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CQ

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

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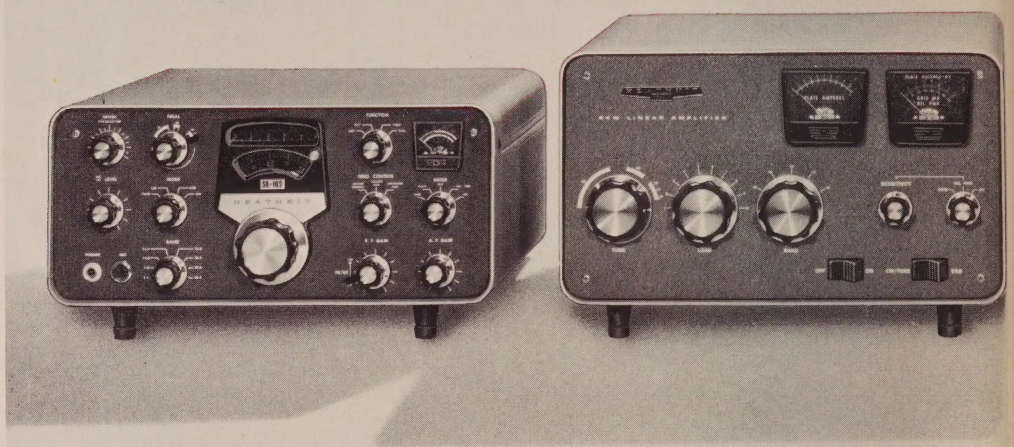
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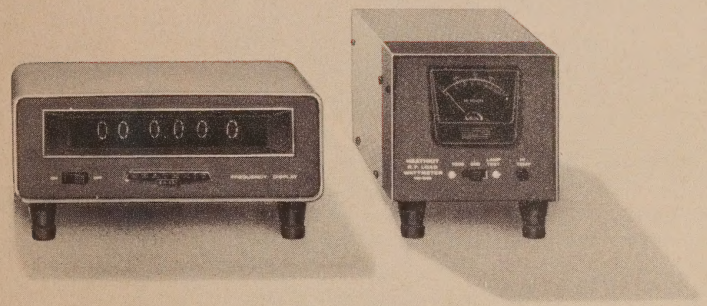
Kit SB-650, 10 lbs. 179.95*

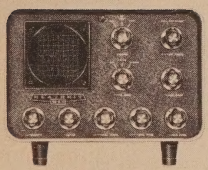
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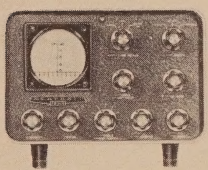
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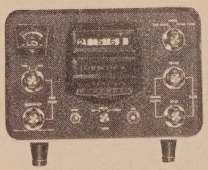




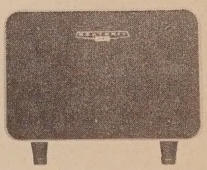
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AUGUST, 1973 VOL. 29, NO. 8

CQ The Radio Amateur's Journal

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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.

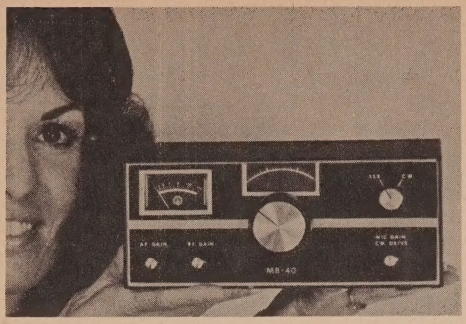
2– *Nowhere* in Docket 18803 or in the latest revised Rules and Regulations does it state that a transmitter licensed in the amateur service may not be operated at a reduced power level. Section 97.41 f, paragraph 3 refers only to the "maximum transmitter power output." What the repeater operator does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

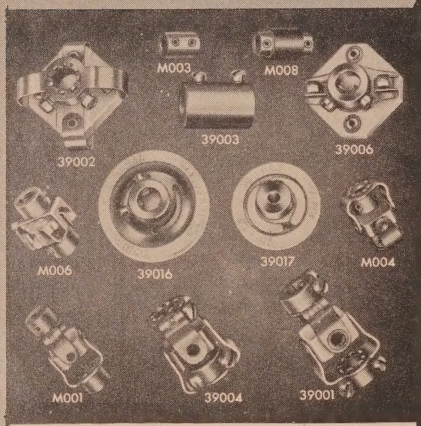
Thank you for this opportunity to comment on W4UW's letter concerning the reference to 1447 Hz in my May/June *CQ* article, "Tuning In On Touch Tone Pads."

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

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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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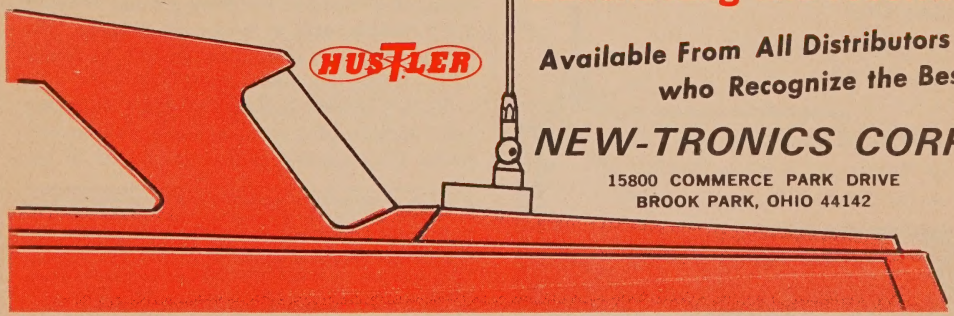
Two Meter—5.2 db Power Gain Colinear Mobile Antenna

- ! 5.2 db gain over 1/4 wave ground plane
- ! SWR at resonance . . . typically 1.1:1
- ! Bandwidth . . . 7 MHz for 1.5:1 or better SWR
- ! Power Rating . . . 200 watts FM
- ! Height, including mount . . . 78″
- ! Radiator . . . 17-7 PH stainless steel
- ! Field adjustable for lowest SWR

CHOOSE FROM TWO VERSIONS

MODEL CGT-144 (illustrated) antenna complete with trunk lip mount for easy, no holes installation on side or edge of trunk lip. 180° swivel included for adjustment of antenna to absolute vertical. Supplied operational with 17′ MIL spec RG-58-U and PL-259 transceiver connector factory attached. Antenna is removable from mount. Shpg. Wt. 3.34 lbs. . . . **$37.95**

MODEL CG-144 — Antenna only with 3/8″-24 base to fit all standard mobile ball mounts. Shpg. Wt. 1.84 lbs. **$24.95**



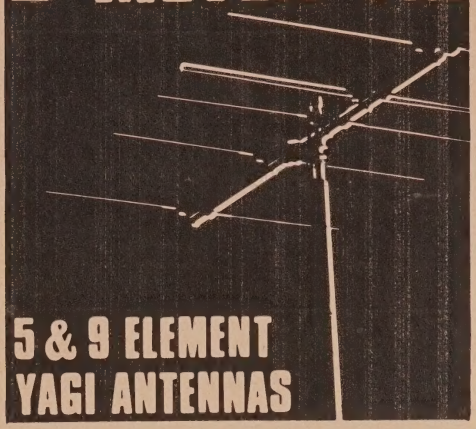
give your mobile signal the big push! this large aperature, two meter antenna will create a new dimension in amateur mobile communications. —where action counts, get the decisive advantage of colinear power gain performance; transmitting and receiving

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BROOK PARK, OHIO 44142

2 METER FM



5 & 9 ELEMENT YAGI ANTENNAS

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GAIN: 12 db.
Model: MY-144-5

9 ELEMENT YAGI
GAIN: 16 db.
Model: MY-144-9

Matching system incorporates a 200 Ohm folded dipole with a 4 to 1 coaxial balun. Element length is adjustable for critical tuning.

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DIPLOMAT - 2
Model: DI-2

DIPLOMAT SPECIAL
Model: DI-2A

For detailed specifications, see your authorized Mosley Dealer or write Dept. 212 . . .

Mosley Electronics Inc.
4610 N. Lindbergh Blvd., Bridgeton, Mo. 63044

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

Q & A is a free technical assistance program offered by **CQ** to its readers. We ask your cooperation to enable us to assist as many amateurs each month as possible. Always include a self-addressed stamped envelope with your question. Only one question per letter, please. Before writing to ask where a published article appeared, try to find it yourself by consulting the annual indexes of the various amateur magazines. Mail questions to: **CQ** Q & A, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

Savoy

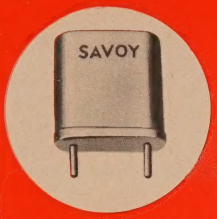
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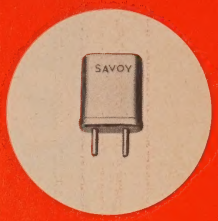
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MODEL DGA-2000-B . . . $12.95

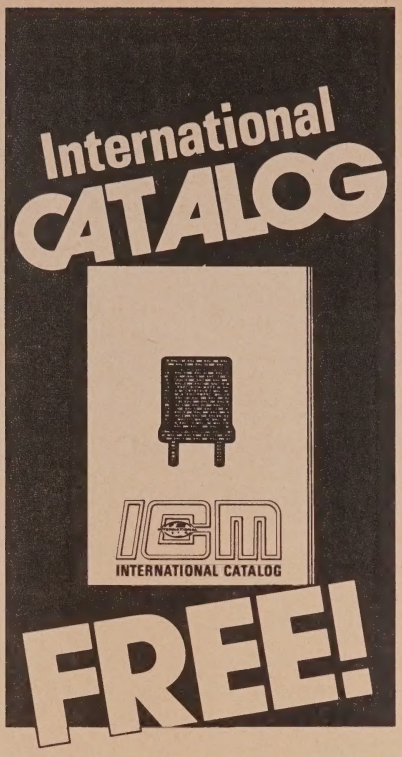
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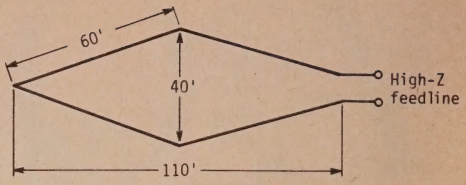


Fig. 1—A rhombic antenna for 2 meters. The support poles holding the antenna up should be at least twenty foot high depending on the terrain.

"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.

(PHOTO COURTESY OF THE SAN DIEGO EVENING TRIBUNE)

How to stay on the air

WHEN AN EMERGENCY STRIKES . . .

