4U1UN to W2MZV
4X6AA to K2UK
5B4HF to WD5BIF
5B4IJ to OE8HFL
5L2AV to N6FL
5N4ROF to W4FRU
5N0DOG to W4FRU
5T5AY to W4LZZ
5T5CJ to W4BAA
5U7BE to DK7BE
5W1CK to WB6NXK
5Z4PG to WB9MFC
5Z4RG to WB9MFC
5Z4RT to OE6MBG
5Z4YV to JA2AJA
5Z4YW to VE3ACY
6W8DY to VE4SK
7P8BG to VE3EUP
7X4AN to DJ2BW
7X5AH to AD1S*
8P6AZ to VE3IUE
8P6FD to VE2QQ
8P6FQ to K2MMT
8Q7AL to SM3CXS
8Q7AM to SM3CXS
8R1X to VE3IUE
9G1AP to I0LCJ
9H4L to W3HNK
9H4P to N2DO
9H79GL to W3HNK
9L1FC to WA0CAE
9L1K to OE3KD
9M2PV to WB9MFC
9Q5DH to WB4CSW
9Q5GB to W7KTI
9Q5RM to WB2GTW
9Q5WH to WB4CSW
9V1UK to VO1CW
9X5LG to DL8AO
9X5NH to DL8AO
9Y4FRC to K3RL
9Y4W to N2MM

*AD1S - Box 32735, Oklahoma City, OK 73123
*N6ZZ - Box 549, Los Angeles, CA 90055
VK6HD - 8 James Road, Kalamunda, Western Australia 6076

With what we have previously learned, we are now ready to write and use two programs. In this installment we will learn to cull out those dupes in our contest logs and the concept of subscripted variables.

INTRODUCTION TO BASIC

A Computer Programming Language

Part V -- Subscripted Variables Plus Two Programs

BY BUZZ GORSKY*, K8BG

In the last few installments I have introduced many new program statements and have showed relatively little in the way of practical programming. In this part I will introduce one new concept and its associated statements, plus one additional statement. Then I will put all we have learned so far into two useful programs—one which *converts hexadecimal numbers to decimal values* and one which will *search for duplicate, and almost duplicate calls during a contest and then print the calls worked in alphabetical order at the contest's conclusion.*

The new concept for this section of BASIC is the **subscripted variable.** If you recall these variables from high school or college mathematics—fine; if not that's OK too! Imagine that we are writing the call duplicate-searching program. We want to have a list of calls and since we hope to work many stations we hope the list will be quite long. If we assign a separate variable to each call we quickly run out of variables. Furthermore, when we try to search through the list looking for duplica es then we will have trouble if each call has a separate variable name. On the other hand each call *has* to have a separate variable indication or there will be no way to keep them straight. The singly subscripted variable solves this problem of a long list. We will assign each individual call letter to a variable **C(N)** (that is read as "C sub N") where N is an integer. For the first call we work N will be 1 and for the second it will be 2 and so on. Each C(N) is different, yet if we want to do something to the list, such as print it, we cxn do it simply with FOR/NEXT loops, such as:

```
10 FOR 1 = 1to N
20 PRINT C(1)
30 NEXT
```

That little routine will print out the call letters in the order in which the stations were worked. A singly subscripted variable then can be used to represent a single list. In order for the little routine above to work, two statements would have been required at the start of the program. The first would have been a **DEFSTR C** which would have defined C as a *string.* The second is called a **dimension statement.** Suppose we assumed that we would not work more than 500 stations in the contest. We could use **DIM zc)500)** as the dimension statement. This would tell the machine that we plan to have 501 C's (there is a C(0) up through C(500). If the program generated a C(501) there would be an error message generated—once the program has set aside space for C's up through 500 it just will not accept any more! If we do not put in a DIM statement for a subscripted variable the machine will set aside room for 10 only. If that's all we'll need, then we do not have to have a DIM statement at all. On the other hand if we only need 3 and if memory is tight we might use DIM C(3) just to save the space.

Suppose now that we have a program which will keep a QSO file. In this file we will list call letters, name, QTH, and date worked. Suppose we have the following entries:

CALL	NAME	QTH	DATE
W1AA	BOB	BOSTON	1/15/79
N3BBC	BARB	BALTIMORE	2/4/78
K5QQ	HAL	DALLAS	3/30/79

We could deal with this data by using separate subscripted variables for each type of entry. We could have C(N) for call, H(N) for name, Q(N) for QTH, and D(N) for the date. However, a simpler technique would be to use a **double subscripted variable.** In such a variable the first subscript can be thought of as the row number in a table corresponding to the data, while the second subscript can indicate the column. Note that these could be reversed. It doesn't matter as long as we are consistent throughout the program. In fact we can have three subscripts (or 10) so we are not limited to simple rows and columns. For 2 subscripts, however, it is handy to think of a table with rows and columns. In our example we might have C(I,J) be our variable. That is read as "C sub I comma J". If we planned to have 1000 entries in our table we would need a dimension statement: DIM C(1000,4). The 1000 indicates that there will be 1000 rows and the 4 indicates that there are 4 columns. Note that this dimension statement

*2449 Derbyshire Road, Cleveland, Ohio 44106

actually sets aside 1001 and 5 places since it allows for C(0,0). Usually it is simpler just to forget about the 0 places though since we tend to begin counting from 1 and not from 0. There is no problem in doing this; we are just wasting a little bit of memory. If memory is tight we could use DIM C(999,3) and begin our counting from 0 in both rows and columns.

Now let's assume we used C(1000,4). What is the value of the variable C(2,3) in our data? C(2,3)= BALTIMORE. BALTIMORE is the literal which occurs in the second row and the third column. Similarly C(3,1)= K5QQ since that is in the third row and the first column. Once we had entered the data shown, we could get it to print with the routine:

```
10 FOR I= 1 to N: REM N= NUMBER OF ENTRIES
20 FOR J= 1 TO 4
30 PRINT C(I,J),;
40 NEXT J: PRINT: NEXT I
```

That routine would print the four columns to each line since the comma after the C(I,J) separates the data into four columns and the semicolon suppresses carriage returns after each entry is printed.

Now before we get to the first of the programs I promised I need to explain a bit about *hexadecimal numbers* so we can see what the program does. In our decimal system, each digit is permitted one of ten values, zero through nine. In a three digit number the digit on the right represents its value, the next digit to the left represents its value multiplied times 10 and the next digit to the left indicates its value times 100 or 10^2. So 589 is taken to mean $5*10^2+8*10+9$. In the hexadecimal system each digit can have any one of 16 values 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F. In the hex number 3FA the A indicates its value, the F indicates its value times 16 and the 3 indicates its value times 16^2. So 3FA = $3*16^2+15*16+10$ decimal. So let's write a program to do this little bit of arithmetic for us. In this way when we are dealing with hex addresses or other values we will be able to obtain decimal equivalents quite easily.

Here's the program:

```
10 REM PROGRAM TO FIND THE DECIMAL EQUIVALENT OF A HEXADECIMAL NUMBER
20 H1$ = "0123456789ABCDEF"
30 INPUT "ENTER HEXADECIMAL NUMBER"; H$:N = LEN (H$)
40 FOR I = 1 TO N: FOR J = 1 TO 16
50 IF MID$(H$,I,1) = MID$(H1$,J,1) THEN 55 ELSE NEXT J
55 D(I) = J – 1:NEXT I
60 P = 0:FOR K = N – 1 TO 0 STEP – 1:P = P + 1
70 D = D + D(P)*16↑K:NEXT K
80 PRINT "Hex--------";H$
90 PRINT "DECIMAL----";D
100 INPUT "ANOTHER NUMBER (Y/N)";Z$
110 IF Z="Y" THEN RUN ELSE END
```

Now let's use our knowledge of the BASIC statements to see how this program works. While the program is short, it has been written in a dense form and it is complicated. In line 20 we begin by setting the variable **H1$**, a string variable, equal to the string enclosed in quotes. Note that this string is the list of possible hexadecimal digit values listed in order of increasing magnitude. In line 30 the operator inputs a hex number which is assigned to the variable H$, also a string variable. Further, N is set equal to the length of H$. Then in 40 we begin two loops; the first will run through the characters in string H$, our number, while the second will run through the characters in the string H1$. Thus the first goes from 1 to N while the second goes from 1 to 16. In line 50 we have an IF statement which looks to see if the single character I characters from the left in H$ is the same as the single character J characters from the left of H1$. If so the program goes to statement 55, and if not the program proceeds with the next J in the J loop. Suppose we had entered 3C as our hex number. As the two loops begin I would be 1 and J would also be 1. In 50 the program asks is the first character of H$ equal to the first character of H1$. The answer is no so we go to the next J and try again. When J eventually gets to 4 so we would be looking at the fourth character of H1$ which is a 3 then the first character of H$ would equal the fourth character of H1$ and the program would branch to 55. Here D(I) is set equal to J – 1, and in this example D(1) would be set equal to 3. We would then go to the next I so we would be starting again from 40 with I equal to 2, thus we would be looking at the second character of H$, namely the C. This time we would run until J equals 13 and D(2) would then be 12. Since our hex number has only two digits the loops would be over and the program would proceed with line 60. Here P is set to 0 and a new loop is started. This loop begins K at N, the length of our hex number, minus one and counts down until K equals zero. The STEP – 1 causes the counting to go down instead of up as in the other loops. We now set P equal to P + 1. At the start of the program D would have been set equal to zero by the machine's start up routine when a RUN was typed. So the first time through D would equal D(1) (since P would be one) time 16 raised to the 1 power, or 3*16. The next time through the loop D(2) is 12 and K equals 0. Since 16 to the zero power is one D now equals 48 + 12*1 or 60. Then the next lines give us the chance to see the results and then select whether we want to quit or enter another number. In this program the use of strings and a subscripted variable D(N) gives us a simple way to do hexadecimal to decimal conversions with very few program steps.

The second program, the contest duplicate detector, is quite a bit longer and considerably more complicated. The program is shown in Table 1. Don't get discouraged though. We know almost all of the steps required in that program, and I will introduce the last one now. Sometimes in a given program it is necessary to do the same set of computations in several places. The programmer can simply repeat the steps whenever they are required, but that can be tedious and wastes programming memory. In such cases we use **GOSUB** and **RETURN** statements. THE *GOSUB* tells the program to find a subroutine, do the steps listed there and when a *RETURN* is encountered to resume where it had left off in the main program. We will see how this works in the program at hand.

The program accomplishes its housekeeping functions in line 10. Here the CLEAR sets aside 100 bytes for string manipulations, while I,J,K, and N are defined as integers and C and Z are defined as strings, and 500 places are set aside for Cs. In addition N is set equal to zero. Lines 20 and 30 get things started. The CLS command tells the computer to clear everything off the screen and CHR$(23) is the upper case right arrow which causes the print format to go to 32 characters per line. (Normal format is 64 characters per line.) Text is then printed to tell how the program works and hitting the enter key will get the real program started. In line 40 the screen is again cleared and things are set up for the large letters. In line 100 the variable Z is set equal to what is called the **null string** that is a string with no characters. This is somewhat analogous to setting a numerical variable equal to zero. We do this by setting the string variable equal to two quotes with nothing between them. N is then incremented by 1 and we are instructed to enter a call which is assigned to the variable C(N). First time through it will be assigned to C(1), then to C(2), and so on.
have entered in a strange way. We could have had line 120 as simply PRINT C(N). The present line 120 will print out the call with a space between each character to make it easier to read. The FOR/NEXT loop

```
1 REM CONTEST DUPLICATE FINDING PROGRAM BY BUZZ GORSKY, K8BG
10 CLEAR 100:DEFINT I,J,K,N:DEFSTR C,Z:DIM C(500):N = 0

20 CLS:PRINTCHR$(23);"THIS PROGRAM WILL TELL IF
   YOU":PRINT"ALREADY HAVE WORKED A STATION":PRINT"WHEN
   ASKED A QUESTION--":PRINT"#85 'ENTER' FOR YES AND ANY":PRINT
   "CHARACTER PLUS ENTER FOR NO"

30 INPUT"HIT ENTER WHEN READY TO PROCEED";Z
40 CLS:PRINTCHR$(23)
100 Z = "":N. = N + 1:PRINTCHR$(23):INPUT"ENTER CALL";C(N). = "ZZ"
   THEN 500
110 CLS:PRINTCHR$(23):PRINT"CALL ENTERED--"
120 FOR K. = 1 TO LEN(C(N)):PRINT MID$(C(N),K,1);CHR$(32);:NEXT K

130 PRINT:INPUT "IS THIS CORRECT";Z
140 IF Z = "" THEN 150 ELSE N = N-1:GOTO 100
150 IF N = 1 THEN 100 ELSE FOR I. = 1 TO N - 1:IF C(I) = C(N) THEN N. =
   N - 1:PRINT"ALREADY WORKED":GOTO 100
160 NEXT I
170 C = C(N)
180 GOSUB1000:K = J2
190 PRINT"POSSIBLE CONFUSION WITH"
200 FOR J = 1 TO N - 1
210 IF RIGHT$(C(N),K) = RIGHT$(C(J),K) THEN PRINT C(J),;
220 NEXT J:PRINT:PRINT"END OF LIST"
230 Z = "":PRINT:PRINT "HAS ":C(N);:INPUT"BEEN WORKED";Z

240 IF Z = "" THEN 100 ELSE N = N - 1:GOTO 100
500 N. = N - 1:REM ALPHABETIZE LIST
510 FOR I = 1 TO N
520 C. = C(I):GOSUB1000:J3 = J2
530 FOR K. = I. + 1 TO N :16K > N THEN 570
540 C = C(K):GOSUB1000:J4 = J2
550 IF RIGHT$(C(I),J3) < RIGHT$(C(K),J4) THEN 560 ELSE Z = C(I):C(I) =
   C(K):C(K) = Z:GOSUB2000:GOTO 510 P00:GOTO510
560 NEXT K:NEXT I
570 PRINT"LIST COMPLETE":INPUT"PRINTER READY";Z
580 FOR I = 1 TO N:LPRINT C(I):NEXT
590 GOTO 100
1000 FOR J1. = 1 TO LEN C
1010 IF (ASC(MID$(C,J1,1)) < 58 AND ASC(MID$(C,J1,1)) > 47) THEN J2 =
   LEN(C) - J1 ELSE NEXT
1020 RETURN
2000 FOR M = 1TON:PRINTC(M),;:NEXT:PRINT:PRINT:RETURN
```

Table 1 - Contest duplicate call letter finding program.

runs from K of 1 up to K equal to the length of C(N), printing each character of C(N) one at a time each time followed by character 32 which is the space. The semicolons in the print statement keep the computer from doing a line feed, so that the entire call is printed on one line. There is then an input statement which lets us say if the call is correct. If we just hit the enter key then Z will not be changed from it's previous value which was set at the null string in line 100. If we hit any other key before the enter then Z will be set equal to whatever key was depressed. In line 140 if Z is equal to the null (which means that the call had been entered correctly, since the original instructions say to hit only *enter* to answer yes to a question) the program goes to line 150, otherwise we return to line 100 to start again, after reducing N by one, which effectively negates the call which had been incorrectly entered. In line 150 we see if N equals 1, that is, is this the first time through. If so we go to 100, otherwise we will look to see if this call has already been worked. We do that with the next loop which sees if the current call, C(N), equals any of the other calls in memory. If the call is identical to one already in memory then a message is printed, N is decreased by one, and we go back to 100. If it is not identical we go on to line 170.

Line 170 gets things ready for a subroutine which starts on line 1000, so let's look at that subroutine first. At 1000 we start a loop with J1 equal to 1 and run until J1 equals the length of the variable C. Since this C does not have a subscript it is distinct from all of the subscripted Cs. Line 1010 asks if the J1th character of C has an ascii value which is both greater than 47 AND less than 58. The AND requires that both be true for the IF to branch to THEN. If either condition is false, the IF will branch to the ELSE. These ascii values are for the numerals 0 through 9. Line 1010 then is looking to see which character has the numeral in the call. When it finds that character J2 is set equal to the length of C minus J1. Just what does that mean? My call K8BG has four characters and the numeral is the second character. Thus line 1010 would find the numeral when J1 equals 2 and J2 would equal 4 - 2 = 2. The RETURN in 1020 sends the program back to where it left off when the subroutine was called with the GOSUB statement.

