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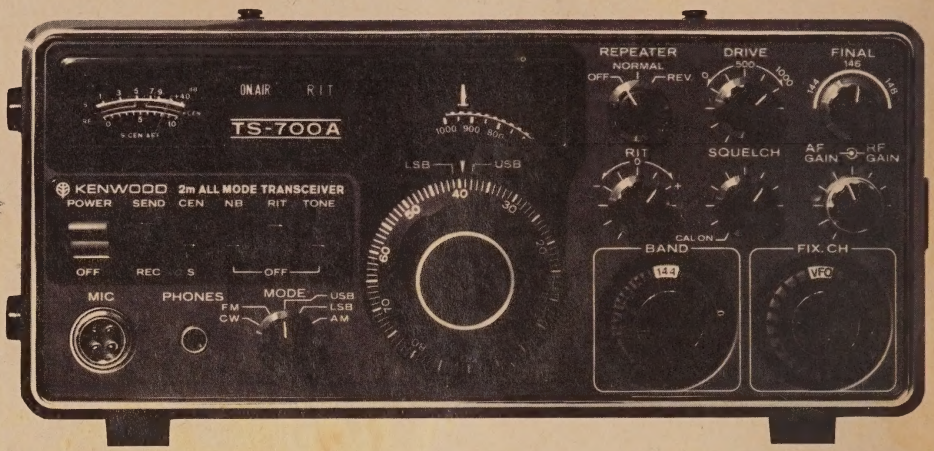
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Amateur's Journal

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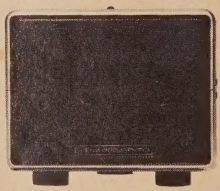



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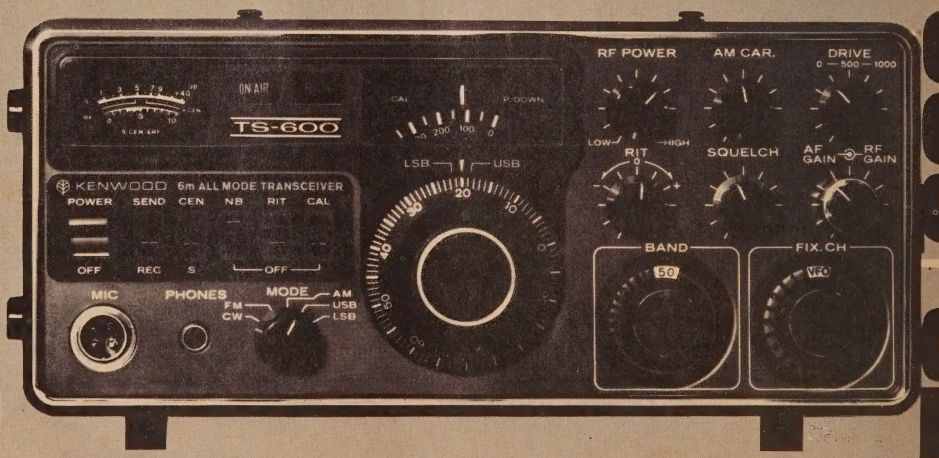
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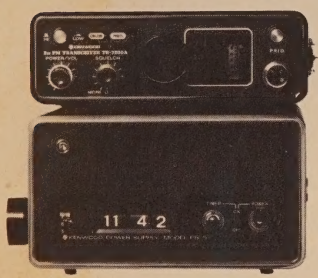

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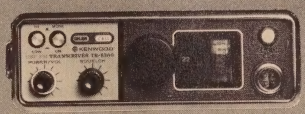
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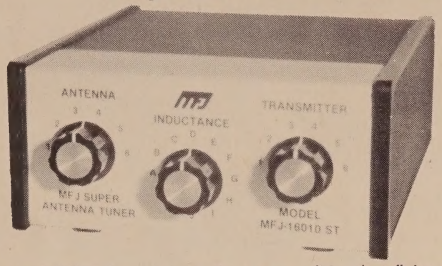
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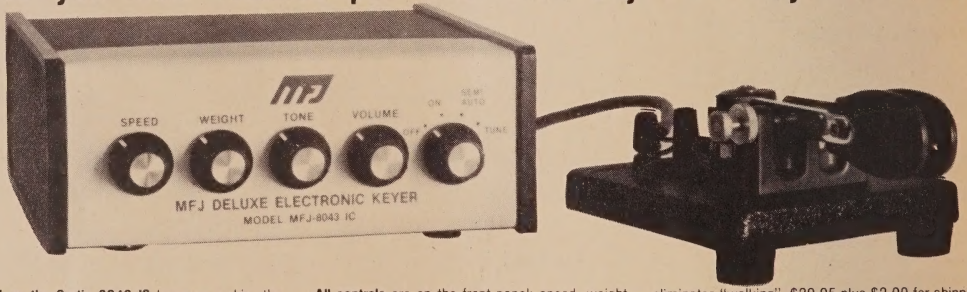
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# Zero Bias

## an editorial

We've got some really good news and some really bad news. First the good news. The number of U.S. amateurs is increasing at a tremendous rate with a record growth predicted. The downward slump has been eradicated with a monumental surge of interest shown in amateur radio. The bad news is that due to this great surge of interest the FCC is seriously considering phasing out the Novice class license and thereby, in our opinion, sounding the death knell for amateur radio. The FCC claims that it is squeezed in a budget crunch and one of the "expendables" or things "they can afford to eliminate" is the Novice.

The FCC which initially sought ways and means of hyping the ranks of Novice licencees including entering into quasi-legal negotiations with the ARRL to give them licensing priviledges has now in the face of an ever increasing number of new Novice license applications given serious consideration to the abolishment of that very same Novice license. Hey fellows what's happening down there in Washington? You get what you want for a change and now you don't want it anymore. It's too much of a bother to process those applications now that you're swamped with CB applications. Well too bad.

What kind of numbers are we really talking about? In January and February for example you (FCC) found time to process about 38,000 amateur applications of which approximately 6,000 were for the Novice license. During January alone you managed to find time to work on almost 500,000 CB applications. Now, 500,000 applications roughly works out to 25,000 per day (on an average 20 work-day month) or about 3,125 applications per hour that you allot to the CBers. Is a little less than two hours work per month really driving you up the wall? Supposing that it was even double that number (I hope it will even go beyond that) what difference would it make?

The difference it would seem to be is Congress. At least the FCC says it's Congress. The FCC claims they are only a regulatory agency with no power other than to regulate the whims of Congress. I would hate to equate that historically with another regulatory agency during WWII that "Just followed orders". The FCC also claims to be hamstrung by the lack of funds. These funds are also controlled by Congress as to how much gets spent on what and by whom.

Back in October I expressed the thought that it would seem logical to have the fees we were paying for our licenses go to the agency that handled the licensing. Congress always seemed to think that the money that came in to administer the licensing rightfully belonged in the General Fund. They in turn doled out a small percentage back to the FCC to administer the licensing. The hue and cry was always there. The FCC didn't have enough money to do this or that because of lack of funds. The money for the "this and that" was sent in by all of us poor fools who believed in the system, but it was spent elsewhere. In January the FCC announced that fees would no longer be required. Big Deal! Now the cry is, we still can't do an effective job because of the ever present "lack of funds". The subtle arguement that Congress **could** have been pressured into releasing more money to the FCC because of licensing fees was and is simple nonsense. This point was argued and fought over for a long time with no tangible results and I guess the elimination of the fees just ended the questioning of where the money actually went. What did it actually buy or pay for?

Back to the FCC. They say they are geared to handle under present conditions of severe hardship only about 8,000 amateur applications per month. That's all their budgeted for and about all they can comfortably handle. Through some altruistic juggling they have managed for a short time to handle two to three times that number, but that something has to give. They have started to cut back on a lot of frivilous requests for second station licenses and I can see the need for a tightening up in luxury types of service-requests. The next thing to possibly go now in the wake of increased demands is the Novice license.

After all, how important is the new Novice in the overall scheme of things? We happen to disagree with the FCC and Congress and think the Novice is **quite** important as the bulwark of amateur radio and the very future of amateur radio itself. It seems almost idiotic to have spent the better part of last year thinking up ways to increase the amateur population and to actually find out that this increase was not only undesirable but that the numbers you have now have to be thinned out. All of this intrigue and double dealing is beyond belief.

Suppose now we imagine that the FCC does indeed phase out the Novice license. OK that's done . . . no more Novices. Now what? According to the FCC, the next logical move would be for the new applicant to go straight for the Technician license since the priviledges are almost the same and the Technicians also have code priviledges. A very laudable thought and workable to some degree. It makes sense . . . or does it?

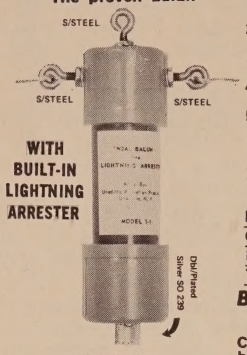
Well suppose we take this thought and further expand on it. If we suppose again and imagine that all of these same 6,000 eager Novice applicants went back home and studied some more and came back to take the Technician test. Well we're back in the

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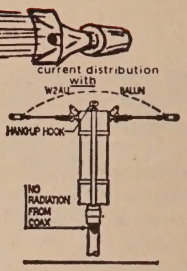

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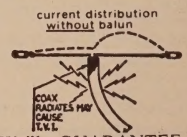
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very same fix once again aren't we? Too many people want to be amateurs. The next step would then be to phase out the Technicians. This as you can see could lead to an increase in Generals and their phasing out, then on to Advanced and their phasing out, even on to the Extras and their demise. Greetings dinosaurs . . . we're financially obsolete and an enigma to the government. Right?

Wrong. What we are, or by now should be, is about 300,000 very ticked off people. There's a great line in a current movie called Network where one of the characters, a newscaster urges his audience to go to their windows, open them and shout out to the world, in effect, "I'm a person and I'm mad and I won't stand for this anymore". Well that's just about where we're at right now. If you want to spend your time nit picking over your own little and petty, by comparison, personal fights within amateur radio that's fine. But don't stand up and cry when it all comes down around you. Don't stand there with egg on your face in stark staring amazement after the results come in from the WARC conference. If you don't raise a stink now by writing, visiting and petitioning your Congressman for what you want, you have no one to blame but yourself for the ultimate death of amateur radio.

For the first time anywhere in amateur radio we have more people moving in many directions to try to improve amateur radio for all of us. But these are relatively small groups who need tremendous support and encouragement. People like the Personal Communications Foundation who want fair and equitable legislation for all amateurs and CBers alike. What's needed is your contribution and input. That is if you put any value on your license, the time you spend on the air, your station, the many friends you've made and the people you may have helped through the years as an amateur, if you don't really care or can't be bothered just now we'll understand.

Since Congress apparently values or listens to the demands of CBers and has been more than generous with the FCC in handling their applications (at the current and certainly future expense of amateur radio) a definite and concerted effort is needed by amateurs in this direction. Remember, it's not the CBers fault if he gets what he wants through the system, it's ours for not being able to do the same thing. I'm not trying to cause a rift or perpetuate a silly meaningless schism that already exists between amateurs and CBers but to try to show you where the problem really lies. It's up to you and it has always been up to you to do something about it. Complaisance is nothing.

I'm lucky in a way since I can get this all out of my system for you to read. Hopefully a tremendous number of people will read this and maybe some of you will do something about it. I hope so. I can speak out for what I think and believe is right through these pages but it isn't enough. You have to move also. Write your congressman, write the FCC, write anyone and everyone who can possibly help. If you don't take the time now and put in the effort now, quite likely the only way you'll end a legitimate QSO in the future is "10-4 Good Buddy, lots of good numbers to you". 73, Alan, K2EEK

# think of yourself as an antenna expert!

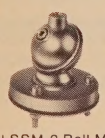
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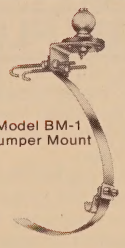
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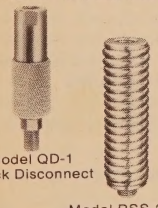




Model SSM-2 Ball Mount

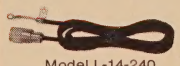


Model BM-1 Bumper Mount

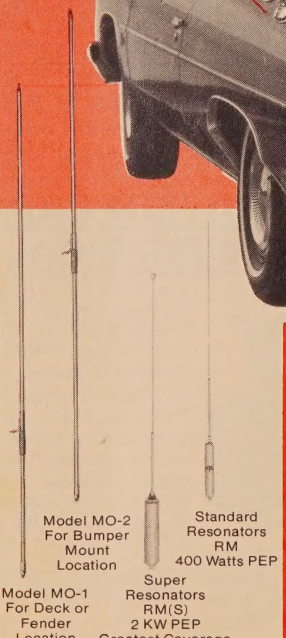


Model QD-1 Quick Disconnect

Model RSS-2 Resonator Spring



Model L-14-240 Mil Spec 50 Ohm Feedline



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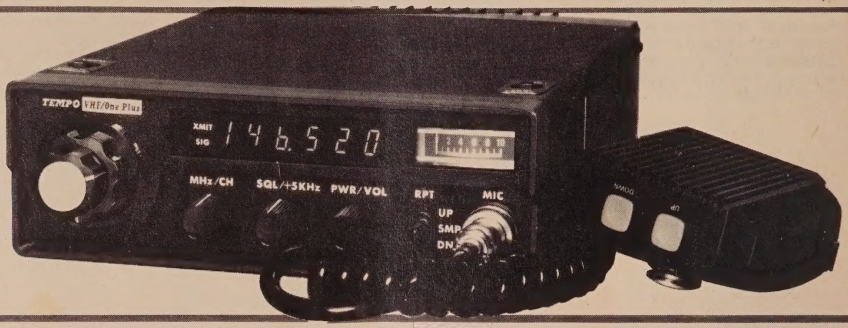
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# Our Readers Say

**AM *is* Alive**

Editor, CQ:

The article by Byron Kretzman, K2JTP, on page 56, March CQ, is the best article I have read in many years. I have been on the air since 1939, and still work A.M. on 75 every day. My rig is all home-brew and I built it in 1945. Although I do work s.s.b. with a TR-4C my first love is still A.M. Don't let it die.

Harold J. Nycum, W3ILO
Templeton, PA

Editor, CQ:

I would like to comment on an article I read in March '77 issue of CQ entitled "No Harry, A.M. Is Not Dead". Gentlemen! Please do not knock A.M. I am a short wave listener and I did not know what amateur radio was until I heard 2 hams who were still using A.M. There was a section on my frequency dial marked "Amateur". But when I listened there, I thought I was getting electrical interference or Donald Duck imitations. Although, now I do have the capabilities for receiving s.s.b., A.M. is what introduced me to amateur radio and put me on the road to studying for a novice ticket whcih I soon hope to receive.

Herman J. Fuselier, 5 HF 7755
Opelousas, LA

Editor, CQ:

Thank you for your article, "No Harry, A.M. Is Not Dead" in the March 1977 issue (By Byron Kretzman). It is the most helpful article I've read in a ham magazine in years. A.M. IS amateur radio.

A.M. is what I listened to while studying for my license. A.M. (along with a little c.w. for some net/traffic work) was what I operated.

It has been inactive for a few years due to the loss of the modulator, the presence of s.s.b., the band divisiveness of the "incentive licensing" folly, and increased work here on the farm. Would surely like to get the transmitter fixed and do some A.M. again.

I would appreciate knowing if there is any A.M. operation on 75 and 160 meters here in the Upper Midwest.

Lester Russell Lauritzen
Centerville, SD

Editor, CQ:

I wish to express to you my deep satisfaction at reading the article in the March CQ, by Byron Kretzman, W2JTP, entitled "No Harry, A.M. Is Not Dead".

Those of us who operate A.M. phone feel sadly neglected, in recent years, by all of the amateur radio publications, and it certainly is gratifying to see that one of these publications--and only one of them--CQ--saw fit to extend to us its consideration.

I feel that it is a mistake, on the part of any publisher, to ignore amplitude modulation, in the amatuer service, for it is indeed the very foundation of radio itself, both historically and funtionally. It is the very heart of the radio industry; therefore, to ignore it is to ignore basics.

As Mr. Kretzman so accurately pointed out in his article, there are a lot of hams using A.M. who are not old men, but who ate indeed young men, just starting out in the radio field. Some of them are broadcaster engineers, and see the 75 meter band as a place in which they can experiment with techniques of development and enhancement of their direct experience with amplitude modulation, which is employed in their daily work at a broadcast station. Such experimentation is virtually impossible to them, in operating single sideband amateur equipment.

I wish to commend you and CQ Magazine for this splendid article, and I hope that you will see fit to publish more such articles in the future which cater to the amateur who prefers A.M. and who sees most of the articles in other ham magazines as irrelevant and uninteresting.

Congratulations, CQ, on a job well done!

James Edwin Bolton, WA3PUN
Harrisburg, PA

**"Wring the Bell"**

Editor, CQ:

The new "Bell bill" in Congress is a threat to phone patches. Each ham should realize the many undesirable consequences including the threat to phone patches in this bill that is now being considered by Congress.

After many years of illegal patches, hams can now in various ways, legally attach phone patches, telephone answering equipment, tape recorders, computers, and other communication devices to the telephone lines. This may be a short-lived benefit if this new bill is passed.

A very good description of the undesirable effects of the new bill is contained in the January 1977, issue of "Consumer Reports". In this article it mentions "Another section of the Bell bill, as already noted would strip the FCC of power to regulate terminal equipment; regulation would be turned over to the states. In some states, that shift would wipe away any chance for consumers and businesses to buy and attach equipment without need for the unnecessary and expensive protective module previously required by state regulators at the insistance of phone companies".

It is very important that each ham and all his friends and acquaintances contact their Congressman and mobilize influence against the "Bell bill". As in so many cases, we must fight for our rights to have them.

C.W. Tazewell, W2GTV
Syracuse, NY

### Canal Zone Report

Editor, CQ:

I want to go all out this year and try to put KZ5 land on the map for WPX!!! Hopefully will have competition from newly arrived KZ5UH, Judy, on the Atlantic side of C.Z., about 50 miles away.

After 5 years of hamming from KZ5 with 10 and 15 meter beams on 2 ele. quad, the opportunity of a 40 meter beam installation at this QTH prevailed, and 10 and 15 meter, 3 ele. beams gave way to the 2 ele., 40 meter beam Jan. 30, 1977, with the help of KZ5ZK, Bob, and KZ5FR, Fred. Hopefully, it will be worth the trouble in the WPX!!!

Please relay my thanks to Mr. Cowan for his message regarding the future of CQ magazine in the October/November 1976 issue. I am very pleased he will not discontinue this fine magazine. Amateurs need CQ Dick!!!

Just received my copy of the March 1977 CQ. The new printer-shipping system is great, if the March issue is an indication of things to come!!!

Best regards from the Canal Zone and don't let the ARRL try to take over amateur radio license procedures!!!

James R. Miller, KZ5JM
Balboa, Canal Zone

### Help Save WWV

Editor, CQ:

I was encouraged by your write-up re the possible curtailment of WWV Boulder Center services to send my few words along both to Dr. Crombie and also Congressman Wirth. Here is a copy of the letter written to them. I am also, may I add, an active ham both ashore and afloat! (see letter below).

Dear Mr. Crombie:

I work in the U.S. Merchant Marine as a Radio Officer and have been priveleged to "grow-along" with shipboard wireless/radio since the early days of crystal receivers and the spark-gap transmitter.

It may not be very well known to the general public ashore but ships at sea today rely almost completely upon radio-communication within the marine High Frequency "bands", using radiotelegraphy via the hand-manipulated code-key. This will come as a surprise in our age of satellite and computerized modes of communication. But in this year of 1976, ships at sea are very, very busy on the H/F "bands", with the coastal marine radio stations often "overloaded" with ship traffic -those of us who can "read" the dots-and -dashes of the code have only to tune-in on the marine frequency "bands" any day or night to prove this to themselves. I have noticed a tremendous increase of radiotelegraphic message-traffic during the past ten years to and from ships at sea, regardless of the also increased use of radiotelephone, telex and other modes of communication now in various stages of development.

In view of this, I believe that at this time it is a great disservice, especially considering our present cycle of poor radio propagation, to call the many hundreds of ships at sea and also the marine coastal radio station services, to curtail in any way the vital services rendered by the Boulder Center. These services are invalueable by many nations other than the U.S.

I may add that during a time when the Soviet Union is apparently intent on increasing its interest in all marine radiocommunication frequency "bands", this is not a time for any curtailment in our own services.

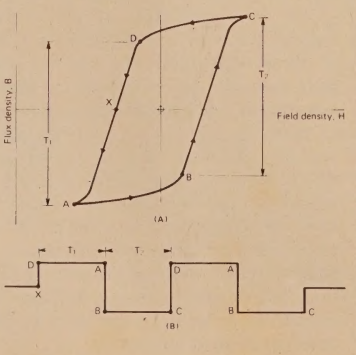
Harry A. Maclaren
Cotonou, Benin., West Africa

### Correction on "Electromagnetics Made Interesting"

Editor, CQ:

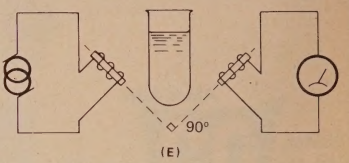
I have made some construtive criticism with regard to my "Cores" article in the March issue. On page 20, the time designations, T1 and T2 are shown in the wrong places on the hysteresis loop. To be sure, this is the way I had initially shown T1 and T2 on my original manuscript.

Actually, the times, T1 and T2, should be indicated as shown below:




Note corresponding changes in the designations on the square wave. The error is quite serious and undermines the theory presented in the context.

The sketch shown in fig.(7-E) is not clearly representative of the situation I tried to depict. What should be shown is a vessel of liquid, such as a test tube, and two coils at right angles to one another. As drawn, it appears to be a resistor inside a cylinder. It should look something like this:




Irving M. Gottlieb, W6HDM
Menlo Park, CA

### Focusing In

Editor, CQ:

I have just received the February issue of CQ and feel I have to say it out loud and clear.

I have been on the verge of dropping my CQ magazine as it did not offer me what I wanted after many years but being a very active slow scanner and knowing Bill DeWitt, W2DD, was writing "In Focus", did renew my subscription as CQ seems to be the only magazine that accepts the fact that slow scanners are a very active part of ham radio and does devote a column to slow scan rather than just the ads for the gear.

This issue was the best slow scan oriented magazine I have ever read, (and I get them all). Not only Bill's article was good, but his slow scan TV overview was terrific and I hope that reprints of it will be made and will be available to all slow scan interested hams as hand outs at hamfests. I for one, am going right down to the post office and make several copies to give to people when they ask me about SSTV. Keep up the good job, Bill. I'm yours, K4TGC.

James H. Young, K4TGC
St. Petersburg, FL

### Signal/One Tranceiver Improvements

Editor, CQ:

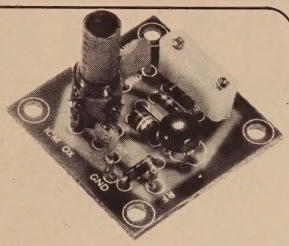
I have noticed several errors in my artilce "Signal/One Transceiver Improvements" as presented in the January, 1977 issue of CQ: (1) Fig. 2. One of the zeners should be a type 1N 5279 (both are shown as 1N5276's in the art-

*(Continued on page 79)*

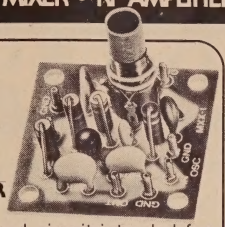
# for the experimenter!

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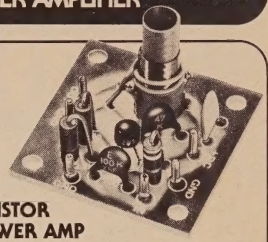
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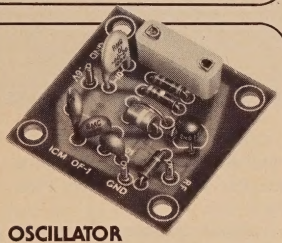
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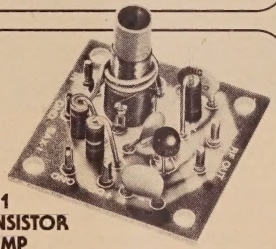
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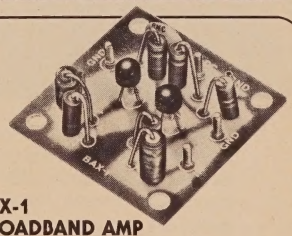
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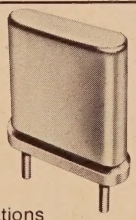
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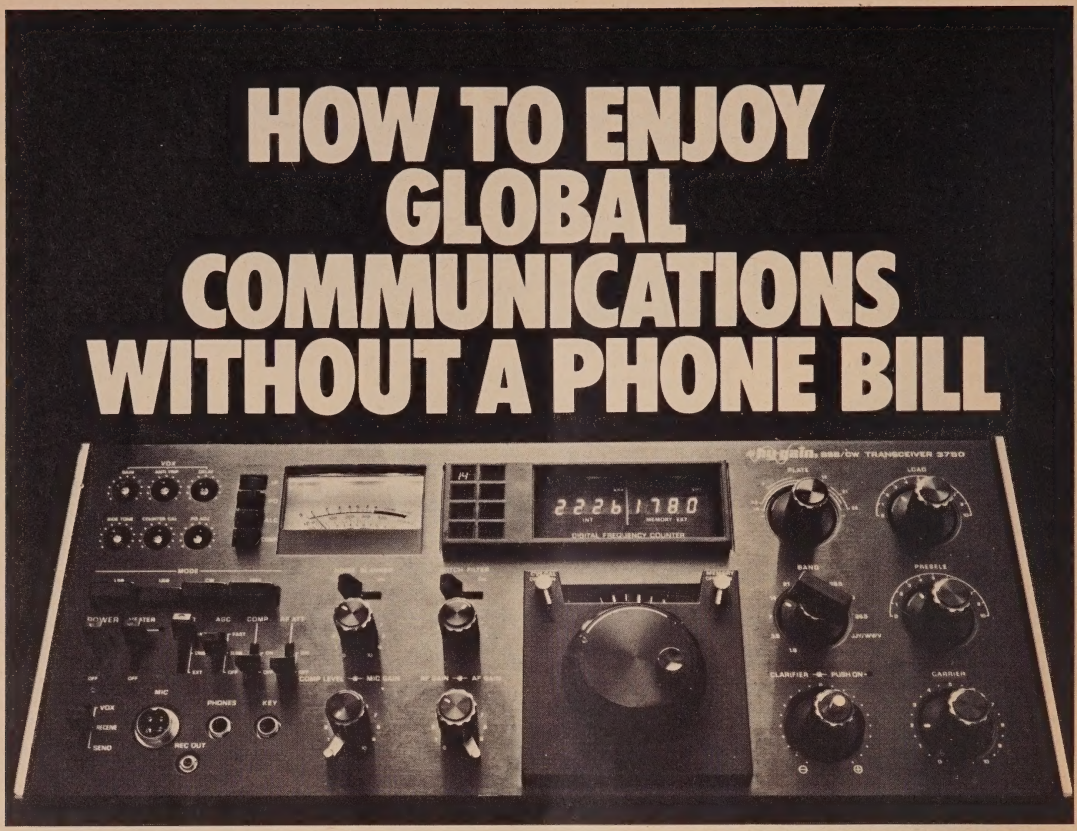
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# Announcing

• **Manassas, VA** — The "Ole Virginia Hams" A.R.C. Inc. Annual Hamfest will be held on June 5th, at the Prince County Fairgrounds located ½ mile south of Manassas, VA on Rt. 234. Gates open at 7 am, Fantastic Prizes again this year, 5 band SSB Transceiver, Digital Frequency counter, Bird 43 Wattmeter and many others. Admission $3.00 per person, children under 12 free, Tailgating $2.00 per vehicle, over 300 spaces available, Refreshments, YL Program Children's Entertainment, FM Clinic: Spectrum Analysis, Deviation, and Power Checks. Lecture on QSL Bureaus, Learn how they work. Indoor exhibit space available for dealers. Talk in on 146.37/97 , 146.52, and 147.84/24. For info write: Frank Atkinson, K4CB, Box 1255, Manassas, VA 22110.

• **Princeton, IL** — The Starved Rock Radio Club Hamfest will be held on June 5, at the Bureau County Fairgrounds. Camping and trailer space, Food and refreshments, many historical sights of interest. Registration $1.50 before May 20, $2.00 at the gate. For info, send SASE to SRRC, W9MKS/WR9AFG, RFD 1, Box 171, Oglesby, IL 61348 (815) 667-4614.

• **Perkiomenville, PA** — The Perkiomen Valley Amateur Radio Club will hold a Hamfest on June 5th, at the Perkiomenville Sale & Auction Ground, Rt. 29. Tables available for flea market. Talk in on 28/88, also on channel 14. Site is located south of Green Lane on Rt. 29 in the scenic hills of Pennsylvania. For infor and reservations contact Bob Bosch, WA3EBX, 215-679-5143.

• **Rome, NY** — The Rome Radio Club's annual Ham Family Day will be held on June 5, at the Beeches, Rt 26, Rome, NY. We plan a full day of fun for the entire family. For the XYL and kids we offer a free tour of the newly reconstucted Ft. Stanwix. For the ham there will be a giant flea market and 5000 square feet of display area with exhibits, technical sessions, contests, door prizes, etc. For info and map write, P.O. Box 721, Rome, NY 13440.

• **Cleveland, OH** — The second annual Midwest Regional Computer Conference will be held on June 10 at the Bond Court Hotel in Cleveland. Features include: workshops, manufacturers' exhibits, a flea market, seminars, and technical sessions open to all attendees. Additional details on Computerfest '77 are available from the Midwest Affiliation of Computer Clubs, P.O. Box 83, Cleveland, OH 44141.

• **Ann Arbor, MI** — The Arrow Repeater Hamfest will be held on June 5, at the Chelsea Fairgrounds, I-94 at exit 159. Nearby overnight camping. Table and trunk sales. Tickets $2 gate, $1.50 advance. Write Arrow, Box 1572, Ann Arbor, MI 48106.

• **Willow Springs, IL** — The Six Meter Club of Chicago, Inc. will hold its 20th annual ABC Hamfest on Sunday, June 12, at the Santa Fe Park, 91st and Wolf Road, Willow Springs, IL. Advance registration $1.50 at the gate $2.00. Large swap row, color TV, picnic grounds, plenty of free parking, Displays in the pavillion, Refreshment. Talk in on 146.94 FM or WR9ABC 37-97 (PL2A). Advanced tickets from Val Hellwig, K9ZWV, 3420 South 60th Court, Cicero, IL 60650.

• **City of Industry, CA** — A Swan Model 400 Transceiver, serial number 100801, grey case, was stolen from my car on the morning of February 10, 1977, at my office, City of Industry, CA. Neither the 406 tuning nor tpower supply were taken; hence, the thief or whoever buys the transceiver might be looking for such items. Thank you for any assistance. Write to: Ira C. Bechtold, 17137 East Gale Avenue, City of Industry, CA 91745. or contact the L.A. Sheriff's Dept., Detective Bureau, 213-330-3322. File number 577-02681-1424-696.

• **Preston, ID** — A Kenwood TS-700A Tranceiver serial number 414264 was stolen from our store 10/18/76 in an unopened carton. If anyone has details please contact Ross J. Hansen, WB7BYZ Ross Distributing Co., 26 South State, Preston, ID 83263.

• **Granite City, IL** — The Egyptian Radio Club, W9AIU, will hold its annual Hamfest on June 12th, at Granite City, Club House. Talk in 146.16/76, food available, games for children, activities for ladies, swap row, main prizes (tickets at parking lot), attendance prizes for OM and XYL's.

• **Atlanta, GA** — The 1977 Atlanta HamFestival will be held June 18-19, Our new location is at the Atlanta Marriott Hotel. For further info write: Atlanta HamFestival, 53 Old Stone Mill Road, Marietta, GA 30067.

• **Jonesboro, TN** — An SBE 2 Meter Transceiver, Model SB-144 S.N. 620565 was stolen on January 26, 1977. If you have any information write to James Rhein, K4ZEK, 404 Main St., Jonesboro, TN 37659.

### STOLEN EQUIPMENT

• **Cincinnati, OH** — The following items were stolen between Dec. 18 thru 22, 1976, from under the dash of a two tone green pick up truck in my driveway at 11318 Gravenhurst Dr., Cincinnati, OH. One was a Regency HR-2A with extra Osc. deck for xmit section. Serial 04-06931 has following Crystals, (XMIT) 146.37, 52, 34, 07, 19, 16, 94, (RCVR) 146.97, 52, 76, 67, 79, 94, marked with Dymo tape on front. Has special telephone female jack hanging from back for touch tones. The other was a Regency AR-2 Two Meter Amplifier, Serial number 115-0388. A 50 dollar reward is offered leading to conviction of suspects involved. Notify Herbert L. Drake, W8QIL, at the above address, or your locale police Dept., items have been entered into (NCIC) FBI computer.

• **Glenside, PA** — The following equipment was stolen from the WA3RCA Club Station in Glenside, PA. They are a Collins KWM-2 Transceiver, serial no. 10272, a Collins P/S 516F2, serial no. 19920, a Drake TR4-C, serial no. 35245 which has a phono jack for phone patch added in back and a Drake noise blkr,

*(Continued on page 79)*

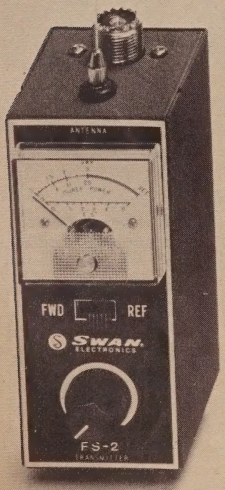
# CHOOSE TOP NOTCH RIG PERFORMANCE FROM THIS SHOWCASE OF SWAN METERS.

Swan precision meters are designed and built to help you make sure you're putting out all the watts your rig can deliver.

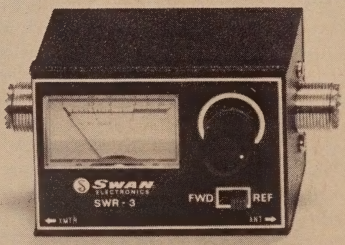
And Swan meters are priced so low they'll probably pay for themselves in improved rig performance and signal power.



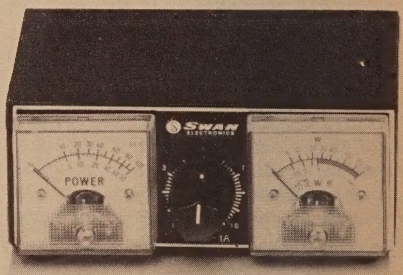

**At last. A precision wattmeter for the 2-meter man.** The upper-band man needs accurate output measurements, too. Now our WM6200 gives them to him with ±7% accuracy output power at 50 to 150 MHz. Two scales to 200 watts. Reads SWR on expanded range scale.
**WM6200 In-Line Wattmeter** . . . . . **$59.95**



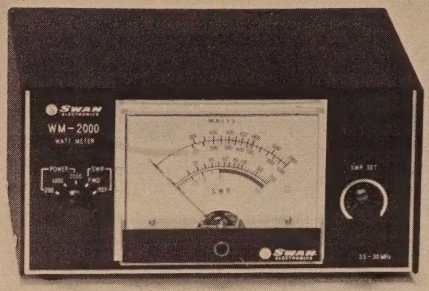

**Measure power coming and going.** Measure SWR and get maximum power to your antenna. Then get your antenna pattern right by measuring relative radiated power. A one-two power punch at a knockout price. **FS-2 SWR and Field Strength Meter** . . . . **$15.95**



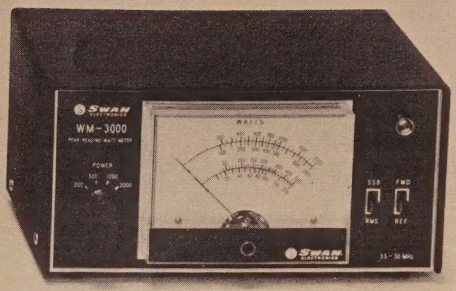

**Easy-on-the-pocket pocket SWR.** Mighty mite SWR meter with high accuracy, SWR-3 indicates 1:1 to 3:1 SWR at 50 ohms on frequencies from 1.7 to 55 MHz. Precision PC board directional coupler makes it a solid value at a rock-bottom price.
**SWR-3 Pocket SWR Meter** . . . **$12.95**




**SWR bridge bridges the price barrier.** This little jewel gives you relative forward power and SWR on two 100 microampere meters at a remarkably low price. Rear mounted coax connectors for easy, neat installation. Capable of handling 1000-watt signals on frequencies from 3.5 to 150 MHz. With low insertion loss, it's great for mobile operations, too. **SWR-1A Relative Power Meter and SWR Bridge** . . . . . **$25.95**



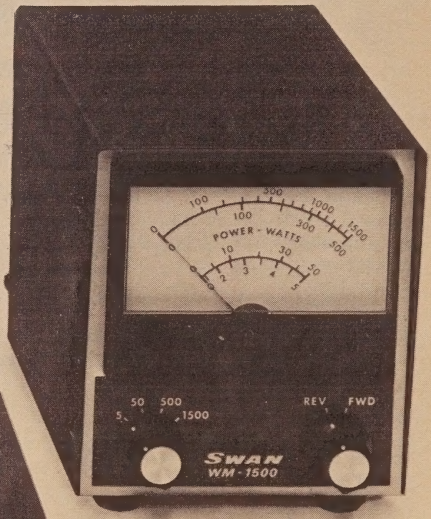

**All-the-law-allows in-line wattmeter.** With three scales to 2000 watts, new flat-frequency-response directional coupler for maximum accuracy and a price anybody can afford, this meter has become an amateur radio standard. 3.5 to 30 MHz with expanded range SWR scale.
**WM2000 In-Line Wattmeter. . $59.95**



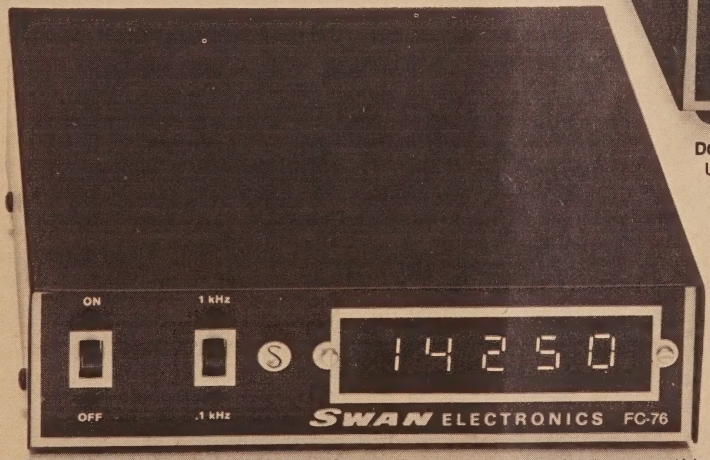

**This wattmeter tells the truth about SSB.** True peak envelope power of your voice modulated signal is what you want to know most about your SSB transmission, and that's where our WM3000 shines. Flat response forward or reflected power from 3.5 to 30 MHz on scales to 2000 watts in RMS or PEAK at the flip of a switch. **WM3000 Peak/RMS Wattmeter . . . . . $79.95**




**Sniffs out radiated power wherever it is.** This little unit is so compact it could measure relative radiated power in your pocket. Telescoping antenna and a frequency range of 1.5 MHz all the way to 200 MHz.
**FS-1 Field Strength Meter . . . . . $10.95**




**Double-duty in-line wattmeter.** Use this meter for output power measurement and troubleshooting, too. Better than 10% full scale accuracy from 2 to 30 MHz, and you can go to 50 MHz with only slightly reduced accuracy. Four scales to 1500 watts and selector for forward or reflected power.
**WM1500 In-Line Wattmeter . . $74.95**

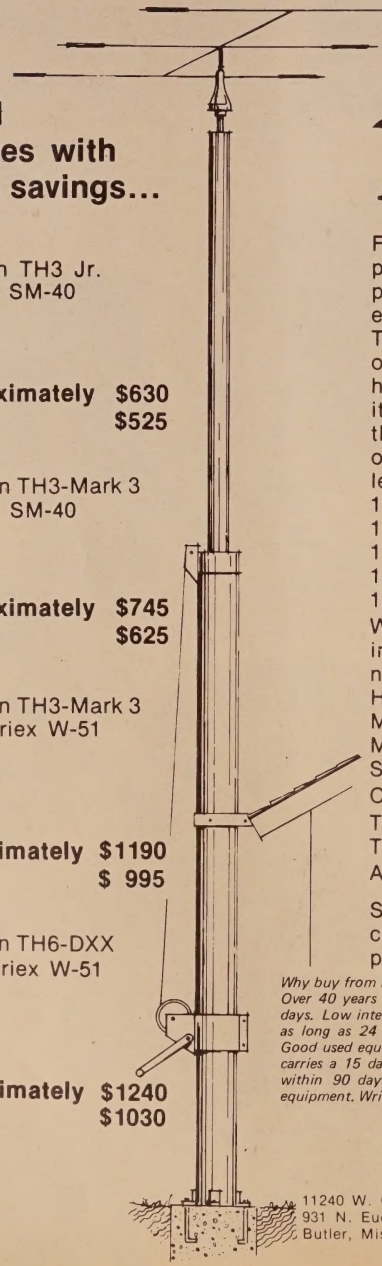



**Put your frequency up in lights.** Perfect tuning and matching don't mean a thing if you're not on frequency. This counter tells the story on big, bright 5-digit LED display. Reads to ±100 Hz or ±1 KHz between 5 KHz and 40 MHz. Signal levels to 50 millivolts so you can use as a test meter, too. **FC-76 Frequency Counter . . . . . $169.95**

Use your Swan credit card for any Swan meter Applications at your dealer or write:

SWAN® ELECTRONICS
A subsidiary of Cubic Corporation
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# either way... you can save from $50 to $500 with a Henry Radio antenna package



## A Special packages with special savings...

**Package No. 1**
Swan TB-2A or Hy Gain TH3 Jr.
Tristao MM-40 or Triex SM-40
CDR CD-44
RG-58 100'
Control Cable 100'
**Retail Price: approximately $630**
**Package Price: $525**

**Package No. 2**
Swan TB-3HA or Hy Gain TH3-Mark 3
Tristao MM-40 or Triex SM-40
CDR Ham-II
RG-8 100'
Control Cable 100'
**Retail Price: approximately $745**
**Package Price: $625**

**Package No. 3**
Swan TB-3HA or Hy Gain TH3-Mark 3
Tristao CZ-454 FS or Triex W-51
5' mast
CDR Ham-II
RG-8 100'
Control Cable 100'
**Retail Price: approximately $1190**
**Package Price: $ 995**

**Package No. 4**
Swan TB-4HA or Hy Gain TH6-DXX
Tristao CZ-454 FS or Triex W-51
5' mast
CDR Ham-11
RG-8 100'
Control Cable 100'
**Retail Price: approximately $1240**
**Package Price: $1030**

## B or design-it-yourself...and you'll still save

For many years Henry Radio has been providing a beam-antenna package program for amateurs who wanted an efficient but economical package. Thousands have benefited from this offer in the past. In recent years we have offered the customer the versatility of designing their own system with the components that they want. Our only requirement is the purchase of at least:

1 Antenna
1 Rotator
1 Tower
100' Rotator Cable
100' Coax Cable

We stock merchandise from the following manufacturers and our packages normally include their products.

Hy Gain Antennas
Mini Product Antennas
Mosley Antennas
Swan Antennas
CDR Rotators
Tristao Towers
Triex Towers
Accessories of all kinds

Send us a note telling us what your choice is and we'll send you our low package price.