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

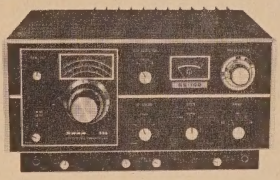
That's right! Even if your area is struck with a massive electric power failure you can have full amateur band coverage, with up to 200 watts P.E.P. available, to relay emergency information or to call for help. A 12 volt battery, just like the one in your car, is all you need to operate a Swan solid-state transceiver.

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-15 (15 watt P.E.P.) @ $579.00
- ☐ SWAN SS-100 (100 watt P.E.P.) @ $699.00
- ☐ SWAN SS-200 (200 watt P.E.P.) @ $779.00
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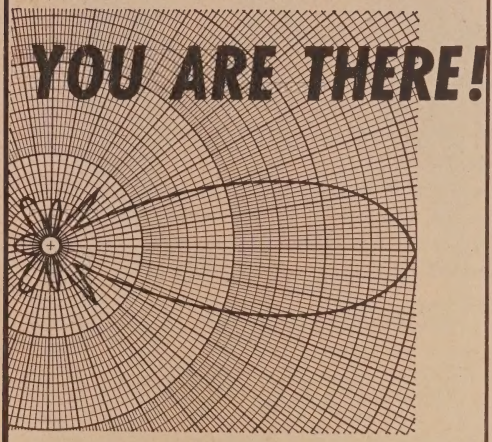
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6KD6 Linear Failures

"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-450 TRC TRANSCONVERTER

instant access to 450 from 144

Now . . . SBE opens up a new high speed route that leads to instant 450MHz operation from any 2 meter transceiver! Rev up—switch in the exclusive SBE, SB-450TRC "Cloverleaf"—arrive instantly on 450! Return at will!

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!

SBE

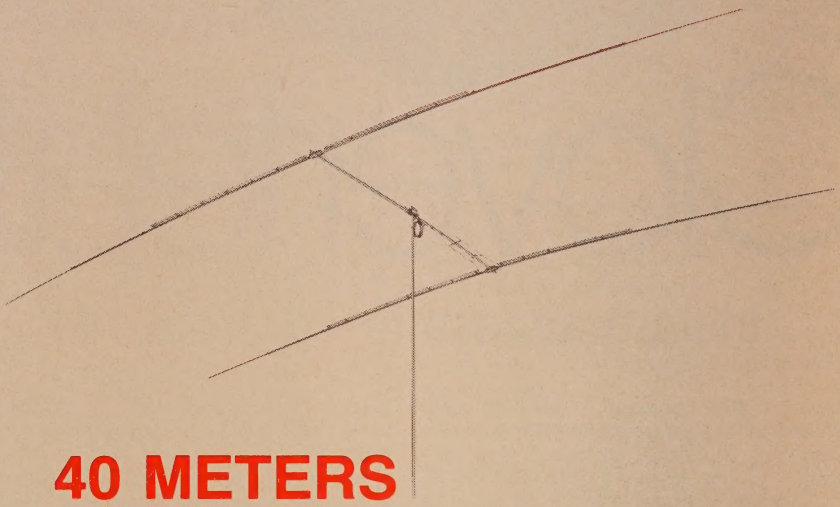


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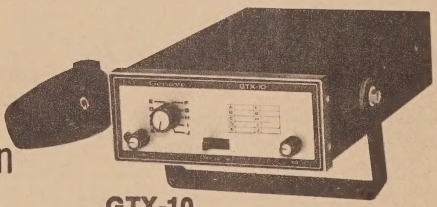
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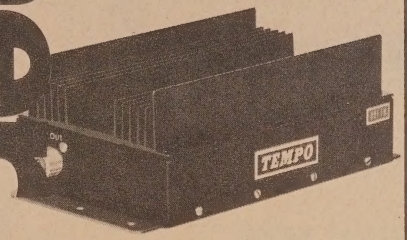
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502B	1- 3W	40- 50W	146	$130.00
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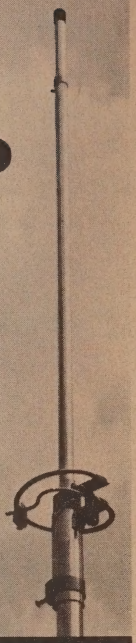
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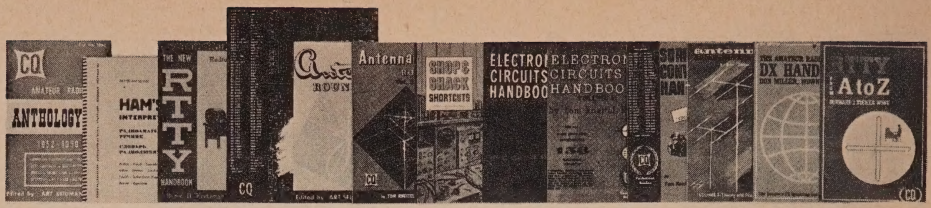
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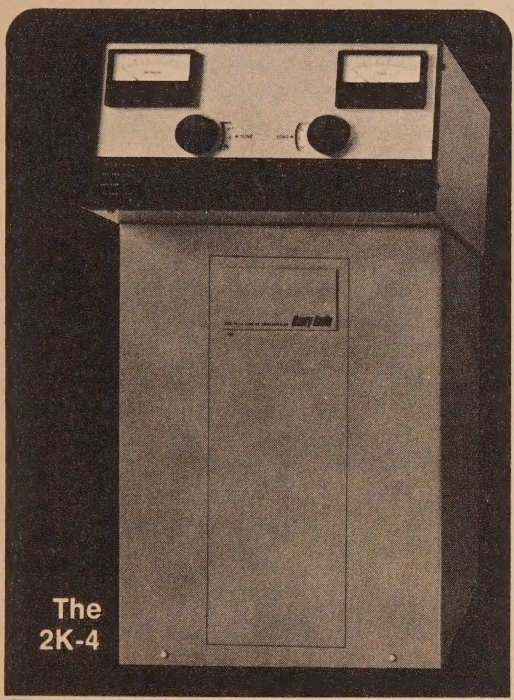
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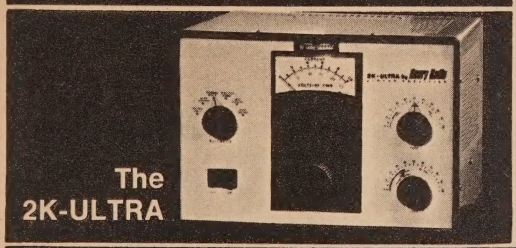
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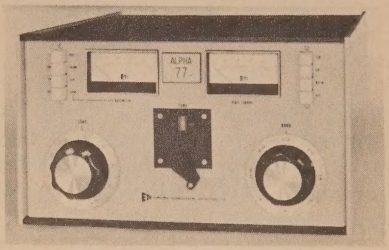
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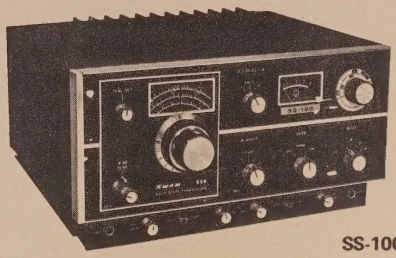
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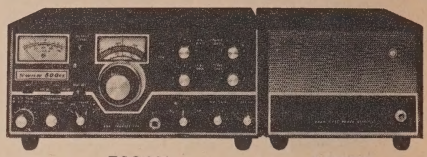
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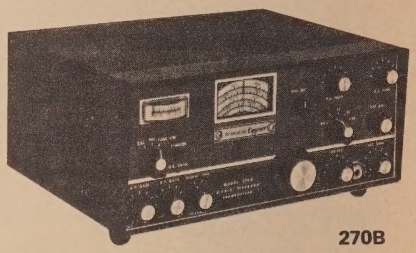
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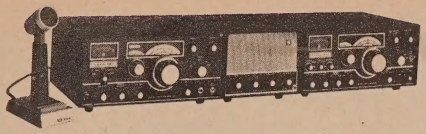


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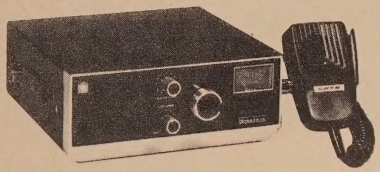
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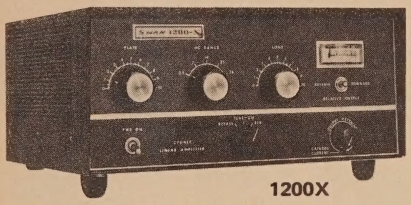


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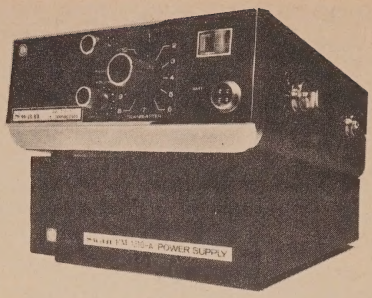
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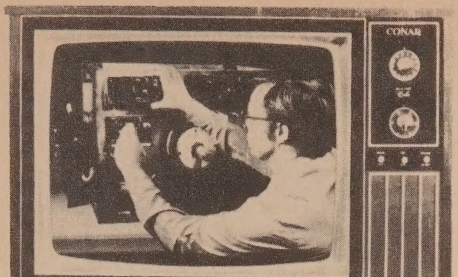
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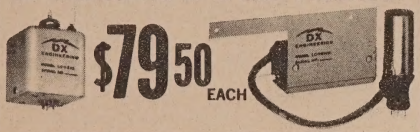
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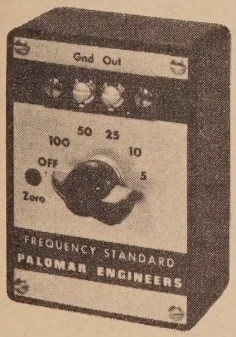
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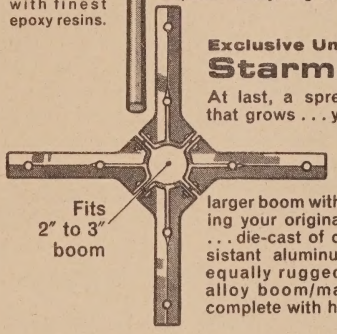


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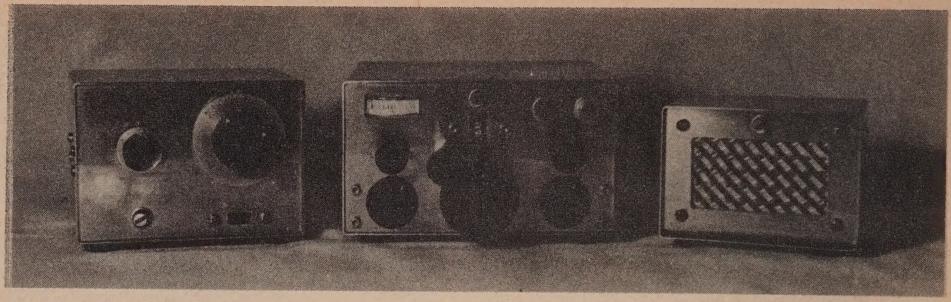
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A General Coverage Solid State Communications Receiver With Direct Digital Frequency Read-Out

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

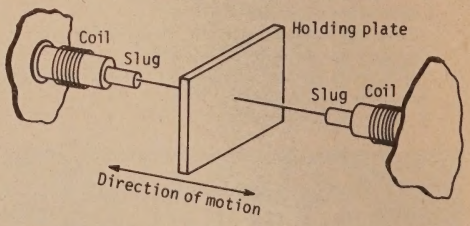


Fig. 1—Principle suggested for a bidirectional v.f.o.