Now let's go back to 170 and see how things will work. C is set equal to the string C(N) which is the call that was just entered. We then go to the subroutine starting on line 1000. When we come back from the subroutine the machine will have a number J2, which in the case of my call letters would be equal to 2. We set K equal to J2. In 190 we simply print the prompt and proceed with 200 where we begin a loop which will run J from 1 through N - 1. We look to see if the K characters on the right of the call C(N) are the same as the right K characters of any of the other calls C(1) through C(N - 1). If so we print the call; if not we look at the next call. When all of the calls have been examined, we print "END OF LIST." If K9BG had been worked before, and we now entered K8BG, this little routine would display K9BG so that we could consider whether the current station is really K9BG who was already worked, or really K8BG who had not yet been worked. In line 230 Z is reset to the null string and we are asked if the C(N) station has been worked. If we just hit enter, indicating yes, then we go back to 100. If we indicate no then N is decreased by one before we go back to 100 to start again.

That concludes the body of the program. Recall that in line 100 we ask if C equals the string ZZ. If it does we go to 500. This is the routine which will alphabetize the calls. This routine is a very inefficient alphabetizer, that is it takes a long time to put a list in order. However, it is *relatively* simple to follow. The subroutine in line 2000 is put in just so that you can see what it is doing in a step by step way. I am not going to describe how this part of the program works, so you can try it on your computer, or run through it with paper and pencil to see what it does. The next installment will explain the alphabetizing routine and we will explore some new BASIC statements.

(To Be Continued)

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The "Story of The Month" for May, as told by Karel, is:

Margaret D. Tettelaar, VE7ATI
All Counties #133, 7-12-75
and
Karel Tettelaar, VE7ATH
USA-CA-2500-#325, 6-29-79

"In 1959 we got our first license and in 1961 our Advanced. We were in Edmonton and very active on all bands, 20 and 15 being our favorite ones. We had a good location outside the city and monobanders for 10-15-20. While in Alberta we were VE6ABP and VE6AAV. Worked DX most of the time and then later on, Counties. Margaret started before I did, as DX Contests were my favorite. We also became members of CHC and YLISSB.

**P.O. Box 73, Rochelle Park, NJ 07662*

Karel, VE7ATH and Margaret, VE7ATI August 1979. I note their license plate reads GAB-, I guess that's why they're on fone.

"In 1972 we moved to British Columbia and now have the calls VE7ATI and VE7ATH but we are less active (getting older, HI!). We are living in a very nice part of B.C. on the north shore of Shuswap Lake, but it is very poor for amateur radio to Europe due to the mountains behind us. But we do very well working into the Pacific.

"At present we are using a Kenwood TS-520 and A Hy-Gain TH6DXX.

"The last few winters we spent in Southern California and we sure enjoy giving out the Counties.

"Margaret received USA-CA-500-#176 in January 1963 and All Counties #133 in July 1975, it being #2 to Canada and #5 outside USA (the others were ZL1KG, TG9UZ, VE3CBY and G4JZ). I did not apply until December 1977 and received USA-CA-500-#1209, 1000 #465, 1500 #345, 2000 #293 and then later USA-CA-2500. We both have enjoyed every minute of it."

Special Honor Roll
All Counties

#263 Don Ronk, WA6WCG 1-14-80
#264 Charles W. Brenner, K7GNC 1-18-80
#265 H. Lee Foster, VE3RN 1-22-80
#266 Kenneth D. Walker, W1FAB 1-22-80
#267 David B. Esh, K3GOO 1-28-80
#268 Larry C. Taylor, AC2J 2-6-80

Awards Issued

Don Ronk, WA6WCG acquired All Counties endorsed All S.S.B., All Mobiles.

Charles Brenner, K7GNC received USA-CA-1000 through All Counties endorsed All S.S.B.

Lee Foster, VE3RN added All Counties endorsed All S.S.B. to his fine collection. This is #9 to Canada.

Ken Walker, W1FAB finally did his paper work and had me send him USA-CA-1000 through USA-CA-3000 endorsed All S.S.B., and All Counties endorsed All Phone.

Dave Esh, K3GOO got busy and collected USA-CA-1000 through All Counties endorsed All S.S.B.

Lary Taylor, AC2J (exWB2PMO) qaulified for All Counties endorsed All S.S.B.

Paul Eiden, WD4LTD obtained USA-CA-500 through USA-CA-2000 endorsed Mixed.

USA-CA Honor Roll

3000		1500		500	
K7GNC	292	WD4LTD	458	WD4LTD	1425
W1FAB	293	WD4HVZ	459	W5VGF/6	1426
K3GOO	294	W0CJG	460	N9AAR	1427
2500		K7GNC	461	WB0VRN	1428
K7GNC	356	W1FAB	462	SM5DYC	1429
W1FAB	357	W8GZF	463	PI1PT	1430
K3GOO	358	K3GOO	464	K1HBM	1431
2000		WB5BBS	465	OE5AHL	1432
WD4LTD	404	**1000**		KA7EOG	1433
WD4HVZ	405	WD4LTD	577	WB3AKI	1434
K7GNC	406	W5VGF/6	578	GI3YMT	1435
W1FAB	407	K7GNC	579	SM6EOC	1436
K3GOO	408	W1FAB	580	WB6PQZ	1437
		K3GOO	581	ZL1QW	1438
		WB6PQZ	582	WB5BBS	1439
		ZL1QW	583	JA8ZO	1440
		WB5BBS	584		

Al Armitage, WD4HVZ added to his collection, USA-CA-1500 and 2000 endorsed Mixed.

Dean Cowden, W0CJG gained USA-CA-1500 endorsed Mixed.

John Alexander, W8GZF also gained USA-CA-1500 endorsed Mixed.

Gene Barry, WB5BBS applied for USA-CA-500 through USA-CA-1500 endorsed Mixed.

Alec Binnie, ZL1QW with help from John, W7KBC collected USA-CA-500 and 1000 endorsed Mixed. This is #8 Award to New Zealand.

Joseph "Red" Robert, W5VGF/6 won USA-CA-500 and 1000 endorsed All S.S.B.

USA-CA-500-Awards endorsed All A-1 went to:

Phil Snyder, N9AAR.

Jan Van Kessel, PI1PT. This is #3 to the Netherlands.

Herman Atzlinger, OE5AHL. This is #6 to Austria.

Roger Williams, KA7EOG.
David Pisco, WB3AKI.

USA-CA-500 Awards endorsed Mixed were sent to:

Ken Hudachek, WB0VRN.
Ola Rosengren, SM5DYC. This is #23 to Sweden.
Gene Brammer, K1HBM.
Aemar Higgins, GI3YMT. This is #2 to N. Ireland.
Olle Wibber, SM6EOC. This is #24 to Sweden.
Sadatoshi Shishido, JA8ZO. This is #1 to JA8 but #15 to Japan.

Awards

Worked Hamburg and the Harbours Of The World (WHHW): Hamburg is Germany's "Door to the World". This Diploma was created to increase the friendship between the amateurs around the Hamburg harbour and radio amateurs throughout the world. The diploma consists of black Epoxy-copper clad board with beautifully etched partial-view of Hamburg Harbour. It may be obtained by all licensed radio amateurs and s.w.l.'s satisfying the following requirements (no band nor mode restrictions).

1. Contacts with amateur radio stations in 40 different sea and ocean harbours all over the world in at least 4 of the 5 continents, but not from applicants own country.

2. Contacts with 10 amateur radio stations around the harbour of Hamburg from at least 5 different DOKs. (The following DOKs are valid: E02, E07, E13, E14, E16, Z07, Z27, Z28). DOKs E07 or Z27 must be included. All contacts from January 1, 1973 or later are valid. Application with GCR-List, certified by 2 licensed amateurs, QSL of applicant and the fee DM 10, or US $4.00 or 17 IRCs to be sent to Awards Manager of the issuing club OV-Hamburg: Kurt Stegert, DK4HD, 21 Hamburg 90, Soltauer Ring 10,XIV, West Germany.

Reseau Des Emetteurs Francias (R.E.F.) Awards: For information, all requests must be sent to: REF Secretary, Square Trudaine 2, 75009 Paris, France with one IRC.

Applications: French awards will be awarded to any amateur who will submit to REF Secretary:

1. A letter, dated and signed, with name, address and call of applicant. It must certify that administrative rules in the applicant's home country have been represented, in the same way as amateur radio spirit, in effecting the contacts upon which the application is based.

2. A list of contacts with call, date, frequency, report and mode.

3. QSL cards for checking. But, in

applications of the decisions of the Region 1 of IARU, foreign claimants may send only a check list, without cards, duly certified by an officer of their national amateur radio society. Contacts made during REF Contests will do without QSL cards for 2 years after a contest. QSL cards must be without corrections, erasures or additions - with a legible text giving call of sender, address, date, band report and mode - with an indication of department, province or country worked allowing verification.

4. The amount of cost (see each award). If registered mail is wanted, the cost is more (additional 3 IRCs) and even more if air-mail.

One Week-All Japan Prefixes Award.

5. The amount of currency for the return of QSLs, if applicable.

D.D.F.M: French Metropolitan Departments: H.f. and v.h.f. bands need 20 departments on the same band. Sticker for 10 additional departments. DDFM-Excellence for 95 (All) departments on one band. DDFM 5 h.f. bands for 95 (All) departments on each 5 Bands. Cost: DDFM: 10 IRCs, Sticker: 5 IRCs. Manager: Annick Guchez, F2GM, rue W. Dian 4, 27620 Gasny, France.

D.P.F.: French Provinces: H.f. Bands: All C.W. or All Phone in one or more amateur bands: Need 17 "DPF Provinces". DPF 5 h.f. Bands: Need 17 (All) on each 5 Bands. Cost: DPF - 10 IRCs. Manager: Annick Guchez, F2GM, rue W. Dian 4, 27620 Gasny, France.

D.U.F.: French Universe: New denomination of the *French Union Award.* Awarded to amateurs, just the same if there is a new QTH or a new call, for work on any bands and with any mode, fixed stations, or all QSO on mobile:
DUF 1st part: 5 DUF countries in 4 continents.
DUF 2nd part: total of 8 countries in 4 continents.
DUF 3rd part: total of 10 countries in 5 continents.
DUF 4th part: total of 16 countries in 6 continents.
Silver Medal for 4th part - DUF of Excellence. (As of 1 April 1979 DUF countries included 5 in Europe; 30 in Africa; 1 in S. America; 6 in N. America; 13 in Oceania and 4 in French Austral Lands FB8W, X, Y, Z.= total of 59). Manager: Edmond Dubois, F9IL, B. P. 7, 59265 Aubigny-au-Bac, France. Cost: Part 1 - 6 IRCs; Part 2 at the same time - 8 IRCs; 3 Parts at the same time - 10 IRCs; 4 parts 12 IRCs; Silver Medal - 15 IRCs.

D.T.A. French Austral Lands: DTA: QSO with 3 lands; DTA of Excellence: QSO with the 4 lands (with Star). Cost: DTA or DTA of Excellence: 10 IRCs. Star for DTA - 5 IRCs. Manager: Michael Menetrier, F5IN, ave. Resistance 128, 93340 Le Raincy, France.
May I suggest you obtain the list of the 59 Countries for DUF; the list of the 95 Provinces for DPF; and the DPF departments (17) from REF Secretary, Square Trudaine 2, 75009 Paris. Be sure to send IRC or IRCs to cover postage.

8-PX Award.

One Week All Japan Prefixes Award: Here is a new Japanese Award.
Class 1. Work 20 Prefixes in one week.
Class 2. Work 30 Prefixes in one week.
Class 3. Work over 40 Prefixes in one week.
(Example: JA1, JH1, JG1, JR2, JA3, JH4, etc...) Send GCR List and 10 IRCs (*not cash!*) to: Awards Manager, Hiromichi Katsurashima, JH1HWN, 5-2236-33 Iriya, Zama-city, Kanagawa, Japan.

8-Prefixes Award: Also a new Japanese Award: work countries with the "8"
Prefix: Class 1: 8 Countries.
Class 2: 16 Countries.
Class 3: 24 Countries.
Examples: JA8; TT8; W8; S8; FK8, etc...)
Send GCR list and 10 IRCs (*not cash!*) to Awards Manager, Hiromichi Katsurashima, JH1HWN, 5-2236-33 Iriya, Zama-city, Kanagawa, Japan.

Notes

A fine *County Hunter Handbook* is being put out by The B & B Shop, 1348 Pinewood Dr., Woodbury, MN 55119 and is offered at a non-profit cost of $2.00 to cover the cost of printing, binding and shipping. This has a tremendous amount of data for County Hunters and I can highly recommend it.

Mrs. Loren Tate (Mary) widow of W0RP, wrote, "We would drive across the country, he usually on the air and I logging and writing poetry - my husband and county hunting were my "first loves" and poetry came next. I am enclosing a poem I wrote about Tate's illness. You may like it." We *loved* it and got permission to use it, although Mary insists she is not good at it. You be the judge.

Many many thanks for permission to use the poem. I can add nothing and besides I can no longer see to type, due to the tears in my eyes.

73, Ed., W2GT

Sweethearts Forever

7-20-1979
Dr. told us "Terminal"
Today we walked through the valley
The valley of gloom and despair,
Our Savior walked there beside us,
Our heartbreak, He sweetly did share.

The Doctor said, "Terminal cancer"
Our hearts were broken with fear.
Our lovestory, our lives, were shattered
Yet our Lord and Savior was near.

We held hands and said, "I love you"
For we had ever been deeply in love.
We knew Tate's days were numbered,
Ordained by our Savior, above.

Tate serenely accepted the verdict
And said, "Doctor, please tell us all-
There's nothing hidden in our lives,
We're ready for God's beck and call."

8-5-79
came home from hospital
After surgery, at home, he'd smile sweetly
To encourage my breaking heart.
I'd smile and kiss him - yet we both knew
In a few short weeks we would part.

We prayed, stood fast, 'lest the children
Would worry and sicken with fear.
Yet they knew that behind our bravado
Our eyes burned with many a tear.

12-2-1979
Tate died.
Our God never makes an error
When he calls His children home.
In December, He called my sweetheart
Some day, that reason will be known.

God needed my husband in Heaven
He had a special job set aside-
Just for Tate and I'm sure, as usual
Tate will do it with pleasure and pride.

I see now why Tate didn't worry
Nor suffer, when he was so low.
He told his friends and children,
"I'm a winner, wither way I go."

"If I survive a little while longer
I'll enjoy my family, so sweet -
Should I die, hand in hand with Jesus -
Forever we'll walk heaven's Golden Street."

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

Listening during the weekend of the new 160 phone contest organized by Wayne Green a week before our C.W. 160 Contest last January, I found that it generated quite a bit of s.s.b. activity.

There was one disturbing factor however, the malicious QRM from a few c.w. diehards who resented the invasion of s.s.b. signals in that portion of the band usually occupied by c.w. operation. I had expected a retaliation by the phone boys the following weekend during our c.w. contest but it did not materialize; they were real gentlemen.

All except one uncooperative East Coast individual however, who purposely started his roundtable right in the middle of the "DX Window" in the early evening, completely covering the European DX that had started to come through.

When he was advised of the "gentlemans' agreement" to keep that spot free of stateside signals, his reply with emphasis was, "I never made such an agreement." Obviously he was no gentleman and numerous pleas were ignored by he and his cohorts.

A very unfortunate situation that could not be solved by self government, could be avoided if the FCC would see fit to split the band into separate c.w. and phone sections like all the other l.f. and h.f. bands. But that would be asking too much wouldn't it?