*Why buy from Henry Radio?*
*Over 40 years experience. No finance charges if paid within 90 days. Low interest contracts - 8%/yr add on (14% annual rate) - as long as 24 months. 10% down or trade-in down payments. Good used equipment. Most makes and models. Used equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit towards the purchase of NEW equipment. Write for literature.*

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## All you need for All Mode Mobile, that is.

All Mode Mobile is now yours in a superior ICOM radio that is a generation ahead of all others. The new, fully synthesized **IC-245/SSB** puts you into FM, SSB and CW operation with a very compact dash-mounted transceiver like none you've ever seen.

- **Variable offset:** Any offset from 10 KHz through 4 MHz in multiples of 10 KHz can be programed with the LSI Synthesizer.
- **Remote programing:** The **IC-245/SSB** LSI chip provides for the input of programing digits from a remote key pad which can be combined with Touch Tone* circuitry to provide simultaneous remote program and tone. Computer control from a PIA interface is also possible.

* a registered trademark of AT&T.

- **FM stability on SSB and CW:** The **IC-245/SSB** synthesis of 100 Hz steps make mobile SSB as stable as FM. This extended range of operation is attracting many FM'ers who have been operating on the direct channels and have discovered SSB.

The **IC-245/SSB** is the very best and most versatile mobile radio made: that's all. For more information and your own hands-on demonstration see your ICOM dealer. When you mount your **IC-245/SSB** you'll have all you need for All Mode Mobile.

**SPECIFICATIONS**

| | |
|---|---|
| FREQUENCY COVERAGE | *144.00 to 148.00MHz |
| MODES | FM (F3)<br>*SSB (A3J), CW (A1) |
| SUPPLY VOLTAGE | DC 13.8V ±15% |
| SIZE (mm) | 90H x 155W x 235D |
| WEIGHT | 2.7 |
| TRANSMITTER | |
| TX OUTPUT | F3 10W<br>*A3J: 10W (PEP), A1 10W |
| CARRIER SUPPRESSION | 40 dB OR BETTER |
| SPURIOUS RADIATION | –60 dB BELOW CARRIER |
| MAXIMUM FREQUENCY DEVIATION | ±5KHz |
| MICROPHONE IMPEDANCE | 600 OHMS |
| RECEIVER SENSITIVITY | *A3J: A1: 0.5 MICROVOLT INPUT GIVES 10 dB S+ N/N<br>F3: 0.6 MICROVOLT OR LESS FOR 20 dB QUIETING<br>S+ N + D/N AT 1 MICROVOLT INPUT, 30 dB |
| SQUELCH THRESHOLD | –8 dB OR LESS (F3) |
| SPURIOUS RESPONSE | –60 dB OR BETTER |
| SYNTHESIZER | |
| FREQUENCY RANGE | 144 MHz to 148 MHz |
| STEP SIZE | 5 KHz for FM<br>*100 Hz or 5 KHz for SSB |
| STABILITY | PER C/N THE RANGE OF –10 TO +60C, ±0.0000145% |

*VALID WITH SSB UNIT ONLY

**VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT**

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# MEET BIG JOHN CAPONE!




## He's about to make you an offer you can't refuse.

Just so you don't get the wrong idea, Big John isn't related to any of those other Capones you might have heard about. But he is in a position to make you one fine business proposition.

John heads up the CW outfit in Denver. They're the guys who've been selling all those ham products west of the Mississippi. 'Cause Big John is an active ham himself, and he knows how to make his fellow hams happy. It isn't just bottom-dollar discounts that we hams want. It's great service, good trades, and the feeling that your salesman understands and cares about personal needs.

Now, we recognize that no one company can sell everyone. That's why we operate in the free enterprise system. But we can, by trying harder to please, make more hams want to buy their radios and antennas from CW. And that's exactly what Big John is doing. So, the next time you're ready for some new goody for the shack, give ol' John a call before you try the other guy. You'll probably like the way you're treated so well that you'll send your friends to CW.

And then Big John will make them an offer that they won't want to refuse.

**CW ELECTRONIC SALES COMPANY**
1401 Blake Street Denver, Colorado 80202 (303) 893-5525

DenTron amateur radio products have always been strikingly individual. This is the result, not of a compulsion to be different, but of a dedication to excellence in American craftsmanship. This dedication now extends to one of the worlds finest high performance military amateur amplifiers.

Luxury styling, however, would not be fully appreciated without an exceptional power source. The heart of the MLA-2500 is a heavy duty, self-contained power supply.

Compare the MLA-2500. It has the lowest profile of any high performance amplifier in the world. It's modular construction makes it unique, and at $799.50 it is an unprecedented value.

Very few things in life are absolutely uncompromising. We are proud to count the DenTron MLA-2500 among them. And so will you.

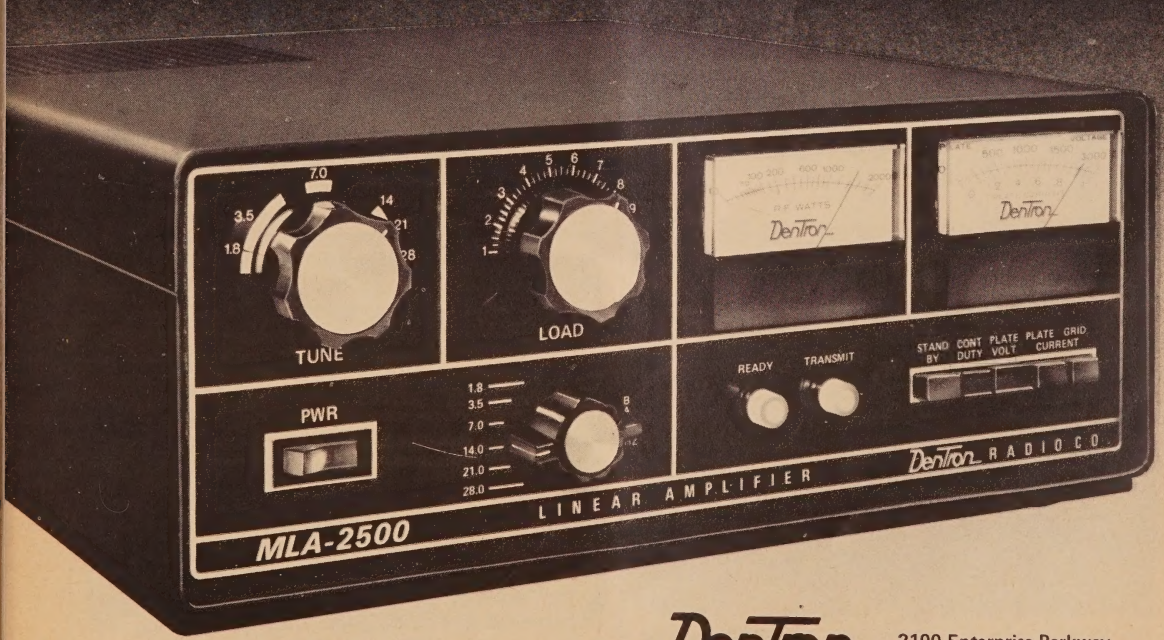
MLA-2500 FEATURES

- 160 thru 10 meters
- 2000+ watts PEP input on SSB
- 1000 watts DC input on CW, RTTY, or SSTV
- Variable forced air cooling system
- Self contained continuous duty power supply
- Two EIMAC 8875 external-anode ceramic/metal triodes operating in grounded grid.
- Covers MARS frequencies without modifications
- 50 ohm input and output impedance
- Built in RF watt meter
- 117 V or 234 V AC 50-60 hz
- Size: 5½" H x 14" W x 14" D.

All DenTron products are made in the U.S.A.

# Introducing the new MLA-2500

## The linear amplifier beyond compromise.




Amplifier in actual operation.

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***A remote unspoiled island in the west indies provides the setting for ideal contest operating during the CQ World Wide DX Contest.***

# Providenciales

## THE DXPEDITION PARADISE OF THE

# CAICOS ISLANDS

BY BERNIE WELCH*, W8IMZ/VP5BER

My own curiosity of this island was sparked by stories told to me by the North Florida DX Association VP5B Contest Group (1975 WPX Contest Multi-Multi Champ) during their visit to the '76 Dayton Hamvention. Their President, Ron Blake, WA4EYR, must have sensed my enthusiasm and interest and extended to me a "tag-along" invitation for their '76 DXpedition for the *CQ* World Wide Phone Contest. My acceptance of this cordial invitation lead me to research the history of such a unique place. I learned that the Turks and Caicos Islands which includes Providenciales is now an independent British Colony and is located just two air hours southwest of Nassau on a direct route from Miami to Puerto Rico and Caracas, Venezuela. Ponce De Leon discovered the islands in 1512 and they were not occupied by Europeans until 1678. Bermudians, Spanish and French each at one time were in control of the islands until 1766. In 1799 the Bahamas Government was in control and in 1813, Providenciales became a dependency of Jamaica. When Jamaica became independent the Turks and Caicos Islands again became an independent British Colony and that government is currently in effect. Weather statistics revealed that Providenciales, in comparison to Florida, is cooler in the summer and warmer in the winter, and is delightfully less humid. About 28 inches of rainfall is recorded annually.

After leaving dreary Dayton, Ron met with me in Jacksonville, Florida and clued me in on all the "pre-plans" and "up-coming" plans for the DXing on Providenciales. For our big weekend of October 30 & 31, part of the group had already preceded to the island to get a head start on the installation of antennas and radio gear. They were testing with their individual VP5 calls. (As a matter of interest, each member of the group had been issued an individual call which they used when operating be-

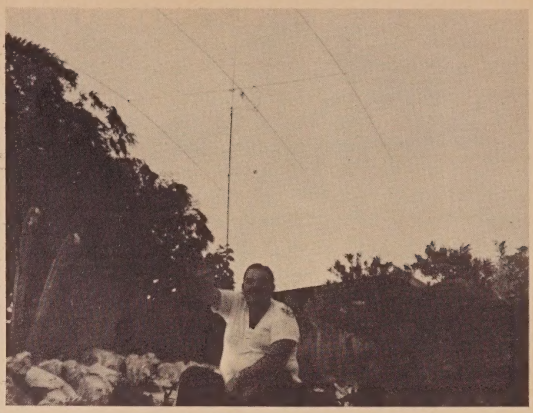
*WPX Contest Director




*The VP5M Group (L to R 1st row) Ed, VP5IZ; George, VP5CW; Ron, VP5B; Bill, VP5WW; Allen, VP5M. (L to R standing) Dick, VP5A; Al, VP5AH; Pete VP5T; Ham, VP5AA; Bernie, VP5BER and Bill, VP5X.*



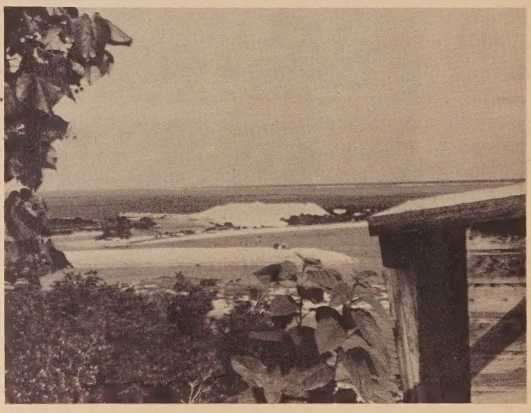
*What's your pleasure? Here is Charlie and he is in charge of the refreshment center at the Erebus.*



*At the top of hill behind me is the 20 meter beam and the Hustler 4BTV Vertical.*



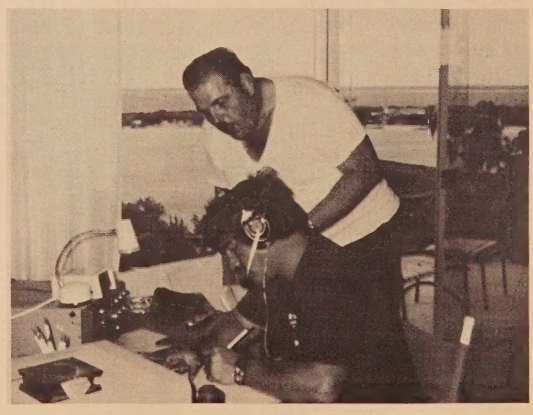
*Here's three of the five huts on top of the hill from which all the contest action was generated.*



*Looking over Turtle Cove toward the USA from the VP5M operating positions.*



*That's VP5M, Allen, WB4QKE and his XYL Mickey. Their big smiles certainly must indicate how happy they are with the results of the group effort.*



*Bill's (VP5WW) operating expertise on 20 meters was something to watch and I took time to pick up a few good pointers.*

fore and after the contest.) Ron and I met the remainder of the group enroute, picked up additional equipment and headed for the Fort Lauderdale Airport. There a Mackey aircraft was ready to load and be boarded and we were soon off into the wild, clear blue Caribbean skies. Excitement prevailed!!!

From the plane, the waters below us seemed almost crystal clear—a variation of light blue and turquoise. We flew directly over San Andros Island and made a short stop at Georgetown in the Bahamas. All very impressive. Continuing the flight, we could see a number of small and probably uninhabited islands. As we approached Providenciales I noted that it is shaped like a crescent moon with beautiful gold and white beaches and shorelines, and what seemed like an island of rolling greenhills and seascapes consisting of every shade of green and blue. Our landing was smooth in spite of the fact that the runway was constructed of sand and coral. I was to learn later this runway was constructed during World War II by the United States.

My first welcome to Provo (the name affectionately given by its natives) was by the Immigration and Customs Officers, who rapidly and pleasantly processed us. U.S. citizens are not required to have passports. Personal equipment brought into Provo must also be taken out upon leaving the island. The airport is a small primitive-type building where you can purchase a ticket, change money (monetary unit is U.S. dollar), purchase local handmade items, or buy a soft drink.

We had no problem in finding the rest of our group as they were waiting for us and helped to load our equipment and baggage into antiquated taxis. On a dusty road of sand and coral we made our trek across the island to the Erebus Inn, where they had already begun setting up the antennas and equipment for our six-band contest operation. These operating positions were distributed between a large cottage on top of a hill and four "chalet" hut-type structures, which seemed to float above the hillside trees, with a magnificent view of Turtle Cove. Having traveled throughout the South Pacific, Asia, Africa and Europe over the past thirty years, I doubt that I had ever seen a place to compare with this unspoiled tropical island of Providenciales (Provo).

By GMT contest time on Friday evening, all antennas were up and the equipment operational. I can truly say that everything was in A-1 shape as I personally tested the 10, 15, 20 and 40 meter operating positions with my own VP5BER and found the pile-ups to be fabulous. It seemed like I had a direct pipeline to Asia and Europe!!

It was determined by the group earlier that VP5M would be the '76 *CQ* World Wide Phone contest call.

An operators' schedule had been agreed upon and with the exception of short periods of relief operating on other bands, the schedule remained intact through the 48 hours. By bands, the eleven ops were:

| | | |
|---|---|---|
| **160** | Ed Edwards | WA4SGF/VP5IZ |
| **80** | Al Harbach | WA4DRU/VP5AH |
| | R. "Ham" Robinson | W4ZR/VP5AA |
| **40** | Ron Blake | WA4EYR/VP5B |
| | Allen Moore | WB4QKE/VP5M |
| **20** | Bill Walker | WB4EYX/VP5WW |
| | Bill Beggs | WB4DIU/VP5X |
| **15** | George Werner | W4ORT/VP5CW |
| | Dick Hicks | K4UTE/VP5A |
| **10** | Pete Peters | W4GDG/VP5T |
| | Bernie Welch | W8IMZ/VP5BER |

At the magic hour with all systems go— "CQ Contest, this is VP5M" could be heard on all bands. It was all very exciting and loaded with thrills. Band conditions were far above normal most of the time and even the high noise level on 160 subsided occasionally. Many old friends around the world were contacted.

The following breakdown shows the final results of the tremendous effort put forth.

| | QSO | PTS | Zones | Countries | Score |
|---|---|---|---|---|---|
| 1.8 MHz | 261 | 530 | 10 | 28 | 20,140 |
| 3.5 MHz | 761 | 1,577 | 17 | 60 | 121,429 |
| 7.0 MHz | 1134 | 2,507 | 24 | 82 | 265,742 |
| 14 MHz | 2683 | 6,026 | 33 | 117 | 903,900 |
| 21 MHz | 2190 | 5,374 | 31 | 125 | 838,344 |
| 28 MHz | 754 | 1,600 | 21 | 51 | 115,200 |
| **All bands** | 7783 | 17,614 | 136 | 463 | 10,550,786 |

Antennas consisted of a home-brew 3-element beam on 20; converted Gotham 3-element beams on 10 and 15; and a Hustler 4BTV vertical. Slopers and dipoles worked out well on 40 and 80, while 160 utilized an HB vertical with how many radials, Ed??—Umpteen.

Kenwood loaned the group a TS820 just for the contest and I'm happy to report it did an outstanding workhorse job on 20 meters.

Dentron loaned their all band Linear Amplifier, which was partially responsible for the big signal on 160. Other equipment was individually owned and was a combination of Kenwood, Yaesu, Heathkit, and Collins.

Power was supplied by the island generators and except for a two hour maintenance outage prior to the contest, provided good reliable service.

What happened to Murphy? Well, except for a tropical rain and wind storm that occurred on Saturday night, causing beams to be lowered and making it necessary to keep a close check on the others, plus—a nervous circuit breaker that cut out occasionally, there was no major problems.

*(Continued on page 69)*



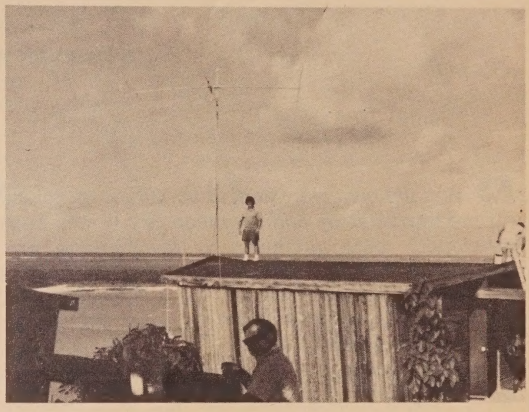
*At dawn, a tired and sleepy Ron, WA4EYR/VP5B was running a pile up of JA's on 40 meters.*



*Wonder if that tired op's snoring caused much QRM? Al, WA4DRU/VP5AH and Ham, W4ZR/VP5AA worked 60 country multipliers on 80.*



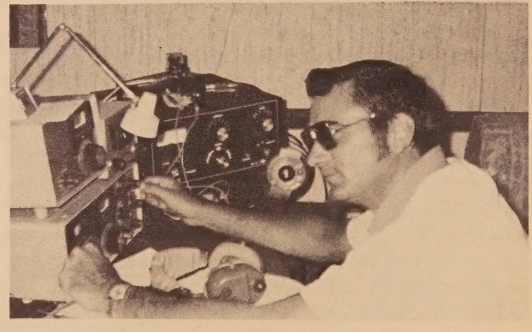
*Dick, K4UTE/VP5A and Pete, W4GDG/VP5T are excited about a new zone and country that George, W4ORT/VP5CW just contacted on 15 meters. George and Pete were very active on c.w. before and after the contest.*



*Standing on top of the hut is Propagation Products Company's antenna expert Bill Walker, supervising the installation of the 15 meter beam. All of the group assisted with the overall antenna work.*



*The XYLs, Pat Harbach, Ruth Werner and Mickey Moore —3 lovely ladies who found plenty to do during the contest—boating, beachcombing, sun bathing and watching the many different exotic fish off shore in the cove.*



*This is the 160 meter operating position with Ed, WA4-SGF/VP5IZ at the controls. He racked up 261 contacts, 10 zones, and 28 countries solo on a very noisy band during the contest. (How many radials, Ed?)*

***Ecology personified! It's off the drawing board and ready for use. Using less can be more as you'll find out in Part I of Ade Weiss's two part article on coherent c.w.***

# Coherent C.W. -- The C.W. Of The Future Part I

BY ADRIAN WEISS*, K8EEG/0

During the past two years or so, a new technique for the transmission and reception of c.w. has been developed which promises to revolutionize c.w. communications in a manner analogous to the revolution in voice communications brought about by the development of s.s.b. However, the overall strategic impact of coherent c.w. (c.c.w.) could be far greater because it is effective in circumstances which render conventional c.w. and s.s.b. useless. A comparison of the effectiveness of c.c.w., conventional c.w., and s.s.b. can best illustrate the point. Given current receiving techniques, in which conventional c.w. utilizes a 500 Hz bandwidth, s.s.b. a 2.1 kHz bandwidth, and c.c.w. a 9 Hz bandwidth, a 5 watt c.c.w. signal, which can be generated under every imaginable set of circumstances, would be on par with a 320 watt conventional c.w. signal about 18 dB improvement) and a 1250 watt s.s.b.[1] signal

*83 Suburban Estates, Vermillion, SD 57069

[1] Ed. Note: Strictly speaking, s.s.b. cannot be directly compared to c.w.; the emphasis here is upon relative bandwidths.

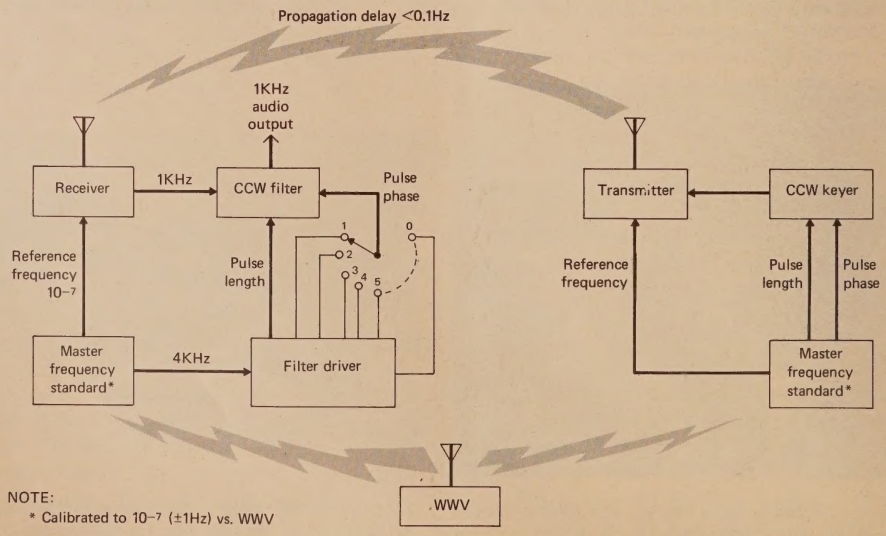



*Fig. 1—A c.c.w. communications system.*

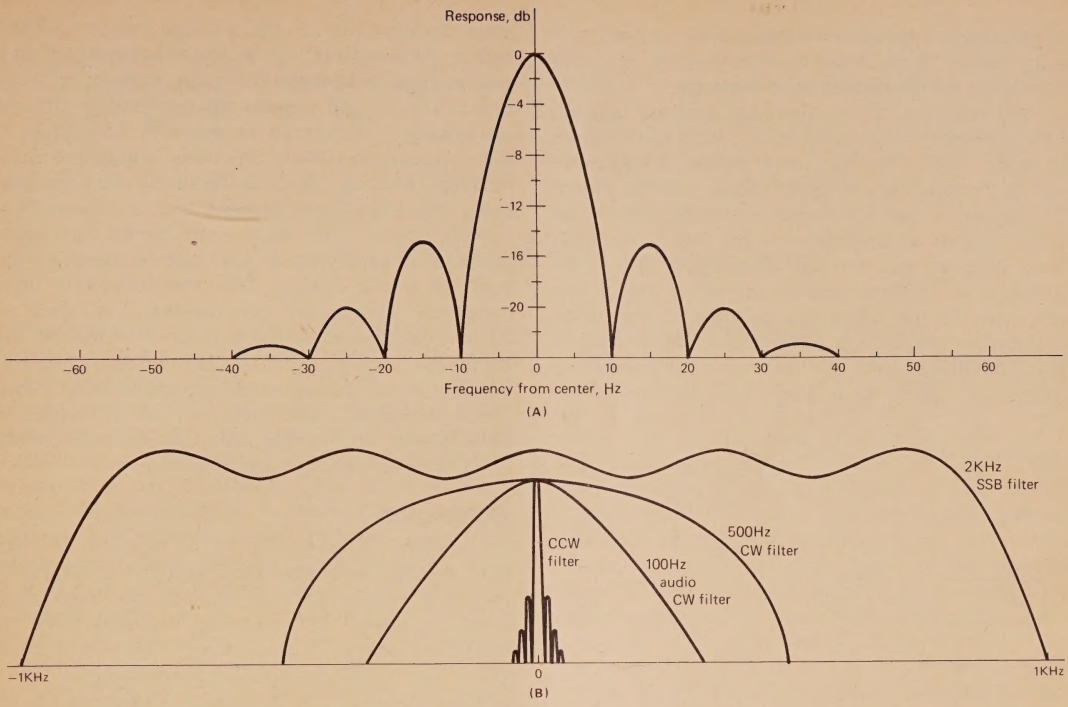



*Fig. 2—(A) Frequency response of a .1 second filter, approximation based on triangular wave inputs to integrators.*

(about 24 dB improvement). Let me emphasize that I am not using a "QRPp perspective," *i.e.,* "with a good antenna, a lot of patience, and some luck, the 5 watt signal will do as good as the QRO signal," in making the above comparison. I am using literal terms. The c.c.w. technique, according to theoretical calculations, yields the above improvements in received signal-to-noise ratios. Practice has shown these estimates to be conservative under weak signal conditions. In practical terms, what this means can be best illustrated by an example. A 5 watt c.c.w. rig, sitting beside a 320 watt c.w. rig on the same table, feeding the same antenna, will deliver a signal to a distant point which is as effective as that produced by the conventional c.w. rig running 320 watts! Furthermore, because of the nature of the c.c.w. signal, it will be far less susceptible to QRN/QRM than the conventional c.w. signal.[2] Of course, if a s.s.b. transmitter is added to the picture, its power will have to be even greater. The comparisons are indeed mindboggling to say the least, but are based upon fact!

Basically, coherent c.w. employs a time-averaging approach in reception, and a time-discipline approach in transmission, in which an accurately processed c.c.w. signal is passed through a receiver equipped with a narrowband filter whose bandwidth is optimum for a c.w. signal of a given speed. Theoretical calculations by the innovator of coherent c.w.—Ray Petit, W7GHM, of Petit Logic Systems, Box 51, Oak Harbor, WA 98277—indicated that a 12 w.p.m. c.c.w. signal using a bandwidth of 9 Hz would yield a 23.5 dB improvement in signal-to-noise ratio over a c.w. signal passing through a 2.1 kHz receiver bandwidth, and a 17.4 dB improvement over a conventional c.w. signal through a 500 Hz receiver bandwidth. Initial lab tests indicated slightly higher figures, but did not, of course, provide any indication of the improvement in respect to actual on-the-air conditions. The real question is: how much improvement does c.c.w. yield in a practical situation, where random QRN and man-made QRM from powerful signals in various modes must be figured into the signal-to-noise figure? In order to provide an answer to this question, Chas. "Woody" Woodson, W6NEY, has been conducting experiments for several months and has obtained some startling results that go far beyond the theoretical predictions. Working with a 14 MHz 0.1 watt c.c.w. signal over the JA-W6 path, W6NEY has consistently measured *a greater than 30 dB gain* with the c.c.w. technique![3] To put this

[2] In the present context, the term "effectiveness" is used in the sense of "readability" or "copyability," and the improvement is due to S+n/N ratio improvements and removal of QRM/QRN.

[3] Furthermore, W6NEY reports many periods of several hours solid copy of 1 and 0.1 watt signals over this path. One period lasted over six hours!

in perspective, 30 dB separates a 5 watt signal from a 5 *kilowatt* signal! Indeed, coherent c.w. *is a new frontier* in communications technology!

Until recently, communications systems utilizing time-averaging techniques to produce such signal-to-noise improvements were exotic entities reserved for specialized applications such as moon-bounce work, and functioned at totally impractical pulse-lengths of several seconds and more. Their main purpose was, through an analysis of a chart-printout, to indicate whether or not a signal was received via the moon-bounce path. C.c.w. deals with pulse lengths that are practical as far as normal communications are concerned. Advances in integrated circuit technology have made it possible, furthermore, for the average amateur, gifted with a finite amount of technical knowledge, time and money, to assemble a c.c.w. station, or more practically, to add several complementary units to an existing c.w. station in order to convert it to c.c.w. operation without any basic equipment modification. A c.c.w. signal is relatively easy to generate, since it is nothing more than a conventional "on-off" continuous wave, and hence, any gear capable of conventional c.w. can be used as the basis of a c.w. station. The complementary units necessary to convert conventional c.w. gear to c.c.w. operation serve the purpose of achieving the frequency accuracy/stability and time-synchronization which are the essential requirements of c.c.w. These complementary units will be discussed in detail below. First, a discussion of the basics of the coherent c.w. concept are in order.

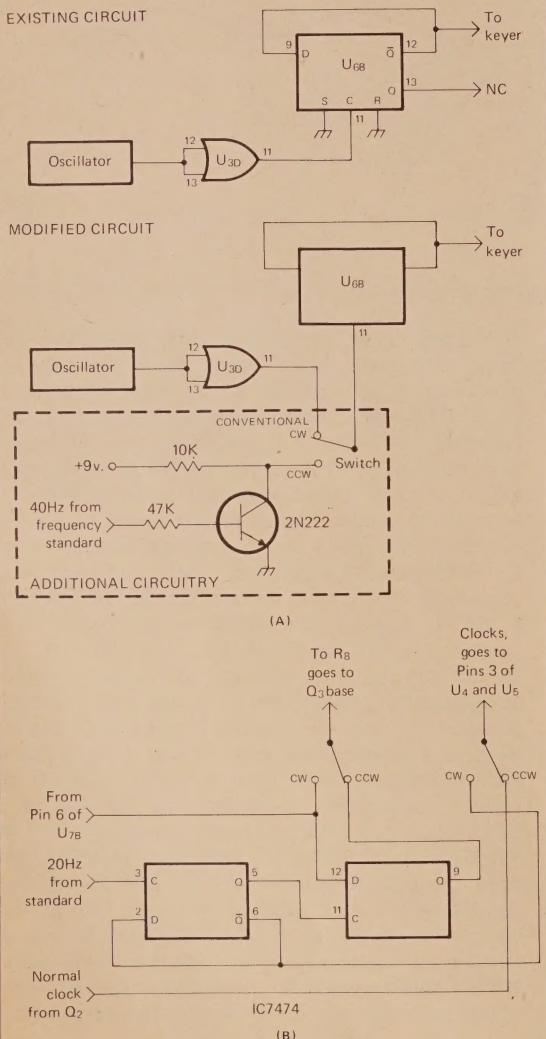



*Fig. 3—(A) Modification of the WB2DFA keyer for c.c.w. operation. (B) Modification of the "Accu-Keyer" for c.c.w.*

## *Coherence*

The term "coherent" in c.c.w. refers to the fact that, in the communications system consisting of the c.c.w. transmitter and receiver, the transmitted signal exhibits distinguishing characteristics to which the receiver is designed to respond. *A c.c.w. signal has three distinguishing characteristics: 1.) precise frequency; 2.) accurately established pulse length; 3.) predetermined "turn-on/turn-off" instant, or pulse-phase.* Fig. 1 shows the basic components of a c.c.w. communications system. Coherent operation is as follows.

A 4 MHz master frequency standard[4] at both ends is calibrated with extreme accuracy and stability against a WWV signal. From this master standard are derived, through digital techniques, signals which determine the precise frequency of the transmitter and receiver, the timing signal which determines the basic pulse length or bit, and the timing signal which establishes the pulse-phase or the exact instant at which each pulse or bit begins and ends. At the transmitter end, the c.c.w. keyer generates a signal whose pulse length and phase are in exact step with the timing signal from the master standard. At the receiving end, the c.c.w. filter samples the received signal in units of time which are in exact step with the timing signal from the master standard. In other words, the keyer and filter are precisely "matched" in a c.c.w. system, and their operation is "coherent."

This coherent matching is rendered possible by the fact that the master frequency standards at both ends are calibrated to within a very close accuracy, specifically $10^{-7}$ or 1 Hz, to the common WWV standard. Because of geographic variances

[4] Ed. Note: In this paper, the "classical" c.c.w. model is used throughout for sake of convenience. The c.c.w. system can be designed to use any combination of derived timing signals, integrating periods, frequencies etc.

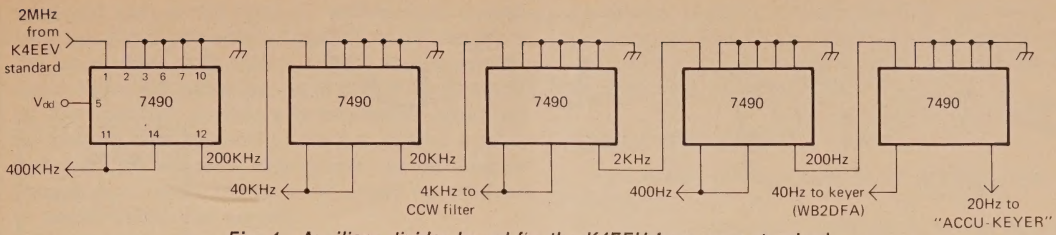



*Fig. 4—Auxiliary divider board for the K4EEU frequency standard.*

between the two c.c.w. stations with respect to the location of the common WWV standard, propagation delay effects may introduce some small degree of inaccuracy into the absolute frequency of either standard. However, this inaccuracy, in terms of current c.c.w. practice, is insignificant with respect to the c.c.w. signal frequency and pulse length. It is significant with respect to pulse phase. To permit precise time-synchronization between keyer and distant c.c.w. filter, the filter pulse phase is adjustable in 0.01 Hz increments over a 0.1 Hz range, the standard pulse length. This is sufficient to offset propagation delay effects in pulse phase synchronization. In short, current c.c.w. technique employs a "fixed frequency, fixed pulse length, adjustable pulse-phase" approach, although other combinations are possible.

Another way of describing what happens in the c.c.w. system of fig. 1 is this: the c.c.w. filter knows that the transmitted c.c.w. signal will be within ±1 Hz of a given frequency, will turn on-off at precise instants, and the on-off periods will last a precisely predetermined length of time. The effectiveness of c.c.w. results from the fact that the odds against a conventional c.w. signal exhibiting these three precise characteristics are astronomical. Likewise, random noise is rejected by the filter.

## C.W. Speed/Bandwidth/Stability

The remarkable improvement in signal-to-noise ratio achieved by c.c.w. is attributable to the fact that c.c.w. applies the classical principle which states that, for the most effective reception of a signal, the receiver bandwidth should be no narrower or wider than the bandwidth of that signal. If the bandwidth is wider, then the receiver passes unwanted energy or interference in addition to the desired signal; if narrower, some of the desired signal is lost. Next, the bandwidth of a signal is proportional to the amount of information contained per unit time. The 3 dB bandwidth of an a.m. phone signal is about 5 kHz; with s.s.b., a 2.1 kHz bandwidth is current practice. In regard to c.w., a 60 w.p.m. signal exhibits a 45 Hz bandwidth, while a 12 w.p.m. signal is 9 Hz wide. At this point, the frequency/timing accuracies required for use of narrower bandwidths become impractical. Current c.c.w. practice is to operate at this threshhold of readily attainable accuracy—12 w.p.m. and 9 Hz bandwidth—although anything faster and wider is feasible.

Obviously, as the bandwidth narrows, a trade-off occurs between the information rate and susceptibility to interference: a 12 w.p.m. c.w. signal has a far lower information rate than an s.s.b.

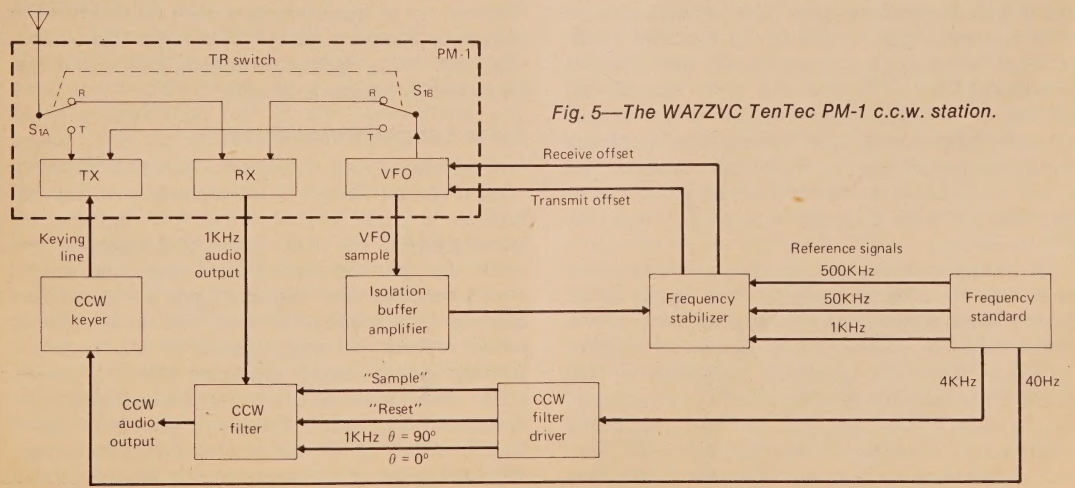



*Fig. 5—The WA7ZVC TenTec PM-1 c.c.w. station.*

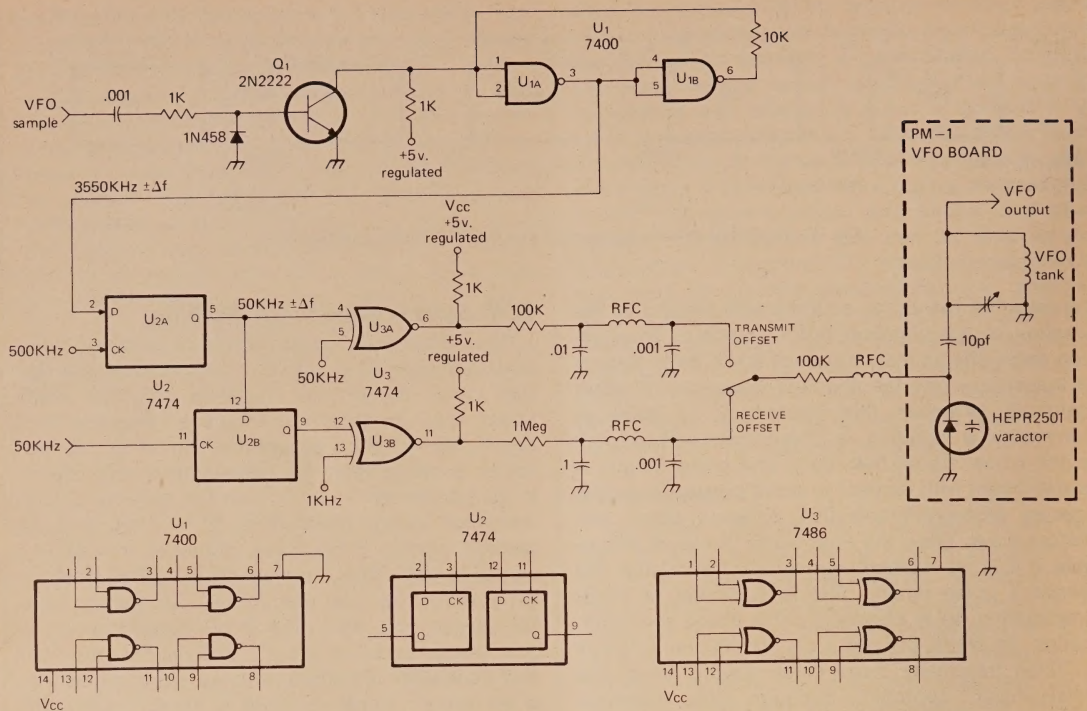



*Fig. 6—The WA7ZVC frequency stabilizer circuit.*

signal, but permits narrowing the bandwidth to 9 Hz, making it possible to eliminate much of the interference energy that could pass through the 2.1 kHz s.s.b. bandwidth. The total noise energy passing through a 9 Hz bandwidth is 9/2100 of that which passes through a 2.1 kHz filter, and hence, the energy of a 12 w.p.m. signal needed to successfully compete with that noise is correspondingly diminished. The result is the improvement in signal-to-noise ratio. In short, the effectiveness of the c.c.w. technique is due to the fact that it operates at the proper bandwidth for the most efficient reception of a c.w. signal of a given speed. The addition of "processing information" in the form of accurate pulse length and pulse-phase increases the selectivity of the c.c.w. system beyond that which the narrow bandwidth would allow on its own. See fig. 2 for a graphic comparison of c.c.w. vs c.w. vs s.s.b. bandwidths.

The frequency stability required to utilize the 9 Hz bandwidth of a 12 w.p.m. signal clearly is far beyond levels achieved in current practice by either homebrewers or commercial producers of amateur c.w. gear. Generally speaking, stabilities of 100 Hz ($10^{-5}$) are considered adequate for conventional c.w. in view of the fact that receiver c.w. bandwidths rarely are narrower than 200 Hz or so. Even with IC technology and active audio filter techniques, "ringing" of narrowband filters can hardly be avoided unless the c.w. signal bandwidth is a fraction of the filter bandwidth. In contrast, the Petit c.c.w. filter requires drift be limited to 2 Hz at most, or an accuracy/stability of $10^{-7}$. While this magnitude may seem like science fiction to those accustomed to stabilities 100 times less, it can be obtained in the hamshack with care. W7GHM feels that accuracies of $10^{-10}$ are not beyond amateur practice, but would require a great deal more effort. Thus far, c.c.w. experimenters have relied upon the frequency standard design by K4EEU (*ham radio,* February, 1974), for the frequency and timing signals used in the c.c.w. station.

### Pulse Length/Pulse-Phase

A codespeed of 12 w.p.m. is based upon a "pulse" or "bit" length of 0.1 second, or 10 bits per second. In c.c.w. practice, the "dit" or "dot" of Morse Code is the basic pulse of 0.1 second, the "dah" or "dash" is exactly three times that length, or 0.3 seconds, and "spaces" are off-periods 0.1 seconds or a multiple thereof. The c.c.w. filter is set to process incoming signals in blocks of 0.1 second, and the keyer generates bits and spaces of the exact same duration. The timing signals derived from the master frequency standards insure an extremely high degree of precision in the establishment of the pulse length. Hence, a c.c.w. signal exhibits precisely formed Morse characters. Con-

yentional keyers will produce well-formed characters, but these will appear of random bit length to the c.c.w. filter. It is highly unlikely that a conventional keyer will either be set to precisely 12 w.p.m. by the operator, or that a conventional keyer will be forming bits precisely at the 0.1 second rate, or that each bit will start at a precise predetermined instant. As a result, the c.c.w. filter will not respond to conventional c.w. signals.

Finally, the c.c.w. signal is distinguished from a conventional c.w. signal in that a pulse will begin and end at highly predictable, precise, time points. The c.c.w. keyer employs as its "clock" a timing signal from the master frequency standard for the generation of both "dots" and "dashes" in contrast to a standard keyer, which employs either single or separate clocks for the formation of the two basic character elements. The conventional keyer-clocks are activated at random instants selected by the paddle operator. In the c.c.w. keyer, the clocking signal runs continuously, and the operator must adjust his manipulation of the paddle to the clocking signal, which determines the precise instants at which a pulse will begin and end. The c.c.w. filter processing periods, similarly, are controlled by a timing signal from the master frequency standard that precisely duplicates that controlling the generation of pulses in the keyer. As noted earlier, the Petit Filter permits a pulse phase adjustment to offset the slight inaccuracies between the two timing signals caused by propagation delay effects. The adjustment of phase at the c.c.w. filter brings the initiation of filter sampling intervals into precise step with the initiation timings of the distant keyer so that time-synchronization is achieved. The Petit c.c.w. Filter permits a small error in phase of a few hundredths of a second before significant intelligibility is lost.

