

# QST

March 1974

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OFFICIAL JOURNAL OF THE ARRL

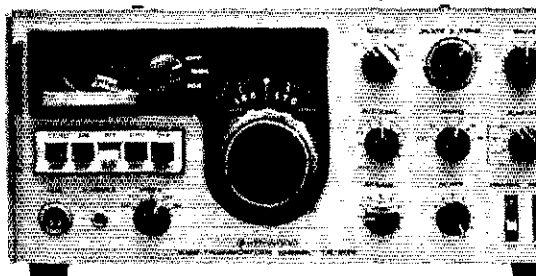


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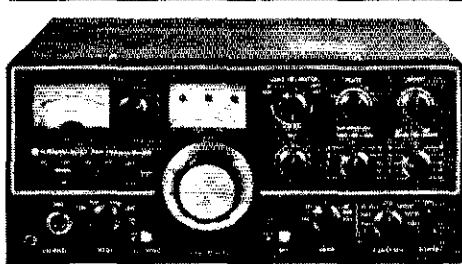
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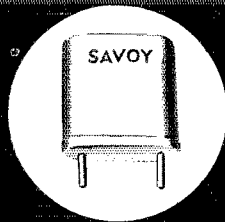
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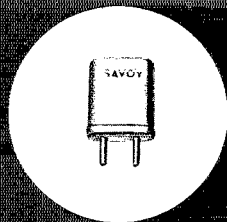
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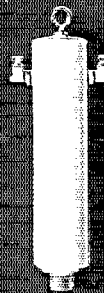


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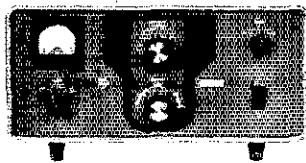
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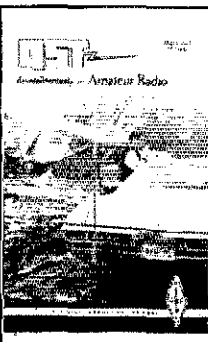
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**OUR COVER:**

"Become Involved" is the theme of the Public Service column this month. See page 56 for details.





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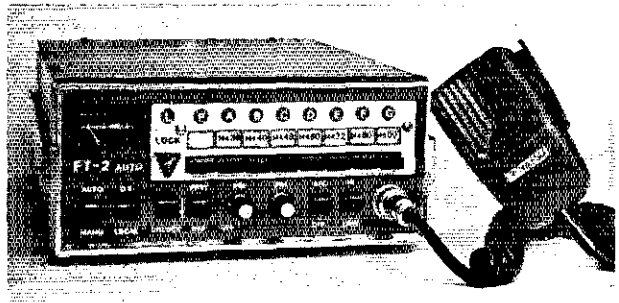
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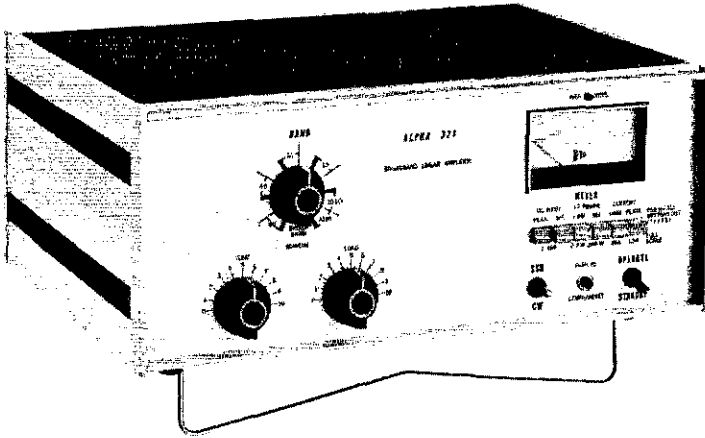
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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORC, QVS, OPS, OO and OBS. Technicians may be appointed QVS, OBS, or VHF PAM. SCMs desire application leadership posts of SRC, FC, RM and PAM where vacancies exist.

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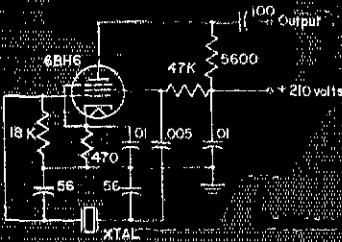
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# THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.



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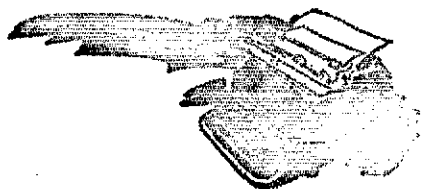
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# "It Seems to Us..."



## AUTO PATCH

FOR MANY YEARS amateurs have made use of interconnections between their stations and the landline telephone system. Phone patching got its major impetus just after World War II. A primary — and most meritorious — objective provided by the setup was the personal tie from servicemen overseas to their families and friends back home. These were communications from areas where commercial circuits were non-existent (Antarctica) or far too expensive for the average Joe. Initially, patching was a technical violation of the tariffs which phone companies had filed with FCC — but everyone looked the other way. The Commission indicated it would rather not have the question of legality raised, so it wouldn't have to answer "no." The phone companies sometimes put special operators on the lines to speed calls and ensure uninterrupted service! The cloud of illegality was lifted in 1969, a result of the "Carterphone" decision which dealt with commercial aspects of the interconnect picture.

But some of us couldn't leave the operation on a high plane of "a voluntary non-commercial communications service [to the public]" as provided in Sec. 97.1 of our rules. For example, some W2s started calling "CQ Miami, phone patch," to talk at length with Aunt Susie, with embarrassing regularity. Domestic patching clouded the question of whether we were serving the public or simply personally interested in saving a buck! Fortunately, such activities appear to have diminished considerably in recent years.

With the growth of repeaters, let us take care to avoid a replay of some of our earlier problems. Some of us tend to forget that when on 2-meter fm we are amateurs and not users of the phone company mobile service. A ham will activate the patch and call his office — "any messages for me, Betty?" This is pecuniary interest with a vengeance and, while now almost non-existent, its early practice brought a bad name for repeater operations in regulatory circles. There are even some who feel that auto patch use from a home (fixed) station is *inherently* a transgression; but the same criteria should apply here as on hf — it is the

purpose and content which should govern, not the band or the physical location of the user.

Interconnection exists to provide a public service — not for our own amusement, and certainly not to avoid personal toll charges. Use it — but with discretion. A landline patch is one of the most valuable tools a repeater system can have for emergency communications effectiveness. Abuse can only result in withdrawal of the privilege.

## IARU FINANCES

THE INTERNATIONAL Amateur Radio Union has operated since its founding in 1925 without any treasury or funds of its own. ARRL has underwritten the administrative costs of a headquarters operation, and most work elsewhere has been on a volunteer basis. With the establishment of regional organizations, however, it was decided that each area should finance its own activities, and this has been done by an assessment of a nominal amount per individual licensed amateur member levied on each member society.

At the conference of Region II societies last year in Santiago, Chile, delegates concluded that very few amateurs actually realize the extent to which their national society is contributing funds and effort for the purpose of a stronger amateur radio service. The conference decided that each society should give more publicity to such functions. We agree!

It is only natural that many ARRL members, Canadian or U.S., appraise the worth of their dues mostly on the basis of tangible returns — primarily receipt of *QST*. More discerning individuals additionally recognize the necessity of supporting those further services which are of collective benefit to all amateurs — regulatory representation, information sources, public relations activities, training aids, code practice, and such. But it is unlikely that many are aware our ARRL contributes each year, on behalf

*(Continued on page 14)*



## League Lines . . .

Correction: IEEE has switched to March 26 (instead of the 28th) the amateur presentation to the technical symposium during the engineers' annual convention in New York. It commences at 9:30 A.M. and will include papers on space communication by Dunkerley, Katz, Klein, McMullen and Sevick. And don't miss the annual QCWA luncheon that noon at the Engineer's Club.

A computer printout of amateur license totals shows a noticeable decline during 1973. Lest we jump too quickly to the conclusion of lessening interest, it must be recalled that four weeks' processing time for a new license was typical until recently; now FCC is behind some 11 or 12 weeks. Two months of extra backlog means several thousand people over the exam hurdle but still not on the computer.

Recreational vehicle operators have launched a "clean up" program for CB channels, sponsored by "Trailer Travel" magazine with K9AQI as national director of a "RV 10-2 CB League." The group opposes 220 CB, and is trying its own "discrepancy report" version of our OO system.

As of the end of January, FCC had issued 555 repeater authorizations under the new rules, 70 of them for brand-new operations given priority (with ARRL cooperation) over renewal applications. Some 218 requests are still pending, more than half having been returned to the applicants for clarification or additional material.

Members might raise an eyebrow over the Board's rejection (Minute 43) of an amendment of our Articles of Association to provide that the four years' membership required for director eligibility be immediately preceding nomination and not just any time in the past. Counsel suggested it was unnecessary, noting that this had always been the practice, that it was so held in court when challenged some years ago, and that the notices in QST made the requirement plain.

FCC staff has for some time been examining the several classes of amateur license, with a view to desirable revisions. One of the ideas contemplates a "dual-ladder" system of progression, one about as now for hf operations, plus a new and separate one for vhf and up, because of the substantial differences in both technical considerations and operating techniques. One thought would include a no-code license at the bottom end of the vhf route. If and when FCC proceeds, there will of course be plenty of opportunity for us all to comment.

Amateurs at Boeing in Seattle and the Jet Propulsion Laboratory in Pasadena are sponsoring a special activity in connection with the Mercury flyby of Mariner 10. Listen for WS6MVM and WS7MVM March 25 through April 5, with cw operation 30 kHz from the low edges, phone at 3930, 7230, 14330, 21360, 28530. Special QSLs for contacts. (Info for the Venus encounter February 5 was received too late for QST but bulletined on W1AW.)

A "Reader's Digest" executive, commenting on the change-of-address problem, says that in a typical year roughly 20 million people in the U.S. move; the result is mis-addressed mail in the magnitude of 50 million magazines which will never get delivered, and 25 million more which will be delivered late. Glad QST is only a small part of that snafu!

Postal rates go up this month, effective March 2. First class, 10 cents; postal cards, 8; airmail letters, 13; air cards, 11. Send some 2-cent stamps to your QSL bureau to be added to the envelopes you've (hopefully!) already furnished. Be sure to include your call. And remember that now, no cards under 3-1/2 by 5-1/4 can be mailed overseas.

We are attempting to enlarge our Training Aids program of films available for loan to affiliated clubs, but most of the "new" material we've reviewed isn't much to brag about. There must be in-house or other training films coming from industry which we might acquire on a mutually-agreeable basis. Can any of you folks in the business provide us some leads? Thanks.