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[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

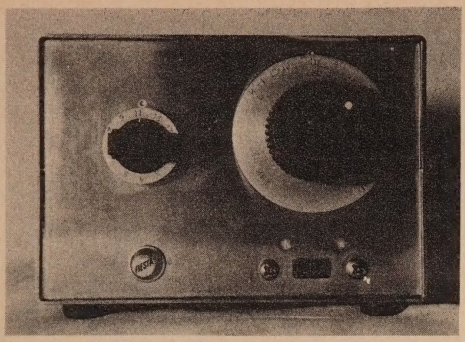


Fig. 2—The h.f. converter has three front panel controls: Bandswitch (left, marked in mHz); R.F. Tuning (large knob with H and L skirt markings corresponding to Hi and Lo ranges); and Hi and Lo Range switch (slide switch selects r.f. coils for Hi—5-18 mHz or Lo—2.5-6.0 mHz ranges). Emblems on this and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

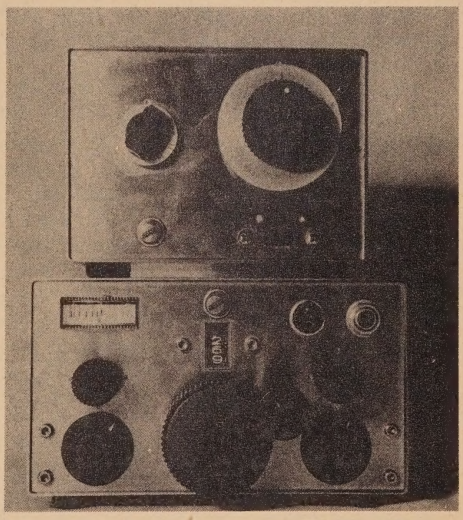


Fig. 3—The l.f. receiver shown with its h.f. converter. At the top left of the receiver is the edge reading S-meter (Japanese import), with the R.F. Gain and Preselector controls below. The crank-type tuning knob and mechanical counter are at the center, while at the right are the On/Off switch and phone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

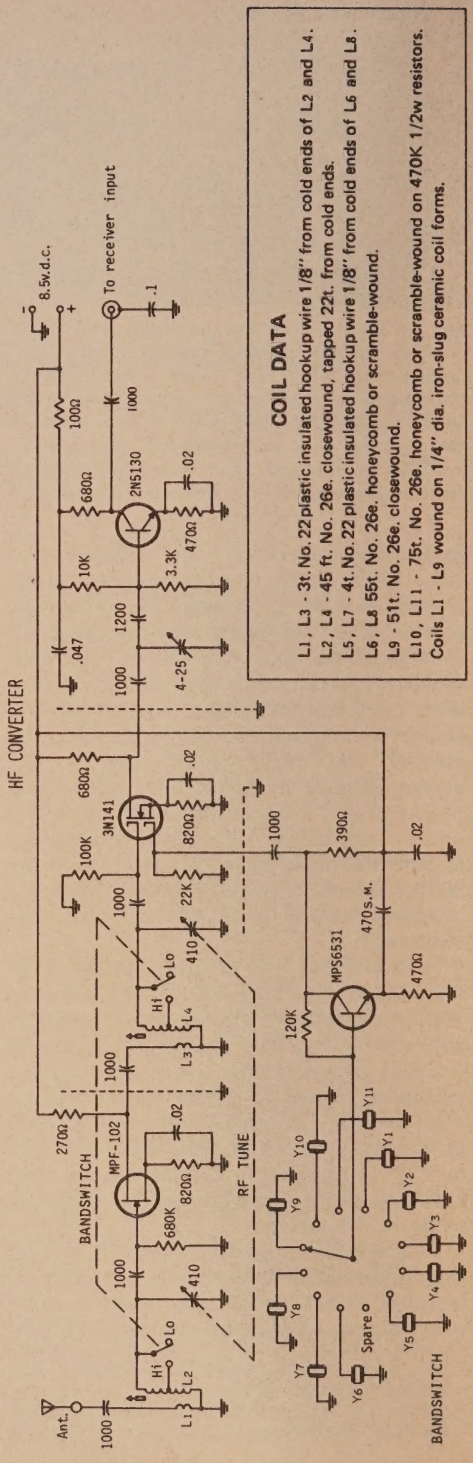
Construction Considerations

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



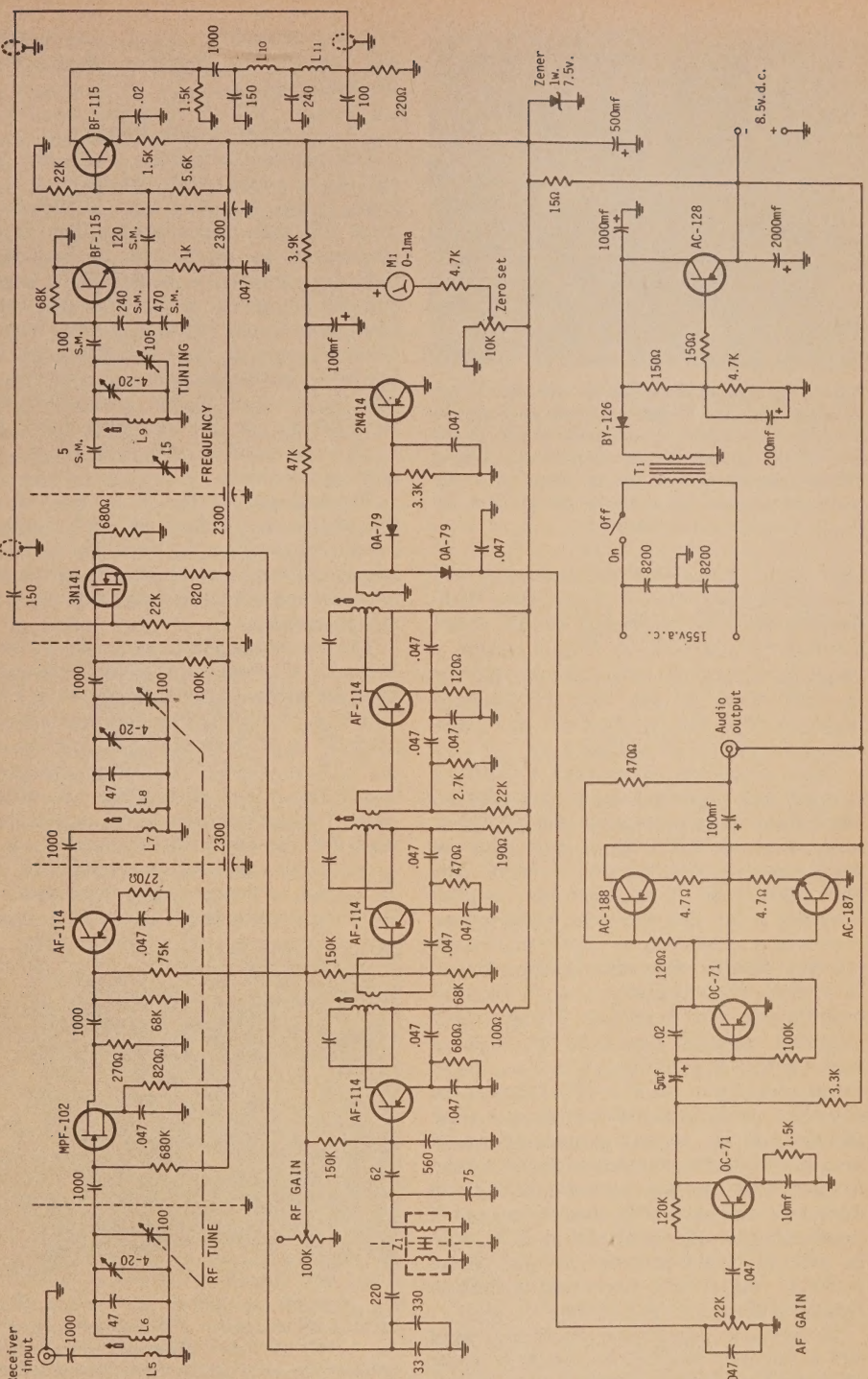


Fig. 4—Schematic of h.f. converter (page 30) and l.f. receiver (above).

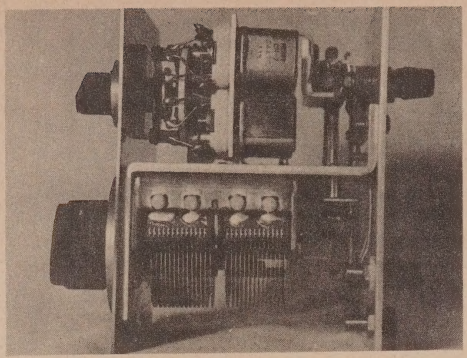


Fig. 5—Top view of the converter with the cabinet removed. The crystal bank is supported on the bandswitch, with the i.f. amplifier visible to the rear of the crystals. To the rear of the 2-gang R.F. Tuning capacitor is the r.f. amplifier stage. Jacks at the rear panel bring power from the l.f. receiver.

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-

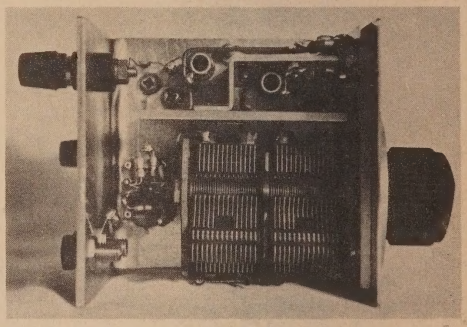


Fig. 6—Right side view of the converter, bottom up. The r.f. and mixer coils are at the top with the 1/16" aluminum plate providing shielding between the slide switch sides. Antenna input is at top left, while the power input is at bottom left.