For obvious reasons I have been following the development of the new format for the ARRL DX Contest with some interest.

Some of the remarks about the change in this format made by W1XX in his column in *QST* however were not only interesting but to me a bit amusing. To quote a few, "the premier operating event of the year, the foremost International DX operating activity, and recognized as the World's Championship."

That last one really got to me. Up to this year when the format was changed the ARRL contest could hardly be called an international activity. I always considered it a one way affair between the U.S., Canada and the rest of the world. That would hardly qualify it as a "World Championship" event.

Come on John, don't you think you jumped the gun and are a bit premature in making those claims? When you can show an input of over 5000 entries with over half of them coming from overseas stations, then perhaps you can challenge our *CQ* World Wide DX Contest for the Championship of the World.

I don't doubt that with the new format you will generate a good foreign return but at this stage I think our WPX Contest will give you a run for your money, let alone making a comparison with our World Wide Contest.

73 for now, Frank, W1WY

Calendar of Events

Apr. 19-20	LIARS 10X QSO Party
Apr. 26-27	King of Spain Contest
May 3-4	New York State QSO Party
May 10	DARC 10 Meter RTTY
May 10-11	USSR "CQ-M" Contest
May 10-11	Rocky Mountain QSO Party
May 11	RSGB WAB HF C.W. Contest
May 17-18	Common Market Contest
May 17-18	Florida QSO Party
May 17-19	Michigan QSO Party
May 17-19	Massachusetts QSO Party
May 24-25	**CQ WW WPX C.W. Contest**
June 7-8	RSGB National Field Day
June 21-22	All Asian Phone Contest
June 22	RSGB WAB LF Phone Contest
June 28-29	ARRL Field Day
June 28-29	ARCI QRP Field Day
July 20	RSGB WAB LF C.W. Contest
July 26-28	County Hunters C.W. Contest
Aug. 9-10	European C.W. Contest
Aug. 23-24	All Asian C.W. Contest
Aug. 31	RSGB WAB VHF Contest
Sept. 13-14	European Phone Contest
Sept. 27-28	Delta QSO Party

LIARS 10-X QSO Party

Starts: 0001Z Saturday, April 19
Ends: 2359Z Sunday, April 20

This year's party is again being sponsored by the Long Island Amateur Radio Service Chapter of the 10-X International Net.

Rules were not received in time for the April issue but are being given here to help you in the scoring since there have been a few modifications over those used last year.

Exchange: Name, QTH, 10-X number and 10-X Chapter number if any.

Scoring: One point for each QSO, 1 point for each 10-X number, and another point for each 10-X Chapter worked.

The multiplier will be based on each DXCC foreign country worked.

Operation of course is on 10 Meters only, suggested frequencies between 28.7 and 29 kHz.

Awards: First and 2nd place certificates to winners in each state, province and DX country. There is a Trophy for the highest scoring participant.

Logs must be received by May 15th and go to Robert Watson, WA2MHL, 2 Suffolk Court, Oceanside, N.Y. 11572. Include a large s.a.s.e. if you wish a copy of the results.

H.R.H. King of Spain Trophy Contest

Starts: 2000 GMT Sat., April 26
Ends: 2000 GMT Sun., April 27

I do not have too much information about this one but the title and them. 1st prize have an attractive ring to them. The "Top Banana' will receive an invitation to visit Calella for a period of 8 days to receive his Trophy. However with the operation being spread over 7 bands, 160 thru 2 meters, it is not likely that anyone from this side will be making a trip to Spain.

You can use all bands, 160 thru 2 meters, both on c.w. and s.s.b. There is a 4 hour compulsory rest period in

the 24 hour contest period. Each EA station may be worked on each band and each mode.

Exchange: RS(T) plus a 3 figure QSO number starting with 001. EA stations will include 2 letters identifying their province.

Scoring: One point per QSO. Multiply total EA QSOs by the number of EA provinces worked on each band for final score. (max. of 53 possible on each band and each mode.)

Awards: Besides the Top Trophy there are also trophies for 2nd and 3rd place, and awards for the top continental and s.w.l. scores. Also diplomas for all stations making 50 or more QSOs, and s.w.l.s logging at least 150 EA stations.

Logs must be mailed no later than June 1st to: Agrupacio Radioaficionats Calella, Apartado 181, Calella (Barcelona) Spain.

New York State QSO Party

1700Z Sat. May 3 to 0500 Sun. May 4
and 1200Z to 2359 Sun. May 4

This year's party is again sponsored by the Univ. of Buffalo A. R. C., WA2NPQ.

The same station may be worked on each band and mode, NY stations may work other NY stations and mobiles and portables in each county change.

Exchange: RS(T), QSO number starting with 001 and QTH. County for NY stations, state, province or country for others.

Scoring: One point per QSO. NY stations multiply total by the number of states, provinces and DX countries worked. Out-of-state stations use NY counties for their multiplier. (max. of 62)

Frequencies: C.W. - 1810, 3560, 7060, 14060, 21060, 28060. S.S.B. - 3900, 7275, 14285, 21375, 28550. Novice: 3725, 7125, 21125, 28125.

Awards: Certificates to the top scorers in each state, province, DX country and NY county.

Indicate each new multiplier in a separate column as it is worked. A check sheet is required for stations making 100 or more contacts. And of course the usual summary sheet with all the essential information. Include a large s.a.s.e if you desire a copy of the results.

Mailing deadline for all entries is June 10th to: Michael Bergman, WD2AJS, 45 Swartson Ct., Albany, N.Y. 12209

DARC 10 Meter RTTY Contest

Saturday, May 10, 1100 to 1700 GMT

This contest will be held four times a year and will be known as the DARC "Corona" 10 Meter RTTY Contest. It of course is for RTTY operation only, in that portion of the 10 meter band used for RTTY operation. This is the 2nd of the series, the 3rd and 4th will be held on Sept. 27th and Nov. 15th.

Exchange: RST, QSO no., and name.

Points: One point for each completed contact.

Multiplier: (a) Countries as determined by the DXCC and WAE country lists, and each W, VE and VK call district. (b) Each different prefix. (The last WAE country list appeared in the August issue of *CQ*.)

Final Score: Total QSO points times the total multiplier as indicated above.

Awards: Plaques to leading stations in each of three classes: Single and multi operator and s.w.l.

Mailing deadline for all entries is June 10th to: Klaus K. Zielski, DF7FB, P.O. Box 1147, D-6455 Erlensee, West Germany.

USSR "CQ - M" Contest

Starts: 2100 GMT Saturday, May 10
Ends: 2100 GMT Sunday, May 11

This year we did receive official rules in time to make this issue. Same format as in the past but now I can give you more detailed information.

Do not limit your operation to working the USSR only. It's a world wide type contest same as our *CQ* WW. Contacts may be made on c.w. or s.s.b., 3.5 thru 28 MHz. The same station may be worked on each band but not both modes for QSO and multiplier credit. Contacts via Oscar count as an extra band when made on 144 to 2 MHz.

Classes: (A) Single operator, single band. (B) Single operator, all band. (C) Multi-operator, single transmitter, all band. (D) S.W.L.

Exchange: RS(T) plus a 3 figure QSO number. The USSR stations RS(T) plus the number of their region. (Oblast)

Points: Contacts between stations on the same continent 1 point, different continents 3 points. Own country may be worked for multiplier credit but no QSO points.

Multiplier: Is determined by the number of countries worked on *each band*. The USSR "R-150-S" list is the standard, which essentially is the same as our DXCC plus the following additions. Oblasts 002, 013, 014, 056, 084-5-6-7-8-9, 090-1-2-3-4-5-6-7-8, 159 and UA1 Novaya Zemlya, UA0 Kuril Is., UA0 New Siberian Is.

Final Score: Total QSO points from all bands times the country/oblast

multiplier from each band.

The s.w.l.s get 1 point for reporting one station exchange, 3 points if both stations and their exchange.

Awards: For foreign station winners. Class (B) and (C) a Trophy donated by the USSR *Radio* magazine. Class (A) and (D) Special medals and badges. And badges to everyone contacting at least 10 USSR stations.

Contest contacts may be credited for USSR awards in lieu of QSL cards if the request is made with your entry. R-150-S, R-100-0, W-100-U, R-15-R, R-6-K, R-10-R.

Mailing deadline is July 1st to: Krenkel Central Radio Club, "CQ - M" Contest Committee, P.O. Box 88 Moscow, USSR.

Rocky Mountain Division QSO Party

Starts: 1800Z Saturday, May 10
Ends: 2400Z Sunday, May 11

This year's party is being sponsored by the Arapaho Radio Club of Colorado. Stations outside the Rocky Mountain Division will work RM stations only, those within the Division may work any station. The same station may be worked on each band and mobiles in each county change.

Exchange: RS(T) and ARRL section. RM stations will also include their county and state. (Colorado, New Mexico, Utah and Wyoming)

Novices will identify with /N, Techs. /T, Club portables /C, and Mobiles /M.

Scoring: QSOs on phone 1 point, on c.w. 2 points, and Club portables 3 points.

Rocky Mt. stations multiply total by (ARRL sections + RM counties + DX countries) worked.

Outside RM Division, total QSO points times (RM sections + RM counties) worked on each band.

Bonus points: 50 points for working 5 RM Novice/Techs., 100 points to RM Mobiles operating from 3 or more counties (min. 10 QSOs per county) and 100 points to Club portable stations with at least 5 operators. (min. 10 QSOs per operator.)

Final Score: QSO points × multiplier + bonus points.

Frequencies: C.W. - 3560, 7060, 14060, 21060, 28060. S.S.B. - 3900, 7270, 14300, 21370, 28570. Novice - 3725, 7125, 21125, 28125.

Awards: To the top scorers in each ARRL section, Novice/Techs. separately, and the top mobile in each RM section. Club portable entries will compete for the "Buckskin Joe" award.

Submit logs, including a large s.a.s.e no later than June 15th to: Buster Boatman, KAØCLS, 8973 W. Harvard Drive, Lakewood, Colo. 80227.

RSGB WAB HF C.W. Contest

Sunday, May 11, 0900 to 2100 GMT

The RSGB "Worked All Britain" contests are divided into 5 different categories and held on 5 separate dates. This one is for operation in the 14, 21 and 28 MHz bands.

The following rules apply to overseas stations.

Classes: Single or Multi-operator (one Tx only) and single or multi band, and s.w.l.

Exchange: RST, QSO number starting with 001. (British stations will add their WAB area and county)

Scoring: Five points for each QSO on each of the 3 bands.

Multiplier: Each WAB area (G, GD, GI, GM, GW) and each county.

The same station may be worked on each of the 3 bands for QSO and mulitplier credit.

Awards: Certificates to the leading scorers in each class in each DXCC country, and to s.w.l.s

A summary sheet showing the scoring, essential information, name and address in Block Letters, and the usual signed declaration are also requested.

Logs for this one must be postmarked no later than June 11th and go to: R. L. Senter, G4BFY, 27 Station Road, Thurnby, Leicester LE7 9PW, England.

Common Market DX Contest

C.W.: Sat., May 17 S.S.B.: Sun., May 18
0600 to 2400 GMT both days

The purpose of this contest is to increase activity between radio amateurs in the Common Market of Europe and the rest of the world.

There are 9 countries in the Common Market. Belgium, W. Germany, Italy, Denmark, Great Britain, Luxembourg, Ireland, Netherlands and France.

Classes: Single operator, Low Band, (80 & 40) and High Band. (20, 15, 10) and Multi-operator, Single Xmtr, All Band only. s.w.l.

Exchange: RS(T) plus QSO no. starting with 001.

Points: *Common Market* - QSO with other CM stations, 1 point. With other Europeans, 2 points, all others 5 points.

Non Common Market - QSO with CM stations, 5 points. With other Europeans, 2 points. The same station may be worked on each band for QSO and multiplier credit.

QSOs with ON4UB are worth 25 points and 1 multiplier.

Multiplier: *For CM* - Each DXCC country worked on each band.

For Non CM - Each call area in the 9 Common Market countries. (max. of 67 per band) and ON4UB on each band.

Final Score: Total QSO points times the total multiplier.

The s.w.l.s score 5 points for each complete QSO reported between a CM station and a non-CM.

Awards: Certificates to the top scorers in each class, in each country, and in each mode. Trophies to the top CM and non-CM single operator score in each mode.

Use separate log for each mode and for each band. Include a summary sheet and the usual signed declaration that all rules and regulations for excessive dupes and etc. will be enforced.

Mailing deadline is June 30th to: Michel Le Bon, ON4GO, Chee de Wavre 1349, B-1160 Brussels, Belgium.

Florida QSO Party

Starts: 1500 GMT Saturday, May 17
Ends: 2359 GMT Sunday, May 18

This is the 15th annual QSO Party sponsored by *Florida Skip,* serving Floridians for over 20 years.

The same station may be worked on each band, phone and c.w. Separate logs are required for each mode. Fla. stations may work other in-state stations for QSO points.

Classes: Florida stations are divided into two classes. Class A is portables and mobiles using emergency power running 200 watts or less, inside Fla. but outside their own county. Class B is all others in Florida.

Exchange: RS(T) and QTH. County for Fla., state, province or country for others. Out-of-state mobiles not within the jurisdiction of any country will indicate their ITU region. (1, 2, 3, etc.)

Scoring: *For Florida* - One point per QSO. Multiply total by sum of states (49), provinces (12), DX countries (25) and regions (5) worked. (max. allowed in each area) Class A stations multiply final score by 1.5 factor.

Out-of-state - Two points for each Fla. contact. Multiply total by Fla. counties worked. (max. of 67)

Frequencies: C.W. - 3555, 7055, 14055, 21055, 28055. S.S.B. - 3945, 7279, 14319, 21379, 28579, 50.2, 146.52.

Awards: Certificates, phone and c.w., to the Top single operator score in each state, province, DX country and Fla. county. And five plaques as follows: Top single operator score in Fla. and out of state, phone and c.w., and to the Fla. Club with the highest

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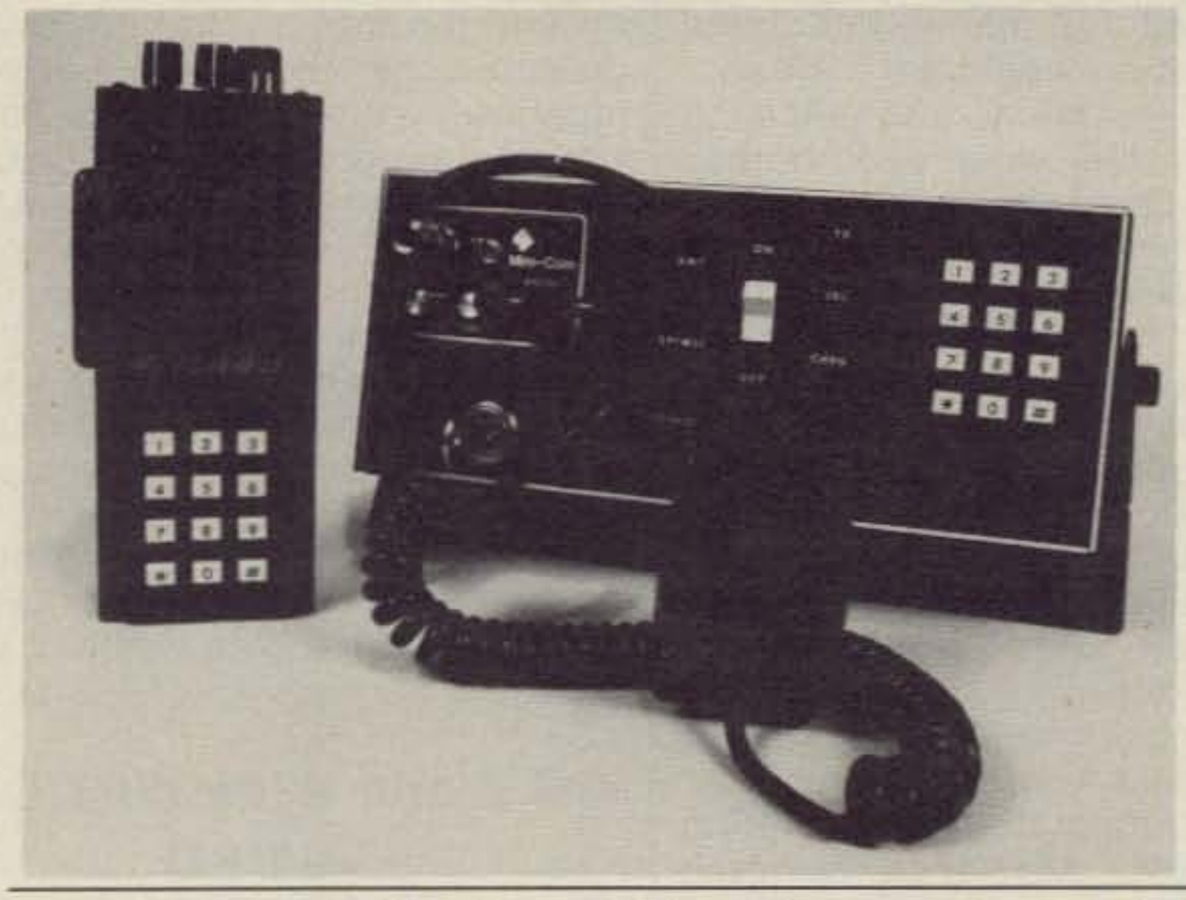

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aggregate score.