### *Summary*

A c.c.w. signal differs from a conventional c.w. signal in several respects. First, the frequency accuracy/stability of the c.c.w. signal is about 100 times greater than that of the conventional c.w. signal. The accuracy/stability figure of $10^{-7}$ is necessary to locate and keep the c.c.w. signal in the 9 Hz passband of the c.c.w. filter. Secondly, the pulse length and pulse-phase of the c.c.w. signal are precisely controlled. Each bit will begin and end at a precise instant, and each bit will last a predetermined length of time. With respect to receiving c.c.w., the c.c.w. filter analyzes the energy present in the 9 Hz passband in 0.1 second blocks, and will indicate the presence of a signal that is at zerobeat, beginning and ending at predetermined instants, and lasting the predetermined length of time; conversely, spaces indicating the absence of a c.c.w. signal will conform to the same time discipline. In comparison to the c.c.w. signal, all other r.f. energy passing through the filter will exhibit a randomness and be ignored by it. The function and operation of the various units of a c.c.w. station will be discussed next.

### *The CCW Station*

The c.c.w. station consists of several units as follows:

1.) A master frequency standard which is capable of the accuracy/stability figure of $10^{-7}$ or 1 Hz, and which provides proper outputs for the various timing signals required by the c.c.w. system.

2.) A transmitter/receiver capable of maintaining the required frequency accuracy/stability to hold the received/transmitted signal within the 9 Hz passband of the Petit c.c.w. Filter.

3.) A c.c.w. keyer that can generate the processed Morse characters in synchronization with the master frequency standard.

4.) A c.c.w. filter which is matched to the c.c.w. keyer and which can perform the time-averaging function required in order to reconstruct the received c.c.w. signal.

These units will be discussed in detail in the following paragraphs.

### *CCW Keyer*

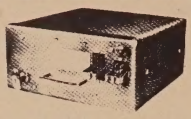
A conventional keyer is easily modified for c.c.w. operation. The modification consists of disconnecting the keyer's internal clock, and substituting a timing signal from the master frequency standard as the new clocking signal. The clocks of standard keyers begin upon command from the operator as he depresses the paddle. The c.c.w. keyer is different in this respect. The clock signal is running continuously and provides the commands for the beginning of a bit in precise step with the timing signal from the frequency standard. The operator must therefore fit his manipulations to the keyer. Since the clock in the c.c.w. keyer initiates a pulse period every 0.1 second in the classical c.c.w. system, and since the paddle may be depressed by the operator at any point during that 0.1 second period, the actual keyer output may lag behind the paddle up to .0999 etc seconds, depending upon how early into the previous period the paddle was depressed. Experimenters report that this aspect of using the c.c.w. keyer is a problem at first, but that after a few QSO's, one becomes readily accustomed to it. W7GHM and W6NEY are exploring various methods of artificially removing the clock-paddle lag, so that the operator hears an audio signal in step with the paddle while the transmitted signal is actually lagging an average .05 second behind.

WA7ZVC's modification of the CMOS keyer by WB2DFA (*ham radio,* June, 1974) for c.c.w. operation is shown in fig. 3. SW1 permits selection of

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## 6 METER F.M. SPECIALS

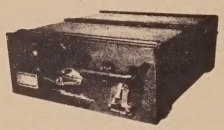
G.E. MA/E13, 40-50 MHz, 6/12 volt, 30 watts, vibrator power supply, transmitter narrow band, receiver wide band. A complete unit, not operationally checked-out, less accessories, shipping weight 45 lbs. .....



W 14", H 6½", D 15"

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MOTOROLA T51G series, 40-50 MHz, 6/12 volt, 50 watts, vibrator power supply, transmitter narrow band, receiver wide band. A complete unit, not operationally checked-out, less accessories, shipping weight 60 lbs.



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either conventional or c.c.w. operation. Fig. 3B shows mods for the popular "Accu-Keyer."

### *Master Frequency Standard*

The frequency standard is the heart of the c.c.w system. All signals for operation of the receiver/transmitter, c.c.w. keyer, and c.c.w. filter, are derived from it. The classical c.c.w. system described in this paper uses a 4 MHz standard, but, as noted earlier, this is entirely arbitrary and relative to the designer's desires. The standard currently used by c.c.w. experimenters is described by K4EEU (*ham radio,* February, 1974). It is a high accuracy, temperature compensated 4 MHz crystal oscillator with IC dividers to obtain 18 precision frequency outputs in the 1 Hz-2 MHz range. In order to provide timing signals not derived in the K4EEU standard, an additional divider circuit employing five IC's is added to the unit, as shown in fig. 4. Furthermore, the use of one standard is optional—W6NEY uses three separate ones in his setup. Accuracy and stability is the essential factor.

### *Receiver/Transmitter Stabilization*

No available amateur gear is capable of the frequency accuracy/stability of $10^{-7}$, or 1 Hz, required for c.c.w. operation. However, it is possible, through synthesis techniques, to achieve that figure with existing equipment using signals derived digitally from the master frequency standard. Generally, a frequency reference signal from the standard is phase-locked to transmitter/receiver local oscillators through additional circuitry and corrects any drift that occurs during operation. Two approaches have been successfully used and are similar: first, WA7ZVC's modification of a TenTec PM-1 with its single local oscillator; and second, W6NEY's modification of a double-conversion Heath SB303. Their operation follows.

1.) **WA7ZVC System.** The first practical c.c.w. station was assembled by WA7ZVC and used for the first on-the-air c.c.w. contact in January of 1975. A Ten-Tec PM-1 was used because of its low cost and the fact that only one free-running oscillator required stabilization. Also, WA7ZVC wanted to illustrate that, with the c.c.w. technique, even the simplest of gear could be converted to c.c.w. Fig. 5 shows the WA7ZVC c.c.w. station. What is of interest to us here is the frequency stabilization unit, shown in fig. 6. Its operation is described in the following paragraph.

A sample of the v.f.o. output is squared up by Q1 and U1 and passed on to U2, a digital IC mixer. The 3550.000 kHz harmonic signal from the master frequency standard is mixed in U2a with the sampled signal to produce a 50 kHz ± (undesired-drift) signal, which is then passed to the transmit offset and receive offset chains. That signal is mixed in U3a with a 50.000 kHz signal from the standard, and if there is a difference in frequency, U3a generates a control voltage proportionate to the amount of difference. That control voltage is applied to the varactor tuning diode which has been added to the TenTec PM-1 v.f.o. board, causin it to pull the v.f.o. back to a 3550.000 kHz frequency. The same process occurs in the receive offset chain, except that in U3b, *a 1 kHz difference* with respect to the 50 kHz reference signal and the 50 kHz ± (undesired-drift) v.f.o. sample signal is desired. This *1 kHz difference* is important. The receiver will be 1 kHz away from the desired 3550.000 kHz c.c.w. signal and produce the necessary 1 kHz audio output to the c.c.w. filter. If the mixed signal from U2b *does not* exhibit the 1 kHz difference between the v.f.o. sample and the frequency standard reference signal, then U3b produces a control voltage that causes the varactor tuning diode to pull the receiver frequency to produce the desired 1 kHz offset at 3449.000 kHz or 3551.000 kHz.

The phase-lock approach used by WA7ZVC in the simple PM-1 is applicable to more complex, multiple conversion receivers such as W6NEY's SB303. We will continue our discussion of stabilization techniques, as well as the Petit c.c.w. Filter itself, in the next installment of this paper.

(To Be Continued)

***In an evening or two you can turn your v.o.m into four additional instruments you'll wonder how you did without.***

# Versatility And The V.O.M.

BY DOUGLAS L. JONES*, K3AAY

Most amateurs have available as a part of their test equipment, a v.o.m. (volt-ohm meter). It is a fairly accurate piece of equipment that a person would never think of modifying. Many people seem to have a quirk about drilling holes in a piece of commercial electronic gear. Described here is a no-holes modification to an existing v.o.m. that can increase its usefulness around a typical ham's workbench.

While tinkering about the bench, amateurs often have a need for a small d.c. power supply to run transistorized projects. The meter can supply the necessary d.c. voltages while still retaining the original functions of a v.o.m. Just the 5000 volt ranges will be sacrificed; the rest of the meter circuitry remains intact. The batteries normally used only on the ohms ranges can double as a perfect small d.c. supply.

An EICO model 565 v.o.m. is typical of the instruments that can be so modified, other brands can be adapted too. The model 565 has voltage ranges (a.c. and d.c.) of 2.5, 10, 50, 250, and 1000 volts. By use of two additional resistors and two additional jacks (lower right-hand corner) the designers also have it covering 5000 volts a.c. and d.c. It is seldom that an amateur measures a voltage in the 5000 volt range. These two jacks can be for a more useful purpose in today's semiconductor world.

Fig. 1 is a partial schematic of the v.o.m. Resistors R-12 and R-13, the multiplier resistors for the 5000 volt ranges just seem to be added to the circuitry as an after-thought. Removal of these two resistors does not change the basic function on any of the volt., amp., or ohm ranges.

A wire connection from J-5 to the positive side of the D battery, a second connection from J-6 to the positive side of the four AA (series) batteries and the modification is complete. It is really as simple as that.

Included here are explicit step-by-step instructions for the EICO model 565:

**Materials Required:**

18 inches insulated wire
1 inch spaghetti
3 Dymo-Embossed labels (NEG., 1.5, 7.5)

**Modifications** (Refer to Fig. 2.)

Unsolder the connection of R-13 from J-5. Carefully straighten this lead. Slip a 1 inch piece of spaghetti over the exposed lead. Carefully bend the lead around the switch post (see diagram).

Remove the black lead from J-6. Bend it back on itself and tack solder it to the top connection of TB-2, where it originated.

Solder a wire on connection 2 of the battery board and solder the other end to J-5.

Solder a wire on connection 1 of the battery

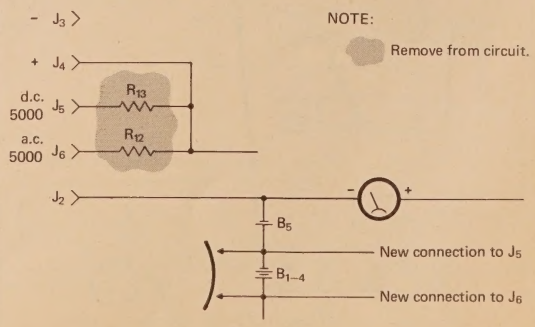



*Fig. 1—Partial schematic diagram of a typical v.o.m.*

*2271 North Mill Road, North East, PA 16428

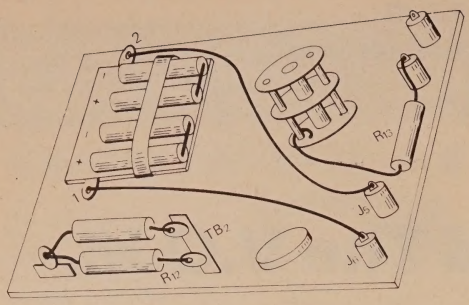


*Fig. 2—Pictorial diagram of the v.o.m. shown in fig. 1.*

board and solder the other end to J-6.

Return the meter to the case and secure it.

Place the label marked (NEG.) over the −10 AMP marking.

Place the label marked (1.5) over the d.c. 5000 volt marking.

Place the label marked (7.5) over the a.c. 5000 volt marking.

Modifications on the meter are complete. If at any time you would rather have the 5000 volt range capability, the parts have been retained in just about their original positions. In a matter of moments the meter can be returned to factory specifications.

You will now have available three d.c. voltages for semiconductor experiments; they are 1.5 volts, 6 volts, and 7.5 volts d.c. These voltages are in no way current limited. Notice too that other than the 5000 volt ranges, the entire capability of the v.o.m. is intact.

For the 1.5 and 7.5 volt supplies, there are some other unique features. Figures 3 and 4 will give you more ideas of what can be done with this set-up. These ideas stem from the fact that at all times the negative of the 1.5 and 7.5 volt supplies have a common negative with the meter circuitry.

Fig. 3 shows how d.c. voltage readings can be taken using only one probe. All voltages are taken

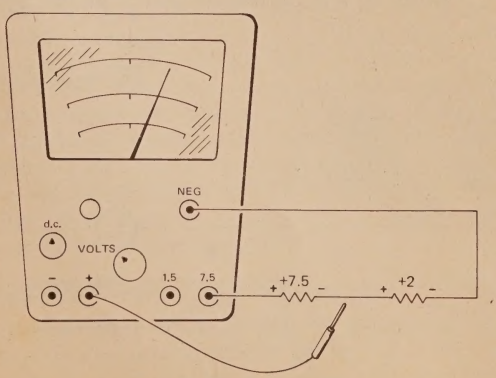



*Fig. 3—Voltage measurement using one probe technique.*

with respect to the negative end of the circuit.

Fig. 4 shows how total current readings of the circuit can be taken with the connections as shown. As is usual, you start on the highest current range and work down.

Ohmmeter readings are *not* taken with power supplied to a circuit, so even with the modifications there is no problem; it is just not done. Remove the power to the circuit, then take the ohmmeter readings.

The normal life of batteries in v.o.m. applications is usually quite long, sometimes a year or more. As can be expected, since they are now serving as a power source, their life expectancy will be somewhat less. As with any batteries, the heavier the current the less the life expectancy. A direct short will naturally ruin any power supply.

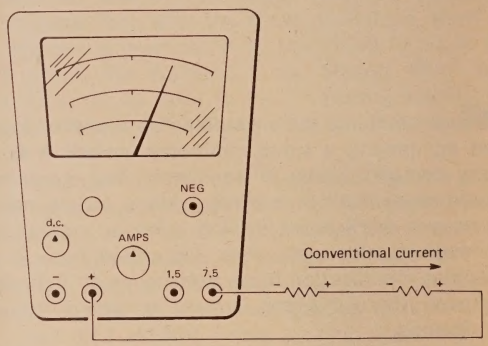



*Fig. 4—How to read total current of a circuit.*

Conservative estimates are that you will only have to buy new batteries every few months. But, as you will learn to appreciate, it is most convenient to have this d.c. power source available.

### Plug-In Adapters

We can now discuss three separate plug-in adapters to the v.o.m. to further extend the usefulness of the unit. Construction and use of these plug-in modules relies upon the fact that the previously mentioned modifications to the meter have been made.

The three adapters will plug directly into the front of the modified meter. The adapter circuits will then utilize combinations of the power supplied by the batteries in the v.o.m. and the basic voltage and current reading capability of the meter. Each of the plug-in adapters performs a testing function of its own; these functions are all at some time needed at an amateur's workbench.

### Audio Generator Plug-In Module

For troubleshooting in all types of amplifiers, no one will dispute the usefulness of an audio generator. This unit exhibits perhaps the minimum number of active and passive components neces-

sary for such an oscillator, while still retaining purity and good amplitude.

The circuit is a bridge-T oscillator. The six passive components serve to give a 180 degree phase shift at one and only one frequency (approximately 1000 Hz.). The common emitter configuration brings back an in-phase or regenerative condition while providing the necessary amplification.

The collector is biased with the 8.2 K load resistor; the base is biased by means of the two series resistors in the feedback path.

The .001 uf capacitor serves as a d.c. blocking to the load amplifier. (d.c. blocking in both directions.) A .001 uf is rather light coupling and will prevent loading down of the oscillator; it can work into as low as a 1 K-ohm load.

The transistor type utilized was a type 2N404. Any PNP transistor will probably work; the unit was found to oscillator with an $h_{FE}$ as low as 35 (taken at 1 ma. $I_c$ and 7.5 v $V_{CE}$.)

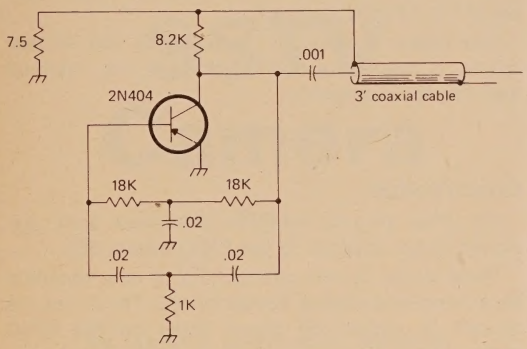



*Fig. 5—An audio generator plug-in module.*

A 3-foot coaxial cable allows easy use of this oscillator with any load amplifier. Further construction procedures will be discussed later in this article.

## Capacitor Comparator Plug-In Module

Five standard principles or circuits are utilized in this plug-in. They are:

1. A collector-coupled astable multivibrator.
2. The use of high frequency a.c. for driving a bridge circuit; the bridge contains a standard capacitor and an unknown capacitor.
3. The transformer coupling for maintaining a balanced relationship between currents.
4. A d.c. bridge rectifier circuit.
5. Use of a transistor as a d.c. amplifier.

The circuits are standard and straight forward. Few parts have any critical value. These will be mentioned.

The a.c. generator is an R-C collector-coupled multivibrator. Standard texts do a yeoman's job describing this circuit and no attempt shall be

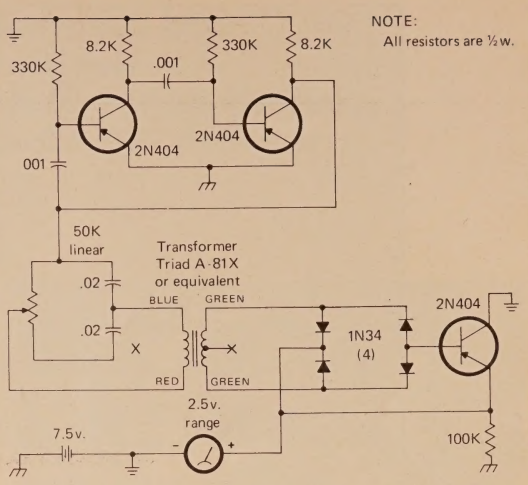



*Fig. 6—A capacitor comparator plug-in module.*

made here. The square-wave output current is fed to the comparator bridge which is composed of a standard capacitor (.02 uf precision) and a 50 K-ohm linear potentiometer. The potentiometer will have a logarithmically calibrated scale (.02 uf in the center).

A balanced output is taken off the center of the bridge, fed through a transformer then into a diode bridge rectifier. The d.c. output of this bridge is the only means of base current for the following d.c. amplifier transistor.

The transistor load is a 100 K-ohm resistor, shunted by the 2.5 volt meter. Null or balance of the comparator bridge is indicated by a sharp rise in voltage on the emitter.

A scale can be easily fastened to the 50 K linear potentiometer, and then calibrated by comparison to a substitution box.

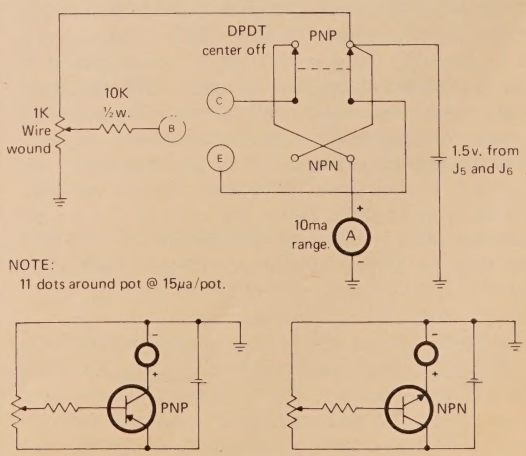
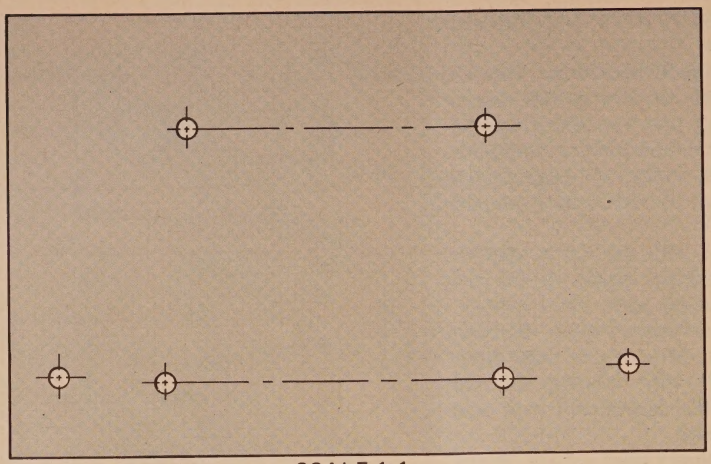



*Fig. 7—A transistor checker plug-in module.*



SCALE 1:1

*Fig. 8—Template for use with the Eico 565.*

It does appear as a rather odd circuit or perhaps an odd way to do things. Please remember the starting specifications: a plug-in board for an existing meter modification, and the negative of the meter is permanently fixed to the negative of the power source.

### *Transistor Checker Plug-In Module*

After an initial ohmmeter check of the transistor, base control over collector current can be established by use of this plug-in module.

In Fig. 7 (refer to the inset diagram) for a PNP, $1_c$ is monitored and is seen to vary as a function of $I_b$. For the NPN, $I_e$ is seen to be a function of $I_b$; and for all practical purposes, $I_e$ equals $I_c$.

Since 1.5 volts d.c. is utilized, the danger of insertion of the transistor incorrectly and harming something is minimized. The transistor socket (or clips as was used in the prototype) were labeled E — B — and C. The power is from the internal batteries of the meter while the ammeter function of the meter is simultaneously being used.

An amazing thing is noticed if a transistor is in the socket correctly, but the NPN-PNP reversing switch is wrong $I_b$ still has control of the collector ...now the emitter. This is described in the Ebers-Moll equivalent as $\infty$ normal and $\propto$ inverted.

The 1 K-ohm linear potentiometer can be calibrated with 11 dots. Since the ends of the potentiometer are not reversed with the switch, the dots will take on different values for NPN or PNP units.

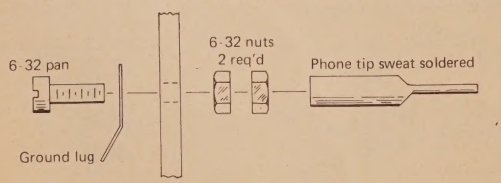



*Fig. 9—Utilizing inexpensive plugs for mechanical and electrical connections.*

A first approximation would give a fairly accurate $I_b$ of 15 microamps per dot. So, 11 dots would cover 0 to 150 microamps $I_b$.

The meter is normally switched to the 10 ma. range; a rough approximation of $\beta$ d.c. can be found by the expression:

$$\beta \text{ d.c.} = \frac{I_c}{I_b}$$

### *Construction*

All three plug-in modules described were designed to be adapted to the EICO model 565.

Parts layout is not critical. Fig. 8 is a template for cutting and drilling Vector board. The holes are spaced to match the panel jacks on the EICO meter.

On these projects, not all jacks are used for electrical connections. The audio generator, for example, utilizes just the power jacks. In such a case, the other plugs can be used for mechanical support.

Fig. 5 shows a detailed close-up of inexpensive plugs for mechanical and electrical connections. The pin plug is sweat-soldered to the 6-32 bolt. The 2 nuts serve as spacing so if flea clips are used they will clear the meter knobs. Other inexpensive hardware can be utilized: a fahnstock clip serves as a cable-pull; three alligator clips securely mounted can serve as a transistor socket with versatility for lead spacing and dimension; and entire sub-modules can be mounted on terminal strips.

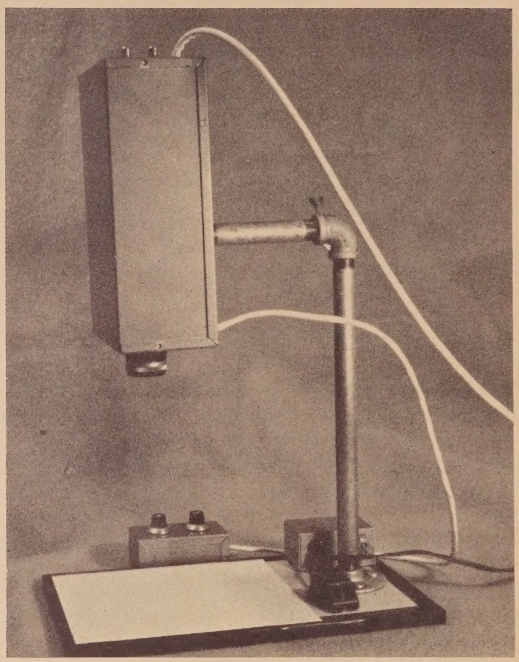
### *Conclusion*

While the use and accuracy of the described test circuits is limited, they serve to introduce you to the idea of plug-in modules or adapter circuits for your v.o.m. With your v.o.m. investment you have a quality instrument whose functions and usefulness around the workbench can be greatly increased. ■

***Here's an interesting project that is guaranteed to fill your building and operating time with solid enjoyment. James is the father in the father and son (Stephen, WA2CLG) team that brought us the DCX/CLG SSTV Monitor in December 1975.***

# The WB2DCX Plumbicon SSTV Camera

**Part I**



**BY JAMES E. McKEOWN*, WB2DCX**

## *Introduction*

One of the problems with any specialized communication system such as SSTV (Slow Scan Television) is the high cost of equipment. Numerous articles have been written on SSTV monitors, but cameras have rarely been documented. One type of camera often homebrewed is a Plumbicon camera. This is due to the availability of used Plumbicon image tubes at commercial television stations. The Plumbicon tube is similar to a Vidicon in construction but has several inherent advantages. One advantage which makes this tube eminently suitable for SSTV is that the dark current of this tube is extremely low producing a less "noisy" image with a minimal amount of objectionable "sticking."

Until now most Plumbicon cameras have produced a soft focus when running in the slow-scan mode. This camera produces excellent focus, and is extremely sensitive, thus allowing its use in semi-darkened rooms as used in viewing P-7 phosphor monitors.

Although this camera is relatively simple, it required approximately 250 hours of development work on the part of WB2DCX. The camera contains only 3 transistors, and makes liberal use of integrated circuits.

*17 Seneca St., Sidney, N.Y. 13838

## *Theory Of Operation*

**Timing Circuitry:**

The purpose of the timing circuitry is to provide 5 millisecond horizontal sync pulses at a 15 Hz rate and 30 millisecond vertical pulses every 8.33 sec. The voltage controlled oscillator of the 565 phase-locked loop (IC1) runs at a frequency of 2400 Hz. This frequency is then divided by 2 to produce the 1200 Hz sync frequency (see output circuitry). The 1200 Hz signal is then divided by 40 to produce 60 Hz which is fed into the PLL comparator and is

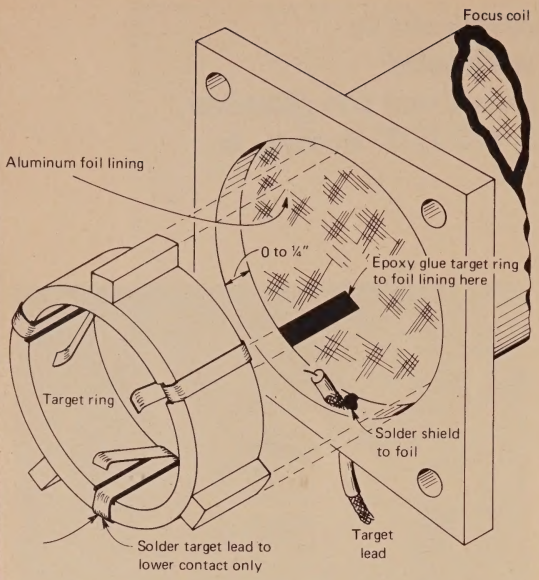



*Fig. 1—Details of target ring and front-end piece.*

compared with the 60 Hz line frequency, this procedure maintains all frequencies to a high degree of accuracy since they are locked to this 60 Hz reference. The 60 Hz signal is further divided by 4 to produce the 15 Hz horizontal line rate. This 15 Hz rate is used to trigger half of a 74123 dual monostable thus forming the 5 millisecond horizontal sync pulses. The 15 Hz is also divided by 128 to produce the vertical timing for a 128 line SSTV picture, this signal is fed to the other half of the 74123 thus forming the 30 millisecond vertical sync pulses.

**Sweep Circuitry:**

The sweep circuitry produces a raster on the photosensitive lead-oxide target inside the Plumbicon. Both the vertical and horizontal sweep circuits are identical except for the capacitor values, so only one sweep circuit will be discussed. The sweep circuit is merely a free integrator using an operational amplifier with capacitive feedback producing a sawtooth waveform at the output. The reset circuitry is slightly different than normally used in that a transistor is not required to discharge the integrating capacitor. In the configuration chosen for this application, a high energy positive going pulse is coupled into the inverting input producing a sudden reversal of the integrating action. The diode in parallel with the integrating capacitor ensures that this capacitor discharges to a fixed voltage ensuring that the voltage sweep always starts at the same level. The trim resistances R21 and R22 vary the d.c. bias on the non-inverting input of the sweep amplifier-integrators, allowing adjustment of horizontal and vertical position. The sweep amplitude is adjusted by varying the resistance in series with the deflection coils. Since the sweep frequency is relatively low and scan coil inductive effects are negligible, a linearly varying voltage across the coils produces a similar current waveform within the coils, which in turn produces a linearly changing magnetic flux causing the electron beam to be scanned across the Plumbicon target. The deflection coils are designed to produce 1 gauss ($10^{-4}$ weber/m$^2$) of magnetic field strength for every volt across the coil.

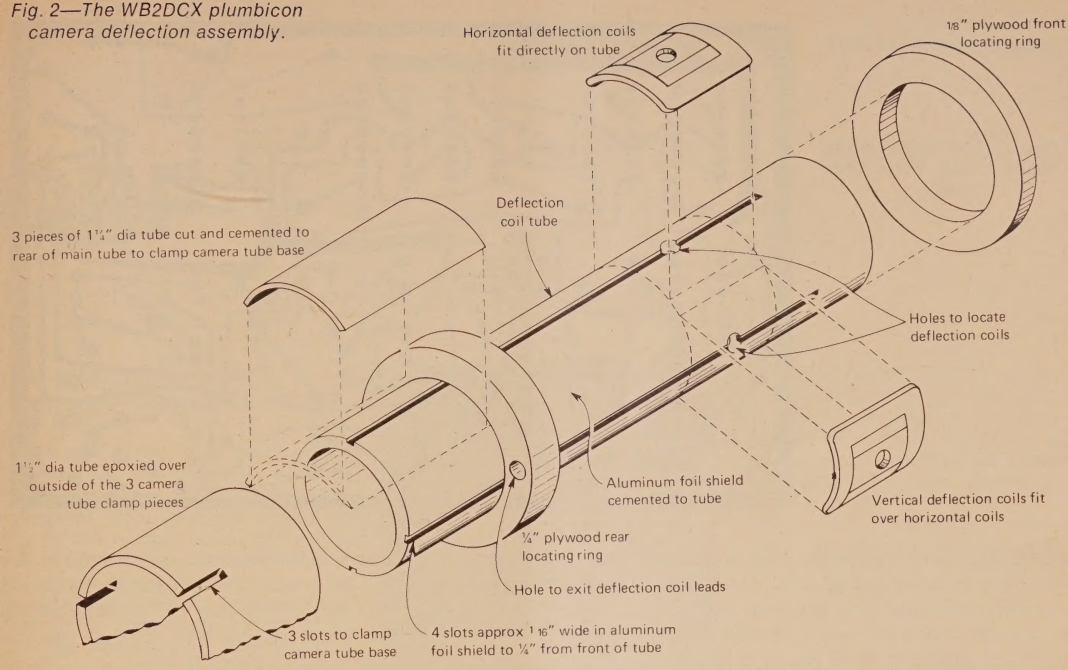
**Video Amplifier:**

The video amplifier used in this camera is relatively simple but required most of the development work to produce enough gain and stability for practical use. Previous Plumbicon camera circuits used a.c. amplifiers and relied on a 10 kHz. carrier to couple the signals through the amplifier. This amplifier is entirely d.c. coupled producing good low frequency response which increases the resolution. IC11 forms a differential pair of high-input impedance non-inverting amplifiers. The inputs of these amplifiers are similarly biased to the same d.c. level resulting in a differential voltage which is proportional to the target input signal. The use of this amplifier configuration tends to reduce drift and improves the rejection of spurious signals such as hum. One of the amplifier inputs is connected directly to the target providing target bias. Contrast adjustment is attained by varying the gain of this differential amplifier pair. The output of this amplifier is coupled to the gamma correction amplifier (½ of IC12) which produces a linear brightness-voltage correlation. Any imbalance between the differential amplifiers is corrected at the input of the gamma correction amplifier by use of the balance control. The output of the gamma correction amplifier is further amplified by the remaining half of IC12 where the black level is set. The output is now a composite video signal with a net negative d.c. level, this signal is fed to a clamp circuit which limits the swing going into the voltage controlled oscillator. The voltage controlled oscillator produces a varying tone between 1500 Hz (black) and 2300 Hz (white). This tone is coupled via a transistor to the output circuitry.

**Output Circuitry:**

The output circuitry is merely a gating system that couples the 1200 Hz signal during the time of the sync pulses, and the VCO output (with video information) at other times to the main output. A trim resistor (R11) is provided to adjust the output voltage level which is capacitively coupled to the monitor and transmitter. The sync pulses are also combined in this circuitry, the resulting sync signal being in turn coupled with a transistor to the Plumbicon cathode to provide retrace blanking.

*Fig. 2—The WB2DCX plumbicon camera deflection assembly.*




## *Construction*

**Deflection Assembly:**

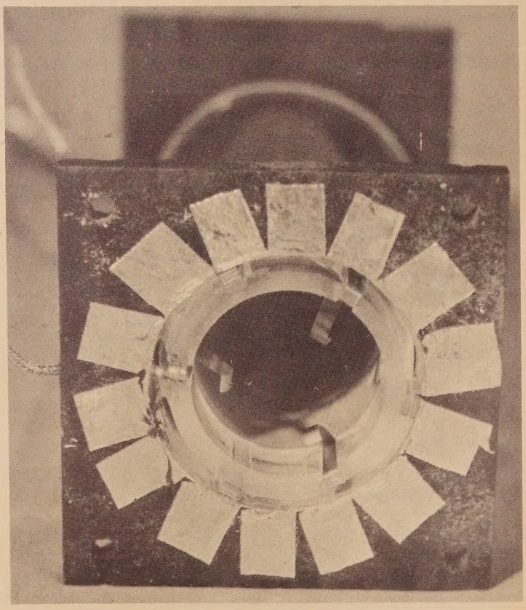
The former for the focusing coil has a minimum inside diameter of 1.750 inches. The end pieces are ¼ inch model aircraft grade plywood, 2¾ inches square. The front end piece has four 5/32 inch holes on 2¼ inch centers. See fig. 1.

End pieces are glued to the former with a white glue. Drill a 1/16 inch hole from the bottom edge of the front-end piece through the former to accommodate the target lead. Paint with flat black paint. Drill a 3/32 inch hole through from edge of back-end piece to accommodate yoke locking screw. Drill a 1/16 inch hole close to former for start-lead of focus coil. The finish lead hole should be 1/16 inch diameter and 3/16 inch minimum from former in rear end bell. Mount the former on the pieces cut from end bell and wind 6000 turns of number 32 enameled wire. This is about ¾ lb. and should have between 450 and 500 ohms resistance when completed. When 12 volts is applied across the coil there should be an axial magnetic field strength of about 15 gauss within the coil.

The target ring as seen in fig. 1 is made from 1½ inch OD by 1¼ inch ID plastic tubing. A ½ inch length was used. Three notches were filed longitudinally on the inner diameter to provide a recess for the wiper springs. The wiper springs were cut from 0.006 inch beryllium copper sheet (hard temper), but a piece of tin can would do.

Three pieces of ⅛ inch square wood were cut ½ inch long. These were epoxied to the outer diameter of the plastic ring.

The shielding inside the focus coil (fig. 1) is



*Front view of the deflection assembly. The shielded wire for the target lead can be seen coming from the left of the end-piece instead of the bottom as the unit is on its side.*

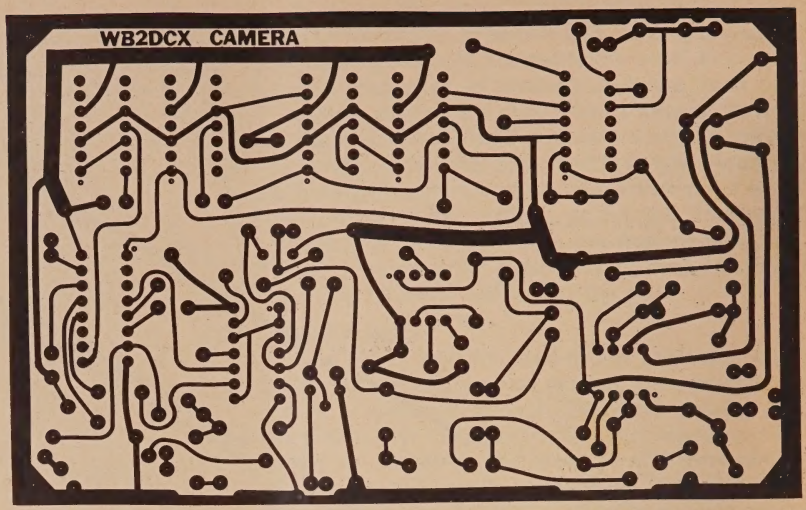
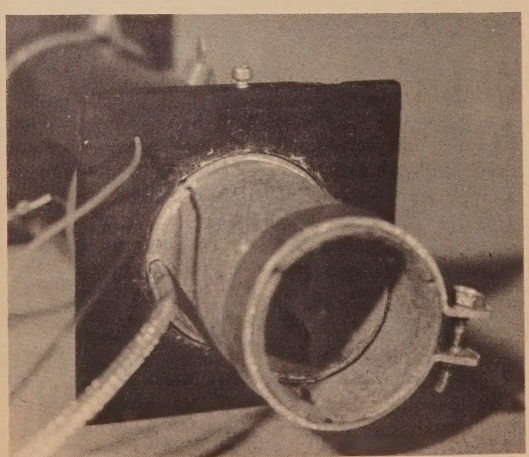



*Fig. 3—Foil layout of the timing circuit board (foil side).*

heavy duty aluminum foil. This was cut to give a 1/16 inch gap at the top prior to placing the foil inside the coil assembly. The foil was laid on a flat surface and coated on one side with 3M Sprayment® (contact adhesive). The inside of the coil was then similarly coated. When dry, the foil was rolled sticky side out on a 1½ inch diameter cardboard tube. A piece of wax paper was then lightly rolled over the sticky side of the foil. This tube was then inserted into the focus coil and correctly oriented, at which time the wax paper was removed and the foil was secured by rolling the tube around the inside diameter of the focus coil. The rear protrusion of the foil was then trimmed with a sharp knife flush with the rear face. The front was cut ½ inch long then laterally cut and folded outward to form a rising sun pattern. Sprayment was again used to secure this. The target lead was then inserted through its hole and the shield was soldered to the aluminum foil. This was accomplished by using plenty of solder and pre-tinning the foil by rubbing the foil with a hot soldering iron. Do not rub too hard or you will rub through the foil.



*Rear view of the deflection assembly. The yoke locking screw can be seen on the top.*

Now lightly sand the three blocks on the target ring until it just fits inside the front end of the focus coil. Pull the inner lead of the target conductor forward. Pre coat the three plywood pieces on the target ring with epoxy and insert into the front of the focus coil. This ring should be flush with the front face of the coil. In any instance it should be no more than ¼ inch behind the front face or problems with optical focus will ensue. Solder inner lead to wiper and epoxy lead in place.

The yoke assembly tube was 1¼ inch ID by 6⅛ inches long. See fig. 2. Wrap with aluminum foil and cement with Sprayment®. Cut foil to give a 1/16 inch longitudinal gap when in place. Using this gap as a reference, temporarily wrap 1 turn of plain white paper tightly around the tube. On the under and outer faces of one edge of this paper, mark the start and finish with a pencil. Remove the paper and fold so that these marks just touch, fold again. This establishes the location of the four deflection coils around the tube. Using this paper, mark at each end of the tube the remaining 3 locations. Cut 1/16 inch longitudinal slots in the foil starting ¼ inch from the front of the tube. Mark the position of of the deflection coil holes 2⅛ inches from front of tube and drill four 1/16 inch pilot holes then four ¼ inch holes. Using Sprayment,® coat entire outer face of tube with brown paper. Accurately measure the inside diameter of the focus coil. On an ⅛ inch piece of plywood, draw 3 circles of this diameter with a compass. Using a 1¼ inch hole saw, cut 3 holes inside these circles. Wrap a piece of coarse

*(Continued on page 70)*

*a monthly feature by*

**ADRIAN WEISS, K8EEG**

# QRP

## The art of very low power operating

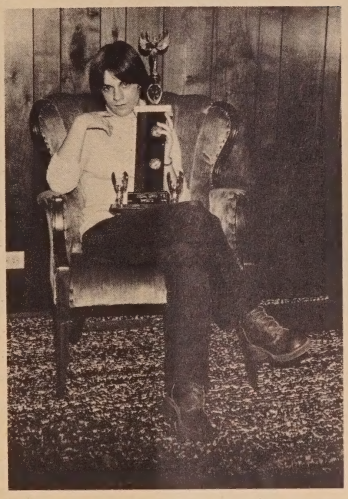
### *The "Almost-Impossible" Challenge—QRPp DXCC #3 & #4*

At one time, the challenge of working 100 countries with less than five watts output seemed to be "impossible." None had ever done it as far as the records show, and everyone figured that it was rather absurd to offer a trophy for something that couldn't be done. So, when I made the official announcement, as editor of the now-defunct *The Milliwatt: National Journal of QRPp*, in April, 1971, of the *DXCC QRPp* (5 watt) and *DXCC MILLIWATT* (1 watt) trophies, I seemed to be undertaking a reasonably safe economic venture—the awards program could never cost much if no trophies had to be purchased and awarded. As it turns out, *DXCC MILLIWATT* has been the only "impossible" challenge and correspondingly economically "safe" award. K4OCE, W2GRR, K8MFO, and W6PQZ have qualified for and received *DXCC QRPp* trophies #1-4, and K2KUR (N2AA) is awaiting receipt of #5. *DXCC QRPp* is thus achieving its objective in a rather dramatic fashion—to demonstrate to the world that very low power, coupled with operating skills and knowledge, is capable of putting a signal anywhere on this globe hurtling through space. I am anxiously awaiting the first packet of 100 QSL's for *DXCC MILLIWATT*—that seems to be the real achievement at present! The present column is intended as a commemoration of the achievements of K8MFO, winner of *QRPp DXCC #3*, and W6PQZ, winner of *QRPp DXCC #4, ALL SSB #1*. Let's let them share their experience with us.

*83 Suburban Estates, Vermillion, SD 57069



*W6PQZ at the desk with the "old" set-up which included QRO gear and the Argonaut 505.*



*The pretty young miss holding the QRPp DXCC trophy for better viewing is Marianne Schuld, friend of K8EEG, and currently enrolled as an art student at the Univ. S. Dakota. Ironically, Marianne is from Glen Head, L.I., just across the bay from Cowan Publishing, and had to come to South Dakota to be discovered.*

K8MFO, Don Karvonen (4433 14th St. NW, Canton, OH 44708), writes:

"I was first licensed as KN8MFO in 1958, with the N being dropped in 1959. I have been mainly active in DX chasing on c.w. with a good deal of contest work thrown in for good measure. Much of my DX'ing has been done with center-fed zepps and dipoles. Of my 316 countries, over 300 were with this type of antenna. At present my antenna system consists of a Mosley Classic 33 tribander on a 40 ft. tower. I use the tower to support inverted Vee's, zepps for the lower bands. My QTH is on a city lot about 150′ x 60′. Until recently, I always ran under 100 watts, and I still use low power except for chasing new countries or while putting in a concerted contest effort.

