CQ

August 1973
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CQ World Wide DX Contest... Phone Results On Page 50

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The Radio Amateur's Journal

09240

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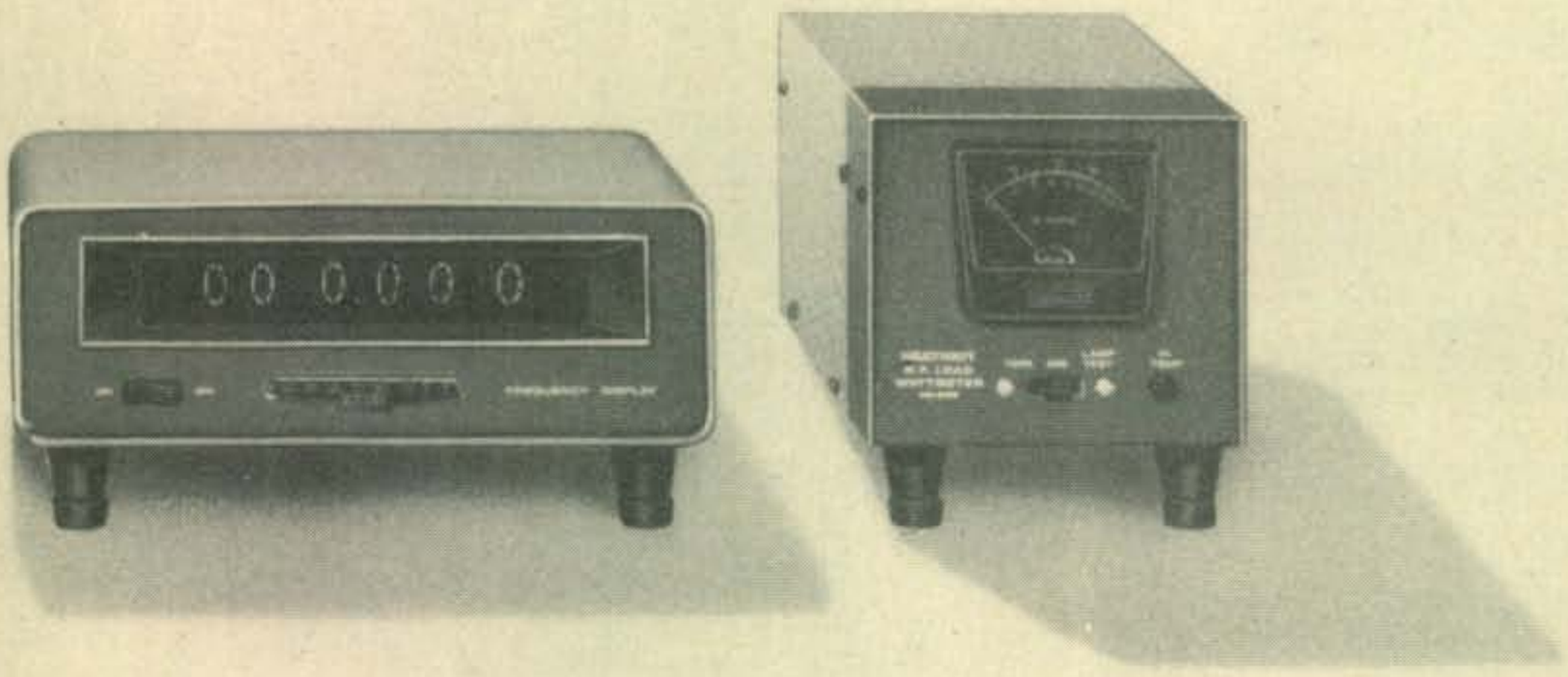

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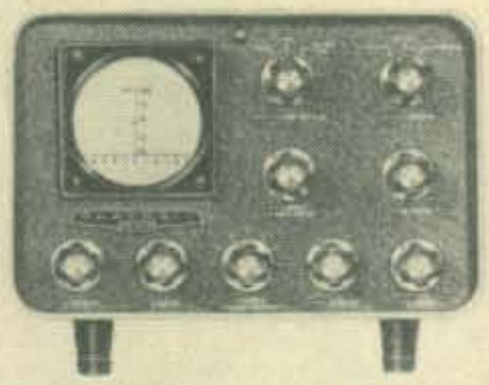

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AUGUST, 1973 VOL. 29, NO. 8

CQ The Radio Amateur's Journal

FEATURES

DEPARTMENTS

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ZERO BIAS

In these times of changing rules and confused amateurs, the greatest *disservice* an amateur publication can perform is to provide false and misleading information under the guise of leadership and editorial commentary. Our June guest editorial took to task the leadership of ARRL and its voice, *QST,* on the matter of the League's relations with FCC. We decried ARRL's failure to properly discharge its responsibilities to its membership by failing to act and comment appropriately on certain proposed rule makings which have since become part of our Rules and Regulations. We called for the establishment of a new dialogue between the League and FCC to enable FCC to be fully advised of the amateur viewpoint in future cases of proposed amateur rule-makings.

Our June editorial was run with a feeling of cautious optimism. We felt that perhaps there was a chance to "reach" the ARRL hierarchy and convince them of the need for a change in attitude– away from the "all-knowing" paternalism which has characterized the League position for decades, and towards a posture of mature adult conversation between ARRL and FCC.

We were wrong.

It is our opinion that the general staff positions of ARRL -- and most clearly the General Manager– are filled by people trying to meet the problems of the 1970's with the thinking of the 1930's and are too aloof and self-insulated from the truth to realize that they're making damned fools of themselves. Witness the sixth item in the anonymously-written "League Lines" for July 1973 *QST,* page 9. For shame! This is not leadership.

But leadership is what's needed, not smoke-screens or inflamatory rhetoric. And not lies and mis-information, either. The July issue of *73 Magazine* could easily serve as a text for students of yellow journalism and character assassination.

Wading through page upon page of rambling disjointed commentary labeled, "FCC Role-- An In Depth Look By Wayne Green W2NSD/1" the reader is led to believe that repeaters have had it. He is told, among other things, that it is: 1– Illegal to experiment with antennas which are to be used for repeaters; 2-- Illegal to operate a repeater on reduced power when necessary or desired; 3– Illegal to use the same station for auxiliary link and remote control; 4– Forbidden to have more than 6 control operators for a repeater.

Taking these four typically misleading statements in order, 1– An amateur can experiment with antennas until he's blue in the face. There is no reason, however, for this experimentation to take place *with the repeater.* By the time a club decides that it has the expertise to construct and maintain a repeater, it should also have the expertise to know what antenna design is going to suit the foreseeable needs of the repeater. If that antenna proves to be unsatisfactory, diddling around with a dozen different antenna designs at the repeater is like trouble-shooting a TV set by changing all its transistors at random until, by chance, on is found that corrects the defect. If a group is unable to anticipate the performance of their repeater perhaps they'd better hit the books until they can.

2– *Nowhere* in Docket 18803 or in the latest revised Rules and Regulations does it state that a transmitter licensed in the amateur service may not be operated at a reduced power level. Section 97.41 f, paragraph 3 refers only to the "maximum transmitter power output." What the repeater operator does within that "maximum" is up to him and the needs of the area to be served by the repeater.

3– Information publicly available from FCC clearly states, "The same station can be licensed as both a control station and as an auxiliary link station, and can have equipment that is common to both stations.

4– *Nowhere* in the Rules and Regulations does it state that no more than 6 control operators be used. It is a fact that FCC has approved up to nearly *three score* control stations for a single repeater! It's a poor practice, though, and in *any* application for additional control points beyond 6 it is necessary to explain how the repeater licensee proposes to keep track of who's controlling what, and when, and how he proposes to meet the log requirements of 97.103 and 97.105.

The point is this: The recent changes in the Rules and Regulations touch many bases. They demand study and understanding. If one determines *not* to understand them, he won't, but careful, thoughtful reading of them will answer probably 95% of the questions the repeater users or operator may have. On some points we obviously require more detailed guidance from FCC, but all we need do is ask. Before jumping on the "I hate the FCC" bandwagon with W2NSD, et al, and deciding that FCC has wiped out repeaters, read the rules, write to the FCC or even call them on the phone in Washington. You *can* talk to them, even if Wayne thinks otherwise.

73, Dick, K2MGA

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OUR READERS SAY

Editor, *CQ:*

Why, Oh why, must you stir animosities with a cover statement re: ARRL as is on your recent issue?

Why can't amateurs, all amateurs, realize that ARRL is organized, strong, and trying hard to look out for the interests of all amateurs (even non-members). Can anyone even begin to appreciate the time and thought being put in by the men who are willing to lead ARRL?

There's room in the amateur radio world for all the present publications, perhaps more. Must they criticize each other? Must they compete that way? Why not gain readership by improving the content of the magazine? Why not stop being childish?

And be aware that an unsigned "guest" editorial (by a non-staff member), regardless of content, is not worth the paper it's printed on.

Edward A. Ludin, M. D., WA2ELJ
Cherry Hill, NJ

Dear Ed,

I'm greatly disappointed to learn of your feelings towards our June Guest Editorial in particular and constructive criticism of ARRL in general.

My decision to publish the unsigned editorial came about through increasing frustration and anger regarding the extremely damaging schism which has developed recently between ARRL and FCC. It is my opinion that only by maintaining close and amicable relations between these two bodies can both bodies remain truly responsive to the changing needs of this great hobby we both enjoy. An objective study of recent ARRL pronouncements re: FCC will reveal the total breakdown of these relations for no reason except that in face of ineffective action by ARRL, FCC was legally obligated to act on certain matters. ARRL did not avail itself of all the legal avenues open to it; FCC took the legal regulatory actions it must; the ARRL membership howled at the actions; and ARRL was unwilling to accept any responsibility for its role in the inception of unpleasant regulations. Someone had to become a scapegoat and FCC was "it."

Now, if our efforts to correct this dismal situation are to be viewed as divisive, overly competitive or destructive, I ask you, sir, what is the value of a free press. If you urge that all reasonable discussion of matters which might irritate the hierarchy of ARRL be muzzled, then perhaps the First Amendment had better be struck from the US Constitution... for it's only a few short steps from a controlled press in amateur radio to a controlled press on a national level.

I urge you to re-read the entire article, keeping an open mind until you've finished. I'm convinced that you'll see that our June Guest Editorial is not a thoughtless attack on the leadership of ARRL, but rather a carefully researched analysis of a complex situation, and a call to ARRL to actively seek to re-establish lines of communication with FCC. I might add, in closing, that for all our noble intentions, the editorial seems to have fallen on deaf ears at League Headquarters as demonstrated by the related item in "League Lines" in July 1973 *QST*, page 10!

Richard A. Ross, K2MGA
Editor, *CQ*

Mr. John J. Nagle, K4KJ,

I have enjoyed reading your articles in *CQ* magazine entitled "Tuning in on Touch Tone Pads."

In your first part article appearing in the May 1973 issue, page 51, you state in the second paragraph, "a group of higher tones from 1209 to 1477 Hz." You then go on to list in table 1 various frequencies used in touch tone dialing and show 1447 Hz, rather than 1477 Hz. I suspect that you may have "borrowed" table 15, page 30-23 of the IT&T *Reference Data for Radio Engineers (fifth edition).*

Several weeks ago, I tried using my touch tone dial through my Motorola unit to Raleigh Repeater, K4ITL. Incidentally, my unit, which was built several months ago, looks much like yours using the same interconnection system to the control head and from the microphone. I was unable to get dial tone from the repeater (for auto patch access) and one of the regular repeater users asked what kind of touch tone dial I was using. He pointed out that a problem existed in different frequencies generated by different dials.

There is possibly a double standard in existence which may be a problem in auto patch work depending on how selective the filters are in station decoders.

For your information, table 6, page 2-14, of the IT&T *Reference* shows 1477 Hz which differs from the aforementioned table. Table 6 agrees with C.C.I.T.T. (International Telegraph and Telephone Consultative Committee of the International Telecommunications Union) *White Book, Volume VI,* covering telephone signaling and switching. I am sure that the Bell System uses 1477 Hz. The editors' and engineers' *Radio Handbook* shows 1477 Hz and references a Western Electric 35A3 touch tone dial. The *A.R.R.L. Radio Amateur's Handbook* shows 1447 Hz.

It would seem that, due to the discrepancy which I have pointed out, you and/or the editor of *CQ* magazine could perform a real service by running this thing down and commenting in a subsequent issue of *CQ.*

R. A. Genaille, W4UW
Winston-Salem, NC

Editor, *CQ:*

Thank you for this opportunity to comment on W4UW's letter concerning the reference to 1447 Hz in my May/June *CQ* article, "Tuning In On Touch Tone Pads."

I did use the ITT *Reference Data for Radio Engineers* when I wrote Table I of my article because that was the most convenient reference available to me at the time. After receiving W4UW's letter, I checked with the publisher of the ITT

reference and found that they were unaware of the discrepancy and they blamed it on a typographical error. I have also checked with the ARRL and found they are aware of the error in the Handbook and will presumably correct it in the next edition. Incidentally, the error also appears on page 117 of the ARRL *FM and Repeaters for the Radio Amateur.*

In my own investigation, I find that Bell System Specifications PUB 42208 entitled "Interface Specifications" and David Tally in his book *Basic Telephone Switching Systems* both give 1477 Hz.

Summarizing, the correct frequency is 1477 Hz and I believe all references to 1447 Hz should be eliminated as soon as possible.

I hope this clears up the problem.

John J. Nagle, K4KJ
Herndon, VA

Announcements

Marshalltown, Iowa

The Annual Iowa 75 mtr net potluck picnic will be at the Riverview Pk. on August 26th. Swap tbls-prizes, serving at noon. Coffee and pop furnished. Everyone welcome. Info: M.R. Otto, W0LFF, Secy. Iowa 75 mtr Net, 733 W. Benton St., Iowa City Iowa. 52240.

LaGrange, Kentucky

Kentucky Hamfest – 3rd annual Great Louisville Hamfest will be on Aug. 26th 8 a.m. to 6 p.m. at the Oldham County Fairground, La Grange on S.R. 146 off I-71. Admission & registration $1, fleamarket $1. 5 major prizes, door, ladies program, food and refreshments, plenty parking. Contact G.E. Partridge, K4KZH, 8276 Walker Rd., Louisville, 40258.

N. Belvidere, Illinois

The Annual Bel-Rock Hamfest held on Sunday, August 26th at the Boone County Fairgrounds, north of Belvidere, Il. Overnite camping, talk-in on 146.94. Advance tickets, $1.50, $2.00 at gate. For further info: WB9KOT, Clyde Aspling, 4970 Linden Road, Rockford, IL 61109.

Lincoln, Nebraska

The Lincoln Amateur Radio Club will operate again this year during the Nebraska State Fair. We expect to have a special call and an appropriate QSL card. Dates for operation will be 30 August thru 9 September 1973. Oper. will be on 80, 40, 20, 15 and 2 Meters. More details from C. R. Dyas, W0JCP, Lincoln Amat. Radio Club, Inc. P.O. Box 5006, Lincoln, NE 68505.

St. Louis, Missouri

Drake TR-4 ham gear was taken from my car while I was a guest at the Holiday Inn South in St. Louis (Sunset Hills, MO) on night of May 26, last. Reward offered. Any info, please contact Lee J. Delworth, WB6RDW, 1125 N. Gardenia, Lompoc, CA 93436.

Bluefield, West Virginia

Hamfest Sunday August 26, 1973, Bluefield, Thumping Keger Hamfest-Picnic-Convention. City Park Shelter, Flea Market. Sat. nite, Aug. 25th, hospitality room at Highlander Motel. For advance reg., contact Ralph Tiller, K4CGF, Rockygap, VA. 24366. For reservations at the Highlander, contact: Mrs. Ralph Tiller. Orders for box lunches will be taken at the park on Sunday.

[Continued on page 84]

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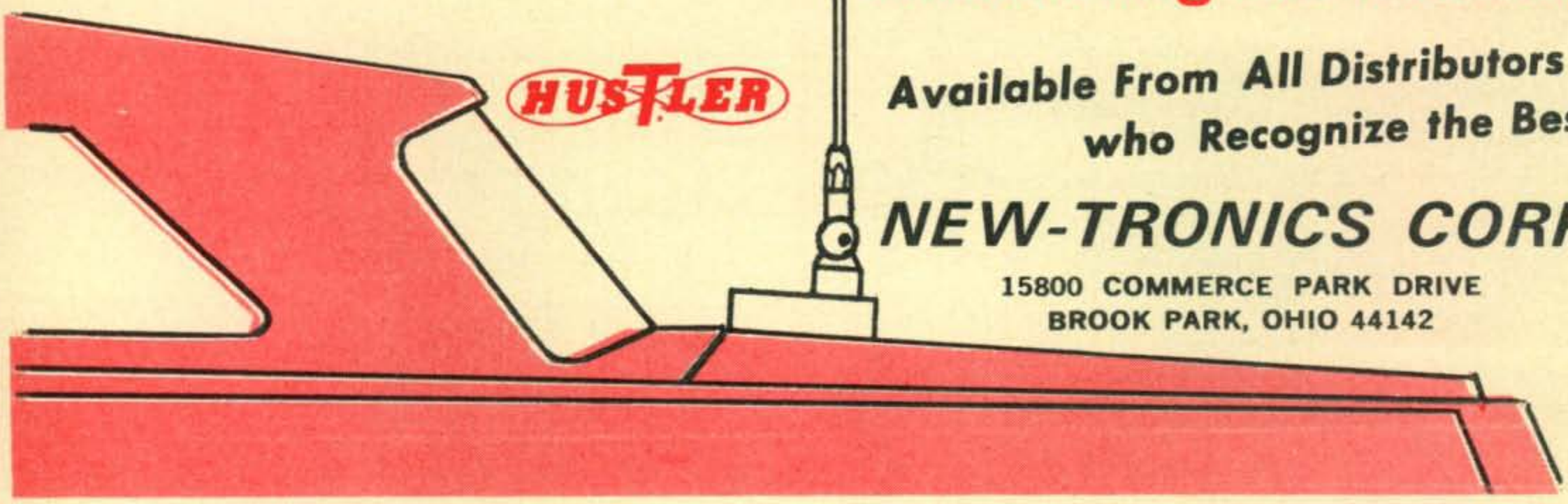

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Q AND A

BY CHARLES J. SCHAUERS,
W6QLV*

TR-4 Power Supply

"My TR-4 works fine on a friend's AC-4 power supply (he has a TR-4 too), but it doesn't on my own. Here's what it does. On receive it's ok, but on transmit it does not work. Checking voltages I find that on pin 9 (bias) there is zero volts. What do I look for?"

A shorted 20 mf 150 volt capacitor, a bad diode D_7 or open pot (R_6). There are two 20 mf 150 volt capacitors—so check them both. Good luck.

Rhombic For 2 Meters

"I am located where a rhombic antenna would be ideal for talking to stations in one direction in which I am interested. Can you give me the dimensions for 146 mHz?"

Sure. See fig. 1. Nothing complicated about the setup. You can terminate it with a 600 ohm or so non-inductive resistance and it will exhibit "one direction" characteristics. Leave it unterminated and it will be bi-directional.

75 Watt Transistor For H.F. S.S.B. Linear

"I am looking for a transistor that will operate between about 2 and 30 mHz in a linear amplifier and will have around 75 watts p.e.p. output with at least a 10 db gain. The intermodulation distortion should be under 35 db. What can you suggest?"

RCA's emitter-ballasted overlay transistor with temperature sensing diode. It's an epitaxial silicon n-p-n planar transistor of the

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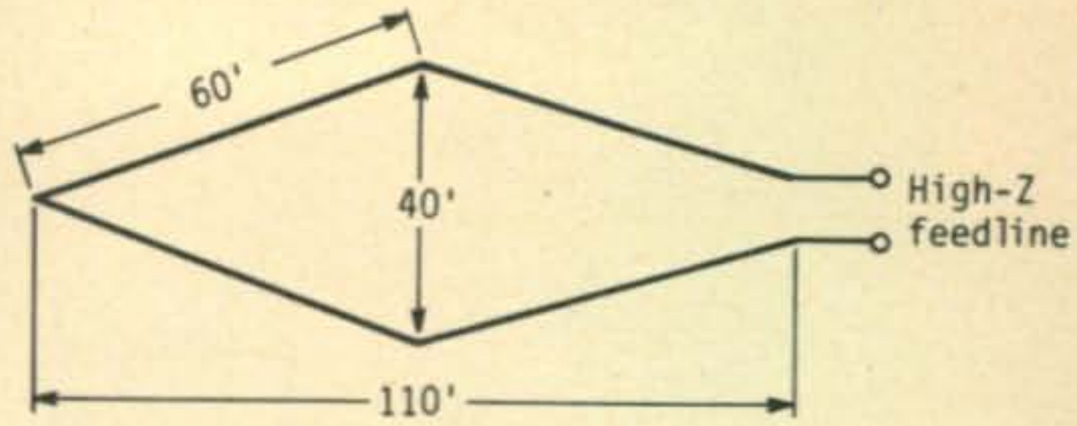


Fig. 1—A rhombic antenna for 2 meters. The support poles holding the antenna up should be at least twenty foot high depending on the terrain.

"overlay" emitter-electrode construction. Forward bias control with temperature change is obtained by use of the built in temperature sensing diode. Write RCA Solid State Div. Box 3200, Somerville, N.J. 08876 for information on the 2N6093. Incidentally, at the lower frequencies (below 30 mHz) I can visualize using the 2N6093 in combinations for higher output.

Stolen Mobile Equipment

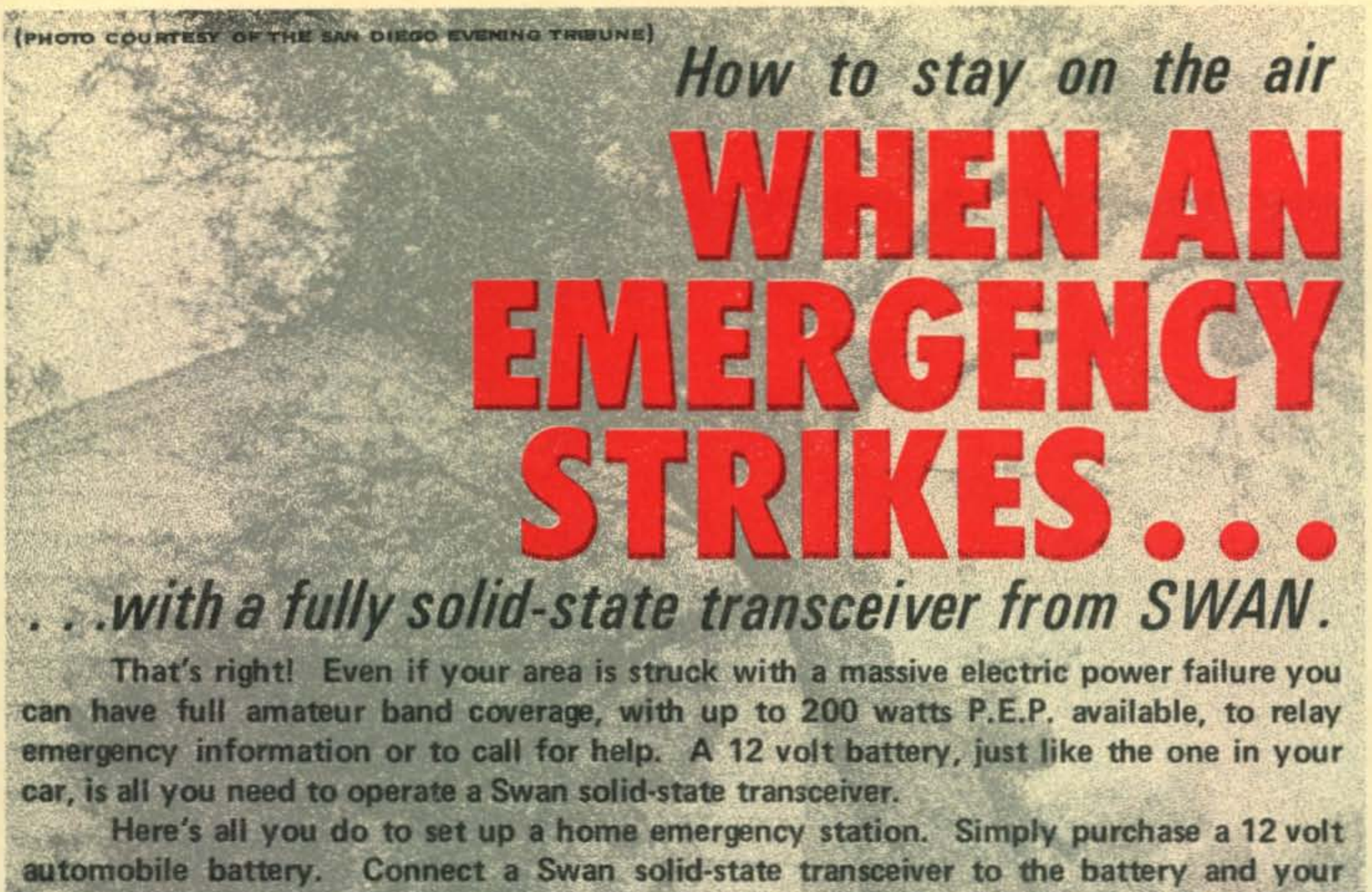
"I have had two mobile rigs stolen from my car and I am getting sick and tired! Please, what can I do? I have a two door car."

My suggestion is this: If you have a two door car, when you open either door it turns the dome-light on. Across the dome-light connect a relay and connect its terminals to your horn relay. The relay should be of the *delay* type which *cannot* be turned off by slamming either door—it should be adjusted to operate for at least 60 seconds. Another: install a microswitch on the rear of your transceiver so that when your transceiver is moved out *slightly* the horn begins to blow and continues to blow. I have other ideas too, but I think I can get one patented.

RCA WV-38A V.O.M. Problem

"I have an RCA WV-38A voltohmeter that has worked fine for a long time. I use it every day I'm in my lab. I work for a hospital as an electronics technician and I'm pretty good at troubleshooting, but the WV-38A has thrown me a 'curve' for I can't seem to put my 'finger' on just why it is erratic on the a.c. position. Any hints—to save my time?"

Yes. Check the pot R_{23} (hi a.c. calibration) and R_{24} (low a.c. calibration) and check the connections at CR_1 and CR_2 (diodes). Next clean all contacts on S_{1c} (the range switch). No problem. Diodes are seldom erratic, they're either out or in, but pots do wear and do become erratic—as well as the test lead connection jacks.



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How to stay on the air

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. . . with a fully solid-state transceiver from SWAN.

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Here's all you do to set up a home emergency station. Simply purchase a 12 volt automobile battery. Connect a Swan solid-state transceiver to the battery and your antenna. That's it! The station is ready to go on the air at any time – able to operate for several days – if necessary. Prepare now, to communicate in any emergency situation!

HINT:— Add a battery charger to a battery-powered solid-state home installation and you can regularly operate more efficiently. It'll cost less than most A.C. power supplies. Even Swan's big SS-200 transceiver takes very little power drain from a battery – less than 500 ma on receive and averages about 6 amps when transmitting on single sideband (as low as 0.8 amps average, to transmit SSB on the SS-15).

Another thought – a solid-state mobile installation can mean a savings of up to $140.00 when compared to the special A.C. power supplies that must be purchased for mobile use of conventional tube-type transceivers.

Now is the time to join the new age of amateur radio electronics by selecting a new fully solid-state Swan transceiver. Every model of the "SS" series features: NO TRANSMITTER TUNING, INFINITE VSWR PROTECTION, CONTROLLED NOISE BLANKING, BUILT-IN VOX, and more. Just 10% down will put an all-solid-state rig in your ham shack, when you use your Swan Revolving Credit Service account. Why wait? Order yours now!!

SWAN SS-100

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- ☐ SWAN SS-200 (200 watt P.E.P.) @ $779.00
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6KD6 Linear Failures

"I recently bought a transceiver that uses 6KD6's in the final. It has a Lo-Hi power switch on the front panel. The instruction manual is specific about 'long' tuneups, but in haste to snag a dx station I have tuned the rig on Hi position and I have had to replace the 6KD6's twice. Now it seems to me that the manufacturer should provide some sort of interlock for tuning. What do you say?"

Not much. I side with the manufacturer. In this case I "think" you have a Swan 600-T —a great rig. But with a little "operational discipline" you will learn. At around $5.00 per tube you should learn! Suggestion: get a piece of RED tape and attach it to the Lo-Hi switch, this will remind you to tune up on Low position.

Parasitic Oscillation Location

"What is the best way to locate parasitic oscillation in a transmitter?"

By using a grid-dip meter. In the "input" position you can determine whether or not a particular stage is oscillating parasitically simply by inductive coupling to the output of each stage.

Writing Ads

"When an amateur has a piece or two of gear to sell he must advertise. How do you write an effective ad?"

Glad you asked. To begin with, you of course know that *CQ* publishes ads of *subscribers* free of charge. In my estimation this is a terrific service! *QST* and others do not do this. Look what you are getting by subscribing to *CQ!*

An ad must be *direct* and it must solicit! Here's one: "D-104 Mike, $25.00." No need to say "for sale" or "sacrifice."

Here's another: "Want schematic for HW-12, will pay $4.00."

And another: "KWM-2 w/gold plated plugin relays, Waters Notch Filter, new tubes and completely realigned. $550.00."

Avoid extra words. Amateurs *understand* nomenclature and each other.

Use a little imagination. Appeal to those who *may* need what you have, but do it with *few* words that are to *the* point!

Most amateurs interested in a piece of equipment will usually write you before setting up a buying arrangement and they should. Don't say, "first check gets a Galaxy V for $185.00." You may have a lot of checks to send back. ■

NEW!!

"Cloverleaf..."

SBE-450TRC TRANSCONVERTER

instant access to 450 from 144

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Installation couldn't be more simple. Outwardly, "Cloverleaf" is a small black box that connects between your existing 144 MHz FM transceiver and its antenna, also to the microphone and car 12 volt battery. You plug the 450MHz antenna into another receptable provided. SB-450TRC has no external tuning, no controls other than a switch that allows instant shift between the 144 and 450MHz ranges. No mods are necessary. **Your existing 144MHz transceiver remains intact.**

Transmitter-wise, SBE "Cloverleaf" is entirely **passive—draws no DC power yet delivers 40% of the RF drive at three times the frequency.** Example: 4 watts out on 450 MHz for 10 watts drive on 2 meters. This high efficiency frequency multiplication is accomplished by a power varactor diode in conjunction with multiple high Q tuned circuits. The 450MHz output is of course frequency modulated; overswing, due to frequency multiplication, being compensated by a fixed pad in the microphone circuit within the unit.

Receiver-wise, "Cloverleaf" has a front end with unity conversion gain that converts 450MHz band signals to I-F frequencies corresponding to 144MHz channels. Limiter, discriminator, output audio and loud speaker in the 2 meter transceiver continue to function in the usual manner.

Mobile wise, this all-solid-state transceiver is ideal—a compact box that can mount wherever space is available. "Cloverleaf" current drain is negligible.

Price-wise, this SBE high value/performance breakthrough represents worthwhile savings over the cost of a complete 450MHz transceiver with comparable characteristics. Truly, SBE has done it again!

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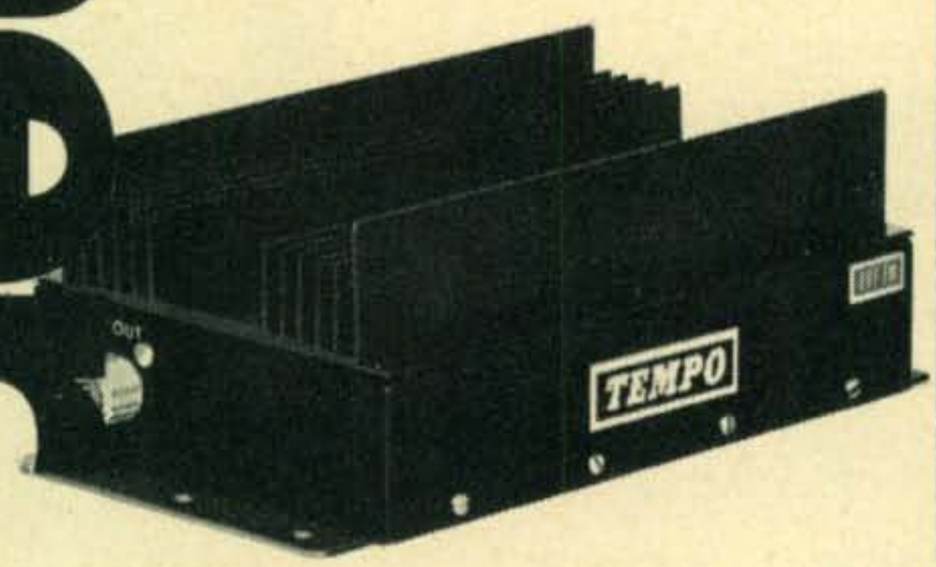

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MODEL NUMBER	POWER INPUT	POWER OUTPUT (min)	BAND	PRICE
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1002-3B	1- 3W	120-130W	146	$235.00
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802B	1- 3W	70- 90W	146	$195.00
502	5-12W	40- 50W	146	$105.00
502B	1- 3W	40- 50W	146	$130.00
445-30	1- 3W	25- 30W	450	$215.00
445-30B	4-10W	25- 30W	450	$235.00
5010	5-12W	100-120W	HF	$149.00

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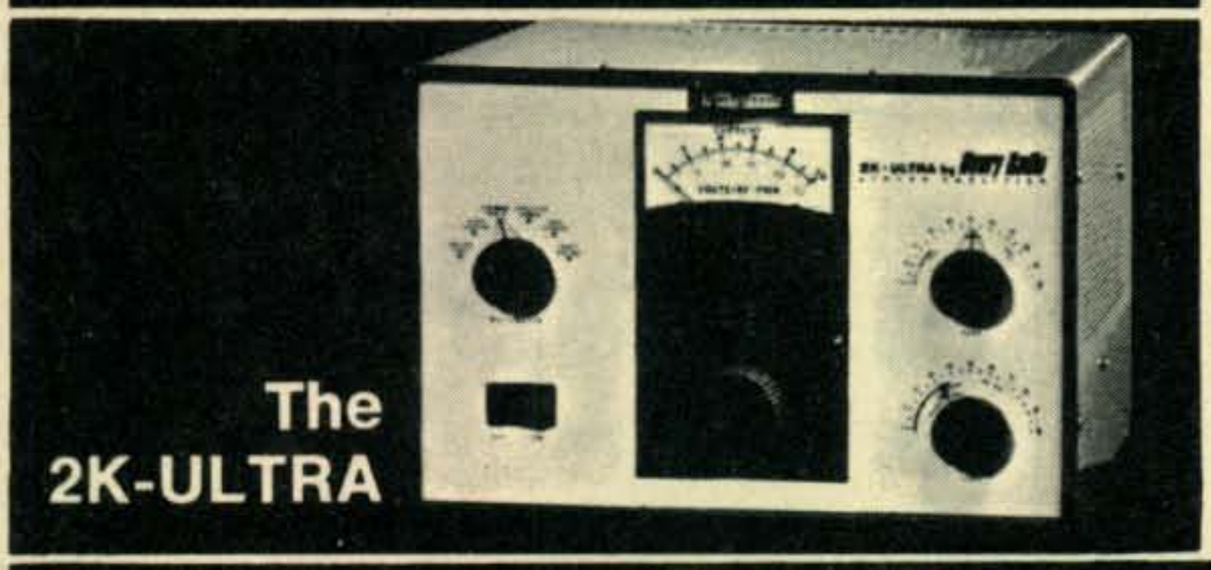

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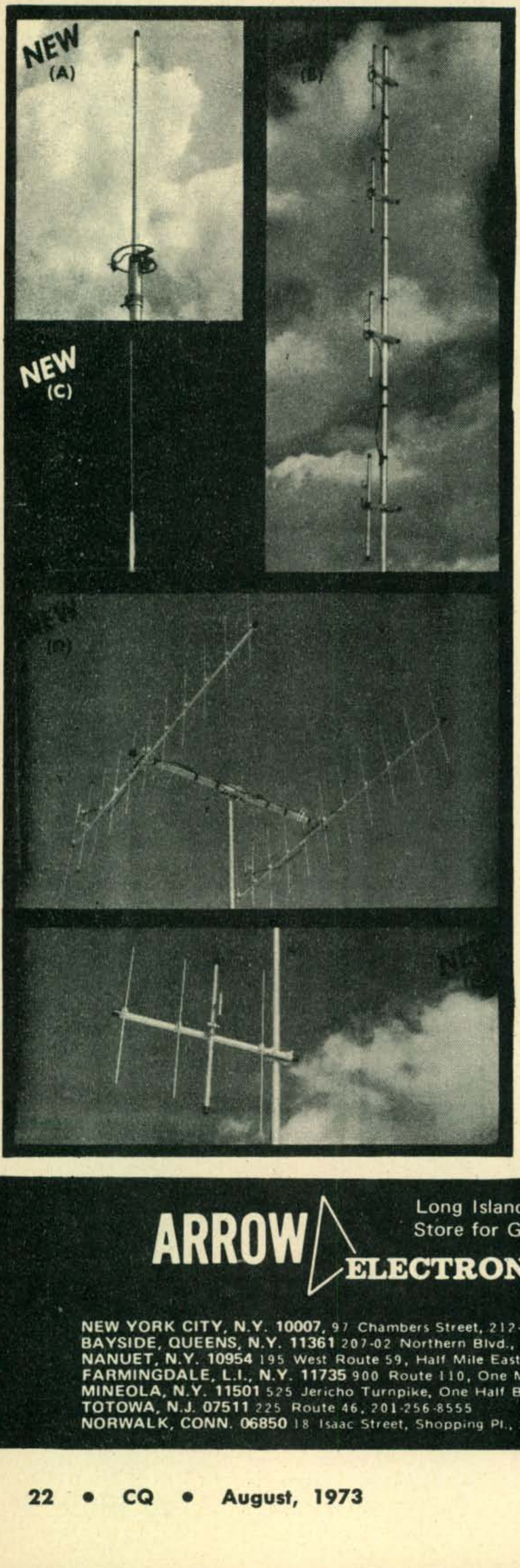

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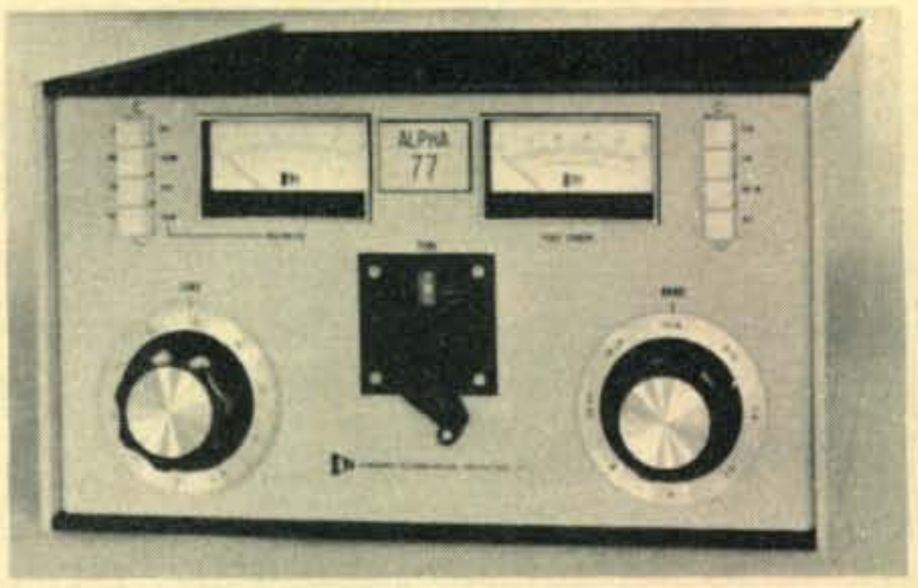

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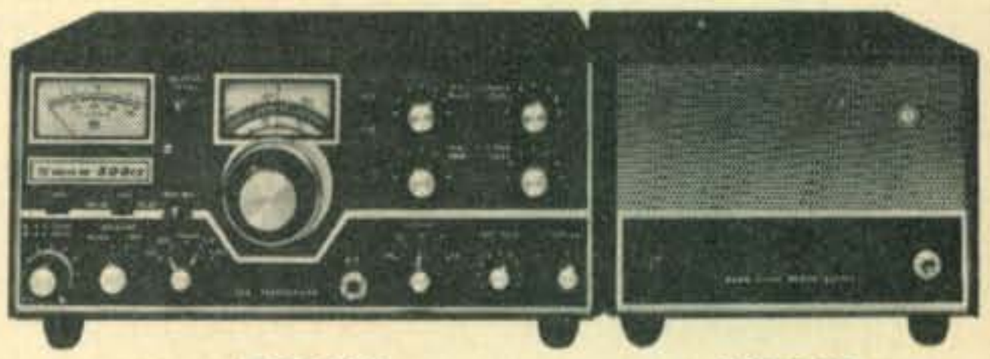

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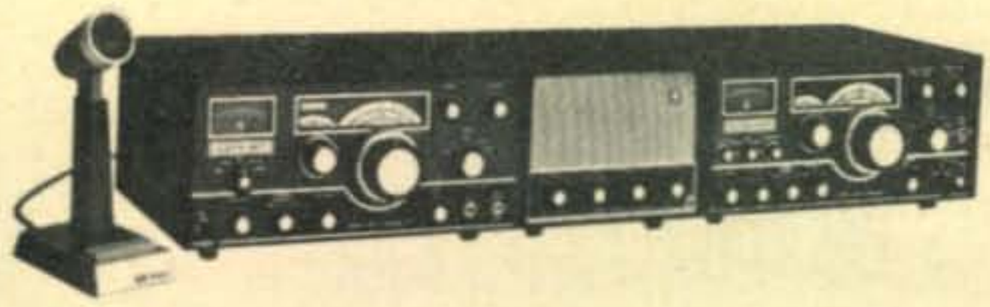

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A General Coverage Solid State Communications Receiver With Direct Digital Frequency Read-Out

BY JACK PEROLO,* PY2PE1C

DIFFERENT considerations on the pros and cons of general coverage communications receivers have already been brought forth in previous *CQ* articles;[1, 2] As time goes by, and after using almost exclusively monoband receivers during the last five years of operation, I believe that, by current technological standards, there is no way to beat the performance of a monoband set.

In recent years, in different areas, this concept has become more popular than it used to be: monoband transceivers command a reasonable share of the market and, with the introduction of high frequency crystal filters of bandpass characteristics competitive with those of mechanical filters, the popularity of two-band sets has also increased. The two-banders are designed around a single v.f.o., by beating its signal above or below the input signal, and by choosing a suitable intermediate frequency complete with crystal filter. The idea is evidently a close relative of a monobander, and some of the monobander's inherent advantages are retained in sets of this type.

Along this philosophy, and thinking for a minute of the v.f.o. as being a permeability tuned affair, it would be feasible to build a single conversion multiband receiver preserving some of the basic advantages of a monobander with digital frequency read-out. Figure 1 outlines the principle behind this idea: by installing the tuning slugs of the v.f.o. coils on opposite sides of a holding plate, when the plate is moved (by means of the tuning knob of the receiver), one slug is moving into one of the coils whereas the other is moving out at the same rate; by properly selecting the filter frequency, the same design v.f.o. coil can be used to cover two bands, and the direction of reading of the dial counter is not changed.

Another possibility would be to alternate the use of ferrous and non-ferrous slugs to achieve electrically what has just been outlined mechanically.

The principles above are definitely applicable, but the actual construction of a receiver built around such a v.f.o. would be a

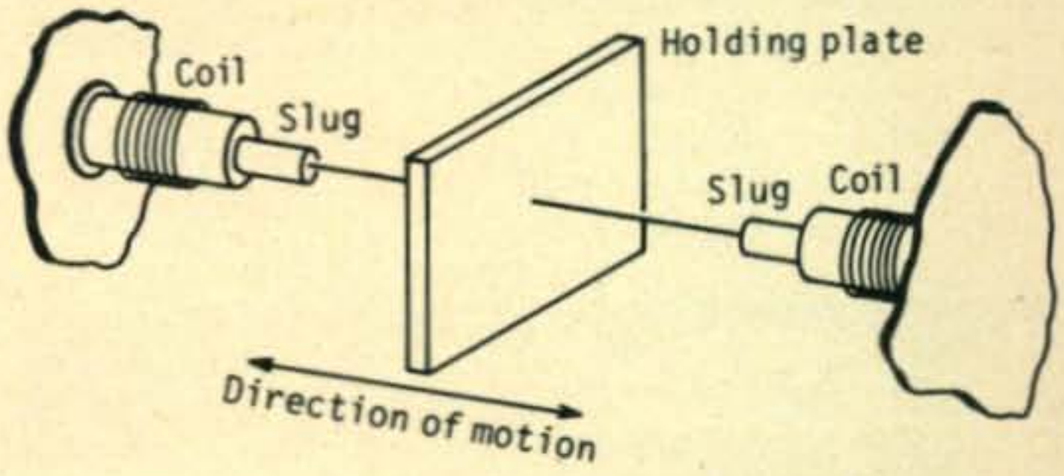


Fig. 1—Principle suggested for a bidirectional v.f.o.

*P.O. Box 2390, S. Paulo, Brazil

[1] Perolo, J., "A Transistorized Communications Receiver with Digital Frequency Read-Out," *CQ*, July/Aug. 1970, p. 14.

[2] Perolo, J., "A Universal Solid State Preselector/Converter for the SW Bands," *CQ*, June 1971, p. 49

Fig. 2—The h.f. converter has three front panel controls: Bandswitch (left, marked in mHz); R.F. Tuning (large knob with H and L skirt markings corresponding to Hi and Lo ranges); and Hi and Lo Range switch (slide switch selects r.f. coils for Hi—5-18 mHz or Lo—2.5-6.0 mHz ranges). Emblems on this and other units are fabricated from stainless steel and finished in black and red.

formidable undertaking for different reasons. Even though it might not be readily evident, in order to maintain the mechanical counter direct frequency read-out capability throughout the bands, the various v.f.o. coils must cover a full megacycle. Add to this that the v.f.o.'s must be linear and that the dial counter is a unidirectional device (*i.e.*, the counter can only display, say, a frequency increase by being tuned clockwise). Mechanically, a frame that could move five or 10 slugs at the same time without detectable backlash and with acceptable resettability is quite a project by itself, and it is definitely beyond reach for the most constructors.

A multiband set designed along these lines, therefore, only solves mixing and conversion problems at the expense of mechanical complexity; one can expect a superb freedom from spurious, assuming a careful preliminary analysis of the various mixing combinations has been worked out. Articles on this matter have already been published by *CQ*, [3,4] bringing in considerable readers' feedback, showing the interest that presently exists on this matter.

I must admit, however, that *CQ* Managing Editor Alan Dorhoffer has a point in insisting that I design and build a more conventional continuous coverage set, and within the reach of the construction capability of most amateurs. To this, I should add that the bulk of *CQ* readers are hams, whose mode of operation is characterized by the possibility of a slight frequency change, while still carrying out a satisfactory QSO; such frequency changes are quite common during a contact in order to avoid a heterodyne, side splash from a nearby operator and other reasons, including to avoid spurious that may be internally generated by the equipment in use.

On the other end, my interest is nowadays primarily directed toward the shortwave broadcast bands, where the situation is altogether different: most stations (not all, though) use high stability crystal oscillators to generate and control their carrier frequency. If a certain station happens to broadcast right on the frequency of the listener's receiver spurious, this situation will add an otherwise avoidable difficulty to pick up readable signals from that particular station.

Essentially because of Alan's suggestion, a reasonably conventional multi-band solid state communications receiver with digital frequency read-out has been designed and built, being described herewith. Figures 2

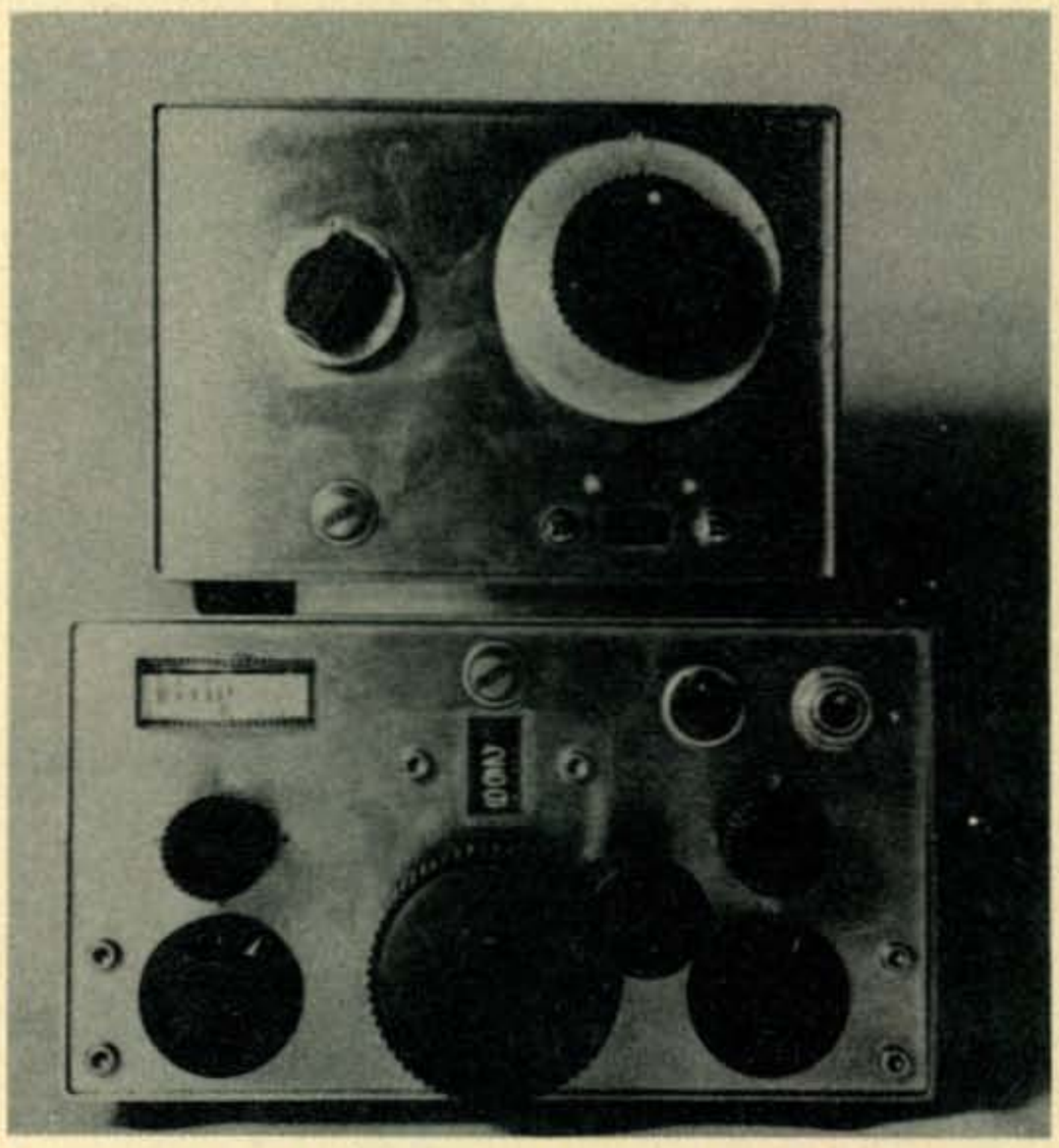


Fig. 3—The l.f. receiver shown with its h.f. converter. At the top left of the receiver is the edge reading S-meter (Japanese import), with the R.F. Gain and Preselector controls below. The crank-type tuning knob and mechanical counter are at the center, while at the right are the On/Off switch and phone jack (top), A.F. Gain, and Frequency (calibration reset) controls.

[3] Lee, J.G., "Mixer Spurious Frequency Analysis," *CQ*, Sept. 1965, p. 42

[4] Perolo, J., "An Analytical Approach to Mixer Spurious Evaluations," *CQ*, Aug. 1971, p. 24

and 3, and the picture at the beginning of this article give an idea of what this set looks like.

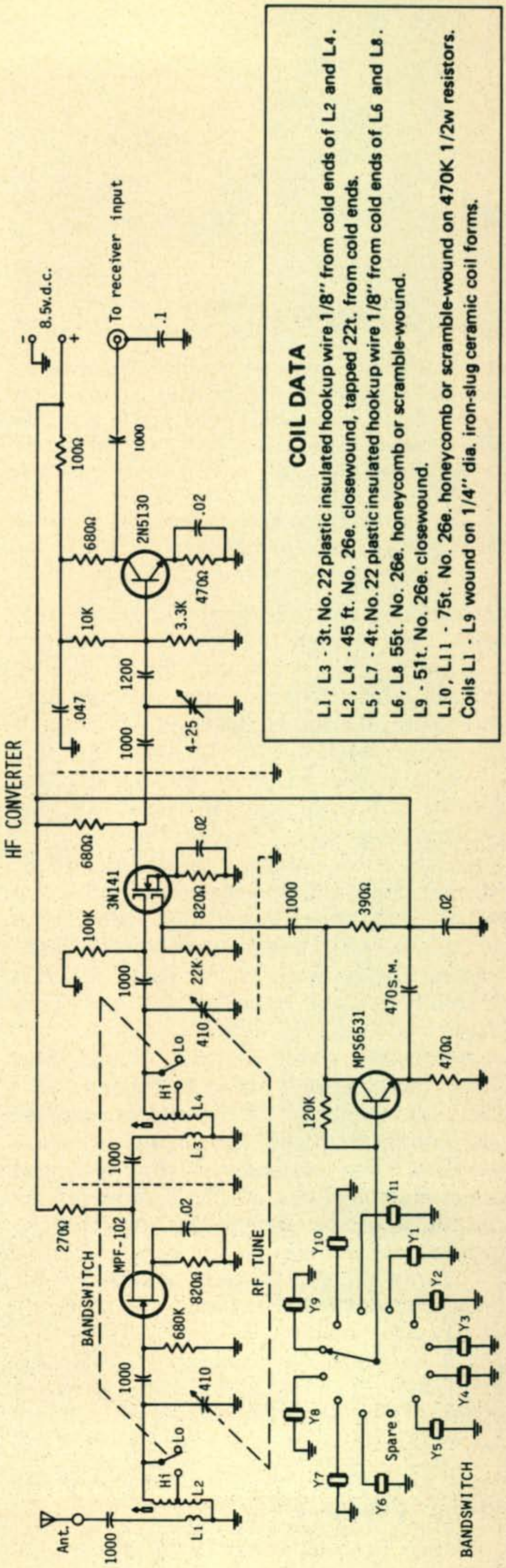
Construction Considerations

Rather than enclosing the whole works in the same cabinet, it was decided to build separately the first conversion unit as an independent h.f. crystal converter, feeding a low frequency monoband receiver hooked after it. By so doing, with a chance for a "break" between the converter and the receiver construction, the whole project does not expose the builder to a loss of interest throughout the assembly period, as happens at times when the undertaking is too lengthy.

As an added bonus, the crystal converter can be used separately with sets other than the one it was designed for, thus adding flexibility or resale value to it. With this purpose in mind, as a close look at the schematics of fig. 4 will reveal, the converter output is aperiodic, as to allow feeding receivers tuned anywhere up to 30 mHz; along the same line, the converter outlet allows direct connection without any modification to either positive or negative ground receivers. This is an advantage for those who, like me, got started early with transistors and have positive ground equipment at hand.

The converter (See figs. 2, 3, 5, 6, 7), as originally built, covers the 2.5-18.0 mHz range; no layout changes would be required to cover the 80 thru 15 m. bands for ham operation, only different coil windings. If 10 m. or, for that matter, 160 m. were to be added, then a different layout would become mandatory, as a different band-switching system should be used. Since both the converter and the receiver are reasonably small, it would be wise to plan in detail in advance the component layout, so as to assure no trouble will develop at time of assembly.