There is a disqualification clause for excessive dupes, multipliers and other obvious reasons. Disqualified stations will be barred from next year's party.

Include a summary sheet and the usual signed declaration, and your name and address in BLOCK LETTERS. Also include a 15¢ stamp for the *Florida Skip* issue with the results.

All entries must be received before June 15th and go to: *Florida Skip* Contest Committee, P.O. Box 660501, Miami Springs, FL 33166.

Michigan QSO Party

Two Periods GMT

1800 Sat. May 17 to 0300 Sun. May 18
1100 Sun. May 18 to 0200 Mon. May 19

This year's party is again sponsored by the Oak Park ARC. The same station may be worked on each band and mode, portable/mobile in each county change. Contacts between Mich. counties are permitted for multiplier credit.

Exchange: RS(T), QSO no. and QTH. County for Mich., State or country for others.

Scoring: For Mich. – One point for phone contacts, 2 points if on c.w. Multiply total by (states + countries + Mich. counties) worked. KH6 and KL7 count as states, VE as a country.

Out-of-state – one point for phone, 2 points on c.w., 5 points if its with Club station W8MB. Multiply total by Mich. counties worked. (max. 83)

VHF scoring same as above but add multiplier from each band for total multiplier. Oscar contacts are worth 5 points. Repeater contacts not allowed.

Frequencies: CW – 1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, 28035, 28125. S.S.B. – 1815, 3905, 7280, 14280, 21380, 28580, V.H.F. – 50.125 and 145.025.

Awards: Certificates to top scorers in each state, country and Mich. county. There are also plaques and trophies for high Mich. score, out-of-state, v.h.f. and aggregate club score in Mich. (Single op. only)

Party contacts do not count toward the Mich. Achievement Award unless one fact about Mich. is communicated.

A summary sheet is requested, showing the scoring and other pertinent information, and a signed declaration that rules and regulations have been observed.

Results will be mailed to all entries. Mailing deadline is June 30th to: Mark Shaw, K8ED, 3810 Woodman, Troy, Mich. 48084.

Michigan Achievement Award

All contacts with Michigan stations made during Michigan Week, May 17-24, as well as Party QSOs, may be used for this award if the following requirements are fulfilled.

1. Michigan stations – Submit a log with information, name and address of station worked if possible, of 15 or more QSOs with out-of-state or DX stations, with information about Michigan.

2. Out-of-state stations including Canada – Submit a log with information, name and address if possible, of at least 5 Mich. stations worked who related facts about Michigan.

3. DX stations – Work at least one Mich. station, with log information, name and address, and relate fact about Michigan given him by the station worked.

4. Only contacts made during Michigan Week, May 17-24, are valid for this award.

Applications for certificates must be postmarked no later than July 1st 1980 and mailed to: Governor William Milliken, Lansing, Mich. 48902.

Facts about Michigan: State Bird – Robin, Fish – Trout, Flower – Apple Blossom, Tree – White Pine, Stone – Petoskey. Or any local fact.

Massachusetts QSO Party

Starts: 1600 GMT Saturday, May 17
Ends: 0200 GMT Monday, May 19

This year's party is being run by the Greater New Bedford Contesters and again being sponsored by W1FJI, N1AS and K1KJT.

The same station can be worked on each band and mode. Cross-band and repeater contacts are not permitted. Mass. stations may work each other for QSO points and multiplier. Mobiles and portables in each county change.

Exchange: RS(T) and QTH. County for Mass., state or province for others.

Scoring: Two points for each s.s.b. contact, 4 points if it's on c.w.

Mass. stations multiply total QSO points by states, provinces and Mass. counties worked.

Out-of-state stations, total QSO points by different Mass. counties worked. (max. of 14)

Add 50 bonus points to your total score for each of the 3 sponsors worked. (once only)

DX contacts count for QSO points only.

Frequencies: C.W. – 1810, 3560, 7060, 14060, 21060, 28060, S.S.B. – 1820, 3960, 7260, 14290, 21390, 28590, 50.110. Novice – 3720, 7120, 21120, 28120.

Awards: Certificates to the 1st, 2nd & 3rd place winners in each Mass. county as well as each state. Two special awards to the highest aggregate Club score in Mass. (min. of 3 logs) and to the Mass. station submitting the all time highest number of QSO's. (Record now held by K1GSK with 1483 in 1979.) Stations working all 3 sponsoring stations will also receive a certificate.

Include a summary sheet with all essential information with your entry. Include 30¢ postage, no envelope, for copy of results and awards.

Mailing deadline is June 30th and they go to: Ed Peters, K1KJT, 29 Greenbrier Drive, New Bedford, Mass. 02745.

CQ World Wide WPX C.W. Contest

Starts: 0000 GMT Saturday, May 24
Ends: 2400 GMT Sunday, May 25

Just a reminder of the WPX C.W. Contest coming up at the end of the month.

This is only the second time around for this one and it has not reached it's full potentials; however it should eventually build up to a major DX competition.

Rules and scoring are exactly the same as for the s.s.b. version run last March, and were fully covered in the January issue, with a brief rundown in the March Calendar.

This year we have 15 plaques being awarded to all areas of the world, a substantial increase over last year's sponsorship.

Mailing deadline for all entries is July 10th.

Please send all logs for the C.W. portion to:

Bob Cox, K3EST
5801 Huntland Drive
Temple Hills, Maryland 20031

Bob will be scoring the c.w. section this year and by sending the logs directly to him you will speed up the whole process. CQ

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

While the analog panel meter should still be around for a while, the use of digital readouts for all sorts of electronics equipment is certainly on the increase. The familiar seven segment digits abound in everything from a stereo tuner to an electronic thermometer or calculator. These applicators are certainly fine and do usually make interpreting data quite easy, but they suffer from one significant problem—that of indicating trends. There is virtually no way that a digital readout can match an analog pointer when indicating a dip in an alignment procedure, or a peak on a VU meter. For these applications and many similar ones the analog display will still be the preferred one.

* *5 Melville Lane, Great Neck NY 11020*

Keeping this in mind, the people at National Semiconductor Corp. have come out with a new integrated circuit—the LM3914. This device contains circuitry that lights a series of LED's arranged in a row (or bar) in accordance with an input voltage. Depending on the hook-up, the LEDs can indicate voltage by the number of devices lit, or by the position of a particular LED in the row for a true solid-state analog display.

Fig. 1 is a block diagram of the LM3914. You will note that it consists of 10 comparators, a reference voltage source input, buffer amplifier and mode select circuit. In its simplest form, an input signal is applied to one input of all comparators and a graduated reference voltage to the other inputs. The indicator LED's are then connected to the outputs of the comparators in operation. All comparators set below the input voltage turn on while those set above it stay off. In this way, the length of the "line" formed by the 10 LED's (in a row) expands or contracts as the amplitude of the input voltage varies. Furthermore, by disconnecting pin 9 from Vcc, the display shifts from a bar type to a point type with the indicator being only a single illuminated LED.

Fig. 2 is a good "get your feet wet" hookup employing the LM3914 as a 0-5 volt full scale analog "meter" with a resolution of 0.5 volts. By employing input voltage dividers this range

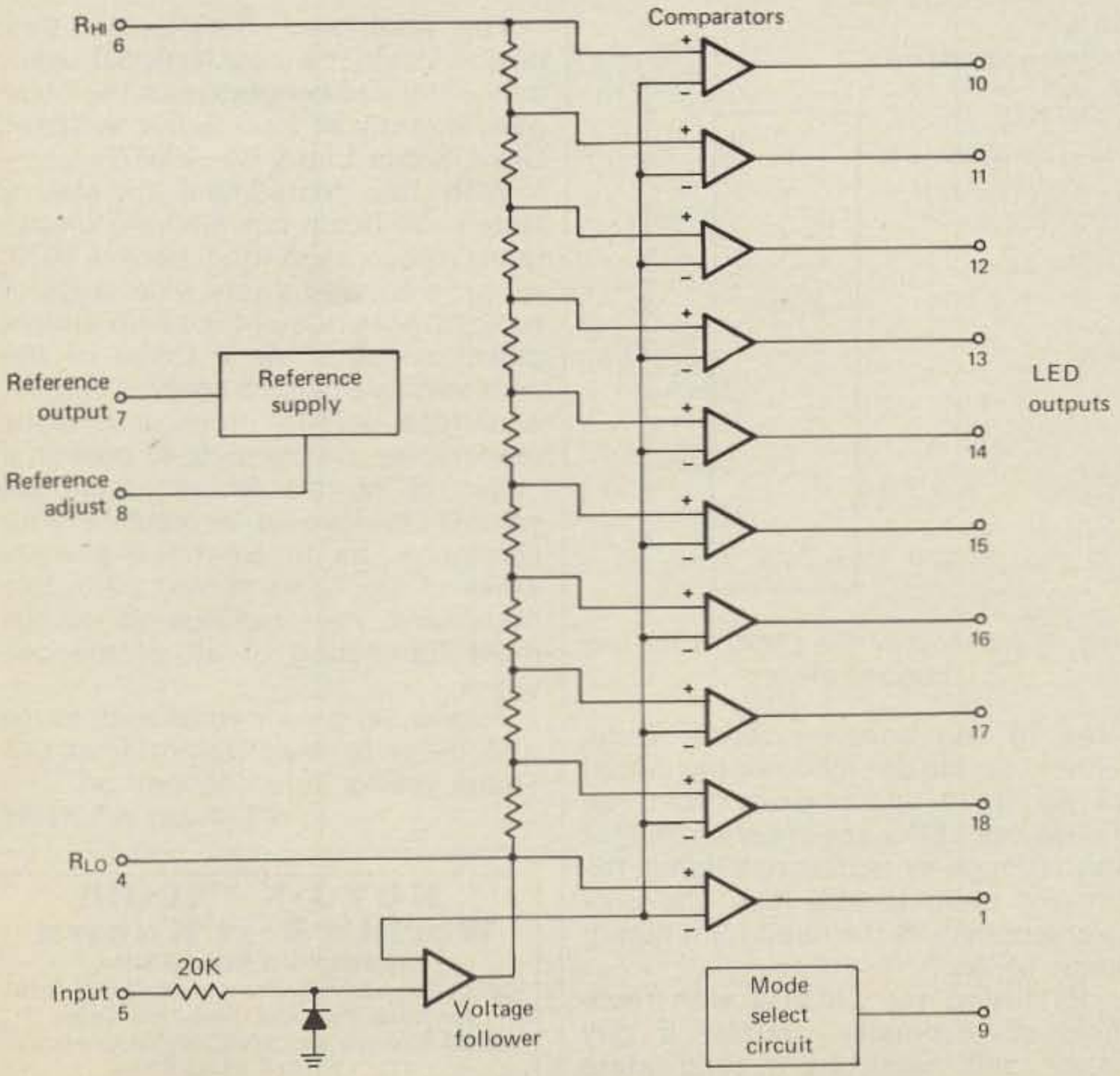


Fig. 1- Block diagram of the National Semiconductor Corp. LM3914 integrated circuit.

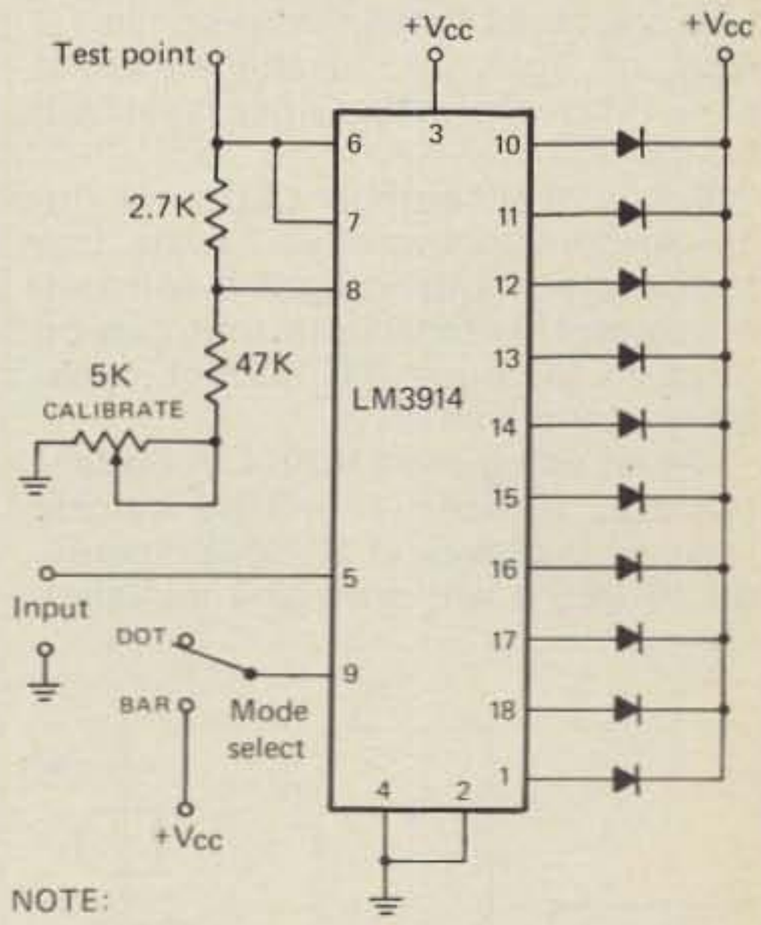


Fig. 2- Hookup for the LM3914 as described in the text. To align, set the 5K potentiometer for exactly 5 volts from T.P. to ground.

can be easily varied. A switch is also provided to switch the mode of display as desired.

When using the chip, keep in mind

that the maximum current that can be safely employed is 10 milliamperes per LED. Therefore, high brightness LED's such as those that produce 1-2 Mcd of light (at 10 milliamperes) should be employed. Other types will be too dim.

For higher output LED's or incandescent lamps if you wish, use the booster shown in fig. 3. It consists of simply 10 transistors that can be used to increase the current capability of the chip.