My first QRPp activity was in the mid-60's while a student at Michigan State University. The club station, W8SH, had an excellent 20m beam. One day when I had a large pile-up of Europeans calling me, I cranked the Collins 32S3 down to 5 watts output. Amazingly, the Europeans were still calling me, and even an EP2 called in to say that I was getting into Iran very well! My QRPp activity was shelved until the summer of 1973 when I built a Heathkit HW-7. Within a couple of weeks I had worked about 20 states on 40 meters, but the contacts were very difficult to make and I found myself losing interest rapidly. It was not until some time later that I discovered that the HW-7 had a bug in it, and that my difficulty was understandable in view of the fact that I was running less

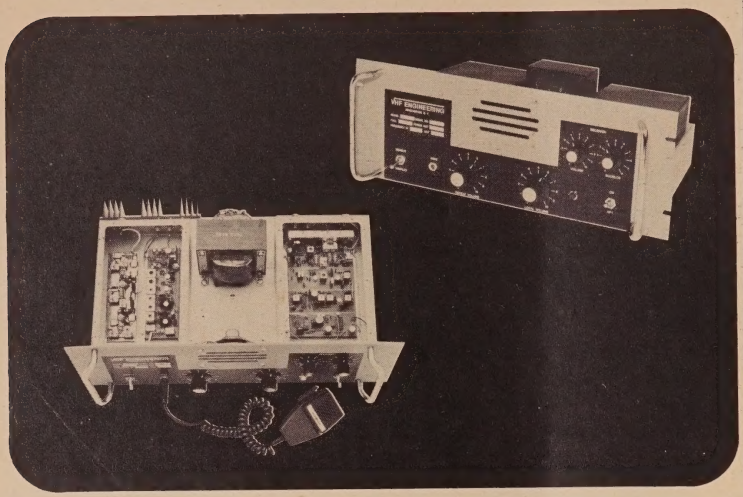
*(Continued on page 72)*



*K8MFO at his operating position.*

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Tufts Radio Electronics, Medford, MA

MICHIGAN
Harry G. Crofts, Northville, MI
Adams Distributing Co., Detroit, MI
Radio Supply & Engineering, Detroit, MI

MISSISSIPPI
Communications Services, Philadelphia, MS

MISSOURI
Alpha Electronic Labs, Columbia, MO

NEVADA
Vegas Radio, Las Vegas, NV

NEW YORK
Barry Electronics, New York, NY
CFP Enterprises, Horseheads, NY
COSYSCO, Inc., Sodus, NY
Delmar Electronics, W. Babylon, L.I., NY
Loffler Electronics, Ogdensburg, NY
VHF Communications, Jamestown, NY
W. Spindler Elec. Service, Rome, NY

NORTH CAROLINA
Vickers Electronics, Durham, NC

NORTH DAKOTA
CDS Electronics, Emerado, ND

OKLAHOMA
Derrick Electronics, Inc., Broken Arrow, OK
Radio Store, Inc., Oklahoma City, OK

SOUTH DAKOTA
Burghardt Amateur Center, Watertown, SD

TEXAS
Teco Electronics, Garland, TX

VIRGINIA
Radio Communications Co., Roanoke, VA

WASHINGTON
A-B-C Communications, Seattle, WA

WEST VIRGINIA
Communication Systems Co., Ripley, WV

WISCONSIN
Amateur Electronic Supply, Milwaukee, WI
Communications Elec's., Fond du Lac, WI

WYOMING
Rule Communications, Laramie, WY

CANADA
Ayre's Ltd., St. Johns, Nfld. A1B 1W3
Traeger Distributors Ltd., Canada V7J1K4

PUERTO RICO
Edison Electronics, Inc., Santurce, PR

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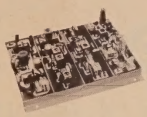
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MAY 1977

# Vhf engineering

36 NEW PRODUCTS

## THE WORLD'S MOST COMPLETE LINE OF VHF-FM KITS AND EQUIPMENT

### RECEIVERS



| | | |
|---|---|---|
| RX28C | 28-35 MHz FM receiver with 2 pole 10.7 MHz crystal filter | $ 59.95 |
| RX28C W/T | same as above—wired & tested | 104.95 |
| RX50C Kit | 30-60 MHz rcvr w/2 pole 10.7 MHz crystal filter | 59.95 |
| RX50C W/T | same as above—wired & tested | 104.95 |
| RX144C Kit | 140-170 MHz rcvr w/2 pole 10.7 MHz crystal filter | 69.95 |
| RX144C W/T | same as above—wired & tested | 114.95 |
| RX220C Kit | 210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter | 69.95 |
| RX220C W/T | same as above—wired & tested | 114.95 |
| RX432C Kit | 432 MHz rcvr w/2 pole 10.7 MHz crystal filter | 79.95 |
| RX432C W/T | same as above—wired & tested | 124.95 |

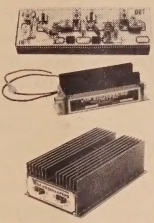
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|---|---|---|
| RXCF | accessory filter for above receiver kits gives 70 dB adjacent channel rejection | 8.50 |
| RF28 Kit | 10 mtr RF front end 10.7 MHz out | 12.50 |
| RF50 Kit | 6 mtr RF front end 10.7 MHz out | 12.50 |
| RF144D Kit | 2 mtr RF front end 10.7 MHz out | 17.50 |
| RF220D Kit | 220 MHz RF front end 10.7 MHz out | 17.50 |
| RF432 Kit | 432 MHz RF front end 10.7 MHz out | 27.50 |
| IF 10.7F Kit | 10.7 MHz IF module includes 2 pole crystal filter | 27.50 |
| FM455 Kit | 455 KHz IF stage plus FM detector | 17.50 |
| AS2 Kit | audio and squelch board | 15.00 |

### TRANSMITTERS



| | | |
|---|---|---|
| TX50 | transmitter exciter, 1 watt, 6 mtr | 39.95 |
| TX50 W/T | same as above—wired & tested | 59.95 |
| TX144B Kit | transmitter exciter—1 watt—2 mtrs | 29.95 |
| TX144B W/T | same as above—wired & tested | 49.95 |
| TX220B Kit | transmitter exciter—1watt—220 MHz | 29.95 |
| TX220B W/T | same as above—wired & tested | 49.95 |
| TX432B Kit | transmitter exciter 432 MHz | 39.95 |
| TX432B W/T | same as above—wired & tested | 59.95 |
| TX150 Kit | 300 milliwatt, 2 mtr transmitter | 19.95 |
| TX150 W/T | same as above—wired & tested | 29.95 |

### POWER AMPLIFIERS



| | | |
|---|---|---|
| PA2501H Kit | 2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors | 59.95 |
| PA2501H W/T | same as above—wired & tested | 74.95 |
| PA4010H Kit | 2 mtr power amp—10w in—40w out—relay switching | 59.95 |
| PA4010H W/T | same as above—wired & tested | 74.95 |
| PA50/25 Kit | 6 mtr power amp, 1w in, 25w out, less case, connectors & switching | 49.95 |
| PA50/25 W/T | same as above, wired & tested | 69.95 |
| PA144/15 Kit | 2 mtr power amp—1w in—15w out—less case, connectors and switching | 39.95 |
| PA144/25 Kit | same as PA144/15 kit but 25w | 49.95 |
| PA220/15 Kit | similar to PA144/15 for 220 MHz | 39.95 |
| PA432/10 Kit | power amp—similar to PA144/15 except 10w and 432 MHz | 49.95 |
| PA140/10 W/T | 10w in—140w out—2 mtr amp | 179.95 |
| PA140/30 W/T | 30w in—140w out—2 mtr amp | 159.95 |

Blue Line . . . RF power amp, wired & tested, emission—CW-FM-SSB/AM

| Model | Frequency | Power Input | Power Output | |
|---|---|---|---|---|
| BLB 3/150 | 45- 55MHz | 3W | 150W | TBA |
| BLC 10/70 | 140-160MHz | 10W | 70W | 139.95 |
| BLC 2/70 | 140-160MHz | 2W | 70W | 159.95 |
| BLC 10/150 | 140-160MHz | 10W | 150W | 259.95 |
| BLC 30/150 | 140-160MHz | 30W | 150W | 239.95 |
| BLD 2/60 | 220-230MHz | 2W | 60W | 159.95 |
| BLD 10/60 | 220-230MHz | 10W | 60W | 139.95 |
| BLD 10/120 | 220-230MHz | 10W | 120W | 259.95 |
| BLE 10/40 | 420-470MHz | 10W | 40W | 139.95 |
| BLE 2/40 | 420-470MHz | 2W | 40W | 159.95 |
| BLE 30/80 | 420-470MHz | 30W | 80W | 259.95 |
| BLE 10/80 | 420-470MHz | 10W | 80W | 289.95 |

### POWER SUPPLIES



| | | |
|---|---|---|
| PS15C Kit | 15 amp--12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection | 79.95 |
| PS15C W/T | same as above—wired & tested | 94.95 |
| PS25C Kit | 25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and ovp | 129.95 |
| PS25C W/T | same as above—wired & tested | 149.95 |
| PS25M Kit | same as PS25C with meters | 149.95 |
| PS25M W/T | same as above—wired & tested | 169.95 |

| | | |
|---|---|---|
| O.V.P. | adds over voltage protection to your power supplies, 15 VDC max. | 9.95 |
| PS3A Kit | 12 volt—power supply regulator card with fold-back current limiting | 8.95 |
| PS3012 W/T | new commercial duty 30 amp 12 VDC regulated power supply w/case, w/fold-back current limiting and overvoltage protection | 239.95 |

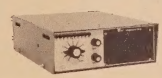
### REPEATERS



| | | |
|---|---|---|
| RPT50 Kit | repeater—6 meter | 465.95 |
| RPT50 | repeater—6 meter, wired & tested | 695.95 |
| RPT144 Kit | repeater—2 mtr—15w—complete (less crystals) | 465.95 |
| RPT220 Kit | repeater—220 MHz—15w—complete (less crystals) | 465.95 |
| RPT432 Kit | repeater—10 watt—432 MHz (less crystals) | 515.95 |
| RPT144 W/T | repeater—15 watt—2 mtr | 695.95 |
| RPT220 W/T | repeater—15 watt—220 MHz. | 695.95 |
| RPT432 W/T | repeater—10 watt—432 MHz. | 749.95 |
| DPLA50 | 6 mtr close spaced duplexer | 575.00 |

| | | |
|---|---|---|
| DPLA144 | 2 mtr, 600 KHz spaced duplexer, wired and tuned to frequency | 379.95 |
| DPLA220 | 220 MHz duplexer, wired and tuned to frequency | 379.95 |
| DPLA432 | rack mount duplexer | 319.95 |
| DSC-U | double shielded duplexer cables with PL259 connectors (pr.) | 25.00 |
| DSC-N | same as above with type N connectors (pr.) | 25.00 |

### TRANSCEIVERS



| | | |
|---|---|---|
| TRX50 Kit | Complete 6 mtr FM transceiver kit, 20w out, 10 channel scan with case (less mike and crystals) | 249.95 |
| TRX144 Kit | same as above, but 2 mtr & 15w out | 219.95 |
| TRX220 Kit | same as above except for 220 MHz | 219.95 |
| TRX432 Kit | same as above except 10 watt and 432MHz | 254.95 |
| TRC-1 | transceiver case only | 19.95 |
| TRC-2 | transceiver case and accessories | 39.95 |

### SYNTHESIZERS



| | | |
|---|---|---|
| SYN II Kit | 2 mtr synthesizer, transmitt offsets programmable from 100 KHz—10 MHz, (Mars offsets with optional adapters) | 169.95 |
| SYN II W/T | same as above—wired & tested | 239.95 |
| MO-1 Kit | Mars/cap offset optional | 2.50 |
| TO-1 Kit | 18 MHz optional tripler | 2.50 |

### WALKIE-TALKIES



| | | |
|---|---|---|
| HT 144B Kit | 2 mtr, 2w, 4 channel, hand held receiver with crystals for 146.52 simplex | 129.95 |
| NICAD | battery pack, 12 VDC, ½ amp. | 29.95 |
| BC12 | battery charger for above | 5.95 |
| Rubber Duck | 2 mtr, with male BNC connector | 8.95 |

### OTHER PRODUCTS BY VHF ENGINEERING

| | | |
|---|---|---|
| CD1 Kit | 10 channel receive xtal deck w/diode switching. | $ 6.95 |
| CD2 Kit | 10 channel xmit deck w/switch and trimmers | 14.95 |
| CD3 Kit | UHF version of CD1 deck, needed for 432 multi-channel operation | 12.95 |
| COR2 Kit | carrier operated relay | 19.95 |
| SC3 Kit | 10 channel auto-scan adapter for RX with priority | 19.95 |
| Crystals | we stock most repeater and simplex pairs from 146.0-147.0 (each) | 5.00 |
| CWID Kit | 159 bit, field programmable, code identifier with built-in squelch tail and ID timers | 39.95 |
| CWID | wired and tested, not programmed | 54.95 |
| CWID | wired and tested, programmed | 59.95 |
| MIC I | 2,000 ohm dynamic mike with P.T.T. and coil cord | 12.95 |
| TS1 W/T | tone squelch decoder | 59.95 |
| TS1 W/T | installed in repeater, including interface accessories | 89.95 |
| TD3 Kit | 2 tone decoder | 29.95 |
| TD3 W/T | same as above—wired & tested | 39.95 |
| HL144 W/T | 4 pole helical resonator, wired & tested, swept tuned to 144 MHz ban | 24.95 |
| HL220 W/T | same as above tuned to 220 MHz ban | 24.95 |
| HL432 W/T | same as above tuned to 432 MHz ban | 24.95 |


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# Math's Notes

## A look at the technical side of things

In the March 1977 installment of this column, we described a simple 3½ digit DVM from Siliconix that could be built with a small complement of components for considerably less cost than commercial units. Since that time we have received many letters on the subject and when we became aware of an even simpler IC DVM, also from Siliconix, we thought that this information would be useful to our many readers.

The DVM to be described this month is a 3 digit unit which means that the maximum count is "999." The circuit consists of an analog to BCD converter chip, and a BCD to seven segment decoder chip—that's all. The converter chip, the Siliconix LD130CJ, is an 18 pin dual-inline package that converts an analog input voltage (of any polarity) to a multiplexed BCD output which are fully compatible with standard CMOS logic. Typical accuracy of conversion is ±0.1% ±1 count.

*5 Melville Lane, Great Neck, NY 11020.

Fig. 1 is a functional schematic of the DVM but since there are various considerations in construction as well as certain circuit details, it is recommended that you write for the LD130CJ data sheet before attempting to build an actual unit. The address is: SILICONIX, 2201 Laurelwood Road, Santa Clara, California 95054. The circuit can be operated from a ±5V supply or a single ended 10V supply if so desired. Power dissipation is only 26 mw so battery life would be good. Cost in 100 quantities for the LD130CJ is only $8.75 each while the Fairchild 9368 decoder is considerably less.

For our second item this month, we came across a very interesting integrated circuit manufactured by the Siemens Components Group, 186 Wood Avenue South, Iselin, New Jersey 08830. This device, their UAA-180, is an LED Bar Graph Display Driver. What this chip does, is drive a 12 LED array as a bar graph display from an analog input voltage. This type of readout would be an interesting departure from the meters, etc. used for tuning applications, instrumentation, display, etc.

The recommended circuit to get used to the device is given in fig. 2. Here, the value of $R_2$ determines the brightness of the display while the value of R, determines the length of the light bar (or how many LEDs light). A data sheet from Siemans will give operating information and when requesting one, also ask for the UAA-170 companion data sheet. This device switches lamps sequen-

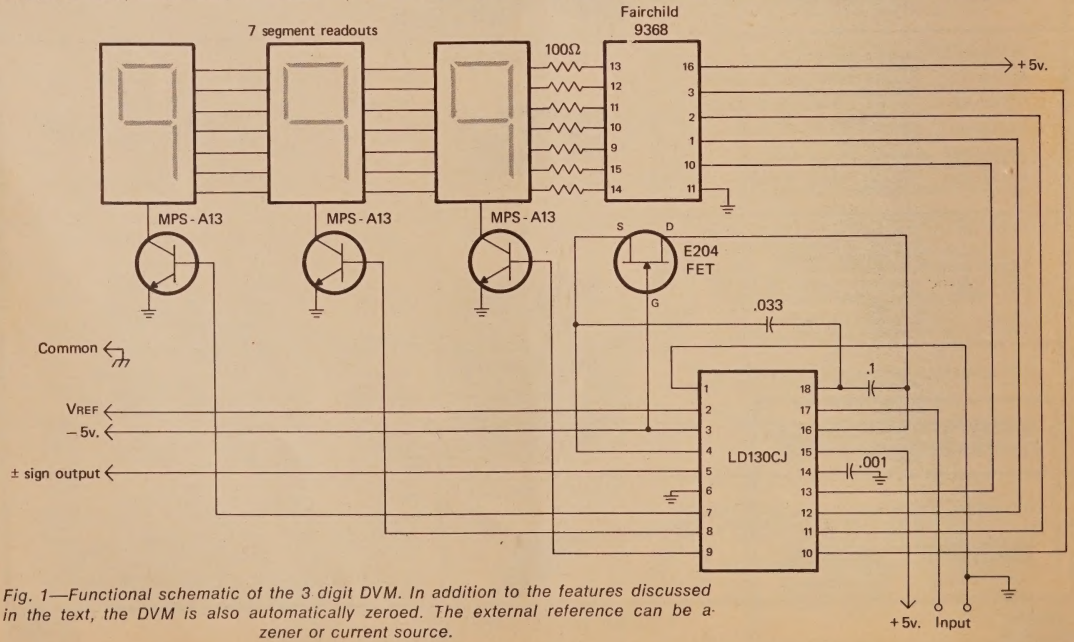



*Fig. 1—Functional schematic of the 3 digit DVM. In addition to the features discussed in the text, the DVM is also automatically zeroed. The external reference can be a zener or current source.*

tally, one lamp at a time, instead of in bar graph fashion.

At this time we would like to point out that many of the details in operation and circuitry of the many integrated circuits that we discuss in Math's Notes are not always given due to lack of space. A short courteous letter to the manufacturer of the device in question will almost always bring a comprehensive data sheet and, in many cases a multiple page application note that will not only answer the question in mind, but will give many additional applications and information. As a result, it is strongly advised that before any circuitry is attempted with any but the most familiar chips, you always obtain the manufacturer's information.

To aid in this we always give appropriate addresses in our columns, and are concluding this column with a list of the more requested addresses by our readers.

**Amperex Electronic,** Solid State & Active Devices Div. Providence Pike, Slatersville, RI 02876

**Crystalonics Div., Teledyne, Inc.,** 147 Sherman St., Cambridge, MA 02140

**Delco Electronics Div. General Motors Corp.** Dept. 5146, 700 E. Firmin St., Kokomo, IN 46901

**E C C Corp.,** 1011 Pamela Dr., Euless, Texas 76039

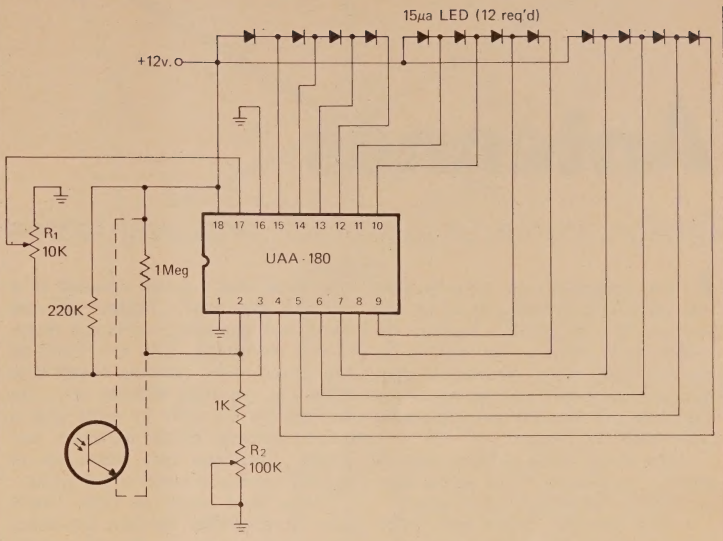



*Fig. 2—Schematic of Bar-Graph I.C. discussed in text by adding a phototransistor, as shown in dotted lines, the brightness will vary in accordance with ambient lighting conditions.*

**Fairchild Semiconductor,** 464 Ellis St., Mountain View Calif. 94040

**General Electric,** 7 Electronic Park, Syracuse, N.Y. 13201

**International Rectifier,** Semiconductor Div., 233 Kansas St., El Segundo, California 90245.

**Motorola Semiconductor Products,** P.O. Box 20912, Phoenix Ariz. 85036

**National Semiconductor,** 2900 Semi-

*(Continued on page 73)*

# RM2846 — A NEW COMMUNITY EDUCATIONAL RADIO FIXED SERVICE AND YOUR NEED TO ACT ON IT

The FCC has assigned RM-2846 to a petition for a new multiple access "Community Educational Radio Fixed Service" (CERFS) and issued a public notice requesting comments from interested parties by June 13, 1977.

This petition calls for the use of cost effective frequencies in the 470 to 930 MHz band with preference being given to television channels 70 through 83 (806 to 890 MHz). Unattended repeaters (translators), located on high places, would pick up low power sound and/or picture signals from remote terminals and rebroadcast them to cover an entire community within a service radius to 35 miles or greater. The sound and picture could be picked up on selected UHF channels on a home TV set. The petition further proposes the use of "Communicasting" which can be defined as the use of co-channel multilateral communication to educate the participants as well as a listening/viewing audience.

By locating remote terminals in schools, universities, community centers, libraries, hospitals, industrial plants, homes, etc. electronic classrooms, lecture halls and forums can provide an open community telecommunications network for educational, public service and social service uses. Educators and others, throughout the country, should recognize the potentials of such a powerful tool which can both improve the quality of education and significantly reduce costs.

The petition was filed on January 24, 1977 by the Center for Advanced Study in Education (CASE) of the graduate school, City University of New York and the Communicasting Association of America as co-sponsors.

Comments (an original and five copies preferred) should be sent to the Federal Communications Commission, Washington, DC, 20554 referencing RM-2846.

Further information may be obtained from the following:

Dr. Lee Cohen, Director IRDOE, Center for Advanced Study in Education, Graduate School and University Center of the City of New York, 33 West 42nd Street, New York, NY 10036, (212) 221-3895, 3896.

S. Edwin Piller, President, Communicasting Assoc. of America, 8 Birchwood Park Drive, Syosset, NY 11791, (516) 938-5661.

*a monthly feature by*

**WILLIAM I. ORR, W6SAI**

# Antennas

## Design, construction, fact, and even some fiction

I have observed from time to time that my friend Pendergast is an unpredictable creature. Today, he looked quite content, his feet up on the operating table, smoking a pipe (unusual for him) as he surveyed his log book and thought about the just-completed DX contest.

"Like a hot knife cutting through butter," he mused. "This is the best score that I've racked up in years."

A new thought struck him. "Too bad the old timers didn't have rotary beams," he remarked. "A good 6-element Long John on a 55-foot boom really works wonders on 20 meters."

"Well, we had beams in the good old days," I replied. "Why should you think that a beam antenna is a modern invention? I'll admit the real old-timers got along without a beam —and did pretty well, too. Look at this photo of the antenna of 9BCV in 1924 (fig. 1). He's WØLFH now. He worked his DX with 10 watts and a cage antenna slung between two poles. The cage was made up of bicycle rims soldered to the wires.

"Now jump ahead to 1936. That's only 12 years later. By then, the rotary beam was in use on the 10 and 20 meter bands. Here's a sketch of a popular design (fig. 2). This little beam was only a quarter-wavelength on a side. The pattern was bidirectional, in and out of the drawing. Actually, the antenna is composed of two half-wavelength wires, bent back upon themselves at the end and voltage fed out-of-phase with a transmission line section. A sort of miniature W8JK beam, if you will.

"The beam was called the *Signal Squirter* and provided about 3 dB gain over a dipole."

"That's not very much gain," observed Pendergast.

"True," I replied. "But it *is* very effective when there are very few beams around. And it provided a simple and inexpensive design whereby the amateur could get his antenna up in the clear. Look at fig. 3. This is a photograph of the Signal Squirter that I erected in 1936. I used it for a year or two, then sold it to a friend who used it for many happy years of DX. It was built around a framework used to support a clothesline. Do you remember the old rotary clotheslines that were in everybody's back yard until the electric clothes dryer came along? Well, the rotary clothes dryer framework, plus bamboo extension arms made up the structure, strengthened with strips of wood at the midpoint of the arms. The antenna wire was strung around the outer tips. A quarter-wave transformer section was used, and the feedline was the famous, old EO-1 twin-wire transmission line."

Pendergast eyed the dim photograph. "That design isn't half bad," he admitted. A gadget built like the antenna in fig. 2 would make a nifty antenna for ten meters—only about 8 feet on a side. And you could feed the quarter-wave transformer section with a coaxial line and a balun."

"That's right," I replied. "It proves there's nothing new under the sun."

My friend placed the sketch in his pocket and glanced over at the pile of mail on the desk.

"What do our buddies out in radioland have to say for themselves?" he asked, as he started to leaf through the letters.

"Look at the interesting letter from Sam, W4BUD. He's got an antenna that is not widely used and has had a lot of luck with it. The original version was called a *Groundpole* antenna which was designed by W6MUR and was shown in the April, 1959 issue of *QST*.

"The antenna consists of two vertical whips, connected together at the top and spaced about 50 feet apart (fig. 4). One whip is grounded at the base (the high current point) to a set of radial wires. The second whip is fed with a 50 ohm line at the base. Each whip has an adjustable loading coil at the base and the coils are adjusted to provide the lowest value of s.w.r. on the transmission line.

"Sam says he can tune the antenna up on both 40 and 80 meters by adjusting the coils. He says it works as well, or better, than a trap dipole at the same height and is small enough to fit into his back yard."

Pendergast eyed the drawing thoughtfully, then he said, "It seems to me that the point of maximum current can be varied in position along the wire by adjusting the variable inductors. I remember an old *QST* article by John Reinartz, W1QP, where he showed an antenna which had a variable angle of radiation. He moved the current points up and down a vertical wire and out along a horizontal wire to achieve the

*48 Campbell Lane, Menlo Park, CA 94025.



*Fig. 1—Old timers worked DX with a simple cage antenna. This is the cage of 9BCV (now WØLFH). In 1924 9BCH had a 10 watt, loop modulated phone transmitter. He tried to work Chicago with it and never did . . . which was pretty good DX for those days.*

angle of radiation he wanted."

"I remember that, too," I admitted. "It must have been about 1936. Well, it would be interesting to play with an antenna of this type and see if it is possible to vary the angle of radiation by moving the maximum current from the vertical whips into the horizontal wire. Maybe Sam will try this experiment and let us know."

Pendergast held up a magazine that he had pulled out of the pile of mail. "Here's an article about another interesting combination of horizontal and vertical polarization. It's in the January, 1977 issue of *Radio Communication,* that great magazine of the Radio Society of Great Britain. It describes the antenna of F0AXP who wrote it up in the German magazine *QRV. . .*"

"From *QRV* to *Radio Communication* to *CQ,* eh?" Pendergast interrupted himself. "It sounds as if there's a lot of incest in the antenna game."

I ignored his thrust and said, "The antenna seems to be a 'half-Quad.' It is 'upside-down' as far as the W4BUD antenna is concerned. That is, the ends of the wire closest to the ground have maximum voltage and maximum voltage at the middle of the horizontal wire (fig. 5). The antenna is end-fed with a quarter-wave transformer from a coaxial line. The points of maximum current fall at the tops of the vertical sections."

"What kind of radiation pattern does it have? Is it horizontally or vertically polarized," asked Pendergast as he sketched the antenna in his laboratory notebook.

"Beats me," I replied. "You have high current in both the horizontal and vertical sections. Why don't you build one up and find out instead of asking me?"

Pendergast gestured at the magazine, laying open on the desk. "This whole family of inverted antennas really derives from the long-forgotten *Chireix-Mesny* antenna, named after the two French radio engineers who designed beam antennas in the early *twenties* (fig. 6). In this beam antenna, the half-wave dipole elements are arranged in the form of sawteeth, rather like an array of large Quad elements. Each dipole element is driven directly by the one preceding it. This array is large for the high frequency amateur bands, but might well be worth investigating for v.h.f. work. From the point of view of the radiated field, this arrangement is equivalent to an array of parallel dipoles."

"That's right," I replied. "Look at fig. 7. This is one element of the

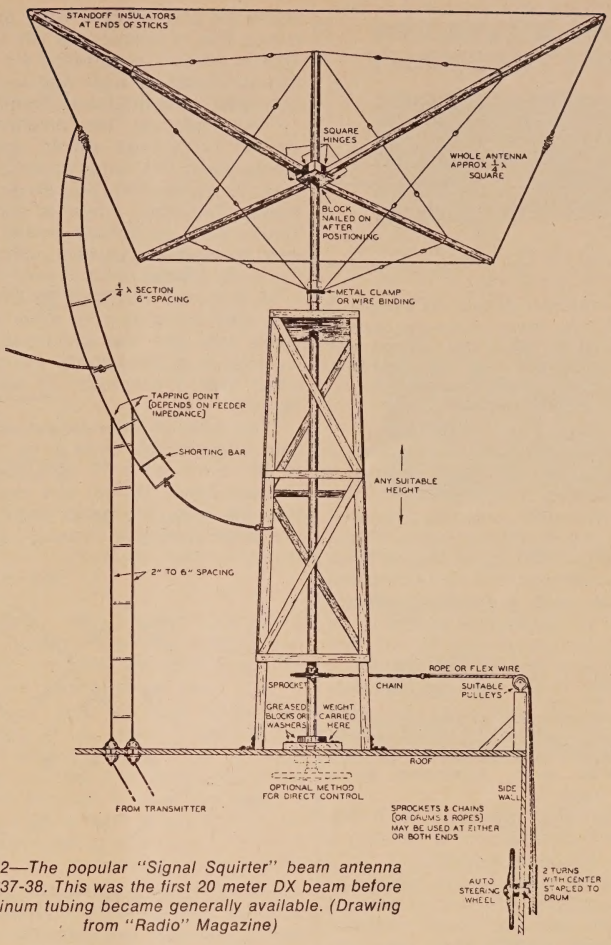



*Fig. 2—The popular "Signal Squirter" beam antenna of 1937-38. This was the first 20 meter DX beam before aluminum tubing became generally available. (Drawing from "Radio" Magazine)*

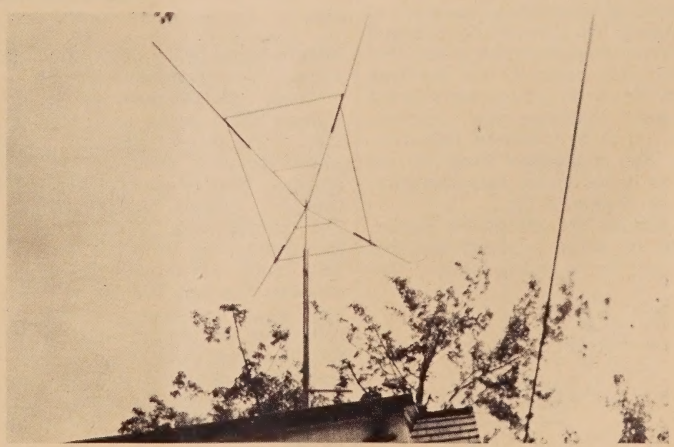


*Fig. 3—The "Signal Squirter" beam at W2HCE in 1936. The bidirectional beam provided 3 or 4 dB gain which was enough to make the signal head and shoulders above most of the other DXers on the band! Sold to W2DQT in 1938, the beam provided many more years of good DX until it was destroyed in a hurricane shortly after World War II.*

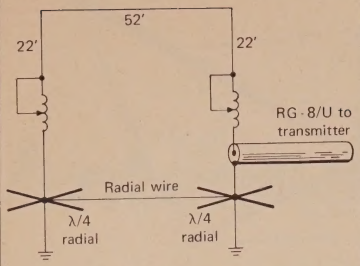



*Fig. 4—The twin Groundpole antenna of W4BUD. Two whips connected together at the top provide a loop antenna with one side at ground level. Adjustable loading coils provide plenty of room for experimentation.*

*Chireix-Mesny* array. Do you recognize it? It is an end-fed inverted-V antenna. This is a single band, vertically polarized antenna. The stub can be fed in any conventional manner. Ted, ZS6BT, uses two of these simple antennas, one on 14 MHz and the other (with a V-shaped reflector spaced 0.1 wavelength behind it) on 28 MHz. He reports that the inverted-V design is roughly equivalent to a half-wave vertical antenna, but appears to be less noisy and less prone to fading on reception. On 10 meters, he has a vertically-polarized broadside beam, supported by a single mast."

"Interesting," remarked my friend. "*Radio Communication* is certainly a fine magazine. I enjoy it!"

"One more item in the same publication. G3LHZ has been doing a lot of work with the Quad antenna, along with G8IBQ. They have developed an interesting variation of the Quad loop. Look at fig. 8, which illustrates three versions of the center-fed loop antenna. The first type (a) is familiar to vhf operators as the so-called "skeleton slot" antenna. Type (c) is a three-wire folded dipole. And in between these two extremes is the square loop configuration of illustration (b).

"Because this antenna is square, it can be driven symmetrically, that is, from the opposite points. This solves the problem of different polarization that is required on 144 MHz. That is, vertical polarization for f.m. and horizontal for s.s.b. And circular polarization for the Oscar Satellite.

"Well, because the antenna is square, no voltage should appear across points A-A[1] when power is applied to points X-X[1] (fig. 9). And it follows that when power is applied across Y-Y[1], no voltage should appear across the equivalent points on the vertical sides.

"A test loop was built by G3LHZ and, after adjusting it for exact symmetry, the idea was confirmed, as an isolation of 30 to 40 dB was measured over a bandwidth of several percent.

"The radiation resistance of either pair of inputs was found to be close to 300 ohms, so a 75 ohm coaxial line and balun (fig. 10) was used to feed the loop. The balun length (L) is a half-wavelength, allowing for the velocity factor of the cable, which is about 0.67 for the ordinary types.

"Next, G3LHZ built up a 10-element Quad based upon this design. It was built of #14 wire loops suspended on a bamboo pole. The reflector and directors were conventional 2-meter Quad elements. The reflector was 22 inches on a side and spaced 15 inches from the new Quad, which was the driven element. The first director had 19.5 inch sides, the second director 19 inch sides, the third to eighth directors 18.5 inch sides, with all directors spaced at 15 inch intervals from the driven element. The overall boom length was about 11 feet, three inches.

"The s.w.r. was about 1.2-to-1 at the center of the 144 MHz band when a 50 ohm transmission line was used, the parasitic elements tending to lower the radiation resistance of the Quad loop. It was found that the antenna input was slightly reactive and a small variable capacitor of about 4 pF was necessary across one set of terminals. This may have been due to the construction of the array, as the capacitor was needed on one set of terminals only.

"Once the antenna was matched up, it was compared against an 8-element Yagi which had a gain of 9.5 dB. The new Quad design proved to be better by 4 to 5 dB using both a calibrated signal generator and reception of 144 MHz beacon signals."

"This sounds like a great v.h.f. antenna," remarked Pendergast, as he made a graceful drawing of the antenna array in his notebook. "I wonder why more v.h.f. amateurs don't use the Quad antenna?"

"More and more are using it," I replied. "One moon-bounce enthusiast, K6YNB, has an array of six-teen, 3-element Quads that is a real block-buster."

"How does G3LHZ switch polarization?" asked Pendergast.

"He has a relay placed at the antenna," I replied. "But he's going to try circular polarization next, feeding each input with equal power, with a phase shift of 90 degrees between the inputs. This can be easily obtained with a quarter-wavelength section of feedline. Each set of inputs to the Quad loop would then

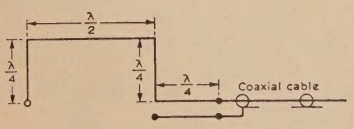



*Fig. 5—The half-loop antenna of F0AXP. The wire is one wavelength long, voltage fed at one end with a quarter-wave stub and coaxial line. (Drawing from "Radio Communication")*

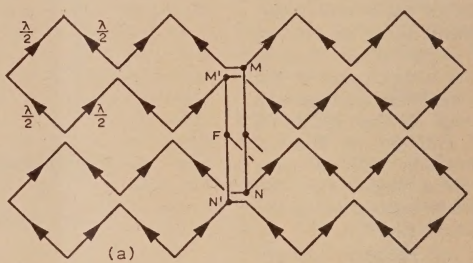



*Fig. 6—The Chireix-Mesny beam antenna is made of dipoles arranged in the form of diamonds. Each leg is a half-wavelength long. The array is fed at the center with a short double-ended stub. The pattern is vertically polarized, in and out of the page. (Drawing from "Radio Communication")*

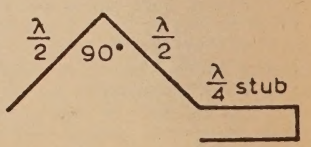



*Fig. 7—The simple antenna of Ted, ZS6-BT. (Drawing from "Radio Communication")*

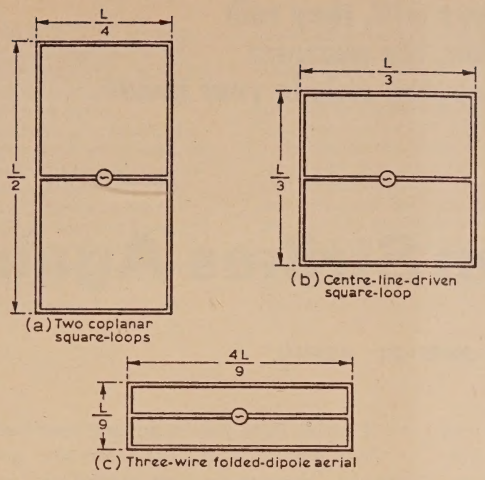



*Fig. 8—Three variations of the Quad loop. At (a) is the so-called "skeleton slot" v.h.f. antenna composed of two "Quad" loops having a common feed point. At (b) is a square loop, one-third wavelength on a side. At (c) is a three wire folded dipole. All are "cousins under the skin."*

have to be adjusted for exactly 50 ohms. G3LHZ found that he could increase the radiation resistance at the feedpoints by up to 25 percent by making the driven loop about 12 percent larger on a side. And he could tune either input to a chosen resonant frequency by placing a small shunt capacitor across the input terminals. So the design is very flexible as far as adjustment goes. It would appear that this unusual driven element could be substituted for the conventional driven element in a v.h.f. Quad with little trouble.

"You must remember, however, that in any Quad design—h.f. or v.h.f.—while the driven Quad loop is relatively broadband, the parasitic element loops are by comparison much more narrowband. Because of this, antenna gain and front-to-back ratio are only maintained over the relatively narrow band over which the parasitic elements operate correctly. And this restriction holds true for the Yagi antenna, too."

"Well, darn it," said Pendergast, shifting in his chair, "I like to work c.w. at 144.0 MHz, s.s.b. at 145.1 MHz and also f.m. at the top of the band. How do I cover the whole 2 meter band with a beam and get good power gain and good front-to-back ratio across the whole band?"

"It isn't easy," I admitted. "One of the best antenna designs that actually accomplishes this is the so-called LPY (log periodic Yagi) design. The LPY beam will provide good gain, good front-to-back and low s.w.r. across the whole 2 meter band. I hope to discuss this unusual antenna in a forthcoming column."

"You do that!" retorted my friend. "Now that amateurs are spreading out across the 2 meter band, there's activity from one end to the next. And a good, wideband beam antenna is a great comfort when you zip from one end of the band to the other!"

* * *

**Note:** Information about *Radio Communication* magazine may be obtained from the Radio Society of Great Britain, 35 Doughty St., London, WC1N-2AE. Additional information on the K6YNB multi-Quad, 144 MHz beam can be obtained by writing: Amateur Service Department, EIMAC division of Varian, 301 Industrial Way, San Carlos, CA 94070. Ask for Amateur Service Bulletin 49-15. ■

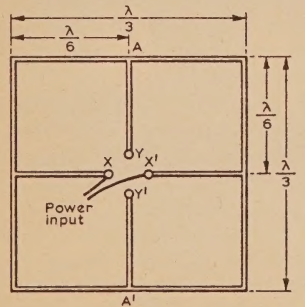
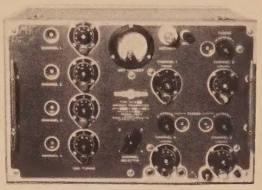



*Fig. 9—The "one-third wavelength loop" arranged for either vertical or horizontal polarization.*


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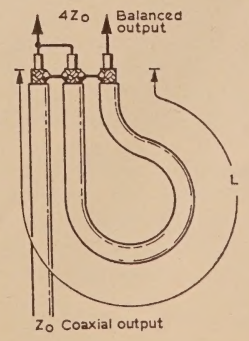



*Fig. 10—The four-to-one coaxial balun. Length (L) is 0.67 of a free space half-wavelength. (Illustrations of Fig. 8 thru 10 are from "Radio Communications").*

***Pete and Alf meet for lunch. As guys will, they talk of important things like food, drink, the waitress and copying code in your head. Copying code in your head? Yes, read on.***

# The Phantom Strikes Again

BY AL D'ONOFRIO*, W2PRO

The two pushed their way to the back of the Blarney Stone, now packed three deep at the bar, and took seats at a small table in the rear, among a similarly dressed luncheon crowd trying to wolf down a sandwich and brew before returning to their glass walled nine-to-five prisons.

A petite waitress with flaming red hair, puffing hard from trying to cope with the crush, smiled weakly and tossed two soiled menus before them.

"How's the pastrami, Franny?" But catching a look of building annoyance in her face, quickly answered: "Pastrami's Okay with me . . . how's with you Alf?"

"Great with me, Pete; we only had it here yesterday," he answered, smiling, "but they sure give you a sandwich."

"And two very cold steins . . . and we're in a hurry, Fran, so if . . ."

She whipped the two menus away and was soon gone in the direction of the deli, which flanked a side of the bar.

"She dresses like 20, admits to 30, and is probably pushing 40, from the wrong side," said Pete.

"So what's wrong with 40? It was my best year, as I recall . . . for several years, in fact." The two broke into smiles amid their own recollections.

"Well, Alf, I finally did it . . . yesterday," said his co-worker of more than a score of years, beaming with delight at his innermost secret about to be revealed to a waiting world.

"What? You've decided to quit and punch old Sternman in the gut; to leave all your trading stamps to the society of wayward female hams; or to run away with Frannie to the hinterlands of Staten Island? You're not getting any younger."

"Come to think, all three seem to have a certain basic animal appeal to me . . . but if I had to choose . . ."

Fran swished by the table, smacking down two large frosty steins and giving Pete an affectionate smile: "Be right back, good looking."

*1537 Central Park Ave., Yonkers, N.Y. 10710

"Careful, Pete. You're spilling your beer."

They sipped their beer, cold and golden, while furtively sneaking a side glance at Fran's fleeting departure to the deli.

"As I was saying, Alf, I finally did it. I went for the extra exam last week—the day you thought I had a 24-hour virus—and just got a notice in the mail that I passed. I'm an extra now!"

"Why you old fox, holding out like that. Why didn't you say something sooner."

"I flunked last time out, remember?"

"Oh, did you?"

"Don't give me that. You gave me the needle for a week; so I thought I'd play it smart and keep quiet." "Well, congratulations. You can celebrate by buying the beer."