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

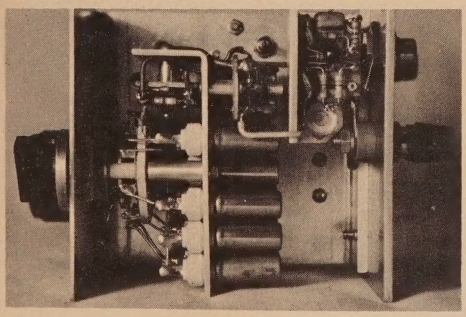


Fig. 7—Left side view of the converter, bottom up. The L-shaped aluminum bracket fastened to the bandswitch holds the 11 crystal sockets. The oscillator sub-assembly is above the bandswitch (inside the L bracket), while the mixer sub-assembly is to the right of the bracket, above the crystals. The buffer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

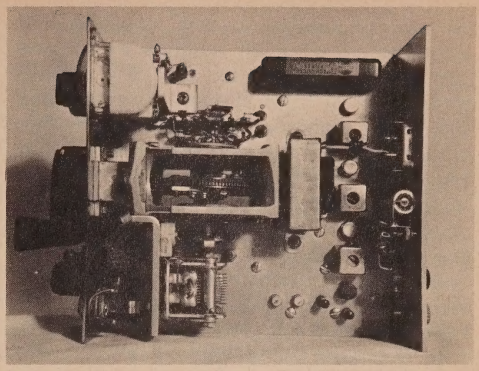


Fig. 8—Top view of the receiver with the cabinet removed. At center the worm gear unit supports a sub-chassis with the v.f.o. capacitor fastened to it. The counter is between the worm gear and the front panel. Right above the worm gear is the RF_2 and RF_3 circuitry. The i.f. strip runs from top to bottom 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 sub-assembly.

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.

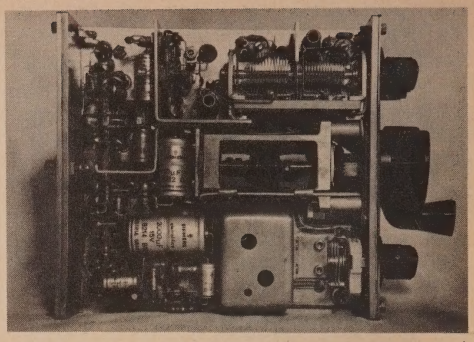


Fig. 9—Bottom view of the receiver. At the center is the main tuning gear with the bevel gear that actuates the counter on the same shaft. On top of it is a two gang variable capacitor for RF_2 and MIX_2 peak tuning. Notice shielding between stages and also between input and output of the mechanical 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.

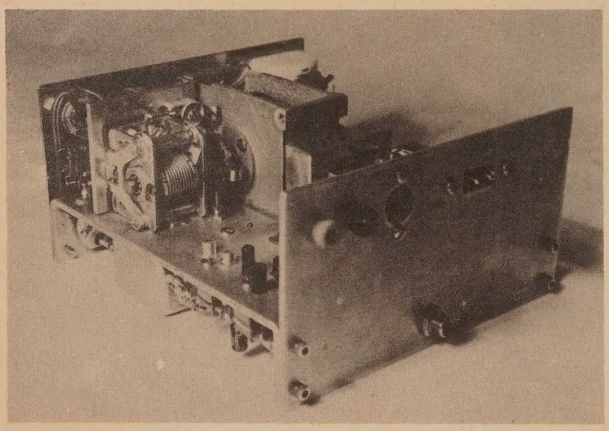


Fig. 10—Three-quarter view of the l.f. receiver, from the right rear side. The v.f.o. variable capacitor is shown fastened to its 1/8" aluminum sheet bracket; behind the bracket is the v.f.o. buffer circuitry. The v.f.o. coil is to the right of the tuning capacitor. On the rear panel are the d.c. power 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.

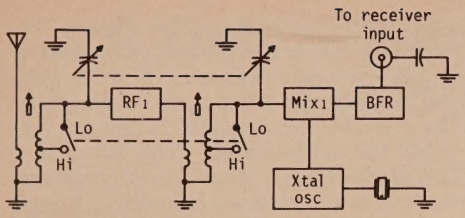


Fig. 11—Block diagram of the crystal converter.

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

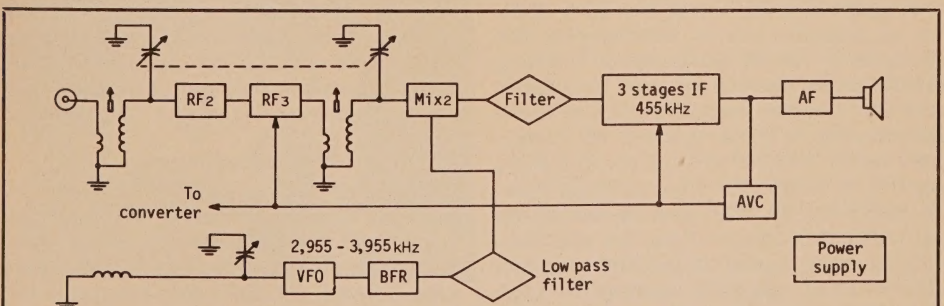


Fig. 12—Block diagram of the 2.5-3.5 mHz receiver.

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 readout 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. ■

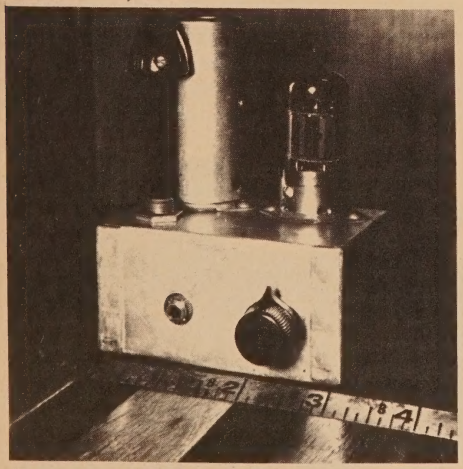
A Deluxe Screen Modulator for Beginners

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

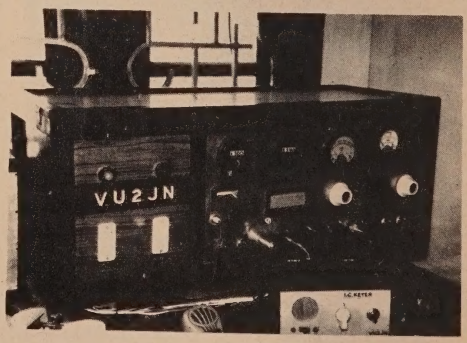
The main factor limiting the output from a screen-modulated PA is the low tube efficiency and hence high plate dissipation. Because of the complex wave-form of the speech signal modulating the screen, a somewhat higher average output can be realized by keeping the d.c. screen voltage and hence the plate 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

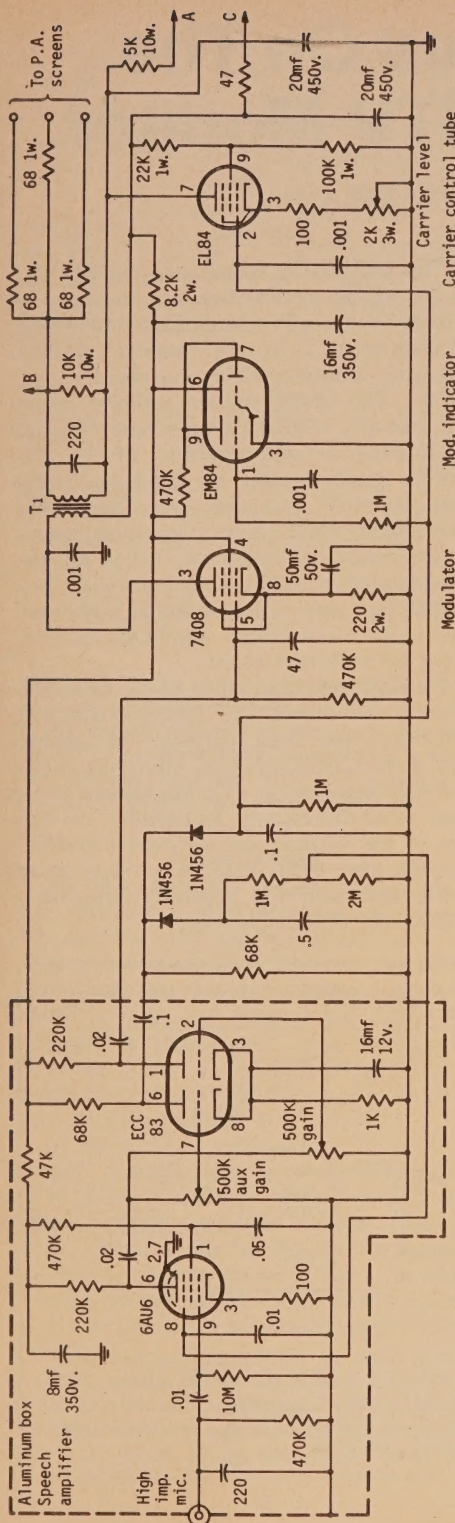
Let us consider the design of a screen-modulated PA, utilizing three 807/1625 tubes in parallel and running an input of about 150 watts.

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.

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

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.

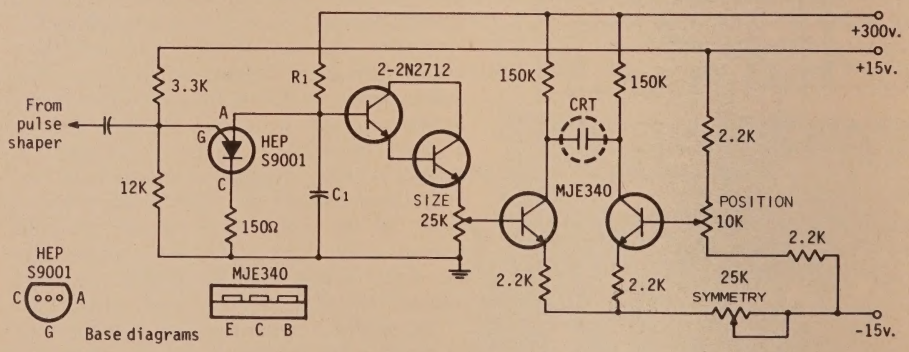


Fig. 1—Improved sweep oscillator, driver and deflection circuit for the Vertical and Horizontal sections of the SS Mark 4 monitor. Values of C_1 and R_1 are as follows: For Vertical circuits, C_1 is 10 mf 10 v., R_1 is 2.7 meg which may have to be adjusted slightly to produce a 9 second sweep. For Horiontal 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).