The receiver v.f.o. (See figs. 8, 9, 10) linearly covers the 2,955-3,955 kHz range, and here goes another word of warning to prospective builders. To achieve frequency linearity with accuracy of half a kHz or less over this range, freedom from backlash and spurious response, signal stability and flat response requires some previous experience in the area and I would not recommend undertaking duplication of this receiver unless there is somebody around who can



COIL DATA

L1, L3 - 3t. No. 22 plastic insulated hookup wire 1/8" from cold ends of L2 and L4.
L2, L4 - 45 ft. No. 26e. closewound, tapped 22t. from cold ends.
L5, L7 - 4t. No. 22 plastic insulated hookup wire 1/8" from cold ends of L6 and L8.
L6, L8 55t. No. 26e. honeycomb or scramble-wound.
L9 - 51t. No. 26e. closewound.
L10, L11 - 75t. No. 26e. honeycomb or scramble-wound on 470K 1/2w resistors.
Coils L1 - L9 wound on 1/4" dia. iron-slug ceramic coil forms.

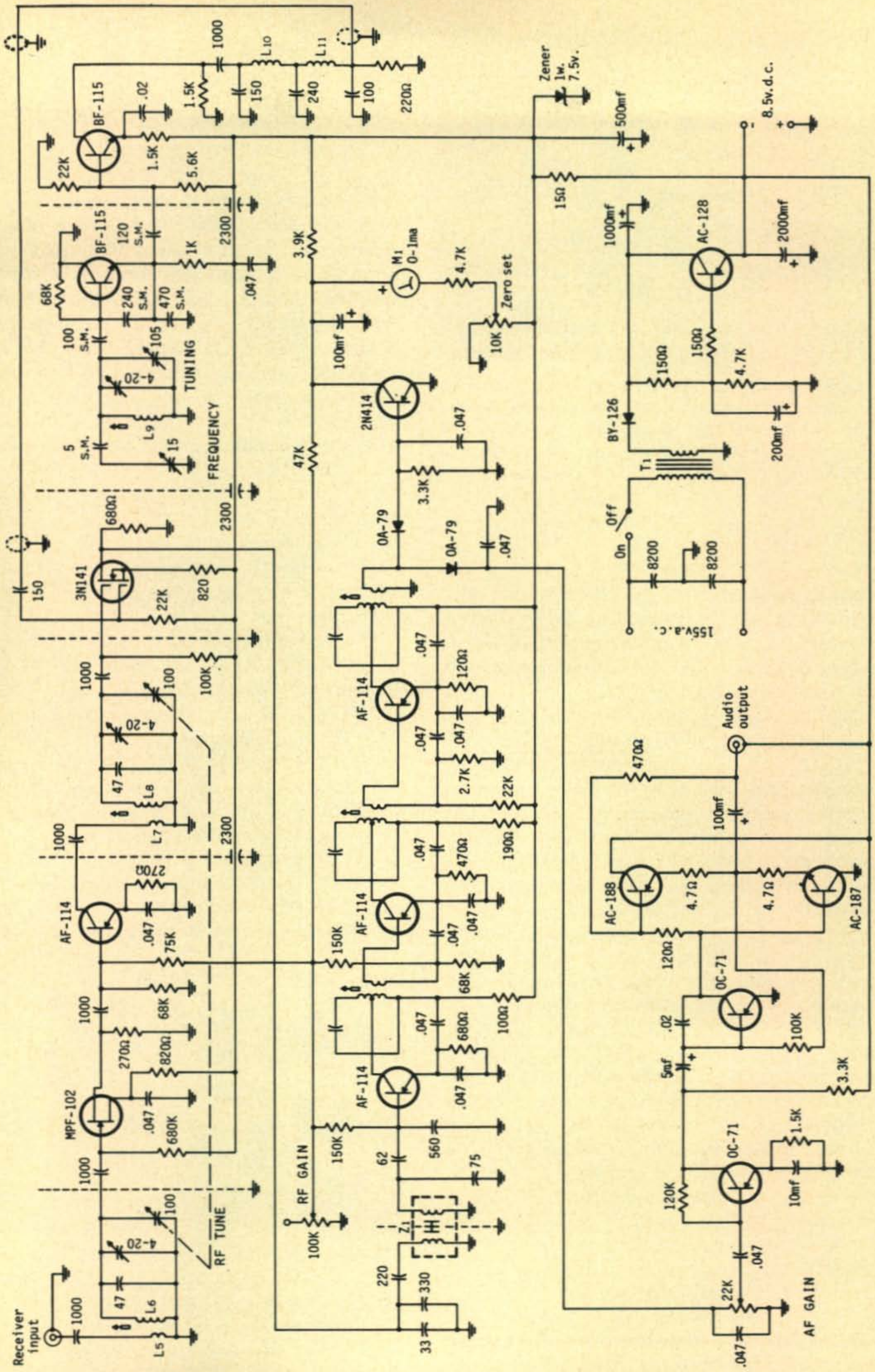


Fig. 4—Schematic of h.f. converter (page 30) and l.f. receiver (above).

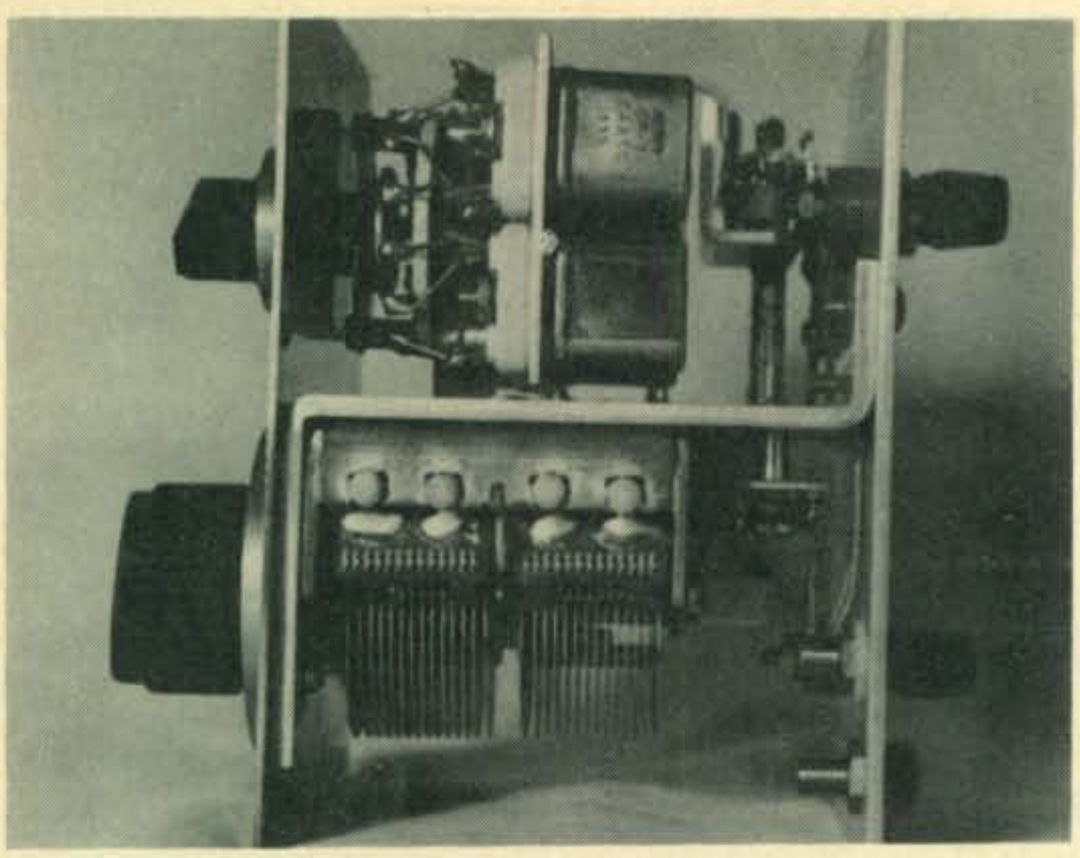


Fig. 5—Top view of the converter with the cabinet removed. The crystal bank is supported on the bandswitch, with the i.f. amplifier visible to the rear of the crystals. To the rear of the 2-gang R.F. Tuning capacitor is the r.f. amplifier stage. Jacks at the rear panel bring power from the l.f. receiver.

offer help, if needed. Breadboarding the circuit externally to get it operating temporarily prior to proceeding to the actual assembly is always quite helpful. Using a larger layout would also minimize trouble in some areas. At any rate, I'll be most happy to offer support by mail, as in previous cases; no SASE is needed.

With electronic counters becoming cheaper and with light emitting diodes replacing the heat generating display tubes, some may wonder why I still stick to mechanical counters on my receivers. The basic advantage of an electronic counter evidently being that the v.f.o. linearization is no longer needed, as an electronic counter responds directly to an electric signal whereas a mechanical counter relys on physical position principles to operate. Trouble is, an electronic counter would be at least as large as the receiver itself, and anywhere between perhaps 20 and 100 times more expensive than a mechanical counter. The addition of an electronic counter would further reduce the number of those willing to give a try at the project. Finally, an electronic counter could always be added externally with the advantage that it could be used for other purposes and for future projects, rather than remaining a built-in feature of this particular project.

If, for any reason, the transistors used will be different from those specified, it will become mandatory to adapt the corresponding bias network to make it operate with the new active device. This is especially true for the crystal oscillator, as explained below.

Construction Details

The cabinets and front panels are built out of 16 gauge AISI 304 stainless steel. Even though stainless steel is difficult to work and even special tools suffer from it because of its mechanical characteristics, there are advantages: the finishing is superb, and the equipment never loses its "brand-new" appearance. Scratches with nails or dusting simply do not exist. The extra time needed to build the cabinets out of stainless steel is, at least in my case, more than compensated by the fact that they don't need to be painted, which is a time consuming operation.

The back panel is $\frac{3}{32}$" aluminum, whereas the chassis is made from $\frac{1}{8}$" aluminum sheet. All bending is done on a 16 ton press, although obviously a more than adequate job could be done with more modest equipment.

The size of the converter is about 5" w. × 3.5" h. × 4" d. while that of the receiver with the built in power supply, is approx. 6.25" w. × 3.5" h. × 7" d. The loudspeaker is an oval affair 3" × 4", housed in a cabinet measuring 4.25" w. × 3" h. × 3.25" d.; the speaker was added more as a matter if esthetics rather than of opertion, as all serious listening is done here with headphones.

All front and back panel lettering (fig. 2 3, 10,) is mechanically engraved using $\frac{1}{16}$" high steel stamps, heavy duty type to survive stainless steel markings. The con-

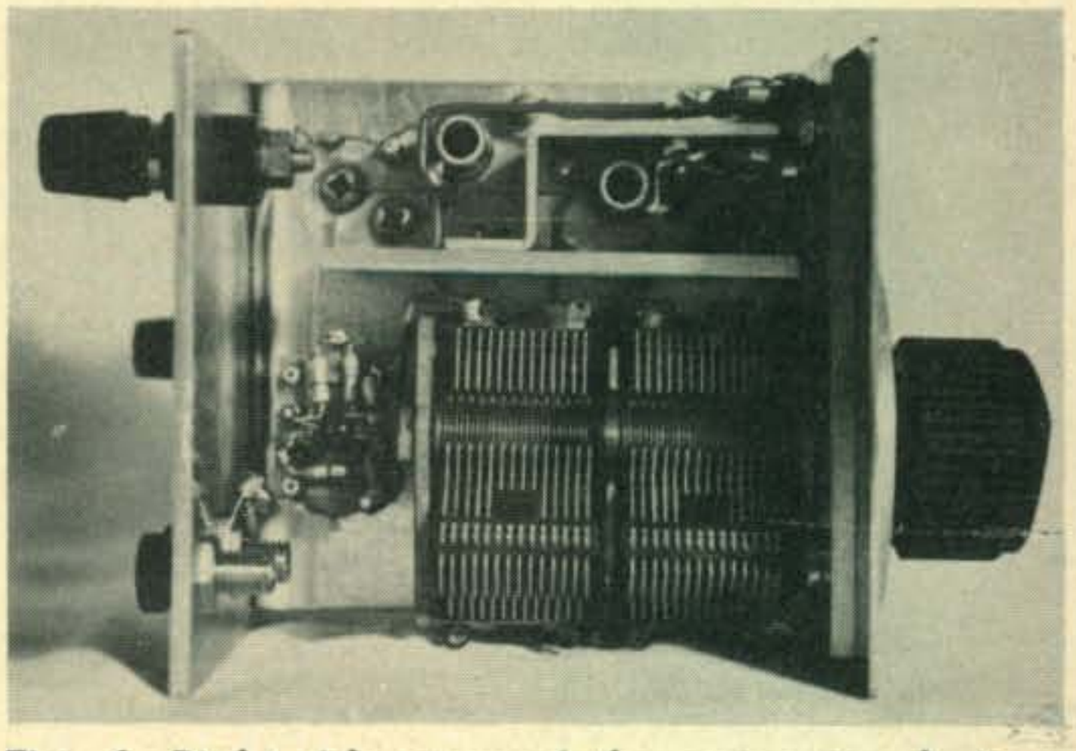


Fig. 6—Right side view of the converter, bottom up. The r.f. and mixer coils are at the top with the 1/16" aluminum plate providing shielding between the slide switch sides. Antenna input is at top left, while the power input is at bottom left.

verter knob skirts (fig. 2) are made out of ⅛" aluminum, mechanically engraved and then fastened with 2-56 screws to the knobs themselves. Obviously, in the case of the preselector dial skirt, engraving is only possible after the converter is functioning properly and calibrated, as to ensure accurate correspondence of the dial markings to the received frequency.

All shieldings are made out of 1/16" aluminum. Components are first class; the v.f.o. worm gear (figs. 8, 9) is of the "spring loaded" variety, mounted on four ball bearings. Manufactured by Bendix, this is available in the New York area as a surplus unit.

The counter is a Veeder Root affair, with three vertical digits; even though this receiver is tiltable, a vertical counter eliminates parallax problems. A three-digit unit was preferred since, because of the extended coverage of the receiver, only the hundreds, tens and units of kHz are read on the counter; the tens and units of megacycles are read on the converter bandswitch.

The tuning rate is 25 kHz/revolution, which is reasonably comfortable. A crank tuning knob is recommended to allow for fast band excursions. The v.f.o. variable capacitor (figs. 8, 10) is a low torque unit with ball bearings at both ends, coupled with a flexible joint to the worm gear. The S-meter is a Japanese import, held in place by a rear bracket to avoid showing its fastening screws on the front panel.

With reference to the converter, the crystals are HC6U type, with 11 sockets installed on the bandswitch that supports an

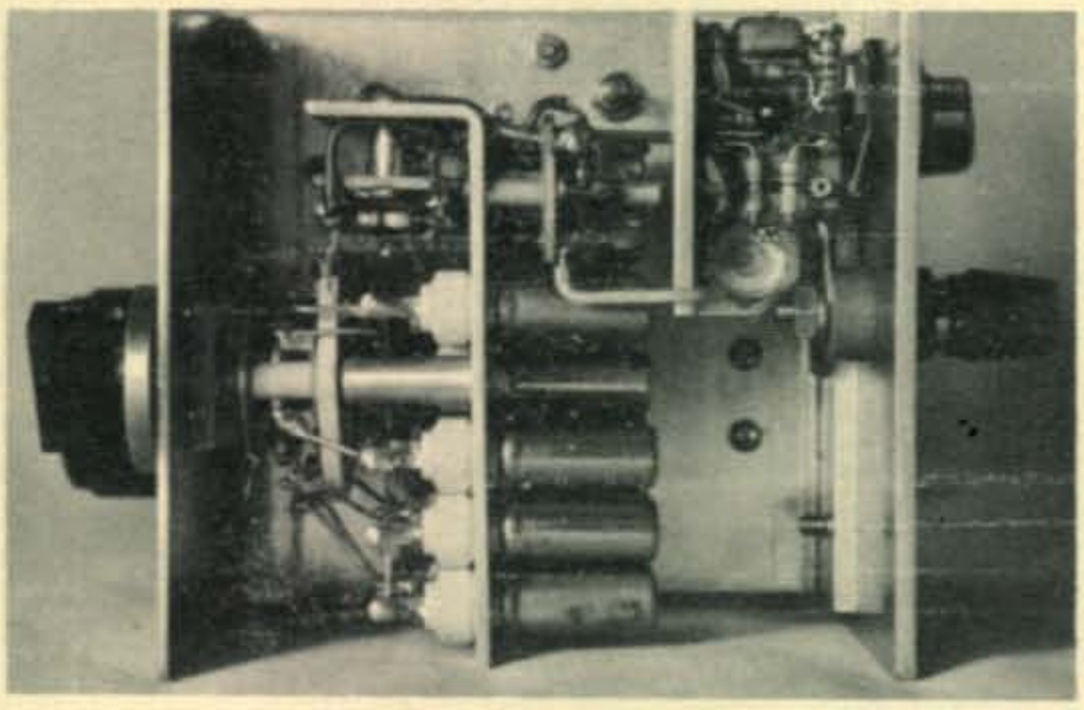


Fig. 7—Left side view of the converter, bottom up. The L-shaped aluminum bracket fastened to the bandswitch holds the 11 crystal sockets. The oscillator sub-assembly is above the bandswitch (inside the L bracket), while the mixer sub-assembly is to the right of the bracket, above the crystals. The buffer stage is at top right, feeding the RCA jack at its right.

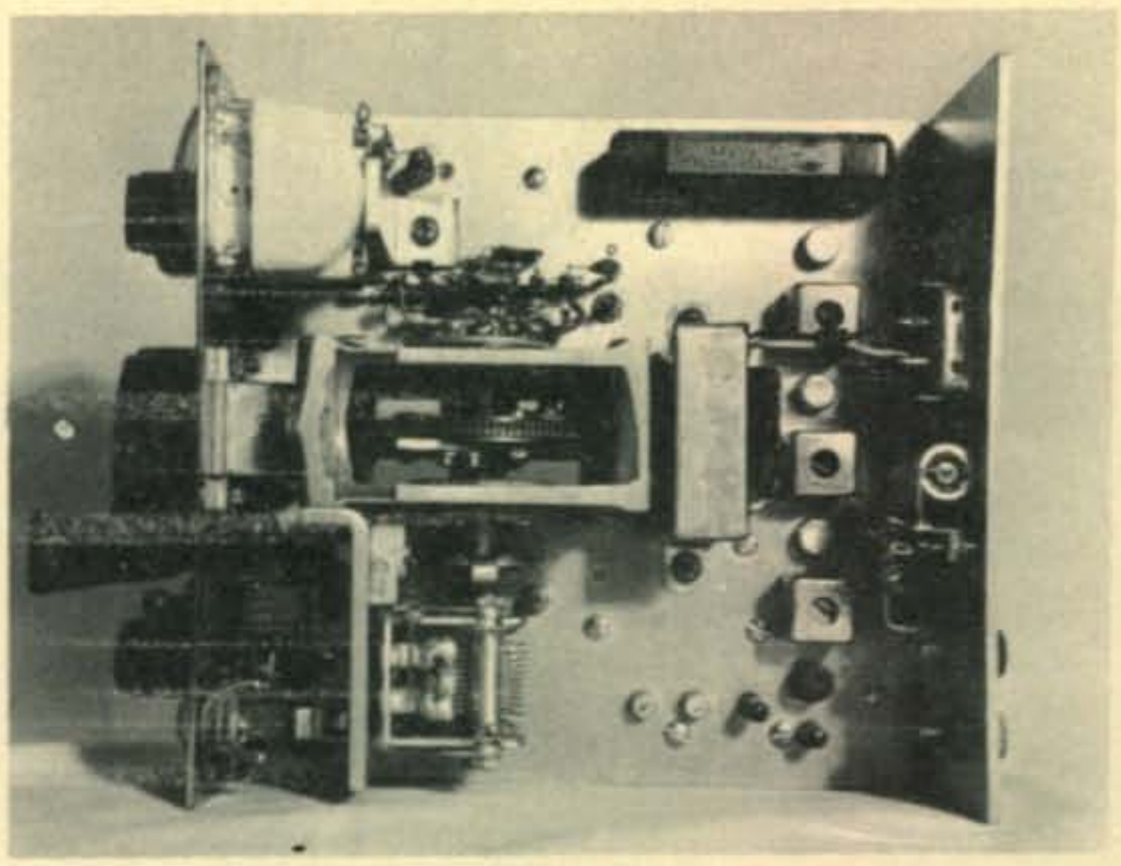


Fig. 8—Top view of the receiver with the cabinet removed. At center the worm gear unit supports a sub-chassis with the v.f.o. capacitor fastened to it. The counter is between the worm gear and the front panel. Right above the worm gear is the RF_2 and RF_3 circuitry. The i.f. strip runs from top to bottom at the right, along the back panel; the Collins mechanical filter is at the top of the IF strip, while at the bottom are the four audio transistors and the a.v.c. amplifier stage. The power transformer is to the immediate right of the worm gear.

L shaped bracket with the whole subassembly.

The r.f. two-gang capacitor is a 2 × 410 pf affair with built-in 6:1 vernier. Output from the receiver to the converter goes via coaxial cable, and RCA jacks and plugs.

In both the receiver and the converter, the cabinet is built in two halves kept in place by ⅛" × ¾" brass spacers (not shown in the pictures), fastened by 4-40 plated binder head screws.

Circuit Considerations

The block diagram of this receiver is shown in figs. 11 and 12.

Notice the concepts used for the front end: since miniaturization of the unit was a point of primary interest, the same set of coils is used for both the Lo and Hi positions. By shorting part of the coil winding out, the higher part of the band is covered. These coils must be definitely breadboarded using components locally available to make sure that the slugs show good performance on both bands or else a deterioration of sensitivity will occur.

Both RF_1 and MIX_1 are FET's because their inherent advantages in these applications.

The crystal oscillator circuit is critical, as no tuning coils were used on it. Because of

its wide frequency excursion capability (2-20 mHz), this circuit requires careful adjustment to make sure that it oscillates throughout the band, delivering a reasonably flat signal response. A frequency counter comes extremely handy at this point. The output buffer helps matching the mixer output impedance to the receiver input impedance; depending on the coaxial cable length and the output frequency (when the converter operates, for example, with a receiver different from that described), proper matching makes quite some difference. A trimmer is provided for this purpose. Provisions are also made to pull an a.v.c. signal from the receiver to RF_1, if so preferred.

Looking at the receiver block diagram (fig. 12), RF_2 and MIX_2 are also FET stages. The double gate FET's show a particularly good performance in the mixer stage. A low-pass filter between the v.f.o. and MIX_2 is a five pole affair designed to attenuate signal above 4.0 mHz.

The v.f.o. is a key piece in any communications gear. Its design was derived from prior receivers; the frequency of operation was chosen, among other considerations, by the capacitance of the variable capacitor available (105 pf), that is later further reduced when, in order to linearize the v.f.o., the capacitor plates are filed down, losing about 20-30% of its initial capacitance.

The mechanical filter has a nominal bandpass (at 6 db down) of 2.1 kHz. The 3 i.f. stages that follow are rather conventional, using germanium transistors. There is no doubt that more modern transistors, primarily silicone, are available today, but there are different reasons for this selection. At 455 kHz, frequency cut-off has not been a problem for many years, and leakage current is not overly critical; on the other hand, this circuit has been used so extensively by the author that not only its performance is well known in advance, but also an extremely high gain is assured, without loss of stability.

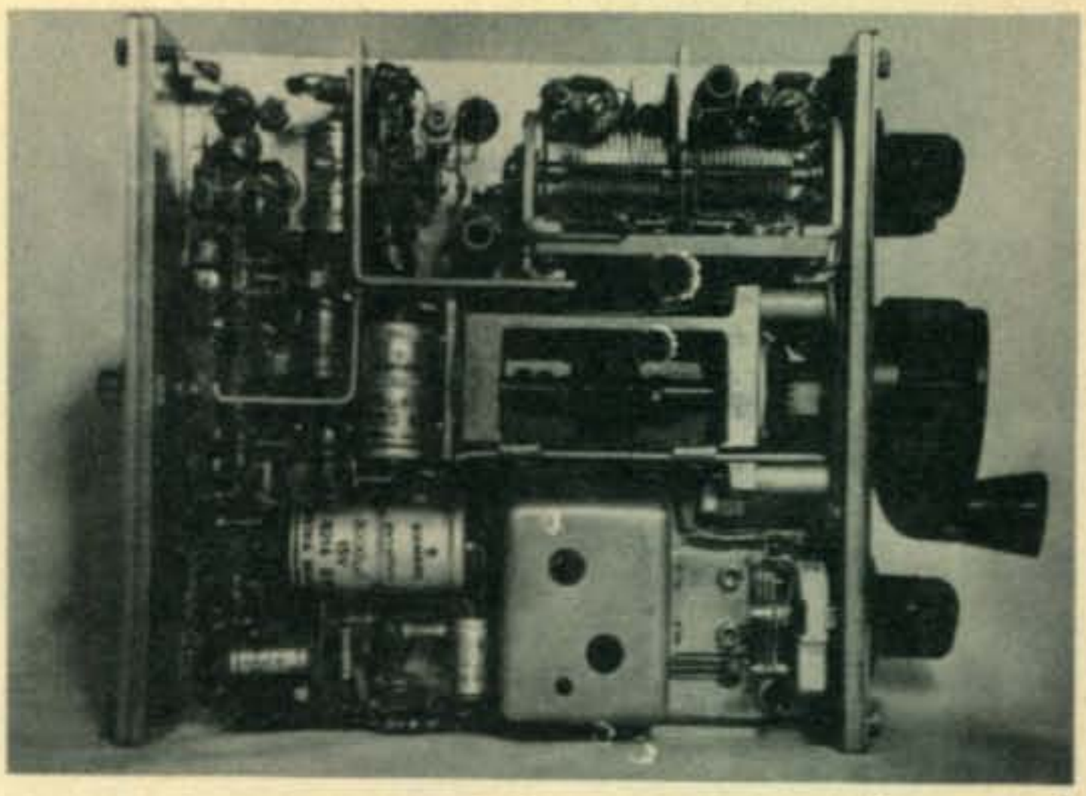


Fig. 9—Bottom view of the receiver. At the center is the main tuning gear with the bevel gear that actuates the counter on the same shaft. On top of it is a two gang variable capacitor for RF_2 and MIX_2 peak tuning. Notice shielding between stages and also between input and output of the mechanical filter, at top left. The power supply is to the left of the worm gear, the two large electrolytic capacitors being part of it. The v.f.o. can hides the v.f.o. circuit and also shields the Frequency control (bottom right) from the rest of the receiver.

The audio stages end up with a complementary pair wired to avoid transformers of any sort. Delivering about 0.8 watts, the audio level is much in excess of the need for headphones comfortable listening. The power supply is electronically regulated providing, through external connections with banana plugs, the d.c. power necessary to run the converter or any other ancillary gear.

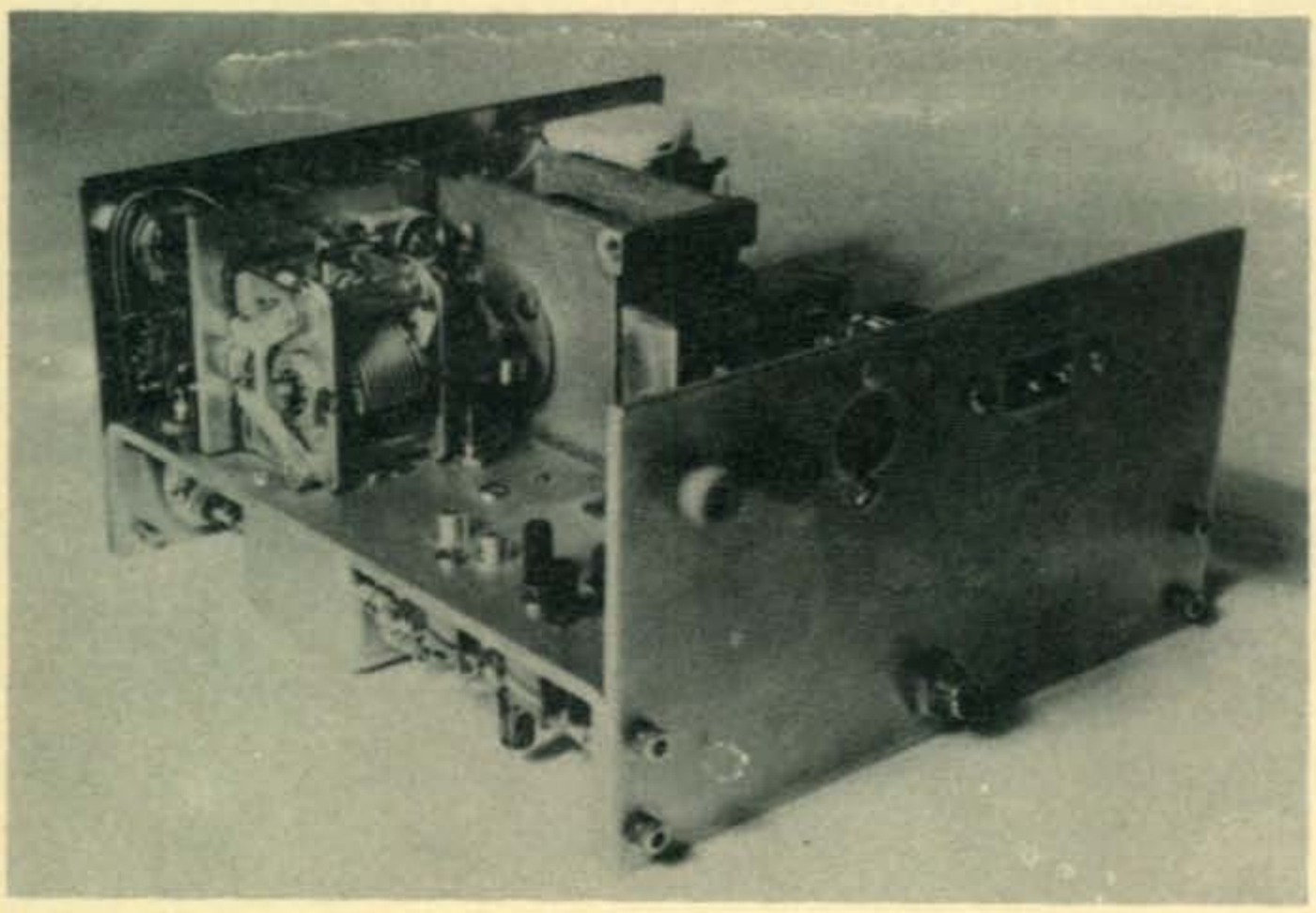


Fig. 10—Three-quarter view of the l.f. receiver, from the right rear side. The v.f.o. variable capacitor is shown fastened to its 1/8" aluminum sheet bracket; behind the bracket is the v.f.o. buffer circuitry. The v.f.o. coil is to the right of the tuning capacitor. On the rear panel are the d.c. power outlet jacks (top left), the 11-pin socket to power the converter, and the 115 v.a.c. connector. Signal from the converter is fed to the receiver via the RCA jack at the bottom center.

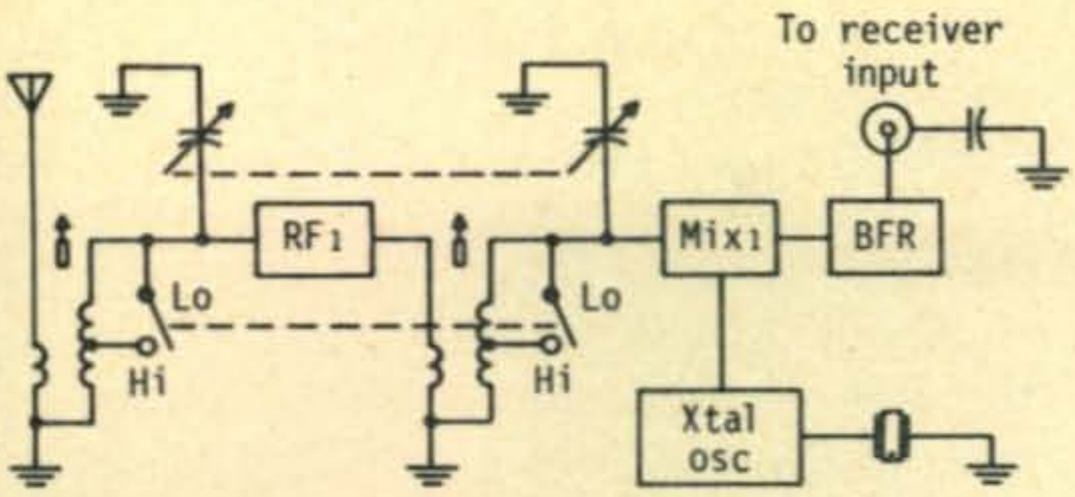


Fig. 11—Block diagram of the crystal converter.

Frequency	*S-meter reading*
Fundamental	9 + 10
2nd harm.	4
3rd harm.	2
4th harm.	0.5
5th harm.	unreadable

Table I—Five Pole V.F.O. Low-Pass Filter Attenuation.

Circuit Details

Because of the extremely high gain of this receiver, proper shielding and by-passing techniques should be used throughout to achieve stable operation. All tuned circuits are shielded from the circuitry of the corresponding active devices. Heavy filtering is used on all power lines; feed-thru capacitors in the whole front end ensure no stray coupling or ground loops take place through the power supply.

The whole v.f.o. circuit and coil are shielded; the v.f.o. capacitor is not shielded because it must be well accessible in order to allow for comfortable filing of its plates during the linearization procedure. It must be noted, though that during linearization (*i.e.*, filing) of the v.f.o. capacitor a small temporary shield must be taped or fastened to the top of the v.f.o. variable capacitor to simulate the effect of the metallic cabinet of the receiver. Failure to do so will result in losing the whole linearization job of the receiver, as the metallic cabinet (when put in place) will throw off the linearity of the v.f.o.

Another area where stray capacitances may affect performance is in the v.f.o. five pole filter. It would be convenient to check (using, for instance, another receiver) the signal strength of the v.f.o. signal on its fundamental frequency and the next five or six harmonics. The readings of Table I were obtained with the prototype, using a converter ahead of a Collins 75A-4 receiver, to check for relative harmonic strength.

What is extremely important to recall on a v.f.o. linear over one mHz is that the simple change of a wiring harness may throw out the calibration by some kHz at the band edge. Therefore, when starting the linearization of the v.f.o. capacitor, all screws, nuts, wires, components, etc. must be securely tightened in place and no circuit changes should be made during or after linearization. The easiest way to achieve perfect linearity is to file down the capacitor to within 1 kHz or so of the nominal frequency; from then on, the fine part of the linearization should be done by slightly bending and properly adjusting the side plates of the capacitor rotor. This procedure has the advantage of being a reversible one, whereas filing is not.

To avoid problems either during filing or in mobile operation, I use a lockwasher on all screws and a small drop of transparent paint. This procedure would probably not be applicable to highly experimental units, as it makes it somewhat difficult to remove screws and components that had already been set in place.

Even though the number of amplifying stages may look excessive, some design requirements are in effect keeping the gain down from what it would be possible to

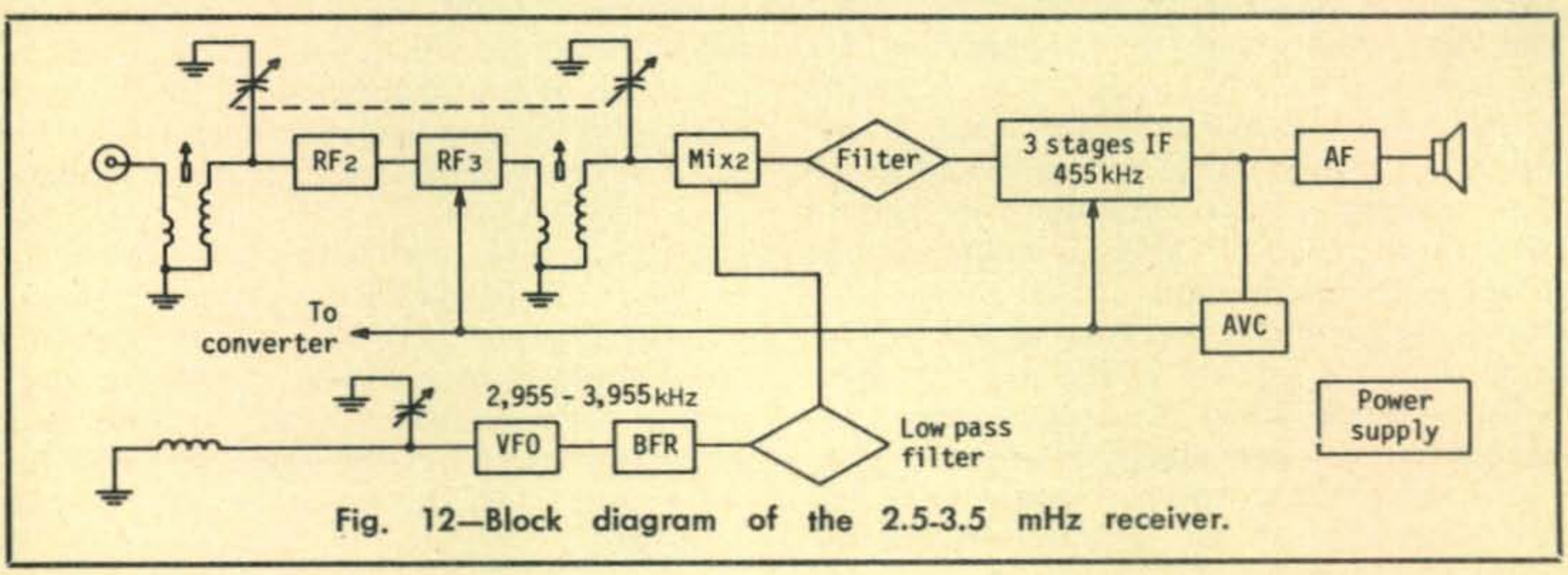


Fig. 12—Block diagram of the 2.5-3.5 mHz receiver.

achieve and what this receiver would still handle from a stability standpoint. For example, all r.f. stages have coils with loose coupling between primary and secondary winding to increase r.f. selectivity and minimize overloading effects; both the first and second mixer are operated at low gain, to avoid internal spurious generation. Consequently, a high number of stages is used in order to obtain satisfactory overall performance.

Ham Band Operation

If this receiver were to be duplicated to cover the ham bands, 80 thru 10 m., the v.f.o. should operate at a frequency approximately one mHz higher. By so doing, the 80 m. band reception would become a single conversion affair, with the converter acting as an r.f. preselector; the converter bandswitch would insert no crystal into the crystal oscillator circuit for this band, thus leaving the oscillator itself inactive. The frequency stability of the set would not suffer from this modification for ham operation, even for s.s.b. The difference in v.f.o. stability between 3 and 4 mHz is negligible. Most commercial sets use v.f.o.'s in this frequency range or even higher with satisfactory results. Consequently, the receiver input should tune 3.5-4.5 mHz or thereabout. As far as the converter is concerned, no circuit changes would be required, except that the coils should have an extra tap to allow coverage of the 10 m. band; a triple position slide switch would then be required. On this matter it is worth noting that a slide switch was initially selected because of its small size, but it is imperative to shield its sections effectively to avoid feedback; such shield is shown in fig. 6.

What might encourage the duplication of this receiver for ham band operation, however, is the fact that direct frequency read-out is probably not as necessary as for operation on the SW bands. If one is willing to have direct read-out on some ham bands (say 3.5-4.0 mHz), and willing to add to the dial reading a fixed number on certain other bands (say, 500 kHz), it would then be possible to reduce the v.f.o. coverage from one mHz to 500 kHz. Among the advantages that this option offers, are that linearity is much easier to achieve over 500 kHz than over one mHz, making the v.f.o. easier to linearize. Another advantage is that using the same worm gear to control the v.f.o., but changing the bevel gears that move the counter, one can tune instead of 25 kHz/rev. as mentioned, 10 or 20 kHz/rev., making s.s.b. tuning more comfortable. The price for this, I repeat, is that on some bands one should mentally add 500 kHz to the dial reading. Since direct frequency read-out is an extremely convenient feature, I would never consider missing it, at least for my type of operation.

Conclusions

To sum up a generalized appreciation of this project, I would classify as favorable characteristics the compact size, dial accuracy and frequency read-out, stability, selectivity (this goes to Collins' credit, though, not mine . . . .), low power drain, sensitivity and a reasonably flat frequency response over the bands. Also the MTBF (Mean Time Before Failure—a measure of reliability) is way up when compared to tube sets, and about 2.5 times better than the HRO-500.

Some aspects that are not so favorable are that, at least in the US, for $220 one can buy a used set in reasonably good condition, with more diversified features and a higher resale value. If space is not a premium item, by increasing the size, especially of the converter, the whole circuitry can be made more siphisticated and show a better performance. Using a standard wafer bandswitch with different coils for each band and also tuning the crystal oscillator output to MIX_1 will definitely improve the performance of the set. This will lead to a converter about the same size of the receiver itself.

I will not comment on spurious response, because it is all Alan's fault: I did my best to stay away from them, but those that are there (as they *are* on *any* commercial multiband set) should be charged to Alan's account. After this, I guess, I will be left alone to continue my crusade for those superbly spurious free and outstanding flat response receivers that are the monobanders.

Acknowledgement

Good ole Maiso, PY2GP has been so generous, helpful and patient over the years that I could never close down without mentioning his continued support to these projects. Tommy, PY2DFR gets the credit for the pictures. All the errors left I claim as my own. ■

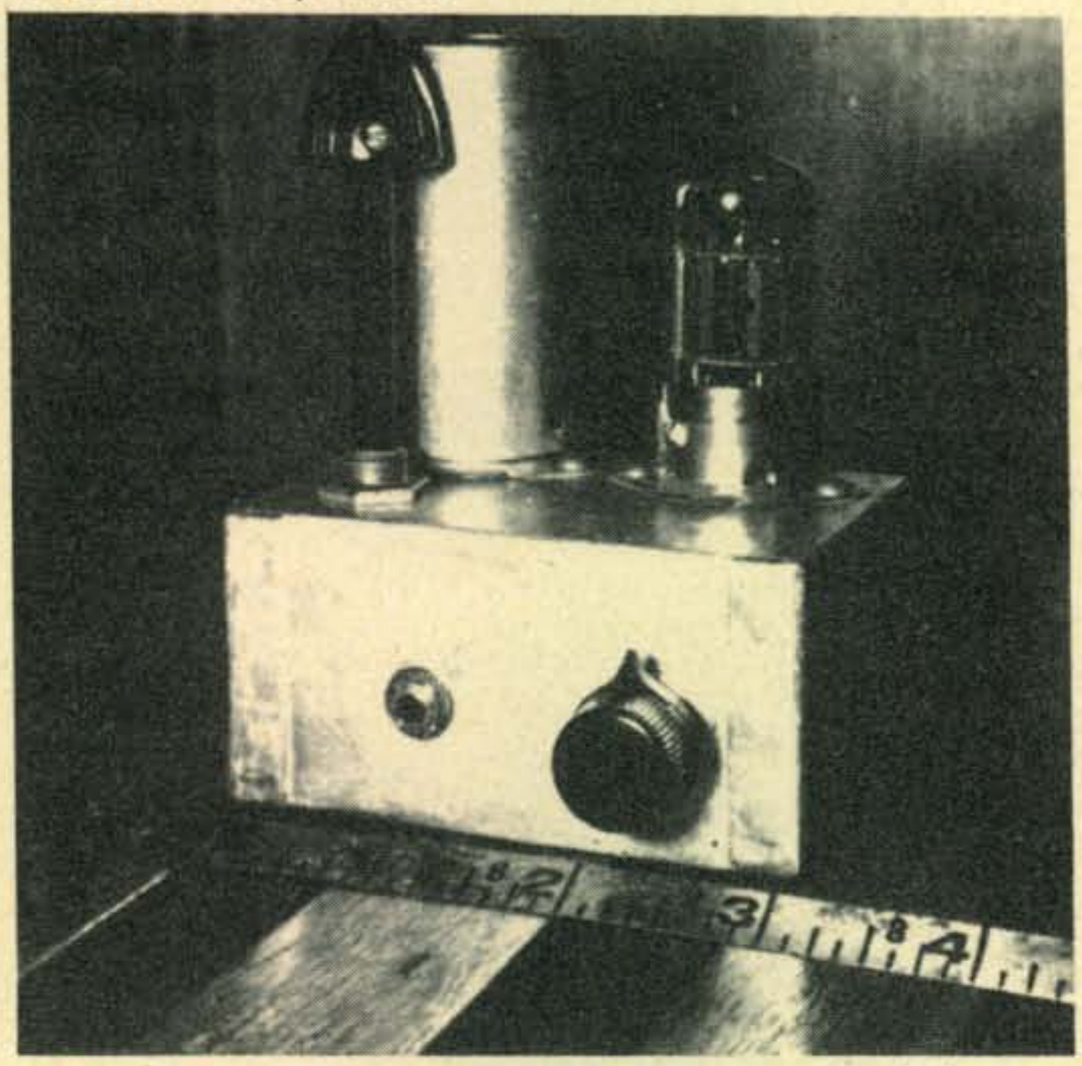
A Deluxe Screen Modulator for Beginners

BY R. JAYARAMAN,* VU2JN

ALTHOUGH a.m. is slowly becoming obsolete in amateur communication, there is no denying the fact that for the sheer pleasure of short-range high-fidelity voice communication, there is nothing to beat good-old a.m. It is the writer's earnest hope that a.m. would not be wiped off completely from the face of amateur radio!

When the writer started building his present c.w./a.m. transmitter, he had a difficult decision to make as far as the type of modulation was concerned. Economy of construction was certainly aimed at, but not at the expense of signal-quality. After some reassuring words from his friend Wickram, 8Q6WA who has built high-power screen-modulated commercial transmitters, the writer decided to go in for screen modulation. Although the writer started the project with not a small measure of difference, the result has been a pleasant surprise—Indian and DX hams have made very good comments on the signal quality and at least one DX ham has refused to believe that the writer is on screen modulation! The writer can now declare with some confidence that a properly designed screen-modulated transmitter can give the same punch and quality as a plate-modulated transmitter, at least as far as listening tests go.

*Department of Civil Engineering, I.I.T., Madras—36, India.



The speech amplifier of the screen modulator is housed in a small sub-chassis. The auxiliary gain control is on the top side of the chassis.

Operating Conditions

It is worthwhile to remember here that the basic principle underlying screen modulation is the fact that the efficiency of a radio-frequency power amplifier (PA) is, within limits, proportional to the screen voltage. In order to obtain good linearity with screen modulation, the tube current as well as the tube efficiency should *both* vary in direct proportion to the instantaneous screen voltage, so that, the PEP output at modulation peaks will be *four* times the carrier output without modulation. It follows that the d.c. screen voltage should be nearly half of that used for c.w. operation, maintaining a low tube efficiency of about 35%.

The issue now arises as to why many screen modulated transmitters put out a mediocre signal. For proper screen modulation, the following requirements should be met.

(1) The plate voltage of the PA should be quite high, preferably equal to the maximum recommended c.w. rating. This is 750 volts for 807/1625 tubes. Unless the plate voltage is high enough, the screen voltage loses its control on the tube conductance at the positive peak of its modulation swing, due to saturation effects.

(2) The proper d.c. screen voltage should be chosen so as to maintain half of the peak efficiency that can be attained at modulation peaks. With 807/1625 tubes, this is around 125 volts, but it can be raised somewhat by carrier control, provided the plate voltage is high enough. In general, the *higher* the plate voltage, the *higher* can be the screen voltage, subject to the limitations of plate dissipation and curvature of the screen characteristic.

(3) Since the screen impedance of the PA varies with the instantaneous screen voltage,

the d.c. screen voltage should be obtained from a regulated supply or carrier control should be used. During modulation, the d.c. screen current, which is simply the time average of the instantaneous screen current over a cycle of modulation, shows a marked increase. Consequently, if a screen-dropping resistor is used without carrier control, the d.c. screen voltage *drops* with deep modulation, causing non-linearity and splatter at the downward peaks of the modulation swing. In the writer's opinion, this accounts for the mediocre performance of many a screen-modulated transmitter.

(4) The operating bias, either fixed bias or self-bias, and the grid current should lie *in between the values recommended for c.w. and plate modulation*. For 807/1625 tubes, the bias voltage should be ×65 to ×75 volts and the grid current 3 to 4 ma.

(5) The PA should be loaded much more heavily than for c.w. In the absence of an oscilloscope, the proper loading can be arrived at only by listening tests. With a self-biased final, the plate-current dip should be barely discernible as the final tank is tuned through resonance. If an r.f. voltmeter or ammeter is connected to the antenna line, the meter should never show a downward flicker with modulation. Without carrier control, there should be a slight upward flicker at modulation peaks.

(6) The audio output of the screen modulator should be heavily swamped by a load resistor placed across the secondary of the modulation transformer. This minimizes audio distortion due to the varying screen impedance of the PA during modulation.

With a final employing 807/1625 tubes in parallel at plate, screen and bias voltages of 750, 125 and —70 volts respectively, the plate input will run around 45 watts per tube. At 35% efficiency, the plate dissipation is as high as 30 watts and the tube will run quite hot. If, however, the plate shows any color, the screen voltage should be lowered to the extent necessary.

Carrier Control

The main factor limiting the output from a screen-modulated PA is the low tube efficiency and hence high plate dissipation. Because of the complex wave-form of the speech signal modulating the screen, a somewhat higher average output can be realized by keeping the d.c. screen voltage and hence the plate input low, and raising it momentarily in accordance with the amplitude of the modulating audio signal. In the writer's transmitter, the screen voltage under no-modulation conditions is 125 volts, and with full modulation it is raised to 175 volts. This is only a moderate amount of carrier control and does not give rise to the somewhat unpleasant "boominess" noticeable in some commercial transmitters employing deep carrier control. In order to have fast response and low distortion, the time-constant of the carrier control circuit should be about 0.1 second.

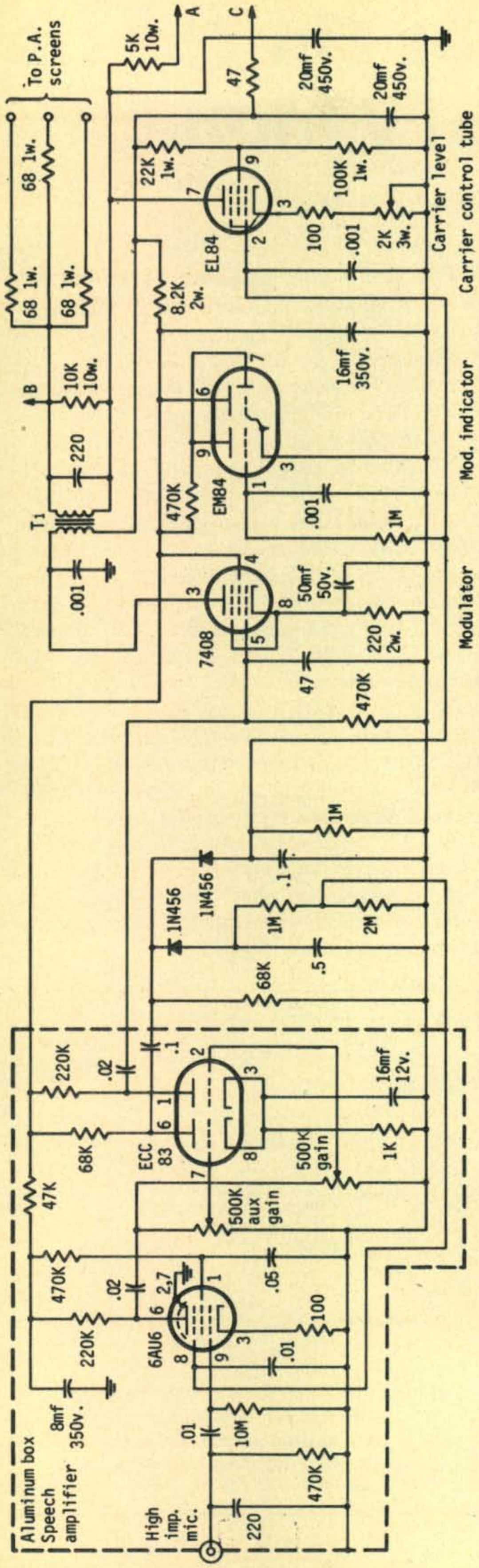
Design

Let us consider the design of a screen-modulated PA, utilizing three 807/1625 tubes in parallel and running an input of about 150 watts.

The screen impedance of the PA varies with the instantaneous screen voltage but, as an approximation, it can be taken to be the d.c. screen impedance under c.w. conditions, *i.e.* about 45,000 ohms. For three tubes in parallel, the modulating impedance is 15,000 ohms. Adopting a swamping resistor of 10,000 ohms 10 watts, the net load on the secondary of the modulation transformer is 6,000 ohms. Using a receiver output tube as the modulator, its output impedance will be about 5,000 ohms. Hence the turns ratio of the modulation transformer should be /5000 : 6000 or 1: 1.1.

Adopting carrier control, let the maximum d.c. screen voltage with full modulation be 175 volts. For complete cut-off of the carrier at the downward peak of the modulation swing, the peak a.c. voltage should be 10% greater than the d.c. voltage, *i.e.*, about 195 volts. This corresponds to 140 volts rms. The power delivered by the

VU2JN's 150 watt c.w./a.m. transmitter incorporating the Deluxe Screen Modulator.



secondary of the modulation transformer will then be $140^2/6000 = 3.3$ watts. Assuming a transformer efficiency of 75%, the primary power required is less than 5 watts.

The Modulator Circuit

Figure 1 shows the circuit-diagram of the modulator. The audio signal from the microphone is first amplified by a low-noise 6AU6 stage, and passes through separate gain controls to the two sections of an ECC83. One section is used in the speech amplifier line, while the output of the other section is rectified by a silicon signal-diode to provide a negative control voltage with a time-constant of about 0.1 second for carrier control. The control voltage also operates a modulation indicator using an EM84 magic-eye tube. Another silicon diode rectifies the audio to provide a fast-attack slow-decay a.g.c. voltage with an attack time-constant of about 0.05 second and a decay time-constant of 1.5 seconds for the purpose of volume compression. This voltage is applied to the suppressor grid of the 6AU6, so as to maintain a reasonably uniform output with widely varying microphone inputs. The entire speech amplifier is built inside a completely closed aluminum box, and tube shields are used for the 6AU6 and ECC83.

The modulator tube is a 7408 which is a high-fidelity version of the 6V6. With a 300-volt power supply, this tube provides more than 5 watts output at 7% total harmonic distortion. An EL84 may also be used but the THD will be about 10%. The modulation transformer uses a good audio-type core and has primary and secondary impedances of 5,000 and 6,000 ohms. The audio output, swamped by a 10K 10w. wirewound resistor, is passed through 68-ohm 1 watt decoupling resistors to the PA screens. Each screen is bypassed to the cathode by a 0.001 mf 1000 v. disc ceramic right at the tube base. Some manuals suggest using screen stopper resistors, but the writer found that the stoppers actually increase the tendency for v.h.f. oscillation.

The carrier control circuitry is also shown in fig. #1. The EL84 control tube functions

[*Continued on page 80*]

Fig. 1—Schematic of the Deluxe Screen Modulator. Transformer T_1 is a 5 watt modulation transformer, 5000 ohm pri., 6000 ohm sec.

Further Notes On The SS Mark 4 SSTV Monitor

BY DAVID F. PLANT,* K9LAJ/2

I WOULD first like to take this opportunity to thank the many *CQ* readers who have written giving comments and encouragement throughout the SS Mark 4 project. Those letters have been very helpful, indeed. A special thanks, also, to those who showed extreme patience while we battled the industry-wide parts shortage while filling and shipping kit orders.

Now to business. Herb Cohen, the chief engineer for GSI Industries, has developed improved horizontal and vertical sweep circuits that eliminate the hard-to-find 2N1671B unijunction sawtooth oscillator. This modification was incorporated in all the kits shipped by GSI and has performed very well.

Figure 1 shows the improved sweep oscillator and driver circuits, which replace either or both sweep circuits in the original article. One problem with the original sweep oscillator was marginal output. Some units required that the Vertical and Horizontal Size controls R_5 and R_9 be run at maximum to achieve proper raster size. The new circuit produces more than ample drive.

The unijunction transistors (Q_4 and Q_{10} in the original circuit) have been replaced by a device called a Programmable Unijunction Transistor (PUT). The PUT used is a readily-available Motorala HEP replacement type, S9001. The 40407 emitter follower stages (Q_5 and Q_{11} originally) have been replaced by Darlington pairs consisting of two 2N-2712's, which together are much less costly than the 40407. A higher output impedance also results, which seems to be advantageous to the deflection transistors. All in all, the combination of the PUT oscillator and Darlington pair yield a sawtooth that is not only linear, but of sufficient amplitude to fully drive the deflection stages.