"Just to show you I'm a sport, I'll pick up the whole tab. I haven't forgot the little tips you gave me over the past couple months on copying on paper. Like the one about writing each letter separately and in easy, big letters to cut the tension . . . it really works."

"Another good one is that of shutting your eyes for a second or two, periodically, whenever you feel yourself getting tensed up, and copying by dead-reckoning. It's an old trick, like another one where you use your left hand to cover up what you've just written down so you can't read it, to keep your mind from wandering and losing the beat. Any little trick that helps you stay relaxed while copying is worth trying."

Fran glided to an abrupt stop and plopped two generous-sized sandwiches before them. Get you two more beers?" she asked. Pete nudged his glass toward her and smiled. She scooped up the steins and was gone in a breath.

"She should try out for the Olympics," mused Alf. They nodded and tackled their juicy sandwiches with gusto. "Say, how come she always gives you three pickles and me only one?"

Pete just snapped off one half a pickle and studied the problem thoughtfully.

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"I really couldn't say," said Pete, wiping his mouth with his free hand. "They sure turn out a terrific pastrami."

"You never have more than one pickle, and I'm always asking you for yours and she..."

"Maybe I'll get a two letter call now," mused Pete. "What do you think?"

"Why? What's wrong with your call?" He reached over and snatched a pickle from his friend's dish.

"Nothing, really. I've had it for better than 35 years now. I was just thinking of an *update,* so to speak.

"How long you and Ginny been married?"

"Thirty-two years this November.

"You thinking of *updating* her, too?"

Pete broke into a broad smile: "No, I guess not this trip. Maybe I'll keep both," and happily munched away on his sandwich. "I'm sure glad I passed that Extra; now I can stop worrying about increasing my code speed. I can't write too well at twenty words a minute anyway."

"Who bothers to write it all down? An Extra shouldn't have to write anything down in a rag-chew QSO except for the logbook."

"Well, I don't know," said Pete, reaching for the mustard jar, "how in the world some guys copy in their head, I tried and I can't."

"Ever try phantom copying? I read about it once in *CQ*[1]. Darndest, simplest little trick to copying behind I ever heard. I didn't believe a word of it until I gave it a fair chance that same evening."

"What's that, phantom copying?"

"It's all in that *CQ* story. It's a trick that weans you away from writing it down on paper to writing it down in your mind's eye instead.

"How do you do that?"

"Simply put, you place your index finger on the writing table, pretending your finger is the pencil, and then, mentally writing down the letters using your finger. Your finger sort of stays in one spot while writing."

"What's the big advantage?"

"Well, by your not having to write it all down on paper, you become immeasurably more relaxed, and this added relaxation pays off in easier, faster copying."

"It sounds like so much sliced pastrami to me. I still say when it comes to code that either a guy has it or he doesn't. It's called talent."

"I'm telling you the trick works." He studied the geometry of his half eaten sandwich, trying to make the meat and the rye bread finish together. "Talent, shmalent; anybody can learn to copy better than twenty in his head if he really tries to."

What're you trying to tell me: that learning the code good doesn't take talent?" He finished his sentence with squinting, fiery eyes, his voice rising on the word talent.

"Increasing your copying speed isn't all that hard... it's easier than most would think."

"Listen, here. I've been ticketed for over 35 years and I've just topped, just barely topped, a one-minute's run of solid twenty words a minute. That's about a half word a *year* of steady, *easy* increasing. After all that easy advancement, you're trying to tell me that talent doesn't play a huge part in becoming a good c.w. op? And now, that I can learn another *easy* way to copy without copying it down? I don't believe a word of it."

Fran whistled by the table, dropping two more beers before them and depositing a single check next to Alf's plate. She looked at Pete: Anything else I can do; want some more pickles maybe?"

"No thanks, Fran, we're fine. Great lunch."

Alf looked perplexed as he studied the single check (why always me?) and spluttered:" I'd like a few more pickles if you..." She'd turned and left already, oblivious to the last request.

"When it comes to c.w. copying schemes and tricks, I'm from Missouri. Show me how and I'll buy you lunch for a month."

"I'd settle for today's check... the one we're celebrating, remember." He straight-armed the check across the table, but Pete ignored the affront like a gentleman.

"If you're interested in this trick called phantom copying, you can buy the back issue. But I'll give you a sampling of how it works. Pushing aside his plate, so Pete could clearly see, he placed his index finger, arched, firmly on the table. "It helps to close your eyes at first, until you get the hang of it." Now, send me some c.w., a few words will do, and I'll phantom copy them and then read them back. Go ahead."

What to send? He looked at Alf, poised at the ready, finger nobly arched. There on the wall, above the little table holding the coffee pot and cups, he spied a sign, and the phantom message of the day. He dit-dahed it to Alf, who sat serenely silent, eyes shut, his little index finger imperceptably wiggling to each dit 'n dah.

"There," he said, searching the reopening of his friend's eyes, "what'd I send you?"

"Child's play, really. The historic mesage was 'Watch your hat and coat.'" He saw the look of sudden envy in his companions face: "I copy like that all the time, at least I once did. The more you practice at this thing the less you have to depend on the trick. You find yourself copying more and more in your head. But phantom copying is a good weaning away technique from pencil 'n pad copying to all upstairs copying."

His friend just stared, almost unbelieving at what he had been privileged to witness. "Good Lord,"

*(Continued on page 69)*

[1]CQ, June 1974, page 21

*a monthly feature by*

**BILL DEWITT, W2DD**

# In Focus

## Television on the Amateur bands

### *Further Comment On A Well-Worn Subject!*

After the Russian RTTY departed 14230 kHz., some naive slow scanners had hopes for improved picture exchanges—without ding-a-ling. But whatever the net degree of improvement may have been, it sure was short-lived! A Russian a.m. propaganda station now occupies the frequency near and dear (for some reason that escapes me!) to the hearts of SSTVers. This a.m. signal is reported to be about 60 dB over S9 in England.

The presence of this station in the 20 meter is something that we should not have to tolerate. Action should be taken by the FCC and/or the U.S. State Department to get it out of this amateur band.

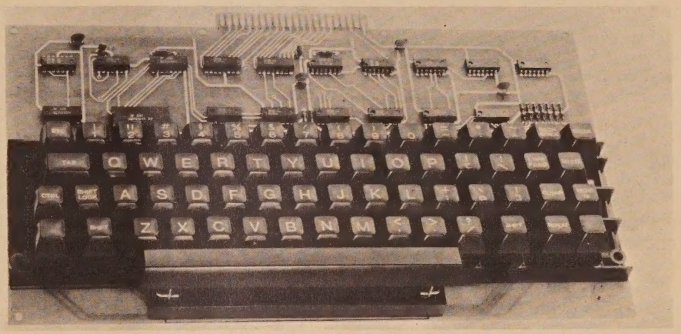
Meantime, as pointed out in a recent letter from Dave Wilke, W3LSG, of Dallastown, Pa. (and in this column repeatedly!) 14230 kHz. is certainly not the best place for SSTV under today's band usage.

On several occasions I have requested suggestions regarding the possible use of some other frequency(ies) in the 20 meter band. W3LSG has suggested the possibility of a sub-band for SSTV at the high end of the c.w. band. His suggestion is the ONLY ONE I have received! I don't happen to care for Dave's idea, but that's just my reaction. Maybe others would think it's great! The point is, let's have some more ideas and suggestions—then perhaps we can collectively find something that has broad appeal and will work. What's YOUR suggestion?

### *SSTV Keyboard Anyone?*

If you're thinking about building the SSTV Keyboard described by WOLMD in the September 1974 issue of *CQ*, you'll welcome some pertinent information supplied by

*2112 Turk Hill Road, Fairport, NY 11450



*The Radio Shack keyboard and ASC11 encoder.*

Charlie Stampf Jr., WA2DBT, of Lagrangeville, N.Y.

Charlie used the Radio Shack keyboard and ASCII encoder board kits as the first step in his SSTV keyboard project. He then designed the circuitry needed to interface the Radio Shack encoder with the WOLMD system.

Here's how Charlie describes his

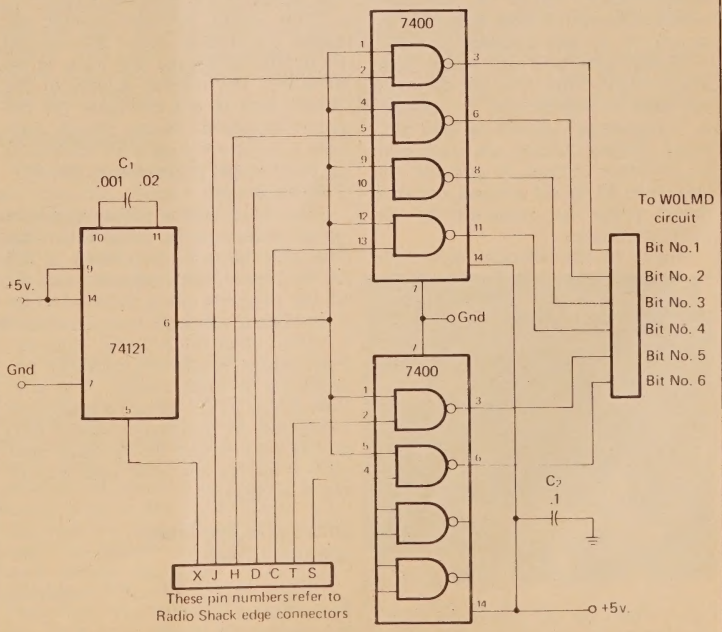



*Fig. 1—Interface circuit for use with WOLMD SSTV Keyboard and Radio Shack ASCII encoder, designed by WA2DBT.*

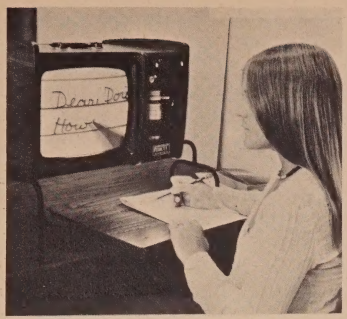


*Fig. 2—Visualtek's Miniviewer with 12" screen. "Folded" optics permit viewing flat copy placed on an easel at magnifications up to 40 times. Other features are: easy-to-operate brightness and contrast controls, portability, and image polarity selection.*

approach to interfacing the ASCII encoder/W0LMD combination:

"The following is one method of providing the required 6 Bit ASCII code for use with the W0LMD SSTV Keyboard.

"The scheme uses the Radio Shack keyswitches and ASCII encoder board. All of the tedious switch wiring and interconnections are avoided using this assembly; the keyswitch unit is simply soldered to the circuit board. All outputs, and, power supply inputs are provided at a 22 pin edge connector. The accompanying literature, with the encoder board, gives a complete circuit description and assembly instructions. A neat package indeed.

"Seven bits of True, ASCII code are available; the first six of which are used in this project. In addition, a "keypressed" output is also provided. These outputs are used with an interface circuit to provide the less than 30 micro second negative going pulse as required by Dr. Suding's design.

"Refer to the encoder schematic fig. 1 and you will find bits one through six available at pins J, H, D, C, T, and S respectively, on the edge connector. The "key pressed" bit is at pin X. These latched outputs are brought to an interface circuit where they are processed to give the negative going pulses of the proper duration.

"This circuit can be wired on perf. board, or for the perfectionist, a pc board can be made. Three IC's are used, a 74121 monostable one shot, and two 7400 quad NAND gates.

"Refer to the interface circuit diagram: The "key pressed" pulse at X is high as long as your finger is holding a key down. When you remove your finger this output returns low. This high pulse is applied to the 74121 which will trigger and give only one output pulse whose duration is determined by the capacitor connected to pins 10 and 11. A capacitor value of .02 uf was found to be satisfactory. (I've used any value down to .001 with satisfactory results.)

The output of the 74121 (pin 6) is parallel connected to one input of each of 6 nand gates. The six ASCII bits are connected to the other inputs. The NAND gates outputs are high, unless both inputs are high, at which the outputs go low. When the short pulse from the one shot and those from the encoder are present at the inputs, a very short negative going pulse is available at the outputs. These are applied to the inputs of the W0LMD circuit.

"The entire encoder circuit requires +5 volts at about 500 ma. so an additional source will have to be provided. The original supply in the "LMD" unit is not adequate for the entire keyboard. (Radio Shack markets a 5v power supply kit for $13.06 or you can get the board alone, 277-102, for $1.99).

"To check for the proper negative going pulse at the outputs of the 7400's temporarily substitute a 100 uf/16v electrolytic capacitor at C7 so the negative going pulses can be seen with a v.o.m.

"The circuit will provide "bounce" free pulses which will properly operate the W0LMD design. If at anytime a fully ASCII encoded sequence is needed, for a micro computer etc., simply replace the SSTV edge connector on the encoder with that of the new device."




*Fig. 3—Featuring a 9" screen, the Visualtek "Commuter" has fold up legs, weighs 21 pounds. Its magnification is limited to 8 times original size.*

### *Sharing In The True Amateur Spirit*

Thanks to WA2DBT for supplying this useful information. I'm sure that his willingness to help others will be greatly appreciated by other slow scanners planning to build the "LMD" keyboard. (I wonder how many have been built!)




*Fig. 4—"Big Daddy" of the Visualtek line is the RS-6 system in which the camera and monitor are separated. Magnification can go to 60 times original size! The camera/lens combination of the RS-6 would be the answer to a Slow Scanner's dream!*

Please note: There are practically infinite variations among the so-called ASCII output keyboards. Some have positive going output pulses, some negative—some have X bits of info, some have Y, etc. So, PLEASE REMEMBER, Charlie's information relates only to the Radio Shack Keyboard Kit Model #1422 and the ASCII Encoder board, Model #277-117, priced at $39.95 and $14.95 respectively. The complete encoder kit less hardware and case sells for $57.80.

### *Non Amateur-Non SSTV, But Very Interesting!*

Some readers of this column may recall an earlier mention of a reading and writing aid for the partially sighted employing a fast scan camera/monitor combination arranged for easy viewing and great magnifications. I am referring to the VISUALTEK Read/Write Systems Miniviewers and other related equipment made by the Visualtek Company in their Santa Monica, CA plant. See figs. 2, 3, and 4.

There are a number of reasons why slow scanners and ATV-minded hams may find this very specialized equipment of particular interest. More on this point later.

### *Reading And Writing Independence For The Partially Sighted*

The Visualtek equipment is designed to assist those with only partial sight. Each "Viewer" is essentially a closed circuit television system. It consists of a camera with a Zoom lens, a monitor, and an easel to hold reading or writing materials. Materials placed on the easel under the camera lens may be magnified




*Fig. 5—Conditions were not exactly perfect when this picture of Emile, TR8VE was received early in January.*

up to 60× (depending upon the particular model). Image size, brightness, and contrast are adjustable. Image polarity can be selected—black letters on white, or vice versa.

Most users of Visualtek Viewers are legally blind persons. The high magnification feature and "super contrast" make it possible for many with tunnel vision, peripheral vision, or having as low as 1% of normal vision to understand most printed or written material. Some users are stamp or coin collectors (with normal vision) who prefer a large TV screen display to peering through a microscope. Many schools, industries, and libraries provide viewers of this nature for those with a sight problem.

At this point I'd like to say that I am not being paid by Visualtek for plugging their product!

### The ATV-SSTV Connection

Why? You may wonder WHY is Bill DeWitt writing about this aid for the partially sighted in his SSTV column?



*Fig. 6—Sorry I don't have the name of Emile's wife. Here she is, Mrs. TR8VE!*

Well, first, I think this type of thing is a terrific use of TV technology. A way to help those with a sight problem. It's hard for the average guy to realize just how much this type of device can mean to someone with a sight problem. There are several manufacturers of such viewers, but the public in general just doesn't seem to know that these reading/writing aids are available. If you know of someone with a need for help of this nature, pass along the word.

The Visualtek viewers gave me a number of ideas about ATV and SSTV operations, and if you study the pictures, you may get a few ideas too. For example: Visualtek uses a pair of mini-fluorescent lamps to illuminate the material being viewed. Nice FLAT lighting, good idea—how about getting a pair of under-the-shelf fluorescent lamps to illuminate your SSTV flat copy?

Another idea: The easel used to hold reading and writing materials slides back and forth, and up and down in a horizontal plane. You could easily rig up a thin board and track arrangement to do the same thing. (Assuming you have a vertical camera mounting fixture.)

Another idea: I have no idea as to whether Visualtek would sell their high magnification Zoom lenses to amateurs for SSTV/ATV use or not, but it sure would be great to have the extreme magnifications available for SSTV use—without auxiliary lenses and other gimmicks! (I'll check that one out with Visualtek and report later.)

### DX Department

TR8VE, operated by Emile Villard of Libreville, Gabon Republic, creates quite a stir every time he appears on the 20 meter band. For a look at Emile, his wife, and QSL information, see figs. 5, 6, and 7.

### Minicomputers And All That Stuff

I suspect that by the time you read this, Dayton's Hamvention will be long gone and those who attended will be all fired up over microprocessor this, and microprocessor that. Meantime, burning the midnight oil, working by himself, and having a lot of fun—Tony Gallo, W3LDS, has his Digital Group Minicomputer operational on RTTY and c.w. video display functions. For tangible evidence of Tony's recent achievements, see fig. 8. This is the first time that yours truly has seen an SSTV picture of another amateur's desk top computer TV read-out.




*Fig. 7—If you want to QSL direct, here is the correct address for TR8VE, courtesy of the* 1st Operateur.

### What's Up Doc?

Many slow scanners have purchased the Digital Group's highly rated mini-computer system. The question is, "What are they doing with them?" Certainly the ways in which these mini-computers are being used would be of interest to "In Focus" readers.

Here's an open invitation to all SSTVers using a DG or ANY kind of a computer to handle or process slow scan signals to drop me a line. You may be doing something that is the basis for a full-blown article on the subject—or maybe just a report on what you're doing. But remember, other slow scanners DO want to know what's going on out there. Please write!

You can address that same old QTH OM, 2112 Turk Hill Road, Fairport, N.Y. 14450. Regards from Bill, W2DD.

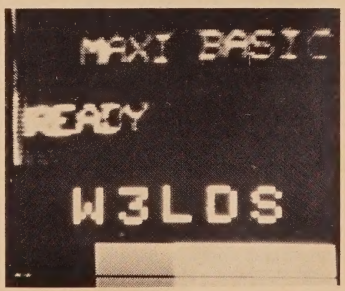



*Fig. 8—When I asked Tony Gallo, W3LDS, for a report on his progress with the Digital Group mini-computer, he gave me this reply by pointing his camera at the TV read-out screen of the computer. (The call sign was added with an SSTV keyboard.)*

*a monthly feature by*

**HERBERT S. BRIER, W9AD**

# Novice

## "How to" for the newcomer to Amateur radio

Since the beginning astronomers have been observing the spots appearing and disappearing on the face of the sun in approximately 11-year cycles. We now know that there is a correlation between this continuing cycle and long-distance radio communications. Propagation experts like George Jacobs, W3ASK, who has been doing it monthly in his "Propagation" column for *CQ* for a quarter century, can predict with surprising accuracy what frequencies (if any) will be usable to communicate between geographical points at any hour of the day for months in advance.

Radiations from the sun bombard the *ionosphere,* the region between 80 and 400 km (50 to 250 miles) above the earth and *ionize* individual particles in the region. The *ionized* particles collect in three layers: as the *ionization* increases, the *E* layer, approximately 112 km (70 miles) high, and the *F1* and *F2* layers 225 km (140 miles), and 320 km (200 miles) high, respectively. Radio signals from the earth striking these layers are refracted (bent) back to the earth at distances up to 3700 km (2300 miles) from the transmitter. A half a dozen such bounces will send the signal half way around the world.

When the average sunspot numbers are high, the *ionosphere* returns frequencies above 50 MHz at winter noontime, but when the numbers are low, frequencies well below 20 MHz crash through the *ionosphere* never to return. Armed with this information and other data collected from the *ionosphere,* the experts prepare their predictions. At present (Spring, 1977) most propagation experts are uncertain whether we have just passed the low point of sunspot cycle #20, and #21 has started or whether the transition will occur in a few months. Whichever is true, it does not look like the sunspot cycle will do much for the amateur bands above 20 MHz at least until next September when daytime maximum usable frequencies (MUF's) will start to increase to their winter peaks. But do not write off the frequencies above the 14-MHz band until then.

*409 So. 14th St., Chesterton, Ind. 46304

### *Short Skip or Sporadic-E Propagation*

Have you ever tuned across a quiet 21, 28, or 50-MHz band, possibly hearing a few signals from up to 100 miles away; and, within seconds, heard many extremely strong signals fill up the band? The signals may come from distances of a few hundred miles out to beyond 1000 miles and "peg your S-meter" one instant and go into a deep fade the next. The signals may pop up from one direction, fade out, and pop up from another direction moments later, and continue to play "hide and seek" for hours. Or they may fade out as quickly as they appear, not to reappear for days. In contrast, the signals will appear at breakfast time and still be roaring in from around the compass after dark and hold repeat performances several days in a row. But, sooner or later, poof! The band is dead again.

We have described "short skip" or "sporadic-E" propagation. It takes place any time, day or night, when ionized patches appear in the *ionosphere* at the height of the regular E layer. The big differences between it and regular E propagation is its erratic nature, the wide frequency range over which it is effective, and how strong the signals often are. While normal E-layer propagation is seldom effective above 10 MHz, short skip is sometimes evident above 144 MHz! It was formerly thought that short skip was triggered by sudden bursts of ultra-violet radiation from the sun. It is now believed that enough unattached ions from the sun, meteor trails, and other sources are constantly swirling around in the *ionosphere* that when they are bunched together by highspeed cross winds they are capable of influencing radio signals. The individual patches are not very large, and they appear and disappear with changes in wind velocity and direction. A widespread opening, in fact, is supported by many small patches rather than by one large patch in an area. Although "short skip" is not predictable with the reliability of normal ionospheric propagation, statistically it occurs most frequently before noon and in the late afternoons in the spring and summer months with another peak in late December and early January. W3ASK lists the most likely times in the appropriate months in his Propagation column.

Fifty-MHz short skip is probably the most concentrated exciting operating available to the average VHF operator, especially if he is located away from the highly-populated areas of the country and is limited in the size of the antenna he can erect. Under usual propagation conditions, his average contact does not exceed 50 miles, and working the same few stations every day is not always a thrill a minute. But the boredom disappears when "short skip" gives him an opportunity to work a dozen states in a couple of call areas in an hour or so, and he may reach the end of his first short-skip season with 25 to 40 states and even an adjacent country or two worked. The essential difference between "short skip" on 28 and 21 MHz, 35 opposed to 50 MHz, is that it occurs more frequently. On the other hand, too many Novices and Technicians miss most of the openings, because they half-heartedly spin their receiver dials, hear no signals, and conclude the band is dead, without trying a few CQ's themselves. After all, you will never hear the other fellow listening, but he might hear you transmitting.

Although it is forbidden territory for Novices and Technicians; the 14-MHz band is often alive around the clock with strong short-skip sig-

nals, much to the disgust of DX-men ever on the prowl for foreign DX signals. Just to complete the picture, sporadic-E layer ionization can also affect 3.5 and 7-MHz signals, but less dramatically than higher frequency signals. For example, if you hear and work distances after dark on these bands that you usually work in the daytime, credit "short skip."

As we implied earlier, it usually does not take much of an antenna to work short skip. In fact, simple dipoles and small beams 25 to 35 feet high often do as well as more-elaborate antennas, because short-skip signals usually are propagated at fairly high angles of radiation, and big arrays radiate their maximum signals at low angles.

### *News And Views*

**Jeff Childs, KH6IOL,** 439 Nahua, Apt. E, Honolulu, Hawaii 96815 tells how one Novice got his ticket: Monty (Raymond von Tempsky, Jr.) visited an "Amateur" station in June, 1975, and saw the "junk box" filled with parts and chasses from a local TV shop. He quickly learned how to unsolder parts—quite a feat, as muscular dystrophy had progressed to the point where Monty had very little strength and mobility in his arms and hands. Listening to their contacts through local amateurs' phone patches confirmed Monty's resolve to get his Novice license. He started learning the code via the telephone. The local gang supplied manuals and practice tapes; and when the straight key seemed an almost unsurmountable obstacle, they rounded up an electronic keyer, and Monty was soon sending perfect 7-w.p.m. code on it.

When he passed the code test, the long wait for the written test papers began, followed by an even longer wait for the license to arrive. Listening to the Hawaiian State 2-meter net and designing his antenna system helped pass the time. Buying parts from the proceeds from his prize-winning block prints, the 36-foot inverted V's went up and still no license, and the school year was over half way through. Then, while still waiting for his own license, Monty did what makes Amateur Radio what it is: he decided to share his new hobby with others having MD. He prepared a seminar entitled "Amateur Radio for the Handicapped," and presented it at the Jerry Lewis M.D.A. Summer Camp at Makapala, Hawaii, in July, 1976, proudly displaying his own Novice license, KH6JCS, at every opportunity.

Monty became a "Silent key" on November 13, 1976, at the age of 18. This is not intended to be a sad story, however, Jeff, KH6IOL, who was Monty's home-hospital instructor for the Hawaiian Department of Education, reports that Monty had a full and happy life in spite of his handicaps. His parents agree.


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**Robert J. DeCrocker,** 1311 Crooked Lake Drive, Kalamazoo, Mich. 49001, reports that he was a Novice over 20 years ago but could not get over the code hump then and probably could not do it now by memorizing the characters and then trying to copy "straight" code. We agree that that is doing it the hard way. But it is interesting to report that Bob thinks that he could learn the code, if the instructor would announce the letter or other character by voice then send it in dits and dahs; so that he could learn how the character actually sounds in code. Next in Bob's method of code teaching, the instructor sends the dits and dahs while the student writes down the corresponding letter, number, or punctuation mark. We do not know how far Bob has thought out his method. We do know, however, it is the method that the great majority of successful code tutors use! And we hope someone near him will tell Bob about the nearest code class or volunteer as a code teacher himself.

Commenting on my statement in the February column that "a 'good' dot or dash will have straight vertical sides and horizontal tops with somewhat rounded corners. Too sharp corners signal key clicks..." Bill Conklin, K6KA, points out that vertical sides mean that the power goes from zero to maximum and *vice versa* instantaneously and generate clicks. A rise and fall time of four or five ms at the ends of the dots and dashes is necesary to suppress the clicks. At a later time, we will discuss key clicks more fully. Thanks to K6KA.

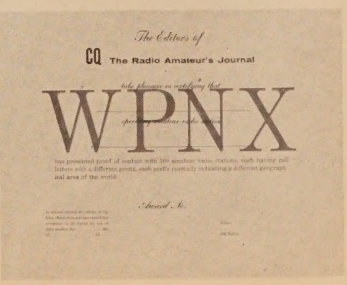
We invite your "News and Views" comments, and suggestions for YOUR column. Send all, including pictures, to Herbert S. Brier, W9AD, Novice Editor, CQ Magazine, 409 So. 14th St., Chesterton, Indiana 46304.

73, Herb, W9AD

## THE CQ WPNX AWARD

The CQ WPNX Certificate is awarded to U.S. novices who have demonstrated their operating skill through confirmed contacts with 100 of the many prefixes used by amateurs throughout the world. The rules to follow in qualifying for this distinctively marked certificate are:

*(Continued on page 73)*


The Editors of
CQ The Radio Amateur's Journal
WPNX

*CQ's WPNX Award.*

# CQ Reviews: The Kenwood TR-7400A 2 Meter Transceiver

BY HUGH R. PAUL*, W6POK

As the number of licensed radio amateurs continues to grow, we are seeing more new equipment appearing on the market each month. More features for less money is one of the results of this growth.

A good example is the latest offering by Kenwood, the TR-7400A. Selling for under $400, this 2 meter transceiver is a compact, high power package offering six digit display of the receive frequency. Frequency control is by means of a phase locked loop synthesizer, which covers the entire two meter band in 5 kHz steps.

Frequency selection entails setting the selector knob, at the lower left, to the appropriate one megaHertz segment and then rotating the large knob next to it for the desired 100 kHz segment. The second large knob selects 10 kHz segments. A plus 5 kHz frequency is obtained with the small push button located between the two large selector knobs.

A lever type switch selects either simplex or repeater operation with a plus or minus 600 kHz offset. When this switch is in one of the offset positions, a small LED indicator is lit. LEDs also indicate the transmit condition, loss of lock on the synthesizer and the selection of tone controlled squelch operation. The latter is an extra cost option. A four position switch in the upper right corner of the front panel selects continuous tone controlled squelch on transmit and receive, transmit only or tone burst on transmit. The fourth position selects standard carrier controlled squelch operation. With more and more repeater groups using either continuous tone or burst tone for access to their machines this feature is no longer a luxury.

*291 Macalester Drive, Walnut, CA 91789




*Front view of the Kenwood TR-7400A two meter f.m. transceiver.*

Other features worth noting include an external speaker jack and touch tone pad input jack. These are located adjacent to each other on the right side of the transceiver, toward the rear. A mobile mount is provided with a variable-tilt steel channel, which mates with the steel rails on each side of the transceiver. Flip locks secure the unit after it has been slid into the mount. These flip locks have a ring, which could conceivably accept a very small padlock. The theft deterrent factor of this arrangement would be minimal at best.

The push to talk microphone supplied with the TR-7400A is "cute." That term was supplied by my younger son. It is a miniature dynamic type and performs very well, but is too small for some of the heavy handed types. A poll was taken among neighboring amateurs and about half of them thought the microphone was difficult to handle.

For desk top operation, a chrome plated stand that slips into two mounts on the base of the unit serves to elevate the front end. This approach is both simple and effective. The TR-7400A requires 13.8 v.d.c. at about 10 amps, in the high power position (25 watts). Fixed operation may require the purchase or construction of a heavier power supply if full power capability is required. Most of the a.c. supplies for the ten watt variety of transceiver will handle the TR-7400A, when in the low power position. As the unit comes from the factory this is about 5 watts output, but may be adjusted for up to 15 watts out.

The transceiver is small, $7\frac{3}{16}$"×$10\frac{5}{8}$"×$2\frac{7}{8}$" and

heavy, over six pounds. When the aluminum cabinet is opened the reason for the weight becomes apparent. There are a lot of components stuffed inside that small cabinet. Construction is the usual Kenwood quality with all the solid state components, including ICs soldered directly to the circuit boards. I do wish Kenwood would stick to the use of sockets for their ICs. Its more costly of course, but of great benefit in the event it becomes necessary to replace one of them. Most all of the manufacturers seem to be going this route these days. If you send your equipment out for repair, I guess it doesn't make that much difference.

The receiver section is a well designed dual conversion type, with a first i.f. of 10.7 MHz and a second i.f. of 455 kHz. A dual gate FET (3SK41) is used as an r.f. amplifier. The same type device functions as a balanced 1st mixer stage. Separating the r.f. amplifier and 1st mixer is a three section helical band pass filter. Monolithic crystal filters before and after the single 10.7 MHz i.f. amplifier and an eleven section Murata crystal filter proceeding the five 455 kHz i.f. amplifier stages contribute greatly to the fine performance characteristics of this receiver.

The pass band is 12 kHz wide at the 6 db down points and plus or minus 30 kHz channel rejection is greater than 70 db. Intermodulation and cross-modulaton was not a problem, the TR-7400A is among the best in this respect.

1.5 watts of audio is more than sufficient to drive an external speaker with distortion levels of 10% or less. The internal 2½" speaker is mounted under the top cover and proved to be adequate for all but the noisiest mobile environments. Receiver sensitivity is excellent, with just under .3 microvolt producing 20 db of quieting.

The transmitter employs direct f.m. modulation with a variable reactance circuit. There are separate adjustments for microphone audio level and oscillator deviation. Distortion was reported when working through one of the local narrow band repeaters. A quick check revealed that deviation was greater than the 5 kHz factory specification. After a slight adjustment all was well.

The final transistor is a 2N6083 driven by an MRF208. Both transistors are well heat sinked. Power out with 13.8 v.d.c. applied measured 26.5 watts. The second harmonic as measured on a

*(Continued on page 69)*


VERTICAL ANTENNA HANDBOOK

Compiles 22-years worth of material from the pages of *CQ* on vertical antenna theory, design, installation, construction. Covers verticals arrays, feeding and matching, short verticals, ground effects, multi-band and single-band verticals, answers the most common questions about vertical antennas. 6" X 9" 136 pages. **$5.00**



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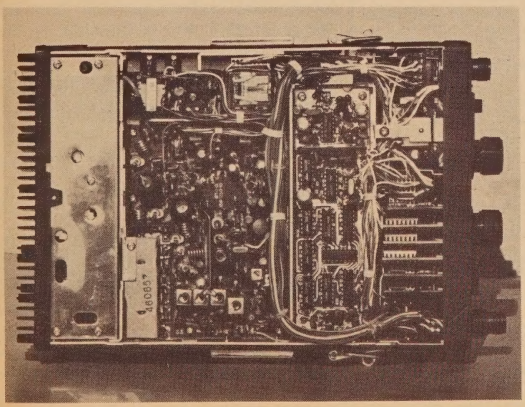
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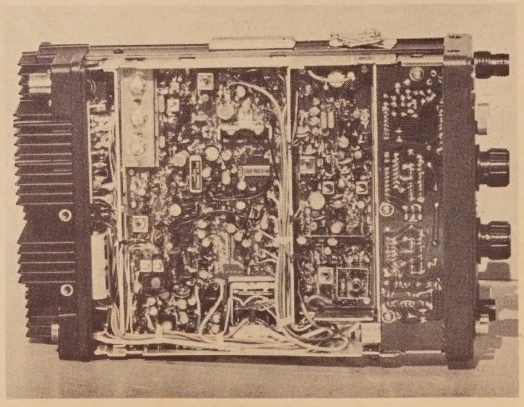
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*Top view of the Kenwood transceiver.*



*Bottom view of the TR-7400A transceiver.*

*a monthly feature by*

**JOHN A. ATTAWAY, K4IIF**

# DX

## News of communications around the world

The summer months are typically a time of reduced activity in DXing. Propagation is uncertain, and after a long winter, outdoor sports, golf, tennis, fishing and hiking reign supreme. However, summer is also a time for planning the fall's activities, which for a lucky few will include a DXpedition. If you are one of this fortunate group, you naturally are interested in DXpedition sites which have been relatively inactive for a long period of time. The following list, compiled by W9KNI, shows DX countries which are believed to have been totally devoid of activity during the entire 1976 calendar year: A51—Bhutan, BY—China, CE0X—San Felix, CE0Z—Juan Fernandez, CR3—Portuguese Guinea, CR5—Sao Thome, FO8C—Clipperton, HK0—Malpelo, KC4—Navassa, KH6—Kure, KP6—Kingman Reef and KW6—Wake Island.

PY0—St. Peter and Paul Rocks, TL—Central African Republic, TN—Congo Republic, TZ—Mali, VK9—Mellish Reef, VK0—Heard Island, VP8—South Sandwich, VU—Laccadives, XZ—Burma, YA—Afghanistan, YI—Iraq, ZA—Albania and ZL— Kermadec Island.

ZM7—Tokelaus, 1S—Spratly Island, 3B6—St. Brandon, 3C0—Annobon, 3Y—Bouvet, 6D4—Revilla Gigedo, 601—Somalia, 7G/3X—Republic of Guinea, 70—South Yemen, 70—Kamaran Island, 70—J'Bal Atair, 8Z4—Saudi Arabia/Iraq Neutral Zone, and 9U5—Burundi.

*P.O. Box 205, Winter Haven, FL 33880.




*This photography, in full color, is the front of the QSL card of Jacques Courty, F8YO. It is one of the most beautiful QSLs we have ever received. Jacques lives about 30 kilometers south of Paris.*



*Peter Reed, A4XVK is the first A4 amateur to receive the coveted WAZ award. During the first 2 months of operation in Oman, Peter made 3000 contacts with over 100 countries, mainly on 14025 c.w. QSL to G4BVH, 73 Dudley Road, Brighton, Sussex, England.*

### *CQ WPX Award of Excellence*

The new plaque for super prefix hunters was first announced on pg. 57 of the September, 1976 issue of *CQ,* and the first winners were shown in last month's listings. Each of these outstanding DXers received a plaque dated Jan. 1, 1977. Numbers are not used on these plaques as there was no ready basis to determine who would receive 1, 2, 3, 4 or 5. The Jan. 1 plaques went to John Kanode, W1WSF; Pete Billon, K6JG; Rick Roderick, WA5VDH; John Yodis, WA2EAH and Bob Huntington, W6TCQ. In addition, plaques dated Jan. 9 and Jan. 10, 1977, respectively, went to Bob Somer, W4CRW and Gary Hammond, VE3GCO.

As the rules for the *CQ WPX Award of Excellence* are not shown on our reprint of DX award rules, the requirements are briefly summarized here:

1000 prefixes, mixed mode
all continental stickers, mixed mode
band stickers for 80-10 meters, mixed mode
500 prefixes on c.w.
500 prefixes on phone and s.s.b.

In addition, a 160 meter endorsement bar will be available to those who also have earned the 160 meter band sticker.

A plaque charge of $10.00 is made to cover a portion of the cost of processing and handling the award. Applications and querys should be directed to the WPX Award Manager, Bob Huntington, W6TCQ, 5014 Mindora Drive, Torrance, CA 90505.

### *De Extra*

*The Best of Hugh Cassidy*—The Editor and Publisher of the *West Coast DX Bulletin* and former Assistant DX Editor of *CQ,* Hugh Cassidy, WA6-

### The CQ DX Awards Program

**S.S.B.**

473...W5DRW
474...DJ9ZB
475...DJ3CQ
476...DL6DE
477...DK8GT
478...I1GEA
479...LA2AD

**C.W.**

253...W5DRW
254...DK6CS

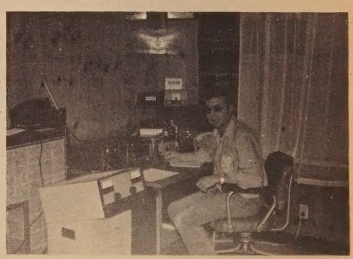
**S.S.B. Endorsements**

150...DJ9ZB, DK8GT, DL6DE, I1GEA, W5DRW
200...DJ9ZB, I1GEA, W5DRW
250...DJ9ZB, I1GEA
275...DJ9ZB
28 MHz...DJ9ZB, W6YVK

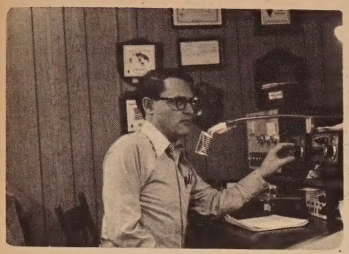
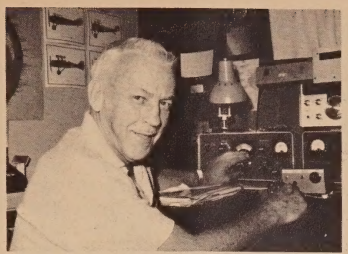
**C.W. Endorsements**

150...JH1VRQ, W5DRW

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," 5632 47th Avenue S.W., Seattle, Washington 98136 U.S.A.



*Don, VE6HN, received s.s.b. WAZ #1355, earned using a homebrew linear and beam. He now has a new station consisting of a Kenwood receiver and transmitter, a Henry 2K-4 linear and a TH6DXX beam at 64 feet.*



*Here are 3 of the first 5 DXers to qualify for the CQ WPX Award of Excellence plaque. Left to right are: John Kanode, W4WSF; John "Pete" Billon, K6JG (formerly WA6MWG) and John Yodis, WA2EAH.*

AUD, is widely acclaimed as the "Sage of DX" for his weekly witticisms at the close of each of his Bulletins. Hugh has also been called the "Poet Laureate of DX" and the "foremost philosopher of amateur radio." The following are examples of his crackerbarrel comments on the weekly DX scene. We hope that someday Hugh will assemble all of these into a book for publication, possibly under the title, "The Best of Hugh Cassidy."

"One of the local QRPers came by last week, troubled in spirit and shaken in his beliefs. 'It was one of those meetings I went to recently,' he explained. 'There was this deep draft, esoteric type there and he did not look too kindly at DXCC. Why, he even said: 'Man does not live by endorsement stickers alone.' What do you think of that?! Son of a Gun! We hardly knew what to say in these times when heresay is rampant and the solid, old values are being eroded, for we have noticed the portents in the skies and the land is sere. But though we thought at length, what could we say? For there may be many things in our own personal worlds these days which may not be necessary for the body but are essential to nurture the delicate spirit of DXers. And we thought of the DXers all over the world who are united by the spirit and the tokens of accomplishment on which their own values have been placed. 'Perhaps you need a new Shaman' we advised the QRPer. 'One better able to divine the hidden, one better able to control events.' For many DXers already know that the chase is the thrill and the stickers the record, and the values are what we DXers place on those things which are of interest perhaps only to us. And it must be said again: 'Only a DXer can understand another DXer. Only a DXer can understand DX."

"It was warm last week and along with some of the older QRPers, we were outside sitting close to a flowering peach tree watching the bees work hard for a living, and we talked of many things, mostly DX. 'There's one thing that has always been a bother to me,' one QRPer said. 'When I was starting in DX things were really tough. You had to work to get a new country. Now look at it, DX is all over the place and they are inventing new ones all the time. And they have these beams and linears and sideband and all those things. It sure wasn't like that 30 years ago. It sure wasn't!' We thought of this for a bit, thinking of those deleted countries he had in his DX-CC totals, those other countries which appeared once and never again, those countries where the government changed and amateur radio vanished, but all of which the QRPper had on the wall in his shack, and we started to work up a head of steam . . . and then forgot it. For new DXers will always struggle, and the years will burnish the memories of the days long gone, and many will have to suffer through the tales of old DXers, old soldiers and old playboys. But it was a nice day, too nice to debate in a win-less situation so we said only: 'It sure was tough,' and the QRPer was pleased to have someone agree with him, but you and I know that the 300 sticker is often fatal to the deserving DXer."

"One of the local QRPers had been visiting down state and last week he came up the hill with some startling news. 'I hate to come with something which may be upsetting,' the QRPer apologized, 'but while downstate last week I visited the DXers there and guess what they told me.' Son of a Gun!! With an opening line like that there was no time to be guessing. 'Tell us,' we demanded, 'Tell us right now!' And the QRPer did, hanging his head, shoulders braced back as bearers of bad news often do. 'Those DXers down there tell me that there is a CBer there who subscribes to the *West Coast DX Bulletin,'* the QRPer said, 'and he makes no secret of it at all. None at all.' This definitely was a surprising thing to hear for the question certainly must be asked as to what use a CBer might have for a DX bulletin. "It's a status symbol,' the QRPer explained. 'He really cuts a big hog with those other CBers. Why, they are all wild with envy because he says he is one of the annointed ones. A reader of *The* DX Bulletin.' We decided that we would have to think this matter over a bit for there are strange things abroad in the land and twice this week the waxing moon had a ring about it. But there may yet be hope for those

## The WPX Program new certificates

### Mixed

566...W4NML
567...W8ZPX
568...YU1NFT
569...I1GEA
570...WB5HVY
571...OK1IQ

### SSB

965...I6TIH
966...DJ3CQ
967...WØIUB
968...CP6EL
969...LA2AD

### CW

1566...JA7AS
1567...JA8DWR
1568...DM2BWK
1569...G4DLL
1570...OK1AKM

### WPNX

94...WA3ZMY/N

### VPX

118...DL-R09/148560

### Endorsements

Mixed: 1439 W2NUT, 1375 ON4QX, 1328 YU2DX, 1200 WB4KZG, WA2EAH, 955 K5DB, 900 SP9AI, 759 OK1IQ, 721 WA8TDY, 680 I1GEA, 507 I5AFC, 454 K9HQM, 450 WB5HVY, W4NML, 417 W8ZPX, 409 YU1NFT.
SSB: 1450 W4UG, 1373 IØAMU, 1061 YU1BCD, 1050 K2POA, 1008 UB5WE, 854 OK1MP, 600 W9YRA, K2AAC, 520 ON4QX, 500 K7RDH, 450 CP6EL, 424 I6TIH, 409 I5AFC, 400 WA6EVX/KG6, K9HDZ, 380 K9HQM, 353 LA2AD, 350 DJ3CQ, 325 WØIUB.
CW: 1208 W2HQ, 1201 ON4QX, 1178 DL1QT, 1105 YU1BCD, 850 WA5VDH, 586 ON4QX, 558 OK2BEC, 505 OK3EQ, WA2AUB, 500 LZ1XL, K9UQN, 458 JA1VE, 331 JA8DWR, 326 G4DLL, 301 JA7AS, 300 OK1AFM, DM2BWK.
10 Meters: WA8TDY, OK1IQ.
15 Meters: ON4QX, WA8TDY, OK1IQ, WB5HVY.
20 Meters: WA2AUB, W4NML, ON4QX, WA8TDY, OK2BEC, OK1IQ, W9YRA.
40 Meters: LZ1XL, OK2BEC, OK1IQ.
80 Meters: WA2AUB, ON4QX, WB5HVY, OK1IQ.
Africa: OK1IQ
Asia: WA8TDY, OK1IQ.
Europe: ZL2AH, ON4QX, WA2GEZ, WA8TDY, OK3EQ, OK1IQ.
No. America: W2GEZ, WB5HVY.
Oceania: ZL2AH.
So. America WA2AUB.