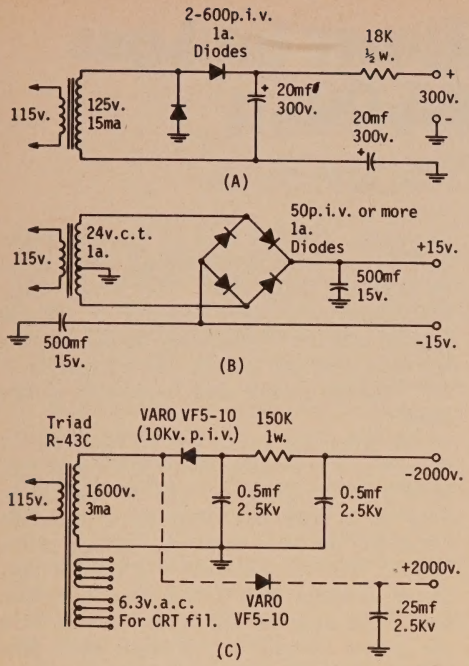


Fig. 2—(A) Circuit of 300 v. supply. (B) Circuit of power supply delivering both plus and minus 15 v. with respect to ground. (C) Circuit of —2Kv supply for CRT cathode showing additional components needed to develop +2Kv for CRT anode in post-accelerator-type tubes (broken lines).

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.

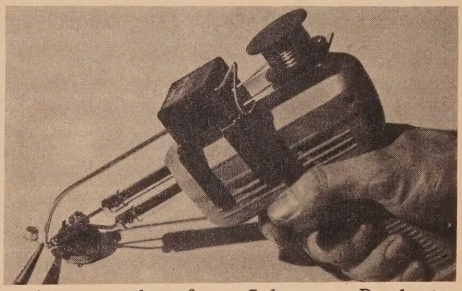
The high voltage supply, fig. 2(C) was lifted right from Cop Macdonald's SSTV column in the August 1972 issue of *CQ*. This circuit also offers the added ability of supplying additional voltage to post-accelerator-type tubes such as the 3JP7, and for only the additional cost of a h.v. diode and capacitor.

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

*421 Lodor Street, Ancaster, Ontario, Canada.

[*Continued on page 82*]

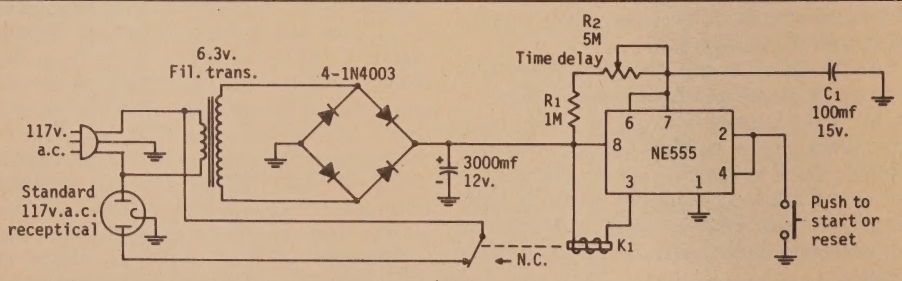


Fig. 1—Circuit of an inexpensive electronic timer adaptable to any number of simple timing applications around the home or shack. With the values shown for R_1, R_2, and C_1, the timers range is from 3 minutes to about one hour, using the power supply shown. Relay K_1 is any 12-volt-coil relay which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

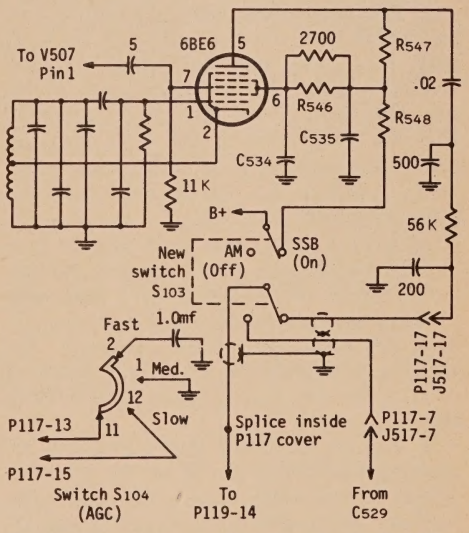


Fig. 1—Circuit of a product detector for installation in the Collins R-390 receiver. The 6BA6 b.f.o. tube is removed and replaced with a 6BE6 pentagrid mixer which is wired as shown. The front panel b.f.o. ON/OFF switch is replaced with a new switch S_{103} which acts as the SSB/AM selector switch.

*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

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

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

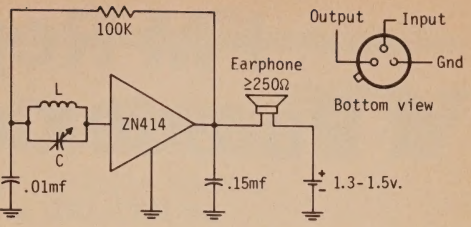


Fig. 1—Complete receiver, usable from 150 kHz to 3 mHz.

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*]

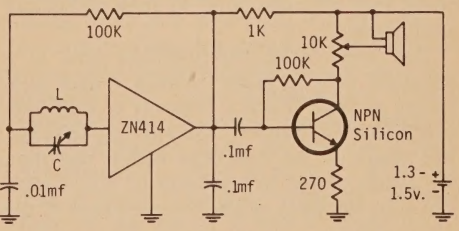


Fig. 2—Amplified version of fig. 1.

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.

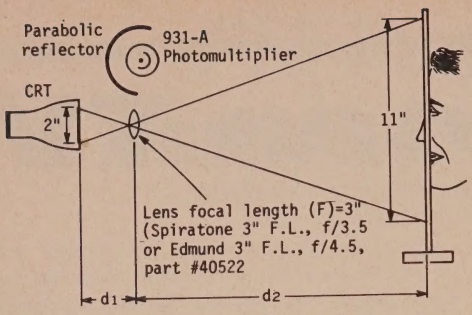
4. At this point all of the slow-scan frames were on tape, but not together in the proper length sequences. Since the number of frames depended on how much I had to say as each frame was being shown, I roughed out a plan for the audio, making notes on what I was going to say and how long it took to say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

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

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

$$= 19.5"$$

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

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.

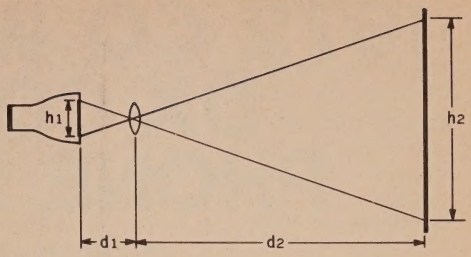
The focal length of a lens is the distance from the optical center of the lens to the image, when viewing an object at infinite distance. An easy way to check the focal length of a simple lens is to use it to focus the image of the sun onto a piece of paper, burning glass style, and measure the lens-to-paper 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_f = Maximum rated film format diagonal for the lens. (h_1 and h_2 are as shown in Table 1)

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

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

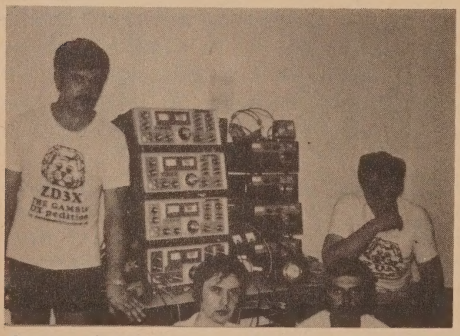
THE Phone Contest back in October '72 will have to go on record as one of our best efforts. With the solar cycle stalled on a plateau about 25% higher than the low expected figure of 40 for the month, the openings on 10 and 15 were much better than we had hoped for.

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.

*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?)

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

PLAQUE & TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association. Dr. Harold Meggibow, 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
KG6JBQ		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**	PZ1AH	2,989,146
KH6RS	**5,331,072**	HTØA	2,884,999
6G1AA	4,069,764	XT2AC	2,861,382
EL2CB	3,131,191	**EA4LH**	**2,744,119**
KG6JBO	**2,992,355**	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

21 mHz

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

14 mHz

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

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**	UK9ABA	3,813,066
YX5AJ	4,087,360	G3WYX	3,662,880
UK3AAO	3,883,008	FØZZ	3,445,596

MULTI-TRANSMITTER

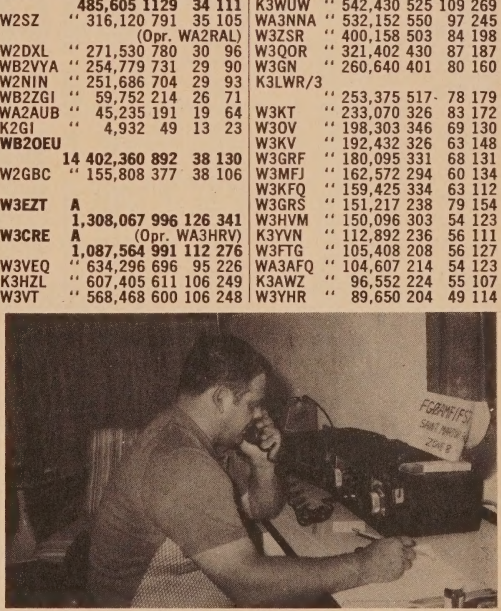
ZD3X	**14,501,872**	W4GIW/VP7	5,510,176
DLØPG	7,634,962	KS6DH	5,488,856
XV5AC	5,656,555	DLØWW	5,334,537

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**
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
WB6BGQ	"	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
W5QNV/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
VF6GQ " 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 35 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

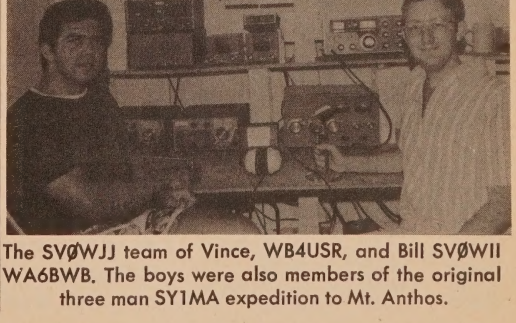
Namibia
ZS3CJ 28 213,382 754 32 70

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

VU2SAAA	A					
		1,740,232	1695	108	269	
VU2SDK	A					
		1,495,688	1748	82	214	
VU2SCK	"	193,720	580	53	114	
VU2SBX	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

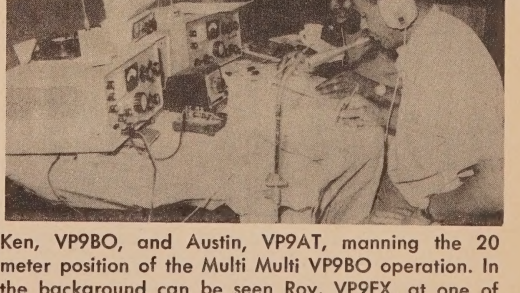
CT7BH	**A**				
		1,523.691	**1761**	**100**	**251**
CT7SH	"	314,127	998	48	123
CT7ZG	"	128,872	358	50	131
CT1MZ	"	11,985	64	31	54
CT7UA	**21**				
		403,420	**1461**	**30**	**85**
CT1TV	"	540	12	7	8
CT7ZW	**14**	**146,804**	**639**	**31**	**67**
CT1QN	**7**	**29,868**	**256**	**19**	**57**

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**



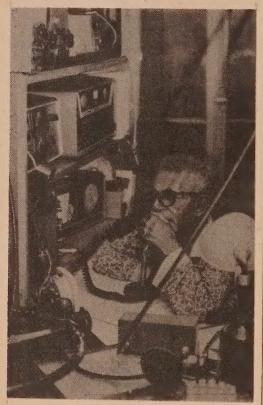
Ken, VP9BO, and Austin, VP9AT, manning the 20 meter position of the Multi Multi VP9BO operation. In the background can be seen Roy, VP9FX, at one of the other positions.