Changes were also made to the deflection circuits themselves. The 2N3739 deflection transistors have been replaced with cheaper and more readily available Motorola MJE-340's as suggested by Cop Macdonald in his Sept. 1972 *CQ* column. In addition, the values of the vertical and horizontal position controls have been altered to produce more stable operation and generally less-critical adjustment of raster position.

*c/o Plant & Plant Associates, 25 5th Ave., New York, N.Y. 10003

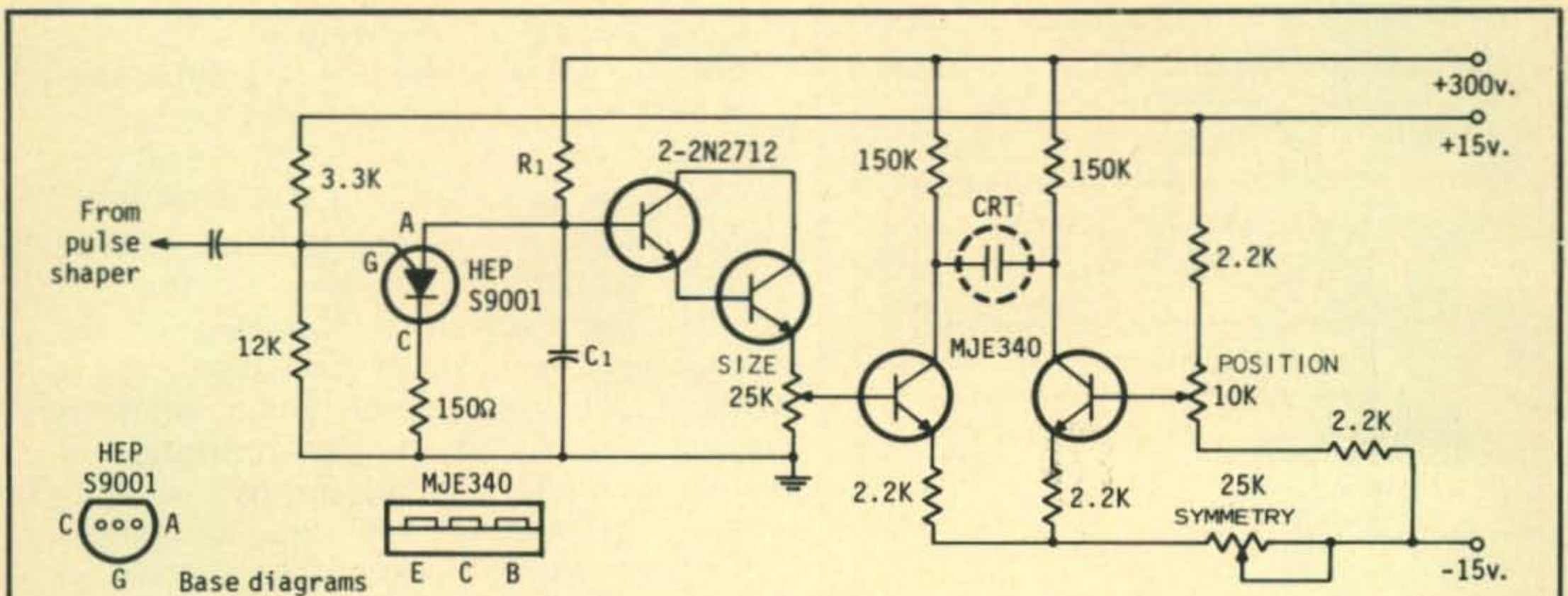


Fig. 1—Improved sweep oscillator, driver and deflection circuit for the Vertical and Horizontal sections of the SS Mark 4 monitor. Values of C_1 and R_1 are as follows: For Vertical circuits, C_1 is 10 mf 10 v., R_1 is 2.7 meg which may have to be adjusted slightly to produce a 9 second sweep. For Horiontal circuits. C_1 is 1 mf 10 v. non-polarized, R_1 consists of a 1.5 meg resistor in series with a 1 meg pot (Horizontal Hold control).

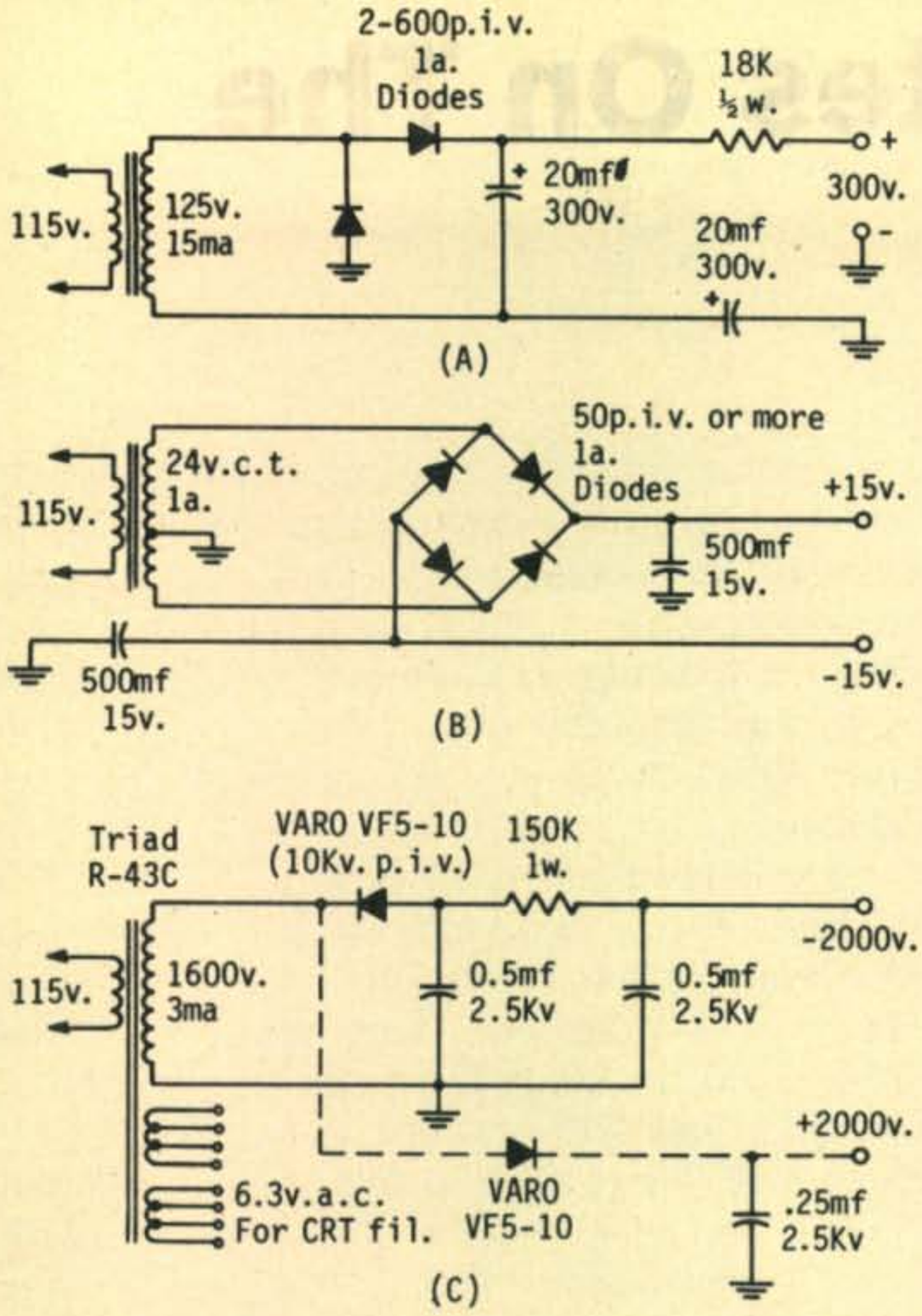


Fig. 2—(A) Circuit of 300 v. supply. (B) Circuit of power supply delivering both plus and minus 15 v. with respect to ground. (C) Circuit of —2Kv supply for CRT cathode showing additional components needed to develop +2Kv for CRT anode in post-accelerator-type tubes (broken lines).

Power Supply

The original article skipped rather lightly over the subject of power supply because it was felt that most amateurs would make do with what was at hand. However, correspondence indicates that many fellows are timid about "making do" where a substantial investment in components for a major construction project is involved. Hence, fig. 2 shows the circuits of the three power supplies used with the SS Mark 4.

At fig. 2(A) is the circuit of the 300 v. supply. A small transformer delivering 125 v. at 15 ma is used in a voltage doubler circuit producing a no-load voltage of nearly 400 v., which is fed through an 18K resistor to yield a full-load output of 300 v. In addition the resistor provides some small measure of protection should wires be crossed. It saves diodes!

Figure 2(B) shows the supply used to deliver plus and minus 15 v. A 24 v. c.t. transformer is used in a grounded bridge circuit. With the Mark 4 and subsequent units, no advantage was found using regulated supplies, hence the rather simple power supply illustrated.

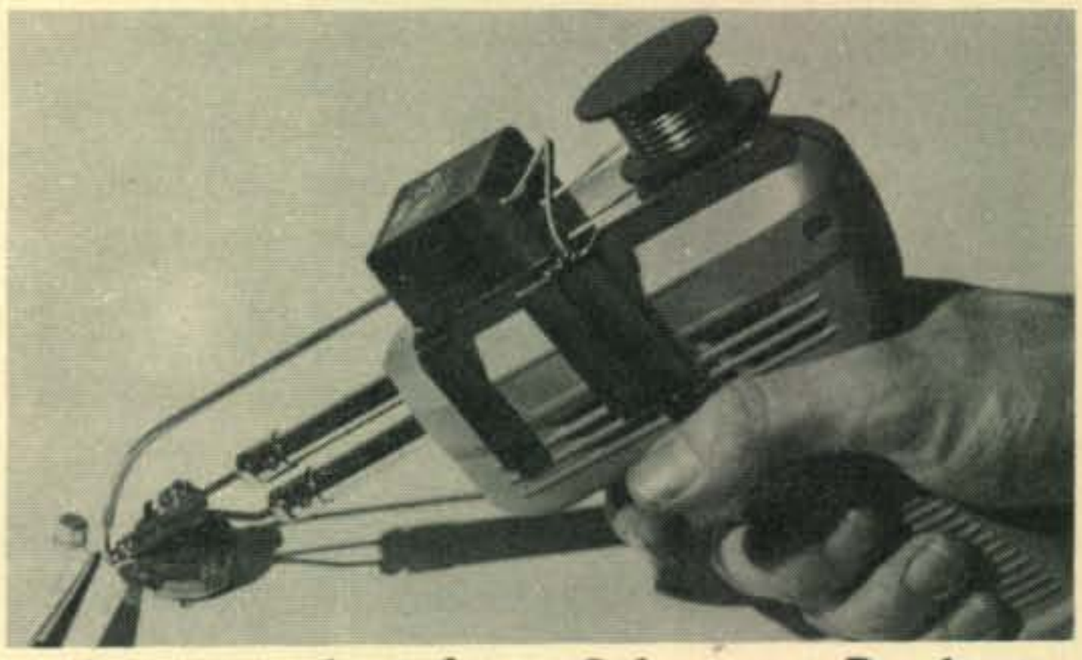
The high voltage supply, fig. 2(C) was lifted right from Cop Macdonald's SSTV column in the August 1972 issue of *CQ*. This circuit also offers the added ability of supplying additional voltage to post-accelerator-type tubes such as the 3JP7, and for only the additional cost of a h.v. diode and capacitor.

Corrections

A few errors crept into the original schematic on page 36 of the May issue of *CQ*. While most of these small errors are no longer of significance in view of the improved circuits presented here, they should be noted for the record. The type numbers for Q_2 and Q_3 were mislabeled and should read 2N4917. The emitter resistors for Q_6 and Q_7 should be 2.2K (2200 ohms), *not* 22K as shown.

Should further changes and improvements be devised for the SS Mark 4, they will be reported here in *CQ*. In the meantime, comments from builders are invited. P.C. boards and kits of parts are available from GSI Industries, 34 W. 13th Street, New York, N.Y. 10011. ■

New Amateur Products



A new gadget from Schurman Products, Dept. C., P.O. Box 13, Weymouth, Mass. 02188, is called the "Free Hand" solder feeder, a clip-on device easily fitted to any popular-brand soldering gun. The Free Hand is a thumb-operated feed mechanism which pushes standard .062" solder through a stainless steel tube which can be accurately positioned at the desired spot at the solder-gun tip. A replaceable 20-foot spool of solder clips onto the rear. "Lefties" will appreciate the ability to position the trigger for right or left hand operation. The Free Hand weighs five ounces and costs $8.95, postpaid. For more info circle A on Reader Service coupon.

An Electronic Timer for Less Than $5.00

BY PETE WALTON,* VE3FEZ

Do you have a TV set in your bedroom? Have you ever fallen asleep and left it on? Or even worse, just find yourself falling asleep and remember that you have to get up and turn the TV off. This versatile timer will turn the TV off from periods of three minutes after you have gone to sleep to periods up to about one hour. You can build this timer in one evening for a total cost of about $5.00 even if you have to buy all new components.

The circuit takes advantage of a new integrated circuit from the Signetics Company called the NE555. The NE555 is a very stable monlithic timing circuit in the form of an 8-pin dual-in-line package. It is currently selling for one dollar from most suppliers. The NE555 is capable of time delays from a few microseconds up to several hours. These delay periods are dependent on an external *RC* network consisting of one resistor and one capacitor.

Very basically the IC is made up of a voltage comparator circuit, one leg of which is connected to a reference voltage, which in our case is the power supply output voltage. The other leg of the voltage comparator is connected to the external *RC* network. When the capacitor has charged to a voltage equal to the reference voltage, the comparator will toggle a flip-flop connected to its output. The ON level of this flip flop is used to turn on a driver circuit which picks up our time delay relay. This a very basic description of a fairly complex IC. If you require a better explanation of the internal workings you can obtain one by writing to the Signetics people and requesting a data sheet.

The relay that I used was an IRC MR312 C with a coil resistance of 212 ohms. Almost any 12-volt relay will do the job as long as it does not draw more than the rated 200 ma limit from the output of the NE555. The *RC* network is a 100 mf capacitor in series with a five meg linear pot and a one meg resistor. These values, with the power supply that I used, gave time delays of 3 minutes at the low-resistance end of the pot and 58 minutes at the high-resistance end. You may have to experiment a little bit to get the exact time delay range that you require. This is due to possible differences in power supply voltage and components. You could even switch in different values of *R* and *C* with a rotary switch to give you several different time delay ranges.

The power supply consists of an old six volt filament transformer that was in the junk box, a full wave rectifier, and filter capacitor. Parts layout is not at all critical

[*Continued on page 82*]

*421 Lodor Street, Ancaster, Ontario, Canada.

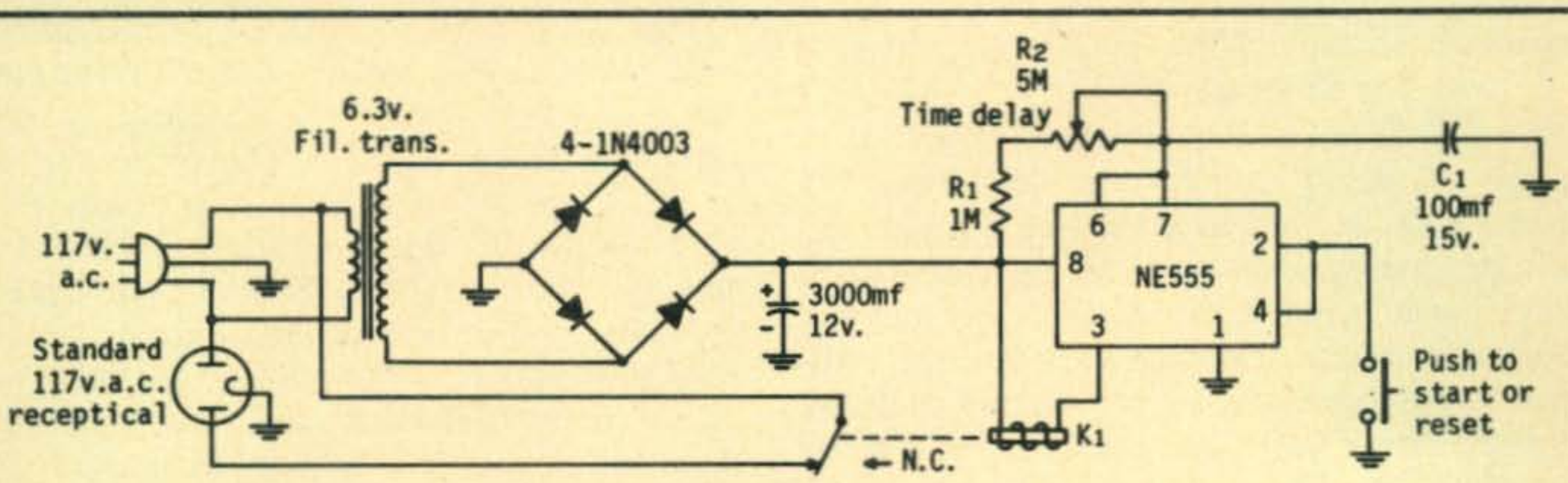


Fig. 1—Circuit of an inexpensive electronic timer adaptable to any number of simple timing applications around the home or shack. With the values shown for R_1, R_2, and C_1, the timers range is from 3 minutes to about one hour, using the power supply shown. Relay K_1 is any 12-volt-coil relay which draws 200 ma or less.

Using The Surplus R-390 Receiver For SSB

BY CAPTAIN PAUL H. LEE, USNR,* K6TS

THE R-390 receiver, made by Collins for the U.S. military services, is now appearing in surplus listings quite often. This excellent set, with its digital readout tuning, stable internal oscillators, and selectable bandwidth, is one of the "Cadillacs" of the receiver field. Its later and more expensive version, the R-390A, made also by Collins and several other companies, is also an excellent buy. The R-390A has mechanical filters, whereas the R-390 does not. The R-390A has only one r.f. stage, whereas the R-390 has two. Otherwise there is much in common between these two fine receivers, which in my opinion cannot be equalled by anything on the amateur market today.

If you are buying one of these sets, remember that the R-390 was made only by Collins, whereas the R-390A was made by Collins and *others*. The *others* did not use the Collins PTO unit, which provides the excellent frequency stability and re-setability to which the really discriminating user is accustomed. So, take a close look at what you are getting for your money!

In a past issue[1] I described the modification of the R-390A for use on single sideband. As built, none of these sets have the necessary product detector. Assuming that the R-390 has been purchased, the simplest way of converting it for s.s.b. is to change the b.f.o. stage to a product detector, as was done in the R-390A. There are differences in the sets, however, and it is my purpose to describe the R-390 modification in this article. This can be done very simply in about two hours time. When it is done, you will have a receiver whose external appearance has not been altered, and which requires no external adapters.

The parts required are listed here:

1—56000 ohm ½ watt resistor;
1—11000 ohm ½ watt resistor;
1—2700 ohm 1 watt resistor;
1—5 pf 1000 v.d.c. ceramic disc capacitor;
1—500 pf 600 v.d.c. mica capacitor;
1—200 pf 600 v.d.c. mica capacitor;
1—1.0 mf 600 v.d.c. paper capacitor;
1—0.02 mf 1000 v.d.c. ceramic disc capacitor;
1—Centralab PA-2003 rotary switch, 2 poles, 1 section, 2-6 positions;
2 small soldering lugs;
1—6BE6 tube;
1—72″ length of small diameter shielded single conductor microphone cable, Alpha No. 1703 or equal.

The conversion is easy. It is done as follows:

1. Disconnect the two control shafts from the i.f. subchassis, unplug all plugs from it, and remove the subchassis from the receiver. This is the subchassis at the top left side.

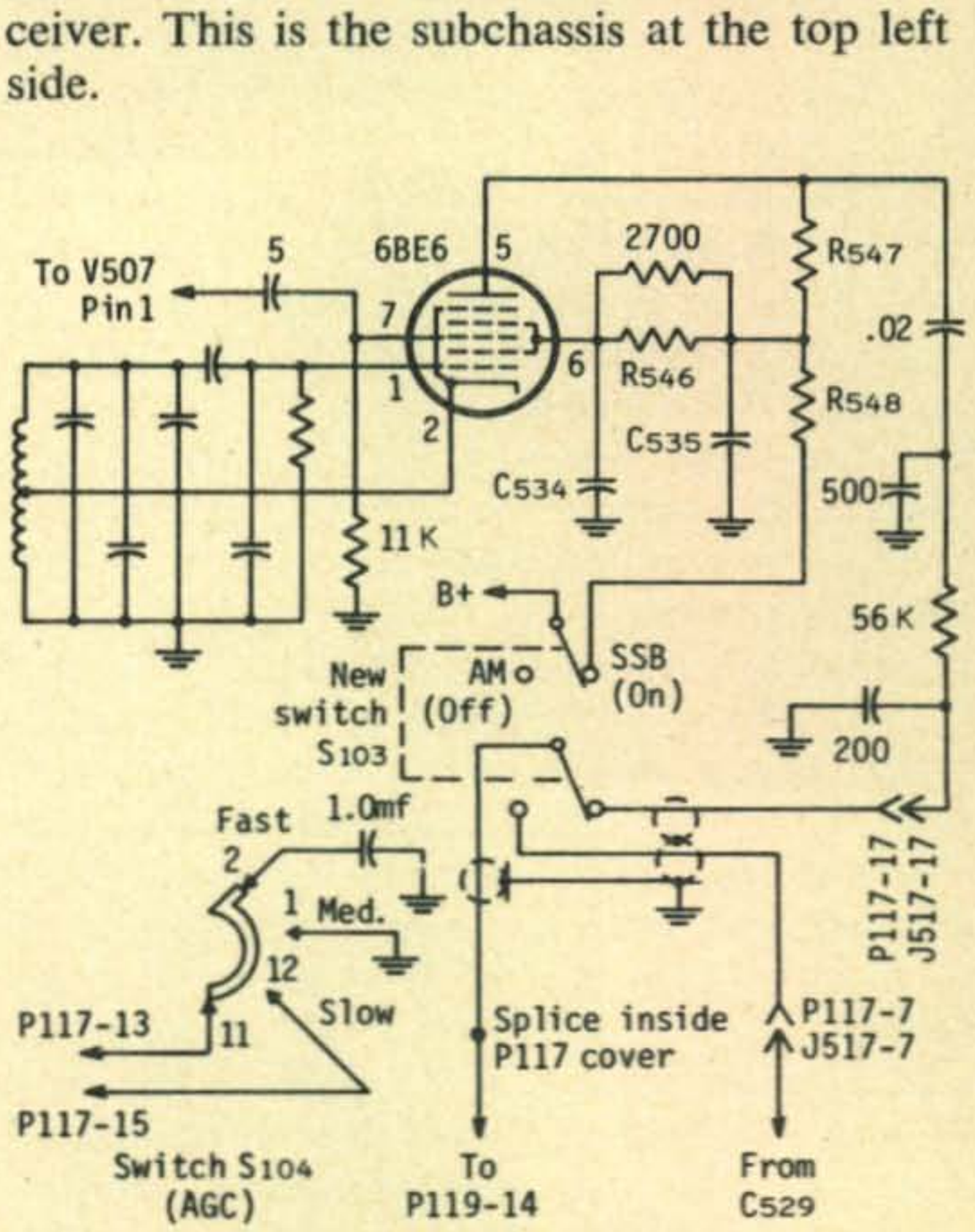


Fig. 1—Circuit of a product detector for installation in the Collins R-390 receiver. The 6BA6 b.f.o. tube is removed and replaced with a 6BE6 pentagrid mixer which is wired as shown. The front panel b.f.o. ON/OFF switch is replaced with a new switch S_{103} which acts as the SSB/AM selector switch.

*125 West Ave. De Las Flores, Thousand Oaks, Calif. 91360.

[1] Lee, P. H., "Modifying the R-390A Receiver for S.S.B.," *CQ*, Jan. 68 p. 55

2. Carefully remove the cable clamp and cover from the multiconductor plug P_{117} slipping it back along the cable, out of the way. Remove the wire from pin P_{117}-7 and leave it hanging.

3. Remove the b.f.o. B+ wires from the BFO ON-OFF switch S_{103}. Remove and discard S_{103}. Save the knob.

4. Cut three 20″ lengths of the shielded cable. From one end of each piece, remove the outer jacket and make a pigtail lead of about 1″ of the shield braid. Twist the three pigtails together, and solder them, being careful not to melt the plastic insulation on the inner conductors.

5. With the new switch in hand, connect these three shielded leads to it to form the audio changeover circuit as shown in fig. 1. (Only two of the six positions are used.) Mount a small lug on one side of the switch frame and connect the soldered pigtails to it. This will be the shield ground for the audio wiring.

6. Mount the new switch in the vacant hole on the front panel. Replace the knob. Connect the b.f.o. B+ wires to the other pole of the switch. The b.f.o. B+ is to be on in the BFO ON position of the switch, and this will be the SSB position of switch S_{103}. This is shown in fig. 1.

7. The three wires from S_{103} should now be twisted into a cable, and run back to plug P_{117} with sufficient length to give clearance to the i.f. chassis and tubes. Wrap the cable with plastic tape at 3″ intervals. Run the three wires of the cable thru the clamp and cover of P_{117}. Make a spare pin in P_{117} and in J_{517} by disconnecting the grounding leads from P_{117}-17 and J_{517}-17. Transfer any wires from these pins to pins P_{117}-18 and J_{517}-18, which are also ground.

8. Connect the shielded wire from the s.s.b. audio terminal of S_{103} to pin P_{117}17. Use an insulating sleeve. Connect the shielded wire from the a.m. audio terminal of S_{103} to pin P_{117}-7. Use an insulating sleeve.

9. Slip an insulating sleeve over the remaining wire which should be the one connected to the rotary arm of the S_{103} audio section. This is the audio input in step 2. Slip the sleeve down over the bar connection, and carefully replace the cover of the plug, and secure it by means of its clamp.

10. Turn the i.f. chassis over, and remove the bellows coupling on the BFO PITCH shaft. Remove the shaft by loosening the panel bearing. This is merely to clear some working space, and these will be put back later.

11. Remove the 6BA6 b.f.o. tube, and add it to your junk box.

12. Remove all wires from pin 2 of V_{508}, Shift any ground leads to other ground points on the chassis.

13. Move the existing lead from pin 7 to pin 2 of V_{508}. This is the cathode tap on the b.f.o. coil.

14. In the following steps be sure to leave room for replacing the bellows shaft coupling.

15. Connect the 11000 ohm ½ watt resistor from pin 7 of V_{508} to ground.

16. Remove and discard C_{536}.

17. Connect the 2700 ohm resistor in parallel with the existing screen dropping resistor R_{546}.

18. Connect the 5 pf capacitator between pin 7 of V_{508} and pin 1 of V_{507}. This is the i.f. coupling into the injection grid of the 6BE6 product detector.

19. Cut small V-shaped notches in the edges of the partitions behind the b.f.o. coil. Cover them with short pieces of plastic tape to protect the wire which will lay in them.

20. Mount the 200 pf and the 500 pf capacitors on the grounded center post of socket V_{507}, letting them be supported in space by their own leads, about ¼ inch long. Connect the 56000 ohm resistor between their free ends.

21. Connect the 0.02 mf capacitor from pin 5 of V_{508} to the 500 pf end of 56000 ohm resistor.

22. Use the remaining bit of shielded cable for the s.s.b. audio lead. Remove 1″ of the plastic jacket from one end, and make a 1″ braid pigtail on this end. Slip an insulating sleeve over the pigtail and ground it to a convenient point. Connect the center conductor of this wire to the 200 pf end of the 56000 ohm resistor.

23. Lay this shielded wire in the slots in the partitions. Run this wire to pin J_{517}-17 of the rear cable socket. This is the pin which mates with pin P_{117}-17 of the plug, to which is connected the s.s.b. audio lead to switch S_{103}. In connecting here, strip back ½″ of the plastic jacket and braid, and use an insulating sleeve for protection.

24. Now replace the b.f.o. shaft and bellows coupling. Make sure the coupling

[*Continued on page 82*]

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

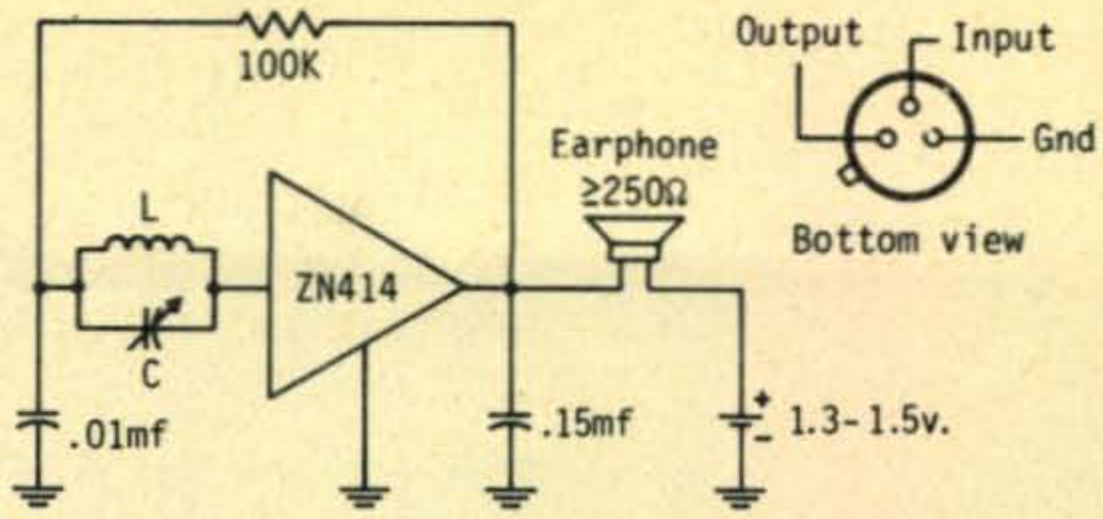


Fig. 1—Complete receiver, usable from 150 kHz to 3 mHz.

I WOULD like to start this month's column with an item I hope is still in stock by the time you read this. Herbach & Rademan, 401 East Erie Avenue, Philadelphia, Pa. 19134, a surplus house dealing primarily with industrial concerns, is offering a Teletron type 7735 one inch vidicon camera tube for the amazing price of $12 each. These tubes are brand new, fully tested, and guaranteed to meet all 7735 specifications except for "occasional slight blemishes and shading and should be perfect for all but the most demanding applications." Since one has to look far and wide and hard to find any kind of usable vidicons, not to mention new ones, for anywhere near this price, this is indeed a bargain for those who need such a tube You might also request a copy of their Spring 1973 catalog.

In the June installment of MATH'S NOTES, we mentioned the ZN414, a complete, self-contained radio receiver integrated circuit, manufactured by Ferranti Ltd. of England, and promised some follow up information when it became available. We have just received some additional circuit details and would like to pass them on to you now.

Figure 1 is a schematic of a complete receiver, suitable for use from 150 kHz to 3 mHz, using one Ferranti ZN414 integrated circuit. The values of L and C should be selected for the frequency range of interest and the "Q" of the combination should be as high as possible. Signals of down to 30uv or so at the input of the chip will be receivable with this circuit.

In figure 2, one stage of amplification with a volume control has been added for greater convenience. Also, a crystal earphone is used instead of the magnetic one.

Other circuits and applications as well as performance data for this unique integrated circuit are given in a brochure published by Ferranti and are available domestically from Ferranti Electric Inc., East Bethpage Road, Plainview, N.Y. 11803.

Also available from the same source are the ZN414's. Cost is only $4 in quantities of 5-49, $3.40 for 50-99 and $2.95 for 100 or more. Single units are $5 plus 50¢ handling.

We have received three new surplus manufacturer's brochures this month and would like to briefly describe the contents of each.

Andy Electronics, 6431 Springer Street, Houston, Texas 77017 has brought out a new catalog listing lots of government surplus test equipment and components. Some items that "caught our eye" were AN/UXH-2 FAX machines, in good condition for $50, Kleinschmidt Corp. (SCM) Teletype units, type TT-100 for $89.95, all kinds of miscellaneous RTTY parts and accessories and replacement CRT's for almost all Tektronix oscilloscopes.

Colonel Wayne D. Russell, 9410 Walhampton, Louisville, Kentucky 40222, a newcomer to us, has sent us a brochure with several interesting items.

One of these is a Hallicrafters T-14/TRC-1 f.m. transmitter, 70-99.9 mHz, 40 watts, that should be easily convertible to 6 meters. These units are complete with all tubes, and a wooden field case. The price is $29.95, F.O.B. Louisville.

Another item is a collection of AN/GRC series, equipment consisting of two f.m. transceivers, the RT-68 ($35.00) and the

[*Continued on page 82*]

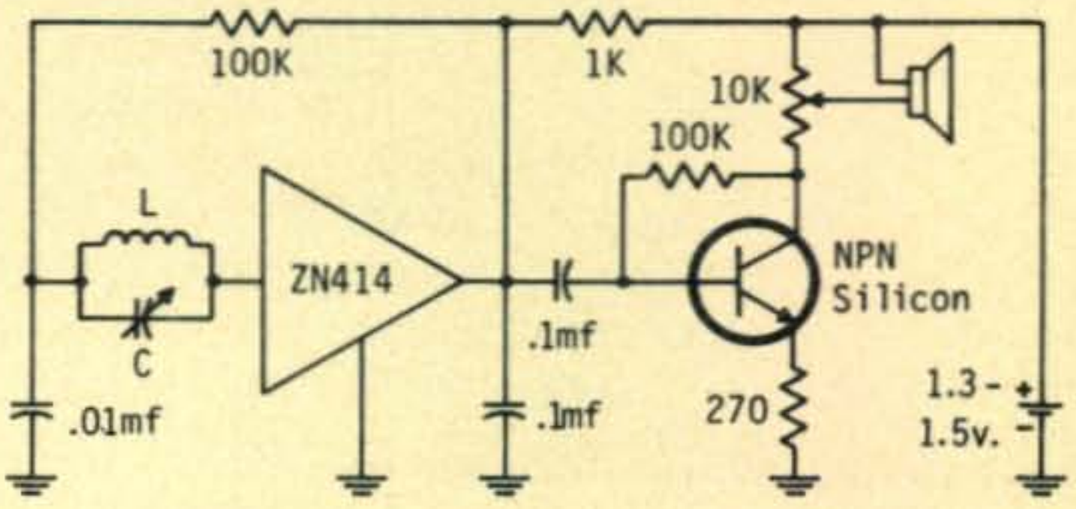


Fig. 2—Amplified version of fig. 1.

*5 Melville Lane, Great Neck, N.Y. 11023.

FM Repeaters— A Paradox of Problems

BY RICHARD A. COWAN,* WA2LRO

No one with any knowledge of current trends in amateur activity would argue with a statement that two meter f.m. repeater activity is the fastest growing, most dynamically changing area in all of ham radio. Relatively a newborn infant just three or four years ago, two meter f.m. has spread to somewhere between fifty and sixty thousand active hams in the U.S. already, and still growing at a steady pace. There are upwards of a thousand repeaters in use already, and in metropolitan areas such as New York, virtually every 30 kHz-spaced frequency is already occupied by repeaters between 146 and 148 mHz, with additional split frequency machines thrown in, as well.

We seem to have come to terms with coordination problems, for the most part, as the result of much hard work on the part of the regional repeater associations, and it's just a matter of time and a bit more effort before most, if not all, repeater groups will come to agreement on the most workable input/output spacing.

However, the typical two meter operator normally uses a transceiver limited in frequency coverage by crystal capabilities, and therefore limits operating time to a small group of local repeaters. As synthesizers grow in popularity, the amateur will discover that there are many other outlets for his air-time, repeaters that he probably didn't even realize were in existence. On the surface this is good, but after a short time hopping across the band, the synthesized operator might well discover that all's not quite so rosy as he had anticipated.

The New York Metropolitan area is a beautiful case in point. Within a fifty mile radius of New York a repeater is active on every 30 kHz channel from 146 to 148 mHz. But many of the repeaters within this area are either closed to outsiders by PL, Touch Tone, or the like, or else the members of the club operating the repeater make is obvious to a newcomer that his presence just isn't welcome. The most common excuse for this attitude seems to be that the repeater has been built and maintained by club membership dues, and therefore "freeloaders" shouldn't be permitted. All of which may be true . . . to a point.

It appears to us that this attitude is diametrically opposed to the basic spirit of amateur radio, to wit, open communications for young or old, rich or poor, etc. The "closed repeater" attitude can only lead to widespread resentment between members of one club and another, and that might eventually lead to some form of closed repeater activity across the entire band. Ironically, the local clubs warmly welcome transient operators passing through the territory from other call areas, yet these same clubs turn a cold shoulder to members of other local clubs who share a strong common bond—both clubs run repeaters, both clubs perform a vital public service.

Granted, the repeater groups have a strong right to resent freeloading by operators who don't contribute *any* financial support to *any* repeater group, but should this same resentment be extended to members of neighboring local clubs? We think not, emphatically. In fact, we feel that repeater-operating clubs should be making a stronger effort to exchange ideas and mingle socially with neighboring repeater clubs if for no other reason than that they might learn something from one another. But just the opposite attitude seems to prevail. If Charlie is a member of the Ixnay Repeater Society, he's not welcome to operate on the Doohickey Radio Club repeater unless he also pays Doohickey dues.

We feel that unless corrective measures are taken to reverse this unfriendly trend, before too long the entire two meter spectrum might become loaded with small clique-type clubs, and should that happen, it's the beginning of

[*Continued on page 83*]

* 32 Burham Drive, Smithtown, N.Y. 11787

Slow Scan TV

BY COPTHORNE MACDONALD,* WØORX

A CHANCE QSO with KH6BAS and W7FEN has led to a series of skeds to explore the ISB mode, and after the first couple of sessions, excitement is running high.

I had no material prepared for the ISB format, so decided to put together a "stereo" SSTV/voice tape, going into some experiences I had while travelling in Peru a couple of years ago. I used slides I had taken on the trip for the majority of the visual material, and drew up four simple maps to help keep the locations straight. The steps I went through might be of interest.

1. I made a rough plan of what I wanted to cover, and selected the slides which looked most promising. I also made rough sketches of the hand drawn material.

2. I drew up the maps, and made an SSTV recording of them on tape, making sure I recorded more than enough frames of each.

3. I projected the slides on a screen and carefully adjusted camera position, focus, lens opening, etc. for optimum field of view, grey scale and full black-to-white swing. I recorded these pictures on a single reel of tape, in the order I planned to use them; recording more than enough frames of each. I found that some slides I had hoped to use didn't come out well in slow-scan, so I discarded these. Others turned out better than I expected. I made a list of the usable pictures (identifying them by their content) in the order they would appear in the final tape.

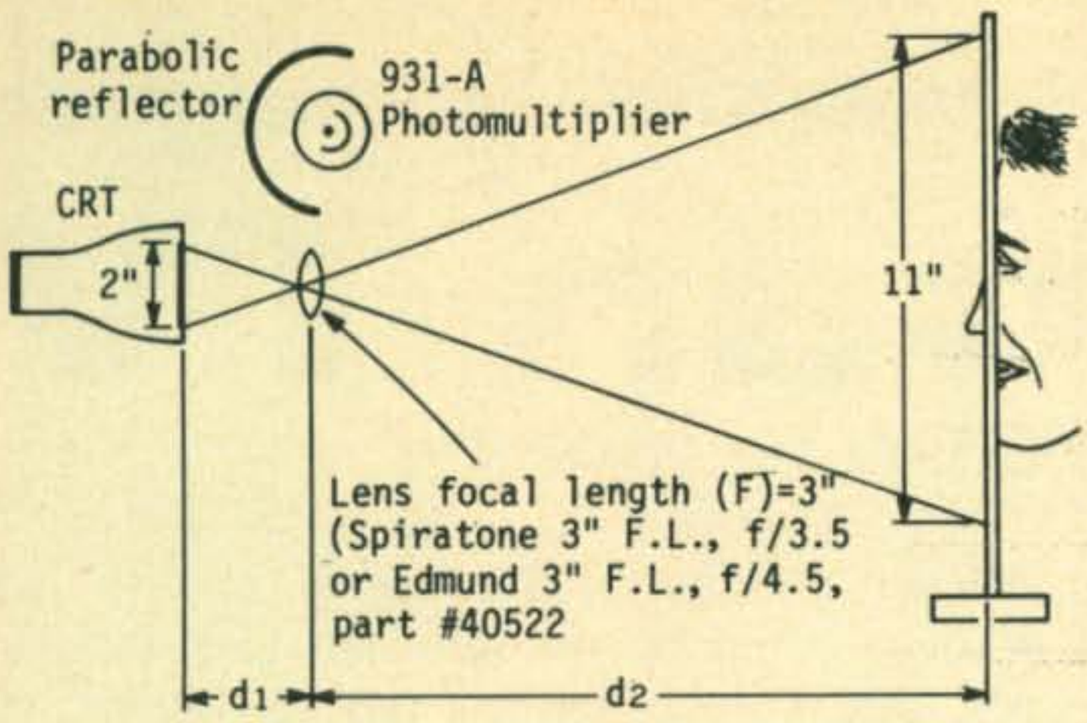
4. At this point all of the slow-scan frames were on tape, but not together in the proper length sequences. Since the number of frames depended on how much I had to say as each frame was being shown, I roughed out a plan for the audio, making notes on what I was going to say and how long it took to say it. I then noted on my list of pictures the number of frames of each that I wanted.

5. The next step was "scissors editing" the tape using the method outlined in the October '72 column, and the splicing machine shown in the June '73 column. (I counted out the desired number of frames of picture #1 while viewing on the monitor, then cut the rest out. I then spliced the last frame of picture #1 to the first good frame of picture #2, etc.) Since the tape was going to be more than 10 minutes long, I counted frames and included some extra tape at the beginning, at the 10 minute points and at the end for eventual recording of audio station identification. I then played the entire tape through, to insure that all the splices were okay and that I hadn't accidently cut off a vertical sync pulse.

6. The final step was recording the audio onto track 1 of the tape. (I had used track 2 for the pictures.) There was much starting and stopping of the tape, and rerecording portions of the audio to change the timing and to say things in a better way. This was slow, but a lot faster than writing a complete script would have been. At the station I.D. points I used two microphones and recorded my spoken call letters on both tracks simultaneously.

The end product was a 21 minute tape containing 31 different pictures and with a simultaneous running commentary that tied in with the pictures. I kept track of how long it took to do all this. Including the time spent drawing the four maps (but not the time to take the original slides) the total came to 25 hours. That's over an hour of preparation time per minute of air time. Was it worth it? Some day when I'm 20 over 9 and the QRM is low, ask me to put the tape on and decide for yourself. From my standpoint it definitely was worthwhile. Doing this kind of advance preparation is the only on-the-air way I'm going to be able to let you into my life. If I eventually share this tape with 100 hams, the extra time investment will shrink to 15 minutes per QSO. More important yet, without advance preparation how many of those 100 QSO's would be worth the air time anyway? My appoach is going to be to try to average 5 to 10 hours a week in "program" preparation. At the end of a year I should have a pretty good tape library that will give the

*P.O. Box 483, Rochester, Minnesota 55901



$$d_2 = \left(\frac{h_2}{h_1} + 1\right) F$$

$$= \left(\frac{11}{2} + 1\right) \times 3" = (5.5 + 1) \times 3" = 6.5 \times 3"$$

$$= 19.5"$$

$$d_1 = \frac{h_1}{h_2} \times d_2 = \frac{2}{11} \times 19.5" = \frac{39"}{11} = 3.55"$$

Fig. 1—Projection optics design example: An FSS that permits live viewing in a dark room.

ham I'm communicating with some insights into **me**, and enable me to share some of the things I'm into.

If you would like to get involved with the ISB activities, drop me a line, or contact W7FEN, K7YZZ or KH6BAS for the latest info on skeds. If you have a second receiver you are probably already set to copy ISB. Another approach is cooperating with a ham friend across town. Handle the SSTV sideband through your rig, and phone patch the audio sideband through his.

Also, let me hear from those of you who would like to get involved with the New Directions Roundtable. (See last month's column.)

Flying-Spot Scanner Projection Optics

Last month we looked at the very simplest optical scheme where a transparency is placed in direct contact with the CRT faceplate. Now let's see what a lens can do for us. For one thing, it allows us to design an FSS that will scan opaque material. Snapshots (including made-at-the-moment Polaroid ones), hand drawn pictures and diagrams, and even magazine and newspaper photos can be used directly in this type of scanner. Figure 1 shows the basic idea. The flying-spot raster on the CRT face is focused through a lens onto the object to be viewed. When the light spot passes over a dark area, little light is reflected and the photomultiplier output current is low. When a white area is scanned, considerable light is reflected and the current goes up. There are two basic design problems:

Selecting the proper lens; and insuring that light collection by the photomultiplier is adequate and uniform.

Selecting The Lens

To project the CRT flying-spot onto our subject matter we need a "positive" lens. This type of lens produces a "real" projected image. Simple convex lenses (such as a magnifying glass lens); and photographic camera lenses, enlarging lenses, and projection lenses are all "positive" lenses. We are concerned with the focal length of the lens, the aperture size or "*f*" stop, and the maximum raster and/or projected image size that will give us acceptable shading and uniformity of focus.

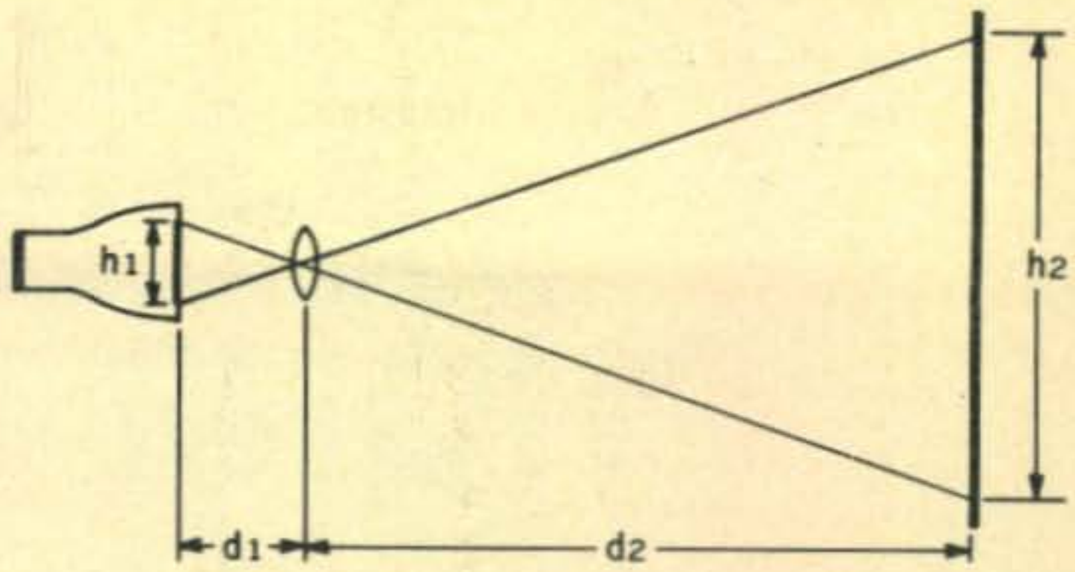
The focal length of a lens is the distance from the optical center of the lens to the image, when viewing an object at infinite distance. An easy way to check the focal length of a simple lens is to use it to focus the image of the sun onto a piece of paper, burning glass style, and measure the lens-to-paper distance. This will be the focal length of the lens. In an FSS we are not viewing distant objects, so the distance from lens to image will be different; but if we know the focal length, we can calculate the distance. Table 1 summarizes the basic lens equations that are of interest to us.

Let's work out a practical example that should help bring back your high school algebra. Assume you have a lens with a 3 inch (75mm) focal length. You're using a 3 inch diameter CRT with a 2″ × 2″ raster size. You plan to make your shack as dark as a darkroom so that you don't need any light-tight box for your FSS. You plan to make your visuals on 11″ × 14″ pieces of poster board using a felt tipped marking pen. You figure that if you make a simple wooden frame the proper distance from the lens, you could simply hang the cards on the frame. In the back of your mind is the idea that you could also position your face in the frame on occasion, and send live pictures of yourself without a camera! The projected raster size will need to be 11″ × 11″ to accomplish all this. The calculations are worked out in fig. 1. These numbers should be very close if the lens focal length is accurately known, but provision should be made for a final focusing adjustment by moving the lens, the CRT, or the image plane, slightly.

Remember that you can plug known values of any of the quantities into the equations of Table 1, and solve for the remaining values. If, for example, you have certain size limitations, you can plug-in all of the dimensions and solve for the focal length of the lens you'll need. The problems you will run into are that lenses aren't readily availabl in all odd focal lengths, and that some designs aren't practical from a field-of-view standpoint. Photographic lenses are designed to cover a specific maximum film format size with good focus and freedom from shading. Focal length is, thus, only part of the story. A 16mm movie camera lens is not going to work in the example of Fig. 1 even if its focal length is 3 inches. It is just not designed to cover the 2″ × 2″ raster area.

If you are going to purchase a lens, my recommendation would be to buy a new or used photographic enlarging lens. These lenses are designed for good resolution at low magnification ratios, whereas many fast" camera lenses do not work well when the magnification ratio (image height divided by raster height) drops down to 1 or 2. Another advantage of an enlarging lens is that it will be rated for use with a specific film format size: 35mm, 2¼ × 2¼, 2¼ × 3¼, 4 × 5, etc. This takes the guesswork out, and if you're *buying* a lens, you won't want to guess. If the diagonal of your raster or image (whichever is smaller) is no greater than the diagonal dimension of the rated film format, you are safe. Under many circumstances you can use more than the rated diagonal with safety. This happens at small magnification ratios, or when the object to be scanned is smaller than the raster. The maximum useable raster diagonal can be calculated as follows:

Let: D_r = Maximum useable raster diagonal



$$d_2 = \left(\frac{h_2}{h_1} + 1\right) F$$

$$d_1 = \frac{h_1}{h_2} \times d_2$$

where F is the lens focal length

Table I—Basic equations for focused images.

D_t = Maximum rated film format diagonal for the lens. (h_1 and h_2 are as shown in Table 1)

$$D_r = D_t \times \frac{h_2 + h_1}{h_2}$$

If D_r calculates out to be smaller than the raster diagonal you intend to use, don't buy the lens; you'll risk shading problems. By the way, the side of the lens that is intended to face the film should face whichever is smaller; the raster, or the area being scanned.

The final lens consideration is the aperture of "*f*" stop." The lower the "*f*" number, the brighter the raster image, and the better the video signal-to-noise ratio. The "*f*" number is defined as the focal length of the lens, divided by its effective diameter. For a given focal length, the larger the diameter, the lower the "*f*" number. (Lenses with low "*f*" numbers are also referred to

[*Continued on page 79*]

Focal Length	f/#	Film Coverage	Df	Mount	Source	Part No.	Approx. Price (Postpaid)
2″ (50mm)	f/3.5	35mm	1.6″	Leica Thread	Spiratone	—	$11.60
2″ (50mm)	f/4.5	35mm	1.6″	Supplied	Edmund	30181	10.50
3″ (75mm)	f/3.5	2¼x2¼	3.2″	Leica Thread	Spiratone	—	12.60
3″ (75mm)	f/4.5	2¼x2¼	3.2″	Cylinder	Edmund	40522	7.25
3.5″ (90mm)	f/4.5	2¼x2¼	3.2″	Supplied	Edmund	30182	17.00
4.1″ (105mm)	f/4.5	2¼x3¼	3.9″	Supplied	Edmund	50289	18.97
5.3″ (135mm)	f/4.5	3¼x4¼	5.3″	Supplied	Edmund	30183	25.24

Table 2—Inexpensive lenses suitable for flying-spot scanner use. Sources: Spiratone Inc., 135-06 Northern Blvd., Flushing, N.Y. 11354. Edmund Scientific Co., Barrington, N.J. 08007

1972 CQ WORLD WIDE DX CONTEST: PHONE RESULTS

BY FRANK ANZALONE,* W1WY

THE Phone Contest back in October '72 will have to go on record as one of our best efforts. With the solar cycle stalled on a plateau about 25% higher than the low expected figure of 40 for the month, the openings on 10 and 15 were much better than we had hoped for.

George Jacobs had forecast normal conditions on Saturday and above normal on Sunday. Some of the fellows thought Saturday was the better day. In any event the scores on 10 and 15 confirm George's prediction. Chalk up another one for W3ASK.

A total of 1710 logs shows an increase of almost 18% over last year. An admirable gain with our stateside stations contributing their share.

However not improved was the questionable logging by some of the entries. With a larger working force on the Committee it is now possible to run a wider check on these logs. Many scores have been proportionately reduced, (a few were upgraded), but some were beyond this consideration and have been disqualified. You will find them listed separately in another section.

The 1972 rules no longer allow a 3% guideline figure for duplicate contacts for the simple reason that many people were abusing that leeway and leaving in 2.9%. That is why we now use the word "excessive" as the guideline in determining whether a log should be disqualified.

We realize that we are all human, your humble Committee included, and no matter how careful you are duplicates are sometimes unavoidable. We do however insist that after the contest, your log should be carefully cross-checked, duplicate contacts crossed out and no credit taken.

Frankly, this year we were not severe. The disqualified logs had dupes far in excess of a figure that could be reasonably expected to be the result of human error. As far as we are concerned the only acceptable figure is ZERO.

A few of the disqualified logs also had contacts that did not stand up in a process of log cross-checking. We consider this a serious matter and second time offenders may be barred from future competition.

We also have a new situation, the "JA Problem." With literally thousands of active JA stations, especially on 15 meters, a stateside "Big Gun" can create quite a pile-up of JA's when the band is open. We do not question the operating skill of the "hot shot" who shows runs of 150 QSO's per hour, but we do question the accuracy of the listed calls. A thorough and expensive investigation which required countless man-hours of work, indicated an overwhelming percentage of inaccuracies in the listed claimed contacts.

This year we are giving the offenders the benefit of the doubt, that perhaps unfamiliar phonetics and other factors was

*Chairman *CQ* Contest Committee

Crew and equipment used in the ZD3X Contest Expedition to Gambia by OH2BCP, OH2BC, OH2-MM and OH2BH. Consider lugging all this gear (450 lbs.) as hand luggage the whole 5000 mile trip that included eleven landings and several plane changes. Quote Martey, "Only a ham would be dumb enough to tackle the job." (How about those shirts?)

PLAQUE & TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association. Dr. Harold Megibow, K2HLB Memorial. Won by Manuel Wilches, CR6IK (14 mMz).
CANADA—Gene Krehibiel, VE6TP/7 Trophy. Won by Yuri Blanarovich, VE3-BMV (14 mHz).
CARIB./CA.—Gus Huether, HR2GK Trophy. Won by Robert Harris, VP1BH (21 mHz).
SO. AMERICA—Brazil DXers Trophy. Won by Jorge Camboni, CV8BBH (14 mHz).

Single Operator, All Band

WORLD—Bill Leonard, W2SKE Trophy. Won by Station 4M4UA, James Neiger, (W6BHY) Operator.
U.S.A.—Potomac Valley R.C. Trophy. Won by Gordon Marshall, W6RR.
CANADA—Jack Baldwin, VE3BS Trophy. Won by Station VE7WJ, L. G. Sawkins (VE7BDJ) Operator.
EUROPE—W4BVV Operator's Trophy. Won by Joachim Immeinkemper, DK2BI.
CARIB./C.A.—Harold Fox, W3AA Plaque. Won by Jose Levy, 6F1J.
AFRICA—Gordon Marshall, W6RR Plaque. Won by Station CR6GA, Jose de Almeida, Operator.
ASIA—Japan CQ Magazine Trophy. Won by Station 4Z4HF, Joe Lieberson, Operator.
OCEANIA—Northern Calif. DX Club Trophy. Won by Dave Petke, KG6JBO. (K1-PKQ).

Multi-Operator, Single Transmitter

WORLD—John Knight, W6YY Trophy. Won by Station PJ1AA. (Oprs. PJ2ARI, PJ2AW, PJ2CL, PJ2CR, PJ2CW, PJ2HR, PJ2MI, PJ2VD, PJ2WI, PJ9CB, PJ9VR).
CANADA—Calgary A.R.A. Trophy. Won by Station VE1ASJ. (Oprs. VE1ASJ, VE1-ACH, VE1DH, K1MTJ, K1RQE).