Complete rules for WPX can be found in the May, 1976 issue of CQ Magazine. Appilcation forms may be obtained by sending a business size, self-addressed envelope to "CQ WPX AWARDS", 5014 Mindora Dr., Torrance, CA 90505, U.S.A.

## The WPX HONOR ROLL

The WPX Honor Roll is based on current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all time count.

### Mixed

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| W4WV | 1645 | WB2FMK | 1270 | W9FD | 1035 | WA6TAX | 899 | IØJX | 803 |
| K6JG | 1451 | DJ7CX | 1252 | W6ISQ | 1028 | W3YHR | 882 | IT9AGA | 791 |
| F9RM | 1430 | W4BQY | 1230 | WØKDI | 1019 | YU2OB | 882 | K2ZRO | 782 |
| W9DWQ | 1365 | PAØSNG | 1229 | K2AAC | 1003 | WA6JVD | 875 | YU4EBL | 782 |
| W2NUT | 1363 | WB4KZG | 1210 | DL1MD | 993 | DL1CF | 872 | K8UDJ | 750 |
| VE3GCO | 1340 | WA2EAH | 1200 | I6SF | 988 | W4BYU | 859 | CT1LN | 749 |
| YU2DX | 1328 | W8ROC | 1181 | K6ZDL | 981 | G3DO | 849 | WA5LOB | 749 |
| YU1BCD | 1327 | N6AV | 1150 | K4KQB | 960 | I3ANE | 848 | PY4AP | 735 |
| ON4QX | 1322 | WA5VDH | 1138 | W4IC | 950 | WAØCPX | 844 | KØBLT | 733 |
| W3GJY | 1321 | WB4SIJ | 1102 | WA1JMP | 948 | JA1AG | 831 | WA8TDY | 721 |
| W8LY | 1319 | K6SDR | 1092 | SM6DHU | 940 | YU3EY | 811 | K7NHG | 719 |
| W3PVZ | 1318 | N6CW | 1092 | K5DB | 923 | W9WHM | 811 | WA6EPQ | 713 |
| W4CRW | 1308 | WØAUB | 1082 | WØSFU | 908 | W6NJU | 811 | PAØVB | 706 |
| W4WSF | 1290 | YU1AG | 1048 | SM7TV | 905 | W9ZTD | 807 | OE6RP | 622 |

### SSB

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| W4UG | 1433 | PAØSNG | 1034 | IT9JT | 916 | DJ7CX | 852 | WA5LOB | 747 |
| F9RM | 1358 | DL9OH | 1033 | F2MO | 904 | W6RKP | 822 | W6YMV | 720 |
| IØAMU | 1329 | I8YRK | 1008 | DL1MD | 903 | W3DJZ | 818 | WB6DXU | 708 |
| K6JG | 1248 | DK2BI | 1003 | WA5VDH | 889 | OK1MP | 817 | CX2CN | 702 |
| IØZV | 1181 | WB4SIJ | 964 | WØYDB | 884 | PY3BXW | 808 | WB2FMK | 700 |
| I8KDB | 1136 | HP1JC | 954 | K2POA | 883 | W4IC | 800 | CR7IK | 613 |
| W4WSF | 1131 | WA2EAH | 950 | WB4KZG | 880 | OE2EGL | 780 | I4LCK | 608 |
| W9DWQ | 1089 | WB2NYM | 941 | ZL3NS | 874 | YU1AG | 776 | K2AAC | 600 |
| YU1BCD | 1063 | WA6TAX | 925 | W3YHR | 857 | G3DO | 765 | | |
| I4ZSQ | 1058 | CT1PK | 923 | W4CRW | 840 | W2EHB | 750 | | |

### CW

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| W8LY | 1300 | W9FD | 1053 | W4WSF | 883 | VK3AHQ | 809 | SM5BNX | 706 |
| W8KPL | 1281 | W4CRW | 1041 | K6ZDL | 876 | WA6JVD | 803 | OK2DB | 693 |
| DL1QT | 1156 | W2AIW | 972 | WA5VDH | 861 | WA2EAH | 800 | WB4KZG | 660 |
| K6JG | 1146 | G2GM | 959 | K2AAC | 856 | I6SF | 771 | K2ZRO | 649 |
| ON4QX | 1133 | DJ7CX | 957 | YU1AG | 847 | W4BYU | 768 | K1LWI | 629 |
| W2HO | 1126 | VO1AW | 932 | IT9AGA | 825 | W4IC | 754 | KH6HC | 620 |
| WB2FMK | 1120 | W3ARK | 910 | W6ISQ | 824 | VO1KE | 750 | VE4OX | 600 |
| YU1BCD | 1086 | WA2HZR | 895 | K7ABV | 812 | OK2BLG | 714 | OK2QX | 600 |

who wail 'Ten-Four, Good Buddy' in the outer darkness. And perhaps one of these days there will be a brave one who will stand and say simply, 'The CBer who reads a DX Bulletin can't be all bad.' "

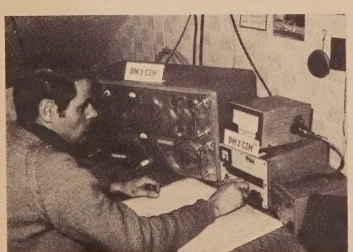
### *Prefix News*

**C4**—C4A — is the new prefix for Cyprus.

**CJ**—Canadian amateurs of Japanese ancestry have been permitted to use this prefix to commemorate the arrival of the first Japanese settlers in Canada in 1877. CJ3BLU is VE3BLU, etc.

**CK3**—CK3UOT is operated by the University of Toronto Amateur Radio Club. QSL to VE3UOT.

**IK**—Was allocated to Italian amateurs as a special prefix from Jan. 1-March 31, 1977.



*Lothar Sierig, DM2CZM, age 38, is another recent winner of c.w.—Phone WAZ. He runs 2 KW PEP to dipoles at 60 feet for 40 and 80 meters and a 3-element beam for 20 meters.*

**N**—Now a regular USA prefix used by many amateurs.

**S7**—Effective Jan. 4, 1977 this became the new prefix for the Seychelles. S79 replaced VQ9.

**S8**—Is the prefix for Transkei in southern Africa. S8AAA is the well-known Garth Hamilton, formerly VE-3EUP. Garth is Postmaster at Umtata, Transkei.

This country is located in Zone 38. Its DXCC status is unknown at press-time.

**VC9**—Celebrates the 100th anniversary of the University of Manitoba. QSL to VE4VV.

**VF**—Another special Canadian prefix.

**4W7**—Is a rare prefix from Yemen where 4W1 is most commonly used. QSL 4W7KM to DB7KM.

### *160 Meter News*

Bob, ZL2BT, and Al, LU1DZ, have initiated a Transpolar Test with emphasis on the southern hemisphere and antarctic pole. The test will be held during the 3rd and 4th weekends of each May and September, and the object will be for DXers in South America and Oceania to work as many stations around the world as possible. Suggested frequencies are 1800—1805 for Oceania and 1825-1830 for South America. Report your results to Alberto Silva, LU1DZ, Obligado 1175, 1846 Adrogus, BS. AS., Argentina.

During last winter's top band season, Herb, KV4FZ, worked F3AT for country #118. OH1CG gave him #117. Herb was the world's first DXer to make DXCC on 6 bands, and it is reported that Gene, W4OO, who worked PYØZAE for #100 is right behind at 6 band WAZ #2. Stew, W1BB, third member of the CQ DX Hall of Fame, received DXCC #1 on 160 meters, which was as it should be as Stew has been Mr. 160 for decades. However, there are reports of controversy surrounding the award of other high numbers with KV4FZ receiving #4.

Those interested in receiving more information 160 meter DX should arrange to be put on the mailing list for *W1BB's 160 Meter DX Bulletin,* and/or read the excellent 160 Meter DX news column by Ralph, W1HGT, in *The DXers Magazine.* The address for the latter magazine is P.O. Drawer DX, Cordova, SC 29039.

### *Here and There*

**Zone 34**—The Northern California DX Foundation has provided a Swan 500 transceiver to Ibrahim, SU1IM, with W3KT handling the shipping chores. Hopefully you will be hearing Ibrahim or his daughter, Moona, SU1MI, by the time this column reaches you. This represents the continuing effort by the Northern California DX Foundation to keep rare countries and zones on the air.

Activity from Libya is appearing again with DK1AS, DJ4LW, JA1TES and JA1SNA operating for brief periods signing /5A. DJ4LW/5A QSLs go to DJ2UU. ST2AY is also active from the Sudan.

**North Jersey DX Association**—New officers are President, Leo Cunniff, W2OEH; Vice President, John Burgio, W2JB; Secretary, Brother Pat Dowd, W2GK; and Treasurer, Charles Moraller, K2CM. Ed Hopper, W2GT, continues to represent the NJDXA on the CQ DX Awards Advisory Committee.

Some new calls for club members include W2FG — exWA2FQG, W2GW — exW2HZY, K2RW — ex-K20JD and W2RS — exK2QBW.

**W1 and W2 QSL Bureaus**—The W1 Bureau is now handled by the Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108, and the W2 Bureau by the North Jersey DX Association, P.O. Box 8160, Haledon, NJ 07508.

**AZ 11 PX**—This award is issued to DXers who confirm contacts with prefixes in *CQ's* WAZ Zone 11 as follows: Class A—30 prefixes, Class B—19 prefixes, and Class C—12 prefixes. Prefixes in Zone 11 include ZP1—ZP9, PY1—PYØ, plus the many

special prefixes used in *CQ's* DX contests. To apply, send a certified list of contacts plus a fee of 5 IRC's to the Radio Club Paraguayo, c/o Award Manager, P.O. Box 512, Asuncion, Paraguay.

**ZS2MI, Marion Island**—The callsign ZS2MI is allocated for use only by bonafide South African amateurs who are members of a team assigned to this rare island. It is *not* an individual callsign. Each team picks its own QSL Manager, and the team on the island from May, 1975 to May, 1976 used ZS6CE to handle their cards. His address is P.O. Box 52, Voortrekkarhoogte, 0143, Republic of South Africa.

**Sun Spots**—Activity began to pickup a bit this spring so we suggest that you watch George Jacob's propagation column carefully for the latest information on Cycle 21. If you are really interested, write George re. a subscription to "Mail-A-Prop."

**Southern California DX Club**—New officers are Cleyon Yowell, WB6EHT, President; John Alexander, K6SVL, Vice President; Perry Esten, W6PN, Secretary; and Marty Woll, WB6VZI, Treasurer.

**United Kingdom QSLs** — Cards for Northern Ireland(GI), Scotland(GM) and Wales(GW) do *not* go via G2MI. Please direct them as follows:

Northern Ireland — Via R.F. Parsons, GI3HXV, 45 Brinvale Avenue, Finaghy, Belfast, Northern Ireland

Scotland—To D. Macadie, GM6MD, 11 Matchmont Road, Ayr, KA7 2SB, Scotland

Wales—c/o J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff Wales

### *The YASME Foundation*

As a result of the extensive DXpedition activities of CQ DX Hall of Fame members Lloyd and Iris Colvin, we have received several letters of inquiry regarding the YASME Foundation, what it is and what it does. This is very understandable as it is an unusual name and if one's amateur career doesn't span the Danny Weil days some explanation is in order.

The name YASME comes from the seacraft used by Danny Weil, VP2VB/MM, beginning over 20 years ago during Danny's efforts to be the first Englishman to circumnavigate the globe singlehandedly. Where Danny got the name we don't remember, but before his adventures were over there had been a YASME I, a YASME II and a YASME III all of which figured in many operations from rare locations. Extremely rare locations as Danny was the last amateur to operate from Clipperton Island. Only YASME III survived the "Where's Danny?" era, numbers I and II being lost at sea. YASME III was honorably retired at Galveston, Texas in 1963.

The group which backed Danny with equipment and funds became known as the YASME Foundation after the "good ship YASME." The Foundation was incorporated in Florida in 1960, but has been headquartered in California for most of the past decade. It's objectives continue to be the advancement of the cause of DX and DXpeditions, primarily through providing parts, equipment and QSL services. The present officers are: Don Wallace, W6AM, President; Danny Weil, W5OSH, Vice President; Bob Vallio, W6RGG, Secretary/Treasurer; Rubin Hughes, WA6AHF, QSL Manager. The following make up the Board of Directors: Tom Taormina, WA5LES; Dick Spenceley, KV4AA; Dick McKercher, WØMLY; Rusty Epps, W6OAT; 'Nob' Itoh, JA1KSO; Marty Laine, OH2BH; Lloyd Colvin, W6KG; Iris Colvin, W6QL and Dave Duff, VK2EO.

## The WAZ Program
## Single Band WAZ

### 20 Meter C.W.

16...JA1EMX

### 20 Meter Phone

37...W8JXM
38...JA3CMD
39...WA7UWO

### S.S.B. WAZ

1360...I1GEA
1361...WA4OPW
1362...W8IHD
1363...A9XBD

### C.W.—Phone WAZ

4054...G3TMA
4055...W4FIA
4056...PAØWRS
4057...JA3GM
4058...DM5UUL
4059...DM2BTO
4060...DK4SY
4061...DJ7ND
4062...DK5JA
4063...DK6NJ
4064...DJ4QM
4065...JA1EMX
4066...WA4DHO
4067...YU3LF
4068...JH3JEX
4069...VE3CSZ

The complete rules for all WAZ awards are found in the May, 1976 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a business-size, self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

### *QSL Information*

**A4XGZ**—Via D. P. Ryan, WB4NND, 1036 Old Dam Neck Rd., Virginia Beach, VA 23453

**AD4II/AJ4**—To W. G. Baird, Jr., K4II, 1018 Woodburn Rd., Spartanburg, SC 29302

**D2AAI** (from 9/1/76)—c/o SMØGMG, L. O. Mohlin, Granbacksvegen 15, S-17010 Ekero, Sweden

**D2ASW**—Via W. R. Hicks, K4UTE, 8201, Cassie Rd., Jacksonville, FL 32221

**DKØGD/ST**—To DL9IL, H. Kroening, Bergmannstrasse 3, D-3000 Hannover, West Germany

**EP2DC**—Via Philip Carpenter, K1DFC, 4 Westwood Drive, Belchertown, MA 01007

**EL2X (ex-HH2WF)**—c/o W3HNK, P.O. Box 14, Norwood, PA 19074

**F0ALN**—To K4II, 1018 Woodburn Rd., Spartanburg, SC 29032

**FGØMM/FS7**—Via WA1JKJ, 147 Lincoln St., Franklin, MA 02038

**FH8CY**—To Y. Seguineau, Boite Postale 50, Dzaoudi, Mayotte, Indian Ocean

**FM7WO**—c/o W4KA, 1044 SE 43rd. St., Cape Coral, FL 33904

**FOØGC**—Via WA6AHF, Rubin Hughes, 17494 Via Alamitos, San Lorenzo, CA 94580

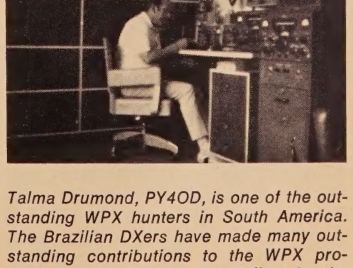
**FR7ZL/T**—To Guy P. de La Rhodiere, Lot. Tanapin, Le Brule, St. Denis, Reunion Island



*Sherm Leifer, W4FLA, of Pembroke Pines, Florida is one of the Sunshine States' leading DXers. Sherm recently qualified for c.w.—Phone WAZ.*

**G5AGA**—c/o K4II
**GC5AGA** and **GD5AGA**—Via K4II
**HL9TJ**—To K6VA, R. P. McGaughey, 3389 Charleston Way, Hollywood, CA 90068
**HL9VA**—c/o WA2JFK, J. H. Gulvin, 80 White Springs Rd., Geneva, NY 14456
**HKØTU**—To HK3LT
**I2DGG/5V**—Via P.O. Box 1170, Lome, Togo
**JY7YJ**—To M. Nugrush, JY5YJ, P.O. Box 6313, Aman, Jordan
**KC4AAA**—c/o J. A. Stagnaro, W6MAR, 2305 Panorama Dr., La Crescenta, CA 91214
**KC4AAE**—Via S. D. Sims, W0OOW, 1065 Hemlock Way, Broomfield, CO 80020
**N3EA**—To J. M. Hertzberg, ex-K3JH, 13 Landover Rd., Bryn, Mawr, PA 19010
**N6AV**—c/o Jerry Hagen, ex-WA6GLD, 1914 E. Heath Terrace, West Covina, CA 91791
**NB6AFC**—Via WA6PDE, J. L. Lynch, P.O. Box 73, Bonita CA 92002
**ON7VT**—To ON6CK, Box 39, B-8500 Kortrijk, Belgium
**PJ8UQ**—c/o W1UQ, M. L. Bardfield, 16 Addington Rd., Brookline, MA 02146
**PJ9JT**—Via J. H. Thompson. W1BIH, 54 E. Hill Rd., P.O. Box 1, Torrington, CT 06790
**PJ9YN**—To E. W. Buck, Jr., W1YNT, Box 18, E. Glastonbury, CT 06025
**S79R**—c/o G3LQP, R. Brown, 11 Fircroft Close, Tilehurst, Reading, RG3 6LJ England
**ST2RK**—Via F. Turek, DL7FT, Petunienweg 99, D-1000 Berlin 47, West Germany
**VK3BGB**—To K4II, 1018 Woodburn Rd., Spartanburg, SC 29302
**VKØAC**—c/o VK3ZQK, A. W. Coolidge, 4 Francis St., Blackburn, Victoria 3130, Australia
**VP2GBU**—Via T. H. Morrison, WB5IZN, Box 13442, Austin, TX 78711
**VR6TC**—To Dr. C. Moser, W6HS, 2153 Lyans Dr., La Canada, CA 91011
**VU2LQA**—c/o H. Mueller, DK6TU, Gaigenbergweg 4, D-7971 Altrach, West Germany
**W6QL/VP2A**—Via YASME Foundation, P.O. Box 2025, Castro Valley, CA 94546
**W9VNE/C6A**—c/o W8PTS, 1205 Lincoln Way N.W., Massillon, OH 44646
**WT1AAG**—To Jack Hill, P.O. Box 491, Lewiston, ME 04240
**WT4AAK**—c/o Route 1, Box 409, Monroe, GA 30655

*(Continued on page 74)*



*Talma Drumond, PY4OD, is one of the outstanding WPX hunters in South America. The Brazilian DXers have made many outstanding contributions to the WPX program through their special prefixes for the CQ contests. (Photo via W6TCQ)*

*a monthly feature by*

**GEORGE JACOBS, W3ASK**

# Propagation

## The science of predicting radio conditions

### *Sunspots On The Rise!*

It looks almost certain that sunspots cycle #20 ended during June, 1976 with a smoothed sunspot number of 12, and that a new cycle is now in progress. A smoothed sunspot number in the upper 20's is very likely for this June.

The Swiss Solar Observatory at Zurich reports a monthly mean sunspot number of 22.6 for February, 1977. During the month daily activity varied considerably; from a low of zero on the 27th and 28th to a high of 68 recorded on February 13. This was the highest daily value of solar activity recorded since August, 1974.

February's level of solar activity results in a smoothed sunspot number of 14, centered on August, 1976.

The Swiss Observatory also recently reported the definitive, or official monthly mean number for 1976, as follows:

| | | | |
|---|---|---|---|
| Jan. | 8.1 | July | 1.9 |
| Feb. | 4.3 | Aug. | 16.4 |
| Mar. | 21.9 | Sept. | 13.5 |
| Apr. | 18.8 | Oct. | 20.6 |
| May | 12.4 | Nov. | 5.2 |
| June | 12.2 | Dec. | 15.3 |

This results in a yearly mean value of 12.6, which is the lowest recorded since 1964.

Twenty meters looks like it will continue to be the best band for DX propagation conditions during June. It should open shortly after sunrise and remain open for several hours in almost all directions. When conditions are Low Normal or better, look for good openings to Europe, Central and South America, the South Pacific, Australasia and the Far East, before noon-time absorption sets in and weakens DX signals. A second, and usually stronger peak is expected during the afternoon and early evening hours, when good conditions should be possible towards Europe, Africa, Central and South America and the Middle East. Later in the evening, and until Midnight, expect good openings to South America, Antarctica, the South Pacific, Australasia and the Far East.

Not much DX expected on 15 meters until after noon, although some openings should be possible towards Central and South America. After noon, the band should open occasionally from the eastern half of the country towards Africa and Central and South America, and from the western half towards South Pacific, Australasia, the Far East and Central and South America. Best time to check for these DX openings is during the late afternoon hours, particularly when conditions are expected to be High Normal, or better.

Few DX openings are expected on 10 meters, but a number should be possible to the Caribbean and Central America via sporadic-E propagation. Longer openings into South America, and possibly to southern Africa and the South Pacific, may also be possible during the late afternoon hours, particularly when conditions are High Normal, or better.

Longer hours of daylight and seasonally higher levels of static should reduce considerably the chances for DX openings on 40, 80 and 160 meters. Some fairly good openings, however, are forecast to several areas of the world for 40 meters during the hours of darkness and the sunset and sunrise periods. Similar openings, but usually with weaker signals, should often be possible on 80 meters during the hours of darkness. An occasional DX opening may also be possible on 160 meters during the nighttime hours.

Plenty of good short-skip openings are expected on the h.f. bands during the month. For distances less than 250 miles try 80 meters during the day, 160 meters at night. For openings between 250 and 750 miles, 40 meters should be best during the day and 80 meters at night. For openings beyond 750 miles, 20 meters should be optimum during the day and 40 meters at night. Frequent short-skip, sporadic-E type openings are also expected on 10 and 15 meters over distances between approximately 600 and 1300 miles. Fifteen meters should occasionally open over longer distances during the late afternoon.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1977. Short-skip Charts for June, for openings between 50 and 2300 miles and from Hawaii and Alaska, appeared in last month's column.

### *V.h.f. Ionospheric Openings*

A sharp increase can be expected in sporadic-E short-skip propagation during June and the summer months. Fairly frequent 6 meter openings should be possible over a range of

**LAST MINUTE FORECAST**

*Day-to-Day Conditions Expected For June, 1977*

| | *Expected Signal Quality* | | | |
|---|---|---|---|---|
| Propagation Index ..... | (4) | (3) | (2) | (1) |
| Day | | | | |
| Above Normal: 15 | A | A | B | C |
| High Normal: 5, 8, 16-17, 19, 23 | B | B | C | D |
| Low Normal: 2, 4, 6-7, 10-12, 14, 18, 20, 22, 24, 29-30 | B | C | D | E |
| Below Normal: 1, 3, 9, 13, 21, 26-28 | C | D | E | E |
| Disturbed: 25 | D-E | 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 *poor* (D) on June 1, *fair* (C) on the 2nd, *poor* (D) on the 3rd, *fair* (C) on the 4th.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768.

*11307 Clara St., Silver Spring, MD 20902.

1000 to 1400 miles. During periods of intense and widespread ionization, two-hop 6 meter openings up to distances of about 2300 miles may also be possible.

An occasional sporadic-E opening on 2 meters can occur, particularly when sporadic-E ionization is very intense, over distances between approximately 1200 and 1400 miles.

Last year there were several reports of trans-Atlantic 10 and 15 meter openings resulting from multihop sporadic-E propagation. It's likely that such openings will occur again this June and through the summer months, but they cannot be accurately predicted.

While sporadic-E ionization can occur at any time, and hence its name, it is more likely to take place between 10 a.m. and 2 p.m. and again between 6 and 10 p.m., local daylight time.

Not much meteor-type propagation expected during June, but some might occur during a minor meteor shower which is expected to take place between June 8 and 10.

Check the "Last Minute Forecast" at the beginning of this column for those days during June that are expected to be Below Normal or Disturbed on the h.f. bands. These are the days on which auroral and perhaps other types of ionospheric propagation are most likely to occur on the v.h.f. bands.

73, George, W3ASK

## June 15-August 15, 1977
## Time Zone: EDT (24-Hour Time)
## EASTERN USA TO:

| | *15 Meters* | *20 Meters* | *40 Meters* | *80 Meters* |
|---|---|---|---|---|
| Western & Central Europe & North Africa | 13-18 (1) | 06-07 (1)<br>07-09 (2)<br>09-14 (1)<br>14-16 (2)<br>16-17 (3)<br>17-18 (4)<br>18-20 (3)<br>20-21 (2)<br>21-23 (1) | 19-21 (1)<br>21-22 (2)<br>22-00 (3)<br>00-01 (2)<br>01-02 (1) | 21-22 (1)<br>22-00 (2)<br>00-01 (1)<br>22-00 (1)* |
| Northern Europe & European USSR | *Nil* | 06-07 (1)<br>07-09 (2)<br>09-15 (1)<br>15-18 (2)<br>18-19 (3)<br>19-22 (2)<br>22-00 (1) | 20-21 (1)<br>21-23 (2)<br>23-00 (1) | 21-23 (1) |
| Eastern Mediterranean & Middle East | 11-13 (1)<br>16-17 (1) | 08-09 (1)<br>13-15 (1)<br>15-18 (2)<br>18-19 (2)<br>19-20 (3)<br>20-22 (2)<br>22-23 (3)<br>23-00 (2)<br>00-06 (1)<br>06-08 (2) | 20-22 (1)<br>22-00 (2)<br>00-01 (1) | 22-00 (1) |
| Western Africa | 11-14 (1)<br>14-17 (2)<br>17-18 (1) | 05-06 (1)<br>06-07 (2)<br>07-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-21 (4)<br>21-22 (3)<br>22-23 (2)<br>23-01 (1) | 20-22 (1)<br>22-01 (2)<br>01-02 (1) | 21-01 (1) |
| Eastern & Central Africa | 11-16 (1) | 16-18 (1)<br>18-20 (2)<br>20-22 (1) | 22-00 (1) | 22-00 (1) |
| Southern Africa | 11-13 (1) | 01-03 (1)<br>05-07 (1)<br>15-16 (1)<br>16-18 (2)<br>18-19 (1) | 20-21 (1)<br>21-01 (2)<br>01-02 (1) | 22-01 (1)<br>23-01 (1)* |
| Central & South Asia | *Nil* | 08-11 (1)<br>20-23 (1) | 05-07 (1)<br>20-22 (1) | *Nil* |
| Southeast Asia | *Nil* | 07-10 (1)<br>19-23 (1) | *Nil* | *Nil* |
| Far East | *Nil* | 07-08 (1)<br>08-10 (2)<br>10-12 (1)<br>20-23 (1) | 04-06 (1) | *Nil* |
| South Pacific & New Zealand | 19-22 (1) | 19-21 (1)<br>21-02 (2)<br>02-07 (1)<br>07-10 (2)<br>10-12 (1) | 02-03 (1)<br>03-06 (2)<br>06-07 (1) | 03-06 (1)<br>03-05 (1)* |
| Australasia | 19-22 (1) | 06-08 (1)<br>08-09 (2)<br>09-12 (1)<br>17-19 (1)<br>21-23 (1)<br>23-01 (2)<br>01-04 (1) | 03-04 (1)<br>04-06 (2)<br>06-07 (1) | 03-06 (1) |
| Caribbean, Central America & Northern Countries of South America | 15-17 (1)**<br>09-12 (1)<br>12-15 (2)<br>15-17 (3)<br>17-18 (4)<br>18-20 (2)<br>20-21 (1) | 06-07 (1)<br>07-08 (2)<br>08-10 (4)<br>10-12 (3)<br>12-16 (2)<br>16-18 (3)<br>18-21 (4)<br>21-23 (3)<br>23-00 (2)<br>00-02 (1) | 20-22 (1)<br>22-23 (2)<br>23-03 (3)<br>03-05 (2)<br>05-07 (1) | 22-00 (1)<br>00-04 (2)<br>04-06 (1)<br>02-05 (1)* |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 14-17 (1)**<br>09-12 (1)<br>12-15 (2)<br>15-17 (3)<br>17-18 (4)<br>18-19 (2)<br>19-20 (1) | 06-08 (1)<br>08-09 (2)<br>09-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-21 (4)<br>21-23 (3)<br>23-01 (2)<br>01-04 (1) | 21-23 (1)<br>23-03 (2)<br>03-06 (1) | 00-05 (1)<br>01-04 (1)* |
| McMurdo Sound, Antarctica | *Nil* | 20-22 (1)<br>22-00 (2)<br>00-02 (1) | 00-03 (1)<br>03-06 (2)<br>06-07 (1) | 03-06 (1) |

*Indicates best time for 160 Meter opening.
**Indicates best time for 10 Meter opening.

## Time Zones: CDT & MDT
## (24-Hour Time)
## CENTRAL USA TO:

| | *15 Meters* | *20 Meters* | *40 Meters* | *80 Meters* |
|---|---|---|---|---|
| Western & Southern Europe & North Africa | 13-17 (1) | 06-07 (1)<br>07-09 (2)<br>09-14 (1)<br>14-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-22 (1) | 20-22 (1)<br>22-00 (2)<br>00-02 (1) | 21-00 (1) |
| Northern Europe & European USSR | *Nil* | 06-07 (1)<br>07-09 (2)<br>09-14 (1)<br>14-17 (2)<br>17-20 (1)<br>20-22 (2)<br>22-23 (1) | 20-23 (1) | 21-23 (1) |
| Eastern Mediterranean & Middle East | *Nil* | 07-09 (1)<br>14-16 (1)<br>16-18 (2)<br>18-20 (1)<br>20-22 (2)<br>22-23 (1) | 20-23 (1) | *Nil* |
| Western Africa | 14-16 (1) | 06-08 (1)<br>13-15 (1)<br>15-17 (2)<br>17-18 (3)<br>18-19 (2)<br>19-21 (1) | 20-00 (1) | 21-23 (1) |
| Eastern & Central Africa | *Nil* | 16-18 (1)<br>18-20 (2)<br>20-22 (1) | 20-23 (1) | *Nil* |
| Southern Africa | 10-12 (1) | 05-07 (1)<br>14-15 (1)<br>15-17 (2)<br>17-18 (1)<br>22-00 (1) | 21-23 (1)<br>23-00 (2)<br>00-01 (1) | 22-00 (1) |
| Central & South Asia | *Nil* | 09-11 (1)<br>18-20 (1)<br>20-22 (2)<br>22-00 (1) | 05-07 (1)<br>19-21 (1) | *Nil* |
| Southeast Asia | 19-21 (1) | 08-10 (1)<br>20-21 (1)<br>21-23 (2)<br>23-00 (1) | 05-07 (1) | *Nil* |
| Far East | 20-22 (1) | 07-08 (1)<br>08-11 (2)<br>11-21 (1)<br>21-23 (2)<br>23-01 (1) | 04-07 (1) | 04-06 (1) |
| South Pacific & New Zealand | 15-19 (1)<br>19-21 (2)<br>21-22 (1) | 17-19 (1)<br>19-22 (2)<br>22-00 (3)<br>00-03 (2)<br>03-07 (1)<br>07-10 (2)<br>10-14 (1) | 01-03 (1)<br>03-04 (2)<br>04-06 (3)<br>06-07 (2)<br>07-08 (1) | 01-04 (1)<br>04-05 (2)<br>05-06 (1)<br>03-05 (1)* |
| Australasia | 16-18 (1)<br>20-22 (1) | 06-07 (1)<br>07-09 (2)<br>09-11 (1)<br>15-17 (1)<br>20-22 (1)<br>22-00 (3)<br>00-02 (2)<br>02-04 (1) | 01-03 (1)<br>03-06 (2)<br>06-07 (1) | 03-06 (1) |
| Caribbean, Central America & Northern Countries of South America | 15-18 (1)**<br>09-13 (1)<br>13-15 (2)<br>15-17 (3)<br>17-18 (4)<br>18-19 (2)<br>19-20 (1) | 06-07 (1)<br>07-08 (3)<br>08-10 (4)<br>10-12 (3)<br>12-16 (2)<br>16-18 (3)<br>18-20 (4)<br>20-22 (3)<br>22-00 (2)<br>00-02 (1) | 20-22 (1)<br>22-23 (2)<br>23-03 (3)<br>03-05 (2)<br>05-06 (1) | 22-00 (1)<br>00-04 (2)<br>04-05 (1)<br>00-04 (1)* |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 14-17 (1)**<br>09-12 (1)<br>12-14 (2)<br>14-16 (3)<br>16-17 (4)<br>17-18 (2)<br>18-19 (1) | 06-07 (1)<br>07-09 (2)<br>09-15 (1)<br>15-17 (2)<br>17-18 (3)<br>18-20 (4)<br>20-21 (3)<br>21-23 (2)<br>23-02 (1) | 21-23 (1)<br>23-03 (2)<br>03-05 (1) | 22-04 (1)<br>00-03 (1)* |
| McMurdo Sound, Antarctica | *Nil* | 18-21 (1)<br>21-23 (2)<br>23-01 (1) | 22-04 (1)<br>04-06 (2)<br>06-07 (1) | 04-06 (1) |

### HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation 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.

4. Time 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. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level: for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

## Time Zone: PDT (24-Hour Time)
## WESTERN USA TO:

| | *15 Meters* | *20 Meters* | *40 Meters* | *80 Meters* |
|---|---|---|---|---|
| Western & Southern Europe & North Africa | *Nil* | 06-07 (1)<br>07-08 (2)<br>08-14 (1)<br>14-18 (2)<br>18-20 (1)<br>22-00 (1) | 20-23 (1) | *Nil* |

*(Continued on page 74)*

*a monthly feature by*

**A. EDWARD HOPPER, W2GT**

# Awards

## News of certificate and award collecting

The June, "Story of The Month", as told by Ken is:

***Kenneth L. Frank, WB5AKI***

*All Counties #135, 9-2-75*

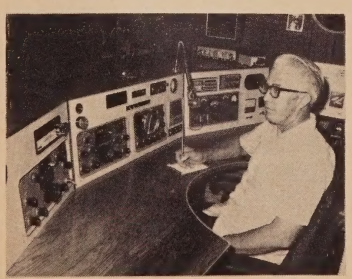
"I brought the population of Buffalo Lake, Minnesota up to 639 in June 1928. Finished my formal schooling in Lansing, Michigan, then a radio-TV course at Coyne in Chicago gave me enough electronics to stay with that line in the service. With a ham license in mind, I did manage to get into a radio operators course at Fort Monmouth, N.J., long enough to get up to 18 wpm before going overseas.

In Germany, Harry Ouye gave me my start and I was licensed as DL4KO in January 1948 (I sure would like to contact Harry Ouye). I operated all over DL land until 1952 (BC-610 days). Then the usual tour in Korea, two in Taiwan, and one in Iran with no amateur operating except for a little MARS work.

"After 13½ years overseas, I settled in Copperas Cove, Texas after retiring from the Army in March 1966. Am now working avionics in civil service at near-by Fort Hood. My interest in amateur radio returned and I was licensed as WB5AKI in 1969.

"In 1971 I met Pete, KH6HIF on ten meters and he sparked my interest in County Hunting. Counties came fast the first few years with "Little George", W4BPC picking up 122 for me. But it took Charley, K5IUW to make the long trip to Kentucky and back through Arkansas for the last two. Many thanks to all for the fine help and cooperation".

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



*Ken Frank, WB5AKI and his fine setup.*

**Special Honor Roll**
**(All Counties)**

#166—Raymond M. Stevenson, W6HDV 3-1-77

### *Awards Issued*

Ray Stevenson, W6HDV qualified for USA-CA-500 through USA-CA-2500, endorsed *All* S.S.B., *All* Mobiles; USA-CA-3000 endorsed *All* S.S.B.; and *All* Counties, Mixed.

"Miro" Justino, CT1UA acquired USA-CA-2000, endorsed ALL SSB, #1 2000 to CT1.

Stan Head, W8KOI (ex-K8MMZ, W9LZC), not to be confused with Earl, W7KOI, added to his collection USA-CA-2000.

Dean Bell, WDX0FXB collected USA-CA-500 endorsed ALL 75, ALL SSB, #2 to a Short Wave Listener in the Zero call area.

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

Mary "Peg" Campbell, WB0LFO.
Don Wood, WA2TNV.
Larry Smith, WA4QQV.
Bill Dickerson, WA2JOC.

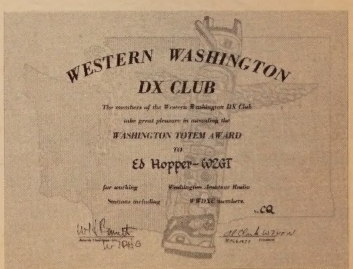
### *Awards*

**NJDXA Achievement Certificates:** New Custodian is Ed. Berzin, W2MIG, 47 Palisade Road, Elizabeth, N.J. 07208. Rules and photograph of certificates in column of January 1976.

**The Washington Totem Award:** The Western Washington DX Club, the Northwests largest and most active DX group, takes pleasure in issuing the first major W7 award. This award is issued to any licensed radio amateur who submits proof of two-way radio contact with the state of Washington. The totem pole shown on the award is typical of the totem poles once found in the state of Washington.

1. Applicants must submit proof of QSOs with 100 different Washington stations, twenty of these must be confirmed contacts with different Western DX Club Members. DX Stations need only confirm 25 Washington stations including 10 WWDX members.
2. General certification rule applies. Submission of QSL cards is not required, your cards may be checked and certified by an officer of any recognized Amateur Radio Society or Club.
3. All contacts must be dated January 1, 1973 or later.
4. Certified lists submitted should be in alphabetical order with date and time in GMT.
5. The award is free to all stations outside of the United States. U.S. stations must include an applications fee of $1.00. If QSL cards are sent to WWDX for checking, sufficient postage must be included for their return by first class mail.
6. Special endorsements may be issued for specific bands or modes if supporting information is included.
7. The WWDXC will furnish a current membership list upon request which should include a s.a.s.e. Send all mail to: AWARDS Chairman, Western Washington DX Club Inc., P.O. Box 224, Mercer Island, Washington 98040.

**THE CANADIAN AMATEUR RADIO FEDERATION INC.** (Federation Des Radio Amateurs Du Canada Inc.) is pleased to announce the following




*The Washington Totem Award.*

awards available to all Radio Amateurs worldwide:

**Canadaward:** A colorful certificate will be issued to any Amateur who confirms two-way QSOs with all Canadian Provinces and Territories. All QSOs to be on one band only. This certificate is endorsed as to the band. Separate awards are issued for each band on which the applicant qualifies. (12 cards per band—see list later). A Mode endorsement is available if all QSOs are made on the same mode (c.w., s.s.b., RTTY, SSTV). Contacts made after July 1, 1977 only will count for this Award. Submit the 12 cards with one dollar ($1.00) Canadian or U.S. funds, or 10 IRCs plus sufficient funds for return postage. CARF members need send only funds for return postage.

**5 Band Canadaward:** A special plaque will be issued to any Amateur who confirms two-way QSOs with all Canadian Provinces and Territories on each of five separate bands. (Total of 60 cards, 12 cards per band). Contacts made after July 1, 1977 only will count for this award. Submit the 60 cards with Seven dollars ($7.00) Canadian or U.S. funds or 70 IRCs plus sufficient funds for return postage. ALL CARF awards are FREE to CARF members. CARF members need send only funds for return postage.

**6 Band Canadaward, 7 Band Canadaward,** Etc . . . Special endorsements to the basic 5 Band Canadaward will be issued to any Amateur who confirms two-way QSOs with all Canadian Provinces and Territories on more than 5 Bands. Submit the additional cards with sufficient funds for return postage.

**List of Canadian Provinces and Territories:**

VO1/VO2 Newfoundland
VE1 Prince Edward Island
VE1 Nova Scotia
VE1 New Brunswick
VE2 Quebec
VE3 Ontario
VE4 Manitoba
VE5 Saskatchewan
VE6 Alberta
VE7 British Columbia
VE8 Yukon Territory
VE9 Northwest Territories

Note: VO2 Labrador is part of the Province of Newfoundland and counts for Newfoundland.

All amateur bands may be used. Each distinct satellite mode —432in/144out, 144in/29out, 144in/432out, etc... will count as a separate band.

Note: These awards do not conflict with the WAVE and WACAN awards sponsored by the Nortown Amateur Radio Club.

Mail all applications for the Canadawards to: Canadawards, P.O. Box 76752, Vancouver, B.C., Canada V5R 5S7.

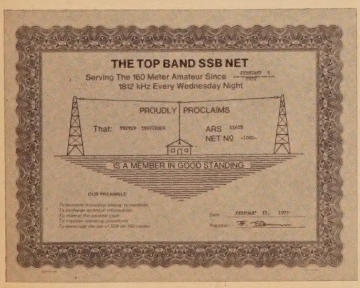
**The Top Band SSB Net:** This membership AWARD is issued to qualifying members of the Top Band SSB Net. The idea is to promote friendship; exchange technical information, to observe the amateur code, to improve operating procedures and to encourage the use of SSB on 160 meters. Members can qualify for the certificate by calling in to the net on at least five separate weeks *or* three consecutive weeks. There is a $1.00 handling fee. The *Net* meets every Wednesday at 9 PM Eastern time on 1812. Apply to: Victor A. Misek, W1WCR, Wason Road, Hudson, N.H. 03051.

Space Net Award: This beautiful Award may be obtained by working K4AWS, WB2MTU/4, WA7LAA/4 or WB6ZRW/4 active nightly on Six and Two meter SSB. Apply to: A. W. (Tony) Slapkowski, K4AWS, VHF Space Center, P.O. Box 15, Sumterville, Florida 33585.

### *Notes*

*Remember* the CW CH Nets are active: Wednesdays 2300 GMT 7055, Saturdays 1400 and 2300 GMT 14070, Sundays 1430 GMT 7055.

*Remember* the MARAC-ICHN 1977 Convention June 30 through July 3 at the Holiday Inn (downtown) in Rochester, Minnesota. *All* County Hunters are welcome, you do *Not* have to be a member of MARAC. Time is short, get full details from Bob Hanson, W0KMH, 9 Hillside Court, Northfield, Minnesota 55057.