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
SM5CFU	"	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

CPIEU	**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**

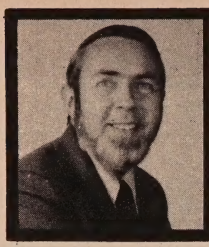
Uruguay

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

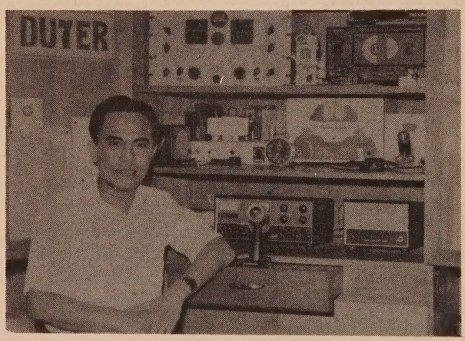
Endorsements

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 Reeves, 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!

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.

*Figures in parentheses are times in GMT.



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)*

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)

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, JA1AG, I5IZ—600, G5GH—500, W9EVD—450, K9UIY—400, W4GEQ—350.
Mixed: W4CRW—900, W4WSF—850, JA1AG—750, W2MB—650, WB2HNO, W5QBM, W5ZWX, WA5ZWC, W9EVD, W9KDX—500, WB2AQC, W4GEQ, W6KYA, 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 CQ LF, 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, IA5TEZ, 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.

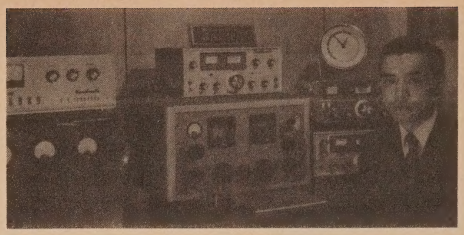
5Y4X: This is a commemorative prefix for the 10th anniversary of the independence of Kenya. 5Y4XKL is 5Y4KL, QSL to Box 30214, Nairobi, and 5Y4XOB is 5Y4OB, QSL to Box 540, Nairobi.

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*)

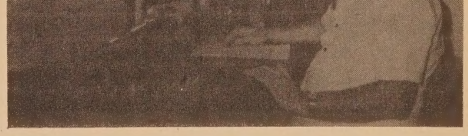
me to him as we swap fishing lies almost daily.

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
YBØABB—To WA5MUN
YJ8FM—c/o W7YBX
YY4CVE—To YV4YC
ZF1RR—Via WA2BCK
ZK2AK—To K3RLY
ZVØWH—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

	Rating & Forecast Quality			
Propagation Index	(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)*
Australasia	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, Antarctica	*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 Mediterranean & 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)*
Australasia	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 Mediterranean & 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*]

"THE NEW RTTY HANDBOOK"



A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by Byron Kretzman, W2JTP, a well known authority in the field. This book is a must for your library! Only $3.95..

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CQ Magazine
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SIRS: My check (money order) for $_____ is enclosed. Please send _____ copies of the "The New RTTY Handbook.

Name_____

Address_____

City_____ State_____ Zip_____



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	W3YHR	768
W6DGH	245	W4WSF	1668
W6DQX	18	WB4RUA	288
K9ECE	240	VE6BU/W5	10
W∅BMM	182	W6DQX	140
		W6DGH	32
C.W.		W8MBB	189
K1CPF	1296	K9ECE	2055
WB2VYA	3570	W9ITD	320
K2BQO	810	VE3GCO	756
WB2HGV	145	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.l.'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

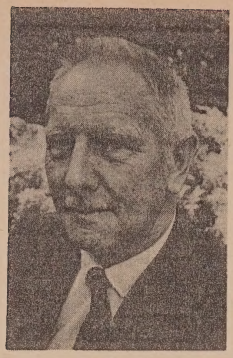
We're much too involved getting out the contest results for any chit-chat this month. If you check page 50 you will see what I mean.

73 for now, Frank W1WY

CQ Country Chart

A two color, wall-sized country chart is available on poster stock and in large type for only $1.25 per copy postpaid. Address request to: CQ DX Country Chart, CQ Magazine, 14 Vandeventer Ave., Port Washington, N. Y. 11050.

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THE awards 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.

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



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

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

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

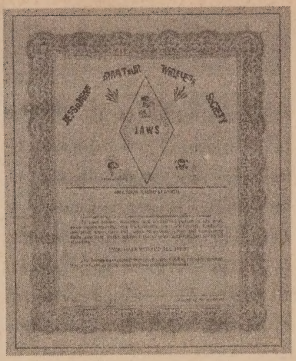
Again that magic number *three* for All Counties.

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.

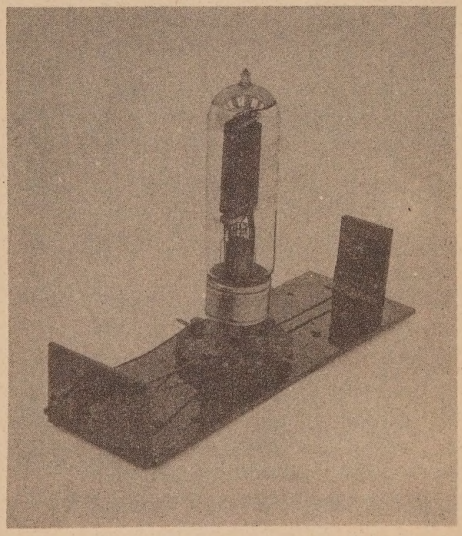
Whatzis Quiz for Old Timers

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.

*1502 Stonewall Rd., Alexandria, Va. 22302

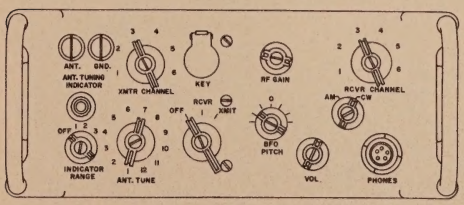


Fig. 1—Front panel drawing of the AN/TRC-77 tactical transceiver.

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.

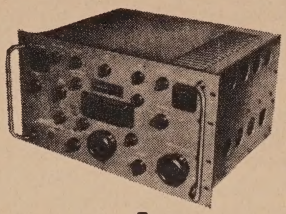
The Pentagon says the scramblers will cost about the same as the transceivers they are attached to.

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.

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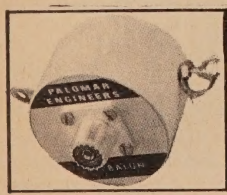
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CQ Country Chart

A two color, wall-sized country chart is available on poster stock and in large type for only $1.25 per copy postpaid. Address request to: CQ DX Country Chart, CQ Magazine, 14 Vandeventer Ave., Port Washington, N. Y. 11050.

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)

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SSTV [*from page 49*]

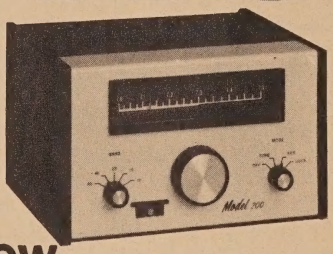
as "fast" lenses, because they allow shorter duration shutter openings.) Most of the enlarging and projection lenses of interest to us will have "*f*" numbers of *f*/3.5 or *f*/4.5. This seems to be about as "fast" as they make reasonably priced enlarging lenses. Table 2 contains a list of the least 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.

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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

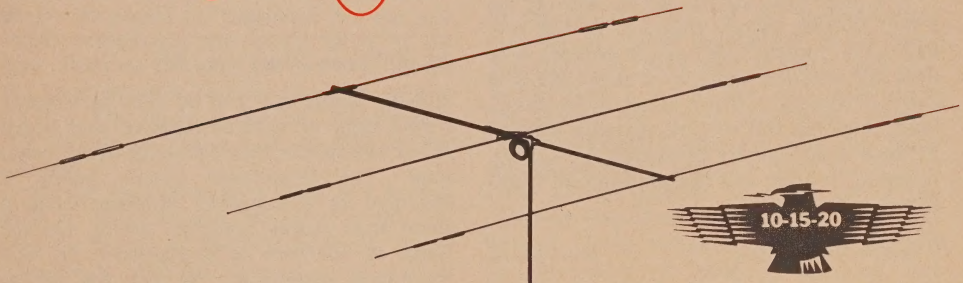
CX1JM, CW2CS, CX2AL, EP2TC, HA8KUC, JA1ELY, JA1YBO, JA2KLT, JA3LWA, JA3PPR, JA4FHE, JA7UJ, JH1EIG, K2IXP/6, KH6BZF, SM5BLA, UK2BBB, UK5MAF, VE7SV, VK2APK, W6HX, YV4KC, 9C9TW.

Screen Modulator [*from page 39*]

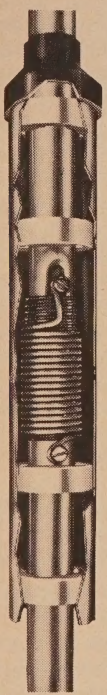
as a controlled screen bleeder responding to the negative control voltage derived from the audio. A 2K 3w wire-wound potentiometer on the cathode of the EL84 sets the no-signal screen voltage to 125 volts, while the auxiliary gain control sets the screen voltage with full audio to 175 volts.

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**

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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.