When using the LM3914 in battery operated devices, it will be quickly realized that even at 10 milliamperes, all 10 LED's will draw 100 milliamp-

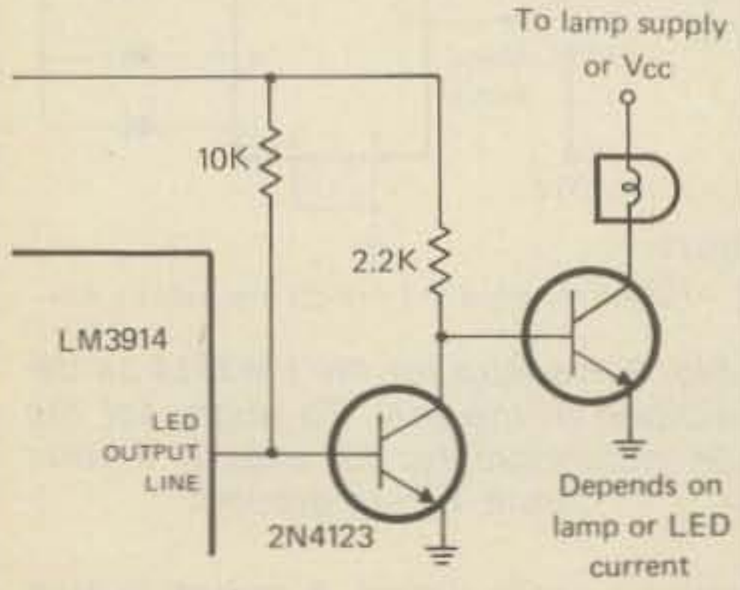


Fig. 3- The addition of a current "booster" for driving heavy loads.

Fig. 4- Hookup of the LM3914 for low current drain.

eres in the bar-type mode. Here, either use the dot mode or the circuit of fig. 4. In this hookup (from National) the LED's are in series so that even though more than one lights, the current drain is still low. The only problem here is the need for a higher value of Vcc.

By fitting the LM3914 with rectifiers or ohmmeter circuitry a very novel and small fully solid state v.o.m. can be built with adequate resolution for most purposes.

For additional details on this device, contact a local National Semiconductor representative or the company directly at 2900 Semiconductor Drive, Santa Clara, Ca. 95057.

With this installment of Math's Notes, we begin our 8th year of columns. Since we started, back in 1972, we have covered a very wide range of topics from state-of-the-art to simple power supplies. As a result of the wide variety of topics covered and the countless letters from our many readers, we are planning to publish a "Best of Math's Notes" technical volume. We would appreciate your comments as to what the primary areas of emphasis should be in this book, and your feelings as to the most interesting of all of the columns.

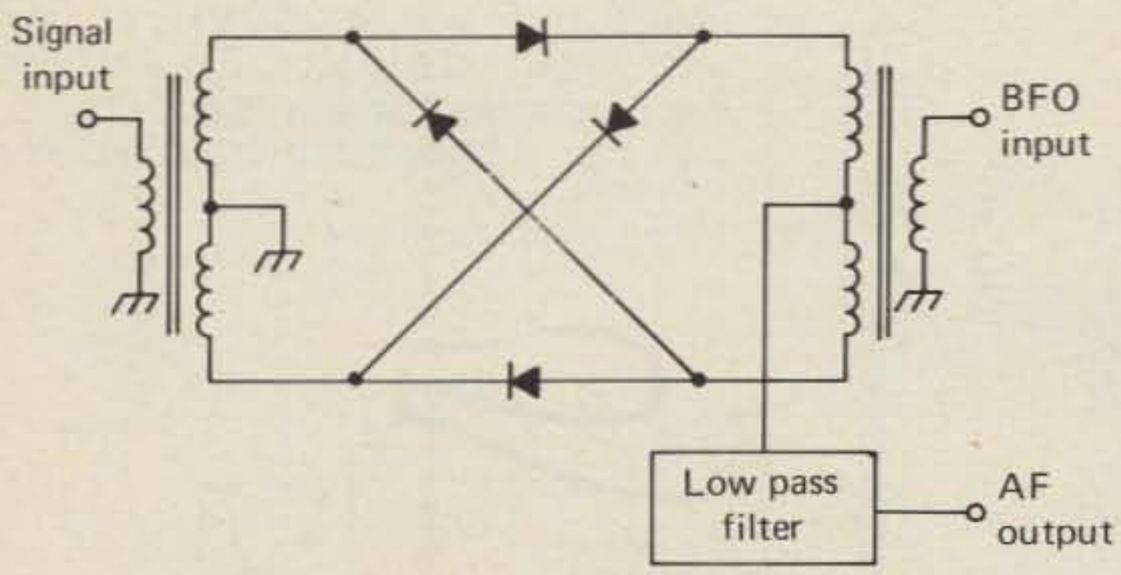
Please send your comments to me directly or to Alan Dorhoffer at *CQ*. Thank you for your cooperation.

73, Irwin, WA2NDM

CRANIUM QUERIES

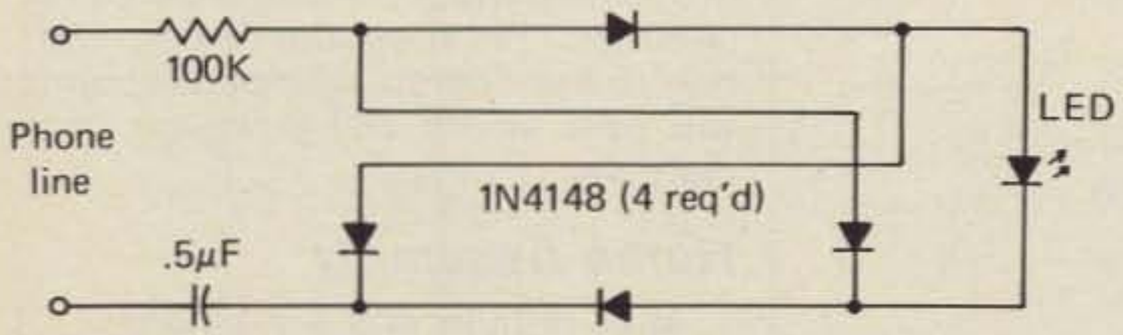
FIND THE ERROR

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
c/o CQ



Here's What Was Wrong

Doublecross is the magic word. First, the diodes were configured as a bridge—not a ring demodulator, as shown here—so two of the diodes are backwards. Then doublecross again, since it's a high pass filter shown at the output instead of a low pass, as it should be.



What's Wrong?

Let's see, a resistor to drop the current, a capacitor to block DC, a diode bridge and the LED should light when the phone rings. Instead, no light and nasty letters from Ma Bell. Where'd my ringer turn into a wronger?

Getting set for Field Day? Here's a little gem that can add two extra bands to your log.

A High Gain Horn Antenna For 220 And 420 MHz

BY T.E. WHITE*, K3WBH

The secret of successful mountain topping for field day or other portable operation is getting the maximum out of the fewest pieces of gear on the most bands. Here is an antenna, of a type largely neglected by amateurs, which will enable fast changeover between 220 and 420 just by switching a single feedline to one or the other transmitter.

No other antenna configuration will give a gain increase of 6 dB simply by doubling the frequency while holding its size constant. The horn, operating on its fundamental (200 MHz in this case), will provide 9 db gain, and 15 db on its second harmonic (400 MHz here). This design, simple to construct, erect, and take down, will get you those contest multipliers for 2-band operating without stringing the mountain with skywire.

Construction

Fig. 1 shows a horizontally polarized (sides vertical) horn one wavelength on a side at 220 MHz or two wavelengths at 440 MHz. Fig. 2 shows the supporting framework and mounting. Fig. 3 shows the feed system.

* 36 Lake Ave., Fair Haven, NJ 07701

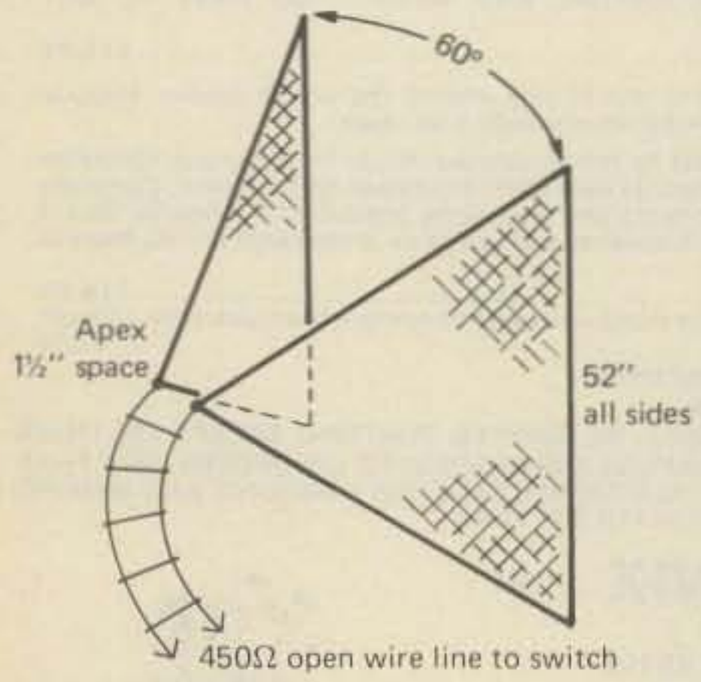


Fig. 1- The horizontally polarized horn antenna. It is one wavelength on 220 and two wavelengths on 420 MHz.

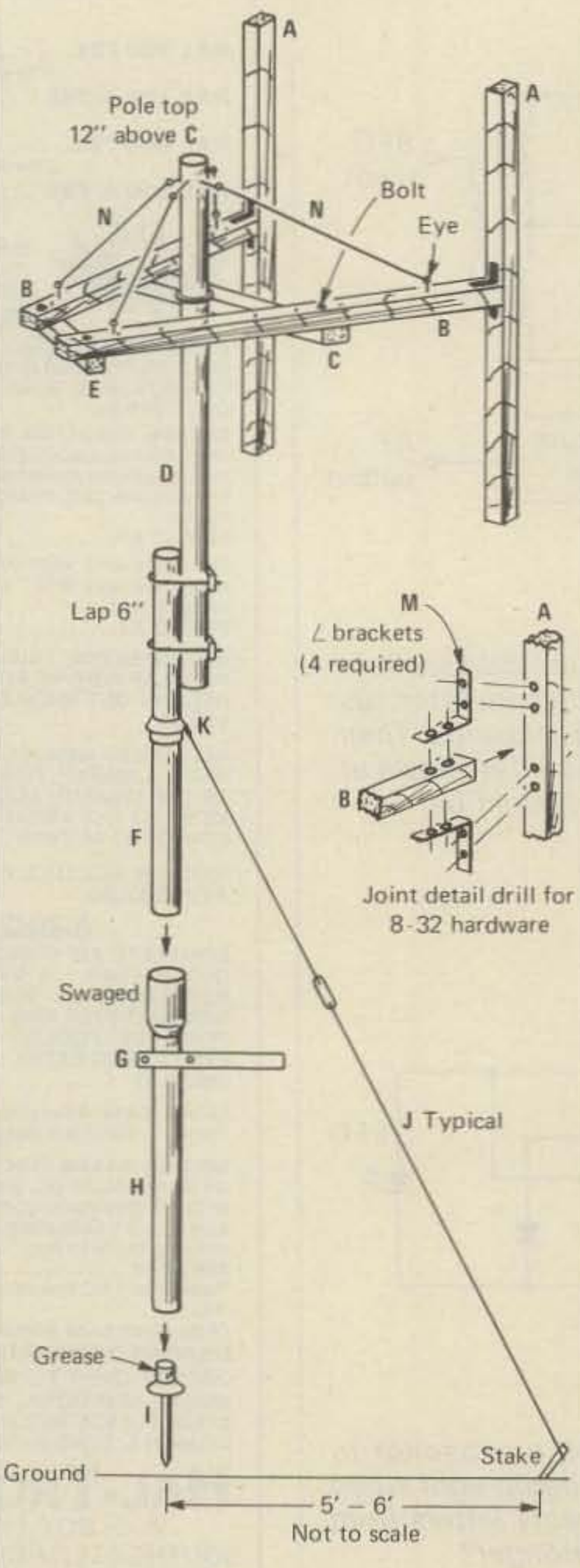


Fig. 2- The support system and mech anical framework for the two band horn antenna.

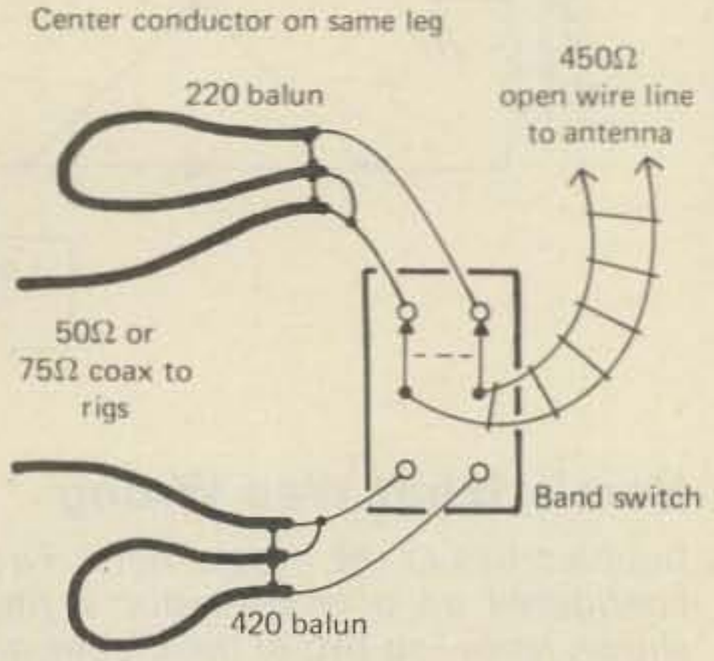


Fig. 3- The horn antenna feed system.

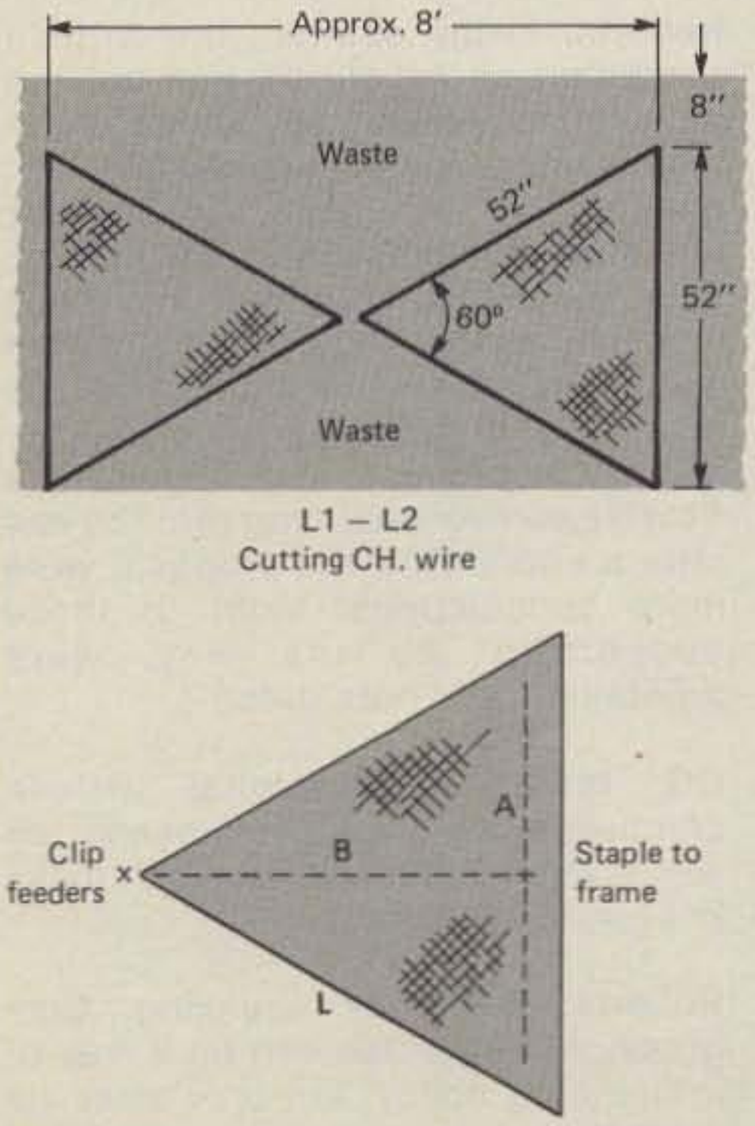
Fig. 4 shows cutting of the "wings." Remember, you're going to encounter strong winds, so guying as shown is a good idea. It may even be advisable to attach a rope bridle to one side where part *C* joins *B* and anchor the rope on the ground while working a particular direction. Rotating the "open end" only to the 4 cardinal compass points will give ample 360 coverage, incidentally.