Multi-Operator, Multi Transmitter

WORLD—Radio Club Venezolano Trophy. Won by Station ZD3X. (Oprs. OH2BC, OH2BH, OH2MM, OH2BCP).

Contest Expedition

WORLD—Stuart Meyer, W2GHK Trophy. Won by Station ZD3X.

Special CQ Champion Awards

OCEANIA—All Band, Station KH6RS. Operated by Willard Meyers, (K2SIL).
EUROPE—All Band, George Cangas, EA-4LH.
ASIA—All Band, Vitaly Davydov, UW9WR.

the cause, rather than a "fast pencil" at this end. We are taking a hard look at this situation and recommend that in the future, accuracy rather than speed should be your objective.

Therefore the scores of the following multi multi stations have been proportionately reduced. K6UA, W3AU, W4BVV, WB5DTX and W7RM.

We had over a dozen good Contest Expeditions and the Committee was hard put to pick a winner of the Stu Meyers W2GHK Trophy. Taking into consideration that the boys traveled over 5000 miles and made the most contacts in the contest, we had to choose the ZD3X expedition to Gambia.

Other expeditions worthy of consideration were UKØSAA/p from Zone 23, KA1DX from Marcus Is., KH6EDY from Kure Is., XT2AC from the Voltaic Rep. and SM2AGD/CEØ from Easter Island. (See cover picture)

Jim Neiger finally realized his ambition of setting a new all band world's record by surpassing the existing record set by Don Miller back in 1967 from VK2ADY/9. Operating from 4M4UA's lush layout, Jim picks up all the marbles. Bill Myers operating KH6RS also broke the old record.

IG9BAF the Contest Expedition to the Island of Lampadusa, in the Mediterranean between Sicily and Africa, created somewhat of a problem. Before the contest it had been determined that the island was geographically on the continental shelf of Africa and therefore in Zone 33. However there had been no change in its country status and

This is G3WYX, the Exeter Contest Group. The station in only activated twice a year, in October for the WW Phone Contest and in March for the WPX SSB Contest. The station is set up in a choice location a week before the contest. After its all over the gear, including an 80 ft. tower, is repacked back into the trailer. John, G3HTA is holding the W9WNV Trophy won in the 1971 WPX Contest. The rest of the crew, Adrian G3RUV, John G3TJW and Barry G3RUX with some of the equipment that placed them 5th in the world standings.

Single Operator – All Band

Station	QSO's						Zones						Countries					
	1.8	3.5	7	14	21	28	1.8	3.5	7	1.4	21	28	1.8	3.5	7	14	21	28
4M4UA	2	128	366	1017	1388	1203	2	13	22	35	29	27	2	28	58	99	68	76
KH6RS	6	212	362	1095	1182	1882	3	16	18	35	29	27	2	23	24	91	63	53
6G1AA		200	278	929	897	1521		17	21	38	25	25		32	60	99	80	80
EL2CB		32	103	1177	409	775		12	15	36	28	27		17	31	110	75	76
KG6JBO		68		614	1340	1320		14		33	32	31		19		63	56	57
PZ1AH		142	194	530	542	1125		10	15	33	27	28		26	31	78	72	99
HTØA		94	166	675	944	1159		11	16	29	27	26		24	37	76	73	78
XT2AC		59	136	768	479	954		10	15	25	29	26		25	39	75	77	90
EA4LH		115	199	664	736	685		11	19	35	31	29		42	51	96	83	72
9G1WW		22	45	956	741	393		10	20	36	32	25		13	34	99	93	73
W6RR		50	164	297	949	360		18	22	32	31	31		28	33	87	86	81

Multi-Operator – Single Transmitter

PJ1AA		172	371	1148	607	1107		11	21	35	25	23		28	46	86	75	69
YX5AJ	3	194	302	890	645	876	3	14	21	32	27	26	3	32	55	113	73	83
UK3AAD		92	195	949	1318	385		10	20	39	36	32		34	50	115	101	75
UK9ABA		221	301	849	491	457		14	24	39	35	32		48	65	128	96	97
G3WYX	10	293	181	776	1321	363	2	13	20	33	34	29	7	44	53	95	79	71
FØZZ		319	266	689	1112	633		12	16	35	30	32		50	44	93	72	78
W7SFA		69	216	406	1004	260		16	22	36	34	22		24	35	88	74	50

Multi-Operator – Multi-Transmitter

ZD3X		369	521	2864	2358	2459		16	25	37	33	30		39	68	131	112	105
DLØPG	144	680	426	1347	1362	860	2	16	23	38	38	34	10	68	65	144	127	109
XV5AC		110	710	1917	2005	969		18	36	39	34	26		33	69	116	106	68
W4GIW/VP7		872	456	1276	1460	1172		20	16	35	25	26		58	37	89	86	84
KS6DH	5	140	0	1479	1697	1983	3	17	0	38	32	26	4	27	0	99	60	52
DLØWW	89	459	625	1041	1073	802	2	11	26	39	37	36	11	51	79	92	84	91

Band-by-band breakdown of top scores.

therefore the QSO point credit and country multiplier remained the same as Sicily.

The island is small, only about 4 miles long, and the airfield runway very short The pilot had to use plenty of braking power to keep from overshooting the landing and dump Mino and the rest of the crew into the blue waters. (QSL's can be sent to I1BAF's new QTH. Corso Francia 9.3, Torino, 10138 Italy.

Martin, VE3MR/4X had set his sights on a new world 40 meter phone record, after having set a new record on 80 phone last year. He was well equipped for the job, (see photo) and was doing OK but was shocked back to reality during a QSO with HR1RF, who informed him that he had already exceeded his '71 record in the first 24 hours of the contest. (Bob almost doubled his last year's score) Martin said he doubts if he ever wants to look at 40 again, the QRM from commercials in that area is unbelievable.

A multi group usually activates 4Z4HF, but it was a single operator effort by Joe Lieberson in this one. Joe's voice gave out with many hours still to go, but he managed to whisper a report to VQ9R/d for his last contact of a 2 million plus score. (Better build yourself a little audio preamp. for the next one Joe)

Up Alaska way, Charlie WB4LEK and the group that operated KL7AIZ were providing communication facilities in support of a local search and rescue work on the Island of Adak during the day, leaving no time for contest operation on the HF bands.

Some of the Portugal boys were using a special prefix, CT7 for this contest. Think it would have been more appropriate if it had been used in our WPX Contest. Doubt if they realized any advantage in this one.

Karl, s.w.l. #SM5-2735 submitted one of the neatest check logs we've ever received. We made good use of it, and to show our appreciation we are going to award Karl a certificate even though we do not have a s.w.l. category.

Another great help was G3HCT's list of dupe contacts in his log. Would you believe that 106 W/Ks called him for a 2nd contact, more than a dozen tried a 3rd time, and a WB4 and YU1 have the dubious distinction of making it 5 times. Even after taking out all these dupes, John was still high man on 15.

[*Text continued on page 80*]

TOP SCORES

SINGLE OPERATOR

ALL BAND

4M4UA 5,409,315
KH6RS 5,331,072
6G1AA 4,069,764
EL2CB 3,131,191
KG6JBO 2,992,355
PZ1AH 2,989,146
HTØA 2,884,999
XT2AC 2,861,382
EA4LH 2,744,119
9G1WW 2,732,670

SINGLE BAND

28 mHz

KG6SL 933,577
CR6CN 650,160
CX8BE 567,633
ZS6YK 479,760
CX3RP 436,680
LU3FAN 381,558

14 mHz

CR6IK 951,660
VK6HD 706,251
CV8BBH 692,440
G3FXB 539,002
VE3BMV 514,635
OH2BAD 508,810

21 mHz

G3HCT 629,847
VP1BH 531,692
DJ6RX 527,156
W2AH 485,605
G3WJN 483,735
UK6LAZ 463,684

7 mHz

HR1RF 399,542
VE3MR/4X ..215,840
4M1BI 155,664
W3PHL 99,912
JA2BAY 61,572
I3BBZ 42,458

3.8 mHz

YV4AGP 72,666
CN8HD 55,366
IP1MOL 39,101
PAØHBO 35,518
SM5GZ 25,489
LZ2ZK 24,510

1.8 mHz

KV4FZ 8,050
GM3YCB 2,128
VE3BS 630
DL5KS 504
WA4SGF 48
W1BB 30

MULTI-OPERATOR

SINGLE TRANSMITTER

PJ1AA 4,206,341
YX5AJ 4,087,360
UK3AAO ..3,883,008
UK9ABA ..3,813,066
G3WYX 3,662,880
FØZZ 3,445,596

MULTI-OPERATOR

MULTI TRANSMITTER

ZD3X 14,501,872
DLØPG 7,634,962
XV5AC 5,656,555
W4GIW/VP7 5,510,176
KS6DH 5,488,856
DLØWW 5,334,537

Number groups after call letters denotes following: Band (A-all) Final Score, Number of QSOs, Zones and Countries. Certificate winners are listed Bold Face.

PHONE RESULTS SINGLE OPERATOR NORTH AMERICA

United States

K1CPF/1	**A**	**851,136**	**840**	**101**	**274**
K1CSJ/1	"	744,246	767	101	245
K1OME	"	420,162	521	89	204
W1FEG	"	395,660	495	81	190
W1MDO	"	164,630	290	66	136
W1BIH	"	154,368	208	85	183
W1ESN	"	131,922	238	64	125
WA1MPP	"	107,016	257	41	106
K1GUD	"	93,451	277	32	81
W1FLM	"	91,350	211	48	102
WA1NRG	"	66,924	202	44	88
W1WXZ	"	62,694	175	45	84
W1WY	"	62,400	152	54	96
W1HWM	"	59,148	168	42	82
W1VF	"	41,925	154	40	89
W1RML	"	39,928	162	27	65
K1DPB	"	28,050	120	31	54
W1PLJ	"	25,925	107	32	53
W1AWE	"	15,249	77	21	48
WA1PHF	"	1,380	18	14	16
K1LWI	**28**	**83,527**	**291**	**26**	**75**
K1JHX	**21**	**459,405**	**1145**	**30**	**105**
WA1PID	"	438,200	1075	32	108
W1RIL	"	369,551	1004	33	98
K1VTM	"	136,091	488	26	71
WA1MCY	"	97,279	359	22	69
W1CWU	"	87,796	340	25	69
WA1RBR	"	64,557	280	26	65
W1OKA	**14**	**176,364**	**452**	**35**	**103**
K2LQQ/1	"	104,160	296	31	93
WA1JMP	"	100,688	326	30	82
W1AM	"	10,260	67	17	32
WA1LAI	"	4	1	1	1
W1GQO	**3.8**	**22,330**	**123**	**18**	**52**
W1BB	1.8	30	6	2	4
W2PV	**A**	**1,790,019**	**1411**	**117**	**324**
WB2SQN	**A**	**1,546,092**	**1331**	**114**	**288**
WA2FCA	"	795,800	823	92	254
W2EHB	"	732,918	759	94	245
WA2KTV	"	481,844	705	67	166
W2FZJ	"	292,640	360	99	196
K2QIL	"	265,315	404	69	166
K2BK	"	253,038	385	71	162
K2KUR	"	231,275	547	40	135
W2UI	"	225,453	370	70	153
W2DT	"	187,335	323	59	148
W2GKZ	"	126,336	225	62	130
WB2AQC	"	113,348	250	56	116
K3MBQ/2	"	106,918	265	46	100
K2INP	"	97,180	200	62	110
W2PFQ	"	85,350	199	47	103
K2JOC	"	76,750	217	39	86
K6SE/2	"	70,990	168	53	102
WA2MBP	"	60,112	157	45	91
WA2BLV	"	49,356	163	35	73
W2CKR	"	46,144	147	39	73
W2LEJ	"	36,472	137	35	59
WA2RQH	"	33,320	164	20	48
WA2BCK	"	15,360	61	41	55
W2FVS	"	13,356	76	22	41
W2FHN	"	6,750	57	17	28
WB2BYY	"	5,967	50	21	30
WB2PWS	"	5,244	42	18	28
WA2CWX	"	4,140	37	18	27
W2KZN	"	1,760	21	15	17
W2MB	"	1,342	21	10	12
W2LWO	"	640	10	5	8
W2DJI	**28**	**51,294**	**218**	**25**	**58**
WB2MAN	"	50,310	206	25	61
WB2GUB	"	37,098	156	23	58
WA2IFS	"	26,376	114	23	61
WA2VDA	"	15,138	94	18	40
W2HNE	"	1,170	17	12	14
W2AH	**21**	**485,605**	**1129**	**34**	**111**
W2SZ	"	316,120	791	35	105
		(Opr. WA2RAL)			
W2DXL	"	271,530	780	30	96
WB2VYA	"	254,779	731	29	90
W2NIN	"	251,686	704	29	93
WB2ZGI	"	59,752	214	26	71
WA2AUB	"	45,235	191	19	64
K2GI	"	4,932	49	13	23
WB2OEU	**14**	**402,360**	**892**	**38**	**130**
W2GBC	"	155,808	377	38	106
W3EZT	**A**	**1,308,067**	**996**	**126**	**341**
W3CRE	**A**	**1,087,564**	**991**	**112**	**276**
		(Opr. WA3HRV)			
W3VEQ	"	634,296	696	95	226
K3HZL	"	607,405	611	106	249
W3VT	"	568,468	600	106	248
W3DQG	"	563,428	656	96	220
K3WUW	"	542,430	525	109	269
WA3NNA	"	532,152	550	97	245
W3ZSR	"	400,158	503	84	198
W3QOR	"	321,402	430	87	187
W3GN	"	260,640	401	80	160
K3LWR/3	"	253,375	517	78	179
W3KT	"	233,070	326	83	172
W3OV	"	198,303	346	69	130
W3KV	"	192,432	326	63	148
W3GRF	"	180,095	331	68	131
W3MFJ	"	162,572	294	60	134
W3KFQ	"	159,425	334	63	112
W3GRS	"	151,217	238	79	154
W3HVM	"	150,096	303	54	123
K3YVN	"	112,892	236	56	111
W3FTG	"	105,408	208	56	127
WA3AFQ	"	104,607	214	54	123
K3AWZ	"	96,552	224	55	107
W3YHR	"	89,650	204	49	114

It doesn't take an elaborate layout to attract attention in a contest when you are using a call like FGØAMF/FS7. Outside, Larry, K2KGB, had an assortment of dipoles.

This is the way a s.w.l. operates a contest. Wonder how Karl, SM5-2735 gets a repeat if he does not copy the call the first time.

W3EVW	"	79,124	182	54	97
W3EQA	"	73,950	150	49	125
W3AXW	"	73,633	168	55	102
K3CBW	"	43,160	125	45	85
W3ECW	"	41,832	126	44	82
W3FA	"	31,600	115	36	64
W3SW	"	28,300	103	34	66
W3ML	"	25,578	102	37	61
WA3RGH	"	18,596	110	17	51
K3KHL	"	17,794	79	30	52
WA3LTC	"	17,094	92	23	43
W3GL	"	16,432	81	30	49
W3CAA	"	15,478	73	24	47
W3CGS	"	14,976	82	21	43
W3TMZ	"	13,920	57	39	48
W3JBW	"	7,482	47	20	38
W3GHD	"	6,592	39	25	39
K2QBW/3					
	"	4,512	38	21	27
K3IMC	"	1,728	25	5	31
WA3ENM	"	189	8	3	6
WA3QDH	"	30	3	3	3
W3KDD	**28**	**87,500**	**302**	**26**	**74**
W3SDV	"	45,496	184	24	64
WB8AME/3					
	"	6,210	54	18	28
WA3OSJ	"	1,848	24	10	18
W3CBF	"	798	16	9	10
WA3RGW					
	21	**259,776**	**682**	**33**	**99**
K3TUP	"	215,301	576	30	99
W3BRB	"	137,750	392	29	96
K3AFO	**14**	**196,144**	**423**	**40**	**124**
W3GPI	"	138,552	305	35	103
			(Opr. WA3OIA)		
WA3RBI	"	43,617	179	28	65
K3ZOL	"	20,930	82	27	64
W3AFM	"	20,203	80	36	53
WA3EFH	"	3,444	31	16	25
W3PHL	**7**	**99,912**	**316**	**31**	**88**
W3MFW	**3.8**	**19,738**	**97**	**20**	**54**
W4QBK	**A**				
		1,370,368	**1142**	**119**	**305**
W9MIJ/4					
		1,214,220	**1019**	**113**	**307**
W4ZCY	**A**				
		1,124,214	**973**	**123**	**283**
W4NQA	"	745,602	721	101	262
W4UPJ	"	698,763	834	87	212
WA4KJR	"	644,056	691	90	259
K4KZZ	"	641,628	651	97	254
W4QAW	"	535,188	603	86	223
WA4YBV	"	512,190	582	94	221
WB4QZT	"	490,644	568	92	216
W4UGE	"	449,442	558	84	203
K4PQL	"	391,906	450	73	183
WB4SIJ	"	355,020	438	87	204
W4ZCB	"	329,536	436	88	186
W4POX	"	297,080	398	94	186
K4EZ	"	292,466	401	75	182
W4YHD	"	236,210	358	76	154
K4HHA	"	219,912	337	72	166
K4AUL	"	218,526	335	68	163
W4DM	"	202,594	353	65	138
W4ZSH	"	202,480	310	72	148
WB4TPI	"	181,196	334	70	127
W4KNW	"	180,128	306	63	145
KØCMF/4		167,904	302	65	133

W4WRY	"	159,975	268	76	149
W4EZ	"	159,870	266	72	147
WA4AEZ	"	141,496	286	59	125
K4NE	"	139,732	233	63	130
WB4TBO	"	129,960	260	53	118
W4JVN	"	86,400	204	51	109
W4HOS	"	84,150	169	67	120
WB4SGV	"	80,445	193	54	101
K4OZQ	"	68,580	199	39	88
LU8AGT/W4		61,420	154	49	99
W4JVU	"	55,096	139	50	92
WB4RUA	"	52,002	126	59	103
WB4SWE	"	47,433	164	43	76
K4ADT	"	44,958	145	34	84
W4JHK	"	43,056	151	36	68
K4TBN	"	41,412	128	45	74
WB4NRI	"	36,808	127	41	66
K4HQI	"	34,281	108	44	73
WB4ZTU	"	29,667	116	31	62
K4JYM	"	28,910	105	36	62
W4GF	"	28,590	118	33	62
WB4NVH	"	26,820	105	28	62
W4DSW	"	24,651	103	32	51
W4YK	"	21,297	80	28	65
W4YZC	"	16,946	92	27	47
W4DXI	"	15,656	72	30	46
W3ZBW/4					
	"	12,464	58	30	46
K4LRX	"	9,540	55	25	35
WA4DWN	"	8,784	52	25	36
K6GNZ/4					
	"	8,220	52	22	38
W4GTS	"	5,247	45	20	33
K4KA	"	5,537	42	19	30
W4QCW	"	4,386	35	20	31
W4IF	"	1,914	24	12	21
K4AUN	"	1,352	18	10	16
W4GXW	"	736	22	11	12
K4YYL	**28**	**355,320**	**869**	**31**	**109**
W4OZF	"	161,816	522	26	87
WB4SJG	"	138,690	417	26	89
K4RLO	"	131,069	349	29	104
W4TZX	"	63,896	231	25	73
W4NJF	"	50,058	172	26	77
WB4PXW	"	48,505	201	24	65
K4HWW	"	40,080	174	23	57
W4DS	"	15,890	82	21	49
W4EEO	"	1,740	20	9	20
WA4EPH	"	1,220	22	8	12
W4ORT	**21**	**162,316**	**455**	**31**	**93**
WA4JQS	"	38,033	178	24	49
WB4KLU	"	31,374	175	19	44
K4ORO	"	11,340	74	18	32
W4WSF	**14**	**308,783**	**605**	**40**	**127**
W4LBP	"	238,545	545	37	118
WA4GWN	"	170,544	401	39	113
WA4FFW	"	61,820	220	30	80
W4ZTW	"	43,324	162	27	66
WA4YRK	"	39,690	153	26	64
W4TMR	"	12,740	73	20	45
W4KMS	"	12,141	59	21	50
WB4TPU	**7**	**13,516**	**82**	**21**	**41**
K4YFQ	**3.8**	**8,784**	**74**	**16**	**32**
WA4SGF	**1.8**	**48**	**11**	**4**	**4**
W5NMA	**A**	**616,770**	**678**	**103**	**227**
WA5RXT	"	543,179	609	105	224
VE6BU/W5		247,020	389	74	156
W5KKZ	"	207,774	323	79	159

WB5AHL	"	201,025	345	71	144
W5OSJ	"	166,632	307	77	135
W5LUJ	"	149,884	274	75	127
WA5WMD					
	"	147,643	274	73	118
K5YRY	"	122,683	226	79	130
W5KZN	"	118,767	242	61	122
WB5EEN/5					
	"	98,421	227	56	103
W5OB	"	96,835	212	67	114
WA5SUE	"	83,460	200	58	98
WA5CAC	"	52,245	151	54	81
K5LVZ	"	49,343	140	50	83
W5HIC	"	47,117	148	41	86
WA5WEY	"	31,185	112	42	63
W5QAM	"	27,195	108	43	62
WB5DBT	"	23,655	93	36	59
W5ZWQ	"	15,323	73	29	48
WB5BNG	"	11,109	61	25	44
WA5ACA/5					
	"	7,695	51	20	37
WB5HAE	"	7,470	67	20	25
W5HCJ	"	6,985	47	19	36
K5DEC	"	2,900	53	28	22
W5NVU	"	2,310	26	14	19
WA5IEV	"	2,275	23	13	22
W5SOD	"	1,504	21	14	18
W5SBX	**28**	**205,500**	**584**	**28**	**97**
WA5JMK	"	170,856	487	28	98
			(Opr. WB5AAR)		
W5PAQ	"	120,600	356	28	92
WA3BZA/5		87,912	290	26	82
WB5FIU	"	28,196	144	22	54
WA5ZWC	"	23,688	120	21	51
WA5EEM	"	23,152	102	25	59
W5QGZ	"	14,352	80	23	46
WA5BKN	"	12,480	88	20	32
W5QNQ	"	4,284	48	13	23
WA5ZKE	"	2,400	36	14	20
W5RMC	**21**	**124,526**	**398**	**27**	**86**
W5ONZ	"	60,220	198	25	65
K5ODZ	"	56,202	227	23	64
K9HTK/5	"	39,547	207	23	48
WB6IPR/5		360	14	8	7
W5RSZ	**14**	**82,280**	**251**	**35**	**86**
W4GHV/5					
	"	46,830	163	34	71
WB5FOU	"	450	8	6	5
W5BJA	**7**	**22,878**	**135**	**20**	**42**
K5PFL	**3.8**	**18,330**	**120**	**20**	**45**
W5WMU/5					
	"	15,360	120	19	41
WA5ZNY	1.8	28	5	4	3
W6RR	**A**				
		2,350,964	**1820**	**134**	**315**
K6AHV	**A**				
		1,849,716	**1604**	**131**	**265**
W6MAR	**A**				
		1,334,494	**1177**	**134**	**264**
W6DGH	"				
		1,101,114	**1013**	**129**	**249**
W9LVT/6	"	795,852	975	100	198
K6QW	"	724,420	871	105	185
W6NJU	"	620,816	729	107	215
W6DQX	"	598,400	662	118	202
W6AEM	"	491,634	851	70	128
WA6CXK	"	449,854	606	97	165
K6DYQ	"	449,204	599	108	155
W6EJJ	"	318,186	558	79	119
WB6BGO	"	275,520	472	73	132
WB6ZUO	"	272,823	445	72	139
W6DOK	"	237,790	386	82	133
K6SSN	"	230,822	327	99	163
W6BJB	"	203,313	386	69	114
K6ITL	"	195,228	331	78	126
W6EYY	"	162,520	347	65	105
W6OKK	"	156,600	310	71	109
K6SSJ	"	153,260	284	77	117
WB6UOM					
	"	149,280	331	61	99
K6HIH	"	139,573	307	67	90
W6YVK	"	139,300	288	73	102
W6BVN	"	131,040	267	67	113
W6NUT	"	127,015	333	57	76
W6YMV	"	103,874	222	68	99
WA6GFY	"	94,806	255	56	82
K6RXZ	"	90,628	238	53	86
W6EJ	"	86,996	175	67	115
W6ANB	"	76,950	125	68	103
K6OC	"	70,785	203	48	73
W6KYA	"	66,172	176	60	82
W6UFJ	"	62,488	170	66	80
W6PSQ	"	56,952	165	48	78
K6MP	"	51,460	154	52	72

K6QX	"	51,300	139	58	77
W6CUF	"	43,473	122	55	74
WA6JQX	"	38,772	138	48	60
WA6ETW	"	34,204	209	27	41
W6GBY	"	21,287	104	29	44
K6RIM	"	15,408	74	32	40
WB6KOR	"	10,752	72	28	28
K6QPH	"	10,269	63	27	36
K6WD	"	8,967	51	27	34
W6ZYC	"	8,643	45	29	38
W6JPH	"	8,250	58	27	28
W6ORZ	"	7,049	52	21	32
WA6WUI	"	6,125	87	23	26
W6RQZ	"	5,929	70	25	24
WA6KXN	"	5,208	48	21	21
K6AO	"	4,576	36	19	25
WB6HWQ					
	"	4,512	37	22	26
W6MQF	"	3,390	43	15	15
K6TU	"	2,541	29	15	18
W6DPK	"	1,080	15	10	14
K6SVL	**28**	**193,088**	**630**	**29**	**83**
WA6QGW	"	138,000	498	27	73
			(Opr. WA6PMK)		
WB6HDG	"	123,640	394	29	81
K6RU	"	106,200	418	26	64
W6ISQ	"	51,030	222	27	54
W6AM	"	42,476	208	24	50
WA6RVK	"	8,869	72	17	23
W6FET	"	6,348	51	20	26
WA6AUE	"	3,906	46	14	17
K6QYB	**21**	**312,970**	**926**	**32**	**87**
			(Opr. W6DSQ)		
W6BH	"	298,750	810	34	91
W6ONV	"	231,420	709	31	83
WB6PNB	"	170,408	490	33	86
K6QZ	"	111,137	371	30	73
WB6GFJ	"	33,408	199	25	33
WB6PZW	"	8,814	80	14	28
W6HJ	"	1,932	33	10	11
W6EJA	"	312	13	4	4
W6CLS	**14**	**283,768**	**636**	**38**	**120**
			(Opr. WA6QGW)		
WA6IQM	"	228,478	572	38	104
W6EUF	"	93,496	294	35	91
WB6FDD	"	63,282	253	36	70
W6OK	"	48,260	184	32	64
K6CQF/6	**7**	**25,300**	**196**	**18**	**28**
K6ERT	**3.8**	**24,192**	**148**	**23**	**40**
W6NLZ	"	14,335	101	20	41
W6ITY	"	10,812	82	19	34
WB6UDC	"	10,340	87	19	28
W7YBX	**A**	**565,390**	**698**	**105**	**182**
W7RS	"	524,308	635	100	178
W7BJ	"	329,188	602	67	121
WA7JCB	"	272,090	525	74	108
K7PXI	"	245,550	404	74	136
W7NP	"	225,450	463	62	105
K7PBU	"	223,560	563	47	91
W7YTN	"	208,505	333	85	138
W7BRU	"	189,540	344	71	124
W7LZF	"	180,642	388	61	100
W7INH	"	77,784	175	71	97
K7KTD	"	52,924	189	38	63
W7QN	"	41,128	134	40	66
K7YDO	"	40,456	160	40	64
W7MCU	"	34,750	104	56	69
WA7PAB	"	33,082	114	48	71
W7APA	"	22,533	92	35	52
WA7NUH	"	18,174	85	28	44
WA7TWG	"	9,246	52	28	41
W7SCQ	"	7,729	46	25	34
W7WMY	"	4,130	44	16	19
W7BQG	"	2,929	36	13	16
K7GYA	"	2,442	24	19	18
W7UBA	**28**	**51,688**	**257**	**23**	**48**
K7IDX	"	47,400	222	24	55
W7AYY	"	32,904	162	25	47
K7RDH	"	19,698	111	22	45
K7CVL	"	18,282	98	21	45
WA7OCN	"	1,222	20	10	16
W7APN	**14**	**140,301**	**390**	**34**	**97**
W7LFA	"	59,599	194	33	74
W7NG	"	43,472	174	27	61
K7LVJ	"	29,532	149	29	40
W7ETZ	"	26,840	108	30	58
WA7BPS	"	16,796	92	30	38
WA7SSZ	"	6,570	68	20	25
W8TWA	**A**	**386,397**	**472**	**96**	**201**
W8DQL	"	363,150	459	89	180
WB8EUN	"	329,936	434	86	186
W8MVN	"	304,920	423	75	177
WA8PRR	"	147,080	263	69	137

WA8MEM	"	131,574	269	62	117
WA8GPX	"	125,248	215	72	134
K8TMK	"	52,245	150	49	80
W8HBN	"	49,590	136	60	85
K8ZLF	"	43,940	125	52	78
W8FJS	"	24,728	108	37	51
W8MBB	"	24,638	93	41	56
W8HU	"	19,500	87	25	53
W8WPC	28	144,144	429	25	93
WA8QIY	"	135,035	439	26	87
K8ULU	"	120,324	393	25	86
W8NBO	"	47,229	189	25	66
W8IMZ	"	22,320	138	18	44
WA1LKU/8		17,822	100	21	46
W8DSO	"	16,140	98	20	40
W8GFH	"	11,571	73	19	38
K8WWU	21	217,984	595	31	97
W8JSX	"	157,014	463	29	88
WB8GKG	"	99,756	351	25	77
W8KOD	"	88,168	284	33	74
WA8YVR	"	22,857	137	20	37
W8PCS	"	2,870	32	13	22
WA8ZDT					
	14	287,064	618	39	123
W8JGU	"	239,086	487	40	133
WA8EEQ	"	133,170	346	36	102
W8KFL	"	73,780	224	31	88
W8DFQ	"	24,138	118	23	58
W9IRH	A	562,905	650	96	219
W9OHH	"	549,100	617	90	233
WA9AUM	"	384,370	517	87	179
K9WEH	"	365,390	439	97	208
W9PKW	"	288,637	391	88	181
WA9NPM	"	251,550	395	85	149
WB9CEP	"	242,351	341	67	190
W9ZTD	"	198,237	326	72	149
WB9EBO	"	185,082	315	69	149
K9KDI	"	175,189	302	66	137
W9DWQ	"	116,017	202	71	128
W9WYB	"	102,256	218	62	104
W9KXK	"	97,050	199	58	92
W9SFR	"	90,791	213	55	108
WA9VGY	"	77,292	166	59	112
W9RQM	"	64,218	164	48	91
WA9UEK	"	56,736	152	53	91
W9IE	"	38,625	132	41	62
K9HLW	"	34,969	108	52	69
W9GXH/9					
	"	30,192	100	42	69
W9IB	"	29,536	105	42	62
W9CH	"	28,928	97	41	72
W9YYG	"	25,098	98	34	60
K9BQL	"	13,192	72	26	42
WA9FZQ	28	48,267	193	24	69
W9MTD	"	45,198	175	24	69
WA9JCO	"	35,200	148	22	66
WB9HAD	"	13,140	85	20	40
WA9NHQ					
	21	265,353	716	30	99
W9RER	"	232,452	605	30	102
W9QEE	"	92,538	334	30	67
WB9DRE	"	64,236	225	28	73
WA9HPS	"	44,500	180	29	60
WA9WIF	"	1,400	25	11	14
K9PPY	14	201,894	446	39	122
W9IY	"	160,348	389	37	97
WA9VKN	"	137,888	352	38	101
K9CLO	"	44,730	186	26	64
W9RKP	"	41,419	150	31	66
W9NZM	7	13,603	87	20	41
WA9JDT	"	2,618	32	14	20
WØHBH	A	133,464	249	68	133
WØGYH	"	93,696	191	64	119
WØBWJ	"	84,466	204	65	93
KØSGJ	"	35,814	106	55	72
WA6UAV/Ø					
	"	31,992	108	48	76
WØUCK	"	29,298	90	44	70
WØFDK	"	28,888	112	34	58
WAØKQU/Ø					
	"	26,269	106	46	63
WAØWSS	"	20,252	93	31	52
WØOWS	"	10,560	61	24	40
WBØAEW	"	5,390	110	20	29
WAØTKJ	28	108,972	380	26	82
WAØETC	"	60,562	206	27	80
WØMHK	"	5,980	45	18	34
WAØYLN	"	5,540	51	16	29
WBØGIJ	21	140,248	514	26	68
WØNGJ	"	73,645	256	27	76
WØJIG	"	61,194	230	26	67
WBØBBR	"	35,916	155	23	59
WAØGGU	"	15,275	86	21	44
WBØFDO					
	14	2,400	43	14	15
K5JZN/Ø	"	195	9	8	7
WØOMH	7	3,220	38	13	22
WAØEMS	"	2,635	38	12	19

Alaska

KL7GDO	A	74,732	516	33	35
KL7GI	14	114,318	568	31	56
WA1CST/KL7					
	"	18,624	157	18	30

Bermuda

VP9GO	14	34,727	191	27	50

British Honduras

VP1BH	21				
		531,692	1843	31	88

Canada

VO1HH	14	135,532	402	29	95
WA5VPT/VO2					
	A	35,939	197	35	48
VE1ANZ	A	469,628	811	70	156
VE1TG	28	181,720	587	25	93
VE1ANF	"	33,187	156	21	56
VE2AYU	A	407,913	613	77	186
VE2AFC	21	94,775	381	23	63
VE2QJ	"	51,280	244	21	59
VE2DCY	14	101,394	301	34	95
VE3RIT	A	598,995	995	74	169
VE3NE	"	42,720	126	37	83
VE3HUM					
	28	115,858	439	25	81
			(Opr.	VE3KZ)	
VE3BBH	"	81,480	280	26	79
VE3BMV	14				
		514,635	1258	37	128
VE3BSJ	"	81,000	280	34	86
VE3WQ	"	77,328	320	32	76
VE3GCO	"	48,840	155	36	84
VE3FFA	"	45,460	212	24	61
W5QNY/VE3					
	21	111,398	381	26	83
VE3BBN	3.8	23,001	218	15	36
VE3BS	1.8	630	47	3	4
VE4RP	A	183,928	457	55	111
VE4JK	"	90,789	228	62	97
VE4MP	"	86,632	166	95	101
VE4SN	"	17,100	85	26	50
VE4BJ	"	7,254	44	25	37
VE4XJ	14	124,486	369	37	97
VE4SD	"	44,702	160	30	73
VE4IE	"	43,792	206	31	61
VE4AA	"	23,460	138	23	45
VE5FK	A	8,428	74	22	21
VE5RA	14	62,424	236	32	70
VE5NW	3.8	13,563	200	12	21
VE6AYU	A	375,003	986	69	102
VE6SB	"	282,348	526	69	129
VE6JD	"	210,614	586	69	89
VE6MC	"	187,992	439	60	108
VE6AP	"	184,044	392	71	125
VE6ZS	"	79,497	298	55	66
VE6AUH	"	21,600	149	26	34
VE6NW	"	19,926	175	20	21
VE6AKV	"	7,612	97	23	21
VE6MD	"	5,792	80	15	17
VE6AVO	"	192	17	2	2
VE6MP	14				
		379,308	1047	36	110
VE6HN	"	67,471	224	35	74
VE6GQ	"	60,500	191	36	74
VE6VK	"	40,992	117	25	42
VE6TK	"	17,340	93	27	41
VE6PL	"	14,976	74	25	47
VE6APJ	"	10,080	61	24	36
VE6IN	"	2,320	31	10	19
VE7WJ	A				
		1,630,240	1712	116	252
			(Opr.	VE7BDJ)	
VE7BBL	"	38,750	265	32	30
VE7IQ	28	8,512	90	16	22
VE7BEF	14	69,444	257	36	72
VE7BGS/VE8					
	14	57,424	321	25	49

Canal Zone

KZ5OD	A	35,952	109	35	72

Cayman Is.

ZF1EP	28				
		262,824	1317	25	69

Costa Rica

TI2WX	A	121,976	602	35	44

Cuba

CO2FA	14	80,700	342	31	69

Dominican Rep.

HI8LC	A	223,436	599	64	102
HI3JEI	14	45,696	314	17	51

Greenland

OX3WQ	28	4,557	62	12	19

Guatemala

TG9GI	21				
		279,612	1089	26	82

Honduras

HR1RF	7				
		399,542	1349	28	93

Mexico

6G1AA	A				
		4,069,764	3825	126	351
6F1J	"				
		656,271	1280	86	145
6J1M	"	633,600	989	86	178
6D1CI	"	164,248	805	40	58
XE2LLX	21	24,576	243	18	30
XI1IX	14				
		314,760	1116	33	94
6I1AZ	"	131,936	615	29	67
XE2ICS/M					
	7	84	7	3	4

Nicaragua

HTØA	A				
		2,884,999	3038	109	288
HTØV	"	843,532	1636	72	155

Montserrat

VP2MAH	A				
		1,346,760	2165	64	194

Puerto Rico

KP4DJI	A				
		407,358	1241	60	99
KP4ACX	"	7,392	197	17	15

St. Pierre

FP8AA	A				
		2,645,019	3260	88	245

Virgin Is.

KV4FZ	1.8	8,050	168	8	15

AFRICA

Angola

CR6GA	A				
		2,467,197	2524	101	232
			(Opr.	CR6XX)	
CR6QR	"	55,104	244	33	49
CR6CN	28				
		650,160	1737	31	95
CR6II	"	235,518	785	27	75
CR6FW	"	233,943	912	28	58
CR6JO	"	207,648	741	29	67
CR6LG	21	53,196	204	27	66
CR6IK	14				
		951,660	1920	36	134

Botswana

A2CCY	A				
		2,314,353	2298	90	249

Cape Verde Islands

CR4BC	A				
		963,858	1046	93	225
CR4BV	21	5,699	54	15	26

Ethiopia

ET3GK	A	330,480	660	48	122
ET3FF	"	52,095	131	56	95

Gabon

TR8DG	A	43,878	159	40	63

Ghana

9G1WW	A				
		2,732,670	2157	123	312

Ivory Coast

TU2DF	A	148,764	354	51	96

Kerguelen Islands

FB8XX	A	302,624	542	63	130

Lesotho

7P8AC	A	2,368	29	14	18

Liberia

EL2CB	A				
		3,131,191	2496	118	309
EL9A	"				
		1,069,380	1544	66	168

Morocco

CN8HD	3.8	55,366	303	13	49

Mozambique

CR7IC	A				
		888,420	1215	82	178
CR7IZ	"	504,000	767	68	157
CR7FR	28	362,496	949	33	95
CR7WL	"				
		308,176	1009	27	76
CR7RM	14	128,260	421	32	74

Namibia

ZS3CJ	28	213,382	754	32	70

Republic of South Africa

ZS6ZE	A				
		1,172,078	1869	94	214
ZS4KC	"				
		396,000	2000	64	134
ZS6BLK	"	276,658	600	56	102
ZS6YK	28				
		479,760	1350	30	90

Rhodesia

ZE2JE	14				
		468,460	1100	35	112
ZE1CW	"	154,512	482	33	78

Sierra Leone

9L1JT	A	493,460	769	67	153
9L1GC	"	16,430	108	19	34

Voltaic Republic

XT2AC	A				
		2,861,382	2396	105	306
			(Opr.	DJ6QT)	

The SVØWJJ team of Vince, WB4USR, and Bill SVØWII WA6BWB. The boys were also members of the original three man SY1MA expedition to Mt. Anthos.

TOP U.S.A. SCORES

Single Operator

All Band	**W6RR**	**2,350,964**
28 mHz	K4YYL	355,320
21 mHz	W2AH	485,605
14 mHz	WB2OEU	402,360
7 mHz	W3PHL	99,912
3.8 mHz	K6ERT	24,192
1.8 mHz	WA4SGF	48

Multi-Operator

Single Xmtr	W7SFA	2,294,522
Multi Xmtr	W3WJD	2,619,440

ASIA

Afghanistan

YA1OS	**A**	**1,569,617**	**2054**	**92**	**219**
YA1DX	"	389,151	847	54	135

(Opr. PA0GMM)

Hong Kong

VS6AI	**A**	**103,505**	**440**	**47**	**80**

India

VU25AAA	**A**	**1,740,232**	**1695**	**108**	**269**
VU25DK	**A**	**1,495,688**	**1748**	**82**	**214**
VU25CK	"	193,720	580	53	114
VU25BX	**14**	**81,700**	**860**	**31**	**64**

Iran

9C9BQ	**A**	**1,425,627**	**1265**	**102**	**295**
EP2WB	"	411,016	908	75	91
EP2NH	21	3,816	33	12	24
9C9ES	**14**	**17,460**	**125**	**17**	**43**

Israel

4Z4HF	**A**	**2,157,004**	**2194**	**90**	**242**
VE3MR/4X	**7**	**215,840**	**643**	**27**	**88**

Japan

JA1PCY	**A**	**515,816**	**740**	**93**	**151**
JA8BMK	"	372,384	620	81	135
JA3MGX	"	325,380	516	82	138
JA2ACC	"	206,276	351	82	130
JAØBFZ	"	75,542	246	50	57
JA8FBM	"	63,551	220	45	58
JA6BIF	"	54,742	192	43	58
JA4BBN	"	46,617	143	53	70
JA3IQX	"	13,724	70	35	38
JA4TR	"	8,844	63	33	33
JA4FM	"	7,095	58	25	30
JR1TMG	"	6,776	46	25	31
JA4AQR/5	"	4,600	40	20	26
JA1ALX	"	4,400	28	22	22
JA3BBG	"	3,008	37	16	16
JH1KRC	"	1,178	18	18	13
JH1ARJ	**28**	**207,756**	**620**	**36**	**80**
JA2IYJ	**28**	**181,500**	**632**	**33**	**67**
JA2CWX	**28**	**173,817**	**667**	**27**	**62**
JA9AG	"	154,998	507	34	75
JA3HZT	"	77,568	289	32	69
JA2GRM	"	67,745	297	30	55
JE1CXO	"	60,350	274	32	53
JA1NVB	"	46,288	254	31	57
JAØJLZ	"	41,915	184	26	57
JA2DYI	"	38,997	213	24	39
JR1VMC	"	33,540	160	26	52
JA2UYS	"	32,934	170	27	39
JH3GCN	"	31,740	167	25	44
JR1TKT	"	24,900	148	23	37
JA1APL	"	23,312	141	23	39
JA2JKE	"	17,920	119	21	35
JA6EFT	"	16,704	111	23	35
JA8GO	"	14,322	84	25	37
JR1BRV	"	14,210	103	21	28
JA1BUI	"	14,006	105	22	25
JA7CUK	"	13,452	85	20	39
JA7BJL	"	12,324	82	18	34
JR1SWB	"	10,442	117	18	28
JH1DJD	"	10,032	80	22	26
JAØMHZ	"	9,282	97	16	18
JA8BZ	"	7,622	73	17	20
JA9BKW	"	6,300	63	15	21
JA1HGY	"	5,800	47	19	31
JH3FQF	"	5,544	55	18	24
JA4LGY	"	4,800	52	15	25
JA1DFQ	"	4,797	48	16	23
JH2NWF	"	4,312	58	13	15
JA5FIQ	"	3,556	52	14	14
JA4TKY	"	2,376	34	13	14
JH1DQZ	"	1,426	23	10	13
JA1AAT	"	448	10	8	8
JA1BSU	"	429	11	6	7
JA1EL	"	84	4	3	4
JA3ERG	**21**	**66,555**	**282**	**28**	**57**
JA8DFD	**21**	**63,714**	**302**	**24**	**50**
JA8WY	"	45,982	195	26	57
JA3BUB	"	43,094	256	21	37
JH2EVL	"	29,766	159	25	41
JE1BTT	"	29,185	158	23	42
JH6CAW	"	25,668	145	23	39
JA7ABE	"	22,491	154	21	28
JH1OGT	"	18,722	139	18	28
JE1UDU	"	17,066	83	20	33
JH3FYW	"	6,882	75	15	16
JE1TDV	"	5,536	61	15	17
JA8EAT	"	4,242	37	18	24
JR1GBS	"	4,205	52	14	15
JE1TEO	"	4,088	52	13	15
JR1VPO	"	3,537	46	13	14
JR1VPU	"	3,441	42	15	16
JR1VOP	"	2,926	46	10	12
JA4QJL	"	2,139	35	10	13
JF1AJR	"	2,037	40	13	8
JH1JUD	"	1,264	28	8	8
JA1FJW	"	1,026	19	9	9
JH1CIZ	"	324	9	5	7
JE1TDU	"	126	6	4	3
JA2PJC	**14**	**167,580**	**448**	**36**	**97**
JA1IBX	"	113,920	358	36	92
JA1RJU	"	41,172	166	30	64
JA3CF	"	23,182	125	28	39
JAØSC	"	16,350	124	21	29
JA5TX	"	7,820	70	20	26
JA2OJ	"	5,945	51	17	24
JA6YY	"	4,960	51	15	25
JH3BJN	"	2,449	32	14	17
JH1AWN	"	2,112	26	16	16
JA4BTD	"	1,113	25	11	10
JA5EN	"	912	14	10	14
JA5CEK/3		704	14	11	11
JA7JW	"	480	15	7	8
JH3GEX	"	156	7	6	6
JA2BAY	**7**	**61,572**	**264**	**33**	**51**
JA2HNP	"	4,524	40	16	17
JH1DVZ	"	1,590	24	13	17
JA2GQT	"	660	19	6	6
JA2YDK	"	52	5	2	2
JA2AIR	"	6	1	1	1
JA1EOD	**3.8**	**2,838**	**46**	**10**	**12**
JA2AAQ	"	2,622	49	9	10
JA8DNV	"	1,168	28	7	9
JA7MJ	"	72	5	3	3
KA6AY	**21**	**93,018**	**435**	**27**	**47**
KA2NA	14	4,356	48	15	18

Korea

HL9WS	**A**	**164,728**	**792**	**'46**	**72**

Lebanon

OD5BA	**A**	**731,666**	**1162**	**59**	**155**
OD5AU	"	9,815	62	26	39
OD5HG	14	3,454	53	4	18

Malaysia

9M2CJ	**A**	**13,038**	**174**	**20**	**33**

Saudi Arabia

7Z3AB	**14**	**85,725**	**388**	**23**	**52**

Singapore

9V1QO	**A**	**200,849**	**528**	**74**	**135**
9V1PQ	"	78,625	397	49	76
9V1RH	**14**	**36,540**	**216**	**30**	**60**

Thailand

HS4AGZ	**A**	**719,400**	**1043**	**94**	**206**
HS2AHF	"	30,444	162	56	62
HS1AEZ	**14**	**14,916**	**120**	**23**	**43**

Trucial States

MP4TEE	**28**	**60,336**	**290**	**18**	**54**

U.S.S.R.

Asiatic

UW9WR	**A**	**2,531,694**	**2207**	**108**	**323**
UA9OO	"	586,580	672	85	193
UA9MR	"	430,034	700	75	167
UA9QDX	"	427,448	711	74	164
UA9MP	"	228,240	504	56	124
UA9FAL	"	2,666	48	12	19
UA9CBO	**28**	**123,715**	**521**	**25**	**84**
RA9OCQ	"	76,609	490	19	64
UA9FAJ	"	47,652	277	18	58
UA9FBM	"	44,086	277	20	47
UW9VD	"	16,338	207	11	31
UA9MDY	"	9,776	111	14	33
UA9MK	"	6,154	76	8	26
UA9YE	**21**	**91,383**	**701**	**23**	**60**
UW9CR	"	17,550	117	15	39
UA9IF	**14**	**108,736**	**455**	**26**	**66**
UA9MT	"	47,508	167	35	76
UK9UAW	"	21,868	173	18	26
UA9UF	"	15,111	84	31	42
UWØAF	**A**	**305,424**	**603**	**71**	**145**
UAØMI	"	51,700	368	43	57
UAØCAH	"	4,641	67	19	20
UAØABP	**28**	**95,326**	**709**	**21**	**56**
RAØFAM	"	10,640	165	16	22
UAØAAL	"	9,472	130	9	23
UWØIQ	**21**	**33,041**	**508**	**17**	**24**
UAØFGM	**14**	**203,019**	**776**	**37**	**74**
UAØABC	"	163,728	476	39	94
UAØIM	"	97,455	555	27	46
UAØSH	"	20,160	124	26	37

Armenia

UG6AU	**A**	**44,118**	**184**	**25**	**61**
UK6GAA	14	7,790	79	11	27

Azerbaijan

UD6DER	**28**	**91,372**	**377**	**29**	**77**

Georgia

UF6CR	**A**	**159,100**	**344**	**56**	**116**
UF6HK	**28**	**28,050**	**161**	**18**	**48**

Kazakh

UL7CT	28	147	7	3	4
UL7CH	**21**	**45,951**	**349**	**12**	**39**
UL7BX	"	32,934	210	18	48
UL7NW	**14**	**36,636**	**153**	**31**	**55**

Tadjik

UJ8JGJ	**A**	**139,383**	**384**	**48**	**105**
UJ8JJJ	**28**	**65,660**	**404**	**16**	**51**

Turkoman

UH8BO	**A**	**40,470**	**139**	**39**	**75**
UH8AE	**14**	**113,048**	**407**	**30**	**74**
UH8BX	**3.8**	**20,812**	**172**	**9**	**35**

Uzbek

UI8LAF	**28**	**64,812**	**394**	**20**	**46**
RI8LAX	"	2,783	57	9	14
UI8OM	**14**	**21,899**	**120**	**22**	**39**
UI8ZAA	3.8	1,254	28	7	12

EUROPE

Arland Island

OHØNI	**A**	**127,330**	**367**	**56**	**158**
OHØNJ	"	99,067	352	49	108

Austria

OE3WWB	**A**	**206,700**	**466**	**65**	**94**

Azores Is.

CT2BG	**A**	**389,844**	**870**	**46**	**136**

Belgium

ON8CG	**A**	**229,111**	**529**	**57**	**140**
ON4XG	"	154,645	532	67	130
ON5KP	"	148,295	405	53	80
ON5TO	"	100,316	431	31	93
ON5MG	**14**	**86,352**	**430**	**32**	**80**
ON6AK	"	61,920	424	19	53

Bulgaria

LZ1CW	**28**	**56,000**	**324**	**23**	**57**
LZ2LY	"	3,150	50	13	22
LZ2SA	**21**	**51,000**	**401**	**23**	**62**
LZ2JF	**14**	**133,994**	**693**	**29**	**90**
LZ1AQ	"	11,970	124	17	46
LZ2JA	**7**	**22,020**	**325**	**17**	**43**
LZ2ZK	**3.8**	**24,510**	**395**	**8**	**49**

Czechoslovakia

OK3EE	**A**	**546,766**	**909**	**95**	**224**
OK1ADM	"	**302,600**	**368**	**103**	**237**
OK1ADP	"	207,808	358	80	192
OK1AVU	"	188,684	651	45	127
OK1AWZ	"	145,326	374	55	104
OK1OAT	"	99,229	221	68	153
OK1MSP	"	34,771	130	43	66
OK1DA	"	25,688	92	42	62
OK2BLI	"	22,644	288	13	61
OK1KZ	"	19,890	195	20	70
OK3CFS	"	14,560	200	14	51
OK1GO	"	13,600	60	32	48
OK1AAA	"	6,313	46	25	34
OK1MSP	"	2,496	64	12	27
OK1AHV	**28**	**46,645**	**182**	**30**	**65**
OK3KAG	"	35,708	183	23	56
OK1AHZ	"	30,550	136	28	66
OK1MGW	"	10,800	64	25	35
OK3CFA	"	3,605	43	15	20
OK1TA	**21**	**130,967**	**487**	**31**	**82**
OK1AVD	**14**	**67,568**	**473**	**27**	**76**
OK2ALC	"	20,164	228	16	55
OK3CM	"	4,343	49	14	29
OK3LU	"	2,814	47	11	31
OK1IAG	"	540	19	6	14
OK3YCA	"	482	17	6	15
OK2BIQ	**3.8**	**18,738**	**364**	**8**	**46**
OK3CAW	"	12,115	305	6	37
OK1AHI	"	8,282	202	5	36
OK3TOA	"	4,408	110	6	32
OK3TAV	"	3,103	110	4	25
OK2BBP	"	3,013	131	4	19
OK1BLC	"	2,576	91	5	23
OK1MWW	"	1,475	59	4	21
OK1AJJ	"	680	40	3	14
OK1JJB	"	616	44	2	12
OK1APJ	"	532	29	4	15
OK1AIJ	"	276	24	3	9
OK2SMO	"	42	9	3	4

Denmark

OZ3SK	**A**	**743,912**	**983**	**99**	**212**
OZ5EV	"	146,331	426	64	149
OZ3KE	"	62,712	234	53	103
OZ2NU	"	55,470	387	27	102
OZ3VJ	"	37,406	149	45	73
OZ4HW	"	31,500	195	31	69
OZ9OI	"	22,695	138	35	54
OZ3PO	"	20,286	84	36	62
OZ7OP	"	13,635	101	31	70
OZ5ME	"	10,434	105	23	51
OZ2UA	"	6,868	82	20	48
OZ6IC	"	5,782	69	16	33
OZ1XO	"	4,465	65	16	31
OZ9HO	"	3,486	52	17	25
OZ9HN	**21**	**3,600**	**59**	**10**	**26**
OZ7HT	**14**	**130,180**	**584**	**30**	**85**
OZ8JV	"	16,473	191	15	42
OZ4CG	"	374	22	3	14
OZ8KU	7	624	39	3	13
OZ5QU	3.8	660	30	3	19

England

G3LNS	**A**	**2,175,173**	**1901**	**127**	**324**
G3SEM	"	258,840	679	59	121
G3YBH	"	193,245	477	60	135
G2AJB	"	65,124	289	41	121
G3MWZ	"	30,996	198	29	79

G3RUI	"	25,025	185	16	39
G2MI	"	23,782	117	37	57
G5BAU	**28**	**272,165**	**701**	**34**	**111**
G2BOZ	"	154,940	475	32	90
G3RZI	"	47,440	227	24	56
G3XKV	"	45,520	232	24	56
G3HCT	**21**				
		629,847	**1645**	**36**	**105**
G3WJN	"				
		483,735	1491	30	89
G4AMJ	"	95,445	436	32	73
G3FXB	**14**				
		539,002	**1330**	**38**	**128**
G3NSY	"	165,416	611	38	86

Finland

OH5YF	**A**	**427,445**	**735**	**78**	**187**
OH2FS	**A**	**330,712**	**520**	**81**	**187**
OH2BMC	"	84,234	240	59	143
OH1VA	"	70,518	288	43	103
OH2AC	"	49,773	262	35	106
OH1UR	"	32,712	136	48	93
OH6LA	"	29,044	168	35	71
OH5OD	"	26,418	162	28	83
OH2BJY	"	25,584	175	34	70
OH2ZY	"	21,736	129	35	69
OH3JR	"	17,776	97	33	68
OH6XY	"	15,916	105	30	62
OH2LU	"	13,446	137	22	61
OH7NW	"	13,200	111	27	63
OH5YX	"	11,375	69	37	54
OH7RF	"	8,424	60	28	50
OH5TZ	"	4,717	49	18	35
OH2DN	"	4,425	51	19	40
OH1SJ	"	1,888	23	15	17
OH4SF	"	1,815	31	14	19
OH2VZ	"	1,500	36	10	20
OH3XJ	"	1,410	39	10	20
OH6NU	"	456	22	6	13
OH3MF	**28**	**38,985**	**167**	**30**	**83**
OH2XA	"	34,176	198	24	65
OH5PA	"	31,065	153	25	70
OH2BMG	"	12,692	66	26	50
OH2BHU	"	3,569	52	13	30
OH5QQ	"	160	6	4	6
OH8OB	**21**	**57,200**	**308**	**30**	**74**
OH6ZH	"	33,264	279	26	62
OH4SO	"	3,024	46	10	14
OH2BCD	"	2,277	35	11	22
OH7SC	"	1,350	33	9	18
OH2KU	"	42	4	3	4
OH4SL	"	24	2	2	2
OH8OA	"	6	1	1	1
OH2BAD	**14**				
		508,810	**1246**	**39**	**131**
OH5WH	"				
		375,399	1069	38	121
OH8RC	"				
		343,728	1044	38	94
OH2CP	"	111,839	631	32	59
OH2BFX	"	4,370	71	9	37
OH2WQ	"	4,294	75	8	30
OH1PG	"	2,414	57	8	26
OH2BLJ	"	160	14	3	7
OH5OZ	**3.8**	**5,676**	**122**	**7**	**36**
OH5PC	"	2,449	82	5	26
OH5XO	"	150	5	5	5

France

F9GL	**A**	**430,716**	**614**	**87**	**199**
F9MD	"	394,196	520	91	198
F6BEE	"	359,970	651	71	142
F8WE	"	88,821	375	40	99
F8NI	"	73,524	234	45	87
F3IJ	"	62,237	232	44	75
F9KP	"	57,452	334	31	75
F6API	"	52,275	248	30	55
F6BPL	"	25,755	147	32	53
F6BCG	"	15,163	99	21	38
F2XW	"	6,710	55	25	36
F2SI	**21**				
		462,336	**1322**	**34**	**95**
F9ZW	"	280,245	874	33	86
F6AUS	"	23,040	181	20	44
F6BVS	**14**	**112,332**	**428**	**25**	**86**
F6BXU	"	1,500	34	9	21
FØACS	**3.8**	**13,974**	**263**	**8**	**43**
F8TM	7	561	37	3	14

Germany

DK2BI	**A**				
		2,478,520	**1866**	**131**	**393**
DJ2HH	**A**				
		1,860,378	**1721**	**108**	**283**
DL8UI	**A**				
		1,344,135	**1444**	**117**	**290**
DJ9MH	**A**				
		1,006,983	**1082**	**107**	**274**
DL8YR	"				
		913,224	1195	88	224
DJ2RB	"				
		725,390	1006	80	209
DL8PC	"	622,336	720	118	298
DK5EZ	"	509,006	617	91	216
DJ4UF	"	441,735	736	69	176
DL1MD	"	370,336	617	82	202
DJ8WR	"	319,454	595	74	137
DK2LM	"	319,158	579	81	217
DJ4ZR	"	274,536	469	79	169
DK8FZ	"	212,040	452	66	124
DK5NH	"	179,166	436	64	123
DJ2UU	"	111,800	305	60	155
DK4YA	"	99,792	267	61	137
DJ9IA	"	98,260	314	48	122
DK5WE	"	78,157	202	62	105
DL3VV	"	77,760	246	48	112
DL9PO	"	76,160	277	49	87
DL9EY	"	72,590	266	45	77
DJ4PI	"	62,460	175	59	121
DK5PR	"	58,432	187	46	120
DL3OH	"	45,318	191	36	55
DK9WB	"	44,480	109	62	98
DJ2VY	"	43,500	196	48	77
DJ2SL	"	42,828	130	47	82
DL1YA	"	39,606	156	39	99
DJ4EJ	"	36,820	123	47	93
DL8MY	"	32,508	157	32	62
DK4QG	"	32,256	109	43	75
DL3RA	"	30,189	186	28	59
DK3PZ	"	24,698	84	43	63
DK6FM	"	18,699	103	29	40
DL2JO	"	17,286	122	28	58
DK4QD	"	14,160	95	28	52
DL1OY	"	12,450	68	28	47
DK6DP	"	7,100	102	16	34
DL1IP	"	6,300	67	20	40
DJ4RL	"	3,264	36	21	27
DK4OO	"	720	22	8	16
DL6EN	**28**	**263,252**	**740**	**34**	**90**
DL9VS	"	160,796	480	33	89
DJ1ZUA	"	86,584	393	25	54
DL6HW	"	80,289	298	25	74
DJ1ZN	"	74,438	286	28	63
DJ2AA	"	46,233	166	31	68
DJ2QH	"	42,918	214	26	43
DK4PH	"	32,123	132	31	60
DJ6RX	**21**				
		527,156	**1437**	**35**	**99**
DJ8RR	"				
		420.500	1201	33	92
DJ5MC	"	63,800	255	31	69
DJ9ZB	"	55,794	244	30	72
DK3BU	"	1,092	26	9	17
DK5AI	**14**	**84,105**	**524**	**23**	**66**
DL1KS	7	578	17	7	10
DK3SN	**3.8**	**8,730**	**209**	**6**	**39**
DK5OL	"	924	43	3	19
DA2EL	**A**				
		747,156	**1172**	**80**	**148**
DA1LA	**28**	**163,461**	**568**	**30**	**73**
DL4JW	**14**	**86,580**	**407**	**31**	**86**
DL5KS	**1.8**	**504**	**60**	**2**	**7**
DM2ATD	**A**				
		1,504,240	**1556**	**117**	**299**
DM3OML	"	53,196	233	40	116
DM3VGO	"	38,556	258	31	88
DM2CDL	"	22,800	200	21	55
DM2CYO	"	10,336	54	25	43
DM4XI	"	1,075	37	7	18
DM2COJ					
	3.8	**3,744**	**94**	**5**	**34**

Greece

SV1GA	**28**	**128,100**	**763**	**29**	**71**
SV1EN	**21**	**55,352**	**641**	**19**	**49**

Guernsey (Channel Is.)