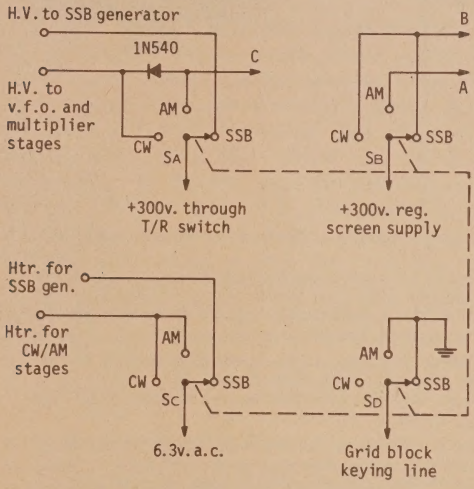


Fig. 2—Function switch wiring for the Deluxe Screen Modulator.

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. ■

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, W3CJU, 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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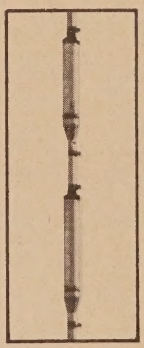
80 through 10 meters

hy-gain 18AVT/WB

New, from the inventors of wideband verticals.

Pack some punch! All the omnidirectional performance of Hy-Gain's famous 14AVQ/WB...plus 80 meter capability! Unrivaled performance, rugged extra heavy duty construction, and the price you want...all in one powerful package!

- Automatic switching on all five bands through the use of three beefed-up Hy-Q traps...featuring extra large diameter coils for exceptional L/C ratio and extremely high Q.
- 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.



The 18AVT/WB is constructed of extra heavy duty, taper swaged, seamless aircraft aluminum with full circumference, corrosion resistant compression clamps at all tubing joints. This antenna is so rigid, so rugged...that its full 25' height may be mounted using only a 12" double grip mast bracket...no guy wires, no extra support...the 18AVT/WB just stands up and dishes it out!

Order No. 386

Get the strength, the performance and the price you want...from the man who sells the complete line of quality Hy-Gain equipment.

HY-GAIN ELECTRONICS CORPORATION

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 141 455

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, 15-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]

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Lambda 12V/11A PS 0.02% Reg. New Units.....$ 65.00
TEK 535 Scope DC-11 Delayed Sweep.....$295.00
Fluke 801 DC DVM to 500 Volts 0.05% ACC.....$ 40.00
Fluke 803 Same as above but AD-DC.....$ 85.00
Gertsch FM-2 & DM-3 Frequency Meter.....$795.00
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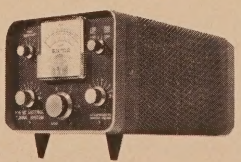
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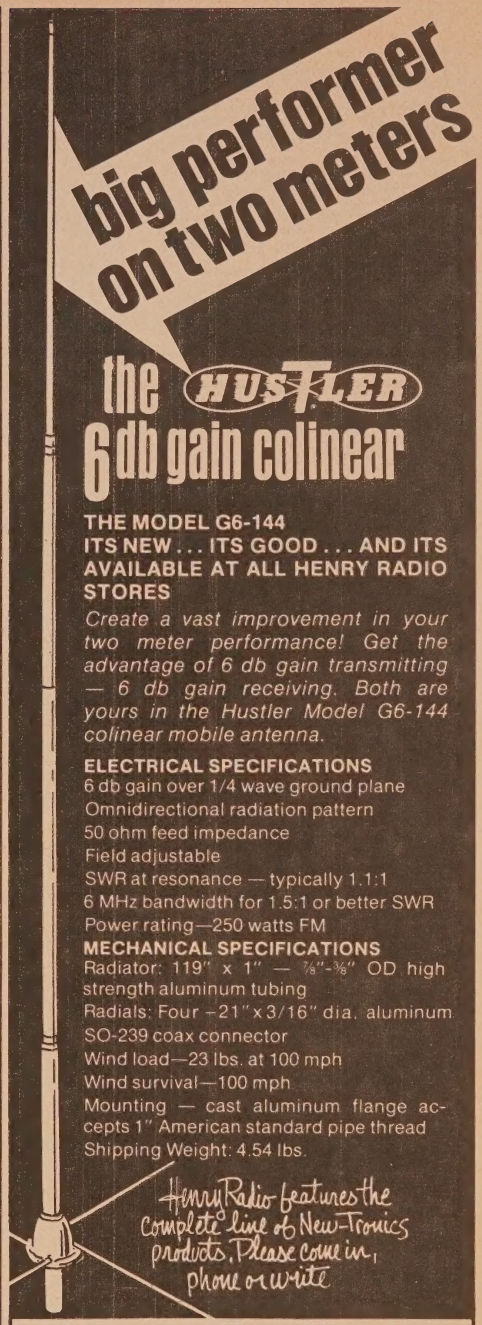
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ELECTRICAL SPECIFICATIONS
6 db gain over 1/4 wave ground plane
Omnidirectional radiation pattern
50 ohm feed impedance
Field adjustable
SWR at resonance — typically 1.1:1
6 MHz bandwidth for 1.5:1 or better SWR
Power rating—250 watts FM

MECHANICAL SPECIFICATIONS
Radiator: 119" x 1" — ⅞"-⅜" OD high strength aluminum tubing
Radials: Four – 21" x 3/16" dia. aluminum
SO-239 coax connector
Wind load—23 lbs. at 100 mph
Wind survival—100 mph
Mounting — cast aluminum flange accepts 1" American standard pipe thread
Shipping Weight: 4.54 lbs.



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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.

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Trade for ham gear, or sell, collection profes. test equip, H-P, Gertsch, 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 thru10 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-ØGYX, 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, 2-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 WØBNF, 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. A1, $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, K1WKS, 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.

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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/n8G12279/CW, 1.8 MHz, REGENCY HR-2-MO3-00030, WAØGFJ, 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 THRdet. Call collect K9MKX, 2515 College Rd Downers Grove, IL 60515.

Linear builders: 30 amp filament choke for 9g 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, CP1 xtal pack, 312B5, all mint. Call Tom, 215-ME5-1640.

For sale: Just back from Japan, brand new IC21-2 mtr 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.

QRP 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. movie cam with 3 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.

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WANTED: Type TA Atwater-Kent Det. Audio module, Cabinets for Radiola IV & IVeForest 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. Fine program, 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.

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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.

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For sale: P-6315 pwr transformers, new $7.50 ppd. Goodman, 5826 S. Western Ave., Chicago, IL 60636.

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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.

Eimac 8875 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-2-1 N5-GT, 2-1 D8-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 pwr 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 Davco DR30, HA144; WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755.

For Sale: 8 1/2" X 19" panel with (40) 0-1 MA vertical meters, $75.00. Nems Clark 1411 225—260 MC 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. Swan 500 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 xcvr 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 CG4611 6 — 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 Schuman, 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 1/2 B, beach, marina, cntrl A/C, gas heat, sprkird, dble elec. gage, beautiful area, LI Sound. Call for appt., 914 NE3-7077, W2ASI, New Rochelle, NY 10805.

Wanted: Metaltape reels for TG-34A code machine. W8OHO, J. J. Vargovic, 695 E. Ford Ave., Barberton, OH 44203.

MOSLEY TA-4 OKR 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, Box 185, 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., 80-10 M 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. WISO, (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 60185.

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 14 mc 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 2-32 mc 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-Art13-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 ampsoutrack 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 55 okc 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. WIKGU, Pope, 294 Summer St., Brockton, MA 02402.

For Sale: Tri-EX THD-471 medium duty guyed crank-uptower in good condx. Also TH-6 DX 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 & 2 m. Write for list. Harry McCollum, 1010 West First St., Mt. Pleasant, TX 75455.

Tektronix Scope 517-A, 60 mHz, 7 nsec rise time. Like new $275. Stanley Garstka, 9W9YDR, 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 osc. $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-1S, 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 SD9818. Garton, 1301 W. Estes Ave., Chicago IL 60626.

For sale: Yaesu FTV-650 transvrtr for 6 m 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 400 Hz fil., SB-600 spkr, HP-23 p/s, Excel condx. Pkg deal $350 fob. A. Emerald, 8956 Swallow Ave, Fountain Valley, CA 92708.

160 m ssb-Central Electronics 20A xmtr, 45 Bvfo & 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 FL85-300 mm 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, WA4 RDV, 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 8 mm 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 IN 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: 2 m 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, TH6 DXX, 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 10-50-100 kc 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, $75. 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 rcvr, $125. 40-80 mtr Cliffdweller ant $75. HA460 6 mtr 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, WB6RQK, 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 QTM. Xmtr, $12 and rcvrs, $6 (SCR522) all tubes. New LaF. VFO 6 m Hg/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/8 mHz 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, 2446 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 SX60B, $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: Swan 500-350 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, xclt 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: 1 KW 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 200 mm 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 $15 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 AS. 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 condx. Will pay bet $70-80 w/manuals. 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 (6-80 m. 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 works 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 Reiverts, transmitter, books, catalogs, handbooks, tubesand 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-svisyns, 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.

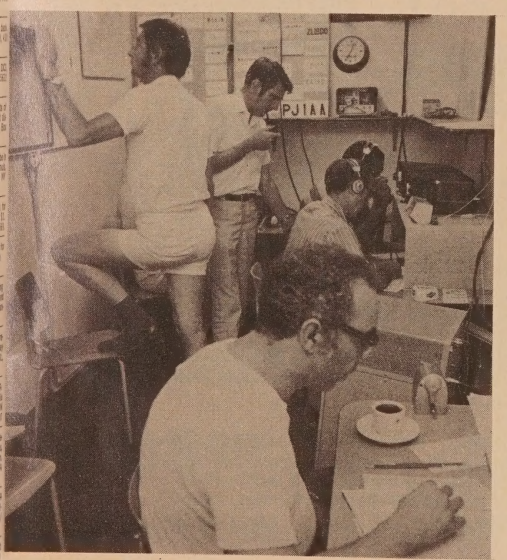
9V1QJ/WB5HQY/HL9TH now located at: Mr. T.J. Daugherty, TNG & Doctrine Comd, DCSLOG, Ft. Monroe, VA. 23351.