Home Assembly

After drilling and pre-assembly of each A to B section cut the chicken wire out of a 5 foot wide roll as per fig. 4. Watch sharp edges! About 8 linear ft. of wire is needed. Start at the cut 8 inches in from one side. Lay off angles and chalk along a board or straight-edge to trace cuts. Dimensions are not critical. Forward edge of "wing" laps two to three inches out ahead of A. Staple each wing to A/B. Bolt holes for C and E attachment in

the field and screw eye holes are done before chicken wire stapling.

It is a good idea to trial-assemble the entire antenna structure up to and including pole D. Install screw eyes and cut non-metallic guys to length before going into the field. Drill U-bolt holes at mid-C for attachment to D. Be sure to use serrated anti-twist clamps with U-bolts.



L1 – L2
Cutting CH. wire

Fig. 4- How to measure and cut the "chicken wire" for the two band horn antenna.

Field Assembly

Pre-erect the mast without the antenna to measure off the main guys and to install the guy ring. Locate stakes at 120 degree intervals and semi-tighten turnbuckles. Take the mast down. Then assemble all components onto pole D. Attach feeder (ladder line) to apex with copper alligator or "pee-wee" clips and tape well, hooking the tape around the last ladder line spreader.

Drive the ground stake (TV push-up mast base type) and grease, as entire mast will rotate thereon. Attach D to joined F and H mast sections with two clamps and U-bolts. Walk it upright, drop it on ground stake and guy it to the radial stakes. Attach turning handle, position feeder into operating position and hook up to band-change and balun assembly. Tune up rigs and start piling up contacts!

Note there is no metal (masts, guys, etc.) within area between the wings of the antenna proper when assembly is complete. An interesting experiment would be (for fixed-direction point to point contacts) to operate two of these side by side, spread 104 in. mast to mast, with an equal-length branched phasing harness.

Bill Of Materials

Item	Qty	Size	Material
A	2	48"	1 × 1 Wood
B	"	48"	" "
C	1	36"	" "
D	1	48"	1¼ Ø Wooden Dowel or Closet Pole
E	1	4"	1 × 1 Wood
F	1	5'	TV Mast
G	1	—	Mast Turning Handle
H	1	5'	TV Mast
I	1	—	Ground Stake—TV Type
J	3	—	Guy Wire & Turn Buckle
K	1	—	Guy Collar & Slip Ring
L	2	52" per side	Chicken Wire (see Fig. 4)
M	4	—	Angle Brackets with 8-32 Nuts and Bolts
N	4	—	Non-Metallic Guys with Screw Eyes

Roberts Interview *(from pg. 11)*

mission. This is partly because large, national CB organizations are, except for REACT and CBA/Alert, almost non-existent, and because the EIA's involvement in CB has declined dramatically as CB sales have dropped.

CQ: Going back to our discussion of the Federal agencies which could affect our service, many amateurs feel that amateur radio is, or should be, above politics. Do you subscribe to this view?

Roberts: As long as radio is regulated by the various governments, no radio service can be "above politics." Amateur radio is crucially dependent upon the spectrum for its very existence, and spectrum allocation is essentially a political process. It's a process guided by Commissioners who are political appointees nominated by the President and confirmed by the Senate, and who ultimately determine what the amateur radio regulations should be. I think it would be naive to expect the amateur service to be immune to "political" considerations. But amateur radio operators, as citizens, should try to understand, and get involved in, the process by participating as much as possible in rulemakings.

CQ: Does the fact that FCC Commissioners are politically appointed and have, in most cases, little knowledge of amateur radio, work to our disadvantage?

Roberts: No, I don't believe the fact that FCC Commissioners are politically appointed works to the disadvantage of *any* radio service, including the amateur service. However, the fact that they generally have little detailed knowledge of amateur radio can lead to heavy reliance on the FCC's staff for policy recommendations in regulating this important service. Even though this gives the Private Radio Bureau staff greater "say" in the affairs of amateur radio than we might otherwise have, I would like to change the situation because I believe a more knowledgeable Commission would make better policy decisions. One mechanism the Bureau has made use of lately is the preparation of Decision Evaluation Memorandums for the Commissioners. These Memorandums set out various alternative causes of possible Commission action on issues, such as ASCII. They also ease the decision-making process and act as an educational tool by giving the Commissioners more information about a subject than they would get from a standard rule-making document.

CQ: For years, those sections of the FCC which addressed amateur matters were under the direction and control of amateurs. This is no longer the case. Do you think the changes made in the Bureau are in the best interests of the amateur service?

Roberts: There are still many amateurs in the Bureau. John Johnston, W3BE, is Chief of the Personal Radio Branch of our Rules Division, where the amateur rules are written and interpreted. In addition, there are numerous amateurs throughout the Bureau, including some in the Policy Development Division, where policies about all the Private Radio services are formulated. I'd have to say amateur radio is still well represented in the Bureau. The changes in personnel and in organizational structure, however, should help us to achieve a better sense of balance in the regulation of all of the Private Radio services.

"My personal belief is that the RFI problem is better handled by the marketplace than by Government intervention and regulation."

CQ: Then, the general attitude towards amateur radio within your Bureau is a good one?

Roberts: Yes. At the Bureau level, I think the attitude towards the amateur service is probably much the same as it was in the past. It's recognized as a valuable service that contributes in many significant ways to the "public interest, convenience, and necessity."

CQ: What is the general attitude towards amateur radio within the Commission?

Roberts: Some in the Commission, including members of other staff offices and some Commissioners, tend to question amateur radio's benefits versus the costs of its administration. I am occasionally asked why the Commission should continue to expend the significant resources that it does in order to administer a service that, according to some people, is equivalent to a "merit badge program" in personal communications. Many of the top officials in the FCC are simply unfamiliar with the details of matters pertaining to amateur service, or they don't fully understand the needs of amateur radio operators. For those reasons, it seems to me doubly imperative for the amateur community to make itself and its needs known at the Commission by communicating the feelings of amateurs on the many important issues that will be surfacing in the next few years.

"I think the amateur service should be devoted to technical achievement and experimentation."

CQ: You recently were the object of a Congressional write-in campaign because of the Government's position on Article 41 (the Morse code provision of the ITU Rules and Regulations). Do you think the write-in was effective in bringing pressure on the Commission to be more responsive to the desires of the amateur service?

Roberts: In my opinion, the write-in campaign on Article 41 was not the most effective way to influence the regulatory process because the U.S. position had long been finalized by the time the letters started arriving. Even the WARC debate on the issue was over before the bulk of the mail was received. I should note that the number and similarity of letters opposing the proposal to change Article 41 were so overwhelming that the few letters supporting the proposal were more conspicuous. Most of those supporters, by the way, were amateurs, not "outsiders."

CQ: Is a Congressional write-in campaign an effective means by which the amateur service can make known its concerns?

Roberts: Generally speaking, Congressional inquiries can be a way of influencing policy, but only after administrative remedies have been tried and exhausted. In some cases Congressional letter writing campaigns simply result in additional paperwork for both the legislator's staff and the

Commission staff, who must then spend so much time just reading, counting, and acknowledging the letters that they have little time to think about the reasons for the campaign.

CQ: Since the Morse code requirement for an amateur license is a current topic of discussion, what are your views regarding this requirement?

Roberts: Right now I really don't know whether the Morse code requirement in the amateur service should be continued, and if it is, whether it should be at the present speeds, or at lower or higher speeds. I'll have a better handle on this question after we analyze this subject more closely. We want to determine how many individuals do not become amateurs because of difficulty in surmounting the Morse code barrier, and what 'price' we pay, if any, because these individuals are unable to participate in the amateur service.

CQ: What are your views regarding the level of technical proficiency required today for an amateur license?

Roberts: I don't have a firm position on this. Our amateur examinations are based on suggestions we have received from a number of interested amateur operators and organizations. During 1979, the examinations were updated to reflect current requirements for operating an amateur radio station.

"I think it's a good idea to have a representative of some sort in Washington for the amateur service."

CQ: What role should the amateur service play today?

Roberts: The role of the amateur service is something we need to examine very carefully. I think it may be presumptuous for me to make a judgment on this subject without the benefit of careful study and analysis. But I admit to having a certain amount of bias towards the technical side of amateur radio. I think the service should be devoted to technical achievement and experimentation. Many of the other activities that amateurs engage in can be done in other personal radio services, but technical experimentation is, and should remain, limited to the amateur service.

CQ: Do you believe in "incentive licensing"? That is, do you believe in the use of incentives as a means of bringing about a general upgrading of amateur capabilities?

Roberts: As I just mentioned, I believe that the amateur service would benefit from increased or renewed emphasis on technical development and experimentation. To the extent that incentive licensing may further these functions, I would be in favor of it. At this time, however, I really don't know how effective incentive licensing is. I would welcome comments from the amateur community on that point. It's clearly something we are going to need to look at in the future.

"As long as radio is regulated by the various governments, no radio service can be 'above politics.'"

CQ: Changing the subject, complaints of radio-frequency interference (RFI) to home entertainment equipment, allegedly caused by CB and amateur operations, currently run about 80,000 per year. While the linear amplifier ban produced a reduction in the annual number of complaints, the number is, apparently, again rising. What is the Commission doing, if anything, to resolve RFI problems traced to design problems in electronic home-entertainment equipment?

Roberts: The Commission, through the Office of Science and Technology, has an active program of investigation into the entire RFI problem. They are now evaluating replies to a comprehensive Notice of Inquiry issued last summer on this whole question. I also find it encouraging that many manufacturers are advertising that their equipment is RFI-proof to some degree, and I am sure that others are introducing RFI rejection without much ballyhoo. My personal belief is that the RFI problem is better handled by the marketplace than by Government intervention and regulation.

CQ: On another interference matter, recently released statistics show that the FCC is receiving an increasing number of complaints from amateurs about interference caused by other amateurs. One must presume that amateurs, who have long prided themselves on being able to police their ranks, now want the FCC to step in and assist in this task. What is the FCC doing about such complaints?

Roberts: The FCC is, of course, taking enforcement actions in the amateur service, but we certainly are not eager to step up our level of activity, for two reasons. First, as you say, the amateur service has always prided itself on being self-policing, and we would hope that this tradition will continue. Second, in this day and age of shrinking resources available for use in enforcement, it simply isn't possible to make large increases in our existing enforcement programs.

CQ: Well, what can amateurs do, then, to resolve interference problems caused by other amateurs?

Roberts: Amateurs should continue to use the traditional methods of self-enforcement that have worked well in the past, promoting rule compliance through peer pressure and resolving disputes through council or club mechanisms. However, let me point out that the larger the service becomes, the more heterogeneous the makeup of the amateur community will become. That, in itself, leads to a loss of identity and increased difficulty with self-enforcement. In other words, I'm hypothesizing that the continued growth of the amateur service may result in a diminishing ability for self-enforcement to work, and that this is a natural phenomenon which cannot be significantly changed by any regulatory or self-initiated action on the part of the amateur community. If this is true, amateurs may wish to stop and ponder whether continued growth, even at a constant, controlled rate, is good for the long-range well-being of the service.

CQ: Let's talk about call signs. Amateurs are very unhappy with the way call signs are now assigned. Does your Bureau intend to review these procedures, and, perhaps, to modify them?

Roberts: The present call-sign assignment procedures were set up after lengthy deliberations, so at this point, we have no plans to overhaul the process any further. However, we will continue to monitor the situation, including how satisfied the amateur community is with our procedures. Perhaps some changes might be made in the future.

CQ: With reference to the recent call sign scandal, we were told that some Commission employees received

preferred call signs as "favors." Have these irregularities now been corrected?

Roberts: The station licenses of all present Commission employees who were identified as recipients of improperly assigned call signs have been replaced with new, systematically assigned call signs.

CQ: And what about the individuals who received amateur licenses and license upgrades without taking the requisite exams? Have you moved to correct these licensing abuses?

Roberts: Fortunately, no present FCC employees were involved in receiving amateur licenses or upgrades without passing the required exams. For those individuals outside the Commission who were identified as having received preferential treatment in this regard, we have begun enforcement actions to correct these situations.

CQ: What are your views regarding access to, and the use of, a natural resource such as the radio-frequency spectrum.

Roberts: The longer I deal with the resource that we call electromagnetic spectrum the more fascinated I become with it. Spectrum is a scarce resource; the demand far exceeds the supply. But even though it's limited, the supply is always there, and it doesn't cost anything to use it. For how many other scarce natural resources can that be said?

My feeling is that spectrum should not be limited to industrial, commercial, military, or public safety uses only. Individual citizens should also have access to the electromagnetic spectrum. I think that's a goal the FCC, should have. Given this viewpoint, I think we need to emphasize and foster the growth of the various personal radio services, including amateur radio. We should also keep in mind the relative amount of spectrum allocated per user of each of these services, and try to keep some degree of balance, although I am certainly not suggesting equality. Obviously, in setting this balance, we must consider other factors such as the benefits society derives from each of these services. When we can't measure the impact or value of these benefits with numbers or with dollars and cents, we have to make subjective decisions. That is what many people refer to when they say that spectrum allocation is a political process. The whole question of spectrum management and allocation is

"Amateur radio's greatest strengths are the 350,000 amateurs in this country and the wealth of radio expertise they possess."

central to the very existence of the FCC, and we are continually looking for new ways to improve our admittedly imperfect processes.

CQ: Speaking of spectrum allocations, many amateurs feel that the Commission "looked the other way" when CBers abused their privileges and were "rewarded" for their actions by an expansion of the band from 23 to 40 channels. Now, a group of so-called HFers is pressing for spectrum allocations. How does the Commission view these scofflaws and what is the Commission going to do for, or about, them?

Roberts: I can tell from the way you phrased your question that you are probably not sympathetic to these "scofflaws," as you call them. However, let me say that with this question, like any other, there are two sides. The amateur community is fairly well aware that many of these HFers have been operating illegally on frequencies above the CB band, and many amateurs view any legalization of such operations as a reward and encouragement for further behavior of this kind.

However, let me suggest another way to look at the situation. I believe it's possible that these citizens who are operating illegally in large numbers have a strong and unmet need to communicate over long distances using s.s.b., without having to become technically knowledgeable. In their view, our Government has proven itself unresponsive to their needs. The choices they were left with then, were two: a) continue with this need unmet, or b) operate illegally. While I obviously do not condone illegal operation, I think one must view this as a symptom of a larger problem, especially when the numbers of illegal operators are as large as we estimate they are in the case of the so-called "HFers." In recognition of this fact, the Commission recently directed the staff to prepare a Notice of Proposed Rule Making in which we propose to create some single-sideband-only channels for operations immediately above the existing CB band, to investigate the possibilities of having a very basic type of required test, and to allow "skip" operation.

CQ: Let's talk in generalities. What are amateur radio's greatest strengths and weaknesses?

Roberts: Amateur radio's greatest strengths are the 350,000 amateurs in this country and the wealth of radio expertise they possess. Generally speaking, individual amateurs exhibit a high level of technical knowledge, an outstanding dedication to public service, and a friendly and cooperative attitude towards their counterparts in other countries. On the other hand, the greatest weakness of the service could be a combination of the increasing tendency of some amateurs to purchase more gear and build less, and of their failure to appreciate fully the communication needs of other segments of the public. Some parts of the amateur community may also be weak in their understanding of the regulatory process.

However, let me note that with good people, which I stress is amateur radio's greatest strength, the weaknesses need only be temporary, and they can be overcome.

CQ: Do you enjoy your position as Chief of the Private Radio Bureau?