*The Top Band SSB Net Certificate.*

### USA-CA Honor Roll

| 3000 | | 1500 | | 500 | |
|---|---|---|---|---|---|
| W6HDV | 184 | W6HDV | 318 | WDX0-FXB | 1156 |
| **2500** | | **1000** | | WB0LFO | 1157 |
| W6HDV | 233 | W6HDV | 433 | W6HDV | 1158 |
| **2000** | | | | WA2TNV | 1159 |
| CT1UA | 270 | | | WA4QQV | 1160 |
| W8KOI | 271 | | | WA2JOC | 1161 |
| W6HDV | 272 | | | | |


## 2 METER CRYSTALS IN STOCK

FOR THESE RADIOS ON STANDARD ARRL REPEATER FREQUENCIES

**Clegg HT-146**
**Drake TR-22**
**Drake TR-33 rec only**
**Drake TR-72**
**Genave**
**Heathkit HW-202**
**Heathkit HW-2021 rec only**
**Icom/VHF Eng**
**Ken/Wilson**
**Lafayette HA-146**
**Midland 13-505**
**Regency HR-2A**
**Regency HR-212**
**Regency HR-2B**
**Regency HR-312**
**Regency HR-2MS**
**S.B.E.**
**Sonar 1802-3-4, 3601**
**Standard 146/826**
**Standard Horizon**
**Tempo FMH**
**Trio/Kenwood TR2200**
**Trio/Kenwood TR7200**

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I promise to have lots of data on many 10-X AWARDS and some c.w. County Hunter Awards next month. *Remember,* write and tell me, How was your month? 73, Ed., W2GT




*The Space Net Award.*

*a monthly feature by*

**FRANK ANZALONE, W1WY**

# Contest Calendar

## News/views of on-the-air competition

Is my face red, announcing the USSR "CQ—M" Contest in last month's column as May 21-22. Late in March I received a communication from Box 88 announcing the contest as May 7-8. It was much too late to make any corrections in the May column which had already gone to press.

I had written at least two months earlier requesting confirmation but no answer. However several over the air contacts with the Soviet boys had assured me that the contest would be held on the same weekend as last year. Which goes to prove that even the fellows over there have no idea what's going on at Box 88.

At least the rules remained the same, except for one item in the scoring. Contacts between stations on the same continent are now only worth 1 point (instead of 2) and different continents 3 points. (instead of 5)

I am sending an announcement of the date correction to all the prominent DX Bulletins so you may still have the information in time.

This is the penalty we contributing editors have to pay now that you are receiving CQ before the published month. The early deadline, three months, makes it pretty difficult meeting the cut off date.

One thing's for sure, I'm not listing any event unless I receive the announcement in writing. So you contest managers better get your material to me at least three months before the date of the event or its not going to make the issue of the current month.

73 for now, Frank, W1WY

### *IARS CHC/FHC/HTH QSO Party*

Starts: 2300 GMT Friday, June 3
Ends: 0600 GMT Monday, June 6

The following are essential rules. A s.a.s.e. to K6BX will get you more detailed information.

**Exchange:** QSO no., RS(T), name, CHC/FHC no., state, county or similar division. Non-members send HTH instead of number.

**Scoring:** *For CHC*—1 point per QSO with other CHCers, 2 points if its a HTHer, 1 additional point if its a YL, B/P, FHC, Novice, CHC-200, Merit of Club station. Or if QSO is on vhf/uhf. Double above points if QSO is out of own country. *For HTH*—Contacts with other HTHers 1 point, with CHCers 3 points. Rest same as above. S.w.l. use same scoring system as HTHers.

**Multiplier:** Each continent, country, ITU zone and U.S. state. (Counted only once)

**Final Score:** Total QSO points from all bands times the sum of the multiplier. Multi-operator stations divide score by number of operators. The same station may be worked on each band and mode for QSO points but not as a multiplier.

**Frequencies:** C.W.—3575, 3710, 7070, 7125, 14075, 21075, 21090, 21140, 28090, 28125. Phone—3770, 3790, 3943, 3960, 7090, 7210, 7275, 14320, 14340, 21360, 21440, 28620, 28690. And 50.1-50.5, 145-147. For U.S. and DX as allowed.

**Awards:** The party sponsors hundreds of certificates and trophies in all categories and divisions. A s.a.s.e. will get you a list, include extra postage for ITU, IARU, IARC, IARS country, prefix and zone lists.

Send all requests and your log to: International Amateur Radio Society, K6BX, P.O. Box 385, Bonita, Calif. 92002

### *Minnesota QSO Party*

Starts: 1800 GMT Saturday, June 4
Ends: 2359 GMT Sunday, June 5

The Heartland A.R.C. is sponsoring this year's party. Phone and c.w. are one contest. There are no restrictions as to mode or operating time. Only one transmitter may be used at any one time and crossband contacts are not allowed.

**Exchange:** RS(T) and QTH. County for Minn. stations, ARRL sections or DX countries for others. Novice and Tech. stations must identify their license class.

**Scoring:** One point for phone QSOs, 2 points if its on c.w. and 5 points if its a Novice or Tech. station. Minn. stations multiply total QSO points by ARRL sections and DX countries worked. Others multiply QSO points by number of Minn. counties worked. (max. of 87) QSOs with club station WBØTTZ count 10 points.

**Frequencies:** C.W.—3535, 7035, 14035, 21035, 28035. Phone—3910, 7235, 14280, 21365, 28525. Novice and Tech.—3725, 7125, 21125, 28125. Avoid nets or traffic frequencies.

**Awards:** Certificates to state, DX countries and Minn. winners. Also top scoring Novice and Tech. station.

Stations making 50 or more QSOs

### Calendar of Events

| | | |
|---|---|---|
| June | 3-6 | CHC/FHC/HTH QSO Party |
| June | 4-5 | Minnesota QSO Party |
| June | 4-5 | SOWP C.W. QSO Party |
| June | 5 | SMIRK 6 Meter QSO Party |
| June | 11-12 | RSGB National Field Day |
| June | 11-12 | ARRL VHF QSO Party |
| June | 18-19 | West Virginia QSO Party |
| June | 18-19 | All Asian Phone Contest |
| June | 25-26 | ARRL Field Day |
| July | 2-3 | DL Activity QRP Contest |
| July | 2-3 | Venezuelan Phone |
| July | 9-10 | IARU Radiosport Champ. |
| July | 16-17 | VHF Space Net Contest |
| July | 16-17 | 10-10 Net QSO Party |
| July | 30-31 | Venezuelan C.W. |
| Aug. | 13-14 | European C.W. Contest |
| Aug. | 20-21 | Canadian/U.S.A. Contest |
| Aug. | 20-21 | SARTG RTTY Contest |
| Aug. | 27-28 | All Asian C.W. Contest |
| Sept. | 10-11 | European Phone Contest |
| Sept. | 17-18 | Scandinavian C.W. Contest |
| Sept. | 24-25 | Scandinavian Phone |
| Oct. | 1-2 | VK/ZL/Oceania Phone |
| Oct. | 8-9 | VK/ZL/Oceania C.W. |
| Oct. | 15-16 | Manitoba QSO Party |
| **Oct.** | **29-30** | **CQ WW DX Phone Contest** |
| Nov. | 5-6 | ARRL C.W. Sweepstakes |
| Nov. | 19-20 | ARRL Phone Sweepstakes |
| **Nov.** | **26-27** | **CQ WW DX C.W. Contest** |

### Top 20 QCWA 1977 Party

| | | | |
|---|---|---|---|
| N4IN/3 | 21,840 | W8EH | 12,336 |
| W6US | 18,414 | W9IB | 12,324 |
| W6UA | 17,808 | W7OK | 10,764 |
| K6FE | 16,848 | W5QGZ | 10,682 |
| W4WKQ | 16,709 | W6MA | 10,143 |
| K2DW | 14,892 | KV4AB | 10,120 |
| W5OB | 14,847 | W2GHV | 10,045 |
| K9CLO | 13,865 | K7BZ | 9,447 |
| W8KW/4 | 13,083 | K5AK | 9,417 |
| W5JC | 12,903 | WØDHN | 9,180 |

*14 Sherwood Rd., Stamford, Conn. 06905

must include a check sheet for each band and mode used, and include a s.a.s.e. with your log.

Mailing deadline is July 2 to: HARC c/o Steven J. Gardner, WBØMAO, P.O. Box 261, Staples, Minn. 56479

### *6 Meter "SMIRK" QSO Party*

From 1300 to 0500 GMT
Sunday, June 5

The Party is open to all but only scores of SMIRK members are eligible for awards.

**Exchange:** Call, state or country and SMIRK number if you are a member.

**Scoring:** Number of contacts × states + countries worked for your final score.

It is only necessary to submit a copy of your scoring, showing number of contacts and states/countries worked, and your final score. You may however be requested to submit your log later so have a copy available.

Certificates to the winner in each state and in each country. The SMIRK Trophy goes to the overall high scorer. This year Canadian stations will compete on an individual and club basis against US stations.

Include a s.a.s.e. for a copy of the SMIRK Newsletter with the party results.

Mailing deadline is July 1st to: Ray Clark, K5ZMS, 7158 Stone Fence Drive, San Antonio, Texas 78227

### *SOWP C.W. QSO Party*

Starts: 0000 GMT Saturday, June 4
Ends: 2400 GMT Sunday, June 5

This is the 2nd annual QSO party for the Society of Wireless Pioneers.

There is no set pattern but the exchange information should at least include the member's SOWP membership number.

Activity will be found about 55 kHz up from the low end of each c.w. band and the middle portion of each novice band.

A certificate will be issued to all participating members who contact 10 or more members.

Submit a list of contacts made, call, member's number and time of contact to: Pete Fernandez, W4SM, 129 Hialeah Road, Greenville, S.C. 29607. Include a s.a.s.e. no later than June 20th.

### *RSGB National Field Day*

Starts: 1700 GMT Saturday, June 11
Ends: 1700 GMT Sunday, June 12

While stations outside Great Britain are not eligible to enter this activity on a competitive basis you can contact British portables and submit your check log.

A certificate will be awarded to the overseas station in each continent whose log shows that he contributed the most contacts to the competing stations.

The following received certificates of merit in last year's activity. JA2-HLX, VP8ON and YU1ELM/p, none from No. America. So here's your chance to pick-up an award.

Send your log to RSGB HF Contest Committee, c/o A. Davis, 41 Gainsborough Road, Crawley, Sussex RH10—5LD, England.

### *West Virginia QSO Party*

Starts: 2300 GMT Saturday, June 18
Ends: 2300 GMT Sunday, June 19

This one is sponsored by the West Virginia State Amateur Radio Council. There are no time limits, the same station may be worked once on each band for QSO points, and W. Va. stations may work each other.

**Exchange:** QSO no., RS(T) and QTH. County for W. Va., state or country for others.

**Scoring:** W. Va. stations multiply total QSOs by (W. Va. counties + states + countries) worked. Multiply total by power multiplier if any.

Out-of-state multiply total W. Va. QSOs by W. Va. counties worked. (max. of 55) And multiply total by power multiplier if any.

There is a power multiplier of 1.5 for stations using 200 watts or less input.

**Frequencies:** C.W.—35 kHz inside each c.w. band. Phone—10 kHz inside "General" portion of each phone band.

**Awards:** To the 1st, 2nd and 3rd highest scorers in W. Va. and top scores in each state and each country. (Single operator only)

Logs must be received no later than July 16th and go to West Virginia QSO Party, P.O. Box 299, Dunbar, West Virginia 25064

### *All Asian DX Contest*

Phone: June 18-19 C.W.: Aug. 27-28
Starts: 1000 GMT Saturday
Ends: 1600 GMT Sunday

This is the 18th year the JARL has run this contest. The exchange is between Asian countries and the rest of the world.

**Classifications:** Single operator, single and all band. Multi-operator, single transmitter, all band only. (no multi transmitter)

**Exchange:** For OM's, RS(T) plus age of operator. For YL's, RS(T) plus 00.

**Scoring:** One point per QSO. Asians use non-Asian countries for their multiplier. (ARRL DXCC list) Non-Asians use prefixes of Asian countries worked for their multiplier. (CQ WPX list) Note: Ogasawara JD1 (Bobin & Volcano) are in Asia. Minamitori Shima JD1 (Marcus) is in Asia. (KA contacts do not count)

**Final Score:** Total QSOs from each band times the sum of the multiplier from each band.

**Awards:** To the highest scorers, both phone and c.w. as follows: Single operator, all band in each country and each USA call area, up to the 5th rank where returns justify. Single band and multi-operator entries, in each country only. Continental leaders will receive a medal.

**Logs:** Keep all times in GMT, fill in country or prefix column only first time it is worked, and use a separate sheet for each band. A summary sheet showing the scoring and other information and a signed declaration is also requested.

Disqualification regulations are strictly enforced so check your log carefully. Non-Asians use prefixes for their multiplier, not countries. Club stations are classed as multi-operator. Each operator of a multi-station will give his age in the exchange.

Logs must be *received* no later than Sept. 30th for phone entries and Nov. 30th for the c.w. section. Logs go to: J.A.R.L. Contest Committee, P.O. Box 377, Tokyo Central, Japan. Include an IRC and s.a.e. for copy of results.

### *Asian Country List*

A4, A51, A6, A7, A9, AP, BV, BY, CR9, EP, HL/HM, HS, HZ/7Z, JA/JE/JF/JH/JI/JJ/JR, JD1, JT, JY, OD5, S21, TA, UA/UK/UV/UW9-Ø, UD6/UK6C-D-K, UF6/UK6F-O-Q-V, UG6/UK6G, UH8/UK8H, UI8/UK8A-G-I-L-O-T-Z, UJ8/UK8J-R, UL7/UK7, UM8/UK8M-N, VS6, VS9M/8Q6, VU, VU (Andaman & Nicobar) VU (Laccadive) XU, XV, XW8, XZ, YA, YI, YK, ZC4/5B4, IS (Spratly) 4S7, 4W, 4X/4Z, 7Ø

### 1976 All Asian Phone Results

**U.S.A.**

**All Band**

| | |
|---|---|
| K3MNT/7 | 46,428 |
| AA6VEF/6 | 35,629 |
| W6MAR | 29,413 |

**7 MHz**

| | |
|---|---|
| W6PXG | 4,625 |
| WB6CEI | 2,552 |
| WA6VNR | 119 |

**14 MHz**

| | |
|---|---|
| W6CCP | 43,710 |
| K6HIH | 30,053 |
| W6OKK | 26,363 |
| W3WJD | 9,860 |
| W5TMN | 8,745 |
| AA6OWM | 3,339 |
| W2GXD | 3,250 |
| AD2BQO | 2,838 |
| WA1STN | 1,800 |
| W4BAA | 1,782 |
| K1RQE | 1,365 |
| W4EEO | 128 |
| AB4WHE/4 | 36 |

**21 MHz**

| | |
|---|---|
| AA6MQS/6 | 3,312 |
| WA6DNM | 466 |

**Multi-Op**

| | |
|---|---|
| W6PAA | 89,890 |

**Canada**

**All Band**

| | |
|---|---|
| VE7UBC | 13,098 |

**14 MHz**

| | |
|---|---|
| VE7BGK | 8,400 |
| XJ5RA | 6,588 |

**Dom. Rep.**

**All Band**

| | |
|---|---|
| HI8LC | 600 |

**Salvador**

**14 MHz**

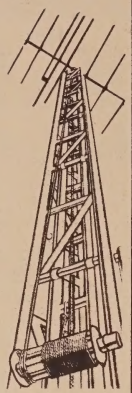
| | |
|---|---|
| YS1MAE | 4,175 |

**Continental Winners**

| | |
|---|---|
| UW9AF | 184,907 |
| AG6JFY | 128,412 |
| UA3SAQ | 93,852 |
| K3MNT/7 | 46,428 |
| 5Z4OM | 35,880 |

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(S. Yemen) 70 (Kanaran) 8Z4, 9K2, 9M2, 9N1, 9V1.

### *DL Activity QRP C.W. Contest*

Starts: 1500 GMT Saturday, July 2
Ends: 1500 GMT Sunday, July 3

Power is limited to 10 watts input or less, single operator and c.w. only. QRO stations may participate but only contacts with QRP stations are valid. Limit your operation to 15 hours. The 9 hour rest period may be taken in two parts. Contacts may be made on any 5 bands in the 1.8 to 28 MHz group.

**Exchange:** RST plus QSO number and power input. Add "x" if crystal control. (579001/8x) Stations using more than 10 watts indicate QRO instead of power number.

**Scoring:** Contacts with stations in same country 1 point. Other countries but same continent 2 points. DX on other continents 3 points. If QSO is with another QRP station add 3 more points. (4 to 6 pts.) There are also handicap points as follows: 1 if station worked is using 3.5 watts or less or is xtal controlled, double points if both stations in QSO meet above requirements. (Gets a bit confusing. DJ7ST could make scoring a bit simpler.)

**Multiplier:** Each DXCC country worked on each band. One if on own continent, 2 if on another continent. Each call area of JA, PY, VE, VK, W/K and ZS considered separate for scoring.

**Final Score:** Total QSO points from all bands times the sum of the multiplier from each band. (Scoring for QRO stations same.)

Use separate log sheet for each band and a summary sheet showing the scoring, times of rest period and equipment information. Plus the usual signed declaration.

Mailing deadline is July 31st to: Hartmut Weber, DJ7ST, D-3201 Holle, Kleine Ohe 5, West Germany.

### *IARU Radiosport Championship*

We do not have detailed rules of this event at this time, but potentially this could develope into the biggest on the air event of all time. A world-wide sweepstakes as it were.

Organized by the ARRL under the auspices of the International Amateur Radio Union, it will receive world wide publicity through the more than 90 member national societies.

Following is a brief outline of the rules.

**1. Contest period:** July 9 and 10 UTC. Single operator stations limited to 36 hours.

**2. Eligibility:** All amateurs worldwide, single and multi-operator, single transmitter categories. No multi transmitter.

**3. Bands:** All amateur bands, 160 thru 2 meters. Each station may be worked once per band, regardless of mode. Crossband not allowed but Oscar contacts OK and count as separate band.

**4. Exchange:** Signal report and ITU Zone. A zone map appeared in the May '76 *QST,* and will also be sent with each request for log forms.

**5. Points:** Contacts within one's own DXCC country count 1 point, within own continent 3 points, and outside own continent 5 points.

**6. Multiplier:** The sum of the number of different ITU Zones worked on each band.

**7. Scoring:** Final score equals total QSO points times the Zone multiplier.

**8. Awards:** Certificates to the highest scorer in each ITU Zone, DXCC country, U.S. state, and Canadian province. Additional certificates and other awards in each country at the discretion of that countries national society.

All entries worldwide to be sent to IARU Headquarters, Box AAA, Newington, CT 06111 USA. All U.S. and Canadian entrants *must* use official log forms and summary sheets which can be obtained from the ARRL.

### *Venezuelan Contest*

Phone: July 2-3—C.W.: July 30-31
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is a world wide type contest, all bands 10 thru 80. There are four categories, single operator, single and all bands, and multi-operator, single and multi transmitter, all band only.

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

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

**Multiplier:** One for each country, and each YV call area contacted on each band.

**Final Score:** Total QSO points multiplied by sum of different countries and YV call areas worked on each band.

**Awards:** Trophies to the top scorers in each category. Medals to the winners in the following areas: Caribbean, Central America, No. America, So. America, Europe, Asia, Oceania and to the top s.w.l. scorer. Certificates to all stations making following totals: Caribbean, Central, North and South America, 20 YV's and 10 other countries for s.s.b., 15 YV's for c.w. Europe and Africa, 10 YV's and 10 other countries. Asia and Oceania, 5 YV's and 10 other countries. S.W.L., 50 complete QSO exchanges at least 10 of which must be YV's.

Times must be logged in GMT, indicate multiplier only first time it is worked on each band, and use a separate sheet for each band. Include a summary sheet showing the scoring and other information, and the usual signed declaration. The usual disqualification rules will be in effect.

A remittance of $2.00 or its equivalent in IRC's is requested with each certificate application. Deadline for mailing is Sept. 15th for phone and Oct. 15th for c.w. to: Radio Club Venezolano, P.O. Box 2285, Caracas 101, Venezuela.

***CQ Reviews:*** *(from page 57)*

spectrum analyzer was 61 db down from full output. All other spurious was greater than 67 db down. An effective protection circuit samples standing wave ration and reduces drive accordingly.

The TR-7400A instruction book includes a schematic diagram and a block diagram, but does not cover much of the theory of operation. Routine adjustment points are called out on the internal photographs and operational procedures are well detailed. I would suggest the purchase of the service manual from Kenwood for you fix-it-yourself types.

Performance is consistent with what you have come to expect from Kenwood equipment. The TR-7400A is a lot of f.m. transceiver for the money and should prove to be another sales success for Kenwood. ■

***Providenciales*** *(from page 22)*

Immediately following the contest, the majority felt that "elbow exercise" was in order, so George VP5CW and his XYL, Ruth lead the way down the hill to the Third Turtle Inn. And of course, wild radio stories were the main topic of conversation. I would like to mention at this point that I thoroughly enjoyed the island cuisine. The lobster was the best I had ever eaten and the hospitality was great.

By late afternoon Monday, all VP5s had signed their own calls off the air and began packing up the gear for the trip back to the USA. Why does it always seem to take less time to take it down than to put it up? Tuesday, it was necessary to say farewell to this paradise and the joy of amateur radio DXing from this fabulous location. Enroute home we stopped at Grand Turk Island and what a contrast—for here is a modern island with all those "creature features"—considerably different from Provo.

A special thanks to Bill Dodson, VP5BD, a Provo resident, who introduced me to some of the special highlights of the island. I will, of course, always have good memories of this entire trip, including the good stop-over visits in Florida with Ron Blake and Bill Walker. Incidentally, Bill Walker would be a good source of information if you plan to do a little DXing from Provo. I can truly say I have never seen a more dedicated amateur radio contest group than the North Florida DX Association. It was my pleasure to have been a small part of this outstand-DXpedition. I am happy to report that I have just received word from the *CQ* World Wide Contest Director that VP5M is the Multi-Multi Phone Contest Champion for 1976. They also established a new all time high score record for North America. WHAT A FINALE! ! ! ! ■

***The Phantom Strikes Again*** *(from page 50)*

he whispered, "the break I've been looking for . . . this is it!"

"What's the matter, Pete? You look kind of funny."

"Alf, you've got to teach me how to do that. Do you *hear* me?" His eyes were afire with determination, his words, slow and measured.

"Sure, Pete. It's easy. I just showed you the basic technique." He studied his friend's face, jaw firmly set, muscles tensed, like a big cat about to spring for his jugular had the reply been "no."

"Well," demanded Pete, his fingers drumming a devil's tattoo upon the table.

Alf slowly recounted the method called phantom copying, attempting to explain the reasons why some have found it a good weaning phase away from all "putting-it-down-on-paper" copying. But Pete didn't have to be sold on its merits. "Now let me try it," he interrupted, putting a sudden QRT to the monologue. He was like a kid who had just been instructed on how to put a roll of caps into his new Ranger six-shooter.

There sat Pete, eyes shut, index-finger arched and trembling, a smile of anticipation on his face, waiting for Alf to send something. What a moment! If only the other patrons around them knew the importance of what was about to take place.

Slowly Alf's eyes wandered across the room to pick out something suitable to send. There's one, and there's another. He dit-dahed both. Then another, and another.

"Ladies . . . Gents . . . No Checks Cashed . . . Millers On Tap . . ." And so it went, one successful c.w. burst after the other. Peter would softly squeel after each little success and squirm with delight. "More, send me some more."

Fran eased by the table and, seeing Pete in this agitated state with his eyes shut and his finger proudly arched on the table, attempted to speak up, but Alf just smiled and waved her off. She left reluctantly, shaking her head at what a couple of beers could do.

"It works," he sighed, contented and exhausted after his arduous ordeal. "I was copying using only my finger . . . incredible."

"It's the beginning of 'armchair' copying, you know.

Pete's face came aglow at the happy prospect: "Armchair copying," he purred to himself.

Alf studied his friend's face on *armchair,* noting a certain faraway look in his eyes. "Once you get the hang of armchair copying, you'll get real pleasure from working c.w. The whole thing gets easier and easier.

"Alf," I can't thank you enough . . . really. I'm going to practice this phantom copying until I won't need a pencil any more, except for the logbook. If I can ever repay the favor some day . . ."

Alf, unaccustomed to such feelings of gratitude from his old friend, magnanimously waved them

off: "It was nothing."

"Tell you what... I'm going to buy you a couple good cigars right now," Pete said, rising from his seat, "meet you by the door."

Alf's mouth opened but he made no sound as he watched Pete trailing off to the front of the establishment. "Hey, the check!"

"I gave you the check," said Fran, quickly on the scene.

He slowly withdrew his wallet, mumbling something under his breath. ■

**Plumbicon Camera** *(from page 38)*

sandpaper around a 1⅛ inch cardboard tube or dowel and ease these holes until the deflection yoke tube just passes through them. Using a jigsaw or coping saw, cut the outside diameter of these pieces. Slip over the tube and sand the outside diameter until these pieces are a free fit without excessive slop in the focus coil. Epoxy cement the remaining two pieces together. When cured, check fit on defection coil tube and in focus coil. If tight, ease with sandpaper. Drill a ⅛ inch diameter hole in this part to accommodate deflection coil wires and epoxy cement to the deflection coil tube. This part must be aligned with back of the focus coil when the front of the defelection coil tube is just touching the target connector ring. When dry, cut two 2 inch lengths of 1½ inch cardboard tube. Divide the inside of one into 3 equal parts and draw 3 longitudinal lines inside this tube. Cut the other into 3 equal parts which will fit inside the marked tube with three ⅛ inch gaps around the tube. Cement these pieces in place with Spray-

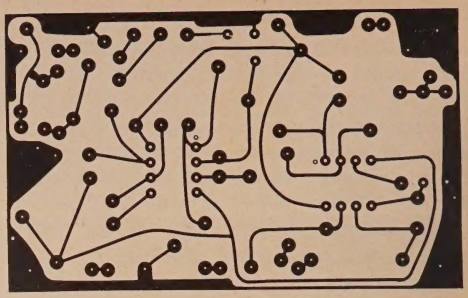
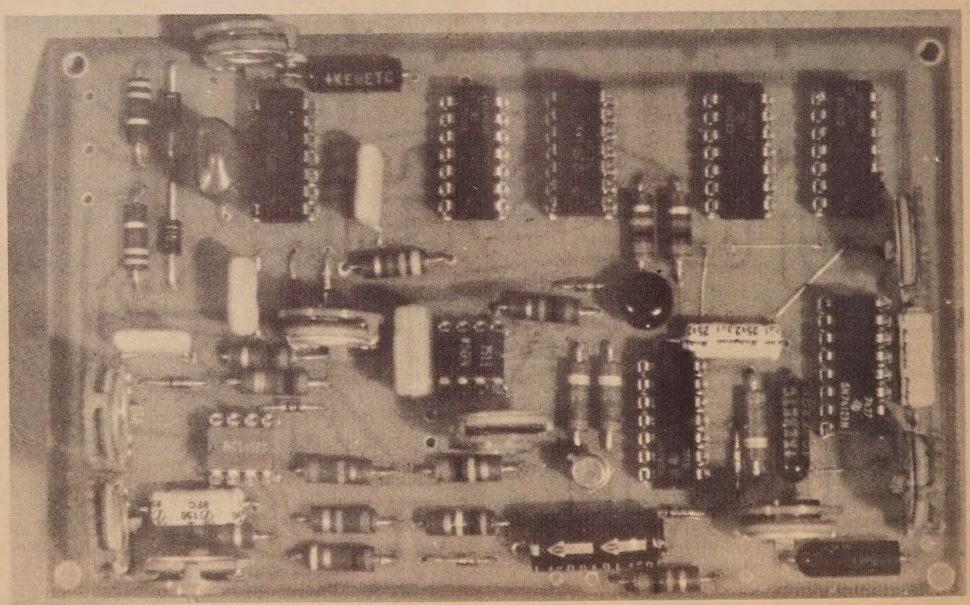


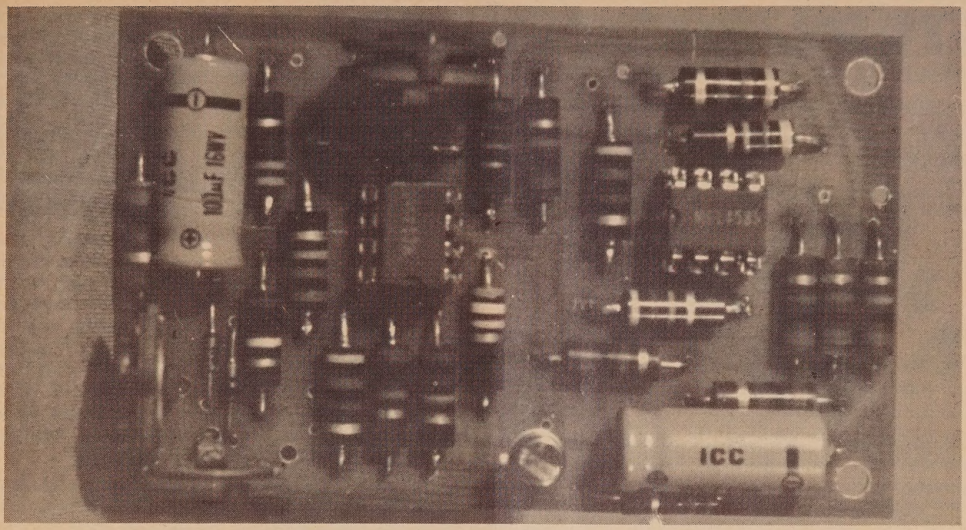
*Fig. 4—Foil layout of the video amplifier circuit board (foil side).*

ment.® Cut a slot in this assembly to clear the ⅛ inch hole drilled for deflection coil wires on the rear deflection tube location ring. Cement this assembly in place at the rear of the deflection yoke tube with epoxy. When dry, clear the slots on the rear protrusion to the inner deflection tube. Bend a 1/32 inch thick by ½ inch wide tube clamp and slip over the tail piece. Insert this tube into the focus coil and clamp in place with a number 6 self-tapping screw threaded edgewise through the rear focus coil flange.

Cut 4 deflection coil formers ¾ by 1 inch. These were made from 1/16 inch thick cardboard. A piece of this material was cut with a razor knife and straight edge ¾ inch wide by about 8 inches long. This was then scored ¼ inch from each edge to about half its thickness. A drilling jig was then made from ⅛ inch plywood by locating a ¼ inch diameter hole ½ inch from one edge and ⅜ inch



*View of the timing circuit board (see fig. 3).*




*View of the video amplifier circuit board (see fig. 4).*

from the other edge. The cardboard former strip was clamped between this jig and a block of wood and the one hole was drilled. The former was then cut off to 1 inch length and a second, third, and fourth were similarly cut. By bending away from the score marks a radius was imparted to these formers.

Using the winding jig shown, each coil was wound on a hand drill clamped in a vise. Horizontal coils had 680 turns of number 32 wire, vertical coils had 800 turns of number 32 wire.

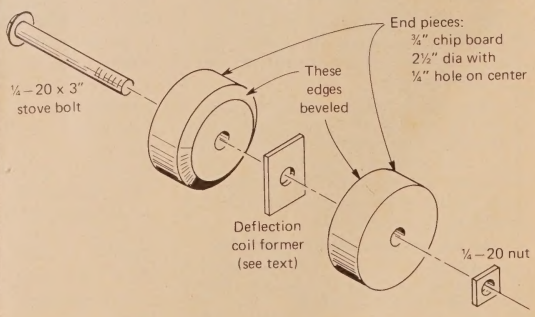
When wound, the fixture was separated leaving the coil laying on one half of the fixture. This was coated with plastic model cement and left to become partially dry and very tacky. The bolt was then removed from the center and the coil was laid on a 1¼ inch antenna mast pipe coated with wax paper. The remaining fixture half was removed and the coil was coated with plastic model cement. When tacky, a piece of wax paper was laid over this coil and the coil wrapped around the mast and tightly held in place with 3 pieces of plastic electrician's tape until dry.

Between coils, it was necessary to sand the glue from the fixture and coat with paste wax.

When all coils were complete, the horizontal coils were placed on the deflection tube and held in place temporarily with a ¼ inch bolt. They were aligned and held in place with PVC tape. The vertical coils were similarly secured to the assembly. The horizontal coils were then connected in series and, to ensure that the magnetic field was aiding, a compass was placed close to each coil and current from a 9 volt battery was passed through the coils. The compass should point to the deflection assembly on one side and away from the assembly when placed on the opposite side. The vertical coils are wired in the same manner.

If one plans to use a "C" mount lens with this assembly, it will be necessary to provide a ½ inch spacer between the coil assembly and the "C" mount. The face of the Plumbicon should initially be about 5/16 inch from the front face of the "C" mount.

(To Be Continued)




*Simple winding jig described in the text.*

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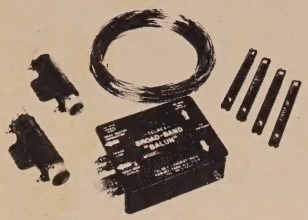
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# Novice-General

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**QRP** *(from page 39)*

than 100 milliwatts input! In the summer of 1974 I purchased a Ten-Tec Argonaut, a truly amazing little rig. For the first several months I used it at a number of portable locations with fair results. Finally, on October 4, 1974, I put it into operation at my home station. The results exceeded my wildest expectations. In short order I worked most of the European countries, and the possibility of *DXCC QRPp* began to intrigue me. In 57 short days this goal became a reality, with the *CQ WW CW Contest* providing 20 or so of the last countries needed. Also, during this period I took part in the *CW Sweepstakes* and worked all 75 sections in about 15 hours operating time. Some of the highlights of the *DXCC QRPp* drive were QSO's with ZM7AH and FW0AA on one call through large pile-ups. There were only a few short excursions to s.s.b., one of which yielded a 59 from A2CCY. Many other rather choice ones were worked without a great deal of difficulty. No superhuman skills or large antenna farms were involved in attaining *DXCC QRPp*. What I did could be done by countless experienced c.w. DX'ers. I feel very strongly about some of the following observations on c.w. DX work in general, and I'd like to share them with readers. Let us call them THE MFO AXIOMS, for want of another term.

AXIOM #1: Absolute mastery of c.w. is necessary. You should be able to copy anything on the bands under any conditions (*e.g.* 50 wpm of chirpy, unstable c.w.). C.w. should become so familiar that you can copy it while reading, carrying on a conversation, listening to music, or even while you are three-quarters asleep. In other words, c.w. should be as natural as your native language. I believe that it was KH6IJ who said: "any operator worth his salt is good for at least 60 wpm." There is considerable merit to this statement.

AXIOM #2: *Learn and practice good operating procedures.* I wish I had a nickel for each minute that I have spent throughout the years listening to operators such as KV4AA, W4KFC, W9IOP, W9WNV *et al* who know *how* to operate. There are countless other operators around to model yourself after. Some of the good habits useful in DX operating follow. Listen to what the DX operator is doing—if he is listening 5 KHz above his operating frequency, do not call him zerobeat. If he does not accept tailenders, do not tailend. Be considerate of your fellow DX'ers. If the DX station calls for WA1?, know enough to hold off if you are not a WA1.

AXIOM #3: *Know how to operate your rig.* It is absolutely essential that you learn such basic elements as zero-beating, placing your transmitter on a particular frequency, and using your c.w. filter, crystal filter phasing, Q-multiplier, etc., to the utmost. I have heard many an amateur miss choice DX QSO's simply because they could not place their transmitters on the proper frequency. I do not wish to comment on ideal rigs. What I am suggesting is maximum utilization of whatever you have.

AXIOM #4: *Pick your spots (or, know what you are capable of working).* You should know almost immediately what your chances are of working a particular DX station. A lot of this will depend on your station and antenna. For example, you would not want to spend much time in a pileup for BY1PK if you run 25 watts into an underground garbage can antenna! If the whole band is calling a super-rare DX station, you might look around for a semi-rare one with few callers. The whole key



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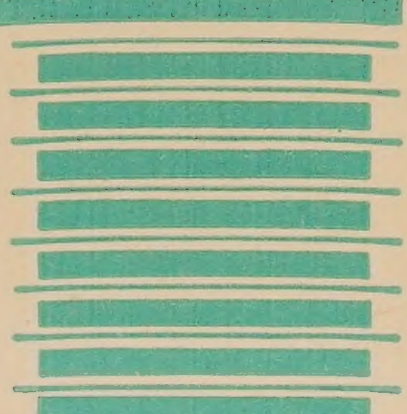
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is not to waste your time and become discouraged when you can't work something.

AXIOM #5: *Keep current on DX.* Subscribe to DX bulletins—they are invaluable in keeping you on-board about who is active, what DX-peditions are coming up, etc. These bulletins will give you times and frequencies used by a particular station. You should also listen as frequently as you can, so that you will have an idea of what conditions are like at a certain time of the year. One of the best times to get on the bands is just prior to and just after the DX contests. Much DX can be worked easily in these lull perids.

AXIOM #6: *Do not become discouraged—Keep things in perspective.* If you miss a DX-pedition or a rare one leaves a country, it is not the end of the world. Chances are that you'll get another chance at a future date. Also, remember, if you've worked everything there is to work, what have you got to look forward to? Years ago, I remember reading a comment made by a DX'er: "To be successful in working DX, you have to be very young, very old, or unmarried." For practical reasons, you often cannot control these factors.

I do not claim to have all of the answers for successful c.w. DX'ing. However, I do believe in what I have said above, and I manage to get my share of DX with a very modest setup. The satisfaction that I get in making a QSO with a rare one while others who are 3-4 S units stronger do not get the QSO is immense. In any walk of life, you have to take certain measures if you are to be successful. The MFO AXIOMS, if followed, cannot ensure DXCC Honor Roll standing, but they could be helpful in making a few more DX contacts."

And next, W6PQZ, John K. Akiyama (1161 North Ridge Pl., Monterey Park, CA 91754) writes:

"On March 1, 1975, I bought an Argonaut 505 from another ham. This was hooked up to my Th3Jr up 70 ft. when I got it home. During the first month I operated in the *ARRL DX Test* (March 1-2) and the *CQ WPX Test* (March 29-30) and worked 43 countries—all on s.s.b.—so I really got hooked on QRPp DX'ing and still am. It was eight months later that I worked IS0PJP on October 20, 1975, for my 100th country. All were s.s.b. and mostly worked on 15 and 20 meters. The toughest areas to work were Europe and Africa from my West Coast location. However,

*(Continued on page 80)*


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## Math's Notes *(from page 43)*

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**Siemens Corp.,** Components Div., 186 Wood Ave., S. Iselin, NJ 08830
**Signetics Corp.,** 811 E. Arques Ave., Sunnyvale, CA 94086
**Silicon Transistor Corp.,** Katrina Rd., Chelmsford MA 01824
**TRW Semiconductors,** 14520, Aviation Blvd., Lawndale, CA 90260
**Texas Instruments,** Components Group, Box 5012 M/S 84 Dallas Texas 75222
**Varo Semiconductor, Inc.,** Box 676, Garland, Tex. 75040
**Westinghouse Electric,** Semiconductor Div., Youngwood Pa. 15697

73, Irwin, WA2NDM

## Novice *(from page 55)*

**I. Applications:**

A. All applications must be submitted on the official CQ WPX application form, CQ1051A.

B. All contacts must be made from the same call area.

C. All call letters must be in strict alphabetical order and the entire callsign must be shown.

D. All entries must be clearly legible.

E. Cards need not be sent with the application, but they must be in the possession of the applicant. Any and all cards may be requested by the WPX Award Manager, or by the CQ DX Editor.

F. An application fee of $1.00 must accompany the application.

G. All applications should be sent to the WPX Award Manager, Mr. Bob Huntington, W6TCQ, 5014 Mindora Drive, Torrance, CA 90505; or to the DX Editor, Mr. John Attaway, K4IIF, P.O. Box 205, Winter Haven, FL 33880.

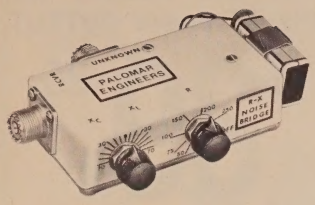
**II. Definition of Prefix**

A. A prefix is the 2 or 3 letter/numeral combination which forms the first part of any amateur call.

B. Any difference in the numbering, lettering or order shall constitute a separate prefix. The following are examples of different prefixes: A4, N6, G3, DL1, EA3, I2, KØ, W2, WA2, WB2, WD2, KP4, KH6, KL7, 3A2, 5N2, 6W8, 7Q7, 9G2, 9M4, 9M6, etc.

C. A suffix designating portable opera-

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tion in another country or call area will count if it is the normal prefix used in that area. For example, K4IIF/KP4 counts for KP4.

D. All portable suffixes without a numeral will be assigned an arbitrary Ø. For example, W4BPD/LX counts as LXØ. However, suffixes denoting mobile or portable operation, such as, /M, /MM, /AM, etc., do not count.

An application for WPNX may be submitted after you have qualified for a higher class license if the contacts were made as a Novice. Prefixes used for the WPNX Award may later be used for credit toward the CQ WPX Award.