GC3YIZ	**A**	**196,636**	**589**	**45**	**119**

Hungary

HA6NN	**A**	**188,340**	**547**	**60**	**159**
HA6NP	"	102,567	432	53	126
HA9KOV	"	39,032	242	37	82
HA8VT	"	20,086	171	22	61
HA5KJX	"	3,240	51	14	26
HA5KO	**21**	**68,068**	**465**	**24**	**44**
HA5DG	"	14,818	120	19	43
HA7LF	**14**	**100,590**	**571**	**28**	**77**
HA5CQ	**3.8**	**14,872**	**285**	**11**	**41**

Iceland

WA9OTH/TF					
	A	**263,640**	**827**	**42**	**127**
WA3SMN/TF					
	21	**19,152**	**366**	**8**	**30**

Italy

I6FLD	**A**				
		1,675,338	**1889**	**110**	**243**
I3PRK	**A**				
		1,305,521	**1339**	**113**	**308**
I4ZSQ	**A**				
		1,194,258	**1420**	**102**	**264**
I3GRX	"	135,828	387	47	85
I3DAB	**28**	**189,878**	**613**	**33**	**76**
I1NU	"	153,636	587	30	63
I8YRK	"	139,250	500	32	93
I4PGD	"	37,701	217	26	45
I8SGZ	"	10,191	65	23	56
I3HL	"	5,060	44	17	29
I3AWK	**21**	**75,600**	**429**	**23**	**61**
I3MAU	**14**				
		471,096	**1271**	**36**	**126**
I1AT	"	107,880	438	34	86
I3BBZ	**7**	**42,458**	**440**	**15**	**56**
IP1MOL					
	3.8	**39,101**	**401**	**11**	**50**
I3MWP	"	1,034	45	5	17

Jersey Is.

GC3XZE	**A**	**24,220**	**179**	**19**	**51**

Luxembourg

LX1JW	**A**	**81,528**	**528**	**22**	**64**

Malta

9H5D	**A**				
		812,630	**1515**	**72**	**194**

Monaco

3A2EE	**A**	**18,225**	**152**	**23**	**58**

Netherlands

PAØKW	**A**	**26,500**	**192**	**28**	**78**
PAØYN	"	22,464	99	28	50
PAØTO	"	12,008	70	30	46
PAØLOU	**28**	**62,836**	**240**	**27**	**65**
PAØHTR	**21**	**15,288**	**124**	**18**	**34**
PAØDCD	"	13,468	98	20	32
PAØVB	"	1,512	30	7	14
PAØLVK	**14**	**12,690**	**145**	**13**	**41**
PAØHBO	**3.8**	**35,518**	**504**	**11**	**48**

Northern Ireland

GI4AHP	**A**	**109,000**	**504**	**30**	**70**

Norway

LA3XI	**A**				
		1,014,505	**1365**	**85**	**210**
				(Opr. LA5KG)	
LA6GF	"	696,764	842	108	265
LA9JD	"	48,723	345	34	75
LA5QK	"	40,764	250	34	95
LA9WK	"	9,036	83	23	45
LA6HL	"	1,225	17	12	13
LA8OM	"	595	17	8	9
LA8RL	**28**	**12,080**	**60**	**29**	**51**
LA5OQ	"	3,744	32	21	27
LA1SP	**21**	**12,690**	**141**	**11**	**43**
LA4KO	14	112	6	4	4

Poland

SP3DOI	**A**				
		984,312	**1085**	**113**	**279**
SP8AWP	"	90,117	403	47	124
SP9BLF	"	65,121	359	34	113
SP5XM	"	43,875	199	45	80
SP8ARK	"	36,332	139	45	79
SP1AGE	"	9,916	48	31	43
SP2DVH	"	1,058	47	6	17
SP9FEW	"	165	11	6	9
SP3BQD	**28**	**26,158**	**124**	**25**	**57**
SP9ABU	"	13,680	89	20	40
SP5BSV	**21**	**102,626**	**446**	**28**	**69**
SP6FSH	"	12,720	151	17	36
SP8AWL	"	6,858	65	18	36
SP7AWA	"	1,848	38	9	19
SP8EDQ	"	1,344	46	7	17
SP2BKZ	"	684	24	8	11
SP5CKM					
	14	**70,349**	**387**	**32**	**71**
SP5ACN	"	43,844	252	29	68
SP9AI	"	40,320	260	29	67
SP9KZ	"	28,080	253	22	58
SP5QU	"	23,048	291	19	48
SP7ASZ	"	7,420	96	15	38
SP8BXF	"	7,013	148	10	31
SP9AJM	"	5,358	80	13	34
SP9AGS	"	5,125	103	10	31
SP3CJW	"	3,102	64	10	23
SP5BB	"	1,769	52	7	22
SP5ANQ	"	1,666	29	12	22
SP3BLG					
	3.8	**16,416**	**337**	**7**	**41**
SP6BQF	"	15,276	245	10	47
SP5ELA	"	13,650	262	9	41
SP1II	"	5,712	179	5	29
SP3CMX	"	2,160	77	5	25
SP9FLY	"	2,110	86	5	21
SP1EIC	"	1,656	77	3	20
SP3BLU	"	1,539	58	4	23
SP5PDA	"	1,144	54	4	18

Portugal

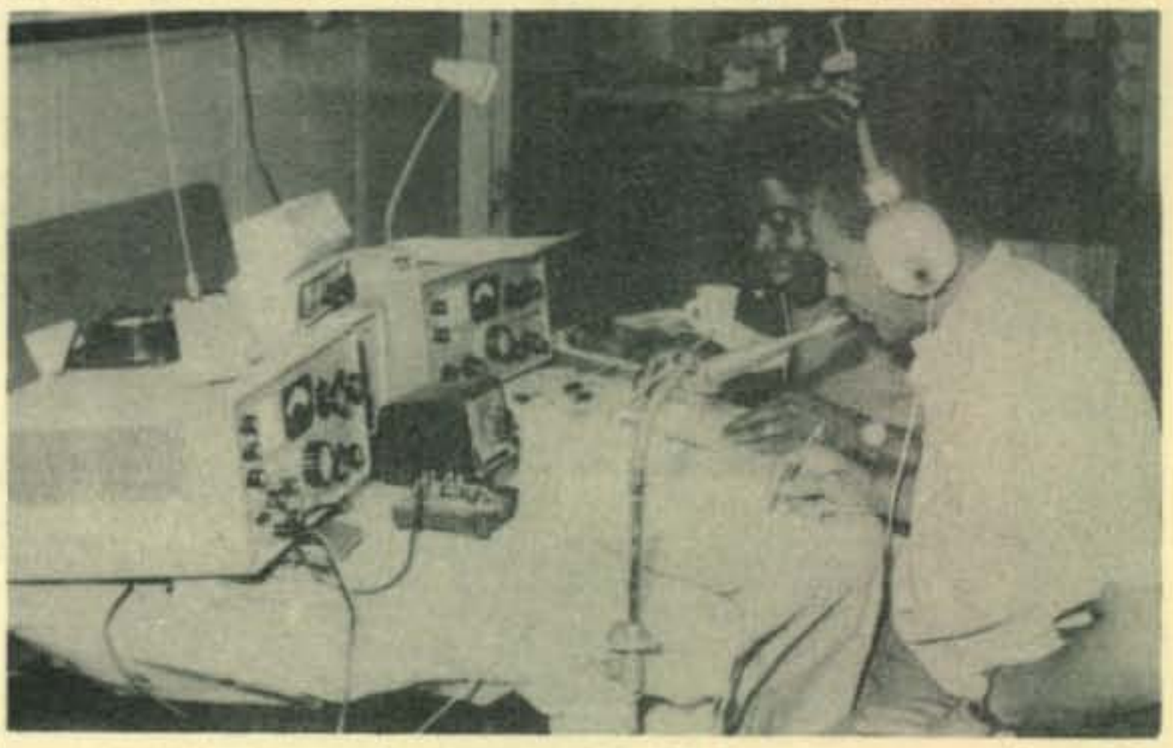
CT7BH	**A**				
		1,523.691	**1761**	**100**	**251**
CT7SH	"	314,127	998	48	123
CT7ZG	"	128,872	358	50	131
CT1MZ	"	11,985	64	31	54
CT7UA	**21**				
		403,420	**1461**	**30**	**85**
CT1TV	"	540	12	7	8
CT7ZW	**14**	**146,804**	**639**	**31**	**67**
CT1QN	**7**	**29,868**	**256**	**19**	**57**

Romania

YO3AC	**A**	**64,527**	**233**	**48**	**109**
YO2AFB	"	5,760	62	15	33
YO9CN	**28**	**105,154**	**501**	**27**	**71**
YO6EX	**14**	**24,866**	**384**	**11**	**43**

Scotland

GM3BCL	**A**	**487,890**	**823**	**67**	**167**
GM5AZS	"	132,821	373	57	164
GM4BIT	**28**	**30,723**	**214**	**21**	**56**
GM3XNJ	**21**	**16,740**	**189**	**18**	**42**
GM5AXY	"	6,426	69	11	31
GM3YCB					
	1.8	**2,128**	**132**	**3**	**13**



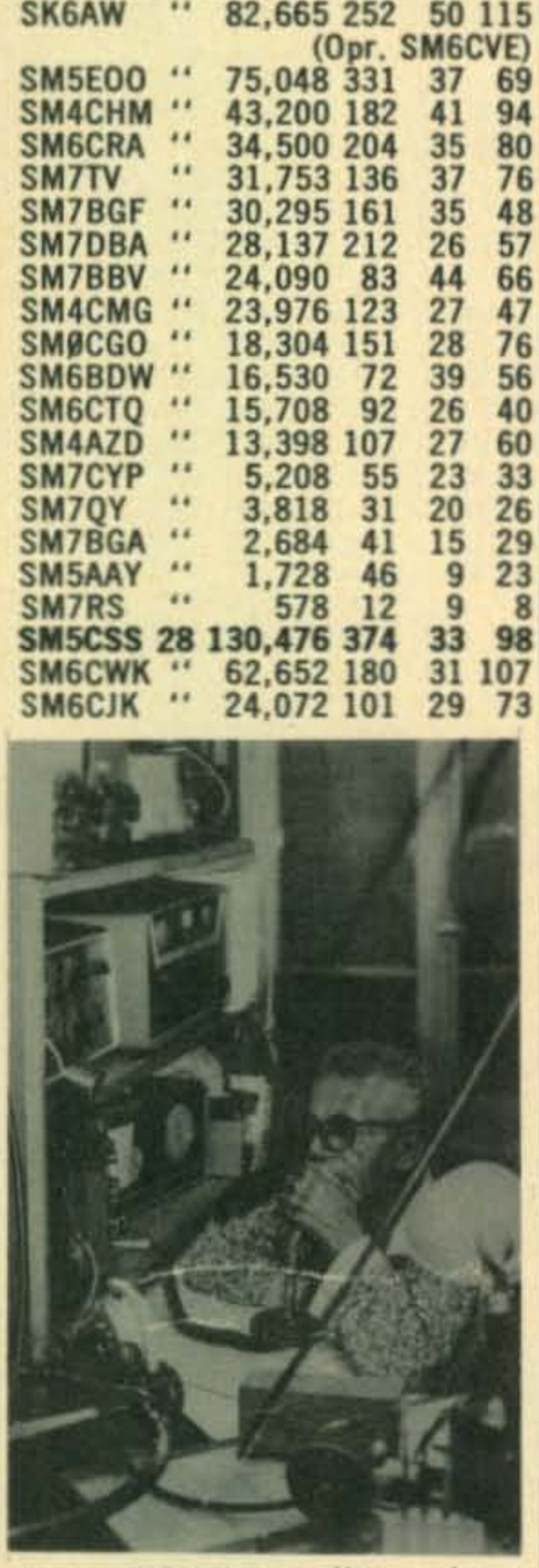
Ken, VP9BO, and Austin, VP9AT, manning the 20 meter position of the Multi Multi VP9BO operation. In the background can be seen Roy, VP9FX, at one of the other positions.

Spain

EA4LH	**A**				
		2,744,119	**2399**	**125**	**344**
EA3FN	"	37,962	223	30	81
EA3OJ	"	31,490	164	23	71
EA2JP	**14**	**30,705**	**182**	**22**	**67**
EA1FX	**3.8**	**18,088**	**230**	**12**	**44**

Sweden

SM5AD	**A**				
		1,320,546	**1398**	**105**	**276**
SM3BIZ	"	649,020	893	92	255
SM7WT	"	502,058	598	114	259
SM5CMP	"	283,240	593	79	213
SK6AW	"	82,665	252	50	115
			(Opr. SM6CVE)		
SM5EOO	"	75,048	331	37	69
SM4CHM	"	43,200	182	41	94
SM6CRA	"	34,500	204	35	80
SM7TV	"	31,753	136	37	76
SM7BGF	"	30,295	161	35	48
SM7DBA	"	28,137	212	26	57
SM7BBV	"	24,090	83	44	66
SM4CMG	"	23,976	123	27	47
SMØCGO	"	18,304	151	28	76
SM6BDW	"	16,530	72	39	56
SM6CTQ	"	15,708	92	26	40
SM4AZD	"	13,398	107	27	60
SM7CYP	"	5,208	55	23	33
SM7QY	"	3,818	31	20	26
SM7BGA	"	2,684	41	15	29
SM5AAY	"	1,728	46	9	23
SM7RS	"	578	12	9	8
SM5CSS	**28**	**130,476**	**374**	**33**	**98**
SM6CWK	"	62,652	180	31	107
SM6CJK	"	24,072	101	29	73



Joe, OD5BA talking himself to the top spot in the competition from Lebanon.

SMØBDS	"	21,420	116	26	58
SM7BEX	"	21,075	122	24	51
SM6FYJ	"	15,594	92	23	46
SM5DUT	"	8,910	70	20	35
SM6CKU	**21**				
		419,419	**1044**	**37**	**106**
SM7DNL	"	144,375	444	33	92
SM5CEU	"	32,307	183	27	62
SMØHL	"	4,429	59	15	28
SM7AIL	"	2,904	42	14	19
SM5CNQ					
	14	**207,414**	**799**	**37**	**101**
SMØAIU	"	150,969	458	38	109
SM5ACQ	"	147,576	609	36	93
SM7ACB	"	108,070	430	33	74
SM5GA	"	9,694	125	12	25
SM5CVC	"	1,770	47	9	21
SM3BUS	"	252	7	5	7
SM5BRS	**7**	**2,816**	**79**	**5**	**27**
SM5GZ	**3.8**	**25,489**	**332**	**16**	**55**
SM7EJQ	"	10,584	294	4	32
SMØBVQ	"	264	25	2	9

Switzerland

HB9ASK	**A**				
		587,650	**1019**	**100**	**222**
HB9UD	"	**68,794**	**221**	**47**	**71**
HB9IX	"	**29,260**	**211**	**20**	**50**
HB9ZY	**21**	**338,776**	**934**	**35**	**101**
HB9AEB	"	66,200	248	26	74
HB9DX	"	53,156	201	29	68

Vatican

HV3SJ	**A**	**74,774**	**425**	**37**	**72**

Wales

GW4BLE	**28**	**102,885**	**456**	**24**	**71**
GW3ZQH					
	14	**38,709**	**299**	**20**	**49**
GW3ZQN					
	3.8	**11,088**	**258**	**7**	**35**

Yugoslavia

YU3EY	**A**				
		1,909,805	**1620**	**128**	**343**
YU1UM	"	250,047	578	63	126
YU2OB	"	150,675	333	65	140
YU1NPG	"	72,940	227	60	99
YU3TVP	**28**	**271,439**	**814**	**30**	**89**
YU1ODO	"	75,095	302	32	83
YU2HDE	"	26,499	145	24	49
YU1NZR	"	1,479	19	11	18
YU2CAW					
	21	**211,576**	**876**	**28**	**78**
YU3TXT	"	34,773	233	23	44
YU1NVM	**14**				
		310,400	**1043**	**36**	**124**
YU2RKC	"	20,022	189	15	56
YU3TKT	"	2,960	76	5	32
YU2BHI	**3.8**	**7,992**	**190**	**6**	**31**

U.S.S.R.

European

UW6LC	**A**	**211,931**	**511**	**68**	**184**
UV3DN	"	161,867	573	51	106
UA3HR	"	156,180	403	70	120
UW3DH	"	102,678	222	67	151
UV3HD	"	71,416	231	50	176
UA3XP	"	35,280	309	26	79
UV3FD	"	11,152	70	32	50
UA1QO	"	9,039	98	23	46
UA3VAM	"	7,980	46	31	39
UW3DZ	"	4,089	73	14	33
UA4LK	"	3,800	85	12	28
UW3HY	"	3,800	30	25	25
UA3BGB	"	1,479	67	8	9
UA6LO	**28**	**174,020**	**745**	**31**	**82**
RA3ACQ	**28**	**162,480**	**771**	**31**	**89**
UK6LDZ	"	121,068	631	30	78
RA3MAH	"	70,551	376	27	54
UA4QM	"	48,544	323	18	50
UA4SR	"	43,200	376	20	44
UA3DDF	"	29,546	262	28	51
UA6HBZ	"	20,007	299	16	41
RA3XAQ	"	9,264	101	14	34
UA3HB	"	8,650	63	19	31
UA6XAL	"	7,450	99	12	38
UA6HYL	"	6,882	98	7	30
RA6HFL	"	4,422	97	10	28
UA3FT	"	3,888	50	13	23
RA1AKZ	"	3,564	94	10	23
RA6HFA	"	1,716	60	6	20
UK6LAZ	**21**	**463,684**	**1355**	**37**	**111**
UA3FG	"	123,480	583	29	69
UW1BM	"	77,010	601	26	59
UA3BK	"	22,649	152	21	50
UA6HAC	"	19,864	290	18	35
UA1CS	**14**	**272,705**	**727**	**39**	**112**
UW1AR	"	223,350	704	40	110
UW1OP	"	73,574	324	36	70
UA4AU	"	28,008	188	23	49
UV3NN	"	12,876	165	14	44
UK3YAA	"	4,623	112	9	31
UK6HAA	"	1,581	40	10	21
UV3GW	**7**	**18,910**	**240**	**15**	**47**
UA3XM	"	12,198	175	12	45
UW3IN	**3.8**	**20,691**	**349**	**10**	**47**
UA4PW	"	8,595	148	8	37
UK6LEZ	"	8,008	153	7	37
UW3RR	"	2,520	65	8	32

Estonia

UR2ED	**28**	**20,097**	**124**	**23**	**54**
UR2QD	**21**	**180,831**	**786**	**28**	**81**
UR2EG	**14**	**22,494**	**151**	**23**	**46**

Kaliningrad

UA2EC	**A**	**110,565**	**387**	**53**	**136**

Latvia

UQ2DV	**A**	**53,625**	**293**	**35**	**90**
RQ2GDT	**28**	**5,334**	**89**	**14**	**28**
UQ2CR	**14**	**10,534**	**171**	**11**	**35**
UQ2NU	**3.8**	**3,904**	**113**	**6**	**26**

Lithuania

UP2OU	**A**	**265,716**	**697**	**68**	**176**
UP2SA	"	73,872	363	39	105
UP2PD	**28**	**9,360**	**75**	**19**	**41**
UP2PBI	"	6,324	62	22	29
UP2PY	"	4,828	57	15	29
UP2PAD					
	3.8	**15,444**	**330**	**8**	**36**

Moldavia

UO5OAB	**A**	**88,270**	**432**	**33**	**97**
UO5BZ	"	36,951	205	27	86
UO5OAA	**28**	**3,696**	**84**	**7**	**21**
UO5OAK	14	1,653	19	13	16

Ukraine

UB5WE					
	A	**1,966,635**	**1990**	**110**	**325**
UY5EM	"	103, 896	415	41	107
UT5LY	"	32,946	241	28	74
UB5LU	"	28,188	254	32	76
UB5EDU	**28**	**231,840**	**800**	**34**	**104**
UK51BM	"	156,000	560	33	92
RB5QAO	"	69,384	523	25	59
UB5ND	"	35,598	156	32	70
UB5VAJ	"	22,950	126	25	65
UY5YB	"	17,298	173	20	42
UB5VAF	"	8,868	64	21	38
RB5VAC	"	7,257	107	13	28
UB5EM	**21**	**59,592**	**458**	**28**	**64**
UY500	"	56,498	329	24	58
UT5FN	"	41,976	379	19	53
UT5LH	"	40,545	316	21	54
UB5SR	"	1,890	30	10	11
UB5JK	**14**	**61,566**	**499**	**27**	**65**
UT5HP	"	19,800	207	17	49
UB5LL	**7**	**29,547**	**310**	**19**	**44**

White Russia

UC2BF	**A**	**35,520**	**180**	**38**	**82**
UC2AF	"	552	16	10	13
RC2WAQ					
	28	**8,855**	**102**	**16**	**39**
UC2WP	**21**	**24,076**	**329**	**15**	**37**
UC2AAM					
	3.8	**8,626**	**221**	**6**	**32**

OCEANIA

Australia

VK2BJL	**14**	**29,580**	**128**	**26**	**59**
VK3JF	**A**	**61,608**	**168**	**47**	**89**
VK3SM	**21**	**15,660**	**124**	**20**	**25**
VK3ARY	**14**	**35,208**	**163**	**25**	**47**
VK4FH	**A**	**129,168**	**402**	**43**	**65**
VK4AK	"	46,618	122	53	90
VK4PJ	28	5,088	56	12	20
VK4DO	**14**	**34,224**	**136**	**32**	**61**
VK5MF	**A**	**46,325**	**186**	**36**	**49**
VK6NE	A	5,412	83	10	12
VK6HD	**14**	**706,251**	**1483**	**37**	**132**

British Phoenix Islands

VR1PA	**14**	**208,506**	**756**	**30**	**63**

French Oceania

FO8CX	**A**	**102,900**	**443**	**41**	**43**

Guam

KG6JBO					
	A	**2,992,355**	**3,342**	**110**	**195**
KG6JAR	"	305,738	894	50	68

Hawaii

KH6RS					
	A	**5,331,072**	**4,739**	**128**	**256**
				(opr. K2SIL)	
KH6IJ					
	"	2,027,500	2,741	94	156
K5CIT/KH6					
		1,039,584	1,395	97	175
WØDAD/KH6					
		383,267	765	67	110
KH6CKJ	**28**	**187,341**	**836**	**28**	**49**
KH6HQL	"	14,600	245	12	8
KH6GMP					
	21	**420,390**	**1581**	**30**	**60**
KH6BVS	"	381,942	1297	34	65
KH6IAB	**14**	**277,833**	**895**	**37**	**74**
KH6HGP	7	7,680	162	8	8

Indonesia

YB3AAY	**A**	**624,220**	**974**	**83**	**147**
YB5AAQ	**28**	**28,952**	**224**	**15**	**29**

Mariana Islands

KG6SW	**A**	**156,870**	**444**	**49**	**77**
KG6SL	**28**	**933,577**	**2467**	**33**	**94**

Marshall Islands

KX6IQ	**A**	**79,992**	**266**	**40**	**61**
KX6JS	28	10,120	173	10	10

Nauru

C29ED	**14**	**147,630**	**563**	**34**	**61**

New Zealand

ZL1BKX	**A**	**299,684**	**410**	**109**	**169**
ZM1AMM	"	117,808	289	56	92
ZL1AGO	"	85,800	227	60	83
ZM1TB	"	11,505	98	28	31
ZM2ACP	**28**	**146,020**	**710**	**24**	**46**
ZM2AH	**21**	**146,790**	**710**	**24**	**46**
ZL4BO	**7**	**39,258**	**252**	**20**	**34**

Papua

VK9RY	**A**	**144,100**	**505**	**37**	**63**

Philippines

DU1JMG	**21**	**350,645**	**1248**	**28**	**67**
DU1GJM	"	166,254	850	26	40

Western Samoa

5W1AU	**A**	**785,325**	**1595**	**80**	**105**

SOUTH AMERICA

Argentina

LU5HFI	**A**	**1,597,900**	**1929**	**90**	**200**
LU3FAN	**28**	**381,558**	**1129**	**29**	**85**

Bolivia

CP1EU	**A**	**1,042,836**	**1271**	**93**	**190**

Brasil

PY2BCQ	**A**	**806,440**	**1123**	**75**	**169**
PY5YC	"	194,280	568	44	76
PT2DCA	"	95,040	301	41	69
PY1BOL	"	94.956	267	44	79
PY4BSZ	"	93,141	256	53	78
PT2EYO	"	77,520	353	36	40
PY6TM	"	66,990	226	43	62
PY6OA	"	57,770	201	40	66
PY6UL	"	550	12	11	11
PY1ZAE	**28**	**109,304**	**364**	**29**	**75**
PY3APH	"	69,093	295	25	56
PY2BZD	"	16,720	84	21	55
PY1CHP	21	14,212	131	16	22
PY7AKQ/6					
	14	**258,084**	**745**	**35**	**99**
PY2ELZ	7	12,450	92	21	29
PY3CGP	"	1,664	25	14	18

Chile

CE3AQW					
	A	**1,518,066**	**1692**	**101**	**205**
CE8AO	"	379,140	742	67	111
CE5GO	**28**	**38,324**	**277**	**18**	**34**

Colombia

HK1CMX					
	14	17,052	104	19	39

Easter Is'and

SM2AGD/CE0					
	A	**174,625**	**490**	**58**	**67**

Peru

OA4AGR	**A**	**564,996**	**1001**	**77**	**120**
OA4A1W	"	161,756	521	36	70

Surinam

PZ1AH					
	A	**2,989,146**	**2533**	**113**	**306**
PZ1CC	**14**	**51,678**	**237**	**22**	**59**

Trinidad & Tobago

9Y4VU	**A**	**1,967,432**	**2014**	**92**	**240**

Uruguay

CX8BE	**28**	**567,633**	**1864**	**23**	**80**
CX3RP	"	436,680	1230	27	93
CX8BZ	**21**	**279,582**	**935**	**29**	**73**
CV8BBH	**14**	**692,440**	**1691**	**36**	**104**

Venezuela

4M4UA					
	A	**5,409,315**	**4104**	**128**	**331**
				(opr. W6BHY)	
YV1YC/5	"	302,528	644	55	108
4M7AV	"	158,650	335	56	111
YV4PA	"	558	13	9	9

[*Cont. on p. 86*]

DX

BY JOHN A. ATTAWAY,* K4IIF

THE Sept. 19, 1972 issue of the weekly *West Coast DX Bulletin* presented a breakdown of the top spots on the A.R.R.L. DXCC Honor Roll according to the 10 U.S. call sections. They ranked as follows: W2—71 slots, W6—66, W4—37, W8—34, W5—33, W9—28, W1—23, WØ—21, W3—16, and W7—15.

This started us speculating on who is working WAZ these days. We checked our records for the past year to get a representative sample and came up with the following numbers of WAZ certificates issued to hams in the various U.S. call areas: W4—29, W6—21, W2—20, W8—17, W9—17, W3—16, W5—14, W7—10, WØ—9 and W1—9. With the 4 area tops and the DX Editor a 4-lander who can say that "a prophet is without honor in his own country," Hi, Hi!!!

We also checked the WAZ output from other countries and found that the West Germans make it no contest. The standings were as follows: West Germany—68, U.S.S.R.—34, Japan—28, Sweden—17, United Kingdom—10, Czechoslovakia—10, New Zealand—10, Canada—9, Australia and France—8 each, Norway, Yugoslavia and Italy—7 each, and East Germany—5. South and Central America together accumulated 12 certificates and Africa garnered 11.

Thus the world's highest concentration of active DXers is definitely to be found in West Germany. We would have thought that Japan would be very close, but the figures say not.

De Extra

Most DXers are also active contest operators, partly because many DXpeditions are scheduled for contest weekends, and partly for the love of competition. Don't let that competitive urge push you into forgetting the new FCC regulations on proper identification. The following, taken from the Western Washington DX Club publication *Totem Pole* will serve as a reminder:

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

The CQ DX Award Program

C.W. DX	2XSSB DX
116—WA5RTG	275—I8YRK
117—WØMHK	276—WB9DVV
	277—WA5RTG
	278—W3YMB

Endorsements

S.S.B: I8YRK—275, WA5RTG—200, W9GHO—200
Low Band: W5QBM
Application Blanks and rules for the CQ DX Award may be obtained by sending a business size, self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, CA 91722 or to the DX Editor.

FCC Has Ears—Ken, W7BRU

"After 20 years of amateur radio I have had the misfortune of getting an FCC notice of violation. I mention it to provide a reminder that there are monitoring stations that do listen. I was cited by the Grand Island, Nebraska monitoring station for violation of rule 97.87(a), 'Failure to transmit, at the end of an exchange of transmissions, the call sign of the station or stations with which communication was established.' I called CR7GJ in a pileup at 21270.7 kHz (FCC measured) and when he came back to me I gave my call sign and his report and said 'go ahead.' He gave me my report and said QRZ. This was during the ARRL test on 3/4/73 at 1814 GMT. Since this is a fairly common violation heard in contest operating, I thought it worthwhile to pass on for everyone's benefit."

We appreciate Ken's willingness to share this warning with all of us. Keep it in mind as the fall contest season approaches, and for all

Respi, DU7ER, is a doctor in the Philippines, about 600 miles south of Manila. This photo was taken by Kenny, K6OPG, during his recent visit to the far east.

WPX HONOR ROLL

The WPX Honor Roll is based on confirmed current prefixes which are submitted by separate application in strict conformance with the *CQ* Master Prefix List. Scores are based on the current prefix total regardless of an operators all-time prefix count.

MIXED

W4LRN 1225	ON4QX 916	W4IC 850	W∅AUB 785	K∅BLT 733
VE3GCO 1014	W4CRW 900	W4WSF 830	K2AAC 783	WA6EPQ 709
F9RM 1003	K1SHN 893	W4BYU 824	WB4KZG 780	K2ZRO 708
W2NUT 967	DL1MD 892	I6SF 814	SM7TV 752	PA∅VB 707
WA6MWG 962	PA∅SNG 882	W9WHM 811	K6SDR 750	W6NJU/6 706
W8LY 959	YU1AG 875	G3DO 810	K8UDJ 750	W9ZTD 700
W3PVZ 938	DL1CF 872	W6ISQ 803	CT1LN 749	W8GMK 683
DJ7CX 930	W6TCQ 855	W3GJY 797	WA5LOB 749	WA∅CPX 656
W8ROC 929	W4BQY 854	WA∅KDI 790	PY4AP 735	WA2EAH 650

CW

W8LY 953	K7ABV 745	K1SHN 715	W6ISQ 666	W3ARK 620
W8KPL 910	W4BYU 744	OK2DB 693	I6SF 658	K2ZRO 612
DL1QT 861	WB2FMK 740	YU1AG 693	SM5BNX 652	VO1AW 605
W2HO 825	W9FD 740	K2AAC 686	W41C 652	WA6JVD 602
ON4QX 823	DJ7CX 730	VO1AW 681	K1LWI 629	VE4OX 600
W2AIW 813	G2GM 728	WA6MWG 674	W8GMK 628	OK2QX 600
VK3AHQ 809				

SSB

W4NJF 1031	K2POA 833	PA∅SNG 758	I1ZV 716	YU1AG 655
CT1PK 930	W∅YDB 809	W4IC 750	ZL3NS 685	WB6DXU 631
DL9OH 890	DL1MD 805	WA5LOB 747	OK1MP 680	CR7IK 613
W9DWQ 881	HP1JC 800	K1SHN 737	W6RKP 678	14LCK 608
I∅AMU 863	F2MO 780	G3DO 719	I8YRK 662	
18KDB 839	W3DJZ 761	14ZSQ 719	W6TCQ 657	

the latest contest information consult Frank Anzalone's column elsewhere in this issue.

Amateur Radio Elsewhere: Republic of Minerva (et Cocos?)

Minerva Reef, located in the South Pacific 260 miles southwest of Tonga and 380 miles southeast of Fiji, has been one of the more controversial DX countries since it was added to the country list during Don Miller's great worldwide DXpeditions of the mid-60's. It is now a 'deleted country,' but has been very much in the news recently as the result of attempts by an American financial group to create solid ground on the reefs and proclaim a new Republic. These attempts were stoutly resisted by the King of Tonga, 6 ft. 4 in. tall, weight 350 pounds, who claims the reefs as part of his own kingdom.

If you wish to really dig into the details of the latest Minerva flap, find a friend who subscribes to *Barron's*, the national business and financial weekly published by Dow Jones and Co., Inc. The March 26, 1973 issue had a very informative article on pg. 5 which details the participants and their objectives. Of particular interest to DXers is the fact that the group is also interested in TI9—Cocos Island, another very rare DX country, and is dickering over a purchase of that island from Costa Rica.

Casey, YB9UA, has been an enthusiastic CQ subscriber in Indonesia for almost 3 years. *(Photo via K6OPG)*

The object of the Minerva effort was to found a free enterprise Republic without taxes, welfare, tariffs or regulatory agencies. The chief participants include Michael Oliver, 44 a Carson City, Nevada author, land developer and coin dealer, Morris C. Davir 47, co-owner of a flight school and President of Caribbean-Pacific Enterprises, a Nevada based corporation claiming the reefs, and Thomas M. Taylor, 33, partner of Intrnational Maritime Legal Research.

Other interested parties include Texan M. Coke Reéves, Floridian Roger W. Adair, Richard J. King of London, England, Thurlow Weed of Ohio and Californian Robert E. Marks. Wood and Marks actually planted the Minervan flag on the reefs claiming them for Caribbean-Pacific, who estimates the cost of creating land on the reefs to be about $15,000 per acre.

At press time the Minerva deal is very much up in the air. The King of Tonga dispatched his navy to remove the Minervan flag from 2 concrete platforms erected by the Caribbean-Pacific group Negotations with the King are reported to be in progress, but meanwhile efforts are underway to purchase Cocos for a reported $1,000,000.

A feature of the proposed constitution for Cocos includes a provision that "all communication systems would be privately owned and operated on a competitive basis," with no regulatory agencies such as the FCC. From this one might assume that there would be no licensing problems for amateurs. However, before finalizing your immigration plans be aware that Cocos has 160 inches of rain per year divided between two seasons, the rainy season and the wet season. Peace!

A pleasant repast at a San Francisco Pub. Left to right are Bob Thompson, K6SSJ, Chairman of the Fresno DX Convention held on April 7 and 8, John Attaway, K4IIF, DX Editor of CQ, Iris Colvin, W6DOD, President of the Northern California DX Club, and Lloyd Colvin, W6KG, OM of the NCDXC President. *(Photo courtesy Smitty, W6JZU)*

80 Meter WAZ

Toughest of the Single Band WAZ Awards will be the 80 Meter C.W. WAZ Award and the 80 Meter Phone (s.s.b. + a.m.) WAZ Award. However, with the sunspot cycle heading for a bottom, DX on 80 and 40 should continue to improve as it worsens on 10, 15 and 20, and we think the 2 plaques will be won within 2 years. In scanning over reports which have come in recently, we find the following stations active in the zones which will be most difficult from North America. Reports from the easier zones such as 1—6, plus the South and Central American Zones 7—13, the European Zones 14—15, Zones 30, 31 & 32 in the Pacific, Japan, Zone 25 and South Africa, Zone 38, are not presented. Where possible, information on stations using both modes is presented for each zone. The December, 1972 issue of *CQ* has complete rules for the Single Band WAZ Awards. Reprints of the rules and application blanks may be obtained by sending an s.a.s.e. to the DX Editor.

Zone 16: *Phone*—UZ5JF, 3783 kHz (0430)* plus many UA1-6 stations.
C.W.—UA2FAA, 3506 kHz (2228), UC2CS, 3511 kHz (2250), UK6LAZ, 3527 kHz (0125).
Zone 17: *Phone*—UI8ZAA, 3635 kHz, UM8MAF, 3635 kHz.
C.W. — UJ8JAU, 3511 kHz (2120), UL7GW, 3505 kHz and UJ8RAB, 3501 kHz.
Zone 18: *Phone*—No reports.
C.W.—UAØAG, 3510 kHz.
Zone 19: No reports on either mode.
Zone 20: *Phone*—0D5BA, 3790 kHz and 4Z4JT, 3790 kHz.
C.W. — 0D5LX, 3527 kHz (0400) and YO2ASZ, 3534 kHz (0313).
Zone 21: *Phone*—YA1OS, 3791 kHz (0250), EP2TW, 3795 kHz and 4W1AF, 3785 kHz.
C.W.—UD6CN, 3510 kHz (0705) and UF6FAG, 3502 kHz.
Zone 22: *Phone*—VU2BX, 3890-3900 kHz and 4S7AB, 3797 kHz.
C.W. VU2KV, 3692 kHz and 4S7DA, 3504 kHz.
Zone 23: *Phone*—No reports.
C.W.—JTØAE, 3507 kHz (0700).
Zone 24: *Phone*—VS6DO, 3796 kHz (1040) very active, and BV2USA, 3814 kHz (1211).
C.W. CR9AK, 3511 kHz (0329)

*Figures in parentheses are times in GMT.

The WAZ Program

S.S.B. WAZ

1086.....VK5QB	1089.....W6LQC
1087.....W5FL	1090.....G3YBH
1088.....WA7DRP	1091.....M1B

C.W.—Phone WAZ

3542.....W7ULC	3546.....W4KN
3543.....WB2AIO	3547.....JA8JO
3544.....W5ZWX	3548.....SM6EOC
3545.....W3BBO	3549.....OZ7HT

Complete WAZ rules are shown on pages 64-66 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, Florida 33880.

The WPX Program

SSB WPX

739—WB9EBO
740—9H4G
741—JA3FD
742—WA5RTG
743—WB9EAQ
744—KS6DY
745—WB9DVV
746—WA2TNV
747—WA2BAV
748—DL9XW
749—WA2AUB
750—WB2FJX
751—F5DE

CW WPX

1239—WA5JVO
1240—WA5RTG
1241—WAGEQ
1242—W3ARK
1243—W1FLX
1244—JA1TNV
1245—WA5RXT
1246—DM3SBM

Mixed WPX

387—W5ZWX
388—WA5RTG
389—W4GEQ
390—W9KDX
391—WB2AQC
392—WB8AAX
393—SP7ASZ

WPNX

58—WN3SJS

VPX

53—WDX5MS
54—DL-13521

WPX Endorsements

S.S.B.: I8KDB—800, 14ZSO, W4WSF—700, YU1AG—650, W2EHB—550, JA1AG, WA9VGY—500, W6CYO—450, 9H4G—400, DL9XW, WA2BAV, WA5RTG—350.
C.W.: OK2DB—700, W3ARK—650, JA1-AG, I5IZ—600, G5GH—500, W9EVD—450, K9UIY—400, W4GEQ—350.
Mixed: W4CRW—900, W4WSF—850, JA1-AG—750, W2MB—650, WB2HNO, W5QBM, W5ZWX, WA5ZWC, W9EVD, W9-KDX—500, WB2AQC, W4GEQ, W6-KYA, WB8AAX—450.
VPX: SP9-649—700, DL—13521—400.
80 Meters: WA2EAH, DL9XW
20 Meters: DJ4VP, W2EHB, W3ARK
15 Meters: WA2EAH, W3ARK
10 Meters: W3ARK
Africa: G5GH
Asia: WA6JVD, G5GH
Europe: G5GH, W5QBM, DL9XW, W3ARK
North America: W3ARK
South America: I4ZSQ

Complete Rules for WPX, WPNX, and VPX may be found on pg. 67 of the February 1972 issue. Application blanks and reprints of the rules may be obtained by sending a business size, self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, Ca 91722 or to the DX Editor.

Zone 26: *Phone*—No reports.
C.W.—XW8BP, 3506 kHz.
Zone 27: *Phone*—DU1EJ, 3798 kHz (0720).
C.W.—DU1POL, 3560 kHz (2137).
Zone 28: *Phone*—9M2PV, 3805 kHz (1440), YB5AAQ, 3805 kHz (1515), CR8AG, 3812 kHz (0600).
C.W.—No reports.
Zone 29: No reports on either mode.
Zone 33: *Phone*—CN8BF, 3799 kHz (0615) CN8HD, 3791 kHz (0500) and 7XØGM, 3799 kHz.
C.W.—CT3AS, 3510 kHz.
Zone 34: *Phone*—ST2SA, 3790 (0445).
C.W.—No reports.
Zone 35: *Phone*—ZD3D, 3777 kHz (0335 & 0635), 6W8DY, 3791 kHz (0700), very active.
C.W.—9L1GC, 3510 kHz (0140), ELØR, 3507 kHz (2200) and 5T5CJ, 3530 kHz (0700).
Zone 36: *Phone*—9J2TC, 3795 kHz (0415).
C.W.—TR8MC, 3502 kHz (0255).
Zone 37: *Phone*—CR7GJ, 3797 kHz (0415) and 5X5NK, 3793 kHz (0420).
C.W.—5X5NK, 3507 kHz (0400).
Zone 39: *Phone*—No reports.
C.W.—FR7ZL, 3502 kHz (0325) and VQ9R, 3512 kHz.
Zone 40: No reports on either mode.

Your reports of rare zones on 80 meters will be greatly appreciated.

Rare Prefix News

The *CQ* Worldwide WPX Contest in March produced a wide range of unusual prefixes, particularly from Portugal and its provinces where the licensing authorities were unusually cooperative this year. Perhaps our old friend Jim, CT1OF, can give us some background on this. In Portugal proper, the CT7 prefix was used, and CT7SH (QSL via CT1VE) and CT7ZG were particularly active.

Among the Portuguese overseas provinces, CR6LF was very active from Angola using the call CQ6LF, and from Mozanbique, CR7IK and CR7IU were pouring on the coal as XX7IK and XX7IU, respectively.

U.S.S.R. stations were using their 4J and 4L prefixes widely in the contest. 4J9B and 4L3Z were particularly strong.

Some other good WPX catches reportedly recently include EI1AA on 160 meters, GW6GW on 80 meters, HA1ØØKJW, IA5-TEZ, IC8DAG, JR6IU, JX8FG, KA6VI, KZØWPX, OK5BCO, SK2DR, SL3AE, SK7BY, TE2CF, VA3JJ, ZX7AAD, 4A4AA/1, 4M5BPG and 9H5D.

BF—BV: The Peoples Republic of China has indicated a new callsign system for amateur radio licenses. The letter B will be followed by a second letter indicating the Province, followed by 1 digit and the letter A plus second or third letters as necessary. The Province letters will be as follows:

F=Shensi, Honan; G=Nanking; H=Shanghai; I=Klangsu, Chekiang and Anhwei; J=Hankow; K=Hupeh, Hunan and Kiangsi; L=Chungking, Szechwan, Sikang and Tibet; M=Yunnan and Kweichow; N=Kwantung; O=Canton, Kwangsi and Fukien; P=Peiping and Tientsin; Q=Hopeh, Shantung and Shansi; R=Jehol, Chahar and Suiyuan; S=Kansu, Ningsia and Chinghai; T=nine NE provinces; U=Sinkiang and V=Taiwan.

CI1: Special prefix for Prince Edward Island to celebrate 100 years as a province of Canada.

IV5: Special prefix for Radio Centenary of Lido Camalone, Italy.

JR6: JR6IU reported on 21269 kHz at 0956 GMT.

LX9: LX9L was heard on 14265 kHz at 1516 GMT.

SK2. SK2DR on 14217 at 1859 GMT.

VA3: VA3JJ, 14020 kHz at 1940 GMT.

YY4: A special Venezuelan prefix. YY4CVE was YV5CVE.

ZT5: A new prefix for Israel. ZT5EC has been active.

ZX7: ZX7AAD was heard on 21230 kHz at 1315 GMT.

5Y4X: This is a commemorative prefix for the 10th anniversary of the independence of Kenya. 5Y4XKL is 5Y4KL, QSL to Box 30214, Nairobi, and 5Y4XOB is 5Y4OB, QSL to Box 540, Nairobi.

DX In The Novice Bands

From Jim, WN7UMU

ZS6AFC remains very workable between 21110 and 21125 daily. He has a terrific signal for WPNX and WAC chasers. New to the 15 meter Novice band is IT9CKA from Sicily whose signal is 2nd only to IØZQ. Scotland remains an easy catch with Ed, GM-2HCZ, operating around 21107. Two Surinam stations are frequently in the Novice bands. These are PZ1AH and PZ9AB who frequently are heard near 21183. A good snag for any amateur is Joop, PJ2JW, who is often found on 15 meter c.w. East coasters should continue to keep a weather eye out for KG6AAY on Guam, a super QSLer who operates in the vicinity of 21125. Forty meter Novice DXers can pick up a quick country from WN8OPK/KP4.

If anyone needs New Zealand my very good friend and fishing buddy, Bryce, ZL3JC, is on almost daily except when out of town on business. His favorite time is 0000—0130 GMT, but they'll have to beat

JA3AA, Isaji Shima's devotion to 160 is outstanding! Author of a 200 page JA-160 Manual, and a frequent 160 Bulletin, he works much DX with this fine 1 kw station on 1910 kHz. (Photo *via W1BB*)

me to him as we swap fishing lies almost daily.

I am always interested in reports of DX worked by other Novices. Break in when you hear me on the air or drop a line to Jim, WN7UMU, 2120 Wagonwheel, Las Vegas, Nevada 89119.

QSL Information

CN8BO—Via K7VAT
CN8HD—To W4WWD
CQ6LF—c/o W3HNK
CR3AB—Via K3RLY
CR6AI—To W7VRO
CX3RP—c/o W3UN
EA6BG—Via W1BLV
EA6BJ—To DL7FT
EL1E—c/o WBØARO
FM7WN—Via K1KGB
FPØBG—c/o VE1AIH
FPØDX—To VE6AYU
GC3EML—c/o K9KLR
GD5BBG—Via W5MYA
GM5AXO—To WA4AUZ
HI7JM—c/o K3EST
HR1KS—Via WB6QAS
HR2WTA—To WB6QAS
HS4AIA—c/o VS6AKV
JY9VO—Via W7JHO
JTØAE—To OK1AQN
KA1CQ—c/o WA6AHF
KA1DX—Via WA6AHF
KJ6CW—To WB6QAS
KZØWPX—c/o WA8TDY
LU1ZC—Via K4MZU
M1C—To I4FTU
PJ8GQN—c/o W2GHK
PJ9BB—Via W2VIA
PSØWH—To W3DJZ
PTØMI—c/o W3DJZ
TY5ABK—Via W8CNL
VP2MYA—To W5MYA/K5RWK
VP2AAK—c/o K4RHL
VP8JE—Via WA5FWC
VR4AA—To ZL4NH
XF4FFC—c/o XE1FFC
XF4IX—Via XE1IX
XF4J—To XE1J
XW8ET—c/o JAØGRF
XX7IK—Via W7VRO
YB0ABB—To WA5MUN
YJ8FM—c/o W7YBX
YY4CVE—To YV4YC
ZF1RR—Via WA2BCK
ZK2AK—To K3RLY
ZV0WH—c/o W3DJZ
3B6CF—Via JAØCUV
3D2AN—To K6ZIF
3E1IE—c/o W2GHK
4W1BC—Via G5SUW
5X5NK—To DJ3JV
8P6DR—c/o G3JUL
9E3USA—Via W4NJF
9J2LL—To WB2ZXN

73, John, K4IIF

PY1DVG, Rolf Rasp, Ex/swl, now S.A.'s 160 "Prime-Mover", Co-Organizer with EI9J of the annual TransEquatorial 160 Tests, operates this fine set-up, with "Twins", PA, Inverted Vee Transmitting Antenna, and Beverage for receiving. *(Photo via W1BB)*

Propagation

BY GEORGE JACOBS,* W3ASK

TYPICAL summertime DX propagation conditions are expected to continue through August.

A few 10 meter openings should be possible to southern and tropical areas during the afternoon.

More frequent 15 meter openings are expected, with the band peaking during the late afternoon.

Twenty meters should continue to be the best DX band during the month. Good-to-excellent openings are forecast to most areas of the world during much of the daylight and evening hours. Peak conditions will occur shortly after sunrise, local time in the USA, and again during the later afternoon and early evening hours. To many southern and tropical areas 20 meters should remain open through most of the hours of darkness as well.

Some fairly good 40 meter DX openings are forecast for the early evening hours, with conditions improving during the hours of darkness and through the sunrise period.

Despite seasonally high static levels, some fairly good DX openings should also be possible on 80 meters during the hours of darkness. Conditions should peak just as the sun begins to rise on the ' light" side of the path.

It's still too early for 160 meter DX openings, but an occasional one should be possible during the hours of darkness and the gsunrise period.

For short-skip openings less than 250 miles, 80 meters should be optimum both during the day and night. For openings between 250 and 750 miles best bet is 40 meters during the day and 80 at night. For distances beyond 750 miles, 20 meters should be best during the day and 40 meters at night.

Considerable short-skip openings are also forecast for 10 and 15 meters over distances ranging between approximately 500 and 1300 miles, with some openings extending out to about 2000 miles. Most of these openings should take place during the hours of daylight, but some may also be possible during the night.

Since the summer propagation season is expected to end by mid-September, this month's *DX Propagation Charts* cover only a *one month* period, rather than the usual two month span. *Short-skip Charts* for August appear in last month's column.

*11307 Clara Street, Silver Spring, Md. 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For August, 1973

Propagation Index	*Rating & Forecast Quality* (4)	(3)	(2)	(1)
Date *August*				
Above Normal: 18-19, 21-22, 25	A	A	B	C
Normal: 1-2, 6-7, 9, 12-14, 16-17, 20, 23-24, 26-29	B	C	D	E
Below Normal: 3, 5, 8, 10-11, 15, 30	C	D	E	E
Disturbed: 4, 31	D	D	E	E

Where *expected signal quality* is:

A—Excellent opening, exceptionally strong, steady signals.
B—Good opening, moderately strong signals with little fading and noise.
C—Fair opening, signals between moderately strong and weak, with some fading and noise.
D—Poor opening, signals weak 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 particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (4) will be good on August 1 and 2, Fair on August 3 and Poor on August 4, etc.

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

V.H.F. Ionospheric Openings

Some fairly good 6 meter short-skip openings should continue during August, as a result of sporadic-E ionization. These openings normally extend over a range of approximately 750 to 1300 miles, but during periods of especially intense sporadic-E ionization, 6 meter "two hop" openings may take place up to distances of approximately 2500 miles. Occasional 2 meter short-skip openings may also be possible over a range of about 1200 to 1400 miles.

One of the year's most prolonged and intensive meteor showers, the *Perseids*, is expected from August 10th through the 14th. Maximum intensity should occur, with an average of fifty meteors an hour, at 5 A.M.,

EST on August 12th. Ionization produced as these meteors enter the earth's atmosphere should be sufficient to make possible numerous meteor-scatter type openings on the 6 and 2 meter bands. The range of these openings could be up to several hundred miles.

A seasonal improvement in conditions for trans-equatorial (TE) openings should be noticeable by late August. Occasional openings towards South America should be possible on 6 meters between 8 and 11 P.M., *local standard time.*

There's a possibility for some auroral-scatter propagation on the v.h.f. bands during August when the ionosphere is below normal or disturbed for h.f. propagation. These openings can range from a few hundred up to about a thousand miles. Check the "Last Minute Forecast" appearing at the beginning of this column for the days that are expected to be in these categories during the month.

Sunspot Cycle

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 58 for April, 1973. This results in a 12-month smoothed sunspot number of 60, centered on October, 1972.

A smoothed sunspot number of 40 is forecast for August, 1973, as the sunspot cycle continues to decline.

For more up-to-date propagation data, call DIAL-A-PROP at Area Code 516-883-6223. For hard copy weekly forecasts subscribe to MAIL-A-PROP. For a sample forecast send an sase (airmail if more than 300 miles away) to MAIL-A-PROP, P.O. Box 86, Northport, N.Y. 11768.