Roberts: Yes, I very much enjoy my present position. Probably the most satisfying thing about the job is being able to implement ideas and concepts that I personally believe are sound public policy. That also contributes to the most frustrating part of the job; there are other concepts and ideas that, for a variety of reasons, such as outdated legislation, cannot be placed into effect, even though they clearly would be in the public interest. However, perhaps with some of the changes in the Communications Act now being discussed in Congress, some of the frustrations will be eliminated.

CQ: Before we close, do you have any other comments, on anything???

Roberts: The only thing I would like to stress is a problem we've touched on repeatedly during the last hour, that is, the lack of good communication between the amateur community and the FCC. I have made one or two suggestions in the course of this interview for steps that could improve this flow of communication, but they are surely not the only possible steps, and perhaps not even the best ones to take at this time. What is clear is that the problem of FCC/amateur communication needs our mutual attention. CQ

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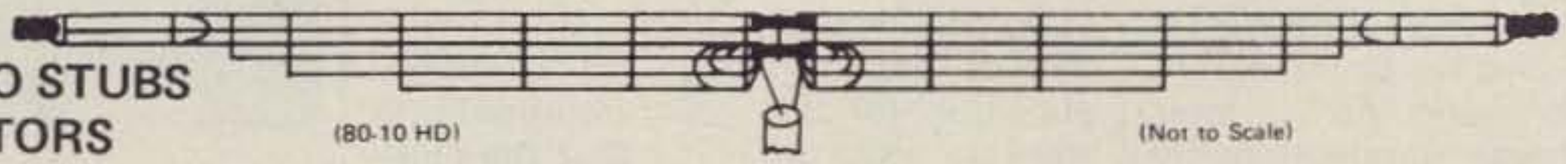

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75-10 HD(SP)	75/40/20/15/10	66	$94.25
75-10 HD(SP)A	75/40/20/15/10	66	$99.50
75-20 HD	75/40/20	66	$80.25
75-20 HD/A	75/40/20	66	$85.50
75-20 HD(SP)	75/40/20	66	$80.25
75-20 HD(SP)A	75/40/20	66	$85.50
75-40 HD	75/40	66	$68.00
75-40 HD/A	75/40	66	$73.25
75-40 HD(SP)	75/40	66	$68.00
75-40 HD(SP)A	75/40	66	$73.25
80-10 HD	80/40/20/15/10	69	$98.50
80-10 HD/A	80/40/20/15/10	69	$103.75
80-10 HD(NT)	80/40/20/15/10	69	$98.50
80-10 HD(NT)A	80/40/20/15/10	69	$103.75
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HKØCOP

(from page 19)

sold his resort complex to parties unknown and suddenly we were without a QTH. After several frantic calls among HKØBKX, W9UCW, and N3ED it was decided to establish a new QTH at Derrick Jones' Sea Horse Inn a little farther down the island. As we later discovered, this was unquestionably the best thing that could have happened. Derrick had a 12 kw generator on site, perfect areas for antenna installations, beautiful facilities, and proved to be an exceptional host in all respects.

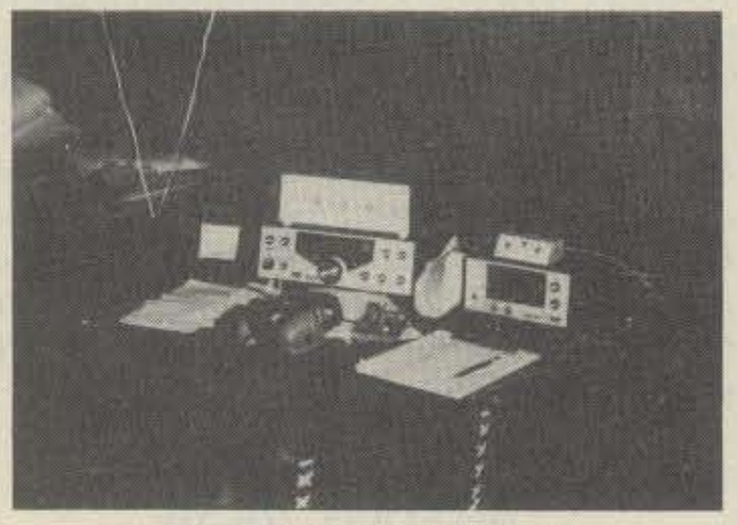
During the call in which the decision was made to relocate our QTH to the Sea Horse Inn, HKØBKX reminded us that we needed visas to get onto the island. During the excitement we had completely overlooked the possible need for visas or shots. A quick check with the consulate showed that we did indeed need visas and smallpox shots. In order to get the visas we had to file a full Ransome Airlines flight plan and a certification document that they were going to deliver as well as remove us from San Andres Island. Once again we were completely ready to go.

The final problem to be overcome was a mistake made on the license issuance which none of the operators ever saw. HKØBKX took care of that problem for us, using San Andres' political representative to the principal Columbian legislative body. In fact, we did not even know the problem had occurred until we arrived on the island. He didn't want to worry us with a problem he was sure could be resolved in time.

On Tuesday evening, November 20, we met at the Ransome Airlines hangar in North Philadelphia Airport to load the airplane. Dawson, K3MBF, was unhappy about loading the four final amplifiers onto the plane because of the weight. The flight itinerary called for fuel stops at Fort Lauderdale, Florida, and Grand Cayman Island. The extra weight and anticipated head winds would require an added fuel stop at Wilmington, North Carolina. After much discussion and cajoling, Dawson was convinced to carry the amplifiers because we needed them to maximize our score.

Early the morning of November 21st we were on our way. Takeoff was just in time to catch a gorgeous sunrise over the top of a cloud cover that had the whole east coast blocked in. The trip down was relatively uneventful. Hourly schedules were held throughout the whole trip on 14202 with Bill, ZF2AE, Leon, K3GM, Francisco, HKØBKX, and our aircraft, K3MBF/AM. Bill and Francisco were supplying us with weather information and Leon was keeping all of our families (and the FRC membes, via 2 meters) informed of our progress. Propagation from 32,000 feet in an airplane is excellent.

We arrived late Wednesday afternoon. We were in contact with members of Frankford Radio Club throughout the landing. Communications were so good on 14202 that the landing was taped by one member as we described the island and the landing itself. A second FRC member was retransmitting the complete proceedings over our 2 meter repeater for all of the members coming home from work. When we hit the runway such a cheer went up on 14202 that the Ransome Airlines co-pilot, Chris Blayden, turned around to ask if he was confused and we had just made a moon landing. The enthusiasm of all of the club members displayed itself at that moment (but I bet that there were a lot of upset DX-ers who were listening and couldn't understand what all the excitement



The 15 meter station.

was and why we were using 14202 for such "mundane nonsense").

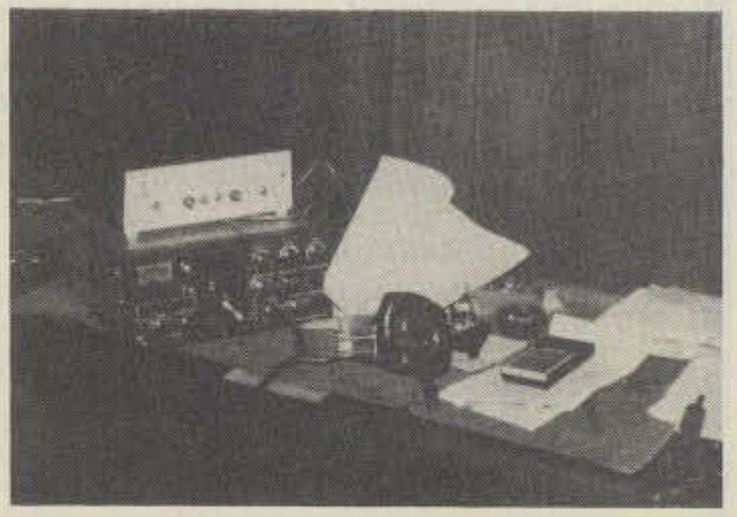
Upon arriving at San Andres, we were met at the airport by Francisco, HKØBKX, Justo, HKØCOP (whose call we were borrowing for the effort), and Rick, HKØBDG. They had arrived with a truck for the equipment and a taxi. After an hour of "persuasion" we cleared through customs and were on our way to the Sea Horse Inn. Having spent six months of working with Francisco to establish all of the necessary arrangements and spending hours on the air with him during the many schedules, the highlight of my trip was meeting him; I was finally shaking the hand of a man I will call "friend" for the rest of my life, even if our paths never cross again. Francisco's hard work and diligent efforts made the trip possible and a long-awaited dream come true.

The Sea Horse Inn itself is a beautiful little resort south of the city about 10 miles from the east coast of the island. At the time of our stay there were 22 rooms in two separate buildings with more planned. The owner, Derrick Jones, assigned us two rooms on the back side of the inn so that we

The 10 meter station operated by Walt, WA3LRO, and John, W3MA.

would be adjacent to the area where antennas would have to be installed. The cooks at the Sea Horse are fantastic. We ate like kings: specially prepared lobster, shrimp creole, steaks, fish, and chowders. The host and his employees were constantly delivering food, drink, coffee or whatever we wanted throughout the operation. In situations when operators could not break loose to eat (five bands were open simultaneously during normal dinner hours), food was delivered to their operating position.

By the time we cleared customs, packed the gear on the truck, and took a mini-sightseeing tour down the island to the Sea Horse, it was well past dark. Since we could not do any antenna work, we started setting up the inside equipment. Our method of setup and operation was via a "buddy" system. Each pair of operators was responsible for two bands. This held true through the setup stages, and by Wednesday night the equipment was in place and interwired. We had two rooms at the Sea Horse for operating only. In one room, on the ground floor, we put a TS 820 and 80 meters and a Ten Tec Century on 15 meters. In the room directly overhead we used a Ten Tec Omni on 20 meters, a TS 820 on 10/160 meters, and a Ten Tec Omni on 40 meters. There were three SB 200's and one MLA 2000 available which were to be used on 20, 10, 40 and 80/15 meters respectively. The equipment "tables" consisted of beds turned on their sides with plywood running across them, chairs turned upside down, and coffee tables with planks. It was quite crude and our host must have had numerous thoughts regarding our sanity, but he worked right



The 80 meter station.

along with us.

Late Wednesday night we tried to meet an FRC 40 meter sked with a roll of hookup wire thrown out the window. They could hear us but good communications could not be established so we all hit the sack.

At daybreak on Thursday, Thanksgiving Day, we commenced what was probably the hardest working day any of us will ever see. After numerous calamaties, we reached sundown Thursday night with a 3 element 10 meter beam, 30 feet up on a TV mast; a 3 element 15 meter beam, 45 feet up; and a 3 element 20 meter beam, 40 feet up. Using an extremely agile professional coconut palm tree climber we set up a 2 element 40 meter fixed wire vee beam toward Europe (with the vee at 60 feet) and 40 meter sloper toward Japan. Attempts were made to run phone patches to our families after dark Thursday, but due to conditions and patch problems, intermediaries had to be used and a schedule was made to try again the next afternoon on 15 meters.

We had noticed during the course of working all day Thursday that the island power was off almost three hours. Shortly after dusk we loaded up each station and amplifier with the 105 v.a.c. line power. We noticed that the voltage fell badly as each station was tuned up. On signal we hit all of the keys at one time and were left with 65 v.a.c. on the line. By pulling the amplifiers out we were able to bring the voltage to almost 90 v.a.c. At this point, because of the island power losses during the day and the simultaneous key down voltage problems, a long discussion was held with Derrick Jones, and he agreed to overhaul the generator the next day and let us run it throughout the contest if we would buy the gas.

Early Friday morning we installed an 18AVQ which was to be used on 80 meters and an 80 meter sloper toward Europe. On 160 we put a "WA3LRO" special, which doesn't fit descriptions of anything ever published but worked like a bombshell throughout the Carribean and into the states. When the job was complete, the Sea Horse's coconut palms had 800 feet of wire and 1500 feet of coax strung out for the effort. We met our schedule, had top quality phone patches with our families, and settled down to wait nervously for the starting gun. Dips in the pool and drinks made of rum and fresh coconut milk helped everyone relax.

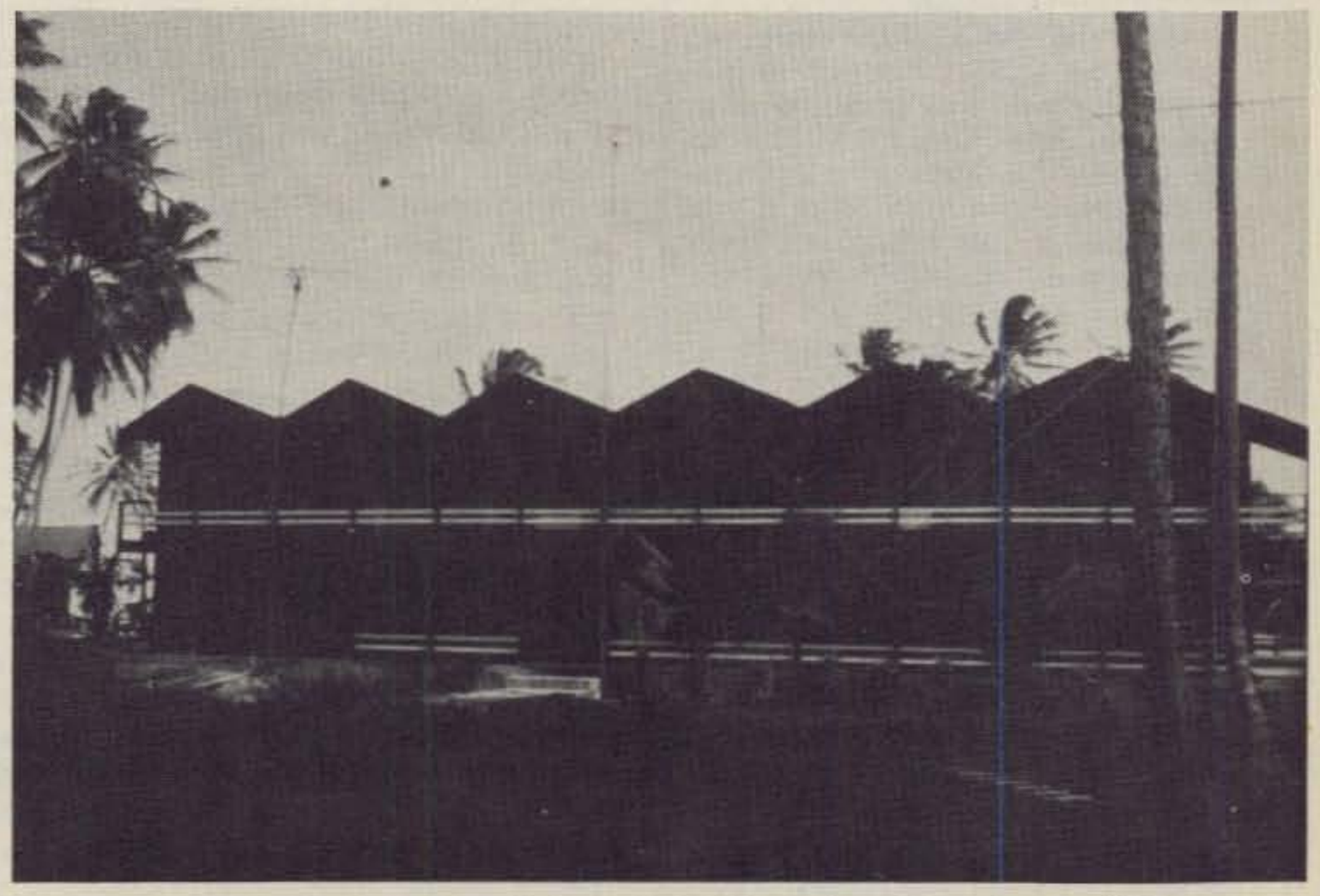
Tests using the generator power showed that we would get about 95 v.a.c. to the rigs with only one amplifier in line. The amplifier was allocated to 20 meters. It might be of interest to you, particularly those of you who worked HK0COP, that at 95 v.a.c. we had innumerable problems: The TS-820's on 80 and 160 meters would load to 50 watts output maximum and, when keyed, would shift approximately 50 cycles. On 10 meters the 820 would only load to 45 watts, but the shift was slightly less. The 20 meter station had a Ten Tec Omni and SB 200. The combination would tune up to 210 watts maximum output. The 40 meter Ten Tec Omni splattered into all the other stations except 80. No matter what we did (we had excellent interference filters with us specially designed and built by Rich Klinman, W3RJ) we could not get rid of the problem. The filters, tuned coax lines, and every other hairbrained scheme we could think of were tried—to no avail. In fairness to Ten Tec, the problem was due entirely to low voltage. The Omnis have been tested thoroughly since our return and there is no sign of splattering at any decent line voltage. It's an extremely clean transceiver.