## Propagation *(from page 63)*

| | | | | |
|---|---|---|---|---|
| Central & Northern Europe & European USSR | *Nil* | 06-07 (1)<br>07-09 (2)<br>09-14 (1)<br>14-17 (2)<br>17-19 (1)<br>21-23 (1) | 20-22 (1) | *Nil* |
| Eastern Mediterranean & Middle East | *Nil* | 06-08 (1)<br>14-16 (1)<br>19-20 (1)<br>20-22 (2)<br>22-23 (1) | 20-22 (1) | *Nil* |
| Western Africa | 10-14 (1) | 07-09 (1)<br>14-16 (1)<br>16-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 20-23 (1) | *Nil* |
| Eastern & Central Africa | *Nil* | 14-16 (1)<br>16-18 (2)<br>18-19 (1)<br>06-08 (1) | *Nil* | *Nil* |
| Southern Africa | *Nil* | 06-08 (1)<br>13-16 (1)<br>22-00 (1) | 20-21 (1)<br>21-22 (2)<br>22-23 (1) | 20-22 (1) |
| Central & South Asia | *Nil* | 07-08 (1)<br>08-10 (2)<br>10-11 (1)<br>18-20 (1)<br>20-22 (2)<br>22-23 (1) | 05-07 (1)<br>18-20 (1) | *Nil* |
| Southeast Asia | 15-17 (1)<br>20-23 (1) | 07-09 (1)<br>09-11 (2)<br>11-12 (1)<br>21-23 (1)<br>23-01 (2)<br>01-03 (1) | 03-05 (1)<br>05-06 (2)<br>06-07 (1) | 04-06 (1) |
| Far East | 14-16 (1)<br>20-23 (1) | 07-10 (2)<br>10-13 (1)<br>21-23 (1)<br>23-00 (2)<br>00-02 (3)<br>02-04 (2)<br>04-07 (1) | 02-03 (1)<br>03-04 (2)<br>04-05 (3)<br>05-06 (2)<br>06-07 (1) | 03-06 (1) |
| South Pacific & New Zealand | 13-15 (1)<br>15-17 (2)<br>17-20 (3)<br>20-21 (2)<br>21-22 (1) | 02-07 (1)<br>07-10 (2)<br>10-16 (1)<br>16-18 (2)<br>18-19 (3)<br>19-22 (4)<br>22-00 (3)<br>00-02 (2) | 23-01 (1)<br>01-02 (2)<br>02-06 (3)<br>06-07 (2)<br>07-08 (1) | 00-02 (1)<br>02-06 (2)<br>06-07 (1)<br>02-05 (1)* |
| Australasia | 15-18 (1)<br>18-21 (2)<br>21-22 (1) | 19-21 (1)<br>21-22 (2)<br>22-00 (3)<br>00-02 (2)<br>02-07 (1)<br>07-09 (2)<br>09-13 (1)<br>13-15 (2)<br>15-16 (1) | 00-01 (1)<br>01-04 (2)<br>04-06 (3)<br>06-07 (2)<br>07-08 (1) | 02-05 (1)<br>05-06 (2)<br>06-07 (1)<br>04-06 (1)* |
| Caribbean, Central America & Northern Countries of South America | 15-18 (1)**<br>10-13 (1)<br>13-15 (2)<br>15-16 (3)<br>16-17 (4)<br>17-18 (3)<br>18-19 (2)<br>19-20 (1) | 06-07 (1)<br>07-10 (3)<br>10-15 (2)<br>15-18 (3)<br>18-21 (4)<br>21-22 (3)<br>22-23 (2)<br>23-02 (1) | 19-21 (1)<br>21-22 (2)<br>22-03 (3)<br>03-05 (2)<br>05-06 (1) | 20-21 (1)<br>21-03 (2)<br>03-05 (1)<br>23-04 (1)* |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 12-16 (1)**<br>10-12 (1)<br>12-13 (2)<br>13-14 (3)<br>14-15 (4)<br>15-16 (3)<br>16-17 (2)<br>17-18 (1) | 05-07 (1)<br>07-09 (2)<br>09-15 (1)<br>15-17 (2)<br>17-18 (3)<br>18-19 (4)<br>19-21 (3)<br>21-23 (2)<br>23-00 (1) | 20-21 (1)<br>21-23 (2)<br>23-01 (1)<br>01-03 (2)<br>03-04 (1) | 22-03 (1)<br>00-02 (1)* |
| McMurdo Sound, Antarctica | 16-18 (1) | 17-20 (1)<br>20-23 (2)<br>23-01 (1)<br>07-09 (1) | 21-23 (1)<br>02-03 (1)<br>03-06 (2)<br>06-07 (1) | 04-06 (1) |

## DX *(from page 61)*

**ZD8BC**—Via E. W. Kinkelaar, Jr., KP4EKI, Box S-2029, San Juan, PR 00903
**ZL2BIY**—To K4II, 1018 Woodburn Rd., Spartanburg, SC 29302
**5N2NAS**—*NOT* to WB2MFC. Send to WB8MFC.
**5V4AR**—c/o F6ACB, 22 Rue Cournil, F-47 Villeneuve-sur-Lot, France
**5W1AB**—Via Leo Haijsman, 1044 S. E. 43rd. St., Cape Coral, FL 33904
**5Z4PG**—To M. F. Lassanske, WB9MFC, W 137 S, 6823 Dunstan Ct., Hales Corners, WI 53130
**9D5D**—c/o K1DFC, 4 Westwood Drive, Belchertown, MA 01007
**9J2WS**—Via W4RF, W. H. Trogdon, 349 Brookside Dr., Asheboro, NC 27203
**9K2EH**—To OZ8EH, c/o Valdemar Sejrsvej, 35-2, DK-4300, Holbaek, Denmark
**9K2EP**—c/o J. Hallenberg, SM0DJZ, Sleipnerg 64, S-19500 Mersta, Sweden
**9L1MD**—Via G3TEJ, M. C. Dighton, 7 The Close, Godmanchester, Hunts., England
**9X5RK**—To D. G. Marceill, 6437 Eaglecrest Dr., Charlotte, NC 28212

Anyone needing a confirmation for one DJ6QT's African DXpeditions between 1970 and 1975 should QSL via Horst Lemp, DL8PC, An Der Kirche 6, D-6364 Florstadt 6, West Germany. The calls for 1970 were: TZ2AB, XT2AB, XT2AC, TY9ABC, TY0ABD, ZD3N, ZD3P and CT3/DJ6QT; for 1971: TZ2AC, XT2AC, 5V8WS, TY0ABD, DJ6QT/5U7, DJ6QT/5T5, EA8GK (only Nov. 12) and CT3/DJ6QT; for 1972: XT2AC, TZ2AC, TY0ABD and 5V8WS; and for 1973-75 the call was CT3/DJ6QT.

73, John, K4IIF

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FOR SALE: Heath HW-16 novice transmitter & HG-10B VFO both in excellent condition-$140.; Hallicrafters HA-1 T0 Keyer & Autronic Paddle to be sold as a set only-$60.; Collins KWM-2 with 516F2 Power Supply & Speaker, excellent condition-$650.; Collins PM-2 Portable Power Supply-$75.; Hammarlund SP-600 Receiver-$100. K4IIF, Box 205, Winter Haven, FL 33880. (813) 324-4122.

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MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

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CUSTOM EMBROIDERED EMBLEMS, your design, low minimum, Emblems, Dept. 10, Littletown, New Hampshire 03561.

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ENJOY the best DXing at Paradise Hotel, Ambergris Cay 35 miles off coast of Belize, Central America. Guaranteed zero noise level and perfect operating conditions. While off air enjoy best of fishing, diving & swimming in the clear white sand Carribean. Antenae on premises. USA Office 9225 Katy Frwy., Houston, Texas 77024 713/461-2027.

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SELL: Operational c.w. system $320.00. Drake 2C Receiver & 2NT Transmitter Ten-Tec 200 VFO & KR-20 Keyer Antenna, Filter. R.W. Lussier, 284 Windsor Pl., Brooklyn, NY 11218. 212/499-4439.

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TECH MANUALS for Govt. surplus gear -- $6.50 each: SP-600JX, URM-25D, SG-3/U, TS-173/UR, TS-174/U, LM-21, OS-8B/U. Thousands more available. Send 50 cents (coin) for 22 page list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

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QSL's - SOMETHING COMPLETELY DIFFERENT! Nothing even close to it on the market! The "Cadillac" of QSL's! Samples: 50 cents (Refundable). W5UTT; Box no. 1171-E; Garland, Texas 75040.

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PERSONALIZED BADGES - $1.50 Send Name and Call. 4-Line Rubber Stamps - $2.95. W5UTT; Box no.1171-E; Garland, Texas 75040.

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B & K test equipment. Free catalog. Free shipping. Dinosaur discounts. Spacetron-E, 948 Prospect, Elmhurst, IL 60126.

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QSL Cards Printed - Sample 20 cents. Printed Shop, P.O. Box 13, LaGrange, IL 60525.

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WANTED: Second-Hand but good operable SSTV Monitor as Robot Model 70, Venus SS-SS-2, SBE, SEEC. Condition, your price and shipping. Darcy Brownrigg, Chelsea, Quebec, JOX IN0, Canada.

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2-METER CYRSTALS, $3.50 each, for all popualr rigs. In Stock. Immediate delivery. Send cash or money order, we pay postage. ROLIN DISTRIBUTORS, P.O. Box 436, Dunellen, NJ 08812.

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LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

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Medical: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906, (617) 233-1234.

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WANTED: Barker and Williamson HDVL coils, base and link. Bill Orr, EIMAC, 301 Industrial Way, San Carlos, CA 94070.

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Sale: Atlas 210B complete with 110/220 V AC Console. Excellent condition. $550 PP. With mods (r.I.T., etc.) as per my Feb. CQ article and latest factory updates. Great rig. Only reason for sale is that am now in CN8 and CN8 will not issue license. Schultz, K3EZ, Box "L", FPO New York 09544.

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SELL: 4-1000 A used, $30. Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch, $16. UTC S-50 kv c.t. 300 ma, new, pick-up only, $75. Small (2 kw) $20. R. Ross, 95 Norwood Ave., Norhtport, NY 11768.

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ATTENTION: The book "CQ YL" has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June '76. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 9412 Rio Grande Blvd., N.W., Albuquerque, NM 87114, Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.50, postpaid.

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WANTED: Antique glass. Looking for old milkglass purple slag, carmel and greentown too. Tell me what you have — I pay the highest prices. Write: Jack Schneider, c/o Cowan Publishing, 14 Vanderventer Ave., Port Washington, L.I. N.Y. 11050.

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WANTED: VFO for low bands, self powered. Want FT-243 crystals 80 meters c.w. (general). Robert F. Voelker, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

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SELL: Project fell thru-25 IA-1000V (Hep 170) diodes-$5.00. Fred J. Gaisser, WDX20B, 22-28 Greene Ave., Ridgewood, NY 11237.

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TRADE: 24 ch. Sonar VHF rcvr. FR-2S13 with 32 srystals. Trade for Robot 70 Monitor. Fred J. Gaisser, 22-28 Greene Ave., Ridgewood, NY 11237.

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DXers! Ham sentences in 54 languages on your card get DX QSLs. K3CHP's DX QSL guide, $3.95. It works! Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

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SPEC-2 Synthesized 2MFM Transceiver with 110/12 VPS and 10W Amp built in. Indep. TR freqs. Uses R-P synthesizer & HT 220, $325. SASE for 150 item list. K2DCY, 11 Squire Hill Rd., N. Caldwell, NJ 07006.

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HEATH SB 104 xcvr. New Nov. '76, beautiful condition, $595. D. Sachnoff, 17103 Magnolia, Hazel Crest, IL 60429. (321) 335-4231.

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SELL: RME 69 RX, $100. L&W 6&2 mtr. xntr., $20, viking mobile xmtr., $10. TA-33 SR Beam, $100. S. Olster, Rt. 1, Box 392B, W. Hurley, NY 12491.

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WANTED: 2 Meter AM xcvr, sell or trade HW-8, needs work. Prefer pickup or you ship. Brice, WB9LGZ, Rt. 7, Box 39, Greenfield, IN 46140. (317) 894-3234.

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WANTED: Collins s-line priced right. W7UD, 8518 W. 37th, Tacoma, WA 98466.

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WANTED: HO-10 Heath Scope. State price & condition. W7VRO, P.O. Box 981, Bellingham, WA 98225.

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SELL: Collins 32V3, R392 W/RTTY conv. & p/s, no.28 machine, CV89A. Joseph Schwartz, WA2JGS, 43-34 Union St., Flushing, NY 11355.

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SELL: E.F. Johnson edgewise s-meters, no. 554-0015-001, F.S. 250ua - $4.50 each. K4EPI, Roland Guard, 235 Nelson Dr., Lavergne, TN 37086.

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SELL OR TRADE: Like new Lampkin Mod. 105-B freq. meter. Also, exc. National Mod. 188 short wave and ham a.m. c.w. receiver. Hamilton, WB90EQ, 6050 North Oakly, Chicago, IL 60659.

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SELL: Clegg FM 22'er-Continuous tune rcvr., 1434-148.3 MHz with 9 xmitting freq., all crystallized. AC DC 32 watts out, excellent. $215-contact Max Sherr, W2TQP, 182 41 80th Rd., Jamaica, NY 11432.

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SELL: Tri-band spider Quad antenna. Never erected. Manual. FOB $45.00. E. Stacy, 103 E. Bartlett Ave., Selah, WA 98942.

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ESTATE SALE of WA1KAX, All mint condition. B & K Digital(vom) mo D61 w/probes. Much other equipmentals, some ham gear. Call 617/943-8221, ask for Jean After 6p.m. Est - Best reasonable offer.

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WANTED: Set of riders Radio repair manuals. State price and condition. T.K. Brown, 35 Lakeview Mob Ct., Sebring, FL 33870.

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FR4U Frequency meter with Calibration, Dumont 304AR Rack Mt 5" Scope; GE ST2A-5" Scope; make offer, cash or trade radio gear, etc. L.G. Basham, 735 Caves Hwy., Cave Junction, OR 97523.

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NEED operation manual, schematic diagram, and calibration, model 1000 Tube Tester, data on Mercury Electronics. Alan Mark, P.O. Box 372, Pembroke, Mass. 02359.

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SELLING BACK ISSUES OF QST, CQ, HR & 73. Also many ARRL Handbooks, snd manuals. Send for list to: Rod Hallen, AA7NEV, P.O. Box 73, Tombstone, AZ 85638.

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SELL: KWS-1 & Control, 75A-4, 1 KW Johnson Matchbox, S-line, including 30 S-1 & 2 & 6, 32 S-1, 75 S-3, 2 & 6. Best price. K2KKU evenings between 6:00-7:00 PM. (914) 337-8773.

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HYGAIN Trap Antenna 5BDd 10-80 meters. Doublet $40.00 FOB, prefer pickup. L.G. Basham, 735 Caves Hwy., Cave Junction, OR 97523.

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WANTED: Antique DA Unit of Rada-Radio. Made by Westinhouse. Also AR-1300 Crystal Dector Receiver - Unit of Radiola 5 Radio. William, LW2LL, P.O. Box 213, Berhlehem, GA 30620.

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SELL: 1296 KW Amplifier. Also UPX-6, 1200 MHz TX-RX. Wallace Domier, Rural Route, Buxton, ND 58218.

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HY-GAIN, 3 Element, DB1015, 10 and 15 meter beam, new boom, mast clamp and hardware, $75. Dick Shideler, 3731 Evergreen, Visalia, CA 93277.

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SELL: Heath HW-202, 2 meter 34/94, 28/88, 16/76, 52, 70, and 94 Simplex-Exc. Cond., $175, you ship, your call sign required for sale. G. Reid, WB5GII, 4523 Goodnight, Amarillo, TX 79109.

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DRAKE R4B w/xtals, $325. SBE33 needs wk $125. Viking VFO, $19. URT 2, VRC19, computers, 150 item list, SASE. K2DCY, 11 Squire Hill Rd., N. Caldwell, NJ 07006.

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SELL: Robot SSTV 70B monitor (factory mod.), 80A Camera, cables, books $475. Mike Ludkiewicz, 143 Richmond Road, Ludlow, Mass. 01056.

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SELL: Heath SB300 Excellent condition, $75 - NY Area. Dr. Eric Palmer, W2RD, 1602 Mermaid Ave., Coney Island, NY 11224.

WANTED: New or used receivers covering 1.5 30 MHz or 2 Meters. Herman J. Fuselier, 445 So. Lombard St., Opelousas, LA.

SELL: FT101B, VFO c.w. filter and fan mint, $575. HO-13 band scanner, $50. Saul Slonim, WB2QKG, 320 Rose St., Massapequa, NY 11762.

WANTED: Cabinet for Collins 75S-3B receiver. W9QCD, Ward Hardwood, Box 216, Crescent City, IL 60928.

WANTED: HBR Receiver any series. Owen Laughzin, 1310 Pinecrest, Ferndale, Mich. 48220.

FREE: Several years of QST, starting 1928, and would rather give than dump. Will be back east in May. K2PFC/7, Duane Harris, 304 Sunrise Blvd., Congress, AZ 85332.

MAGAZINES FOR SALES: CQ 1970 thru 1975—$30. 1970 thru 1975—$35. Ham Radio 1971 thru 1973—$15. 73 Magazine 1963 plus 10 misc. issues—$3.00 All prepaid. J.R. Shank, W2CNS, 21 Terrace Ln, Elizabethtown, PA 17022.

WAVEMETERS: Set of four millen wavemeters, 9 thru 150 mh. $10. postpaid. Art Johnson, K2POA, 29 Boone St., Bethpage, NY 11714.

TRADE: Vol's 1 thry 4 Riders Radio Manuals for Vol's 17 thru 23. WANT: Old National 5880 power unit. Clarence Filley, W7KE, 1109 S. 2nd St., Hamilton, MT 59840.

ROBOT SSTV 70D monitor 80A camera with new vidieon and factory alignment. 25 mm F 1.8 lens. Mint condx. $550 plus U.P.S. Peter Sils, WB8PJR, 13529 Harold Ave., Cleveland, OH 44135.

WANTED: Collins '75A2 receiver for parts. Would prefer a non-operating unit. Send info on price wanted. G.W. Chittenden, W9CMM, 3408 S. Parnell Ave., Chicago, IL 60616.

WANTED: Any c.w. transmitter 100-200 watts, VFO controlled. Runs by a.c. Will take best deal. Charles Taylor, WB5VYR, 502 S. Goodrich, Sequin, TX 78155.

SALE: Swan 270 - $275. will ship. Viking II with HAID VFO - $75. K2IGW, 341 Tracey Lane, Grand Island, NY 14072.

WANTED: ICOM 22-S; Kenwood 820. Sell 3600-0-3600 vac Plate Xfmr at 1 amp with 110/220 Pri $50, same but .65 Amp $25 fob. Paul Bittner, W0AIH, 304 W. 17, Grand Island, NE 68801.

WANTED: Any 1945 copies CQ - preferably a bound volume! Copies Don Chesser's "DX"—1 thru 64;85;180;198. ZL2GX, 152 Lytton Rd., Gisborne, New Zealand.

WANTED: Model SGI32A-AN/TRM-3 sweep gen. manual/diagram to buy or copy. Philip D. Greenway, W4LRR, 234 Elden Dr. N.E., Atlanta, GA 30342.

WANTED: pre-1940 ARRL Handbooks. Quote W9DDL, 5006 N. Second St., Loves Park, IL 61111.

FOR SALE: (as-is) Heath 5" scope $15., Eico 710 griddipmeter $20., Eico 320 sig. gen. $15., Heath SWR meter $5., Dowkey DKC-TRM-1 relay $10. R. Hajdak, 1834 Paisley St., Youngstown, OH 44511.

H.V. CAPACITORS: mica, vacuum, oil, etc., high power resistors. Write your needs for quote. Stephens, Box 18160, Cleveland, OH 44118.

MUST SELL: XYL needs money! SB-301 and HT-37. Brand new-GR-110 Heath scanner, WV-4 Drake VHF wattmeter, and shure 450 Mic. WA0NZO, Leon Kirschemann, Regent, N.D. 58650. (701) 563-4654.

WANTED: 136B Collins Noise Blanker for KWM-2A. All offers considered. What do you need from Tokyo? SELL: SB-100 &300., like new, used littlw. Houston/W6UUX/JR1YIE, Box 8233 APO SF CA 96328.

WANTED: (Large sizes) clear glass antenna insulators for collection, A.M. Kasevich, W1CDC, 43 Dover Road, Manchester, CT 06040.

WANTED: Series "60" Coils for National S.W. 3 Receiver. A.B. Morgan, VE3OI, 62 Oak Ave., Dundas, Ontario, L9H 4Y9.

AMATEUR COLLECTOR wants to buy old Radio and wireless equipment as well as early BC receivers. Also want early Handbooks, catalogs, and radio magazines before 1930. Will pay cash or trade. Erv Rasmussen, 164 Lowell St., Redwood City, CA 94062.

WANTED: (1) General Coverage Receiver in excellent condition and a name brand general Coverage Transceiver. Full details please. Earle W. Harriman, 319 N. 100th Pl., Mesa, AZ 85207.

HEATH HR-1680 Rcvr. new w/manual, $185. Heath HM-102 watt meter new w/ manual, $30. (615) 882-7539. Lee Randall, P.O. Box 746, Kingston, TN 37763.

RESORED NC33 National RX, $50. needs manual for KARR, KE23A. RX made in 1944. J. Larson, Rt. 1, Box 105B, Rosamond, CA 93560.

SELL: US and DX Callbooks. 1976, $7.00, 1975, $5.00, 1974, $4.00 each. Lowry, 3 Darlin Dr. Reading, PA 19609.

SELL: TR4, $300.00 Transmatch type 92200 $150, Shipping extra. James K. Ramsey, 4 Gregg St., Graniteville, S.C. 29892.

PACE 308 UHF-VHF-HF Scanner $95.00. Turner Plus 2 Mobile Mike $22.00. Hy-Gain 400 Roto-Brake $150.00. Bill Fulcher, 217 Bluegrass Dr., Hendersonville, TN 37075.

SELL: HW-16 with built in MFJ CWF-2 CW Filter and MFJ-200 freq. standard, 20 meter conversion parts included. Also HG-10B VFO. All for $150.00 You ship. WB2CTK, E. P. Giambastiani, 7534 Ambergate Place, McLean VA 22101.

WANTED: Coaxial Relays & Switches w/N-type conn. SPDT, DPDT, Transfer end SP4T required. C. Huth, 1233 1/2 W State, Fremont, OH 43420.

FOR SALE: Signal Corps BC-348 Excellent Condition $100.00. Also Knight Star Roamer II Good Condition $50.00 Schematics for both. T.C. Streeper, 5265 Madison Rd., Madison OH 44057.

HEATHKIT SB-401 Transmitter, excellent condition, $225.00. Will deliver 150 miles from N.Y.C., Call Briggs, (914) 939-3379 After 8PM.

SELL: Two Stewart Warner T-2820/GR Transmitters. 222-400MC. 4X150A Outputs. in final. $50 for the two. Pick up only. Fred Van Pala, 70-64 45 Ave., Woodside, N.Y. 11377.

WANTED: One Regency Converter Model ATC-1. For Mobile Use. Phil Pichette, VE7ADW, Box 183, Salmo B.C. Canada V0G-1ZD.

WANTED: Hallicrafters 5X100, SX110, or Hammarlund HQ 100A, or HQ145X Receiver. If you have one for sale Write to: Donnie Lee, WDX3EVB, 1535 Lafayette St., Lebanon, PA 17042.

NCX-5, p.s., VFO, $390. Zea KW5-1/75A4, Custom desk and console with one $1000 per pair. Dave Heil, 64 Millers Ln. Fort Thomas, KY 41075.

URGENT: One Million Q.S.L.' and DX Cards Needed - Send Q.S.L. And DX Cards to: Philip Steven Kurland, 357 East 201 St., Apt. 1-F Bronx, N.Y. 10458.

WANTED: Schematic of "Mon-Key", 1950's Vintage Keyer. Will Reimburse copy & Postage costs. Donald L. Schliesser, K6RV, 1151 Ivy Court, El Cerrito, CA 94530.

Sell: Hallicrafters S-38B and Hammarlund Super Pro Best offer or Trade Bill Sorg, 903 S. Mass. DeLand, FL 32720.

SELL: Automotive type jumper cables percent copper, $4.00 per set. Postpaid. Lebow, 355 Mower Rd., Pinckney, MI 48169.

WANTED: SP-600 VLF or Collins R389/URR VLF rcvr. Collins 136-B2 Noise Blanker. W7KSG, 1876 E. 2990 So., Salt Lake City, Utah 84106.

WANTED: Tubes and parts for Pre 1930 Battery Radios. Gary B. Schneider, 6848 Commonwealth, Parma Heights, OH 44130.

WESTERN DIGITAL 40-pin input/control ceramic chip ER1422B and 40-pin output chip ER1432B, and 26 page bound manual—new. $15 postpaid. G. Alfred Dodds, 874 Pepperwood Lane, Brunswick, OH 44212.

SONY: Model PVJ-51RU nine inch commercial video and audio plus air monitor. For 110-VDC with service manual, $100. G. Alfred Dodds, 874 Pepperwood Lane, Brunswick, OH 44212.

WANTED: Hy-Gain 18HT Vertical antenna. Dr. A.M. Fox, W0EE, P.O. Box 895, Greeley, CO 80631.

HAMMARLUND: Clock for receiver wanted, A. Eckman, WA3ECI, 11 Fort George Hill, New York, NY 10040.

SELL: Sonar 3601, fully crystalized, 8 channels. Sonar P.S. 2983, mobile bracket, etc. Mint, $225. W4MGL, 7010 SW 16th St., Plantation, FL 33317.

HA-146 2 meter transceiver, A.C. Power supply, Mobile antenna, Base Antenna, Telephone encoder with crystals, $350. J. Iuliano, RR2 Cirlce Dr., Covertry, RI 02816.

CALLBOOK MAG, Pay $5. for late clean issue. H. Anderson, 816 N. Cedar, Colorado Springs, CO 80903.

FOR SALE: Headphones, Murdock, Trimm, Western Electric, Brandes. Large Earphones, $5. a set. Small Trimm, Acme, Brush, $2.50 a set. Helmet Units, 2-TE 37, $3. each with cord socket, $1. each all plus postage. Douglas, 2254 Pepper Dr., Concord, CA 94520.

WANTED: Good general coverage receiver ER-SX-25, SX-28, HQ-145x, ORHQ-150, what have you? State price and condition. (no junk). Lawrence F. Wood, WBC1Y, 2719 East 116th St., Apt. 26, Cleveland, OH 44120.

WANTED: Triband beam or quad. Also want Heath HG-10B. Richard Gussow, 950 E. 14th St., Brooklyn, NY 11230.

MECHANICAL, electronic devices catalog 10 cents. Greatest values, lowest prices. Fertik's, 5249 "D" St., Phila, PA 19120.

WANTED: Manual for Hammerlund HQ 170A receiver, borrow or buy. Bob Wertz, 2018 N. Crestent, Flagstaff, AZ 86001.

WANTED: Crystal blanks. 80/40 meters suitable for etching into the novice bands. 5 x 5 and 5 x 6 sizes in large lots. E. Taylor, 2921 Loyola Dr., Davis, CA 95616.

FERRITE BEADS: Lowest price in the country. 15 for $1. w/specs. For P&H. Todd Gorlin, 4829 Buchana St., Hollywood, FL 33021.

NEED: "S" Meter plus plastic dial pointer for Hallicrafters Sky Buddy RX. Richard W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

CALL Letter License Paltes wanted for collection. Will pay postage. Srt Phillips, WA7NXL, Route 4 Box 720, Flagstaff, AZ 86001.

ATLAS 215A, $449. Icom 22A, $175, DV 21A, $219. Icom 230, $275. OBO Kenwood TS900, PS900, VFO900, $750. Mike Maurer, WA6BMK, 12941 Crowley, Arleta, CA 91331.

SSTV and PHOTOGRAPERS: Make offer; $1 each, like new, Fujitar Lenses, 135mm, f 4.5, telephoto 35mm, f 3.5, wide angle. Cary Cowan, c/o CQ Magazine or call (516) 883-6200.




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G.E. 440 MC REMOTE BASE & desk top remote control ready to use, $125. Trade for HR-440? K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

HIGH VOLTAGE resistors, capacitors, including silver mica, vacuum, variable, etc: SASE for list. SX-130 receiver, $110. W8KAJ, 2386 Queenston, Cleveland, OH 44188.

WANTED: CW Electronic Keyer Dual Paddle, Drake MN 2000 and Drake C4 Console, must be in good condition. WB8VBI, 1329 Cleveland Ave., Hamilton, OH 45013.

LM/BC221 freq. meter with 60 Hz. power supply, schematic, and original calibration book, $70. K4FJZ, 1204 25th St., Shawmut, AL 36876.

WANTED: Used 2m FM mobile gear with crystals for Atlanta Athens area. Send info and phone no. to: Jake Cook, WB4FPE, Box 363, Comer, GA 30629.

DRAKE 2A receiver with schematics and manual, $150. K4FJZ, 1204 25th St., Shawmut, AL 36876.

SELL OR TRADE: New Ten-Tec 200 VFO. Knight VFO. Harold Greenfield, 9501 N. Lorel, Skokie, IL 60076.

SELL: HW-7 and AC Supply, $55, also Hallicrafters SX-110. 538-34 MHz General Coverage Receiver and speaker $55 or $100 for both. WB7DYK, (307) 382-2320.

WANTED: Cushcrat HS-1 Hamstick Antenna. SBE SB2-CW Codapter. Galaxy GT-550A Calibrator and RF-550A Wattmeter. Ralph Sieloff, Lagrangeville, NY 12540.

WANTED: Heath SB-500. 220/450 MHz FM xcvr's. K8HWW, 33727 Brownlea, Sterling Heights, MI 48077.

WANTED: Heath DX100 or similar xmeter and AM phone mode. Dr. D.L. July, 3415 Glenwood, Highland, IN 46322.

NEDD: Operating manual for Hallicrafter SX-111 receiver. Advise condition and price please. C.G. Aldrich, WB3FXY, 4 Smutz Rd., Warren, PA 16365.

SELL: HQ110AC, $95. Knight xmtr., T150 (A), $45. W3IET, 1894 Yakona Rd., Parkville, MD 21234.

WANTED: Heath HW-7; HW-16 w/HG-10B VFO; SB-102; HW-101. We will swap for CB equipment. Send inquiries to: Brad, 807 N. Court St., Toledo, Iowa 52342.

SELL: TR-3 w/A.C.-P.S., Spkr nice conx., $300. U ship. Larry Kellough, WB9AZQ, Box 144, Robinson, IL 62454.

SASE my crystal list. K8LJQ, 355 Mower Rd., Pinckney, Mich. 48169.

SELL: the following copies fo CQ: April 1945, May 1946 thru Nov. 1958. Make offer. Also many various radio magazines of the 20's and 30's. John R. Palmer, 7425 Schuyler Dr., Omaha, NE 68114.

WANTED: 220 MHz and 432 MHz Transverters and Converters. John Gilbert, W0DYK P.O. Box 11, Otis, CO 80743.

SELL: Yaesu Monitor Scope YO 100 Frequency Counter YC355 cables set up for FT101E, $300, firm. Herbert DeWitt, 700 Willis St., Madera, CA 93637.

NAME BADGES with call sign, $1.50; CB badges, No. 101 CB'ERS Do It With Freqency, No. 102 We Brake For Beavers, No. 103 CB'ERS Have More Fun, No. 104 CB'ERS Do It Better, No. 105 I Love CB Radio, No. 106 CB Radio Saves Lives, $1.50 each, others on request. Jim Hill, 1819 McComb, Charleston, IL 61920.

FREE Catalog. Solar Cells, Nicads, Kits, Calculators, Digital Watch Modules, Ultrasonics, Strobes, LEDS, Transistors, IC's, Unique Components. Chaney's, Box 27038, Denver, Colo. 80227.

WANTED: Collins filters: 2.1 KHz mechanical (F455FA21) and 300 Hz crystals (X455 KF300), Power Transistor: RCA40977, Transformer: Stancor P-8170, Available: RMC-32 /25-S. J. Blais, VE2BWK, 1698 9E Ave., Charny, Que. G6W 4H2.

SELL: Heath Apache TX-1 Transmitter. Excellent Novice c.w. Transmitter. Real good condition. 110 watts output. No. 100 with manual. Curt Gridley, Wb)sBC, 2221 N. Hillside, Wichita, KS 67219.

ATTENTION: Physicians and medial laboratory directors: I have a large inventory of medical equipment which I will sell at low prices or trade for good quality ham gear. Frank C. Dahm, P.O. Box 642, Cocoa Beach, FL 32931.

FOR SALE: Clegg FM 27B late model with modifications including power supply, mobile, bracket manual, $300. Lafayette HA 350 rcvr, a.m., c.w., s.s.b., mech filter, $95. manual. Venus SSTV early model monitor, $195., manual. Jerry Macari, WA2KDB, 3 Robin Ct., Coram, NY (516) 736-0425.

EQUIPMENT of deceased ham. J. Girgus, W2BWI, 335 Driftway Rd., Greenbrook, NJ 08812. (210) 757-9386.

B & W Model 425 low pass filter, $15; Webster 20 M bumper mount ant, $30. Pollock, WA2IBE, Box 215, Ironia, NJ 07845.

OSCAR ant. tracking prgm for SR-52 on cards w/info, $5. C. Milazzo, B-43 L-14, Villa Carolina, P.R. 00630.

SELL: 1 B&K Sweep/marker Gen. no. 415, new $200. 1 Lampkin 105B Freq. Meter (like new) $80. 1 Lampkin 205A Mod. $35. and 1 WR69A Rea/Sweep/Generator, $75. You pay shipping. Howard W. Smith, 1312 Gillespie Ave., Portage, PA 15946.

RUBBER STAMPS for hams. Call, name, address, etc. Les Belyea, WB7FBV, Box 327, Belgrade, Mont. 59714.

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WANTED: Diagrams and or Manuals for Collins R648/arr/41 Rcvr. VE3FEZ, 421 Lodor St., Ancaster, Ontario, Canada.

SSB Receiver for Sales: BC-453B converted to an SSB Receiver by reknown expert, W2EWL, e/w 20 meter converter, less power supply, $50. 144 MC Crystal controlled converter using 396A, 404A, and 2-417A Electron tubes, with 14 MC output, $30. 10 MF 2500 volt condenser, $5. 3 MF 2000 volt condenser $1. AC Line Filter two 15 amp circuirs, $5. Art Johnson, K2POA, 29 Boone St., Bethpage, NY 11714.

FOR SALE: Yaesu FT-101E $750, Yaesu 200R with ac $300, Dentron 160-10at $110, Autek MK-1 Keyer with key $105, Joystick antenna $50, Misc. All mint. R. Hajdak, 1834 Palisley St., Apt. 12, Youngstown, OH 44511.

FOR SALE: Drake R4C new never used full factory warranty. 10-80 meter cw/ssb. High serial number. Latest model, with MS4 speaker, $515 plus shipping. Tony (215) 271-8898. Drake TR4 10 thru 80 meter Transceiver includes AC-4 and MS4. Mint condx. Late model, N/B switch on front right hand corner, $420 complete. Tony. (215) 271-8898.

SELL: All new parts for WA4DSY Synthesizer, $75, shipped. WA9WDB/5, John Teles, 10511 Tenneco, Houston, TX 77099.

HEWLETT: Packard distortion analyzer. Model 320 AR and Manual. Take cash or trade. John Hamilton, 6050 North Oakley Ave., Chicago, IL 60659.

SELL: New pair 4CX 350 A with ceramic sockets and chimenys, $50. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

HEATH HW-22 with both Power Supplies, DX-100, Drake 2-B, Globe Scout 65A Tx, SP-600 Rx, Speech Compressor, Hallicrafter Speaker, VTVM (Model V-4, Heathkit), Other parts and equipment. Complete list on request. Will reimburse toll call if you buy over $40. of gear. Tele, (513) 878-1518, 1518 Glendale Dr., Fairborn, OH 45324.

WANTED: 2.1 kc filter for Collins 75A4 rcvr. W6MIT, 455 Belfast Ave., Pacifica, CA 94044.

HY-GAIN Marine VHF Radio for sale. Write Jim, W9KNZ, 160 Betty Lane, Brookfield, WI 53005.

FOR SALE: Hardbound edition of the 1947 ARRL Amateur's Handbook, $10.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

WANTED: Ten-Tec PM2B or PM3A. State condition and price. Craig Taylor, 504 S. Chestnut, Marshfield, WI 54449.

FOR SALE: Drake 2-C receiver, 2 CQ spkr Q multiplier, 2 ac calibrator, 2NB Noise Blanker. Drake 2-NT transmitter, HG10B VFO. All cables and manuals. Both rigs alligned by Drake, 1/27/77, $325, firm price. WB2IMX, Scott Cronin, 33 N. Sufolk Dr., Rocky Point, NY 11778.

WANTED: 3RP1 Scope tube. K9BSL, 122 Country Club Dr., La Porte, IN 46350.

FOR SALE: Hallicrafter SX101 Receiver, $120, excellent condition. WA1YRV, Kyle Scott, 1 Wentworth Ave., Turners, Mass. 01376.

WORLD WIDE Q.S.L. D.X. Cards wanted. Send Q.S.L. and D.X. cards to: Philip Steven Kurkland, 357 East 201 St., Apt. 1-F, Bronx, NY 10458.

WANTED: Please sell me your old tymeter 24 hour clock, thanks. Greg Livingston, 24 Lyncrest Ave., New City, NY 10956. WA2-EHV.

LINEAR BUILDERS: Send SASE for list of goodies & stuff. W6RW, 8600 Skyline Dr., Hollywood, CA 90046.

SIGNAL ONE CX7A with CW2 filter & RIT Mod. Mint with warranty. W6RW, 8600 Skyline Dr., Hollywood, CA 90046.

## Our Readers Say *(from page 10)*

icle). (2) Fig. 4. The .1 capacitor between pin 8 of the LM380 and ground should be deleted. This capacitor is not needed and could cause oscillations. (3) Fig. 7. The short lines between wire numbers 78 - 71 and wire numbers 75 - 67 should be deleted. (4) Page 72; 4th line from top: Correct "See circuit below" to read "See circuit above". Please add a note to the section "Improved Audio" as follows: A completely wired and tested audio module utilizing the LM380 is available from the author. Write for details.

Robert A. Sullivan, W0YVA/4
Arlington, VA

**April Foolishness**

Editor, CQ:

You almost succeeded on the 'Broadcasters Threaten Takeover' article in the very fine April issue. I bought the bag for almost 3 or 4 paragraphs - until I remembered that *this was* the April issue. Thought only A.R.R.L. played April Fool stuff!

David L. Hays, W0FCL
Great Bend, KS

## Announcements *(from page 13)*

and a Heathkit HW-2021, serial no. unknown. Report information to Cheltenham Police Dept., 215-887-6200; Detective Santee. An award of $100.00 is being offered for identification of the robbers or other substantial info, and/or return of the equipment. Peter H. Shavney, WA3OVH, Chairman, Pennsylvania Amateur Radio Club, 111 S. Easton Rd., Glenside, PA 19038 (215) 886-1859.

• **Denver, CO** — An Icom 22S, serial no. 2265, Channeled for 94/94, 22/28, 28/88, 52/52, 16/76, and 90/30 was stolen from Ed Weiss, 4501 West Kentucky Number 56, Denver, CO 80219. Anyone desiring to list stolen Amateur Radio equipment send info to Colorado Council of Amateur Radio Clubs c/o Charles E. Meyers, WA0ZCS, 1120 Yosemite Drive, Colorado Springs, CO 80910. (303) 632-0848.

• **Bridgeport, CT** — A Clegg FM-DX 2 Meter FM Transceiver serial number HM 298 and microphone were stolen from the van of WA3BGN on Feb. 5, 1977, in downtown Bridgeport, CT. Anyone with information please contact Jon P. Zaimes, 681 Longhill Ave., Shelton, CT 06484 (Phone 203-929-4659) or the Bridgeport Police Dept. file no. 6856.





At first glance, both these cars look like they have standard factory antennas. Even at second glance.

But the one on the left has a ham rig inside. You can't tell because on the outside it has an ASPR 748 gain disguise antenna. So the rip-off artists just pass it by.

A/S has an entire line of high-efficiency disguise antennas for GM, Chrysler and Ford automobiles. The HM85 Cowl Mount Whip System, for instance, will mount on an auto cowl, fender or deck in a single 7/8" to 15/16" hole.

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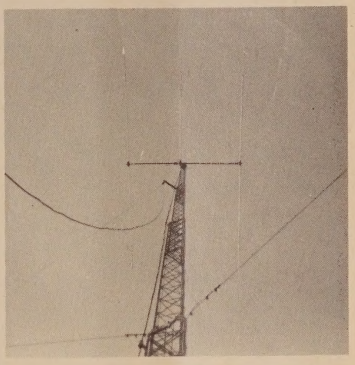



*The "new" QRPp only look at W6PQZ sporting a new Argonaut 509 and Vomax speech processor.*

during July through October, the long path was frequently open, which helped greatly, since I didn't have any East Coast competition to worry about. Many nice contacts were had while working the 100 countries. But getting the QSL's was something else! At first, I resorted to IRC's, and then I found a DX Stamp Service operated by W2AZX. Sending SASE's to a DX station with his own country's stamp helped tremendously in improving QSL responses. It took eight months to work the 100 countries, but another five months was required before I got my 100th QSL. It is my belief that, had I known about the DX stamp service earlier, I could have worked and confirmed all 100 in 1975! All in all, *DXCC QRPp* was a tremendous challenge to me and I enjoyed every minute of it. At times, it was very frustrating not to break through the high power boys, but persistency paid off. At present I am up to 145 worked, 132 confirmed, all s.s.b. I can't seem to latch on to some good ones as pile-ups have been too great to make it through! In the October *CQ WW SSB Contest*, I managed to rack up 39K points and in the past *ARRL DX Phone Contest* (1977) I did almost as well. I've worked 34 zones and only need those most difficult for the West Coast—zones 21, 23, 33, 34, 37, and 39. I've been hearing WA6EGL/VQ9 real well but just can't seem to hook up with him, yet I worked VU2LE and VU2GDG last month, so I suppose it is just a matter of time. The addition of a Swan TB4A tribander and a Vomax speech processor should help my efforts in the future. In closing, I'd like to offer a word of praise to Ten-Tec for a wonderful little transceiver. "So little, yet so powerful!" And also to K8EEG for his devotion towards QRPp and for establishing the *DXCC QRPp* award, which gave me something to strive for. Now on to 200! ! !"




*Ever wonder what type of QSL's these QRPp DXCC guys collect? Here's a shot of just some of the choice wallpaper that W6PQZ has gathered. No matter how hard I try, I can't seem to come up with stuff like XW8, 9VI, P29, XV5, HL9 and the like!*



*A shot of W6PQZ's TH3 Jr. at 70 ft. A 40m inverted Vee is supported part-way up the tower.*

My congratulations to both K8MFO and W6PQZ for their outstanding achievements. W6PQZ's closing remarks raise an interesting question: "will anyone ever work 200, or 300, countries with QRPp?" Why not? And, of course, I'll just have to throw down the gauntlet at the feet of those DX'ers who hang out at the 250+ Honor Roll level: was it you or your QRO rig that put you at the top? Take the acid test—toss out the QRO rig and see if *you alone* can do it with QRPp! ! !

### *The DXCC QRPp & DXCC MILLIWATT Awards*

These two awards are still offered in the name of *The Milliwatt*, which ceased publication in June, 1975, after a 33 issue run, and which is available at present in sets of back issues only ($4.00 per year, $22.00 whole set). To qualify for *DXCC QRPp*, an amateur station must present bonafide QSL proof of QSO's with stations in 100 ARRL DX countries, accompanied by an alphabetical list of those QSO's showing date/time/band/mode/power output, a signed statement testifying to the fact that not more than five watts output was used in making any of the contacts, and that all contacts were initiated with less than five watts. A $5.00 application fee should accompany the application. The same rules apply to *DXCC MILLIWATT*, except the power level should read "no more than 1 (one) watt output" instead of "five watts." I am really curious as to whether anyone out there has the courage to go after this one! It *is* the impossible challenge. 73, Ade, K8EEG

*Circuit Corrections For W9SCH 80M Solid State Transceiver (March, p. 28-29)*

VFO:

S and D connections reversed; put S at bottom, D at top of Q2.

Power connection: eliminate (E) on Transmit-Receive switch (S1); connection +12VDC directly to VFO point (E).

Receiver:

Capacitor between collector Q6-base, Q7 is Imf, resistor from base Q7-B+ is 22K.

-D1-2 are 1N34A or similar r.f. diodes. Asterisks are to parts referred to in Notes.

-Q5 base: a 0.005 mf capacitor should be connected to the 2.7 k-1mf point, with the other side of the .005 connected to ground.

-If audio output is not adequate to drive phones, add an extra audio stage that is identical to Q7.

Transmitter:

-A 560 ohm resistor is shown between Q4 base and ground; change this value to 27 ohms.

-A 560 ohm resistor should be added between ground and where the 5 ohm connects to the 6.8k/.005 combination.

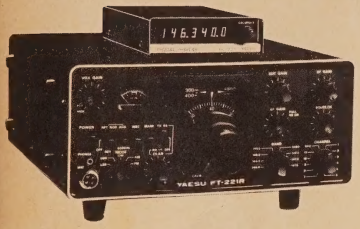
-RFC 2 can be wound on a 6.8k 2 watt resistor and soldered to the resistor leads; the resistor leads then serve as the RFC 2 leads.

-L5 is 20 turns, close spaced, on ½ inch diameter form.

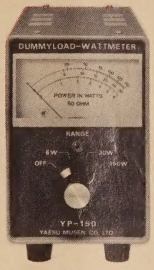
L1 coil - 5-8.1mh r.f. coil. The Miller number is incorrect, and should be shown as 21A686RBI.

# SUMMER TIME IS YAESU VHF TIME!

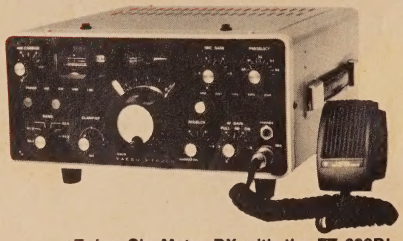
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