73, George, W3ASK

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 call 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 (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates 80 Meter openings. Openings on 160 meters are likely to occur during those times when 80 meter openings are shown with a *propagation index* of (2), or higher.

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) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this 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. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, *add* to the times shown in the appropriate Chart 8 hours in the PST Zone, 7 in the MST Zone, 6 in the CST Zone and 5 in the EST Zone. For example, 14 in Washington, D.C. is 19 GMT and 20 in Los Angeles is 04 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.

August 15—September 15, 1973

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	12-14 (1)	08-12 (1) 12-15 (2) 15-17 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 12-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1)	18-20 (1) 20-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-02 (1)*
Northern Europe & European USSR	*Nil*	09-14 (1)	05-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1) 21-00 (1)	19-21 (1) 21-23 (2) 23-02 (1) 21-01 (1)*
Eastern Mediterranean & Middle East	*Nil*	09-12 (1) 12-15 (2) 15-17 (1)	05-06 (1) 06-08 (2) 08-13 (1) 13-16 (2) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-02 (1)	18-20 (1) 20-22 (2) 22-23 (1) 21-23 (1)*
West & Central Africa	12-13 (1) 13-15 (2) 15-16 (1)	07-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1) 00-03 (2) 03-06 (1)	19-22 (1) 22-01 (2) 01-03 (1) 00-02 (1)*
East Africa	*Nil*	09-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	20-00 (1)

*Predicted times of 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a forecast rating of (2), or higher.

South Africa	11-13 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (2) 15-17 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-23 (1) 23-01 (2) 01-02 (1)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
Central & South Asia	*Nil*	08-10 (1) 19-21 (1)	06-07 (1) 07 09 (2) 09-10 (1) 19-22 (1)	04-06 (1) 18-20 (1)
South-east Asia	*Nil*	09-11 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-10 (1) 18-22 (1)	*Nil*
Far East	*Nil*	08-10 (1) 17-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	05-07 (1)
South Pacific & New Zealand	15-18 (1)	08-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	11-19 (1) 19-21 (2) 21-00 (3) 00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 03-07 (1)*
Austral-asia	17-19 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-21 (1)	05-07 (2) 07-09 (3) 09-10 (2) 10-15 (1) 15-17 (2) 17-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Northern & Central South America	12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-14 (2) 14-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-06 (1)	19-20 (1) 20-21 (2) 21-03 (3) 03-05 (2) 05-07 (1) 21-01 (1)* 01-03 (2)* 03-06 (1)*
Brazil, Argentina, Chile & Uruguay	12-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-00 (3) 00-03 (2) 03-06 (1) 06-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-06 (1) 03-05 (1)*
McMurdo Sound, Ant-arctica	*Nil*	13-15 (1) 15-17 (2) 17-18 (1)	17-18 (1) 18-19 (2) 19-21 (3) 21-00 (2) 00-02 (1) 06-08 (1)	00-04 (1)

August 15—September 15, 1973

Time Zones: CST & MST (24-Hour Time)

CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	08-10 (1) 10-14 (2) 14-16 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-16 (3) 16-19 (2) 19-21 (1)	19-22 (1) 22-00 (2) 00-03 (1) 21-01 (1)*
Northern Europe & European USSR	*Nil*	10-14 (1)	05-06 (1) 06-08 (2) 08-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1) 21-23 (1)	19-01 (1) 21-00 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	09-10 (1) 10-12 (2) 12-14 (1)	06-13 (1) 13-18 (2) 18-20 (1) 20-22 (2) 22-23 (1)	19-22 (1) 20-22 (1)*
West & Central Africa	10-13 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	12-14 (1) 14-16 (2) 16-19 (3) 19-21 (2) 21-00 (1) 05-07 (1)	19-23 (1) 23-00 (2) 00-01 (1 22-00 (1)*
East Africa	*Nil*	10-12 (1) 12-15 (2) 15-17 (1)	12-16 (1) 16-20 (2) 20-23 (1) 05-07 (1)	20-23 (1)
South Africa	10-12 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	05-08 (1) 12-14 (1) 14-17 (2) 17-19 (1) 21-23 (1) 23-01 (2) 01-02 (1)	19-20 (1) 20-22 (2) 22-23 (1) 21-23 (1)*
Central & South Asia	*Nil*	07-11 (1) 18-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-18 (1) 18-20 (2) 20-21 (1)	05-07 (1) 18-20 (1)
Southeast Asia	*Nil*	08-11 (1) 17-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-00 (1)	05-07 (1)
Far East	*Nil*	08-10 (1) 14-15 (1) 15-18 (2) 18-20 (1)	18-20 (1) 20-22 (2) 22-01 (1) 06-07 (1) 07-09 (3) 09-10 (2) 10-12 (1)	02-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
South Pacific & New Zealand	15-18 (1)	08-12 (1) 12-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	06-07 (2) 07-09 (3) 09-12 (2) 12-18 (1) 18-21 (2) 21-01 (3) 01-04 (2) 04-06 (1)	23-00 (1) 00-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 01-03 (1)* 03-05 (2)* 05-06 (1)*
Austral-asia	16-19 (1)	08-10 (1) 13-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-22 (2) 22-00 (3) 00-04 (2)	01-03 (1) 03-06 (2) 06-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	11-14 (1) 14-16 (2) 16-18 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-20 (4) 20-22 (3) 22-01 (2) 01 05 (1) 05-06 (2)	18-20 (1) 20-22 (2) 22-02 (3) 02-05 (2) 05-06 (1) 20-23 (1)* 23-02 (2)* 02-05 (1)*
Brazil, Argentina, Chile & Uruguay	12-14 (1) 14-16 (2) 16-17 (1)	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	11-15 (1) 15-16 (2) 16-17 (3) 17-19 (4) 19-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-02 (2) 02-05 (1) 01-04 (1)*

1972 WWDX C.W. SCORES NEXT MONTH

McMurdo Sound, Antarctica	*Nil*	12-14 (1) 14-16 (2) 16-19 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 07-09 (1)	00-05 (1)

August 15—September 15, 1973

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	*Nil*	09-10 (1) 10-12 (2) 12-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-13 (2) 13-16 (3) 16-17 (2) 17-19 (1) 22-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 21-22 (1)*
Central & Northern Europe & European USSR	*Nil*	09-12 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-15 (2) 15-16 (1) 21-23 (1)	18-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	08-11 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 19-21 (1)	19-21 (1)
Western & Central Africa	12-15 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-15 (2) 15-17 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-22 (1) 05-06 (1) 06-08 (2) 08-09 (1)	22-00 (1)
East Africa	*Nil*	08-12 (1) 12-14 (2) 14-15 (1)	12-15 (1) 15-18 (2) 18-21 (1)	19-21 (1)
South Africa	09-12 (1)	07-09 (1) 09-11 (2) 11-12 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-18 (1) 20-21 (1) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	*Nil*	08-10 (1) 16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	05-07 (1)
Southeast Asia	*Nil*	08-10 (1) 13-15 (1) 15-18 (2) 18-19 (1)	18-20 (1) 20-23 (2) 23-00 (1) 04-07 (1) 07-10 (2) 10-12 (1)	02-06 (1)
Far East	*Nil*	13-15 (1) 15-18 (2) 18-20 (1)	060-7 (1) 07-09 (3) 09-11 (2) 11-13 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	01-02 (1) 02-07 (2) 07-08 (1) 02-06 (1)*
South Pacific & New Zealand	15-18 (1)	09-12 (1) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	03-06 (1) 06-07 (2) 07-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-22 (4) 22-01 (3) 01-03 (2)	21-22 (1) 22-23 (1) 23-05 (3) 05-06 (2) 06-07 (1) 22-01 (1)* 01-04 (2)* 04-06 (1)*

[*continued on page 78*]

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Aug. 4-5	Romanian Contest
Aug. 4-5	Illinois QSO Party
Aug. 11-12	WAEDC C.W. Contest
Aug. 11-12	Western Electric QSO Party
Aug. 11-12	Space Cadets QSO Party
Aug. 18-19	SARTG RTTY Contest
Aug. 18-19	New Jersey QSO Party
Aug. 18-19	Trinidad & Tobago Party
Aug. 18-19	QRP ARC Contest
Aug. 25-26	All Asian C.W. Contest
Sept. 8-9	WAEDC Phone Contest
Sept. 8-10	Four Land QSO Party
Sept. 15-16	Scandinavian C.W. Contest
Sept. 15-16	Space Net VHF Contest
Sept. 15-17	Wash. State QSO Party
Sept. 15-17	Pennsylvania QSO Party
Sept. 19-21	YLRL "Howdy Days"
Sept. 22-23	Scandinavian Phone Contest
Sept. 29-30	Delta QSO Party
Oct. 6-7	VK/ZL/Oceania Phone Contest
Oct. 13-14	VK/ZL/Oceania C.W. Contest
Oct. 13-14	RSGB 21/28 mHz Phone
Oct. 17-18	YLRL Anniv. C.W. Party
Oct. 20-21	RSGB 7 mHz C.W. Contest
Oct. 27-28	**CQ WW DX Phone Contest**
Nov. 1-2	YLRL Anniv. Phone Party
Nov. 2-5	IARS CHC/FHC/HTH Party
Nov. 3-4	RSGB 7 mHz Phone Contest
Nov. 11	Czechoslovakian Contest
Nov. 10-11	ARRL Phone Sweepstakes
Nov. 17-18	ARRL C.W. Sweepstakes
Nov. 24-25	**CQ WW DX C.W. Contest**

WAEDC DX Contest

C.W.—Aug. 11-12 Phone—Sept. 8-9
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

It's advisable you read the complete instructions given in last month's CALENDAR, especially the part about the QTC feature.

Log forms are available from W1WY. A large s.a.s.e. with sufficient postage please.

Mailing deadline for your entries is Sept. 15th for C.W. and Oct. 15th for Phone. To the DARC WAE Contest Committee, D-895 Kaufbeuren, P.O. Box 262, West Germany.

Romanian Contest

Starts: 1800 GMT Saturday, August 4
Ends: 1800 GMT Sunday, August 5

Object of contest is to work as many YO stations in as many YO countries as possible. However you are also permitted to work other European countries as well.

The same station may be worked on each band and mode, 3.5 thru 28 mHz.

Categories: Both single and multi-operator, single and all band for both divisions.

Exchange: RS(T) plus a progressive QSO number starting with 001. In addition, YO stations will include 2 letters indicating their county.

Points: Each European QSO counts 2 points, 10 points if it's with a YO station.

Multiplier: Each European country and each YO county worked on each band and mode.

Final Score: The sum of QSO points times the total multiplier from each band.

Logs: Use a separate sheet for each band or mode and fill in multiplier column only first time a new country or county is worked. A summary sheet showing the scoring, equipment description, and a signed declaration and your name and address in BLOCK LETTERS is also requested.

Awards: Certificates to the top scorers in each country and each classification. And a Crystal Cup to the over-all champion.

Mailing deadline is Sept. 1st to: Romanian Amateur Radio Federation, P.O. Box 1395, Bucuresti 5, Romania.

Scandinavian Contest

C.W.—Sept. 15-16 Phone—Sept. 22-23
Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

This is the contest in which the activity is concentrated in working the Scandinavian countries on all bands. Full details will be given next month. Rules are the same as in previous years.

This year however logs go to' The NRRL Contest Committee, P.O. Box 21, Refstad, Oslo 5, Norway.

*14 Sherwood Road, Stamford, Conn. 06905.

1972 WWDX PHONE SCORES on p. 50

Western Electric QSO Party

1800-2300 GMT Saturday, August 11
1800-2300 GMT Sunday, August 12

This activity is for the employees and retirees of Western Electric, Bell Tel. and Teletype Corp. systems. With a membership of over 2000 hams, we feel justified in making this announcement, even though QSO exchange is limited to above groups.

The VHF and RTTY section is scheduled for the above period. The C.W. and Phone section will be held on the week-end of October 6-7.

VHF will be on all bands, 6 meters and up. RTTY on 3605, 7140, 14085, 21095, 28095.

Exchange will be QSO no., (starting with 001) name and location symbol.

The Traveling Works Trophy will be sent to the location having the highest works location score. There are also awards for individuals in the different categories.

It is suggested you write your local coordinator or K4JO for more details and list of location codes.

He can be reached as follows: E. Valentine, Dept. 7272, Host Coordinator, CQ-WE 73, c/o Western Electric Co., 2400 Reynolda Road, Winston-Salem, N.C. 27106

Space Cadet QSO Party

Starts: 0001 GMT Saturday, August 11
Ends: 2359 GMT Sunday, August 12

The Space Cadets of America, a relatively new and small organization, trying to find a place in the sun, organized this party to stir up some interest in the US and Canada.

Operation will be on all bands, both phone and c.w. Contacts with the same station on different bands permitted for QSO credit.

Exchange: QSO no., RS(T) and ARRL section. SCA members will also include their number.

Scoring: QSO's times number of SCA members worked for non-members. SCA members will total number of stations worked for their score.

No frequencies were given. This being a small group it would have been advisable to set spot frequencies for operation. (The Space Cadet Net is on 7295 at 2100Z daily)

Awards: To the top five non-member scores.

Mailing deadline is Sept. 1st to: WB9-BBC, 1109 Sherman Ave., Janesville, Wis.

S.A.R.T.G. RTTY Contest

Three Periods (GMT)
0000-0800 and 1600-2400 Sat., Aug. 18
0800-1600 Sunday, August 19

This is the 3rd contest sponsored by the Scandinavian Amateur Radio Teleprinter Group.

Use all bands, 3.5 thru 28 mHz. The same station may be worked once on each band for QSO and multiplier credit.

Classifications: Single operator, (a) less than 100 watts input, (b) over 100 watts input. Multi-operator, (c) single transmitter. And s.w.l.'s.

Exchange: QSO no., and signal report.

Points: QSO's with own country, 5 points. With other countries on same continent, 10 points. And with other continents, 15 points.

Multiplier: Each country and each W/K and VE/VO call area. (DXCC and WAE country list)

Final Score: Sum of QSO points frim all bands times the multiplier from each band.

Awards: Certificates to the top station in each class in each country and W/K and VE/VO call areas. Additional awards if warranted.

Points and position achieved in this contest may be included for the 1973 World RTTY Championship.

Contest contacts may be applied for the RTTY WAC Award and the Scandinavia RTTY Award. Include 2 IRC's for mailing of the WAC. A fee of $1.00 or 10 IRC's is requested for the WSRY. (working 8 different Scandinavian stations.

Applications and contest logs go to: SARTG Contest Manager, BO V. Ohlsson, SM4CMG, Box 1258, S-710 41, Fellingsbro, Sweden.

New Jersey QSO Party

1900-0600 GMT Sat./Sun., Aug. 18/19
1200-2300 GMT Sunday, August 19

This is the 14th party sponsored by the Englewood ARA. Phone and c.w. are considered separate bands. The same station may be worked on each band and mode and N.J. may work in-state stations for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for N.J., ARRL section or country for others.

Scoring: US and VE contacts count 1

1972 WWDX C.W. SCORES NEXT MONTH

SAC 1972 Contest Results

Phone

W4JUK	8
W6DGH	245
W6DQX	18
K9ECE	240
WØBMM	182

C.W.

K1CPF	1296
WB2VYA	3570
K2BQO	810
WB2HGV	145
W3YHR	768
W4WSF	1668
WB4RUA	288
VE6BU/W5	10
W6DQX	140
W6DGH	32
W8MBB	189
K9ECE	2055
W9ITD	320
VE3GCO	756
VE2AFC	176
VE6AYU	18

point, DX 3 points. N.J. multiply total QSO points by ARRL sections worked. (max. of 74) KP4, KH6, KL7 and KZ5 count both as a 3 point QSO and as a section multiplier.

Out-of-state stations multiply number of N.J. QSO's by N.J. counties worked. (max. of 21)

Frequencies: 1810, 3535, 3735, 3905, 7035, 7135, 7265, 14035, 14280, 21100, 21355, 28100, 28500 and 50-50.5, 144-146. (Phone on even hours)

Awards: Certificates to the top scorers in each N.J. county, ARRL section and DX country. Novices and Technicians will also be awarded.

Indicate each multiplier the first time worked. A summary sheet and check list of QSO's made is also requested.

Stations planning activity in New Jersey are requested to advise EARA by Aug. 5th so that coverage of all counties may be planned.

Logs must be received no later than Sept. 15th by the Englewood ARA, 303 Tenafly Road, Englewood, N.J. 07631. Include a large s.a.s.e. if results are desired.

Trinidad & Tobago QSO Party

Starts: 0000 GMT Saturday, August 18
Ends: 2400 GMT Sunday, August 19

This QSO Party has been organized by the Trinidad & Tobago A.R.S. to commemorate the 11th Anniversary of the Independence of Trinidad & Tobago.

Operation is on phone only, 10 thru 80.

Exchange: Usual five figures, signal report plus 3 digit QSO number starting with 001.

There is no scoring system but certificates will be awarded as follows: To each DX station working 5 or more 9Y4's. Contacts with the same station may be made on different bands for credit. (Cross band operation not permitted)

DX stations working 9Y4's on five bands will receive a separate certificate and QSL cards for the contacts made.

Log only is required for the first award, log and cards for the five band.

A remittance of $1.00 or IRC equivalent is requested if you are eligible for an award.

Mailing deadline is October 15th to: S.T.A.R.C., P.O. Box 131, San Fernando, Trinidad, West Indies.

QRP ARC International

Starts: 2000 GMT Saturday, August 18
Ends: 2400 GMT Sunday, August 19

This is the annual contest for the QRP ARC International and open to all amateurs.

Exchange: RS(T), state, province or country, JRP number and power input. Non-members use "NM" instead of QRP number.

Scoring: Each QRP member worked counts 3 points, non-member QSO's 2 points. The multiplier is determined by the states, provinces and countries worked on each band. (The same station may be worked on each band for QSO and multiplier credit.

There is also a power multiplier as follows: Over 100 watts input, no multiplier. 25 to 100 × 1.5; 5 to 25 × 2; 1 to 5 × 3; and less than 1 watt × 4. (p.e.p. double)

Final score: QSO points × multiplier × power multiplier.

Frequencies: C.W.—3540, 7040, 14065, 21040, 28040. s.s.b.—3980 7280, 14330, 21430, 28600.

Awards: Certificates to the highest scoring station in each state, province and country. Also 2nd and 3rd place where activity warrants. The lowest power station with at least 3 skip QSO's will also be awarded.

A summary sheet with equipment description and a signed declaration is also requested.

Mailing deadline is Sept. 25th to: Jim Hadlock, K7JRE, QRP ARC Contest Chairman, 3701 S.W. Morgan St., Seattle, Wash. 98126

All Asian DX C.W. Contest

Starts: 1000 GMT Saturday, August 25
Ends: 1600 GMT Sunday, August 26

This is the 14th contest sponsored by the JARL. The exchange is between Asians and the rest of the world, all bands 1.8 thru 28 mHz.

Classifications: Single operator, single and all band. Multi-operator, single transmitter,

all band only. (Multi transmitter operation not permitted.)

Exchange: For OM's, five figures, RST plus your age. For YL's, RST plus OO.

Scoring: One point per QSO. Asians use non-Asian countries for their multiplier. (ARRL DXCC list) Non-Asians will use prefix of Asian countries as their multiplier. (*CQ* WPX list) Note: Ogasawara Is. (Bonin & Volcano) are in Asia. Minamiterishima (Marcus) is considered in Oceania.

Final Score: For Asians, sum of contacts on each band multiplied by the Country multiplier from each band. For non-Asians, sum of contacts on each band multiplied by the Asian Country Prefixes worked on each band.

Awards: Highest scoring stations as follows: Single operator, all band. Certificate and plaque with medal in each continent. And 1st, 2nd and 3rd place certificates in each country. And 1st place certificate in each USA call area.

Single operator, single band. Certificate and medal in each continent. And 1st place certificate on each band in each country.

Multi-operator. Certificate and plaque with medal in each continent. And 1st place certificate in each country.

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

Disqualification: Violation of the regulations in the country of the contestant, or the rules of the contest, or unsportsmanship conduct, or taking credit for incorrect QSO's or multipliers, or duplicate contacts in excess of 2% of the total made, will be deemed cause for disqualification.

Things to remember: Non-Asian stations use country prefixes for their multiplier. Multi-operator stations are restricted to single transmitter operation. Contacts on different bands in the same time period are prohibited. (Club stations are considered multi-operator.) Each operator of a multi station gives his age in the exchange. KA contacts do not count.

Logs must be *received* no later than Nov. 30th and go to: J.A.R.L. Contest Committee, Central Post Office, Box 377, Tokyo, Japan. Include one IRC and s.a.e. for results.

Four Land QSO Party

Starts: 1800 GMT Saturday, September 8
Ends: 0200 GMT Monday, September 10

This is the 4th annual *QSO Party* sponsored by the 4th Call District A.R.A. if the I.A.R.S. to make the many counties in the eight 4th call area states available for the county hunters.

The same station may be worked on each band and mode, fixed and again if operating portable or mobile, and from each different county. Fourth call area stations may work their 4th district stations for QSO and multiplier credit.

Exchange: QSO no., RS(T), and QTH. County and state for 4th district; state, province or country for all others.

Scoring: *For 4th Call Area:* One point for W/VE contacts, 3 points all others. Final score, total QSO points × states × countries worked. *All Others:* Two points for each QSO. Final score, QSO points × 4th district states × 4th district counties. (Counties, states and countries are counted once only.)

Frequencies: C.W.—3575, 7060, 14075, 21090, 28090. Phone—3940, 7260, 14343, 21360, 28600. Novice—3700, 7100, 21100, 28100 and up.

Awards: Certificates to top scorers in each state, province and country, 2nd and 3rd place awards when warranted. Also county awards to 4th call area states and special awards to Novices, s.w.1.'s and B/H. (Blind and Handicapped) There are also four High Honor Trophy Awards to the top scorers in Four Land, outside W/K's, VE's and DX country.

Mail logs within 30 days of end of party to: Fourth Call District A.R.A., Att: Bob Knapp, W40MW, R#7, Box 187, Greenville, N.C. 27834

We're much too involved getting out the contest results for any chit-chat this month. If you check page 50 you will see what I mean.

73 for now, Frank W1WY

THE dwards PROGRAM

BY ED HOPPER,* W2GT

Special Honor Roll
All Counties

#102—William E. Helton, WA4LSU, 4-23-73.
#103—Dwain Schunke, WB6RMZ, 4-25-73.
#104—Claude S. Cain, K9HRC, 5-10-73.

USA-CA HONOR ROLL

3000	2000	1000
WA4LSU .124	W4WSF ..181	WA4LSU .300
K9HRC ...125	WA4LSU .182	W3ARK ..301
2500	K7CUY ..183	WA4VAP .302
WA4LSU .155	K2LFG ...184	K9HRC ...303
VE4QZ ...156	K9HRC ...185	500
K9HRC ...157	1500	WA2DFC .942
	WA4LSU .222	DL2HI ...943
	W3ARK ..223	W3ARK ..944
	K9HRC ...224	K9HRC ...945

THE "Story of The Month" as told by Cliff is:

Clifford A. Taylor, WB4FBS
(All Counties #87, 11-16-72)

Born in Hazard, Perry County, Kentucky on October 29, 1935, Cliff moved with his family to Scioto County, Ohio in 1941. Back to Hazard after World War II, and in 1949 to Leslie County, Kentucky which is now his "home-of-record" QTH.

Cliff finished grade school in a one-room schoolhouse in 1950 and graduated from Leslie County High School in 1954. He joined the U.S. Army in June 1954 and except for one break of 19 months, has so remained.

The amateur radio bug bit him in 1966 while stationed in Kassel, Germany—yes a fellow worker who was a ham, got him started. A Conditional license was earned in 1967 after a few months of studying theory and driving his XYL out of her mind while he was practicing sending and receiving code. He put his first station, a DX-60, HR-10, and HG-10, on the air in March 1967 under the call DL4BO. S.s.b. in the form of an SB-101 soon followed in December of that year.

While still in Germany, Cliff happened across the 20 meter ICHN and after listening in on many occasions, he decided to ship his rig to his home QTH so that he could put out Leslie County for the County Hunters while he was on leave. This got him started and after he got everything set up at his new duty station in San Angelo, Texas, he was on in earnest. From here, WA5ZUV was heard quite frequently as NCS. His Texas operation started in July 1969 and 2 months later he teamed with Roy, WA5OCG for his first mobile trip.

In November the SB-101 was installed in his car, a Ham-Cat on the back and he was off mobiling himself. Many weekends found Cliff with his family and a picnic basket out on the roads of Texas. At last count, more than 260 counties in 12 states have been run.

In October 1970, his County Hunting was

*P.O. Box 73, Rochelle Park, N.J. 07662

Cliff, WB4FBS near Princess Ann, Somerset County, MD. May 1972.

interrupted by a tour of duty in Vietnam. But he was back at it upon returning stateside in October of 1971 and on November 4, 1972 the search for #3077 was ended when Clint, K5JBC gave him the last one, St. Helena Parish, La.

Cliff would like to thank everyone that helped him so much, especially the mobileers that venture out into the crowded highways in all kinds of weather and conditions to make it all possible. He considers the County Hunters to be the "salt of the earth" and if you don't believe him, he says to just meet them on the air and eyeball-to-eyeball and you'll find out for yourself .

Cliff has another "county" award of which he is very proud. This one is the Deutschland Diploma Bronze Pin that he earned while in Germany for working 400 DOK's, or "counties". The Award is sponsored by the DARC, the German equivalent of our ARRL.

Cliff presently resides at 7912-B Cayer, Fort Meade, Maryland 20755 with XYL Faye and their 4 harmonics. His equipment now includes SB-101 (barefoot) and a W3-DZZ multiband dipole antenna. (Also foto of Cliff page 63, *CQ* of May 1972.

Awards Issued

Again that magic number *three* for All Counties.

Bill Helton, WA4LSU, the only one to start with USA-CA-500-3-2-64 as a Novice, again got busy and made it to the Top and in the process made it All S.S.B. up to and including USA-CA-2500.

Dwain Schunke, WB6RMZ grabbed the few he needed and got All Counties Mixed but brought all other endorsements to All 14 S.S.B. Mobiles.

Claude S. Cain, K9HRC waited until he had them *all* before sending in the application—500 through 3000 endorsed All 14 Phone. As most of you know, his XYL, Hazel, K9QGR is also a County Hunter and has USA-CA-500-#51 dated 1-8-62 and is not very far from getting them *all* for herself. Claude was fortunate to get them *all* before he had to go for eye surgery, many thanks to all who put forward such supreme efforts to make it possible. We all hope the surgery will be as successful. He and Hazel will be at 3811 E, University Dr., Mesa, Arizona 85205 until next summer.

Doug Bowles, VE4QZ added USA-CA-2500 to his collection.

JAWS Award.

John Kanode, W4WSF (ex-K5UYF) was issued USA-CA-2000. His new QTH is RFD 1, Box 73-A, Boyce, VA. 22620.

Ray McGrath, K7CUY won USA-CA-2000, All Phone.

Manuel Greco, K2LFG also keeps plugging and got USA-CA-2000.

Jack Kupp, Jr., W3ARK qualified for USA-CA-500, 1000, and 1500, All A-1. It's a small world, Jack's son lives near me in Saddle Brook and teaches school in Bergenfield, N.J.

Mr. Lynn Craig Benjamin, WA4VAP made it USA-CA-1000, Mixed.

Fred Lampert, WA2DFC applied for USA-CA-500.

Dr. Sigurd Meng, DL2HI was issued USA-CA-500-All A-1.

Awards

Jessamine Amateur Wireless Society Award: This *JAWS* Award issued FREE for working 3 members of the JAWS of Nicholasville, Jessamine County, Kentucky. Send *your* QSLs for the 3 contacts to: John C. Criner, Jr., WB4WBP, 101 E. Main Street, Wilmore Kentucky 40390. YES, John is a County Hunter.

Abegweit Award: Sponsored by the Ama-

ABEGWEIT Award.

Jumping-Off Place Award.

teur Radio League of Prince Edward Island is available to amateur radio stations and short wave receiving stations who have worked or heard Prince Edward Island Amateur Stations. VE1 or VO1 Stations need: 1 Prince Edward Island contact in each of three P.E.I. Counties — Prince, Queens and King. Remainder of Canada and all U.S.A. stations need: 3 P.E.I. contacts. All other stations need: 2 P.E.I. contacts. All contacts from January 1, 1960 will be eligible for the award. QSL cards must be in the possession of applicant. Send log data certified by two other amateurs or submit the QSL cards. Cost is One dollar or 10 IRCs. Send application and fee to: Amateur Radio League of Prince Edward Island, Inc., P.O. Box 1232, Charlottetown, Prince Edward Island, Canada. To celebrate their Centennial, all amateurs in the Province of Prince Edward Island are authorized to use the prefix CI in lieu of VE during 1973.

Jumping Off Place Award: Honoring Independence, Mo., "Queen City of the Trails", starting place for the Santa Fe and Oregon Trails in the 1840s, 50s and 60s. Five points are needed for this Free Award. QSOs with WBØAEW, WØQWS and WNØGYR (who recently passed his Advanced) count 2 points each. QSOs with other Independence, Mo. stations count one point each. There is date, time or mode limitations. QSLs aren't needed, just send log information to: Jerry Dowell, WNØGYR, 14412 37th Street, Independence, Mo. 64055.

International Peace Garden Award: The yearly International Hamfest, which is dedicated to friendly cooperation between Canadian and American amateurs, was held July 7 & 8 at the American Lodge in the International Peace Garden between Dunseith, N.D. and Boissevain, Manitoba. This Award is available to amateurs and s.w.l.s and has no time limit. Applicants from Canada (VE) and Continental U.S. (W/K) must acquire 100 points, *all* others must accumulate 50 points for the basic award. A contact with a club station operating out of the Peace Garden is worth 10 points. Contact with a founder of the Int. Hamfest is worth 5 points (Founders: WAØHUD, WAØCHR, VE4BE & WAØIOB). Contact with a current member of the organizational committee is worth 2 points. Contact with any station operating out of the Int. Peace Garden is worth 5 points. Contact with any mobile, portable or fixed station in North Dakota or Manitoba is worth 1 point. Contacts may be on any band or mode, and cross-mode contacts are valid. Amateur radio operator applicants must submit a copy of their log data with call sign, signal reports, name and location. Short wave listeners must submit QSL cards, which will be returned.

Half of the accumulated points must be from contacts with Manitoba stations and the other half with North Dakota stations.

Send application and $1.00 to: Milo A. Shelton, WØFNZ, Box 31, Carbury, N.D. 58724.

Editors Notes

Obviously I gave an OK too soon in my May column for improved service for the "Admiral of the Great Lakes" Award. I did get a letter of apology and explanations, but even subsequent letters to *WA8HHD* have *NOT* produced any Award to the original complaint of the amateur who applied for the Award in October 1972, so cross that one out of your file!

Steve Cope, K5KDG would like the following added to his "Story" which appeared last month. His job at Mt. Home, Ark. is Purchasing Agent with the Army Corps of Engineers and prior to that he was in the Air Force for 10 years. Most important— the family includes XYL, Willa; son Steven eleven; and daughter Stephanie, age 3. He has been lucky enough to make it to all the Conventions starting with Mountain Home in 1969 and *they* look forward to them each year. Steve became a radio operator in the Air Force in 1952 and got his first amateur license while stationed in Iceland in 1957 and operated as TF2WBZ. He got a

big thrill when he gave Jim, W8UOQ his last U.S. County—W. Carroll, La. in March.

From unknown source in Dayton, Ohio, information was given to Dick Ross, K2-MGA, that Joyce, WN8NWT is the only ham in Calhoun County, West Virginia and we believe she is active on 40 & 80.

Courtesy of Arnie, K9DCJ came this data that a new County Hunter Net has been started on 7291 starting at 0000 GMT. Active Net Controls have been Dean, WAØ-TKJ; Steve, WA6PGB; and WBØFGV. This sounds good due to the poor conditions that have prevailed on 14337 lately.

I must plug my own State, so see details in CONTEST CALENDAR by Frank Anzalone, W1WY for details of the 14th New Jersey QSO Party, August 18-19.

Owners of Yaesu amateur equipment (and others) who might be interested in joining the Fox-Tango Club and receive the monthly *Newsletter* should send an s.a.s.e. to Milton Lowens, WA2A00, 3977-F Sedgwick Ave., Bronx, N.Y. 10463 for full details. You will find many valuable suggestions regarding such equipment.

To clear up the question that has been asked by some oversea County Hunters. In Alaska the First Judicial Division (County) is also known as SOUTHEASTERN. The Second Judicial Division is NORTHWESTERN; the Third Judicial Division is SOUTH-CENTRAL; and the Fourth Judicial Division is CENTRAL.

Just received a copy of the 50 page booklet about County Hunting that was compiled by George, WB6IFA/VE6 which will sell for about $1.50 and handled by Jim Hoffman, K1ZFQ. I mentioned this in June *CQ* and it is full of important information and operating hints, etc....for County Hunters. You know that Jim, KIZFQ publishes a monthly *C.W.-County Hunters Newsletter.*

Sad to report the tragedy that befell Frank, WB2CUI—hit by a car on Feb. 7, 1973 while he was walking on the sidewalk and he did receive a serious brain injury. Kindly send get well expressions to Frank J. Suckanek, 55 Wantagh Ave. S., East Islip, N.Y. 11730. Such messages will also help XYL, Jeanne realize that others care!

How was your month? 73, Ed., W2GT.

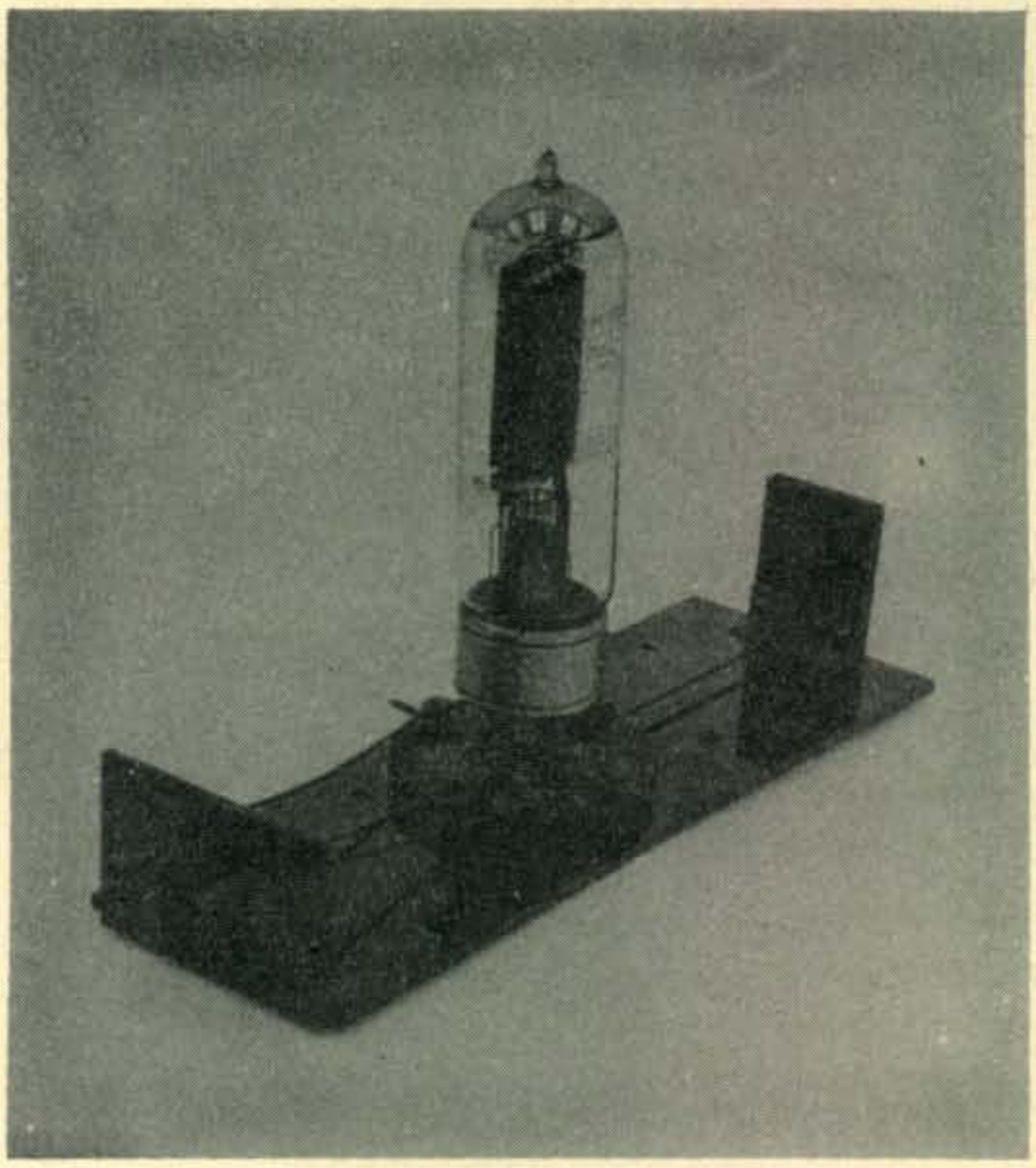
Whatzis Quiz for Old Timers

BY WILLIAM I. ORR, W6SAI

HERE'S a photograph of a beautiful Whatzis. Look closely and see if you can determine what this old-time radio gadget really is.

It looks something like a long lines oscillator, doesn't it? And observe the beautiful low-loss socket. Somebody had a great idea, and W6SAI wonders if *CQ* readers can tell him what this device was used for, and identify the tube shown in the socket of this wonderful machine.

If you think you can describe the object, write Bill Orr, W6SAI, EIMAC division of Varian, 301 Industrial Way, San Carlos, CA 94070. The first three correct descriptions of this Whatzis received by W6SAI will win an autographed copy of one of Bill's famous antenna handbooks. The answer to this Whatzis Quiz and names of the winners will be published in a future issue of *CQ*.



SURPLUS sidelights

BY GORDON ELIOT WHITE*

THINGS are happening in surplus; the system has churned like a cauldron for months, and late in the Spring began to spew forth more and more material after a federal freeze which distressed a lot of the larger dealers. As I reported last winter, "demilitarization" orders held up disposal of vast quantities of electronics and other items, but the lid was off by April, and the stores should be full by the time this column is printed.

Things were bad for a while. So meager was the surplus supply that the Institute of Surplus Dealers cancelled its Miami Beach trade show for the first time in 33 years.

On the way to the Dayton Hamfest I checked around a bit in the northeast and midwest, and found that things were better, that Uncle Sam was pushing out the goodies in the old style, and that even a better grade of surplus electronics may be expected in coming months.

No real post-war boom is likely because of Viet Nam. The phasedown from southeast Asia has already happened, and it was nothing like 1945-46, as old timers will recall. There are new developments coming though.

Right now, anyone who bids on government lots is aware that the new Defense Property Disposal System has consolidated its offices into regional centers, doing away with offices in such places as Philadelphia and Norfolk. This is pretty much a paperwork change as far as we are concerned.

A lot more important change is in the wind, as the Pentagon implements a policy of scrambling *all* voice communications.

The Defense Department has just banned the procurement of any voice radios or telephones that are not capable of putting sophisticated scrambling on their channels. What this means is that billions of dollars worth of gear, from aircraft emergency transceivers to telephones in the Pentagon will have to be bought with scramblers either installed or available.

Assistant Secretary of Defense Eberhardt Rechtin told reporters here that voice communications (as a lot of old Army types have long known) are the worst security problem in the military.

Rechtin said he thought most new gear would be bought with scramblers built in, although some would be added-on. Of course all that non-scrambler gear will become surplus sooner or later.

Larger-scale-integration has made scramblers practical for tactical voice radio, with the devices as small as a pack of cigarettes, and able to make voice communications sound like atmospheric noise. These units are a long step beyond 1950-era scramblers which inverted the speech but did not hide it from a determined enemy. The latest devices mask its existence, and make it far harder to "break." This equipment first came to light in a seven foot tall relay rack device made by National Radio Company, but solid-state has reduced it to a small fraction of its former size.

The Pentagon says the scramblers will cost about the same as the transceivers they are attached to.

Another potential development in the surplus markets could—just could—bring a surplus store to some communities which are located so far from a government depot that they have not been able to support a surplus business before. Sanford Mendelson, of Dayton, would like to set up "franchise" surplus outlets in cities where there are no surplus dealers. Like the McDonald's hamburger people, he would supply the merchandise, which he buys in carload lots, and a local entrepreneur would sell it.

Mendelson would like to have anyone interested in the idea write him and discuss the plan. He is located at 516 Linden Ave., Dayton, Ohio, 45403. There is no doubt that Mendelson has the gear—I saw a couple of warehouses full in April, and Sandy said more was pouring in every day.

*1502 Stonewall Rd., Alexandria, Va. 22302

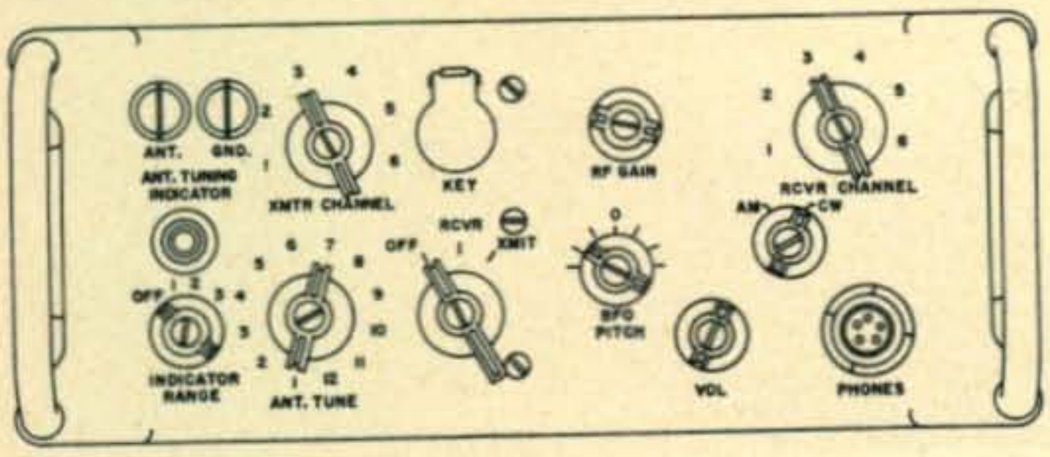


Fig. 1—Front panel drawing of the AN/TRC-77 tactical transceiver.

The unit I want to describe this month is the AN/TRC-77, a tactical transceiver that is showing up more and more frequently. I saw the set at Mendelson's and at Dayton Surplus, 1001 E. Second Street, in Dayton. I have heard from several readers that the sets are showing up widely in MARS and other sources.

This is a small (12 pounds) portable set (fig. 1) covering the 3-8 mHz band, with six crystal-controlled channels. The military estimates that the range is from 5 to 7 miles, with the usual inadequate field antenna. Power output is from 10 to 14 watts and sensitivity on c.w. of the receiver portion is rated at 1 microvolt for 1.0 signal plus noise to noise ratio (Those are the Army's terms, not mine.)

The intermediate frequency is 455 kHz, and the set does have a b.f.o.

The components include the RT-654 and 654A/TRC-77 transceiver, an AT-1098 antenna, battery BB-447, H-140-A headset, and various cables and accessories. The battery case (wet cells) is usually clamped to the base of the transceiver when in use. Alternatively, any 12 volt d.c. power source may be used with the TRC-77.

The TRC-77 uses 3B4WA and 2E24 tubes in the transmitter. The receiver is fully transistorized.

The maintenance manual is *TM 11-5820-473-12.* ■

Propagation [*from page 67*]

Australasia	14-18 (1)	13-16 (1) 16-17 (2) 17-20 (3) 20-21 (2) 21-22 (1)	12-19 (1) 19-21 (2) 21-22 (3) 22-01 (4) 01-02 (3) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-12 (2)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 2() 07-09 (1) 01-03 (1)* 03-05 (2)* 05-06 (1)*
Northern & Central South America	11-13 (1) 13-16 (2) 16-17 (1)	06-08 (1) 08-11 (2) 11-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	06-09 (3) 09-15 (2) 15-16 (3) 16-19 (4) 19-23 (3) 23-01 (2) 01-05 (1) 05-06 (2)	18-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-06 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Brazil, Argentina, Chile & Uruguay	12-13 (1) 13-15 (2) 15-17 (1)	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-00 (2) 00-06 (1) 06-08 (2) 08-09 (1)	20-00 (1) 00-02 (2) 02-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	*Nil*	12-16 (1) 16-18 (2) 18-20 (1)	07-10 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	00-04 (1)

SSTV [*from page 49*]

as "fast" lenses, because they allow shorter duration shutter openings.) Most of the enlarging and projection lenses of interest to us will have "*f*" numbers of *f*/3.5 or *f*/4.5. This seems to be about as "fast" as they make reasonably priced enlarging lenses. Table 2 contains a list of the least expensive good quality lenses that I know of. I have personally used the 3" Edmund lens in just the sort of live viewing scheme shown in Fig. 1 with good results. I have also used the 2" Spiratone lens in a 1:1 magnification FSS with a 2" × 2" raster, and found it excellent. Remember that amateur photographers have their "junkboxes" just as hams do. Dropping in at a meeting of your local camera club might lead you to the lens you want, or in any event to some people who understand optics.

Light Collection

The second part of the FSS problem is always that of gathering as much light as possible, uniformly from all areas of the scanned image, and funnelling it into the photomultiplier.

In the direct contact transparency scheme described last month it is possible to center the 931-A directly behind the transparency, at a reasonable distance, and thus get uniform, high light level pickup from all areas of the transparency. Projection systems present collection problems. In the example of fig. 1 the main problem is getting enough light into the photomultiplier. We can't center the photomultiplier on the optical axis and move it close to the scanned image for two reasons. First, it would get in the way of the projected raster, and cast a shadow on the object being scanned. Second, if the image being scanned has a shiny surface (glossy photos, etc.) and the photomultiplier is close to the optical axis, it will pick up an unpleasant mirror-like "specular" reflection.

In this month's example, where we will be scanning primarily matte finish postier board, and human faces, specular reflections shouldn't be a problem. This allows us to bring the photomultiplier close to the optical axis. This will insure acceptable uniformity. In my first experiments with a system of this type, the photomultiplier simply faced out toward the object being scanned. The signal-to-noise ratio was marginally acceptable, but might not have been good enough with a low limit 931-A. (The S/N was low because the light gathered drops as the square of the distance; and 24 inches is a long way!) Placing the 931-A at the focus of a shiny parabolic reflector, with the photocathode facing *toward* the reflector, should greatly improve the quantity of light gathered, and thus the S/N. A large old fashioned flashgun reflector, or a wooden or plastic bowl lined with aluminum foil, is what I have in mind. Another approach worth trying would be the use of a fresnel lens instead of the reflector. (See the Edmund catalog for inexpensive fresnel lenses.)

Next month I'll describe a very compact FSS optical system, and go into techniques for solving the uniformity problem in the more typical FSS designs where specular reflections *are* a problem.

Vy 73, Cop WØORX

Phone Contest Results [*from page 52*]

In spite of 40 meter phone restrictions in Guam, KG6JBO (Dave K1PKQ) made nearly 3 million points, good enough for 5th world high on all bands. This also earned him the Northern California DX Club Oceania Trophy.

A typhoon just missed KG6SL's location just before the start of the contest. Didn't damage his antenna system but it sure raised havoc with the island's power supply. Bert had to use emergency power during a good portion of the test. Took 1st place on 10 by a wide margin and just missed top single band honors and the Trophy. (He had a winning score last year but his QSL manager never submitted his log.)

Believe it or not there really is a DU1JMG as well as a DU1GJM, and to make it more confusing they both operated single band on 15. Jose, JMG spent a lot of time trying to convince some of the fellows that they had not worked before.

We added more members to our Committee this year, Dave Donnelly, WB2SQN and Dick Norton, W6DGH, two knowledgeable and experienced contesters. The rest of the Committee same as last year, Fred Capossela, W2IWC, Bob Entwistle, W1MDO, Ralph Nichols, W1CNU, Andy Malashuk, W1GYE, Gene Walsh, K2KUR, Bernie Welch, W81MZ and yours truly. In addition W2IWC and W6DGH had a crew of hard workers giving them a hand on the West Coast. Sue Buschlinger our new gal Friday, caught on fast and keeps contest matters well organized out at the office.

Now to get back to work and wrap up the c.w. section. We should have fewer problems with that one.

73 for now, Frank, W1WY

Disqualified Stations

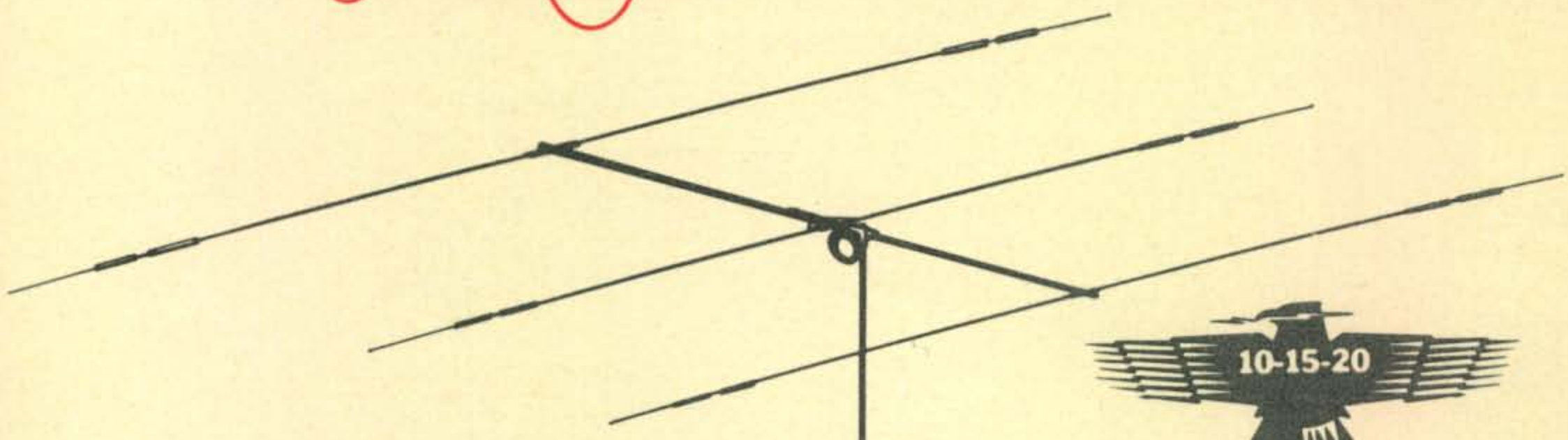
CX1JM, CW2CS, CX2AL, EP2TC, HA8KUC, JA1ELY, JA1YBO, JA2KLT, JA3LWA, JA3PPR, JA4FHE, JA7UJ, JH1EIG, K2IXP/6, KH6BZF, SM5BLA, UK2BBB, UK5MAF, VE7SV, VK2APK, W6HX, YV4KC, 9C9TW.

Screen Modulator [*from page 39*]

as a controlled screen bleeder responding to the negative control voltage derived from the audio. A 2K 3w wire-wound potentiometer on the cathode of the EL84 sets the no-signal screen voltage to 125 volts, while the auxiliary gain control sets the screen voltage with full audio to 175 volts.

The most popular three band beam in the world!

hy-gain TH3Mk3



INTERNATIONALLY superior | RESPECTED for performance

Superior construction and performance make the difference in Hy-Gain's popular 3-element Thunderbird.

- Thunderbird's "Hy-Q" traps provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. And you can tune the antenna, using charts supplied in the manual, to substantially outperform any other antennas made.
- Thunderbird's superior construction includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" to 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

Taper swaged, slotted tubing on all elements allows easy adjustment and re-adjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.

- Thunderbird's exclusive Beta Match achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.
- Up to 8 db gain
- 25 db front to back ratio
- Power capability 1Kw AM, 2Kw PEP
- SWR less than 2:1
- Extra heavy gauge, machine formed, element to boom brackets with plastic sleeves used only for insulation. Bracket design allows full mechanical support.

Model 388 $144.95

Other tri-band beams to choose from:

• 6-element Super Thunderbird TH6DXX	**Model 389 $179.95**
• 3-element Thunderbird Jr. TH3JR	**Model 221 $ 99.95**
• 2-element Thunderbird TH2Mk3	**Model 390 $ 99.95**

AVAILABLE FROM AMATEUR DEALERS THROUGHOUT THE WORLD

HY-GAIN ELECTRONICS CORPORATION

8601 Northeast Highway 6 Dept. FF Lincoln, Nebraska 68507
402/434-9151 Telex 48-6424

Screen Modulator [*from page 80*]

The 5K 10w. screen-dropping resistor and the 20 mf audio bypass capacitor provide a time-constant of 0.1 second, which should be the same as the time-constant of the control voltage source.

The Function Switch

A 4-pole 3way switch can be used as the CW/AM/SSB switch (fig. 2). In the c.w. and s.s.b. modes, the carrier control tube does not function, since its screen voltage is derived from the 300 volt supply to the modulator. Also the full volts regulated is applied to the PA screens by bypassing the screen-dropping resistor and the modulation transformer secondary.

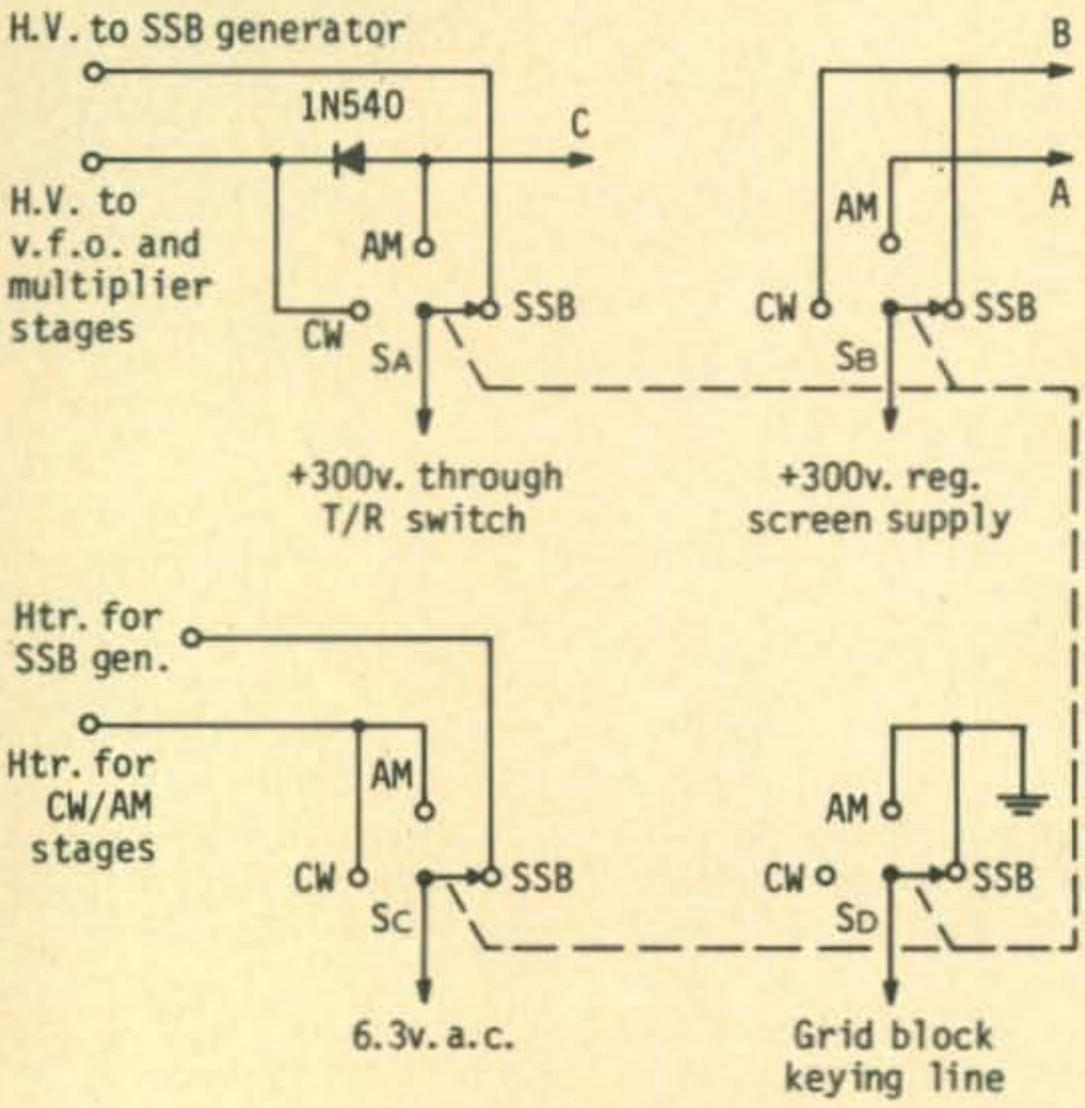


Fig. 2—Function switch wiring for the Deluxe Screen Modulator.