# The Half Square Antenna

BY BEN VESTER,\* K3BC

WITH THE sunspot cycle on a downtrend, and the 5-band DXCC award as bait, considerable interest has arisen in DX and antennas for the lower frequency ham bands. My attempts to get a decent 80-meter DX antenna have gone through an evolutionary cycle with a lot of iterative tries and with steadily improving results. The half-square antenna that is the latest of these has some interesting properties and gives about as many "dBs per buck" as any I've seen.

Before describing this configuration, it might be interesting to cover briefly the different antennas tried which didn't work as well. My available options were set up by (1) a yard full of tall trees and (2) very little money to spend. The first antenna was an inverted V hung on the 75-foot tower (23 m). This is really a quite good antenna — primarily because it has the high current part of the antenna at the highest support point. It provided a standard against which all succeeding antennas were checked. The next step was to add a parasitic element (director) which didn't seem to help at all. This is perhaps not so surprising with the ground so close. Viewed simply, normal parasitic coupling is dependent upon a fair proportion of the current in the driven element being coupled to the parasitic element. When they are both close to the ground, the reverse polarity of the image of the driven element starts to couple heavily to both the driven element and the parasitic element, making it practically impossible to get the desired parasitic current at any useful spacings.

This effect has been shown experimentally to be less with closed-loop type antennas such as the quad. Based on this supposition, I next constructed a 2-element quad, supported at the corners by ropes tied off to trees. With only 75-foot trees and the consequent sag, the bottom was only about 6 feet (2 m) off the ground. However, the quad did work, had an acceptable feedpoint impedance, and gave a few dB (about 1/2 an S unit) improvement over the inverted V on European contacts. Obviously, the only useful low-angle radiation in this antenna came from the upper half of it, the lower half serving to feed or excite the upper half. A major problem with the quad was keeping it up. It had to be very tightly stretched between trees to

keep it from sagging to the ground and as a result the wire often broke.

To try another tack which would avoid the parasitic coupling problem, I tried an 8JK array with four half-wave elements, all elements being fed. With the span of this being so long and with lots of high-voltage points which had to be kept from touching the trees, I only managed to get it to a height of about 40 feet (12 m). The signal-report results with this were essentially identical to the quad on the path to Europe. The horizontal beamwidth was noticeably less than the quad. It probably would have done better if I could have gotten it to 75 or 80 feet in height.

The next antenna tried was the so-called bobtail which is shown in Fig. 1. This is a broadside vertical array with approximately twice the current in the center leg as the two outer legs and with current distribution in the horizontal wires which tend to cancel horizontally polarized emission.<sup>1</sup> A major reason for trying this was my frustration with trying to use the maximum available height of the trees and still be able to feed the antenna and keep the high-voltage points clear of the tree branches. I had avoided vertical antennas before

<sup>1</sup>[EDITOR'S NOTE: While complete cancellation of the horizontally polarized component occurs at a point broadside to the array, some radiation from the flat-top portion will exist at other angles. This is because of incomplete cancellation of the components from the opposite ends of the flat top.]

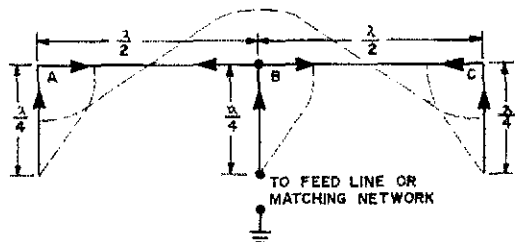


Fig. 1 — Bobtail array. The dotted lines show the approximate current distribution along the antenna and the arrows indicate the relative directions. With this array, the high-current points occur at the highest points on the antenna.

\* 4921 Bonnie Branch Road, Ellicott City, MD 21043.

Fig. 2 — The "half-square" evolved when one leg broke off the bobtail. The input impedance of both the bobtail and half-square antenna is very high, which eliminates the need for an elaborate ground system at the feed point. Either a parallel-tuned circuit or a quarter-wave transformer can be used to match to a 50-ohm feed line.

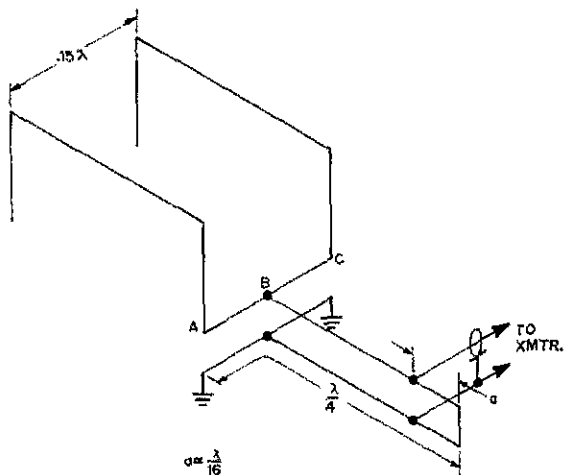


Fig. 3 — Two-element half square array gives greater gain and a very wide bandwidth.

because of the difficulty in getting a good low-loss ground. Also, the trees looked like great vertically polarized rf energy eaters. The bobtail is particularly nice for tree hanging since its highest support points (A, B, and C in Fig. 1) are all at low impedance and looked as if they could be directly slung over a tree limb with no insulators. It is fed from the bottom at a high-impedance point so the ground system doesn't need to be as good as it does with low-impedance feedpoints. Also, like the inverted V, the bobtail has its maximum current at the highest support point. It can be excited from a parallel-resonant tank circuit or a quarter-wavelength stub.

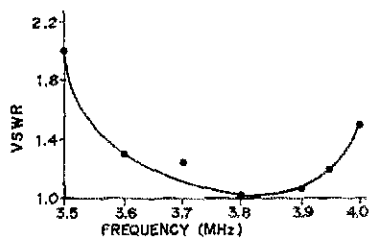
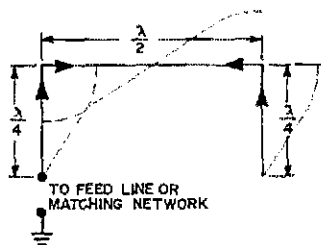


Fig. 4 — Measured SWR of the antenna shown in Fig. 3.

The bobtail has been an outstanding performer for me. It's at least an S unit better than the inverted V and works great on DX paths to the Far East (JA, KG6, and VS6). I put up two of these at right angles and found their interaction to be practically nil even though their center legs are quite close. When switching, I ground the feed point of the one not in use.

### The Half-Square Antenna

With such fine results, I thought I had the ultimate "tree-hung" antenna. However, after a particularly bad storm, I noticed that one leg of

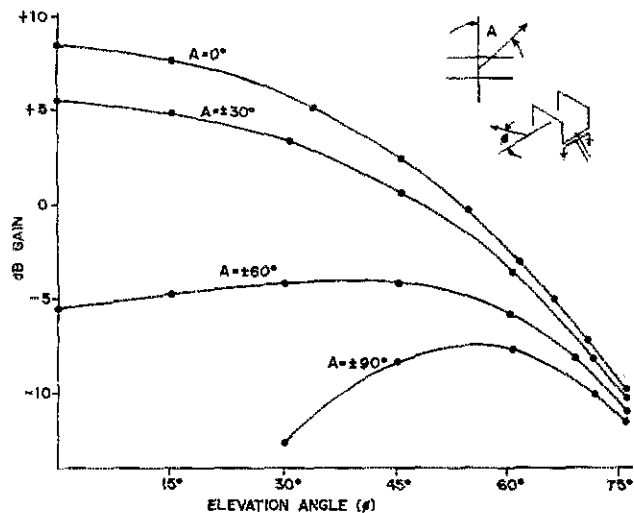
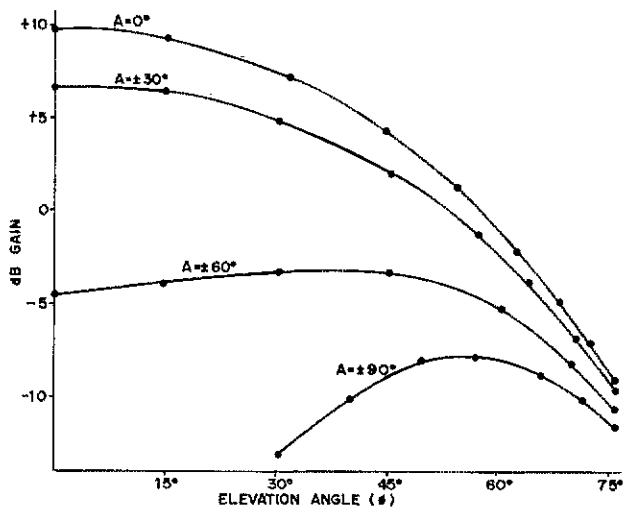


Fig. 5 — Computer-pattern plot for a two-element half square array with 0.15-wavelength spacing between elements. The angles referred to in the drawing are shown in the inset.

Fig. 6 — Computer-pattern plot for the antenna of Fig. 5 with 0.25-wavelength spacing.



the bobtail had broken off and yet the antenna feed impedance hadn't changed noticeably. Furthermore, the results compared with the inverted V seemed about the same as the full bobtail. Fig. 2 shows the configuration. It is a two-element (instead of 3) vertical broadside array with the same current in both legs. It has all the advantages of the bobtail except that the radiation from the horizontal part of the antenna doesn't cancel as well in all directions and some end-fire, horizontally polarized energy does spill off. This might be considered an advantage or a disadvantage, depending on whether you're seeking coverage or discrimination! In discussing this with Ed Watters, WA3LGX, he pointed out the kinship this antenna has with the bisquare array. It's sort of half of a bisquare laid sideways with the ground image antenna making up the other half. That, plus it's obvious shape, led me to dub it the half-square antenna.

After using a single half-square for awhile, I decided to add another element with about 0.15-wavelength spacing. With the new element in place, I made a check to see what parasitic coupling there might be between elements. With several hundred watts fed into the driven element there was no evidence of rf on the parasitic element (using a neon bulb). This was a very gross measurement which tended to confirm what was expected; the very close proximity of the antenna to ground tends to reduce greatly parasitic coupling to a nearby element. I hope to devise a means of measuring this coupling more accurately since I'm still puzzled that it should appear so small.