ıone Contest Results [*from page 86*]

STATION OPERATORS

Multi-Operator, Single-Transmitter

K8DI & CX1BBR, CX2CX, CX4AF, CX4BBX, CX5BR. **KØAA:** DJ4XG, DJ8YQ, DK4ST, DK5SZ, DK8SK, DL3BK, L6KB, DL8NU. **DL3LU** & DJ4GO, DJ5FW, DJØND, DK4OV, K5OA, DL8RL. **DL4QF:** DA1QC, DA2QC, DJØGM. **DL8OH** DK3NS, DK6QO. **DLØJRA:** DL7HN, DL7OD, DL7ON, L7QU. DLØKG: DJ3HJ, DJ5JT, DJ5TH, DK2WR, DK8GM, K8GT. **DLØRCA:** DJ1GX, DJ4EI, DJ6AP, DL2QB, DL9ME. **LØWU:** DJ4AX, DJ8SW, DK4TP, **EL2DI** & EL2CZ. **FØZZ:** QQ, F6AZP, F6BHK, G3TXF. **FGØAMF/FS7:** K2KGB, M7WN. **G3FVA:** G3FNM, G3SMM, G3SMT, G3SVW, G3WFT, 9YKJ, G4AFT, G4AUR, G4BJT, G8DMJ. **G3KMI:** G3WIE, 3XSV, G3XZG, G3ZBU, G3ZER, G4APA, G8DUO. **G3RCV:** 3VLX, G3WVP, G3YQG, G3ZAY, G3ZEN. **G3RRS:** G3SIT, 3UKS, G4AYL, G8DMQ. **G3VUM:** G3XDY, G3ZNS, G3ZPY, 4ALS, G4AOS, G4AZA, G4BGT. **G3WYX:** G3HTA, G3RUV, 8RUX, G3TJW. **G3YXR:** G2DSY, G3BJQ, G3MDR, G3RUZ, 8WSL, G3ZQC, G4ASM. **G4ANT:** G3IOR, G3JOC, G3LDI, 8MPN, G3VZT, G5AHE. **G8JC:** G3RMF, G3TBU, G3TQD, 5VDX, G3WFZ, G3WGY, G3XRU, G4AWA, G8ASO, G8BBP. **G5BBG:** K4TSJ, W5MYA. **GM3YOR** & GM3FXM, GM3OLK, M3PFQ, GM3YBQ, GM3ZAP, GM4ALK, GM4AQO, GM4BFQ, M8ESJ. **GM4AFF** & GM4AXE, GM4BFX, GM8FTJ. **GM5AXO** GM5ATK, GM5ATY, GM5AXS, GM5BAZ. **WAØSVA. W3UCB/P:** G3WKH, G3WXS, G3XXC, G3XZK, G3ZLL, 4ABP, G4AHN, G4AJW, G8ESI, GW4BGD. **HL9UH** & L9VF. **I4BMJ** & I4ADS, I4BFY, I4SRB, I4VOS. **I4GAD** & AUM, I4LCK. **I8DGP** & I8KBT, WA6ELX. **IG9BAF:** I1BAF, CGI, I1MTK, I1UW, I2TPL. **JA2YAB:** JA2BY, JA2DDD, A2DGD, JA2FRG, JA2HO, JA2HZA, JA2JSF, JH2ACL. **K2GE:** 2KFE, W2JDH, WA2QIO. **K2GXT:** WB2HJV, WB2WVG, B2ZOW. **K3MBF** & K3LJZ. **K6JGV** & W6KNC. **K7RSC** & 7GVF, WA7OXQ. **K9CUY** & K9TZH, W9ZRX, WA9RQY. **ØKU:** WB9ALN, WBØFGV. **KA2DX:** KA2AD, KA2DD, WA5IIS, A8RWL, WB6CGM. **KA8FY:** CLUB. **KH6EDY:** KH6HLK, A5TET. **KL7AIZ:** K1MBA, WB2GJW, K3YWJ, WB4ARV, B4LEK, WN9IQA. **LA1H:** LA4KQ, LA8UL, LA8XM. **LA7V:** LUB. **LA8AK** & LA5KO, LA6HL, LA8VP. **OH3MG** & OH3TQ. **H4RH** & OH4NM, OH4SM, OH4RF. **OK3KGI:** OK3CFA, K3UE, OK3-7555, OK1KPU: CLUB OZ6RT & OZ3CE, Z5QU. **PI1PT:** CLUB. **PJ1AA:** PJ2ARI, PJ2AW, PJ2CL, J2CR, PJ2CW, PJ2HR, PJ2MI, PJ2VD, PPJ2WI, PJ9CB, J9VR. **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.



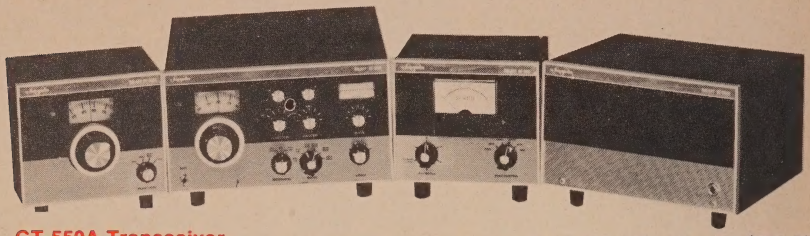
he gang at PJ1AA finally made it and are winners f the W6YY Multi-Operator, Single Transmitter Trophy. lere is part of the crew in action. PJ2CL giving out ıe numbers, PJ2WI doing the logging, PJ2MI keeping ıe check list up to date, PJ2ARI locating the just orked Zone 23 on the map, and PJ2VD supervising the operation.

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, **K30AE,** 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.

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GT-550A Transceiver Order No. 855 Ham Net $595.00

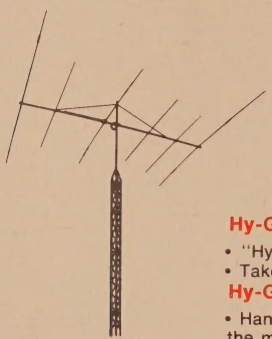
The GT-550A is the best transceiver on the market for the money. Bar none. Costs just $595.00 and runs 550 watts. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550A 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



Hy-Gain's *Super Thunderbird* TH6DXX

• "Hy-Q" Traps • Up to 9.5db forward gain • 25db front-to-back ratio • SWR less than 1.5:1 on all bands • Takes maximum legal power • 24-foot boom. Order No. 389 Ham Net $179.95

Hy-Gain's 18 AVT/WB

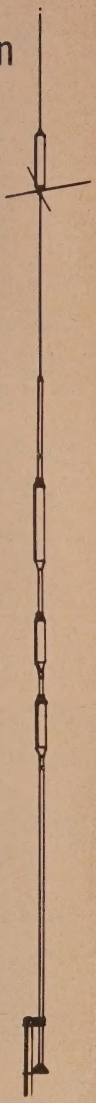
• Wide band performance, 80 through 10 meters • Three Hy-Q traps • Top loading coil • True 1/4 wave resonance on all bands • SWR of 2:1 or less at band edges. Order No. 386 Ham Net $59.95

Hy-Gain's Thunderbird TH3Mk3 (not shown)

• "Hy-Q" traps • Up to 8db forward gain • 25 front-to-back ratio • Takes maximum legal power. Order No. 388 Ham Net $144.95

Hy-Gain's 400 Rotator/Indicator

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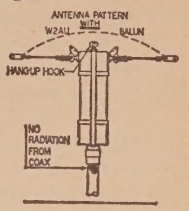
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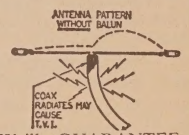
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3. **NOW ALL STAINLESS STEEL HARDWARE.** SO239 Double Silver Plated
4. **IMPROVES F/B RATIO** By Reducing Coax Line Pick-Up
5. **REPLACES CENTER INSULATOR.** Withstands Antenna Pull of Over 600 Lbs.
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GENERAL: • **All amateur bands** 10 thru 80 meters in seven 600 kHz ranges (5 supplied) • **Solid State VFO,** 1 kHz dial divisions • **Modes** SSB Upper and Lower, CW and AM • **Built-In Sidetone** and automatic T/R switching on CW • **30 tubes and semiconductors** • **Size:** 5½"H, 10¾"W, 14⅜" D (13.9 x 27.3 x 36.5 cm). Wt.: 16 lbs. (35.2 Kg).

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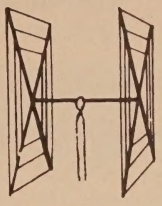
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WHICH ANTENNA WINS THE CONTEST ?

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

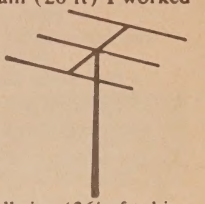
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

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
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(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*
4 EL 20	38*	4 EL 6	24
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, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts! *FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$18.95
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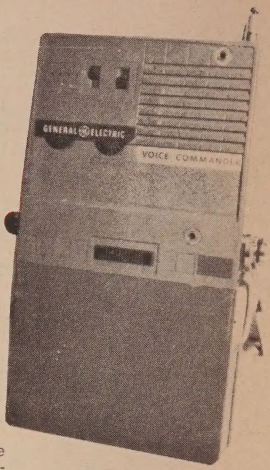
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GENERAL ELECTRIC
VOICE COMMANDER III



- **Full Solid State FM Transmitter-Receiver**
- **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.

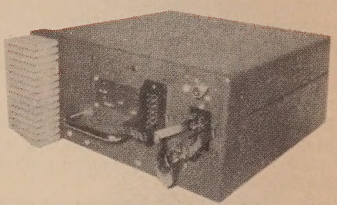
Proper chargers available separately, each $15.

Lots of 5 less 10% — $124.20
Lots of 10 less 15% — $117.30

TWO METER MOBILE UNITS

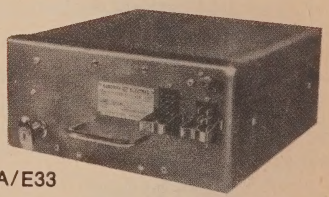
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14″ or 17″ case, complete accessories, fully narrow band.



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MT/33, 12 volt, 30 watts, transistor power supply.....$158
with wide band receiver.....$143



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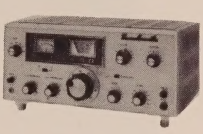
SP-400P $59.00
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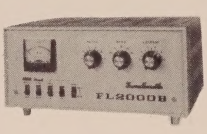
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Exciter $339.00

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.

( ) option

SP400-P

SP400-P: Hand Liner Phone Patch, speaker is designed for the FT dx 400 and 401 series, single side band transceivers. 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 receiver jack, monitor null switch, balance control, line jack transmitter 600 ohm jack transmitter 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.

Here is the opportunity you have been waiting for:

- *Split frequency operation for working that choice DX and Net Operation.*
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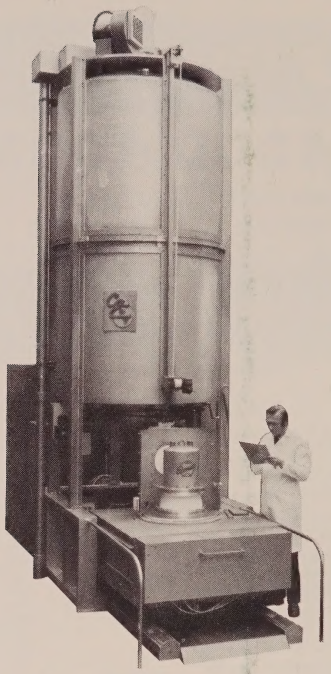
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This is the world's most powerful shortwave transmitter.

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.

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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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