The writer uses a "stiff" fixed bias supply that is continuously adjustable from —35 to —75 volts by means of a wirewound potentiometer. It is regulated by a zener at the lower end and a VR-tube at the upper end.

The a.m. mode can be used for safe tune-up of the transmitter. Due to the low screen voltage, the final shows no tendency to "take off," even if it is not tuned properly. However, an occasional glance at the plates of the PA is always a wise precaution!

Conclusion

This screen modulator is easy to build and give excellent performance. s.s.b. being what it is, it is not wirthwhile to spend much on an a.m. modulator. At the same time, an all-band s.s.b. project is anything but an easy one. Hence the logical sequence for a budding amateur will be to build first a c.w./a.m. transmitter with a screen modulator, leaving provision for running the final as a linear. As his experience and skill improve, he can add a s.s.b. exciter to drive the final of the c.w./a.m. transmitter. ■

$5.00 Timer [*from page 42*]

and the whole unit can be kept very small. I built mine on a scrap piece of perf board about two inches wide by about three inches long. The completed circuit board is mounted in a standard Minibox using a three wire power cord for safety. On the front of the box is a standard 117-volt three-wire receptacle, the pot for setting the time delay period, and the push button to start the timer. The time delay pot was calibrated using an ordinary clock and a lot of patience. ■

Math's Notes [*from page 45*]

RT-70 ($15), (both tune the 6 meter band with no modifications), an R110 receiver (also 6 meters) and several control boxes, power supply, and accessories.

East Coast Electronics, 50 Scott Street, Hamburg, N.Y. 14075, has sent us their latest flyer which contains a wealth of components that should interest the experimenter.

New Rotron fans are $6.50 each, Nixies are 3 for $6, a Guardian solid state time delay (adjustable from .5 to 100 seconds) is $4.50 and, for those just getting started, several brand new, excellent quality hand tools such as diagonal cutters, long nose pliers, etc., for only $3 each.

Also included are capacitors, semiconductors and the like, just about all of which are *brand new!* If you are interested, write for the list.

73, Irv., WA2NDM

R-390 Product Detector [*from page 44*]

does not accidently touch any components or wiring.

25. Replace the i.f. subchassis in the receiver. Plug in all plugs removed in step 1. Reconnect the two control shafts. Replace their front panel knobs. Make sure the BANDWIDTH knob is properly positioned on its shaft.

26. Plug the 6BE6 tube in socket V_{508}. Turn on the receiver, with the antenna off.

27. With b.f.o. switch S_{103} in the ON(SSB) position, a hissing sound will be heard in the speaker. With the BANDWIDTH switch in the 1 kc position, rotate the BFO PITCH knob. The pitch of the hiss will vary from high to low and back again, as the oscillator portion of the 6BE6 is tuned thru the center of the receiver's i.f. passband. Set the BFO PITCH control for the lowest pitch of the hiss. Without rotating the control, loosen the knob setscrew. and set the knob pointer to "0". The pitch of the hiss should now rise equally on the + and — sides of the control.

28. Set the BANDWIDTH knob at 2 kc and at 4 kc. In each case, the pitch of the hiss will be lowest at the "0" position of the BFO PITCH control, rising an equal amount on each side (—1, +1, or —2, +2).

29. From unused terminal 2 of a.g.c. switch S_{104} (FAST position), connect the 1.0 mf capacitor to ground. This may be done right at the switch itself. This slows down the a.g.c. time constant in the FAST position just enough to make good s.s.b. voice copy. If you like it slower, use the MED position of the switch.

30. The receiver is now ready to operate. With the antenna connected and the a.g.c. switch set in the FAST position, tune in an s.s.b. signal. On the 14 mHz band, for example, where upper sideband is conventional, the BFO PITCH control should be set at —2, with the b.f.o. switch ON, and the BANDWIDTH control at 4 kc. The signal should sound clean and pure (assuming it is so). If you wish to use a 2 kc bandwidth, then set the BFO PITCH control at —1. I prefer 4 kc—it sounds more natural.

31. Shift to the 7 or 3.9 mHz bands. In this case, for receiving lower sideband, set the BFO PITCH at +2 or +1, depending on whether you prefer the 4 kc or 2 kc bandwidth.

32. Note that the BFO PITCH control must be set to the *opposite side* of the carrier ("0") for reception of the desired sideband When you do this, you are in effect placing the locally injected carrier from the b.f.o. portion of the 6BE6 in the proper position for demodultion of the s.s.b. signal and for positioning the signal in the receiver passband.

C.w. may also be received with the b.f.o. switch ON (SSB position), using the BFO PITCH control and the BANDWIDTH control as desired. For a.m. the b.f.o. switch is OFF, of course, unless one wishes to receive it in the s.s.b. mode.

The conversion is now completed. The R-390 may now be used for s.s.b. with no external converter, and the job has been done without carving any holes in the chassis or mounting any additional tubes in the set. In fact, to the inexperienced eye, the set looks untouched. It performs beautifully. I have one R-390A and one R-390, and I would not part with them for any of the newer solid state amateur band equipments. They are both of Collins manufacture and they are truly the "Cadillacs" of the receiver world as far as the amateur and short wave listener are concerned. Using vacuum tubes, they are not so susceptible to front-end overload and cross-modulation as the solid state sets—their dynamic range is much greater. ■

FM Repeaters [*from page 46*]

the end for this truly fun mode of operation.

Now that we've isolated the problem, we'd like to suggest a cure.

We feel that operating privileges on each repeater within an area should be openly extended to members of *every* other local or neighboring repeater group. In other words, dues paid to a single club should take the "freeloader" label off a ham that might want to operate on another club's repeater. And the same privileges returned in kind would stimulate inter-repeater communications, stronger bonds of friendship between neighboring clubs, and in general, a much healthier respect for the rights of other amateurs. To accomplish this end, membership lists could be exchanged by various clubs within an area, updated regularly, and possibly even joint projects might evolve. The true "freeloader" would soon find himself with no other choice but eventual support for one repeater or another. In the long run, every repeater group would benefit by larger participation, greater income, and more club members to share the work load. Those clubs that wish to remain PL or tone accessible, could at least make the access frequencies known to neighboring club members.

Give these ideas some thought and let us know your feelings on the subject. We suspect that there might be quite a bit to say on this subject. ■

Announcements *[from page 8]*

Washington, Missouri

Zero-Beaters ARC Annual Hamfest, August 5th Over $700 prizes. Ham auction, large traders row, entertainment for XYL and children. St. Louis ARC Ham of the Year Award. Missouri Army MARS meeting. Write Zero-Beaters ARC, Box 24, Dutzow, MO. 63342 for tickets and information.

Portsmouth, New Hampshire

To celebrate the 350th Anniversary of the 1st settlement in State of N.H. the special events sta.: WP1ORT will operate during the period 1-19 Aug., 1973. Modes of oper will be cw, ssb and SSTV. Phone freqs. are 14.230 (SSTV), 14.300, 7.250 and 3.925 mhz. QSL with sase or sae and IRC to: P.O. Box 1973, Portsmouth, 03801.

Uniontown, Pennsylvania

The Uniontown Amateur Radio Club will present its 24th Annual Gabfest on Club Grounds, Sat., Sept. 8th. In the past, this has been one of the best affairs of its kind in the Tri-State area of W. Pa., W. Va., and Ohio.

Lafayette, Indiana

The Tippecanoe ARA and the Indiana Radio Club Council is sponsoring the Annual Indiana Radio Club Council Picnic & Hamfest August 19th at the Tippecanoe County Fairgrounds, 1100 Teal Rd., Indiana Rte. 25, Lafayette. Contact WB9FOT, 2233 Delaware Dr., W. Lafayette, IN 47906 for tickets, Tickets may also be obtained from any IRCC Club, or at the gate. Tickets $2.00.

Reno, Nevada

The Sierra Hamfest will be held on Sat., August 18th at the California Bldg. in Idlewild Pk., Reno. Contact Geo. V. Lyle, K7ZAU, Chairman, Nev. Amat. Radio Assn., 1047 Mark Way, Carson City.

Yankee Lake, Ohio

16th Annual Warren Hamfest will be held at Yankee Lake on Sunday, Aug. 19th. Info: R.D. Kelley, W8GFG, Pres., W.A.R.A., P.O. Box 809, Warren, Ohio. 44482.

Pittsburgh, Pennsylvania

The 36th Annual Hamfest of the South Hills Brass Pounders & Modulators Amateur Radio Club will be held in Pittsburgh on August 5th, 1973, in the pavilion at St. Clair Beach, Pittsburgh. For info: Frank T. Donahue, W2QNI, 227 Baldwin Rd., Pittsburgh.

Flourtown, Pennsylvania

The Mt. Airy Vhf Radio Club will hold the 18th Annual family day and picnic, Sunday, August 12 (rain date Aug. 19) at the Fort WashingtonState Park, Flourtown. For info: Donald Hampton, W3-CJU, 500 E. Ct. St., Doylestown, PA 18901. Games, entertainment and free soda.

Decatur, Alabama

The North Alabama Hamfest will be held Aug. 19th in Decatur. For info, write: North Alabama Hamfest Assn., Inc., Box 9, Decatur, AL 35601.

Graham, Washington

The Radio Club of Tacoma presents "Hamfair-73" Sat. & Sun., August 18th and 19th at the Pierce County Fairgrounds near Graham (directly So. of Pyallup on Meridian Ave). Advance regis with Sat. even. dinner, $6; registration without dinner or at door, $3. Tent, trlr, or camper space, $1.50 per night. Sunday Logger's Breakfast, $1.50. 3965 kHz and 146.76 MHz monitored for mobiles. Contact: Emil Koth, K7GPK, 13616 10th Ave. East, Tacoma, Wash. 98445.

Atlantic City, New Jersey

The Southern Counties Amateur Radio Association will operate a special station in conjunction with the Miss America Pageant in Atlantic City, New Jersey. This year's call will be WP2MAP, Operation will be from Aug. 26-Sept. 9, 1973 Pageant Hdqtrs. at the Haddon Hall Hotel, Operation will be on 80 through 10 mtrs: CW frequencies will be 30 Khz inside the band edge, SSB frequencies will be 10 Khz inside the gen. class portion of the phone band, when possible. Special QSL will be issued. K2JOX will handle this.

Dunkirk, New York

The Worldwide TV-FM DX Association, the only N. American Club dedicated exclusively to VHF-UHF DXing, holds its 5th Annual convention in Dunkirk, August 5th – 7th. Convention host Robert Seybold, Bennett Rd., RD 2, Dunkirk, New York 14048.

Paterson, New Jersey

Knight Raiders VHF Club, Inc. K2DEL, will be holding its 7th Annual Hamfest on Sat., Aug. 11th, starting at 10 am at the YM/YWHA Camp, Rifle Camp Road, W. Paterson. Flea Mkt., auction, swimming, boating, picnic tables, contests, etc. Info. Knight Raiders VHF Club, Inc. POB 1054 Passaic, NJ 07055.

Winchester, Virginia

The 23rd annual Hamfest of the Shenandoah Valley Amateur Radio Club will be held on Sat. and Sun., Aug. 4-5. Banquet on Saturday and an all-day session on Sunday in the Winchester Armory. Contact L. Neill Woods, W4-LOG, Chairman, P.O. Box 139, Winchester, VA. 22601.

Aberdeen, South Dakota

The Hub City Radio Club of Aberdeen is sponsoring the Annual S.D. Ham Picnic Aug. 4, at Wylie Pk., Aberdeen, from 10 a.m. to-------??? Prizes, flea mkt., activities for XYL and jr. ops. Limited camping available. For information or tickets, W0OGS, 1017 7th Ave. S.W., Aberdeen, SD 57401. Talk in on 3955 khz and 146.94 mhz.

Concordia, Kansas

The Kansas Nebraska Radio Club, Concordia, will present its 22nd Annual KNRC Hamfest Sunday, August 5th at the Moose Bldg., 113 W. 5th St., Mobile Talkin on 3920khz and on 146.94 or .94–.34 repeater. Free soft drinks, swap table. Reg. begins at 9 a.m. For info: WA0KDP, Ken Huber, Secy. Formoso, Ks.

Sauk Rapids, Minnesota

St. Cloud Amateur Radio Club will hold its hamfest on Sunday, August 12th at Sauk Rapids Municipal Park. $1 registration, rain or shine. Refreshments, games, gear swap, etc. Contact Gary Loomis, WN0GSC, Box 103, Clear Lake, MN 55319.

Pentagon City, Virginia

Air Force MARS will hold its Annual Eastern Div. Conf. on Sept. 7th, 8th and 9th at the Quality Inn in Pentagon City, Va. Banquet & awards starts at 8 pm on Sept. 8th. Guest speaker will be Sen. Barry Goldwater, AFA7UGA. Other notables. Info. Eastern Div. Conference, PO Box 2836, EADS Sta., Arlington, VA 22202.

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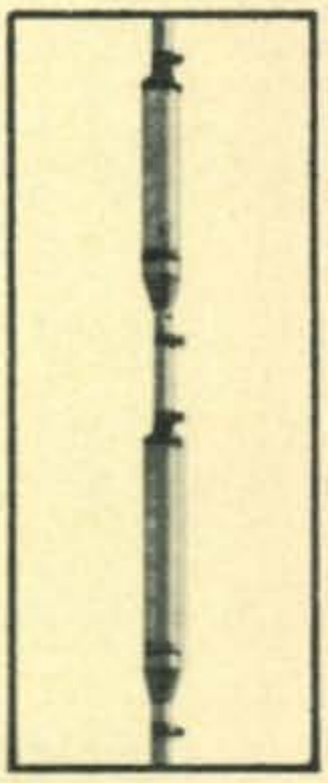
- Recessed coax connector furnished.
- Top loading coil and four element static hat.
- Constructed of extra heavy wall high tensile aluminum.
- Hot performance all the way across the band with just one setting (10 through 40).
- Hy-Q traps effectively isolate antenna sections for full 1/4 wave resonance on all bands.
- No dissimilar metals to cause noise.
- SWR 2:1 or less at band edges.
- Maximum legal power with low frequency drift.
- Exceedingly low radiation angle makes DX and long haul contacts a cinch...whether roof or ground mounted.
- Very low RF absorption from insulating materials.



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Box 5407- FD Lincoln, Nebraska 68505

Phone Contest Results [*from page 58*]

YV10J	**28**	**113,148**	**604**	**21**	**42**
K5LWL/YV6					
	14	**503,408**	**1183**	**36**	**110**
4M1BI	**7**	**155,664**	**604**	**26**	**69**
YV4AGP					
	3.8	**72,666**	**388**	**18**	**48**

Multi Operator Single Transmitter

NORTH AMERICA

WA1KZE	**1,047,418**	**1000**	**100**	**267**
WA1RDN	606,080	668	96	224
WA2BVU	**1,577,408**	**1223**	**119**	**329**
WA2HSU/2				
	1,217,707	987	119	324
WA2LQZ	706,407	808	93	214
W2PU	338,074	493	71	171
K2GXT	43,068	134	39	72
K2GE	22,160	112	33	47
W3GM	**856,544**	**737**	**120**	**296**
W3BWZ	745,875	705	117	258
W3DBT	514,546	632	87	200
WA3LHG	439,348	512	85	199
W3GLY	372,120	472	94	186
W3ZNH	320,040	434	82	172
W3TV	195,364	310	81	140
W3YXM	147,260	307	58	127
K3MBF	64,977	185	30	91
W4FDA	**1,398,210**	**1111**	**122**	**324**
W4JD	653,256	687	103	241
WA4MSU	458,964	478	107	235
W4DOC	210,600	348	82	143
WB5AEH	**357,898**	**460**	**93**	**205**
W5WQI	149,968	264	67	139
WA5UUK	128,640	256	70	131
WB5CRG	31,500	152	45	60
WB6KBK	**955,440**	**965**	**123**	**237**
W6YRA	689,760	855	105	183
W6DOD	607,320	770	114	166
W6HQN	593,125	648	113	212
W6ABP	328,560	534	87	135
W6BIP	221,832	354	74	142
W6ZBS	139,284	302	60	99
K6JGV	103,514	254	64	82
W6VPZ	78,659	238	49	70
W7SFA	**2,294,522**	**1955**	**130**	**271**
W7VRO	667,554	806	99	182
K7RSC	514,948	867	83	129
W4FAY/7	177,670	321	82	136
WA8ZDF	**1,521,936**	**1151**	**129**	**331**
W8EDU	545,376	647	91	208
W8BVF	539,324	637	80	212
W8ZHO	266,151	385	79	158
K9CUY	**1,348,508**	**1013**	**132**	**344**
W9EXE	480,105	420	121	302
WØMYN	**1,244,705**	**1171**	**118**	**253**
WAØQLH	837,440	941	110	210
WØHP	631,536	680	117	237
WAØCVS	384,514	604	77	140
WAØVPN	289,000	396	82	168
KØKU	261,504	418	83	144
WBØFHH	140,264	269	71	126

Alaska

KL7AIZ	**46,905**	**357**	**26**	**27**

Canada

VE1ASJ	**2,574,318**	**2521**	**121**	**305**
VE1XW	984,632	1131	91	243
VE6LB/6	**499,870**	**1260**	**77**	**116**
VE6AO	495,363	1106	70	117
VO1HI	**2,100,474**	**2411**	**97**	**269**

French St. Martin

FGØAMF/FS7				
	252,154	**1438**	**24**	**59**

AFRICA

Liberia

EL2DI	**1,904,873**	**2279**	**83**	**200**

Sicily

IG9BAF	**3,118,072**	**2792**	**95**	**293**

ASIA

Cambodia

XU1AA	**160,720**	**462**	**58**	**106**

Japan
Club Stations

JA2YAB	**550,392**	**911**	**86**	**127**
JA7YRR	365,284	693	71	117
JA9YBA	355,509	581	89	120
JA7YAA	164,032	340	73	103
JA2YFI	55,638	199	46	53
JA2ZAP	42,085	160	42	53
JA7YCW	7,310	63	19	24
KA2DX	**666,966**	**881**	**98**	**169**
KA8FY	207,480	455	58	75

Korea

HL9UH	**309,442**	**1130**	**60**	**101**

U.S.S.R.
Club Stations
Asiatic

UK9ABA	**3,813,066**	**2219**	**144**	**434**
UK9XAC	146,928	424	44	92
UK9CAM	58,092	258	28	66
UKØSAA/P				
	1,103,113	**1443**	**88**	**201**
UKØAAB	769,860	1478	87	186
UKØFAA	219,296	674	68	86
UKØAAC	108,108	456	55	71

Kazakh

UK7GAA	690,828	994	85	191
UK7LAA	317,824	574	63	145

EUROPE

Czechoslovakia

OK3KGI	**99,334**	**409**	**49**	**117**
OK1KPU	24,390	122	36	54
OK3KTR	13,752	200	16	56

Denmark

OZ6RT	**880,640**	**1232**	**98**	**222**

England

G3WYX	**3,622,880**	**2944**	**131**	**349**
G4ANT	**2,935,728**	**2386**	**133**	**331**
G3FVA	1,010,128	1399	85	226
G8JC	936,500	1637	72	178
G3KMI	724,477	1144	98	201
G3RRS	616,920	983	84	234
G3RCV	580,839	842	95	262
G3YXR	502,280	754	84	206
G3VUM	324,216	628	69	168

Finland

OH4RH	**790,194**	**1048**	**97**	**269**
OH3MG	252,749	590	73	194
OH2AC	49,773	262	35	106

France

FØZZ	**3,445,596**	**3019**	**125**	**337**

Germany

DLØWU	**2,764,629**	**2414**	**118**	**323**
DKØAA	1,643,994	1562	116	298
DL3LU	1,173,040	1432	95	246
DLØRCA	1,067,116	1212	105	256
DL8OH	817,200	1146	89	211
DLØJRA	724,462	864	102	257
DLØKG	357,173	703	75	176
DL4QF	**471,444**	**1029**	**82**	**204**

Greece

SVØWJJ	**570,076**	**827**	**66**	**181**

Hungary
Club Stations

HA3KMA	**461,416**	**1045**	**74**	**200**
HA4KYH	262,730	619	64	151
HA5KFA	242,844	814	64	172
HA4KYB	220,095	782	59	142
HA5KHD	167,265	590	54	135
HA5KHE	138,857	500	57	134
HA9KOL	119,163	596	38	119
HA8KCI	101,680	411	45	119
HA7KLF	94,085	424	49	106
HA9KOZ	81,450	379	44	126
HA3KNA	70,680	274	48	97
HA2KMR	58,185	274	39	96
HA8KUA	17,313	167	30	57
HA3NA	4,428	106	10	31

Isle Of Man

GD5BBG	**1,352,026**	**2007**	**83**	**215**

Italy

I4GAD	**2,097,568**	**2118**	**114**	**290**
I4BMJ	1,702,272	2098	100	212
I8DGP	761,964	974	94	235

Netherlands

PI1PT	**57,948**	**315**	**34**	**98**

Norway

LA1H	**573,888**	**1336**	**61**	**131**
LA8AK	381,420	763	69	165
LA7V	1,911	25	65	24

Poland
Club Stations

SP5PWK	**614,328**	**885**	**91**	**221**
SP9KRT	114,686	711	31	112
SP5PBE	14,726	156	20	54
SP5PLL	8,281	128	14	35
SP6KDA	2,088	46	8	21

Scotland

GM5AXO	**717,309**	**1185**	**77**	**202**
GM3YOR/P	354,878	989	47	144
GM4AFF	110,696	772	27	74

Sweden

SK3AH	**1,852,248**	**1818**	**107**	**319**
SK5AL	1,751,856	1875	117	335
SMØMC	766,500	918	93	257
SM5AOE	567,667	776	98	233
SL6BH	167,310	404	57	112

Wales

GW3UCB/P	1,937	157	2	11

Yugoslavia
Club Stations

YU1JRS	**1,336,236**	**1574**	**102**	**280**
YU1AHI	410,120	974	77	183
YU1EXY	330,576	526	90	194
YU1INO	106,978	469	55	123

U.S.S.R.
Club Stations
European

UK3AAO	**3,883,008**	**2939**	**137**	**375**
UK3ABO	1,094,368	1372	116	236
UK1AAA	1,004,846	1393	104	263
UK3SAB	952,099	1372	103	268
UK4WAC	854,910	1221	96	227
UK4WAB	296,940	717	64	146
UK3YAB	184,274	381	73	126
UK3EAK	112,392	452	46	122
UK3TAR	67,353	342	42	101
UK3MAA	66,421	340	42	85
UK6HBF	64,976	370	40	84
UK3DAA	28,213	283	24	65

Estonia

UK2RAT	**53,163**	**507**	**21**	**78**

Kaliningrad

UK2FAD	**39,525**	**383**	**20**	**55**

Latvia

UK2GDZ	**794,543**	**1253**	**86**	**215**
UK2GAR	83,000	415	36	93

Lithuania

UK2PAD	**913,316**	**1106**	**105**	**265**
UK2PAF	824,296	1083	99	275
UK2PAA	57,845	270	37	78

Ukraine

UK5JAG	**1,133,880**	**1814**	**94**	**236**
UK5MAG	258,304	671	69	187
UK5ZAA	155,477	572	51	116
UK5VAE	99,408	426	40	112
UK5IAI	54,171	310	35	82
UK5LAS	11,900	151	19	51

White Russia

UK2WWW	**156,456**	**600**	**53**	**111**
UK2WAF	11,932	126	21	55
UK2AAS	6,208	88	12	55

OCEANIA

Kure Island

KH6EDY	**1,814,400**	**2956**	**84**	**126**

SOUTH AMERICA

Brazil

PY1BQK	8,181	86	29	38

Netherlands Antilles

PJ1AA	**4,206,341**	**3405**	**115**	**304**

Paraguay

ZP5AQ	**2,031,976**	**2681**	**85**	**173**

Uruguay

CX8DI	**1,071,840**	**1652**	**83**	**137**

Venezuela

YX5AJ	**4,087,360**	**2910**	**123**	**359**

Multi Operator Multi Transmitter NORTH AMERICA

W4GIW/VP7				
	5,510,176	**5236**	**122**	**354**
VP9BO	**3,165,489**	**4373**	**97**	**246**
W3WJD	**2,619,440**	**1662**	**135**	**413**
W7RM	**2,592,733**	**2009**	**125**	**303**
W3AU	2,501,630	1856	119	366
K6UA	**2,403,246**	**1696**	**120**	**315**
W9YT	**2,291,185**	**1714**	**133**	**372**
W3FRY	2,002,770	1442	133	377
K8IDE	**1,798,220**	**1352**	**130**	**340**
WB5DTX	**1,706,200**	**1381**	**123**	**326**
WA3ATP	1,570,816	1159	126	346
W4BVV	**1,540,860**	**1293**	**112**	**309**
W3GPE	1,527,364	1156	128	341
K3BW	1,468,678	1162	120	326
WA3ATX	1,313,774	1135	114	304
K4CG	1,251,370	1043	117	316
W3DHM	1,153,984	957	108	308
K2UQT/2				
	1,143,130	**1043**	**118**	**277**
WA5OCN	1,010,457	987	113	274
K2FL	796,800	689	117	298
W3SS	742,632	828	101	247
KL7FBI	**735,048**	**1818**	**72**	**92**
W3BYX	497,344	581	85	219
W3NX	333,700	425	96	188
WB6JOD	197,184	377	76	116
W6OAT	154,706	268	79	127
WA2DNR	51,094	156	41	77

AFRICA

ZD3X	**14,501,872**	**8571**	**141**	**459**

ASIA

XV5AC	**5,656,555**	**5711**	**153**	**392**
JA2YEF	**1,056,847**	**1161**	**111**	**208**
XW8CN	**558,327**	**1309**	**83**	**148**
JA3YCH	282,376	533	52	136

EUROPE

DLØPG	**7,634,962**	**4789**	**151**	**523**
DLØWW	**5,334,537**	**4093**	**151**	**408**
OH1AA	**4,679,040**	**3463**	**155**	**485**
OH1VR	**4,378,416**	**3337**	**149**	**479**
DK3II	2,403,297	2304	130	371
OH1AD	2,302,612	2988	128	351
4U1ITU	**650,199**	**991**	**99**	**224**
GB3MAN	**582,131**	**1332**	**76**	**207**
DLØII	466,896	883	85	189
DLØID	135,228	410	59	116
LZ1KKZ	**61,336**	**402**	**32**	**104**

OCEANIA

KS6DH	**5,488,856**	**5304**	**116**	**242**
KA1DX	**3,657,450**	**3519**	**125**	**245**
KH6EOQ	**2,992,691**	**3436**	**105**	**194**

SOUTH AMERICA

CW3AA	**3,748,869**	**3331**	**115**	**272**

Check logs are always useful in cross-checking other entries. We extend our thanks to the following.

DM2ARA, DM2BFK, DM2BTO, DM2CBB, DM2CPD, DM2DGO, DM5PBN, HS1AFI, HSØISB, I5-LAO, K4PR, KV4AA, KA1AD, LA1-LK, LA2CQ, LA3YQ, LA5KO, OH-2BAC, OH5AB, OK1ACV, OK1ATX, OK1NH, OK3TZD, OK3YAX, OZ1-LO, OZ1TD, OZ5BS, OZ7XU, OZ-9FJ, PAØTV, PAØWDG, PY7DW, RA1AKS, SM5AQB, SM5BFJ, SM5-2735, SM6CZU, SM7DBD, SM7TQ, SMØKV, SP5ENA, SP5-HH, SP9-2220, UA1ALN, UA3-DAO, UA3DFC, UA3IAT, UA3NG, UA3VAQ, UA6RB, UA9MQ, UB5-QD, UK2FAA, UK3XAA, UK5QAV, UL7YR, UV3NB, UW1AR, UW4NA, UW6CW, VE7AJ, VE7IQ, W2LEJ/2, WA3FXJ, W4UDS/Ø, W5EDX, W6-BIL, W7MS, WB8CGC, WB9BPG, WAØMYM, YN1VMD, YV5IZ, ZE6JJ.

[Station ops. on p. 91]

HAM SHOP

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Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publishers of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.**

Free bus driver newsletter, all hams with retired from any Bus co. name QTH birthday on QSL/postal. K4CLA-CBD 5/111-A Oak, Lex SC 29072.

Heath HW-16 excel condx, 14 mo. old $90. Call after 6pm(201) 635-5488. Philip Johnson WA2-DSA, Chatham, NJ.

Miniature rf amp, 4-450 mHz, gain 20db, flat 1/2 db, —20vdc required $45. Wide Bnd Engin. Co., PO Box 21652, Phoenix, AZ 85036.

Early radio and wireless gear wanted, rcvrs, transmtrs, mags and books. Will pay cash or trade QSTs, CQs. Call books and handbooks. Erv Rasmussen, 164 Lowell St., Redwood City, CA 94062.

Trade for ham gear, or sell, collection profes. test equip, H-P, Gertsch, GR, etc. Swap vhf/uhf, sase. W4API, Box 4095, Arlington, VA 22204.

QSL cards - brochure and sample card 20 cents. The Print Shop, P.O. Box 353, Lockport, IL 60441.

Sell: GE mirror Galvanometer, no shipping $25. W2DQC, 229 Sarles Ln, Pleasantville, NY 10570.

Sell: Hy-gain Hy-twr 18HT self support. 80 thru 10 mtrs vert. ant. $90. A.M. Fox, Box 895, Greeley, CO 80631.

Need: Tech. manual for model FR149/USM159 freq. mtr. Will buy or pay for repro. W6RNE, 24771 Kay Ave., Hayward, CA 94545.

Trade: 14-1000, 2 4-400, 4 4-250. Want Ten-Tec PM2/PM3 or HW-7. WB4RBK, 114 Havron St., McMinnville, TN 37110.

Mix pleasure with pleasure. 1973 Hamburg International Hamfest on September 15 only 45 minutes from fabulous Niagara Falls. RV parking for weekend only $2.50 with hook-up. Details: Valerie Orgera, K2KQC, 187 Main, Hamburg, NY 14075.

BRAILLE DIALS for the blind (at cost) on Drake Transceivers and Drake twins and VFO's. Remove knob, slip on Braille dial and replace knob, that's all. Please state model type. $2.00 ea. P.Pd. Vernon Page, W8EXJ, 1969 Manz St., Muskegon, MI 49442.

TRADE: 8 MM Movie outfit, mint; for Mint SB—200; SB220; 30L1 Linear. Replies Answered. WA-9GYX, George, 1422 So. Pearl, Independence, MO 64055.

WE would like to correspond with many radio amateur operators in the United States. The purpose of our club is to make friends through radio and by mail. Please give us letters to the following address. THE GREEN CLUB, Z.C.—591 1-25, Shinonome, Sakai, Osaka, Japan, Club Manager, Masuo Inoue, JH3BCZ.

SAFETY BELTS Tower climbing, Nylon (new), Lanyard/snap (used), $23.50. Link, Rt. 111, Monroe, CT. 06468.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

QSL'S "Brownie," W3CJI, 3111 Lehigh, Allentown, PA 18103. Catalog 25 cents.

CANADIANS Free 120 page Electronics Catalog. ETCO, 464A McGill, Montreal.

KWM2, yours can perform much better in 1 hour, you do it. Write to W@BNF, Box 105, Kearney, Nebraska.

NCX-500 factory overhauled, with AC/PS, manual, set spare tubes, excellent, used West African DXpedition, $300. WB2AQC, (212) 639-3195.

WANTED: 4 RTTY Models in good condition. Tape perforator, 20 meter Ham gear - needed for Youth Outreach Program. Tax deductible receipt written for value. Box 4594, Clearwater, FL 33518.

HAM HAWAII. Maui oceanfront three bedroom two bath luxury penthouse apartment for rent by week or month completely furnished plus Yaesu, TH6DXX and automobile. K6OE, Box 218, Carmel Valley, CA 93924.

Wanted: RAX-1 Receiver, 1.5 to 9.0 MC. Tubes - used and new. Autodyne, Box 26, Bethpage, NY 11714.

New Instruments Oscilloscope from $79, Signal Generator $39, Multimeter for Inductanc Volt Current Resistance and Capacitors measuring from $14 for Catalogue. Send $1.00 to Telemix, Box 75, 17522 Jarfalla, Sweden.

Clegg 99'er, with HA-5 VFO and Mich. AI, $90. Russell 19680 Mountville Dr. Maple Hts., OH 44137 216-662-2175.

Cleaning out extra gear; xmtr, rcvr and parts. Send SASE for list. Dana French, KIWKS, 9 Mechanic St., Medway, MA 02053.

Wanted: Tech manual for receiver R-501/FRR-21, E. G. Roberts, WA2LFN, 111 Patricia Lane Syracuse, NY 13212.

WESTERN UNION DESK-FAX TELEFAX TRANSCEIVER MANUAL: Complete theory of operation, adjustments, lubrication, preventive maintenance, troubleshooting, parts list. Includes all schematics and mechanical parts drawings. $3.80 postpaid. Bill Johnston, 1808 Pomona Dr., Las Cruces, NM 88001.

HAMS: All new, personalized stationery with call and address. Write prices, samples, to: WA2BQI, Burdette's Elite Printing, Jamestown, NY 14701 P. O. Box 72.

Surplus Radio Gear; also parts, kits for the Ham & experimenter. Free catalogue. T&T Enterprises, Box 702, Decatur, GA 30031.

WANTED: Used correspondence Course by Cleveland Institute of Electronics. Title, advanced Communications Engineering. Course Contents: 75 lesson units. Must be complete and in good condx.. Donald Chapman, 1621 W. Division St., Chicago, IL 60622.

Electronics Equipment; Test Equipment; Pane Meters; Connectors; Capacitors; Tubes; Transistors, etc. Inquirer invited. F. F. Williams, P.O. Box 7057, Norfolk, VA 23509.

TELETYPE MACHINES by Kleinschmidt. Page Printer with Power Supply, as received from Govt., $59.95. Single tables, excellent condition, $19.95. Page Printer and Reperf combination, as received from Govt., $59.95 ea. Double tables, excellent w/ Chad Box and Tape compartments for $34.95. Each of the above TT Machines cleaned, oiled and adjusted please add $30.00 ea. TH-5 Converters, Transmit and receive on 170 shift, $49.95. Paper winders $14.95. Freight is collect on all orders. Andy Electronics, Inc., 6431 Springer, Houston, TX 77017.

MOVE-SALE: Drake sta R4B, T4XB, C-4, L4B, MN2000, Classic 33, Ham M Rotor, W2MGD, 3301 Foxcroft Rd., Charlotte, NC (704) 364-8697.

REWARD info recovery STOLEN YAESU FT-101 s/n82G12279/CW, 1.8 MHz, REGENCY HR-2-s/n03-02030, W4GF, 7216 Valleycrest Blvd., Annandale, VA 22003. (703) 650-5229.

GE 150mc fm xcvr $15, BC-312 rec like BC-348 $15, Johnson swr bridge $5, Eldrado counter 740 $35. W.J. Davis, K6KZT, 4434 Josie Ave., Lakewood, CA 90713.

If you have QSOed me and need a QSL for Wave or WACAN awards please QSL to VE6UP (3C6UP-1967) 513-19St. North Lethbridge, Alberta Canada. T1H3K6.

Heath Counter & Scaler. Motorola T43GGV, other goodies. WA5CMC, 2309 Bullington, Wichita Falls, TX 76301.

Wanted: George Segal records. Advise RPM and price. Must be in good condx. Dr. W.C. Hess, W6CK Box 19-M, Pasadena, CA 91102.

Wanted: Heath digital clock plus QST, CQ, 73 binders. Tom Dornback, K9MKX, 2515 College Rd Downers Grove, IL 60515.

Linear builders: 30 amp filament choke for gg linears. Perfect for pair 4-400A's, 3-500Z's, etc. New. $5 ea, 2 for $9.50. .50 ship. V. Murrell, K4HHA, 712C Rich Rd., Newport, TN 37821.

For sale: Collins KWM2, 516F2, 30L1, CPI xtal pack, 312B5, all mint. Call Tom, 215-ME5-1640.

For sale: Just back from Japan, brand new IC21-2mtr fm only $325. Save $75. Morty, 215-884-6010

Wanted: FT-243 type crystal holders. only lots of over 500 considered. Price in first letter. W6DOR, 2921 Loyola Dr., Davis, CA 95616.

Oscilloscope, DC/wide band, 5 in. Knight KG635, all instructions, few hours, mint condx, $65. W9-TVV, 2028 Oriole Trail, Michigan City, IN.

Q Multiplier, Heathkit QF-1, 450-460 kHz $11 ppd. H. Anderson, 639 N. Wahsatch, Colo. Springs, CO.

Neon test lamps, NE-2 bulb & resistor mounted in insulated housing with test point and binding post. New, 24 ea for $3.75 ppd. W4JGO, 643 Diamond Rd., Salem, VA 24153.

Sell Drake R4A, good shape, $290 will ship USP. Heathkit Tower $25. Jim Berger, K3BW, 6615 Silverwood St., Philadelphia, PA 19128.

Wanted: Gonset model 3357 VFO for communicator. Give condx and price. C. Foltz, 234 So. Richmond, Carson City, NV 89701.

Wanted: Collins mech. filter in good condx, 500B-60 (51J4 rcvr); have spare 500B-31, new. Bob Houston, KA2AX, Box 73, APO, S.F., 96525.

QRPP Handbook: 324 pages jam-packed with QRP articles, construction projects, news, all about QRPp 3 yrs of Milliwatt, $10, or Vol I-$4, II $3.50, III-$3.50. $3.40 yearly. Ade Weiss, K8EEG, 213 Forest, Vermillion, SD 57069.

Have 8 mm Nizo movie cam plus Bell & Howell 16 mm Mag. move cam with 3 best lens turret. Need 30L1 linear. U. H. Oung, WA6SNC, 1452 Vallejo St., San Francisco, CA 94109.

Hamfest-Sunday August 26, in Bluefield, W. Va. at Bluefield City Park Shelter. Flea market, box lunch, etc. For info: Ralph Tiller, K4CGF, Rockygap, VA 24366.

The Novice Magazine-publication for beginning ham $3 yr (10 issues) $1 for 5 diff back issues, 40 cents for sample copy. 1240 21st St., Hermosa Beach, CA 90254.

Wanted: Swan 1200-X or W, Linear Amplifier. Russell, 19680 Mountville Dr., Maple Hts., OH 44137. (216) 662-2175.

Wanted: QSL Card swappers to join fastest growing CB Club in U.S. receive 8X10 certificate, ID card, lists of swappers, printers and much more. CB Radio QSL Club of Greater New York, Box 427, Rego Pk., NY 11374.

Rubber address stamps. Free Catalog. 45 type styles. Jackson's, Box 443F, Franklin Park, IL 60131.

QSLs. Second to none. Same day service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah 84015.

Active Hams - Monthly mailer of reconditioned and new equipment specials. Sell — buy — trade. Write Associated Radio, 8012 Conser, Overland Park, KS 66204.

SELL: Swan 270 $255. Model 55 Remote mobile antenna, connector and bumper mount, $70. Heath IG-57A Sweep Generator $95., 10-101 Vectorscope $80. GE "Volt Pac" 9T92Y3G3 Variable XFRMR $70. All like new, with manuals. R. Murphy, W9-DCK, 312 N. Franklin, Shawano, WI 54166. (715) 526-2034.

FCC type test answers general advanced extra first second class $10 specify Dixie Tec Box 8352, Savannah, GA 31402.

HAMMOND NOVACHORD. Unique, 36 year old electrical musical instrument. Keyboard and controls imitate piano, organ, singing guitar. TELEVISION TAPE RECORDER. Slant scan, 1/2 inch, transistorized. Both reasonable. Voyles, 7425 Brushmore, N. Canton, OH 44720. (216) 494-5648.

TECH MANUALS for Govt surplus gear, $6.50 ea, R-220/URR, R-389/URR, R-390/URR, URM-25D, URM-32, SP-600JX. Hundreds more. Send 50 cents coin for list. W3IHD, 7218 Roanne Dr., Washington, DC 20021.

Li'l Lulu 6 meter transmitter by Whippany Laboratories in original carton, new, $60 plus shipping. Box 402, Bradford, VT 05033.

Mobile Ops — Completely shielded ignition system kits available for most US cars 1965-72. Alternator, generator and regulator filters, feed-thru capacitors, copper braid in stock. Write Summit Enterprises, 36 Winchip Road, Summit, NJ 07901.

HOOSIER ELECTRONICS-Your ham headquarters in the heart of the Midwest where only the finest amateur equipment is sold. Individual personal services by experienced and active hams. Factory-authorized dealers for Drake, Regency, Standard, Ten-Tec, Galaxy, Hy-Gain, Cush Craft, Mosley, Ham-M, Hustler, electronic pocket calculators, plus many more. Orders for in-stock merchandise shipped the same day. Write or call today for our quote and try out personal, friendly Hoosier service. Hoosier Electronics, RR 25, Box 403, Terre Haute, IN 47802.

National NCX-5 MII, AC supply/speaker, Autronic keyer, standing wave meter, Collins mike, Xtal calibrator, have new toy. $350. W6OTN, 2828 Latham Drive, Sacramento, CA 95825.

WANTED: Type TA Atwater-Kent Det. Audio module, Cabinets for Radiola IV & DeForest D-17 with or without Chassis, Radiola II Variometer, junker chassis ok, Sleeper receiver, junker would be fine. Joe Horvath, W6GPB, 522 Third St., San Rafael, CA 94901.

CAPE COD'S fabulous Hyannis! N.E. ARRL Convention September 29 & 30. Flea market, seminars, FM, SSTV, AMSAT, YL trips, 2 pools, golf, beaches, sailing. Early bird registration $3. W1ZQQ, 17 Barnes Ave., E. Boston, MA 02128.

FOUNDATION FOR AMATEUR RADIO annual Hamfest Sunday 21 October 1973 at Gaithersburg Maryland Fairgrounds.

SIDEWALK SALE: Every first Saturday-now in its fourth year. Turn your surplus electronics into cash at the Southwest's leading Ham store. It's free. Electronics Center, Inc. Dallas, TX 75204.

Sell Heath CW filter $15, Plate xfmrs 3600-0-3600 with 110/220 pri., 1 amp $25. 1.7 amp $40. W0-AIH, Paul Bittner, 814 4th St., Virginia, MN.

Cash for metal 4-1000 sockets also 30 kv500 pfd door knobs. W4GD, 3087 Carnes Ave., Memphis, TN 38111.

SP-600 new condition, little use, $285. Bouvier, 2609 Finlaw Ave., Pennsauken, NJ 08109.

For sale: P-6315 pwr transformers, new $7.50 ppd. Goodman, 5826 S. Western Ave., Chicago, IL 60636.

Wanted: Late model counters, plug-ins VLF tracking recvrs. Hi stability standard oscillators. WA8ULG, Ted Hartson, 31 Sanderson St., Battle Creek, MI 49017.

Color TV - want NTS color TV lessons & answers for master color TV course. Sell INCL-2000 linear $375 & sig/1 CX-7A $170. K4RTA, 105 Freshrun Dr., Hendersonville, TN 37075.

Swan 500C, 117xc with spkr $435, W0MS, 303-798-6255, 7190 S. Franklin Wy., Littleton CO, 80122.

Anyone want to play chess on the air! Contact Bernie, W8KXL, 811 Diane Dr., Cincinnati, OH 45245. 752-2259.

Antique rcvr (Thermodyne-1920's) Tubes and case incomplete, but has front panel. Also 1963 chev. car radio. SASE for info. WA2CPM.

Sell: Galaxy GT550 complete with pwr sup, vox, cal. spkr. 5 hours use perfect. F.W. Cooper, W3N-V, 8258 Brittany Pl., Pittsburgh, PA 15237.

Wanted: Heath HD-10 or Eico 717 keyr and turner plus 2 mobile mic. WA1NTF, 33 Bates Ave N. Kingstown, RI 02852.

Sell: Receivers test equipment and components. SASE for list. Lisaius, 116 Orton Rd., W. Caldwell, NJ 07006.

T43GGV, Heath counter and scaler GE Pacers, WA-5CMC2309 Bullington, Wichita Falls, TX 76301.

Call letter license plates wanted for collection. Will reimburse postage. Art Phillips, WA7NXL, 3401 N. Columbus, Apt. 5-O, Tucson, AZ 85712.

Selling station. Laff. HA350 rec. like new in orig. box. FB DX60B xmtr & h/b tr switch. All $165 or offer. J. Pluth, 6092 Chase St., Downers Grove, IL.

Wanted: Tecraft 220 transmitter with pwr sup. W1-BOM, 61 Sunset Blvd., Wethersfield, CT 06109.

Sell: HB pwr sup for SB-101, HW-100, etc. $17. Hi-impedance dynamic mike $5. Kw plate trnsformer, 2500 volt at 1,000 ma $15. Need SB610. Nastoff, 320 W. 56th Pl., Merrillville, IN 46410.

Eimac8875 tubes. Brand new! with sockets. Asking $60 for two. Marty, WB6NWW, 5349 Abbeyfield St., Long Beach, CA 90815.

Wanted: Galaxy III/IV, HW-22A, or Swan 350c with or without sup. State condx/price. John Brewer, 2204 Commander St., Pasadena, TX 77502.

Sell: Swan 350, 117c, VX-1, mike, manual. Excel condx $295. W6DJZ, 213-294-0284. L. A. eves.

Wanted: old tubes-2-1N5-GT, 2-1D8-GT, 2-958 Acorn tubes. Please advise as of price. Charles Brand, 242 Highland Ave., Haddon Heights, NJ 08035.

Stolen with VW Campmobile Drake ML-2 all xtals and mike Ser. No. 10582, on-off sw broken. Notify W3MSN(301)894-3977 or Prince George's, County Police.

NCX3 with AC pwer supply. Speaker $175.00. No shipping. Phone: (914) RO9-2568.

Wanted to buy or copy: manual for Hallicraft SX-101A rec. Charles Robbins, P. O. Box 116, Orland, CA 95963.

Sell or Trade: Gonset G-50 6M, clean w/mic, manual, $109; want Dayco DR30, HAI44; WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755.

For Sale: 8 1/2" X 19" panel with (40) 0-1MA vertical meters, $75.00. Nems Clark 1411 225—260MC Rec., $100.00. Don Dressen, 17 Woodlyn Ln., Bradbury, CA 91010.

Want: Clean 75S3B. State serial number and filter complement, particularly interested CW. 367 Northwest, Vacaville, CA 95688.

For Sale: Heathkit SB220 Linear, only 10 hours use, $345.00. Swan500 w/ps, factory aligned 4 mos. ago $395.00. Both like new, no scratches. Going QRP. Also Heathkit HP-10 Elect. keyer, $35.00 & Swan phone patch $38.50. Never used. D. B. Wood, K6AHM, 11325 Isleta St., LA, CA 90049. (213) 472-5001.

Heath GR-78 Solid State general coverage recvr, $90 postpaid. K2MVR, 50 Mountain Rd., Verona, NJ 07044.

Help! Need info for converting Hammarlund HX-50 to 160 mtrs. K5MHG/6, 419 Westbourne Dr., LA, CA 90048.

Wanted: Old Radio, TV and similar servicing mags, also June '66—'73 mags. Donald Ryan, Star Rt., South Plymouth, NY 13844.

Make offer: DM35-D, 12V in 600V-300MA Out. Choke .01 1500V test. RF Meter 250 MA. 100 ft. 72 ohm T.L., 1000 V. ins. FOB. J. J. Crowl, POB 74, Ingram, TX 78025.

For Sale: Lafayette HE45A 6M transceiver and Lafayette HE61 VFO, $30.00. Norman, WA2PXT, 126 Parkway Dr., Westbury, NY 11590.

SSTV Parts. A lge. selection of building components for the SSTV home brewer. SASE for list. Carol Kimber, K7WUR, 590 Bonnie Brae St., Lander, WY 82520.

BC221 frequency meter, AC power supply, TM300 manual, $55.00. N. Gruenfelder, WA2PXT, 126 Parkway Dr., Westbury, NY 11590.

Vibroplex original in like new condx, $12.50 PP, K8OUQ, 268 Annis Ct., Chillicothe, OH 45601.

For Sale: A Hammarlund HQ-170 receiver with clock and manual. Perfect condx. Price $150.00. WA5WZX, Elmo Baese, 826 E. College St., Seguin, TX 78155.

2 mtr FM — SBE144 Solid State xceiver 9 channels xtaled, $225 or best offer. WA1MCY, 53 Old Amesbury Line Rd., Haverhill, MA 01830.

Join the American Cryptogram Association, 312-A W. Jackson St., Mexico, MO 65265. $3/ur.

Wanted: RAX-1 Receiver CG46116 — BC610 parts-tubes. Autodyne, Box 26, Bethpage, NY 11714.

Chester County (PA) ARC meets last Thursday. For information call W3HUS, 827-7374.

DX QSL guide for 54 languages. Gets QSLs! $3.95. K3CHP, Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

Sell: Hammarlund HQ180C, $200. Johnson Valiant $200 or best offer. Both perfect condx. Fred Schipman, K4JXZ, P.O. Box 749, Florence, SC 29501.

HEATHKIT-GD18 grid dip meter, 2-250 mc., $15. For collectors: Telephonics TM37 headphones, $12. Postpaid USA. H. Marhoff, P.O. 569, Largo, FL 33540.

Sell: HR10B with xtal calibrator mint condx, $49; RME HF 10-20 converter excellent, $19. Pair makes hot novice set-up. You ship. W6NVA, 15426 Patronella Ave., Gardena, CA 90249.

LEICA Camera, Mod. G w/35 mm, 50 mm & 105 mm coupled lenses, shade, filters, tripod all in case, size of sm. typewriter. $165 postpaid USA. H. Marhoff, P.O. Box 569, Largo, FL 33540.

Heath-Kit "Q" Multiplier QF-1. This is a dandy — $16.00 postpaid USA. H. Marhoff, P.O. 569, Largo, FL 33540.

Home for sale: 60 ft. twr, triband beam, radio rm., unusual split, 4BR, 2 1/2B, beach, marina, cntrl A/C, gas heat, sprklrd, dble elec. gage, beautiful area, LI Sound. Call for appt., 914NE3-7077, W2-ASI, New Rochelle, NY 10805.

Wanted: Metal tape reels for TG-34A code machine. W8OHO, J. J. Vargovic, 695 E. Ford Ave., Barberton, OH 44203.

MOSLEY TA-40KR converts TA-31, 32, 33, 36 or MP-33 to 40 meters, $30.00. W3HUS, (215) 827-7374.

Wanted: Johnson 250-20 Low Pass Filter, Norris McKamey, RR1, Box185, Bettendorf, Iowa 52722

For Sale: DX-100 xmtr, $95.00, Ameco TX-62 xmtr, $95.00. Both gud cond. No ship. F. Kurz, P.O. Box 347, Zion, IL 60099.

Heathkit Transceiver HW-16 plus HS-24 speaker. Well-built & assembly manuals & 4 crystals, $90. W2AMI, Sidney Weinberg, 252-08 Cullman Ave., Little Neck, NY 11362.

Lafayette Vert. Ant., 80-10M w coaxes connectors. $10. I ship. WA3LPK, 2300 Louise Ave., Baltimore, MD 21214.

Wanted: Clock & manual for copy for HQ145—X and meter for Ranger I. State price. W. Kipping, Box 253, Box Elder, S. D. 57719.

Sale or Trade Radio Shack DX150A Receiver, use: 1 hr. with warranty, $110. Julio Sannazzari, W6-CWR, 1821 Albany Dr., Santa Rosa, CA 95401.

Wanted: Lafayette HA-460. Write R. Davis, 2465 Gutford Rd., Jeffersonville, IN 47130.

Wanted: Drake Linear L4B widbs John Savonis, 410 Blake Rd., New Britain, CT 06053.

Cash for 4-1000 & 4-400 metal Eimac sockets & chimneys W4GD, 3087 Carnes Ave., Memphis, TN 38111.

Collins 32V1; National NC300 with hf. converter-Heath DX100 mint - manuals - $100 pack - pickup. W1SO, (301) 582-5004.

Chicago Area: Package only, mint HT37 & HQ170C $325 or swap for SR150, AC or SB100, AC. K9ARZ, 338 Sophia, W. Chgo., IL 60285.

Wanted: Galaxy III xcvr. with/without pwr supplies. State condx & price. Barry/WA5DTK, 2204 Commander St., Pasadena, TX 77502.

Every Shack should have a legible wall clock. We got em. 12 or 24 hour, battery or electric, all styles. WB5BNM, 1524 N. Okla. Ave., Shawnee, OK 74801.

Trade: Very nice Collins ART-13, all pwr sup, manual, 2 spare 813s, for Viking Ranger or best offer. K5UAE, NPS, SMC 2340, Monterey, CA 93940.

Sell or trade: Gonset G-50 $85, CN-50 14mc if $20, 4Q-145X $55, needs ant & osc WB2WTJ, 1720 77th St., Brooklyn, NY 11214.

Hygain TH-2-mk3 exc condx $59.95, Hygain mod 23 2m $8.95, Srr-13A 2-32mc gen cov $39.95 W6RQZ, 1330 Curtis St, Berkeley, CA 94702.

For sale: SB303-HA10 kw-75A3-HT37-S37 Swan 350 w/ps model 19 TT-Artl 3-mar xcvr-trc8. All fb. W7KSG, 1876 E. 2990 S. SLC, Ut 84106.

Collins 75S3 barely used $375, KWM1 excel $200, pwr sup for same orig condx $73. Package deal $600. WA6SNC, 1462 Vallejo St., San Francisco CA 94109.

Sell: Alltronic-Howard model L RTTY conv. w/850 cycle shift w/cab excel $100. pwr sup 110 volts in 28 volts at 20 amps outrack mt $40. WA4WIA, 16—45 Dobbs Ln., B'ham, AL 35216.

National URR27 VHF 110 to 190 mc $125. Heath 2m pawnee excel condx $140. ARR-7 55okc to 42 mc p.s. p.d. $35. W2OAP.

Have a great deal of audio gear for sale. Some new. Sase for list. Steve Thurber, WB0JON, 316 Island View Rte, Int'l Falls, MN 56649.

For sale: Johnson Porta Pack (250-854-001) $40. Ross Hansen, WN7TZU, Preston, ID 83263.

Ham golfers: reduce QRM on the green QRN on your drives. Practice at your QTH. Free info. W6-KUH/7, Box 887, Provo, UT 84601.

BC-342, 1.5-18.1 rcvr with manual and matching LS-3 spkr. ac pwr $50. Silbert, White Sulphur Springs, NY 12787.

Wanted H.P. 410B meter, Sams AR manuals, have 2 Atwater-Kent radios and old radio & TV tubes for sale. PIL. Williams, 106 S. Jefferson St., Lewisburg, WV 24901.

Swap or sell: CV-591A/URR ssb convrtrs, as is $35 fob. Clem, K8HWW, 33727 Brownlea Sterling Hts., MI 48077. 1-313-268-2467.

Want to buy: ESSA tech. rpt. ERL 110-ITS 78 on predicting HF propagation. W6EL, 11058 Queensland St., Los Angeles, CA 90034.

4-1000 2-30 mHz, 5kv s.s. supply, extras, $350. W2RHE, 2609 Finlaw Ave., Pennsauken, NJ 08109. 609-662-6575.

Want: 75S3B or C Collins rcvr, will also take any late Collins gear. Pay cash. W4AIS, 300 Thornwood Dr., Taylors, SC 29687.

Sell: ARRL handbooks, 47, 52, 53, 54, $3 ea, 30, 33, 35, 42 $5 ea. 1937 Jones Handbook $5 fob. Douglas, 2254 Pepper Dr., Concord, CA 94520.

Wanted: Amprobe, rf millivolt mtr. For sale: RME DB-23 preselector $25. John Becker, 201 Marion, Prospect Hts., IL 60070.