Having had to tear down the 8JK antenna to get enough wire for this antenna, as a first try for feeding it I just used the 8JK open-wire line and stub match as it existed. The one wavelength of wire for each element was taken directly from the 8JK also. Fig. 3 shows the configuration. Unlike the 8JK, which was narrowband (centered around the middle of the band), this configuration gave

the very flat SWR shown in Fig. 4 — on the first try! The SWR was not very different whether the feed-line stub was connected to point A, B, or C (Fig. 3). B gives a bidirectional characteristic while connection to A or C gives some unidirectivity. I'm still suspicious of the wide bandwidth and suspect the two elements may be different effective lengths, giving a stagger-tuned effect. If the spacing between these two were increased to a quarter wave and fed at point A or point C, it should theoretically add another couple of dB gain and give a more significant front-to-back ratio than with the 0.15-wavelength spacing. WA3LGX plugged the dimensions and shape of this antenna into a generalized computer program he has developed for wire antennas and got the curves shown in Figs. 5 and 6. Fig. 5 defines the forward pattern for 0.15-wavelength spacing assuming a perfectly conducting earth. Fig. 6 is for quarter-wave spacing. The actual patterns will be modified at angles below 10° to 15° by the earth's resistivity<sup>2</sup> as is the case with any vertical antenna. The 0.15-wavelength spaced antenna was used for some time and consistently gave better results than the bobtail on the path to Europe.

I've taken one other step beyond the 2-element array and added another element at 1/8-wavelength spacing (see Fig. 7). The extra element is fed, like the other two, with an extension of the same open wire line. This antenna is considerably quieter (less QRN) than any of the other 80-meter antennas I have and has better than 1/2 an S unit advantage over the bobtail on European signals. It doesn't require any retuning to cover the whole band.

With these antennas not insulated at their support points, one might expect some effects when the tree sap rises or in wet conditions. I haven't been able to notice any differences from dry weather to monsoon-type rains or wet snow covering everything. The trees are slightly over 1/4-wavelength high on 80 meters. Considered as

<sup>2</sup>The ARRL Antenna Book, 12th edition, p. 46.

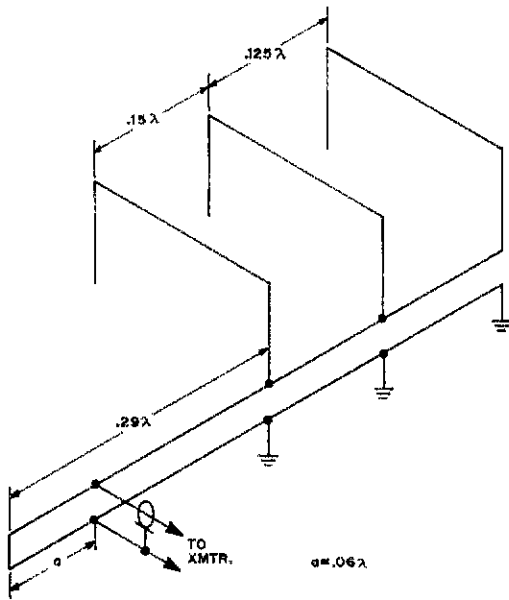


Fig. 7 — A three-element half-square array.

antennas or absorbers, they would look like grounded 1/4-wavelength vertical radiators. The vertical sections of the half-square antenna that run close to the trees are just the opposite. That is, at the bottom of the antenna the voltage is high and at the top, the voltage is low. This should minimize coupling to the trees, as opposed to, for example, using 1/4-wavelength grounded verticals for the antenna elements.

### 160-Meter Operation

Now if you look closely, you can see that the 80-meter half-square whether 1, 2 or 3 elements, should make a good antenna for 160 meters. Each element is 1/2-wavelength long on 160 meters, voltage fed on the end, and the high current part of the antenna is at the maximum height. True, a higher impedance part of the antenna touches the tree, but you can't have everything free! While I haven't managed to work any DX with the few watts I have available on 160 meters, I can hear

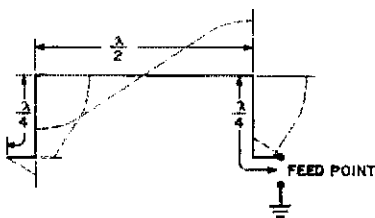


Fig. 8 — Any of the antennas mentioned can be bent as shown in order to keep the current loops at the upper corners.

Central European ham stations quite well on this band for the first time ever at this location. Of course, a different stub or tuning arrangement is necessary for getting a low SWR on 160 meters. I just unshorted the stub and put a tapped coil (about 14 microhenries) in series with the coax feed line to tune it.

### Construction Details

These antennas were all built with No. 14 soft-drawn copper wire. The elements are pulled over the top limbs of trees that have approximately the correct spacing and tied to nylon strings at about shoulder level. If your trees aren't a full quarter wave high, the extra wire can be stretched out parallel to the ground at each end as shown in Fig. 8. Note that you still get the maximum current point at the highest support point you have.

The best technique I've found for getting a line over the highest tree is to use a fisherman's casting reel (I use a Zebco 202) with an 8-pound nylon line and a 1- or 1-1/2-ounce sinker. The reel is put in the RELEASE position and a sling shot is used to shoot the sinker and line over the desired tree. This is a very accurate technique and you can easily put a line over 90-foot trees. The light fishing line is used to pull over a heavier line. It's a good idea to paint the sinker a bright color since the line is almost invisible. You can waste a lot of time looking for the sinker at the end of the line.

Be sure to leave enough droop in the horizontal section of the antenna to allow for tree motion in high winds. The open-wire feed line used for the harness and stub sections is made with the same No. 14 wire spaced 3-1/2 inches (9 cm).

I think the avid Field Day or camping fan will notice the obvious advantages of the half-square antenna for that type of operation. It uses minimum materials, goes up very quickly, will really put out a booming signal on 80 meters, and can be taken down in just a few minutes. You can also make good use of the fishing rod in between your turns at the key.

QST

### It Seems . . .

(Continued from page 9)

of both Canadian and U.S. members, some \$4,500 for operation of the Region II organization. Other societies in this hemisphere contribute also, though not anywhere near the same amount (because of the considerably smaller number of members). The funds are used for administrative costs of bulletins, secretarial service, etc., and for travel of members of the Executive Committee to annual meetings. The purpose remains closer liaison between our organized groups for a stronger amateur radio — one better able not only to retain our bands at future frequency conferences, but enhancing the likelihood of some additional hf space to provide for growth. Your support of ARRL, therefore, is truly support of amateur radio worldwide.

# 1776 - 1976 QSL WINNERS

32) On motion of Mr. Strieter, seconded by Mr. Arnold, after discussion, unanimously VOTED that the League sponsor a competition to design an official ARRL QSL card to be used in celebration of the upcoming Bi-Centennial of the U.S. The competition shall be open to all U.S. licensed amateurs. The winning entry is to be used as the basis for printing plates which will be made available by the League to interested printers at the actual cost of plate preparation. Amateurs may then purchase the QSL cards as they wish from normal commercial outlets. The winning designer to receive an appropriate plaque and suitable publicity in QST. . . (1972 Second Board Meeting.)


So began the 200th Anniversary QSL card contest. Entries were received from across the country, in finished form and in rough sketch. Most were in red, white and blue (indicated by shaded areas in our reproductions to the right), and many used symbols of our country - the eagle, liberty bell, maps, flags, and various communications themes. The cards were judged early in October by Bryant H. Gardner, ex-1GD, of 3-D QSLs, representing QSL-card printers; Don Waters, ARRL public-relations consultant; Ellen White, W1YL, deputy communications manager of ARRL, and Perry F. Williams, W1UED, senior assistant secretary of the League.

Winning card, top right, is by A. F. Kanda, W7HZL, of Scottsdale, Arizona. It can be readily reproduced by any of the regular QSL printing processes; and could be produced in an economy one-color version if desired. Incidentally, use of the official Bi-Centennial logo was considered a plus by the judges - but turned out to be a delaying factor in presenting these pictures, since permission for its use had to be obtained from the Bi-Centennial Commission.

The runners-up were not chosen in any particular order, but all were designs which intrigued the judges. Second from the top in mechanical sequence:

A. L. Mumby, WB2MCP, of Rochester, New York  
 Martin Bunger, WNØJFW, Osage, Iowa  
 Kyle Thompson, W6BNJ, San Jose, California  
 Raymond O. Sanders, WA8VZO, Follansbee, West Virginia

Suggestions for additional ways in which amateurs can help the U.S. celebrate its 200th birthday can be sent to Box 1776, ARRL Hq., Newington, Conn. 06111. **QST**




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# 1776-1976

## UNITED STATES

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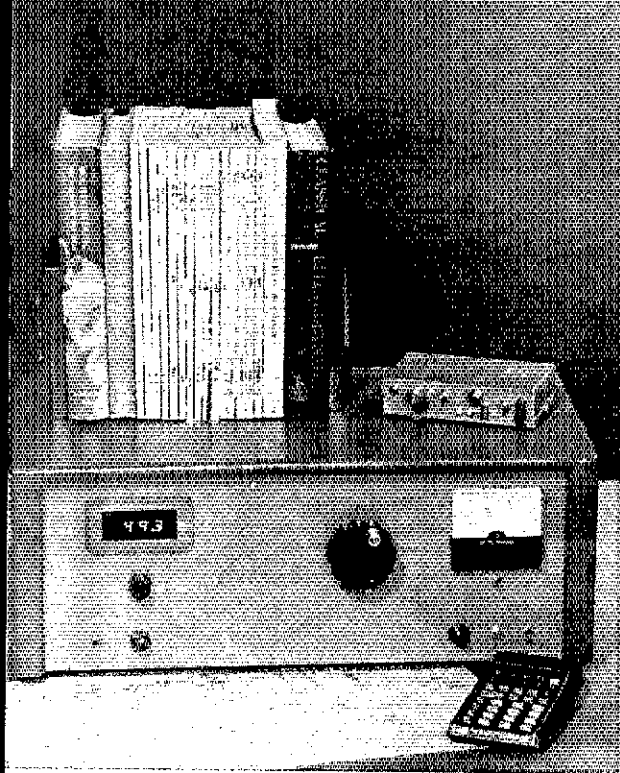
# 1976

THE SOUNDS HEARD AROUND THE WORLD

AMATEUR RADIO  
COMMEMORATING AMERICA'S  
200 TH. YEAR OF PROGRESS

WA8VZO





# A Competition- Grade CW Receiver

## Part I

BY WES HAYWARD,\* W7ZOI

**T**HERE ARE MANY factors which motivate an amateur to build his own receiver, with economics and experimental curiosity often being dominant. Although the receiver described here evolved as a result of these motivations, the design was inspired by two additional factors. The first of these was the publication of a superb paper by Sabin,<sup>1</sup> wherein many design subtleties were presented which had not been considered in the writer's earlier efforts. The second motivating factor was the acquisition of a sample KVG 10-pole cw filter. Although this filter would be an excellent addition to any receiver, its main value to the author was the extremely steep-skirted response which allowed the observation of receiver performance in a critical way not possible with a less complex filter.

\* 7700 S.W. Danielle Ave., Beaverton, OR 97005.

<sup>1</sup>Sabin, "The Solid-State Receiver," *QST* for July, 1970.