At 0000 GMT we all hit the CQ buttons on the memory keyers and we were off and running. Since Peter Carter, K3VW, had agreed to computerize our logs, we were not keeping dupe sheets. We kept the logs as best we could and ticked off new countries or zones on a single sheet which showed countries, zones, and beam headings. The pileups were intense (and beautiful) on all bands. Our dream of "being on the other side" had come to life. A few anecdotes about the operation itself might be of interest, particularly to the serious contest statisticians. On 15 meters, N3RD had three straight hours of 150 to 160 contacts per hour (remember, this is c.w.). Our complete game plan, antenna wise, was to get around the states as best we could so that we could work three pointers. For those of you planning a similar strategy for a c.w. contest, forget it! We learned quickly that, due to their operating techniques and their signal strengths, you can work two or more U.S. hams (for four points) for every three pointer. In fact, when the JA's hit us on any band, the pileups were so intense that the QSO rate often dropped to well below 50 (and sometimes as low as 35) per hour. Some of this was taped and we wish a tape could become part of this article, but since it can't, hopefully many of you heard it at Dayton. On 15 meters we were changing frequency every 30 to 45 minutes, just to start over with a thinner JA pileup and get the QSO rates back up.

On 80 meters over 600 contacts were made the first night with very few Europeans on an extremely noisy band. On the second night at sunset, an interesting phenomenon occurred. The band was dead quiet and the Europeans were well over S9. We could not work even one of them. It was truly one way skip and they simply could not hear us. They were unbelievably loud, but not one European would come back to our calls or answer our CQ's. In fact 80 meters was a total disaster the second night since we had less than 100 contacts total for the night's work.

On Saturday night we were forced to shut down 40 meters for much of the night because it was splattering into all of the other rigs. As a rough guess, we estimate this cost us nearly a million points in lost contacts, because the station and antennas were working so well with the exception of the interference problem.

Midway through the contest we took a quick reading of QSO's, score,



The fully installed beams—(left to right) 10 meter, 15 meter, and 20 meter.

The submitted HKØCOP score, fully dupped (and there were lots of them), ended up as follows:

BAND	QSO's	QSO POINTS	ZONES	COUNTRIES	
160	121	243	6	11	
80	565	1,160	15	39	
40	1,216	2,860	23	59	
20	1,923	4,302	33	88	
15	2,219	5,328	30	85	
10	1,468	3,274	26	68	
Total	7,512	17,167	133	350	= 8,291,661

and multipliers. At that point, we were in excellent shape contact-wise (approaching 5000) but hurting for multipliers. Our score would need improving, so the operators caucused and were advised to spend 10 or 15 minutes per hour multiplier chasing. On top of this the 40 and 80 meter rigs were put into service all day Sunday for multiplier hunting on 10, 15, and 20 meters. As the score shows, this strategy worked fairly well.

The "unofficial" island communications network exceeds anything imaginable. On Sunday morning a phone call came in to the Sea Horse informing Dawson that the Ransome Airlines airplane had been broken into overnight. Since the nonamateur co-pilot, Chris Blayden, had gone on a sightseeing/fishing trip for the day, Dawson took off for the airport but told the field personnel to try to find Blayden. As Chris tells the story, he and one of the Sea Horse employees had grabbed a case of beer, gone fishing, and were sitting on a deserted reef cooking some fish for lunch over an open fire when a native came running down the reef to inform him of the break-in. Evidently, everyone on the island knew exactly where Chris was. The airplane break-in was serious only in that the life raft had been opened and damaged beyond repair. This required that life rafts be flown in from the South American mainland so that we could leave the island. Because the life raft is packed in talcum powder, a major clean up was required to get the talcum powder out of the plane's interior and a guard was posted by the airplane on Sunday night to ensure that no further incidents would occur. The guard was Venissimo Fox, our coconut palm climber, who, by now, had "adopted" us and was nearby for all five days to help in any way possible.

The contest ended with no further incidents. After it was over we met with Steve, W3BGN, FRC's president, and Jay, N3AW, our unofficial "at home" coordinator to pass along our estimated score. As any active, major contest club member can tell you, the club rivalry during major DX contests is intense. This is particularly true of the Frankford Radio Club and the Potomac Valley Radio Club. After each weekend of a contest club effort, a session is held on 75 meters to exchange top scores and take a rough cut at determining which club (and which individuals) has won the competition. Frankford went into the c.w. half of the 1978 CQ WW DX competition many millions of points down to the PVRC because of their super phone effort at PJ9. We knew that it would take 100 million total accumulated points to win the overall club competition and a substantial portion had to come from HKØCOP (the club's total score was actually 107,990,050). Needless to say, all the members back home were anxious to know how we had done.

The following morning it took less than four hours to remove everything we had installed, dispose of all the material, repackage what was being sent home commercially, and put the Sea Horse Inn back into the same shape we found it. By early afternoon, we were on our way to Grand Cayman and 24 hours of "R and R" prior to heading back home. As a last, climatic anecdote, we were lying on the beach at the Holiday Inn in Grand Cayman, admiring the various views and 80 degree plus temperatures, when word came over the radio that Philadlephia had been belted with a six inch snow storm. It doesn't take much to imagine the mixed emotions with which we left the balmy Carribean to head for home!

Looking back, our DXpedition was a wonderful experience, and one that each of us who participated would recommend highly. For some of the operators it may have been a once in a lifetime effort. Every ham should take a trip of this nature at least once, either as a contest effort or as part of a vacation (or both if the timing is good). Working with local hams to set up the trip can be the beginning of a long, lasting friendship and a wonderful exchange of customs and ways of life. After all, isn't that what amateur radio is all about? CQ

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***DIODE SWITCHING BOARDS** available to permit 1, 2 or more filters than those for which manufacturer provides room. **SPECIFY** make and model. Single-filter type: $12 Airmail postpaid worldwide.
Dual-filter type: $21 Airmail postpaid worldwide.

Visa/MC welcomed. Money back if not satisfied.

BROCHURE ON REQUEST

Florida residents add 4% (sales tax)

CIRCLE 18 ON READER SERVICE CARD

NAVY: ELECTROSTATIC Device 26A7 demonstrates SPARKS. 28 lb. Case; Sell Cheap SASE. D. TESTA, Box 9064-CQ, Newark, NJ 07104.

WANTED: Drake C4 Console. K3UKW, Tony Musero, 215-271-8898.

WANTED: Radio Boy books by Chapman. R. Randall, K6 ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

SELL: Heath Voltage Calibrator fan oscilloscope $15, Lambda Power Supply 300V regulated $30, Hallicrafter Ha-6 6 mtr Transverter with power supply $175, Ignition Shield kit includes spark plug and regulator shielding $30, Mosley 10-75 mtr mobile whip with coils and folding mast $45. T.K Brown, RD1, Box 102, Forksville, PA 18616.

GENERAL RADIO 1001A signal generator, exc. cond. with GR874 to PL259 adaptor cable and manual. $250 FOB UPS. W6TDA, PhD, 5220 Carlingford Ave., Riverside, CA 92504.

SELL: Collins AN/ARR-15, $50 and AN/URR-35, $60. You ship. C. Klawitter, 4627 N. BARTLETT, Milwaukee, WI 53211.

WANTED: McMurdo Silver and WWI military radio, particularly Navy, K4TS, Rt. 11, Box 3, Fredericksburg, VA 22401.

SELL: QST 1970 THRU 79, 73 1977/79, CQ 76/79 perfect condition. Best offer. Taylor, 2602 Kansas Ave., Kenner, LA 70062 FOB.

SCANNER MONITORS: List of secret freqs. Send $3 to J.P.J., P.O. Box 142, Whitehouse, FL 32220.

FOR SALE: Comm receivers. National H.R.O. 5A1 complete. Also Kenwood R300. Pick up only. Shull, W7FIM, 12349 36th Ave. N.E., Seattle, WA 98125.

WANTED: Pre-1930 QST's and old ARRL/Radio Handbooks. Ken Miller, K6IR, 16904 Geo. Washington Drive, Rockville, MD 20853.

SELL: ATLAS 350XL with power supply 305 auxillary VFO, all extras. Almost new, under warrantee $1000. CB Base Station 40 channels, has electric clock, alarm, all the goodies. Almost new $150. Harley, WD4LNC, 2399 E. 14th St. No. 99, San Leandro, CA 94577.

SELL OR TRADE: Surplus Tx gen. coverage 1.5-20 MHz 850w input cw/rtty. Pick-up only. Wanted: Globe King 500 B or C. WB7AVO, 178 Centre St. No. 3, Mountain View, CA 94041; 415-964-6184.

HELP: Need Service Manual for Tokyo Skylark alias Space Commander ICF-2002 RX. Xerox copy acceptable. Tepper, 72 Shenkarstr, Holon 58329, Israel.

WANTED: Any National Receiver. Sell: Hallicrafters HA-10 Tuner for SX-117, mint, $50. Clegg 27B, works fb, $200. Standard 146A with case, mike, charger and rubber duckie, $170. Chrome Bencher, $35. T.N. Colbert, 1800 Rhodes #612, Kent, OH 44240.

SELL OR TRADE: Cherry Pro B70-05AB Computer Keyboard, Sealed Box. $90 or trade for ham/computer equipment. CATV equipment for sale. W. Marti, Box 6113, Hilton Head, SC 29928.

SELL: Call Books, 77 and 78 issues, United States listings. WA4TKG, inquire via amateur radio.

SELL: Gonset 6m xcvr mod. IV 110V and 12VDC, Heath DX35 xmtr, RCA 3" scope, Hallicrafter rcvr SX140, Tasco 300 power telescope w/tripod, azimuth. Albert Spunar, W3RCI, 45 Chester St., Wilkes-Barre, PA 18705; phone 717-824-6232.

SALE: Varactor 432 to 1296, 1 w, $25; Allied 8 band rcvr, AM, FM, SW, PS, $25. W2CVW, 343 Catherine St., S. Amboy, NJ 08879; 201-721-6579.

ADVERTISER'S INDEX

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CIRCLE 1 ON READER SERVICE CARD

SOMETHING DIFFERENT
The FT-107 Series with "DMS"*

"It's A Cut Above The Rest"

*** OPTIONAL DIGITAL MEMORY SHIFT ("DMS")**
12 discrete memories. Stores individual frequencies or use as 12 full coverage VFOs (500 kHz each)

- **Solid State**
- **240 watts DC SSB/CW**
- **160-10 meters, WWV**
  (2 auxiliary band positions are available for future expansion)
- **RF Speech Processor**
- **SSB, CW, AM, FSK**
- **Built-in SWR Meter**
- **Excellent Dynamic Range**
- **Audio Peak/Notch Filter**
- **Variable Bandwidth**
- **Full Line of Accessories**

The FT-107 has been created as a result of a blending of technologies — computer, solid state and RF design. By careful utilization of these disciplines and the experience gained from our FT-301 series, YAESU has achieved an HF transceiver which offers unique features (e. g. "Digital Memory Shift"), efficient operation and a level of performance that has been previously unattainable.

(Receiver Section) FT-107 TRANSCEIVER SPECIFICATIONS (Transmitter Section)

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at −6dB, 4.0 kHz at −60dB.
CW 0.6 kHz at −6dB, 1.2 kHz at −60dB.
AM 6 kHz at −6dB, 12 kHz at −60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synthesized)
FTV-107 VHF (UHF Transverter)
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply

Power Input: 240 watts DC SSB/CW
80 watts DC AM/FSK
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: −50dB.
Transmitter Bandwidth 350-2700 hz (−6dB)
Transmitter: 3rd IMD −31dB neg feedback 6dB
Transmitter Stability: 30 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms
Power Required: 13.5V DC at 20 amps
100/110/117/200/220/234V AC at 650 VA

YAESU
The radio.

Price And Specifications Subject To Change Without Notice Or Obligation

CIRCLE 48 ON READER SERVICE CARD

1179R

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

THE TRANSCEIVER... THAT SENT THE OTHERS BACK TO THE DRAWING BOARD.

SIGNAL ONE'S CX11A

Signal One first to introduce the solid state integrated station, designed for the professional amateur, continues this leadership with the CX11A.

Featuring:

- A new high power system with 150 watt CW/SSB output; 200 watt option.
- Unsurpassed strong signal receiver performance by incorporating high level quad FET mixers.
- Dual PTO/Synthesizer function which simultaneously receives two channels and transmits on either . . . perfect for chasing that out of band DX station.
- .35 uV Sensitivity, 20 poles of IF crystal filtering, active audio filter, IF shift and pre-IF noise blanker for the most effective anti QRM system available.
- Unequaled SSB talk power with RF envelope clipper for maximum linear performance.
- QSK CW: Vacuum relays and 300 Hz filter combine with built-in keyer to offer a superb full break in CW system.
- Built-in AC power supply with heavy duty Hypersil® transformer.

Modular construction, utilizing ribbon cable interconnection and Minisert® sockets for transistor and IC replacement, insures ease in self servicing. Military and computer grade components owner proven for over two years.

Contact Signal One for the dealer nearest you.

signal/one®

Black Canyon Industrial Park
Phoenix, Arizona 85021
(602) 995-0608

CIRCLE 22 ON READER SERVICE CARD

SPECIFICATIONS*

FREQUENCY RANGE: Synthesizer/PTO frequency coverage: continuous tuning in 1 MHz bands. 160 thru 10 meters. Four additional 1 MHz bands may be programmed for future frequency allocation in the 1-30 MHz range.

FREQUENCY ACCURACY STABILITY: ±150 Hz after 10 minutes—oven controlled.

POWER REQUIREMENTS: 120/240, ± 5% V AC, 50/400 Hz, internal switch selection. Requires approximately 100 W receive, 700 W peak at full transmit input.

SIZE: 16½"W, 7¼"H (w/o feet), 14"D. **WEIGHT:** 50 lbs. **PRICE:** $5900.

RECEIVER PERFORMANCE

SENSITIVITY: Better than .25 uV for 10 dB S+N/N at 10 meters; .35 uV all other bands. Matched 50 ohm measurement (10 dB noise figure).

SELECTIVITY: Standard SSB-dual matched 2.4 kHz 8 pole and ± 12 kHz 4 pole crystal bandpass filters deliver 20 pole 1:4:1 shape factor performance (6/60 dB). Standard CW 300 Hz filter, 1:2:1 shape factor (6/60 dB).

DYNAMIC RANGE: 98 dB with a 2.4 kHz bandwidth.

INTERMODULATION DISTORTION: Third order intercept point, +20 dBm (two signals spaced 25 kHz at a level of -23 dBm).

IF AND IMAGE REJECTION: Greater than 65 dB.

TRANSMIT PERFORMANCE

POWER OUTPUT: 150 W, CW/SSB output, all bands and modes into 50 ohms thermostatically controlled. FSK at full output requires optional blower assembly; 200 W output option requires heavy duty vacuum relay module and blower assembly.

THIRD ORDER IMD: -35 dB below each of two tones at full PEP output.

HARMONIC OUTPUT: -55 dB minimum. **MIXER PRODUCTS:** -40 dB minimum.

CARRIER AND UNDESIRED SIDEBAND

SUPRESSION: -55 dB minimum.

* Subject to change without notice.