New codax keyer, model 361, cash and carry $50. K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

For sale: Hallicrafters HT37 orig owner, looks and runs fine $125. W1KGU, Pope, 294 Summer St., Brockton, MA 02402.

For Sale: Tri-EX THD-471 medium duty guyed crank-up tower in good condx. Also TH-6DX beam. Prefer So. Cal. deal. Jerry, WA6GLD, (213) 332-9542.

QST wanted: Six issues for library 1965-Jan, Feb, Mar, Apr, May June. Alex Henry, WA9YXA, 1057 Spricewood Dr., Jeffersonville, IN 47130.

Eico 460 scope, mint w/3 probes & manuals. $85 firm. I ship 48 states. WA3MKB, D. Warnick, RD2, Bx 122F, Spring Grove, PA 17362.

Want: Swan Mark II, TV-2 transvrtr, 508 vfo. Sell: Swan 250, 117xc, $235. Heath HW32-A $75. WA3-HMQ, 301 Blacksmith Rd., Camphill, PA 17011.

Heath sb station, 301-401-200. Testers, scope, keyer, ant., misc. Sase for complete list. G. Beyer, 15426 Comstock, Grand Haven, MI 49417.

Ten mtr skeds wanted with Delaware, Vermont & South Dakota. WB2FJX, Gerry, 158-14 85 St., Howard Beach, NY 11414.

Cleaning shack. Lots of goodies. SASE for list to WB2MRA, 212 No. Jerome, Margate, NJ 08402.

Swap: 75A4, w/spkr, for rc system. Heathkit or similar. W1CZM, PO Box 102, Stockton Springs, ME 04981.

Wanted: Urgently manual for Systron donner model 1039 counter, will copy. Heard S. Lowry, 915 Madison St., Manchester, TN 37355.

FM Crystals: Motorola & GE, 6 & 2m. Write for list. Harry McCollum, 1010 West First St., Mt. Pleasant, TX 75455.

Tektronix Scope 517-A, 60 mHz, 7nsec rise time. Like new $275. Stanley Garstka, W9YDR, 5700 Wilson Ave., Chicago, IL 60630.

Hygain Duobander model DB10-15A with balun never used. $70. Need SB-220 and RDF type selsyns. K5FKD.

Handy-Talky: GE Pocketmate H.T. with charger, manual with 94 crystals. Will send via parcel post at no cost. $150. Ken Mahoney, 455-41st Ave., San Francisco, CA 94121.

First caller takes my clean HT37 xmtr for $175. Leonard Dore, 301 Washington Ave., Pleasantville, NY 10570. 914-RO9-2568.

For sale: Bird coaxwitch model 72-2 $25. Model 74 $30. Hallicrafters S-38C, needs work $15. Eico code osx. $10. fob. W3MSN, 5108 Boulder, Oxon Hill, MD 20021.

For sale: Heath HW-22A, mint with man $85. HP-13A DC supply mint with man $45. Want: SX122 and Hustler 20m mobile tip. T. Coddington, WB6-AWC, 7825 Scotts Valley Rd., Lakeport, CA.

Signal One owners! Booklet of compiled problems and their solutions. $1. W0YVA/4, P.O. Box 6226, Shirlington Station, Arlington, VA 22206.

Drake R-4B rcvr, like new, guaranteed $375. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

Free, pick up only, one Acme telephoto transcvr model FNP-IS. N.C. Moseley, Beechwood, Dr., Tarboro, NC 27886.

Globe Deluxe VFO for sale. Tunes 80-6 meters, cost $25. Also Burroughs adding machine, $35. R. H. Scott, 3579 Fish Ave., Bronx, NY 10469.

Heath IB-101/IB-102 counter. Units have counted to 220 mHz. Manuals, cables. K8NGV, 16496 W. Six Mile, Detroit 48240.

Worked South America Certificate: Work all 13 countries. Send list and $1. HC1TH. 4805 Willowbend Blvd., Houston, TX 77035.

Wanted: Touch-Tone rcvr SD98148. Garton, 1301 W. Estes Ave., Chicago IL 60626.

For sale: Yaesu FTV-650 transvrtr for 6m ssb. Perfect shape. $100 fob. Joe Roberts, W7DRR, 9251 N. 37th Ave., Phoenix, AZ 85021. 601-937-7092.

Linear builders: send sase for lo priced list of hi power parts & goodies. Mace, 8600 Skyline Dr., Hollywood, CA 90046.

For sale: SX42, $65. Henry 2K $400, 2K-2 $500, 2K-3, $650. KWM-2 36,460, 516F2, $1000. 51J4 $400, others. James Craig, 29 Sherburne Ave, Portsmouth, NH 03801.

For sale: GE Progline mobile 60w 2m fm R94-T34 and 94 all assc $100. Wanted: Heath Shawnee 6m & Pawnee 2m. Have 2m fm equip. to trade. Burt Cheesman, Rt. 5, Lexington, SC 29072.

I still have used test equipment, radios, tubes and parts to sell. Send sase (long) for list. James Fred, RR1, Box 28, Cutler, IN 46920.

Printed circuit negatives made. Sase and quarter for info/prices. P-C Nega systems, 186-80th St., Niagara Falls, NY 14304.

Heath SB-101, w/cw 400Hz fil., SB-600 spkr, HP-23 p/s. Excel condx. Pkg deal $350 fob. A. Emerald, 8956 Swallow Av, Fountain Valley, CA 92708.

160m ssb-Central Electronics 20A xmtr, 45Bvfo & qt vox, factory wired $60 ppd. Ameco model CN-144 2m convrtr with ps-1 pwr sup $30 ppd. Shank, 21 Terrace La, Elizabethtown, PA 17022.

Receiver National NC-303, xmitr Johnson Invader, make fair offer each. W3GEB, 4640 York Rd., Baltimore, MD 21212.

For sale: QST mags 1915-1929. Will break collection in complete years. Also have Canon FL85-300mm telefoto zoom lens. Paul Kluwe, Box 28, Cedar Lake, MI 48812.

Sell: Hygain 15m beam model 153BA $40 or swap for DB 10-15A. WA9HRN, C. Pitcher, 5 Whitehall Ct., Buffalo Grove, IL 60090. 312-537-4655.

Wanted: Radio control model airplane xmtr, rcvr, servos, etc. equipment. Jim Brink, WB4FTR, POB 3734, Fayetteville, NC 28305.

Sell: 2 good 4-1000A tubes $30 ea, also two Heath VF-1 VFO's $15 ea. Willie Carr, WA4RDV, 1145 Kerns Ave., S.W. Roanoke, VA 24015.

Sale: SB300 mint $200, Mosley classic 33 ant $65, W2AIN, J. Adam Frisch, 1 Channel Rd., Toms River, NJ 08753.

Sell: 21AXP22 color picture tube w/yoke. Rebuilt, hardly used $20 must pick up. W2WLJ, 17 Coleman Rd., Berlin, NJ 08009.

Sell: Eico 369 sweep gen. mint $50, Dejur 8mm projector mint $25. Samkofsky, 4803 Brenda Dr., Orlando, FL 32806.

Want: old radio tubes with brass bases and pre-circa 1927 transmitter tubes, W9LGH, 610 Monroe Ave., River Forest, IL 60305.

KWM-2 and S-line owners, compiling booklet send problems & solutions. Free copy sent to contributors. Frank Andrei, MR-1 Saltsburg, PA 15681.

Transformers rewound, Jess Price, W4CLJ, 507 Raehn St., Orlando, FL 32806. 305-425-7251.

R-4B with 2 cb crystals $375. M. Tewksbury, WA-8RYG, 4361 Clarkwood Pkwy 425, Warrensville Heights, OH 44128. 216-662-3868.

Sell: BC-453 200-550 kc rcvr with built on pwr sup $25, Morris coil winder $8 all plus post. W6-BLZ, 528 Colima St., La Jolla, CA 92037.

25 amp SCR's on heat sink 400 piv RCA C3 $2 ea., 1.6 amp 50 piv-2N 1595 5 for $1. J. Schrenk, 2707 McDivitt Rd., Madison, WI 53713.

Wanted: bug or keyer. Describe, state condx, es price first letter. Stan, WA3EXX, 136 Manhattan, Waldwick, NJ 07463.

For sale: 2m fm transistorized p.s., 75 watts output crystalled for .31/.91, complete, ready to go, excel cond. $85. W2LHW, (914) 968-3920, Yonkers, NY

Sell trade 71 foot Tri-ex crank up twr, TH6DXX, ham-m, all manuals. Want 5 bd ssb transcvr or? R. Pohorence, 2334 Regal Court, Lawrenceville GA 30245.

For sale: HT32A, good condition, $100 you pay shipping. M.E. Knowles, 9 Brown St., North Billerica, MA 01862.

For sale: Heath HW19 ten mtr transcvr $25, pair new 4-400A $50 pick up only. W6PZX, S. San Francisco. 589-1369.

SX101 $100, new Simpson 260 $50, Eico ps 12 volt solid state $50, Drake W-y wattmtr $50, HT-32 transmtr $150, more. Dupont, 15 Fitchdale, Bedford, MA 01730.

For sale: General Radio 617-C Interpolation oscil. $65, Ranger I, excel condx $80. SASE for list. W1BGW, 28 New Haven St., West Roxbury, MA

Your KWM2 capable of "better than new" performance. You can do it easily. Write: W0BNF, Box 105, Kearney, NB 68847.

Sell: Drake TR3 and AC3, National 1 inch scope, variacs, cooling fans, best offer. WA1ING, RFD 1, Box A-9, Saunderstown, RI 02874.

New Hy-Gain TH6DXX antenna, $120.00. 50' Rohn No. 25 Tower and acc., $120.00. Ameco PCL-P pre-amp., $17.50. Tappehorn, 2536 Kings Hwy., Louisville, KY 40205.

Heathkit MT1 xmtr, 90W AM/CW, MR1 Rcvr, 80-10M, HP20 & HP10 AC and mobile pwr sup, all manuals. $120, you pay ship. R.F. Keeth, 504 Virginia Circle, Forrest City, AR 72335.

Oldies, Gutman U-10 FQ mtr for $10. Meissner Xtal Calib. No. 9-1076 10-50-100kc at $10. W.J. Kinne, 1163 Ingerson Rd., St. Paul, MN 55112.

Wanted: Calibrator for NC300 — XCU-300. WN-4BCY, Don Hammond, Faunsdale, AL 36738.

2 — HT32 Transmitters, $150 each. SX101 Rcvr, $99. NC303 Rcvr, $175; Matchbox, $60. Drake wattmeter, $50. Johnson Ranger, $75. New Eico 12V supply, $50. Simpson 260, $50. M. Dupont, 15 Fitchdale, Bedford, MA 01730.

Wanted: Late model Scope, Cash or trade. W3MSN, 5108 Boulder Dr., Oxon Hill, MD 20021.

Wanted: Copy of assembly manual for Heath Kit AR-2 receiver. M. D. Chedester, Box 461-A, Rt. 13 Baltimore, MD 21221.

Complete set of Popular Electronics for sale. Jan 1960 to June, 1972. Best offer. W1IVW, 4 1/2 Hawthorne Ave., Methuen, MA 01844.

Sell: SP600 recvr, $125. 40-80 mtr Cliffdweller ant $75. HA460 6mtr transceiver $90. Viking II xmitter, $60. No ship. WA1DHM, 16 Brae Road, Fairhaven, MA 02719.

Wanted: Information on coils to put the Central Electronics 100V on 160 meters. W7JI, 235 E. 15th Street, Tempe, AZ 85281.

Wanted: Yaesu FT101 and FT2 W6BL Box 1975, Beverly Hills, CA 90213. Herb, (213) 653-2250.

Cincinnati Hamfest: The 36th Annual Hamfest will be held Sunday, September 16, 1973 at the All New Stricker's Grove on State Route 128, one mile west of Ross (Venice), Ohio, Check local area map for location. Lots of food, flea market, contests, and model aircraft flying. $7.00 covers everything. For further information, contact: Jim Wellman, W8HSI, 725 Stout Avenue, Wyoming, OH 45215.

Drake TR4 No. 29040 Rv4 AC-4, $525, WB6 RQK, Box 625 Stinson Bch., CA 94970.

Hallicrafters HT-18 VFO/exciter 80-10, CW/FM. Drives HA-2, HA-6, TV-2, etc., $45; 1296 & 432 KW Linears, trade/sell, list SASE. W4API, Box 4096, Arlington, VA 22204.

Microphone - Dynamic Electro Voice, Mod. 676, never used, $40 Wm. McFadden, W8DFA, 29 Vernon Ave., Wheeling, WVA 26003. 304/242-3655.

For Sale: Bud Cabnit, 21"W X 15"D X 14"H, for 12-1/4" X 19" panel, excellent condx. $8.00 FOB. W2RXW.

Buy or borrow to copy: CV591A/URR manual, also Motorola Dispatcher Motorcycle FM rig manual or diagram, Philip D. Greenway, W4LRR, 234 Elden Dr., NE, Atlanta, GA 30342.

Wanted: 2 mtr Walkie-Talkie, 1 to 2 wts. Must be clean and very low price. C. Zornes, W9TAL, 6634 So. Campbell, Chicago, IL 60629.

Wanted: Digitrio R/C Equipment. Please state item, price and condition. Damian E. Schumacher, Unit AA, Box 993, APO New York 09098.

Wanted: Old battery operated radios and crystal detector sets of the early 1920's. Need not be in working condx. State model and price. McKenzie, 1200 W. Euclid, Indianola, IA 50125.

Ham mags, CQ, QST, 73, 10 cents each $1 yr 2M. Xmtr, $12 and rcvrs, $6 (SCR522) all tubes. New LaF, VFO 6m He6/A, Eico 722 vfo all band, make offer. WB2OBO, 1533 Lowell Ave., New Hyde Pk., NY 11040.

Sell: FT101, 160M w/xtal, CW filter, fan & mic. Mint condx. D. Sachnoff, 9429 Ohio, Omaha, NE 68134.

Wanted: Parts list for Motorola 41V rec strip PA9033 w/8mHz IF. Need: PN for coils in two freq. kit. T. Adams, 9707 Hansford, Austin, TX 78753.

RTTY (Hal ST6 & AK1) factory tuned & rack type KSR28 with parts for rack mount. (no rack). $550.00. WA5ZUH, Rt. 1, Box 58, Lone Wolf, OK 73655.

Sell: Heath HW-100 w/Swan tuning, AC&DC PS Hustler ant. mic. Best offer. WA6IYK, 8809 Tyrone Ave., Panorama City, CA 91402.

Wanted: Stancor ST202A W7JLU, RFD 1, Box 273-U, Mulino, OR 97042.

Sell: AN/FGC-1 dual RTTY Converter $200., BC-342-N rcvr/pwr supply, $35; Eico 324 R.F. Gen. $20. WB2IHB, 244B Bayport Ave., Bayport, NY 11705. 516/472-3279.

Wanted: Drake RF Wattmeter, Mod. W-4; Collins 75A-4, late serial number. K2UYG, 17 Buckminster Rd., Rockville Centre, NY 11570.

Eico 753 xcvr, 751 P/S spker console, $100.00, Drake 2NT xmitter, $90.00. WV4 VHF wattmeter, $50. Others, SASE gets list. Colella, WA2HQD, 105 18 181 St., Richmond Hill, NY 11419.

Sell or trade: Measurements 80 sig. gen, $175. ART-13 w/FSK and S.S. pwr. sup, $45. Others. Johnson, 6305 Redbird Terr., Clinton, OH 44216.

Heathkit Apache, $85. Mohawk & spkr, $115; the pair, $175. Fine shape with manuals. No shipping. K1GAW, 484 Main St., Portland, CT 06480.

Model 15, KSR teletypes, $25 each, Goodman, 5826 S. Western, Chicago, IL 60636.

For sale: KWM2, $625, 516F2, $125, PM2, $85. Others. M. D. Shapiro, WA3IFQ, 1138 Boxwood Rd., Jenkintown, PA. 19046.

DXers write in English. Why not reciprocate? In 54 languages! K3CHP's DX QSL guide $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

Sell: HW100 with power supply, $200, SB200 linear, $185. Kressel, 1260 Westcott St., Syracuse, NY 13210.

Sell: 75A4 Serial 5329-3 filters, $350 firm. Heath SX50B, $60. Write, Oberstein, 55 Knolls Cresc., Bronx, NY 10463.

For Sale: Hallicrafters HT32 exciter, $125; HT41 linear amplifier, $150; Collins 75A3 rcvr with spkr, $125. Many others. SASE. D. B. Moore, 29276 Snapdragon Pl., Canyon Country, CA 91350.

TR-3, RV-3, HBAC, fine condx. Sell or trade for old Wireless Gear, etc. SASE to W2CE, 8604 55th Rd., Elmhurst, NY 11373. 212/639-3982.

Wanted: Kennedy, SE-143, Grebe, Atwater Kent, IP-501, D. B. Mike and old Wireless gear; Cash or swap equipment. W2CE, 11373, Elmhurst, NY 212/639-3982.

Collins Fetters (new) 2.1 kc at 455 I.F. S-line case, $21.50. K0ARV, 2925 Wildwood Ct NE, Cedar Rapids, IA 52402.

HY-Gain 18AVQ vertical, 80-10 meters, only year old, like new. C. Counselman, 123 Radcliffe Rd., Belmont, MA 02178.

Weston Model 547 No. 2757 (1927) test set for old battery radios. Bakelite case not cracked and in mint condx. Best offer or trade. W7BUS.

Wanted: Hallicrafters HT-32B, SX122A, HA2, HA6, P26 must be in excel. condx. with manuals. Jim Gysan, W1VYB, 53 Lothrop St., Beverly, MA 01915.

Wanted: Swan500-350 or 270 and ac ps in working condx with manual. Box 8352, Savannah, GA 31402

Wanted: Heathkit SB-640 with manual. State price and condition. WA2RPG, Philip Petix, 408 Thomas Avenue, Lyndhurst, NJ 07071.

Weston Model 301 and 507, Jewell and Readrite meters bought, sold, traded and repaired. James Fred, RI, Cutler, IN 46920.

Wanted: Antique wirelessequipment and parts,1920 vintage. T.G. Soukup, 161 Bob Hill Rd., Ridgefield, CT 06877.

Sell: Drake R-4B, one year old, absolute mint condx $350. John Mullen, POB 5883, San Francisco, CA 94101. (415) 921-6608.

Wanted: Cabinet to fit standard 8-3/4 inch rack panel. E. L. Hardin, 316 Greenbay, Lake Bluff, IL 60044.

Surplus equipment CHEAP— Novice Xmtrs - 75w; xfmrs, up to 750V., Tube pwr supplies, old tubes, var and fixed caps, all sizes, what do you need? W-B2OBO, 1533 Lowell Ave., NHP, NY 11040.

Drake R4, $255, Heath HW-7, $60. W0MS, 7190 S. Franklin Way, Littleton, CO. 80122. 303/798-6255.

BC-342, xcit 1.5–18 MHZ rcvr, with manual and matching LS-3 spkr. AC pwr. $50.00. Silbert, White Sulphur Springs, NY 12787.

Will swap Heath Delux Metal Locator for Heath HW7 or Ten Tec transceiver. Ken Hand, WN2EUF, Bridgehampton, NY 11932.

Invader 200 — $130. BC221-$50. 22 watt Pye 2m base, $60. WA2KWB, 26 Valley View, Trenton, NJ 19711. (609) 585-4188.

Join New York CB'ers needed to start Radio Patrol in the Queens, Elmhurst Area. No license required. Operating presently on 11 meters. Elmhurst Corona Radio Patrol, POB 427, Rego Pk. NY 11374.

Wanted: Heath Digital Clock and Heath QRP CW Transceiver. Tom Dornback, K9MKX, 2515 College Road, Downers Grove, IL 60515.

2KW PEP: 1KW RTTY CW Johnson Viking Thunderbolt amp. $175 or make offer. WA7UJQ, 5830 70th St., Marysville, WN 98270.

Wanted: Heath. H.O. -10 scope. Advise price and condx. W. K. Ault, WB6BKN. 1120 Larch Ave., Moraga, CA 94556. 415/376-6921.

Camera: Petri 35mm w/ttl meter, 35, 55, and 200m lens, $180. WB4UBA, 324 Burkewood Dr., Winston-Salem, NC.

Wanted: Ticker Tape: Equipt., Literature, information. Will pay cash. J. Kelly, 2901 Pace Ct., Sacramento, CA 95826.

Wanted: Early radio magazines, books, catalogs, broadcast and ship rcvrs made prior to 1930. Erv Rasmussen, W6YPM, 164 Lowell St., Redwood City, CA 94062.

Cash for you antique wireless equipment. Sell 1st class FCC License Course. T. Soukup, 161 Bob Hill Rd., Ridgefield, CT 06877.

International Crystal 6 meter converter mounted on 6 by 6 chassis with own AC pwr supply 7MC IF works FB $12 PP K8OUQ, 268 Annis Ct., Chillicothe, OH 45601.

Best offer takes: SB-301, SB-401, and HR-10, DX-60B. As is, prefer U pick-up. WB9BSH, 614 S. 24th, Mt. Vernon, IL 62864. 618/244-2567.

Drake Station, TR3, RV3, AC3. Excellent, factory overhauled last year. Illness forces sale. $400 offer. K7JYE, Albrant, 1706 Avalon Way (141), Hood River, OR 97031.

Sale: 2—Electro-Voice TV Boosters 300vc $5.00 ea., 1 — Blonder Tongue dist-amp for 8 sets, 75/300, $15. J. Oliveri, W2IXT, 447 S. Ocean Ave., Patchogue, NY 11772.

I would like to buy QST Magazines from 1970 back. Could anyone help? Ed Herbert, WA2NMW, 410 N. 3rd St., Minersville, PA 17954.

Sell Drake TR-4, 34PNB, AC4, M54, RV4, DC3, SB200, Classic 33. Pkg. deal only. Best offer. 5632 Haughey, Wyo., Mi 49508.

HP Counter: Homebrew pair 4-400 A5. Lots of FM GE/PL mobiles 6 & 2 mtrs. Some Mot dispatchers, Bob/K9KZN, 217/546-1556. RR 6, Box 187, Spfld, IL 62707.

Want: HR-10B, HRA-10-1 & SB-600. All mst be in gd to exll conx. Will pay bet $70-80 w/manuls. S.L. Ballinger, 11 Lown Ct., Poughkeepsie, NY 12603.

For Sale: Mint EF Johnson Key No. 114-321 for $5.50; also mint CQ Ant Roundup Vol II for $2. Both $7. WA1NYV, Box 363, Uxbridge, MA 01569.

Wanted: EF Johnson Viking "SSB Adaptor" for Valiant II. James N. Glass, W4CDK, P.O. Box 548, Eddyville, KY 42038.

Hallicrafters SX-43, clean gd condx, with matching spk. A gen. cov. rcvr (6-80m. commercial AM and FM). Make offer. WN8LIE, 10 Bates Rd., Morgantown, WV 26505.

For Sale: Johnson Ranger Xmtr with antenna relay & manual, $75. In very gd workg condx. U pay shipping. Paul Hughes, WB4ZPD, 902 Fields St., Hartford, AL 36344.

Sell: New Swan 12 Channel, 10W, 2M FM 1210A Xcvr, Xtals for 10 chan., AC pwr sup, mike, mobile mount, DC cable, $285. K2HNB/4, 3051 NW 46th Ave., Ft. Lauderdale, FL 33313. 305/735-1347

Early Radio and wireless material, such as Receivers, transmitter, books, catalogs, handbooks, tubes and magazines wanted for amateur collection. Erv Rasmussen, 164 Lowell, Redwood City, CA 94062.

Trade or sale: Collins KWM-2, $450; R-390/A $400. Both excellent condx. with manual. WB4-IIP, 4524 Banff St., Annandale, VA 22003. 703/280-1629.

For Sale: Johnson Pacemaker SSB Exciter w/ant relay and JT-30 mike, $120. Mosley CM-1 80-10 rcvr, $100. K8VOA, Star Rte. Box 118, Chassell, MI 49916.

Prop Pitch Meter, remote control, power supply, August issue 1971, 2-syisyns, compass. $75. Wm. McFadden, W8DFA, 29 Vernon Ave., Wheeling, W. VA 26003. 304/242-3655.

Sell: CQ Magazines: Jan., Feb., March, 1945; All 1950 thru 1951; Jan., May, Nov., 1952. Make offer. W2BGO.

9V1QJ/WB5HQY/HL9TH now located at: Mr. T.J. Daugherty, TNG & Doctrine Comd, DCSLOG, Ft. Monroe, VA. 23351.

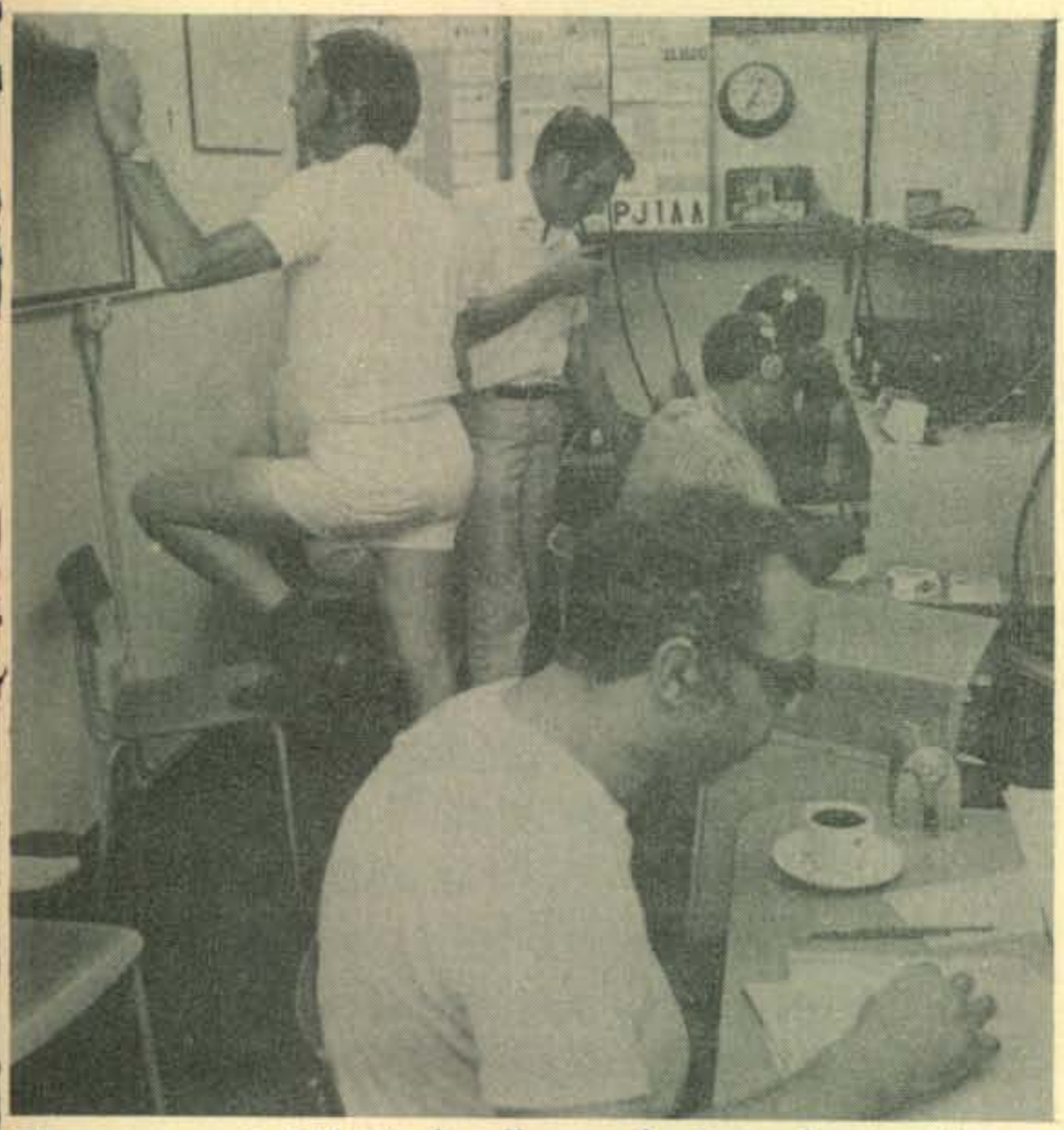
STATION OPERATORS

Multi-Operator, Single-Transmitter

CX8DI & CX1BBR, CX2CX, CX4AF, CX4BBX, CX5BR. **DKØAA:** DJ4XG, DJ8YQ, DK4ST, DK5SZ, DK8SK, DL3BK, DL6KB, DL8NU. **DL3LU** & DJ4GO, DJ5FW, DJØND, DK4OV, DK5OA, DL8RL. **DL4QF:** DA1QC, DA2QC, DJØGM. **DL8OH** & DK3NS, DK6QO. **DLØJRA:** DL7HN, DL7OD, DL7ON, DL7QU. DLØKG: DJ3HJ, DJ5JT, DJ5TH, DK2WR, DK8GM, DK8GT. **DLØRCA:** DJ1GX, DJ4EI, DJ6AP, DL2QB, DL9ME. **DLØWU:** DJ4AX, DJ8SW, DK4TP, **EL2DI** & EL2CZ. **FØZZ:** F2QQ, F6AZP, F6BHK, G3TXF. **FGØAMF/FS7:** K2KGB, FM7WN. **G3FVA:** G3FNM, G3SMM, G3SMT, G3SVW, G3WFT, G3YKJ, G4AFT, G4AUR, G4BJT, G8DMJ. **G3KMI:** G3WIE, G3XSV, G3XZG, G3ZBU, G3ZER, G4APA, G8DUO. **G3RCV:** G3VLX, G3WVP, G3YQG, G3ZAY, G3ZEN. **G3RRS:** G3SIT, G3UKS, G4AYL, G8DMQ. **G3VUM:** G3XDY, G3ZNS, G3ZPY, G4ALS, G4AOS, G4AZA, G4BGT. **G3WYX:** G3HTA, G3RUV, G3RUX, G3TJW. **G3YXR:** G2DSY, G3BJQ, G3MDR, G3RUZ, G3WSL, G3ZQC, G4ASM. **G4ANT:** G3IOR, G3JOC, G3LDI, G3MPN, G3VZT, G5AHE. **G8JC:** G3RMF, G3TBU, G3TQD, G3VDX, G3WFZ, G3WGY, G3XRU, G4AWA, G8ASO, G8BBP. **GD5BBG:** K4TSJ, W5MYA. **GM3YOR** & GM3FXM, GM3OLK, GM3PFQ, GM3YBQ, GM3ZAP, GM4ALK, GM4AQO, GM4BFQ, GM8ESJ. **GM4AFF** & GM4AXE, GM4BFX, GM8FTJ. **GM5AXO** & GM5ATK, GM5ATY, GM5AXS, GM5BAZ, WAØSVA. **GW3UCB/P:** G3WKH, G3WXS, G3XXC, G3XZK, G3ZLL, G4ABP, G4AHN, G4AJW, G8ESI, GW4BGD. **HL9UH** & HL9VF. **I4BMJ** & I4ADS, I4BFY, I4SRB, I4VOS. **I4GAD** & I4AUM, I4LCK. **I8DGP** & I8KBT, WA6ELX. **IG9BAF:** I1BAF, I1CGI, I1MTK, I1UW, I2TPL. **JA2YAB:** JA2BY, JA2DDD, JA2DGD, JA2FRG, JA2HO, JA2HZA, JA2JSF, JH2ACL. **K2GE:** K2KFE, W2JDH, WA2QIO. **K2GXT:** WB2HJV, WB2WVG, WB2ZOW. **K3MBF** & K3LJZ. **K6JGV** & W6KNC. **K7RSC** & W7GVF, WA7OXQ. **K9CUY** & K9TZH, W9ZRX, WA9RQY. **KØKU:** WB9ALN, WBØFGV. **KA2DX:** KA2AD, KA2DD, WA5IIS, WA8RWL, WB6CGM. **KA8FY:** CLUB. **KH6EDY:** KH6HLK, WA5TET. **KL7AIZ:** K1MBA, WB2GJW, K3YWJ, WB4ARV, WB4LEK, WN9IQA. **LA1H:** LA4KQ, LA8UL, LA8XM. **LA7V:** CLUB. **LA8AK** & LA5KO, LA6HL, LA8VP. **OH3MG** & OH3TQ. **OH4RH** & OH4NM, OH4SM, OH4RF. **OK3KGI:** OK3CFA, OK3UE, OK3-7555. OK1KPU: CLUB OZ6RT & OZ3CE, OZ5QU. **PI1PT:** CLUB. **PJ1AA:** PJ2ARI, PJ2AW, PJ2CL, PJ2CR, PJ2CW, PJ2HR, PJ2MI, PJ2VD, PPJ2WI, PJ9CB, PJ9VR. **PY1BQK** & PY1DBE. **SK3AH:** SM3COL, SM3COZ, SM3EAP, SM3EHQ, SM3FUA, SM3PZ. **SK5AL:** SM5BGK, SM5DFM, SM5DBS, SMØDSG, SMØGM. **SL6BH:** SM6DSQ, SM6SM. **SM5AOE** & SM6BJI. **SMØMC** & SM5AZU, SM5BGM, SMØATN. **SP5PWK:** SP5AUY, SP5BB, SP5BT, SP5DZJ. SVØWJJ & SVØWII. **VE1ASJ** & VE1ACH, VE1DH, K1MTJ, K1RQE. **VE1XW** & VE1AIH, VE1AST, VE1KG. **VE6AO:** VE6AB, VE6AGV, VE6AQB, VE6AQU, VE6AUH, VE6AVO, VE6TK. **VE6LB/P** & VE6AN, VE6GS. **VO1HI** & VE1AL, VO1AQ. **WA1KZE** & WA1JZC, WA1NRV. **WA1RDN:** W1ARR, K1ZND, WA1NES. **W2PU:** WB20FY, WA3MQJ, WA3NST, K4CIO, WA6QAT, VE3BUV. **WA2BVU** & WA2FQG, WA2HSX, WB2CKS. **WA2HSU/2** & WA2BED, WA2BYJ. **WA2LQZ** & WA2KBU, WB2FZO. **W3BWZ** & W4RHS, K4BED. **W3DBT** & VK1RY, 4Z4AI. **W3GLY** & K3JFY. **W3GM** & W3FHR, W3JSX, WA3JYB, K3ZOL. **WA3LHG** & WA3NQJ, WA3NYU. **W3TV** & W3AOH, W3VW. **W3YXM:** WA3JVG, WA3MNN, WA3QYM, WA3RSK, WN3REO, WN3TAC, KP4DJX. **W3ZNH** & K3BNS. **W4DOC:** WA4AHD, WA4VHA, WB4MAH, WB4QLN, WB4RTP, WB4UFW. **W4FDA** & WB4EYX, WB4IAE, WB4UFW. **W4JD** & WA4HHW. **WA4MSU** & K4SHB. **W5WQI** & W5SKB, WA5FMF. **WB5AEH** & WA5VCF, WA5VUC, WA5WPV, WB5AJM. **WB5CRG** & WB5GZI, WN5HDL. **W6ABP** & K6ELX, K6VA, WA6YLZ. **W6B1P** & K6OSO, WA6DII. **W6DOD** & W6KG. **W6HQN** & W6CXF, WA6DKF, WA6HRS. **W6VPZ:** K6HRT, W6CFM, W6YOJ, WA6B1L, WA6NLQ, WB6JCD, WB6WWU, WN6BYP. **W6YRA:** WA6DPQ & CLUB. **W6ZBS** & W6ZTJ. **WB6KBK** & WA6PGB. **W4FAY/7** & WA7JUO. **W7SFA** & W7LFA, W7RX, WA7MEO, WA7MJJ, VE7ZZ. **W7VRO** & W7DQM, W7EKM. **W8BVF** & K8TVO. **W8EDU:** WN2THV, WA3BGE, WA3MSZ, WA8RXM, WB8JJS. **W8ZHO:** CLUB. **WA8ZDF** & WA3GJU, WA8OBG, WA8RWU. **W9EXE** & W91CE, W9JAN. **WØHP** & WØPAN, WØYCR, WAØWEZ. **WØMYN** & WA2WMT, WBØCMM. **WAØCVS** & WØOBY. **WAØQLH** & WØLJF, WAØAWH, WBØAMJ, WBØDJY, WBØDLE. **WAØVPN** & WAØENQ, WBØCLY. **WBØFHH** & WA9GUO, KØHWE, KØLFF, WBØBPH. **XU1AA:** 9M2AA, 9M2IR. **YU1JRS:** YU1NFP, YU1NFQ, YU1NPZ, YU1OAU, YU1OAX. **YX5AJ:** YV5ANF, YV5BBU, YV5BPJ, YV5BPU, YV5DFI, F5QQ. **ZP5AQ** & ZP5CO, ZP5FN, ZP5MD, ZP5TQ, ZP5US.

Multi-Operator Multi-Transmitter

CW3AA: CX1AAC, CX3BH, CX4AAC, CX4AQ, CX4VA, CX5BT, CX7BV, CX7CO. **DL3II** & DL8AN, DL8CM, DL8DC, DL8FR, DL8GH, DL8HB, **DLØID:** DJ4ZF, DJ7UD, DK4DK, DL2WJ, DL6QH. **DLØII:** DJ5PE, DJ5PC, DJ2YE, DJ4TJ, DL6RY. **DLØPG:** DK2JX, DK3BJ, DK5KY, DK1QV, DK8QL, DL6WE, DJ6TK, DK1FW, DJ1FC, DJ9TQ, DJ9IE, DJ4PT, DJ1LP. **DLØWW:** DA1ED, DA1NL, DA1RJ, DJ4OQ, DJ4DU, DJ6FJ, DJ6NT, DJ9CE, DK7FO, DL1OP, DL2UU, DL3ZA, DL6NK, DC6CK, DC6FF, DC8DE. **GB3MAN:** G3YSG, G3ZSS, G3YXN, G3WUX, G3YBY, G3YRU, G3YZY. **JA2YEF:** JA2IDZ, JA2KKA, JA2LUV, JA2QOF, JA2SAA, JA2SAP, JA2TCA, JA2UJC, JH2BFT, JH2FMK. **JA3YCH:** CLUB. **K2FL &** K2OO, K3KNH. **K2UQT/2** & W3FPP, WA3RRE, K2BQO, K2UYC. **K3BW** & K3JLK, K3TGM, **K4CG:** K6OZL, WB4GRN, WB4VUI, K4CFB, WB4RDV, W3JPT, WB4FDT. **K6UA** & K6BCE, K6VI, W6KUT, WA6OHJ, WB6VFJ, K6SEN, K6MQG, W7KW, W6QQW, WA6NNJ, W6EEG. **K8IDE** & K8HLR, W8ROF, WA8VMQ, WA8UUQ, WA8JUN, WA8OWU, & Sheldon. **KA1DX:** KA2BL, KA2WW, KA2AA, KA2AS, KA2DF, KA1MI, & Steve. **KH6EOQ:** KH6CFG, KH6GQW, KH6HDA, KH6HIF, KH6HOY, WA6RSZ. **KL7FBI:** WB4CFN, KL7HAM, KL7HMT. **KS6DH** & KS6DY, KS6ER. **LZ1KKZ:** Rajcho, Vlad. **OH1AA:** OH1NH, OH1NK, OH1NM, OH1LQ, OH1SS, OH1YW, OH1RG, OH1SY, OH2BBM, OH2SB, OH2QV, OH3NB. **OH1AD:** OH1PS, OH1PV, OH1QP, OH1RU, OH1RV, OH1SH, OH1VT, OH1XX, OH2BO, OH2BX, OH2KK, OH2WI. **OH1VR** & OH1LX, OH3KX, OH3MK, OH3WF, OH3YI, OH3ZE, OH3ZN, OH3UN, OH3XZ, **VP9BO** & VP9FU, VP9FW, VP9FX, VP9AT, VP9BP, VP9BV, VP9AL, VP9EJ, VP9HE, VP9AS, WB2PXZ. **WA2DNR:** W2KZN, WA2TUJ. **W3AU** & W3ABC, W3AZD, W3IN, W3ZKH, K3EST, K6ETM, WA3AMH, WA3ECT, WA3IAQ, WA3LJP, WA3LVX. **WA3ATP** & WA3LRN, WA3LRO, W3GHD. **WA3ATX** & WA3COJ, WA3MME. **W3BYX** & W3KRD. **W3DHM** & W3DRD, WA3OVC, WA3RAP. **W3FRY:** K3HTZ, WA3LNM, WA3QPS, WA3NQX, W3WPG. **W3GPE** & K3OIO, K3WJV, WA3FFR. **W3NX** & W3TGF. **W3SS** & WA3SYO, WA3QJZ, K3SME, W3YCI. **W3WJD** & W3PSM, K3YUA. **W4BVV** & K3NPV, **K3OAE,** W3BQV, K4GKD. **W4GIW/VP7** & W4MCM, W4GKF, K4PGM, WA4VWV, WB4SEO, W4SSU, K4BAI, WB4WMG, W4BYG, VP7BL. **WA5OCN** & W5KFL, WB5AAU, WA5ZWC, WA5WPB, W5IVN. **WB5DTX** & WB5AUU. W5DJ, W5EOT, WA3GBU, WA5JMK, W5QBM, WA5QXD, WA5UCT, WA5VDM. **W6OAT** & K6EBB. **WB6JOD:** K6OJZ, WA6HCL, WB6RWO, WA6GSL, WB6PZX, W6KHS. **W7RM** & W7EXM, W7GYP, W7JEG, W7YGN, K7HTZ, K7JCA, K7VPF, WA7FDF, WA7GWL, W5QQQ. **W9YT:** OH2BM, K9LBQ, K9KGA, K9ZSE, WA9SUU, WA9TPV, WB9FRG, WB9EGZ, WB9ELB, WB9AMT. **XV5AC:** W4EVG, K7CBZ, VS6DR, HS4AGN, HS5ABD, WA4NMU, WB4VBY, W3LHR, W7SVL, WA7ODG, W9ELR, WB4CXY. **XW8CN** & XW8EV, XW8DO, XW8CY, XW8FB, XW8EN. **ZD3X:** OH2BC, OH2BCP, OH2BH, OH2MM. **4U1ITU:** HB9ANW, SP5ZK, K4ZA.



The gang at PJ1AA finally made it and are winners of the W6YY Multi-Operator, Single Transmitter Trophy. Here is part of the crew in action. PJ2CL giving out the numbers, PJ2WI doing the logging, PJ2MI keeping the check list up to date, PJ2ARI locating the just worked Zone 23 on the map, and PJ2VD supervising the operation.

THE GALAXY 550A

MORE POWER, MORE FLEXIBILITY FOR THE Fixed Station

GT-550A Transceiver

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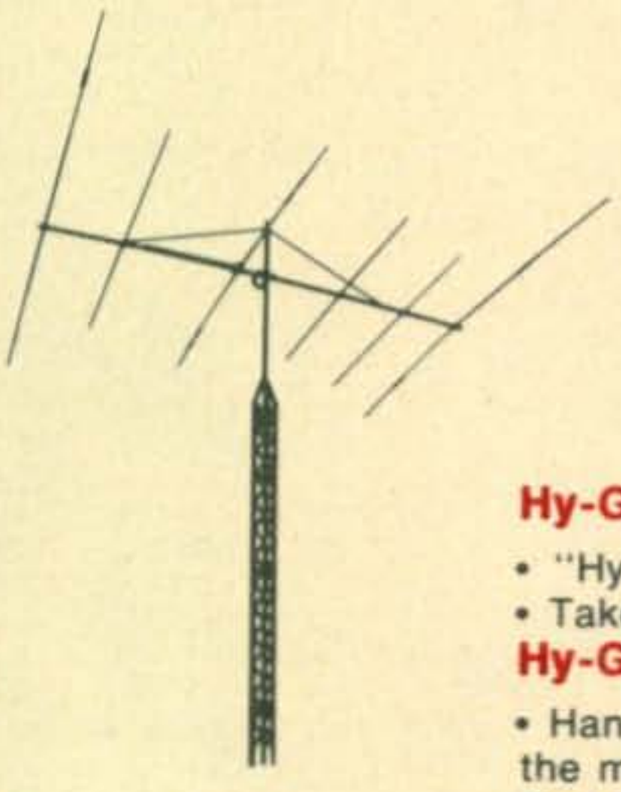
The GT-550A is the best transceiver on the market for the money. Bar none. Costs just $595.00 and runs 550 watts. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550A showing the purchaser how stable his radio was when it went through final check. 550 watts SSB; 360 watts CW; sensitivity better than .5 uv for 10 db S+N/N; stable—45 db carrier suppression; 25 KHz calibrator and vox option; no frequency jump when you switch sidebands.

RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95



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Hy-Gain's 18 AVT/WB

• Wide band performance, 80 through 10 meters • Three Hy-Q traps • Top loading coil • True 1/4 wave resonance on all bands • SWR of 2:1 or less at band edges. Order No. 386
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Hy-Gain's Thunderbird TH3Mk3 (not shown)

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Hy-Gain's 400 Rotator/Indicator

• Handles large beams and stacked arrays with ease—up to 10 times the mechanical and braking capability of any rotator on the market. Order No. 400 Ham Net $229.95

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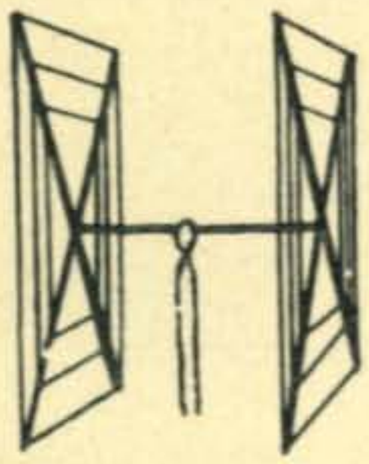
WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15 meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices - rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount: uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished): 52 ohm coaxial cable

Now check these startling prices—note that they are *much lower* than even the bamboo-type:

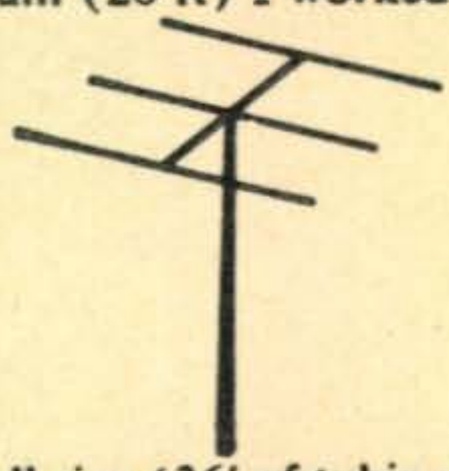
10-15-20 CUBICAL QUAD	$41.00
10-15 CUBICAL QUAD	36.00
15-20 CUBICAL QUAD	38.00
TWENTY METER CUBICAL QUAD	31.00
FIFTEEN METER CUBICAL QUAD	30.00
TEN METER CUBICAL QUAD	29.00

(all use single coax feedline)

GOTHAM
1805 Purdy, Dept. CQ, Miami Beach, Fla. 33139

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$25	4 EL 10	24
3 EL 20	31*	7 EL 10	38*
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2 EL 15	21	8 EL 6	34*
3 EL 15	25	12 EL 2	31*
4 EL 15	31*	*20' Boom	
5 EL 15	34*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$18.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$20.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$22.95

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- **132-150 and 150-174 MHz/Size: 9.5" x 5.3" x 1.7"**
- **1 watt output, .5 micro-volt sensitivity.**

High performance, completely self-contained two-way FM radio. Compact, lightweight, easily operated and hand-carried. Housed in high-impact, 2-section case. All external hardware polished stainless steel. Top section has transmitter and receiver modules, built-in mike and speaker, antenna, carrying handle, all switches and controls. Bottom section has battery power supply. Power connections to top section made by plug and jack connection.

$138. Includes rechargeable nickel cadmium battery pack and charger.

Crystals and tuning, add $50.

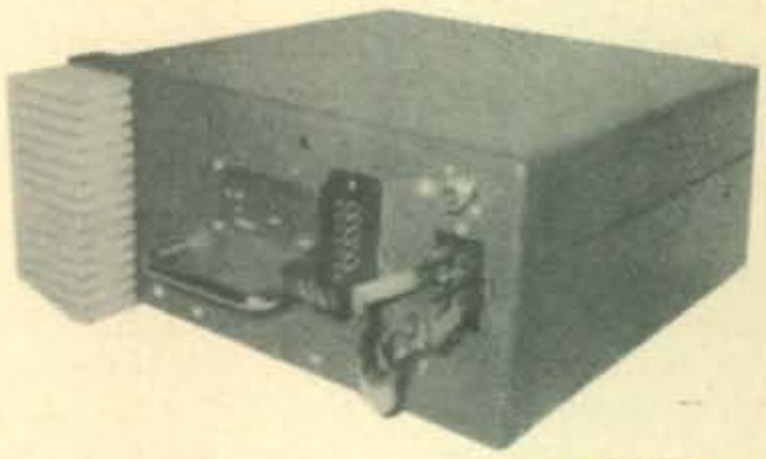
Proper chargers available separately, each $15.

Lots of 5 less 10% — $124.20
Lots of 10 less 15% — $117.30

TWO METER MOBILE UNITS

GENERAL ELECTRIC PROGRESS LINE

14" or 17" case, complete accessories, fully narrow band.



MT/33

MT/33, 12 volt, 30 watts, transistor power supply.....$158
with wide band receiver.....$143

MA/E33

MA/E33, 6/12 volt, 30 watts.
vibrator power supply.....$88
with wide band receiver.....$73

YAESU

YOUR ASSURANCE OF PERFORMANCE & QUALITY

Amateur Price Net

F-LINE MODEL 400D/400SD

Includes 6 & 2 Meters

FR DX 400 $299.00
FR DX 400 SD $399.00

SP-400P $59.00
SP-400S $19.00

FLDX 400
Exciter $339.00

FL 2000B
1200 Watt Linear Amp.
$339.00

SPECIFICATIONS

FR-DX-400 RECEIVER

Mode of Operation: SSB, CW and AM (FM)
Frequency Range: 1.7-2.3Mc, 3.5-4.1Mc, 6.9-7.4Mc, 13.9-14.4Mc, 20.9-21.4Mc, (26.9-27.5Mc), 27.9-28.5Mc, 28.5-29.1Mc, 28.9-29.5Mc, (29.5-30.1Mc), (9.9-10.5Mc), (50-52Mc or 52-54Mc), (144-146Mc or 146-148Mc).
Sensitivity: SSB/CW; 0.5uV at S/S+N 10 db. AM; 1uV at S/S+N 10 db.
Selectivity: SSB/CW/AM; 2.4kc/6 db 4 kc/25 db. AM; 4 kc/6 db 7.5kc/60db. (CW; 600 cps/6db 1.5kc/60db). (FM; 24kc/6db).
Spurious Response: Better than -60 db at 14Mc
Frequency Stability: After warm up less than 100 cps. per any 15 min. or 10% line voltage, fluctuation.
T-notch Attenuation: -50db
Antenna Impedance: 50-75 ohms
Audio Output Impedance: 4 or 600 ohms
Output: 1 watts @ 5% distortion
Power Requirement: 100/110/117/200/220, or 234 volts AC, 50 or 60 cps., approx. 50 watts
Dial Calibration: 50 kc main dial division, 1 kc reading
Calibration: 100kc or 25kc
Dimensions: 14 1/2" W, 6 1/4" H, 11 1/5" D.
Weight: Approx. 24 lbs.

SP400-P

SP400-P: Hand Liner Phone Patch, speaker is designed for the FT dx 400 and 401 series, single side band trans ceivers. Front panel: Patch switch, off and on switch, (meter level to phone line). TX and RX gain controls. Rear apron: Receiver 8/4 ohm jack, 600 ohm receiv er jack, monitor null switch, balance control, line jack transmitter 600 ohm jack trans mitter Hz jack.

FL-DX-400 TRANSMITTER

Frequency Coverage: 3.5-4.1Mc, 6.9-7.5Mc, 13.9-14.5Mc, 20.9-21.5Mc, (27.9-28.5Mc), 28.5-29.1Mc, (28.9-29.5Mc).
Modes of operation: SSB; Upper and lower sideband on all bands. CW; Grid block keying, VOX circuit keying. AM; Either sideband with carrier.
Dial Calibration: Main dial calibrated 0 to 500kc and 500 to 1000kc. Vernia dial calibrated 0 to 50kc and 50 to 100kc in 1kc division.
Stability: Less than 100 cycles within any 15 minutes after warm-up, less than 100 cycles with 10% change in line voltage.
Sideband Suppression: 50 db at 1000 cps.
Carrier Suppression: Better than 50 db.
Distortion Products: In excess of 30 db down.
Frequency Response: 300 to 2700 cps.
Input Power: SSB and CW-240 Watts PEP AM-100 Watts.
Output Impedance: Nominal 52 ohms adjustable with pi network.
Microphone: High impedance dynamic or crystal.
Power Requirements: 100/110/117/200/220 or 234V, 50/60 cps AC.
Dimensions: 14 1/2" W, 6 1/4" H, 11 1/5" D.
Weight: Approx. 25 lbs.

FL-2000B LINEAR AMP

Circuit: Grounded Grid
Frequency: 80 to 10 meters
Max. Input: 1000 watts DC
Plate Voltage: 2400 volt DC
Power Requirement: 115/230 volt AC, 50/60 cps. Input
Impedance: Approx. 60 ohms Output
Impedance: 50 to 100 ohms
Cooling: Forced air cooling
Tubes: 572B; 2 in parallel
Dimensions: 14 1/2" W, 6 1/4" H, 11 1/2" D.
Weight: Approx. 40 lbs.

( ) option

Here is the opportunity you have been waiting for:

- *Split frequency operation for working that choice DX and Net Operation.*
- *This is the ultimate for complete coverage with control from either the transmitter or the receiver.*
- *2 Mechanical Filters for excellent selectivity plus T notch rejection tuning.*
- *Solid State VFO for excellent stability.*
- *Clarifier for Net operation.*
- *Built in Monitor for listening to transmitted signal.*
- *100KC and 25KC calibrator -- 3 step AQC.*
- *Pick up a brochure at your Dealers and ask for Demonstration.*

FACTORY SERVICE IS AVAILABLE WHERE WARRANTY HAS EXPIRED. MODIFICATION KIT MK-160 (160M) $16.00 WITH XTAL PLUS LABOR. MODERNIZATION KIT MIR-1 FOR OLDER MODEL FT101 $40.00 PLUS LABOR. BROCHURES WITH SPECIFICATIONS ARE AVAILABLE AT YOUR DEALERS LISTED BELOW:

HENRY RADIO STORES/213-477-6701
Los Angeles, Anaheim, CAl.; Butler, Mo.
HAM RADIO OUTLET/415-342-5757
Burlingame, Cal.
RACOM ELECTRONICS/206-255-6656
Renton, Wash.

WILSON ELECTRONICS/702-457-3596
Pittman, Nev.
ED JUGE ELECTRONICS/817-926-5221
Fort Worth, Tex.
AMATEUR ELECTRONICS SUPPLY/414-442-4200
Milwaukee, Wis.; Cleveland, Ohio

FRECK RADIO & SUPPLY/704-254-9551
Asheville, N.C.
HARRISON RADIO/516-293-7990
Farmingdale, L.I. Valley Stream, L.I. New York City, N.Y.

YAESU MUSEN USA INC.
7625 E. ROSECRANS AVE. UNIT 29 PARAMOUNT, CAL. 90723

TWX 910-346-7624
TEL 213-633-4007

This is the world's most powerful shortwave transmitter.

This compact, single tube amplifier, located in the EIMAC facility, develops over 1300 kilowatts of 100% modulated carrier. It is quickly and easily tunable over the range of 15 to 30 MHz. Drive power at the grid of the tube is less than 5 kilowatts.

Using a single EIMAC X-2159 super-power tetrode in a Continental Electronics transmission line-cavity configuration, this amplifier combines high power gain with excellent operating stability and complete freedom from circuit parasitics.

A single amplifier stage using two EIMAC X-2159 tubes is capable of over 2.5 megawatts of 100% modulated carrier. Two amplifiers combined would make a 5 megawatt transmitter a practical reality.

The EIMAC X-2159 super-power tetrode is designed for MF and HF broadcast service, VLF communications, SSB linear service and extremely high power pulse modulator applications.

The X-2159 is another example of tomorrow's tube that's ready today at EIMAC. For complete information, contact EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.

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