It should be emphasized from the beginning that this is not a construction paper. While it is the writer's hope that some of the experimental results presented will be of interest to other receiver designers, duplication is not recommended. In the interest of brevity, design philosophy, measurement methods and results will be emphasized. Complete circuit details are not presented for those sections which are fairly standard. The receiver built by the writer tunes only the 40- and 20-meter cw bands. Since band switching is realized easily by means of relays which connect separate modules into the system, the description will be confined to the 14-MHz section of the receiver. Extension to other bands is, however, straightforward.

### System Considerations

The design goal of this project was to realize a receiver suitable for weak-signal DX work, but also capable of handling a proliferation of strong signals a few kHz away from a desired weak signal. All of the refinements wanted for contest work are incorporated. These include wide-range age, accurate frequency readout, a minimum number of controls, and transceive compatibility. While this "competition grade" performance is, of course, dependent upon the design of individual modules, of equal significance is the way in which the modules are combined. Hence, some of the system problems will be outlined initially.

Fig. 1 is a block diagram of the receiver. A single-conversion approach is used, with great care taken in the design of individual sections in order to obtain an adequate receiver noise figure and the ability to handle strong signals. Realizing these goals in the hf spectrum depends to an extent upon the semiconductors chosen for the front end, but primarily upon the care with which the devices are applied.

In reviewing Fig. 1, the reader will note several items which depart from a more classic design. Integrated circuits are used extensively not merely because they permit simplification, but because they yield the best performance available to the writer. A prime example of this is the local oscillator, which was designed for low residual-noise sidebands. Similarly, two stages of i-f amplification are used to enhance the age range, though the gain of one stage is more than adequate. A second crystal filter is used in the output of the i-f in order to reject wide-band noise generated in the high-gain ICs. Finally, a digital system is used for frequency readout.

In planning a receiver for wide dynamic range, the most critical design point is the input to the first crystal-lattice filter. The noise figure<sup>2</sup> at this point is the product of the noise figure of the following i-f amplifier and the attenuation through the crystal filter. Hence, the net gain required in

<sup>2</sup>While a low noise figure is rarely a requirement for an hf receiver, an understanding of the concept is mandatory in the design. A brief and excellent review of the principle was presented by Nelson, "A Little Bit About Noise," *73* for Jan., 1967.



Amateur receiver construction in recent years has been aimed generally at achieving wide dynamic range in designs based upon solid-state techniques. This effort is no exception. Although the receiver outlined here is designed exclusively for cw use, the results are directly applicable to a similar effort for ssb. Special attention is devoted to the elimination of cross modulation, intermodulation distortion, and blocking problems. Further, the effects of noise modulation are treated in detail. The circuits presented include an advanced i-f amplifier and agc system which is optimized for cw use. An integrated-circuit approach is utilized to provide a digital frequency readout. Special precautions were taken in this design to virtually eliminate the rf interference which can be a major problem when counters are used in receiving applications.

the front end of the receiver is dictated by this i-f-system noise figure. Since the front-end gain should be minimized for optimum dynamic range, the noise figure of the i-f is most significant. The use of an exotic, multipole crystal filter can, in some cases, degrade receiver dynamic range, resulting from the higher bandpass attenuation of filters with many crystals. In the author's receiver, the noise figure at the input of the first filter is about 15 dB. Using this data, the design of the various parts of the front end can now proceed.

### Front-End Design

Some of the problems which may plague a cw receiver tuned to a weak signal, in the presence of very strong signals out of the i-f passband, include desensitization and noise modulation. Often the

most offensive element in the front end is the mixer. The usual motivation for eliminating the rf amplifier, when possible, is to minimize signal levels at the mixer. In reviewing possible mixers, the diode ring shown in Fig. 2 was chosen as being optimum for amateur applications because of the well-documented wide dynamic range available.<sup>3</sup> While other devices may yield a better dynamic range, the ring modulator provides a good starting point. A modular layout was chosen to permit evaluation of subsequent designs.

As emphasized above, the i-f system used by the writer has a rather large noise figure. If this i-f were driven directly by a diode ring, the noise

<sup>3</sup> Construction details for a diode-ring mixer were presented by Ress, "Broadband Double-Balanced Modulator," *Ham Radio* for March, 1970.

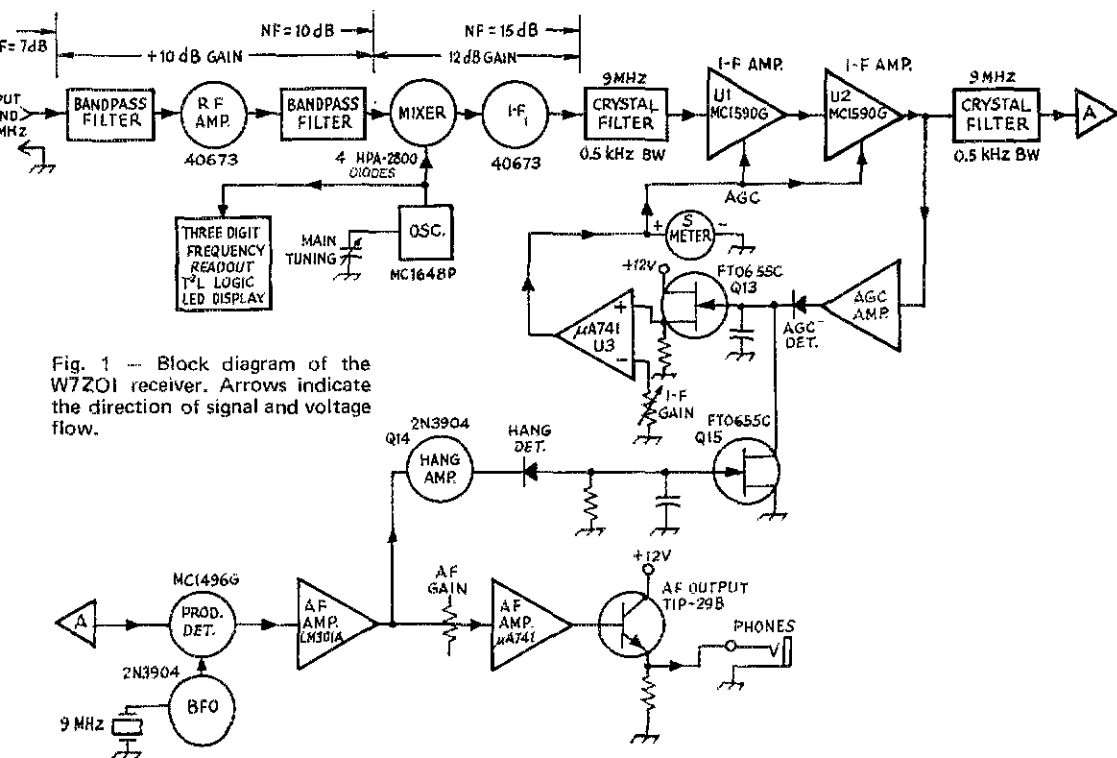
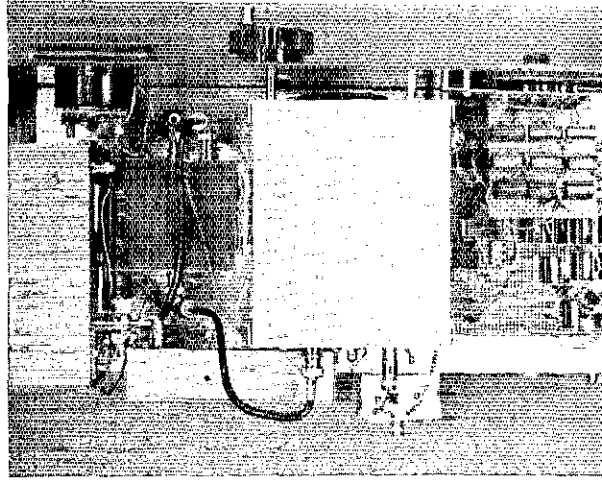


Fig. 1 — Block diagram of the W7Z01 receiver. Arrows indicate the direction of signal and voltage flow.



The large box in the center contains the two local oscillators with the digital circuitry and light-emitting-diode readout to the right. The box at the extreme left contains rf amplifiers and preselector networks for both bands as well as the necessary relays for band switching. The square box between the front-end and oscillator enclosures contains the diode-ring mixer and i-f preselector. The narrow box paralleling the rear of the chassis contains the first crystal filter and the 70-dB i-f amplifier. Extensive shielding is mandatory if the full dynamic-range capability of the receiver is to be realized.



Classic, two-tone IMD measurements have not been performed owing to a lack of test equipment. However, a qualitative IMD measurement was performed, which was enlightening and gratifying. As any receiver "freak" realizes, the specifications on most commercially built amateur receivers are very loose and uninformative. Hence, a receiver was borrowed from a friend for evaluation. This multiconversion, vacuum-tube model is considered to be the ultimate by many DX- and contest-oriented amateurs, and this reputation is reflected in the unit selling price. A 40-meter dipole and a calibrated signal generator were paralleled and attached to the receiver antenna terminal. With the generator set at 7.000 MHz, the 40-meter cw band was tuned while looking for undesired responses. With the generator set for a 10-millivolt output (power available to 50 ohms), the cw band was filled with strong IMD products which disappeared when the generator output was reduced. The test receiver was desensitized severely at 30 millivolts from the generator and was totally useless at 100 millivolts. With the author's receiver, weak IMD products were first detected at 30 millivolts from the generator and the receiver was still usable at 100 millivolts.

The specifications outlined above by no means reflect the state of the art. For example, Sabin realized only 1 dB of desensitization with an

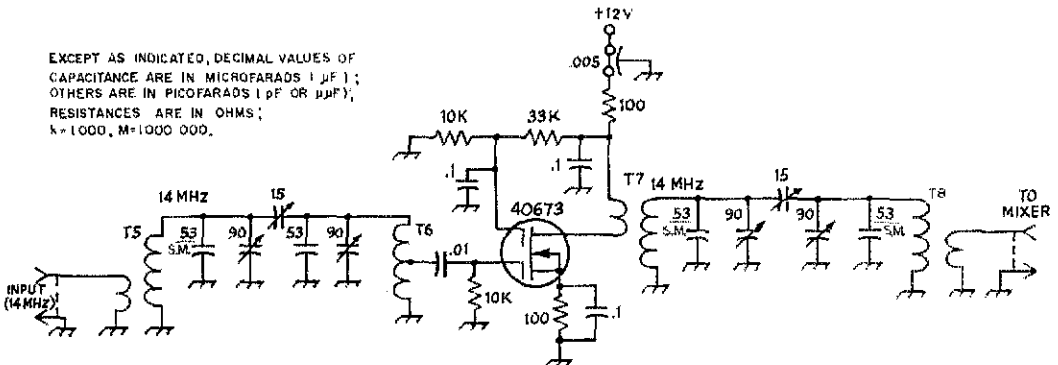
undesired signal of 250 mV in a receiver with an 8-dB nf. Modern commercial receivers for use close to many strong transmitters (e.g., aboard a naval vessel) are capable of operating with volts of undesired signal on the antenna without IMD or blocking problems. It is the writer's intuition that another 10 dB of dynamic range could be obtained with the general design presented. However, this will come only with time-consuming measurements and adjustments with high-quality test equipment.

### Local-Oscillator System

Up to this point, the reader could easily gain the impression that designing a receiver for strong-signal performance is necessary only for the amateur whose neighbors are dumping a kilowatt down his throat. Unfortunately, such is not the case. While few sky-wave-propagated signals are ever strong enough to render useless the poorest of receivers, other problems can occur which degrade the performance. One of the most dramatic and least appreciated of these is noise modulation from the local oscillator.<sup>4</sup>

<sup>4</sup>Priestley, "Oscillator Noise and Its Effect on Receiver Performance," *Radio Communication* for July, 1970.

Fig. 3 - Schematic diagram of the 20-meter preselector. T5 through T8, inclusive, are toroidal-wound on 0.37-inch (0.94-cm) OD powdered-iron cores of SF material. All major windings consist of 18 turns of No. 24 enamel wire. T5 primary has 3 turns. T6 is tapped at 8 turns above ground. The T7 link consists of 4 turns and the link for T8 uses 3 turns.  $Q_u$  of each tuned circuit is 16 at 14 MHz.



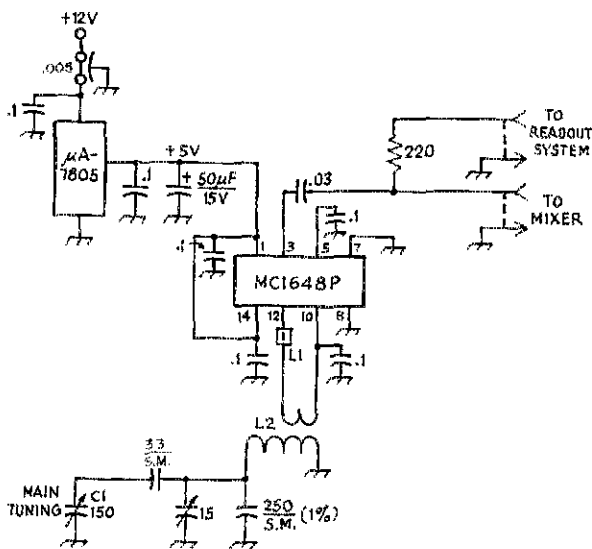


Fig. 4 - Schematic diagram of the W7Z01 5-MHz low-noise local oscillator. C1 is one section of a BC-454 Command receiver tuning capacitor (see text). L1 is a miniature ferrite bead. L2 contains 30 turns of No. 27 enamel wire, toroidal-wound on a 0.37-inch (0.94-cm) OD powdered-iron core of SF material. The link which connects to terminals 10 and 12 of the MC1648P has 6 turns of wire.

We tend to think of the signal from an oscillator as being characterized by a given power at a single, discrete frequency, with perhaps a few harmonics. In reality, the signal from an LO consists of a carrier which is modulated by *noise*. Hence, sidebands exist. For example, one might think of thermal drift as being low-frequency fm applied to the carrier. In a contest-grade receiver, the main concern is with noise sidebands which are spread up to a few kilohertz from the LO carrier. Generally, the energy contained in LO noise sidebands drops off rapidly as we move away from the LO carrier. The rate of this decrease is dependent upon the loaded  $Q$  of the oscillator resonant circuit. Hence, this loaded  $Q$  should be maximized. For related reasons, the circulating energy in the tank should be as high as practical, and low-noise devices should be used in the LO chain.

There are several problems which can occur at the mixer from LO noise. Components at the  $i$ -f and at the signal or image frequencies can be injected directly into the system to degrade receiver noise figure. As pointed out by Sabin, these effects are minimized by LO filtering and by using a balanced mixer. The most significant problem in a contest-type receiver is *noise modulation*. This occurs in the mixer and is not a function of mixer balance. Moderately strong signals (e.g., 50  $\mu$ V) near the frequency to which the receiver is set will beat with an LO noise sideband to produce a component at the  $i$ -f. This is most observable in a receiver with a very steep-skirted crystal-lattice filter. When the receiver is tuned to the strong cw signal, a keyed, well-defined beat note is heard. As the receiver is tuned slowly away from this signal, a point is reached where the signal is well down on the skirts of the filter and a beat note is no longer audible. However, if the LO noise sidebands are excessive, a keyed hiss is still present. This hiss level decreases as one tunes farther away from the

strong signal. The steep-skirted response of the  $i$ -f is redundant unless the LO is clean.

A related noise-modulation effect occurs when the receiver is tuned directly to a moderately strong signal. Closely spaced noise sidebands can still beat with the incoming signal, resulting in an upper limit on the output signal-to-noise ratio. This seemingly esoteric effect will explain to a large extent why two receivers with identical sensitivities will sound different. One sounds mushy while the other sounds very crisp and clean. Noise modulation is by no means a purely academic phenomenon!

Shown in Fig. 4 is the 5 MHz LO used for 20 meters in the writer's receiver. A relatively new type of Motorola integrated circuit, the MC1648P, is used as the active element. The tank circuit uses a small toroid core with an unloaded  $Q$  near 200 at 5 MHz. Link coupling is used to excite the core while keeping the loaded  $Q$  as high as possible. The link was chosen for a minimum number of turns to sustain stable oscillation. The oscillator is tuned with one part of a three-section capacitor from a BC-454 Command receiver. These high-quality capacitors, with a built-in gear-drive mechanism, are still hard to beat. A second capacitor section is used to tune the separate 16-MHz oscillator used for 40-meter reception. A relay is used for band switching.

The reader should consult the Motorola literature<sup>5</sup> before using the MC1648P. These "pills" are from the MECL line and are extremely high-speed devices. As such, very careful bypassing and layout is required to keep the oscillator from "taking off" at some undesired frequency in the vhf range. Double-sided pc board was used for construction.

<sup>5</sup>MECL Integrated Circuits Data Book, Motorola Semiconductor Products, Inc.

(Continued on page 37)

**PART I** of this article, in *QST* for February, 1974, included a general description of the transceiver, along with specific information on the receiver portion. This section will deal with the transmitter, switching from transmit to receive modes, and the tune-up and alignment procedure for both units. References are given at the end of this article as sources of additional information about solid-state fm equipment.

### Transmitter

The heart of the transmitter is a complete, miniature, 100-milliwatt fm transmitter board<sup>5</sup> (see Fig. 5 and parts list). This crystal-controlled, completely solid-state fm unit has built-in speech processing and is supplied fully tested and ready to go, with a choice of a 146.16-, 146.34-, or 146.94-MHz crystal and a miniature crystal microphone. A complete schematic diagram, circuit description, technical data, crystal specifications, and a large pictorial parts-location diagram are also furnished. The rf output of this little unit is used to drive a power amplifier stage (Fig. 7) to an output in excess of one watt.

The fm transmitter board as supplied is a single-channel unit with the crystal (a miniature 8-MHz HC-18/U type with wire leads) soldered to the board. The first procedure, then, is a slight modification to provide crystal switching. Begin by removing the crystal from the board. Connect a short length of RG-174/U miniature coax from the base of Q1 to the crystal selector switch, which should be a good quality ceramic unit.<sup>†</sup> It can have as many positions as you like, depending upon how many channels are desired. A five-position switch was used in this rig. The crystal sockets are mounted on a small pc board which serves as a crystal deck. This deck is fastened to the switch in the same manner as the receiver crystal-oscillator board discussed earlier. This allows short leads to be used from the crystal sockets to the switch.

A trimmer capacitor is placed in parallel with each crystal to permit tuning each channel exactly to frequency. Miniature HC-25/U, 8-MHz crystals are used and should be ordered from reputable sources. Crystal specifications are furnished with the transmitter board.

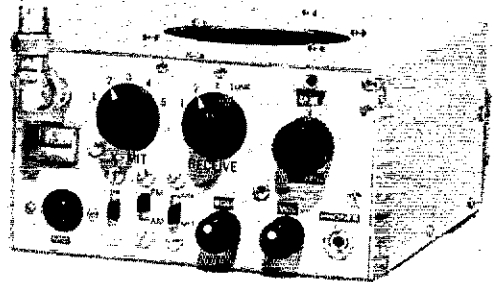
The original output transistor, Q7, was removed and replaced with a larger, more rugged transistor, a 2N3866 was used here, but similar vhf types such as the HEP75, 40290, or equivalent can be used. L9, the small ferrite-bead choke, should be removed and reconnected on the foil side of the board to allow more space for the new transistor, which has a much larger case than the tiny 40637 it replaces. A simple heat sink made of a piece of brass tubing was slipped over Q7.

<sup>5</sup> This and other references appear at the end of this article.

<sup>†</sup> EDITOR'S NOTE: To avoid confusion in parts designations, the reader should be aware that the parts and numbers mentioned in conjunction with the exciter are those used by the manufacturer. Q1 in the transmitter section is not the same Q1 that is mentioned in the receiver front end description.]

# A Complete 2-Meter FM Transceiver

## Part II



BY ALVIN J. BERNARD,\* WA2JTN

The transmitter board can be mounted by means of small metal spacers. Alternatively, it can be mounted vertically to conserve space, as was done here.

The audio section of the fm board is designed for use with a ceramic or crystal microphone, which is simply connected to the gate of Q8. The author chose to use a low-impedance dynamic microphone, one of the low-cost imported variety with a remote-control switch, commonly used with cassette tape recorders. A simple impedance-matching circuit (Fig. 6) transforms the low impedance of the dynamic microphone to the high impedance required at the gate of Q8. This circuit can be constructed on a small pc board or "perf" board and mounted somewhere between the microphone jack and the fm transmitter board.

### Power Amplifier

An outboard rf power-amplifier stage (Fig. 7) boosts the nominal 100-mW output of the fm transmitter board up to the more respectable 1-watt level. This is the PA circuit used in the popular "Pipsqueak" fm transmitter.<sup>6</sup> (Incidentally, if you do not wish to use the ready-made fm transmitter board as specified, the Pip-

\* 300 Lawrence Ave., Oakhurst, NJ 07755.

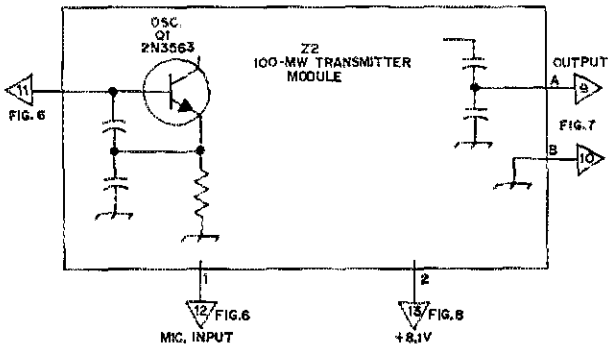


Fig. 5 - The heart of the transmitter is a complete fm exciter providing 100 milliwatts output. See reference 5 at the end of the article for ordering information. Modifications are described in the text and shown in Fig. 6.

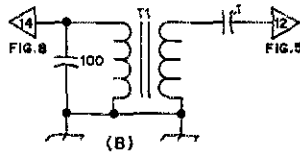
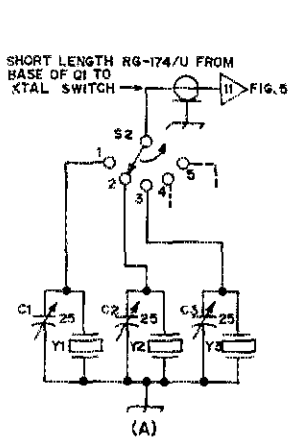


Fig. 6 - A switch to select additional channels is wired to the exciter board. The frequency-adjusting trimmers are 5- to 25-pF miniature ceramic units. Crystal information is supplied in the instructions obtained with the exciter. At B, a miniature transformer is used to step the low impedance of the microphone to the higher value needed at the audio input of the transmitter. T1 can be a Lafayette TR-120 (99R60345) or Radio Shack 273 B 1376. Primary impedance is 100Ω; secondary is 200kΩ.

squeak would be a good choice as an alternative, but the rig would have to be considerably larger.) Other transistors that will work well here are the 40290, 2N3866, 2N4427, and HEP75. However, the rugged 2N5913 is strongly recommended as it can withstand considerable abuse and tolerate severe mismatch without being damaged. A circuit for metering the relative rf output is included. A small capacitor couples rf energy to the diode where it is rectified, filtered, and then applied to a microammeter. This is the same meter that serves as the S meter, and switching is taken care of by one of the four sets of spdt contacts on the relay, K1. A small potentiometer allows adjustment for maximum meter deflection.

A full-size pc layout and pattern for the PA stage is given in Fig. 9. This board should be mounted as close as possible to the fm transmitter board (driver) and connection between the two should be made with a short length of RG-174/U coax.

### Switching

The method of transmit-receive switching is to a large extent dependent on the type of operation desired, number of channels used, and types of switches and connectors available. The switching

scheme used here is shown in Fig. 8. Many of the details have already been discussed. K1 is the main switching relay and is activated by the PTT switch on the microphone. This relay is a 4pdt type, but only three sections were used. Section B switches +12 from the transmitter to the receiver. Section C switches the meter from transmitter (relative rf output) to receiver (S meter). Section D switches the antenna from the transmitter to the receiver.

S4 is the on/off switch. In the ON position any external dc source is removed and the internal 12-volt battery is connected to the transceiver circuitry. In the OFF position the positive terminal of the internal 12-volt battery is connected to one of the pins of the front panel microphone connector, J3, a 5-pin "DIN" type, commonly used on tape recorders. The battery charger cable is fitted with the corresponding 5-pin plug (Switchcraft 05GM5MP1), the same as the microphone cable, to permit charging the battery through J3. The battery, therefore, can only be charged with S4 in the OFF position, and the rig can only be operated from an external 12-volt dc source (introduced at J2) with S4 in the OFF position.

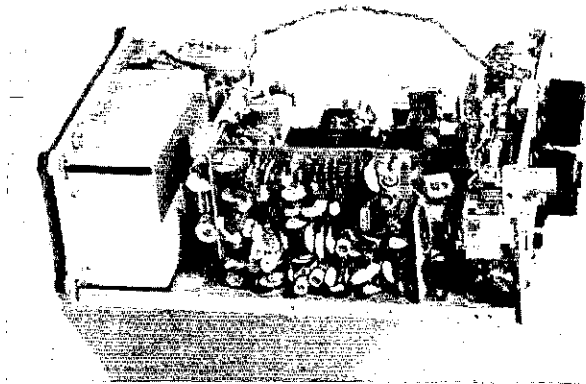
### Checkout and Alignment

Expensive test equipment is not required for alignment. A grid-dip meter, preferably one that

incorporates tone modulation, is a must. A general-purpose rf signal generator is also desirable, as is a tunable 144- to 148-MHz receiver with fairly good calibration. A Hallicrafters SR-42A was used here. Of course a VOM (20 k $\Omega$ /volt or better) or VTVM is always indispensable.

The receiver is checked out first, starting at the speaker and working backwards toward the front end. Start with the audio and squelch board, Fig. 4. Make sure a speaker is connected to the output of C10. Set the audio and squelch controls fully counterclockwise. With a simple transistor audio oscillator or audio signal generator as a source, feed a tone (about 400-800 hertz) into the base of Q7 through C7. Turn the volume control clockwise. The signal should be plainly audible at the speaker with increasing volume as the volume control is advanced. Leave R5 set for a comfortable volume level. Now advance the squelch control slowly. At some point the audio signal from the speaker should be cut off, if the squelch is functioning properly. If the squelch control works backwards reverse the connections. If everything checks out as indicated, disconnect the voltage, remove the audio generator, and return the squelch control to its most counterclockwise position. Leave the volume control at about midrotation.

Now connect the 455-kHz i-f/detector circuit (Fig. 3) to the audio/squelch board. Set S3 to the a-m position. Feed a modulated 455-kHz rf signal to the input of Z1. Apply voltage and swing the signal generator frequency back and forth until the signal is heard in the speaker and the tuning meter peaks to a maximum reading. Keep the output from the signal generator as low a level as possible that still gives a good meter indication. Adjust all three i-f transformers in Z1 for maximum meter



In this view of the transceiver from the transmitter side, the PA module is just visible between the battery compartment (left) and the exciter board (center). The output/signal-strength meter is just below the BNC antenna connector.

reading. If the circuit of Fig. 3C has been used instead of the i-f module, adjust T9 and T10 for maximum meter reading. All circuits of Fig. 3 are now aligned.

The first i-f/second converter board (Fig. 2) can now be connected and peaked up. Apply voltage and inject a modulated 10.7-MHz signal through C8. The signal source can be an rf signal generator or grid-dip meter. Move the frequency back and forth until the signal is heard in the speaker and the tuning meter peaks. Keep the output of the signal generator as low as possible. Adjust T2, T3, and T4 for maximum meter reading. Remove voltage and disconnect the signal generator.

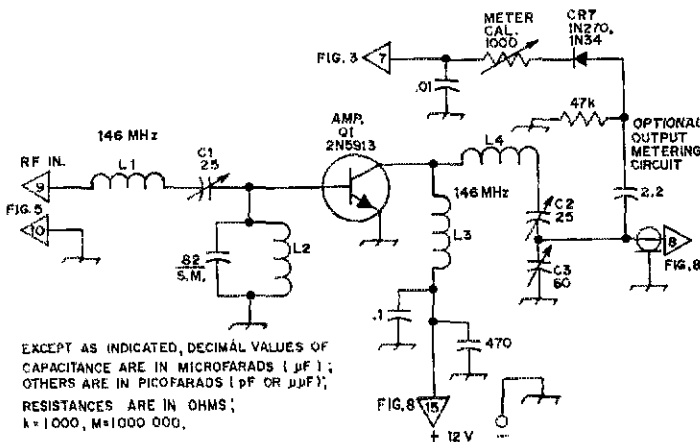
The front end and the crystal-controlled local oscillator (Fig. 1) are now ready to be tuned up.

Fig. 7 — A power amplifier stage is needed to boost the output from the driver to the 1-watt level. See Fig. 9 for a circuit board layout. Note that the trimmers mount to a pc board with the bodies perpendicular to the board.

C1, C2 — 7- to 25-pF miniature ceramic trimmer, Erie 538-0068-7-25 or equiv.  
C3 — 15- to 60-pF miniature ceramic trimmer, Erie

538-006F-15-60 or equiv.

- L1 — 4 turns No. 22 enam., close wound, 1/4-inch dia.
- L2 — 4 turns No. 30 enam. on ferrite bead.
- L3 — 12 turns No. 22 ena., close wound, 1/4-inch dia.
- L4 — 5 turns No. 16 tinned 5/16-inch ID  $\times$  1/2-inch long.





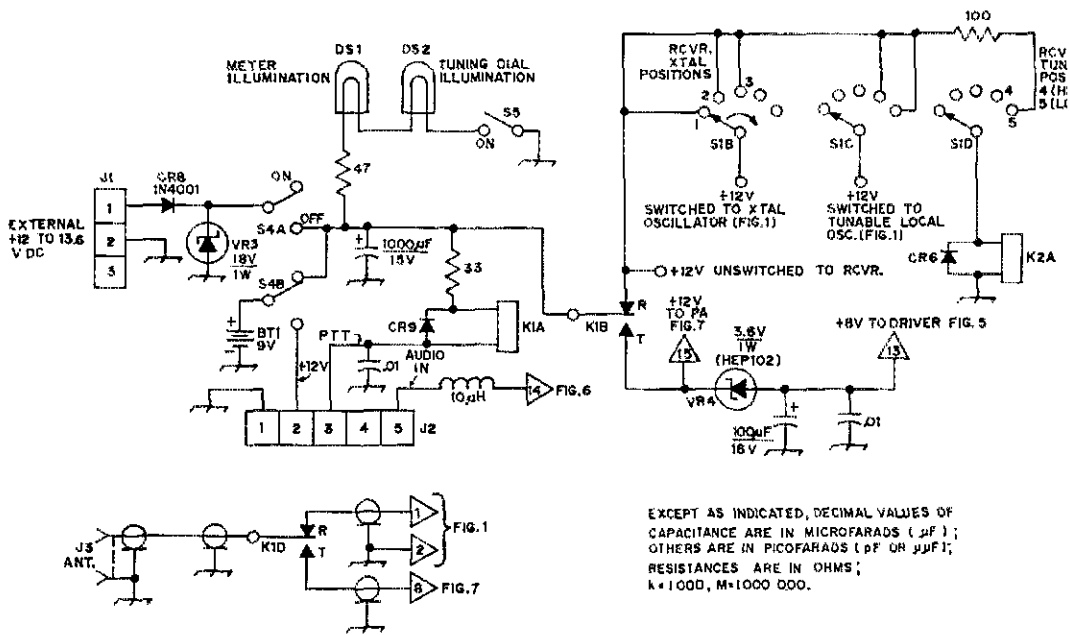


Fig. 8 — Switching and power distribution system can be tailored to the individual needs of the builder. The dial lamps are miniature incandescent units, with pigtailed. They are held in place on the panel by means of a small amount of clear epoxy cement. The series resistor should provide long life. BT1 — 12 volt, 0.600-Ah nickel-cadmium battery, Gould MP202 or equiv. J2 — Chassis-mount connector, Amphenol 78-S3S or equiv. J3 — Miniature chassis-mount audio connector,

- Switchcraft 57GB5F or equiv.  
 K1 — Miniature enclosed 4pdt relay, 12-V dc coil; Allied Control TU154-4C, Sigma 67R4-12 DC, or Potter and Brumfield R10-E1-Y4-V185.  
 K2 — Spst miniature reed relay. Contacts (K2B) are shown in Fig. 1, Part I of this article.  
 S1 — Miniature ceramic rotary, 4-pole, 5-position, Centralab PS-111 or equiv.  
 S4 — Dpdt slide or toggle.  
 S5 — Spst slide or toggle.

The tunable oscillator, Q6, is also connected to the mixer (Q3) at this time but voltage is not yet applied to it. Apply voltage to the crystal-controlled oscillator, couple a grid-dip meter in the absorption mode to L6, and adjust L6 and C2 for maximum output near 45 MHz. Now couple the GDO to L8 and adjust C3 for maximum indication in the vicinity of 136 MHz.

Connect the output of the first mixer to the input of the first i-f amplifier. Connect the output of Q5 into the mixer via a very short piece of RG-174/U from L9 to L5. The entire receiver is now connected except for Q6, the tunable local oscillator. Set S1 to the crystal position representing the busiest local repeater or simplex channel. Use a modulated GDO (or vhf signal generator) to generate a signal near 147 MHz and slowly rotate the GDO dial back and forth until the signal is heard in the speaker and the tuning indicator meter peaks. Move the GDO as far as possible from the receiver and keep the output to the minimum required to hear the signal and obtain a sufficient meter reading. Adjust T1 for maximum meter indication. Then adjust L4, L3, L2, and C1 in that order for maximum output. Reduce the level of the signal source or move it further away, if necessary, to prevent overloading.

A rough alignment has now been accomplished which will be sufficient to permit reception of signals when a two-meter antenna is connected to the receiver.

Final adjustment can be accomplished with a received signal as the source. The source can be one of the local repeaters or you can prevail upon a local fm'er to provide you with a good signal on one of the simplex channels for which you have a crystal. With an antenna connected and S3, (Fig. 3) now set to the fm position, turn the squelch fully counterclockwise (off) and the volume to a comfortable listening level. Select the crystal which will provide a good on-the-air signal for final adjustments. Adjust C2, L6 and T5 for best audio quality. Then peak all adjustments in the front end in addition to C3 for maximum indication on the tuning meter.

Alignment of the tunable oscillator, while not especially difficult, is somewhat tedious and requires a little patience. Set C4 so that its plates are completely unmeshed. Use a signal generator or GDO to provide a modulated signal at the highest frequency you desire to receive in the tunable mode. In the author's case this frequency was 147.5 MHz. You will probably not be able to rely on the calibration of the average signal generator or

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu F$ ); OTHERS ARE IN PICOFARADS (pF OR  $\mu\mu F$ ); RESISTANCES ARE IN OHMS; K=1000, M=1000 000.

GDO, so use a calibrated two-meter receiver to verify the frequency from the generator or GDO. A modulated GDO was used here and it was found best to keep it as far away from the receiver as possible. Apply voltage to the tunable oscillator and be sure voltage is removed from the crystal-controlled oscillator. Carefully adjust C5 until the signal is heard. Then set C4 at maximum capacitance (plates fully meshed). Tune the signal source lower in frequency until the signal again is heard. If the resulting frequency spread is too great, carefully remove plates one at a time from the tuning capacitor until the desired coverage is attained. In the author's case it was necessary to reduce C4 to one rotor and one stator plate to achieve coverage of 146-147.5 MHz in the upper range and 144-145.5 in the lower range (with C6 switched in). Some experimentation and juggling will be necessary to get the tuning exactly the way you want it.

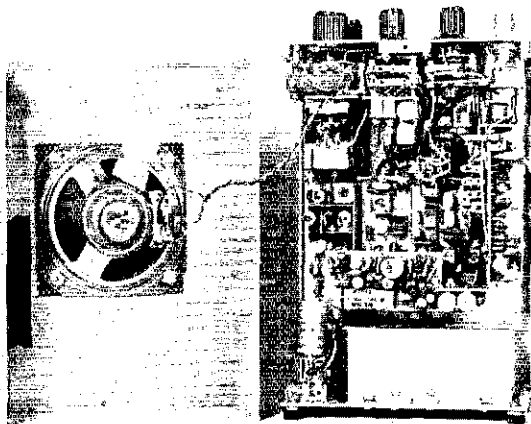
### Transmitter Checkout and Adjustment

Transmitter tune-up is straightforward and conventional in every respect. The exciter board (driver) was factory aligned and was found not to require any adjustment except for proper setting of the deviation control. All tuning is done on the PA stage. Select a suitable transmitting crystal and connect the driver to the PA stage. A No. 47 pilot lamp across the output will serve as a convenient visual indicator and load of approximately 50-ohms impedance. Apply voltage and adjust C1 (Fig. 7) for maximum output. Alternately adjust the tune and load trimmers, C2 and C3, for maximum output. At 12.5 volts normal lamp brilliance should be obtained. Couple a GDO in the absorption wavemeter mode to L4 to verify that maximum output is actually at 147 MHz and that the second-harmonic energy (294 MHz) is minimal. All that remains is to set the deviation control for the proper amount ( $\pm 5$  kHz) and adjust the netting trimmers for each channel to the exact frequency. This was readily accomplished with the aid of a vhf digital frequency counter (thanks to WA2FPB), but these adjustments can also be made during on-the-air tests.

### Results and Performance

Results have been most gratifying. The little rig provides just about all the performance and versatility that one could ask for in a small portable package. What can be accomplished with a watt on two-meter fm is a constant source of amazement. Repeaters up to 35 miles have been worked with just the 19-inch whip and the rig sitting on the bench. Prior to the installation of a mobile antenna, the rig provided excellent communications while sitting on the front seat of the car and using the 19-inch whip.

The receiver has a sensitivity of  $0.3 \mu\text{V}$  for 20-dB quieting and  $0.1 \mu\text{V}$  for reliable squelch operation. These figures are on a par with some of the best fm transceivers. Current drain is approximately 100 mA while receiving and 300 mA in the transmit mode.



In spite of the apparent compactness of the unit, there is still room for the speaker to be mounted in the cover. One of the secrets of obtaining good audio level from portable equipment is to use as large a speaker as practical. A three-inch unit such as this provides ample volume for comfortable listening.

The time and energy expended on this project have been repaid many times over, not only from the fine comments from those who see and hear the rig, but also from the feeling of accomplishment that comes from building and operating your own gear. It is sincerely hoped that some of the ideas and techniques presented here will serve as a source of encouragement to others.

### Acknowledgements

The author would like to acknowledge the contributions of several others whose kind and generous assistance helped to bring this venture to a successful conclusion: Ken, WA2FPB, who introduced the author to the world of fm and provided much advice and technical assistance throughout; Tom, WB2AZQ, and Bruce, WB2FKA, who provided timely assistance along the way; Ray, K4DHC, for several of the major parts and components used in the project; and special thanks to Jason Grossman, Asbury Park, N.J., who took time from his busy restaurant chores to take and process the excellent photographs.

[EDITOR'S NOTE: An error in the schematic diagram shown in Fig. 4, Part I of this article has been called to our attention. See Feedback on page 83 in this issue.]

(Continued on page 39)

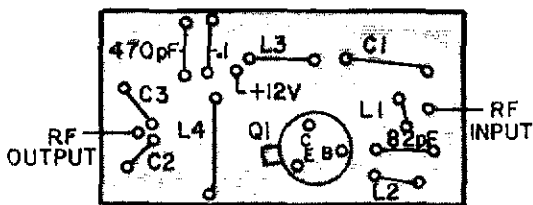
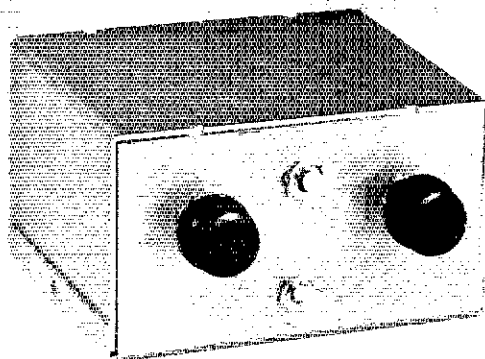


Fig. 9 — Full size pc board layout and parts placement guide for the PA. View is from the component side. Shaded areas are copper foil.



• *Beginner and Novice*

# Improving Your Receiver Performance on 15 and 10 Meters

BY LEW MCCOY,\* WH1CP

**M**ANY OF the lower priced receivers, or second-hand models that Novices use, leave much to be desired when operated in the 15- and 10-meter bands. Usually the tuning rate is too fast, sensitivity is poor, and stability is lacking. On the other hand, these receivers can do a reasonably fair job of covering 80 meters. It might be added that no amount of work or changes to the receiver proper are worth the expense and effort to make such a receiver a good performer on the higher bands. However, there is a method, and it isn't complicated, to step up the performance of such receivers on 15 and 10 meters. This consists of using a *converter* ahead of the receiver. This article describes the "hows and whys" of converter operation and shows how to build a simple, but high-performance, unit.

## What a Converter Is

Simply, the type of converter we are talking about is a combination of electrical circuits that *converts* an incoming signal to a lower frequency. Let's explain that in a little more detail. Fig. 1 is a block diagram of how a converter works. With

\* Novice Editor, *QST*.

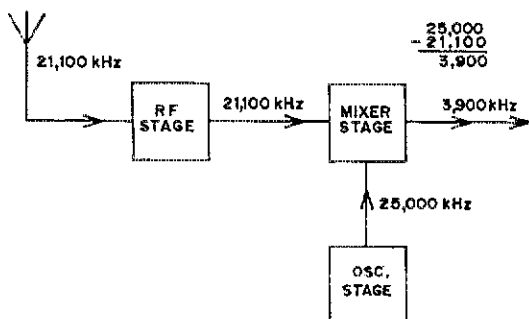


Fig. 1 - This block diagram shows the frequency relationship of converter.

incoming rf energy from the antenna, say at 21,100 kHz, the signal is amplified first in a radio-frequency amplifier stage. The boosted signal is then fed to a mixer stage. Also being fed into the mixer is some rf voltage which is obtained from a crystal-controlled oscillator. This energy is at 25,000 kHz. The output signal, or rather signals, from a mixer stage are the sum or difference frequencies of the energies applied to the mixer - in this case 21,100 and 25,000 kHz. We are interested in the *difference* frequency, 25,000 minus 21,100 or 3900 kHz. This new energy (i-f, or intermediate frequency) can be fed to our receiver, the latter being tuned to 3900 kHz. Our i-f energy will be treated by the receiver as if it were an 80-meter signal.

## Why Do It?

As we pointed out earlier, these poorer receivers will work well enough on 80, but not the higher bands. By converting the signal to 80 meters, you will have a much slower tuning rate (bandspread), much more sensitivity (the converter provides signal gains of as much as 20 decibels), and better stability.

The decision to make the converter will depend on how well your receiver performs on 15 and 10 meters. Check the number of turns of your tuning knob for 450 kHz (the width of the 15-meter band) on 15, then count the turns for the same number of kilohertz on 80 meters. One receiver we checked had a difference of nearly four complete turns for the same coverage. Does your receiver sound insensitive on 15 and 10? If it does, you need the converter.

## The Circuit

Fig. 2 is the circuit diagram of the unit. We should point out that this converter has a rather unusual feature which, to our knowledge, is the first time it appears in print. One of the objectives of our staff is to design equipment for the

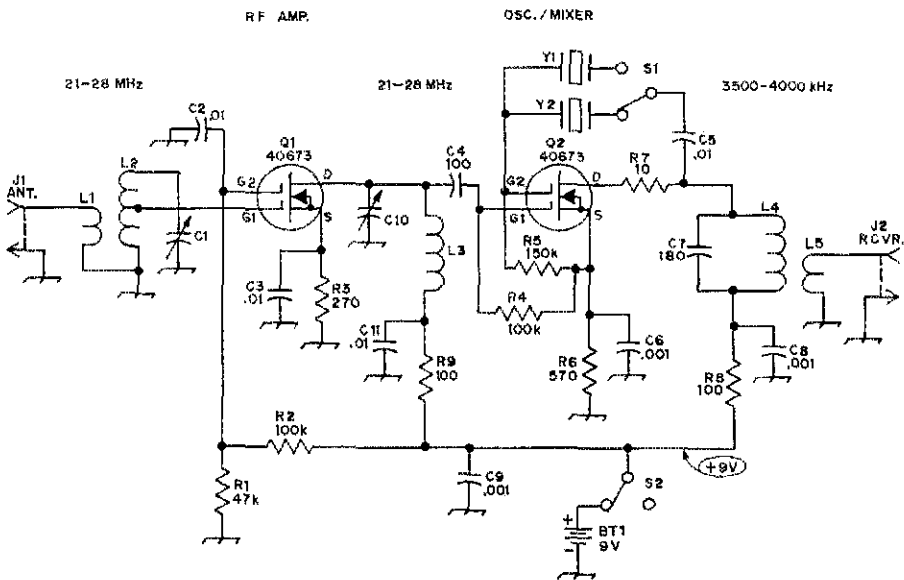


Fig. 2 — Circuit diagram of the 15- and 10-meter converter. Unless otherwise noted, all capacitors are disk ceramic. Resistors can be either 1/2 or 1/4 watt. Part numbers not listed below are for text reference and layout purposes only.

- BT1 — 9-V transistor battery.  
 C1, C10 — 365-pF variable, modified as per text (Radio Shack part No. A1-233).  
 C4 — 100-pF silver mica.  
 C7 — 180-pF silver mica.  
 J1, J2 — Phono jack.  
 L1 — 3 turns of No. 22 or 24 enam. wire wound at the ground end of L2.  
 L2, L3 — 7 turns No. 22 or 24 enam. wire wound on an Amidon T-50-2 toroid core. The tap for G1 of Q1 is placed two turns from ungrounded end of L2.

- L4 — 55 turns No. 30 or 32 enam. wound on an Amidon T-50-2 toroid core.  
 L5 — 10 turns of No. 30 or 32 enam. wound over ground end of L4.  
 Q1, Q2 — Dual-gate MOSFET, RCA 40673.  
 S1 — Single-pole, double-throw toggle switch.  
 S2 — Single-pole, single-throw toggle switch.  
 Y1 — For 15-meter coverage, 17,500-kHz crystal; for 10 meters, 24,500 kHz (International Crystal type F-700 or equiv.).

Note: Most of the components can be obtained from Radio Shack stores. The 40673s are available by mail from Nurmi Electronic Supply, 1727 Donna Rd., West Palm Beach, FL 33401. The toroid cores are available from Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.

newcomer, using the simplest circuitry possible, with a minimum number of components, without sacrificing performance. In this converter, dual-gate MOSFETs (40673s) are used. Normally, three transistors would be required, one for the rf stage, one for the mixer, and another for the oscillator. W1SL of our staff suggested that it might be possible to use a *single* 40673 as both a mixer and oscillator. Frankly, we had doubts about being able to obtain proper mixer performance, but they vanished when we found the circuit worked — and very well! This eliminates the need for another 40673, resulting in a saving of parts and lower cost for the converter.

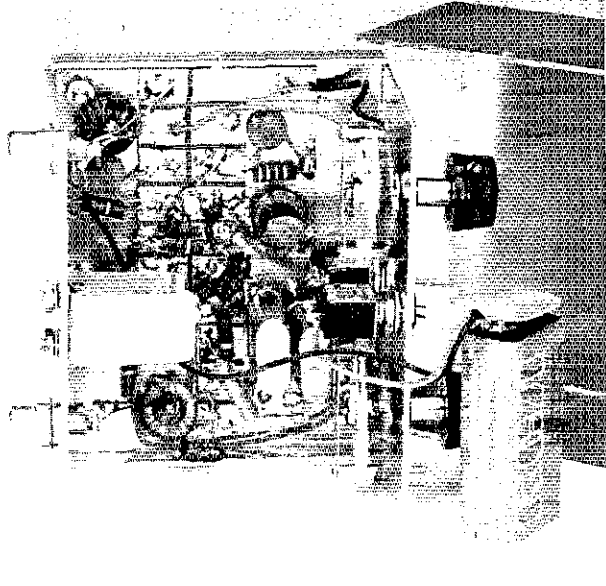
For the technically minded, the performance figures for the converter might be interesting. The converter was tried with three different receivers, all of which performed poorly on 15 and 10 meters. Using a signal generator, it was noted that these receivers required a signal input on the order of 1 to 2  $\mu\text{V}$  to produce a barely audible signal. With the converter, sensitivity was improved so that only 0.1  $\mu\text{V}$  produced

a plainly audible signal on the two bands. There was some concern that combining the oscillator and mixer in a single device would result in either too little or too much oscillator-voltage injection into the mixer. However, there was no evidence of this, also, at least ten different crystals were tried in the circuit, and all performed well. The highest rf gate voltage noted on gate 1 was about 4, well within the ratings of the device.

### Construction Information

In last month's *QST* a simple breadboard method of construction<sup>1</sup> was described. This technique is a simple one, so it was used here. Copper circuit board is separated into squares by drawing a hacksaw blade across the copper foil, just enough to remove the copper covering and exposing the board. The main section for the converter is a piece of board 3-1/4 inches (8 cm) long by 1 inch (2.5 cm) wide, consisting of two rows of squares, 10 squares to the row. This piece is glued to another

<sup>1</sup>Leslie, "Breadboard Revisited," *QST*, Feb., 1974.



Inside view of the converter. The two peaking capacitors, C1 and C10 are on either side of the power switch. The two crystals are visible just below the power switch. The phone jack at the top rear is the antenna input and the bottom jack is for receiver input.

board, 2-1/4 inches (5.5 cm) wide. (See the photograph.)

The converter is housed in a Minibox, 2 x 3 x 3-1/2 inches (5 x 7.6 x 8.8 cm). The copper circuit board is installed on the bottom of the box and the controls are mounted on the face of the housing. When soldering any of the components to the individual squares or pads, apply heat from the iron to the pad *first*, along with a small amount of solder. Then solder the component lead to the pad. Some newcomers tend to use too much solder and too much heat. You'll find that with a little practice, soldering with this type of construction will be very easy.

The two variable capacitors, C1 and C10, have a total capacitance of 365 pF each, as they come from the store. This is considerably more capacitance than is required to tune 15 and 10 meters, and the tuning rate will be better if they are

modified. It is a simple matter to modify them by removing stator and rotor plates. You'll find there are three screws holding the plates in place. Remove the screws carefully (don't drop and lose them!) and then remove the plates and spacers one at a time. Remove 5 stator and 5 rotor plates from each capacitor. If you want to try the capacitors before removing the plates, of course you can. However, we found that it was hard to separate the "peak" tuning points for each band.

### Tune-up

One problem we found was that the converter had some instability, but this was cured when we bolted the copper chassis board to the bottom of the cabinet. No doubt this trouble was because of poor ground connections. Make up a short length of shielded cable to go from the converter to the receiver antenna terminals. The cable only needs to be long enough to reach between the two units but it must be shielded cable to prevent pickup of unwanted 80-meter signals. A short length of RG-58/U cable is satisfactory. With the converter turned off, you should not be able to hear 80-meter signals leaking through.

Turn on the converter and tune your receiver to the part of the 80-meter band that gives you the correct coverage area for either 15 or 10 meters. You can calculate this from the information in Fig. 1. Peak both C1 and C10 for maximum background noise and also peak the antenna trimmer of your receiver. If you don't observe any increase in background noise, check the wiring of the converter to make sure you didn't make any mistakes. Don't be discouraged if you don't hear signals on 15 or 10 meters. At the present time, we are approaching a sunspot minimum and there will be long stretches in time where neither 15 nor 10 meters will be open for skip signals. QST

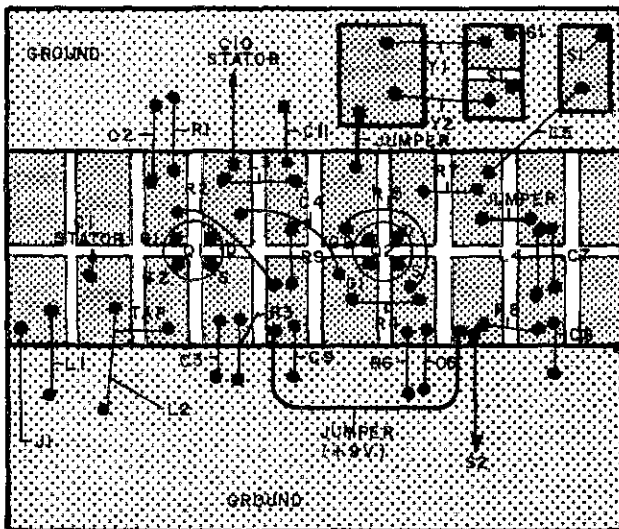
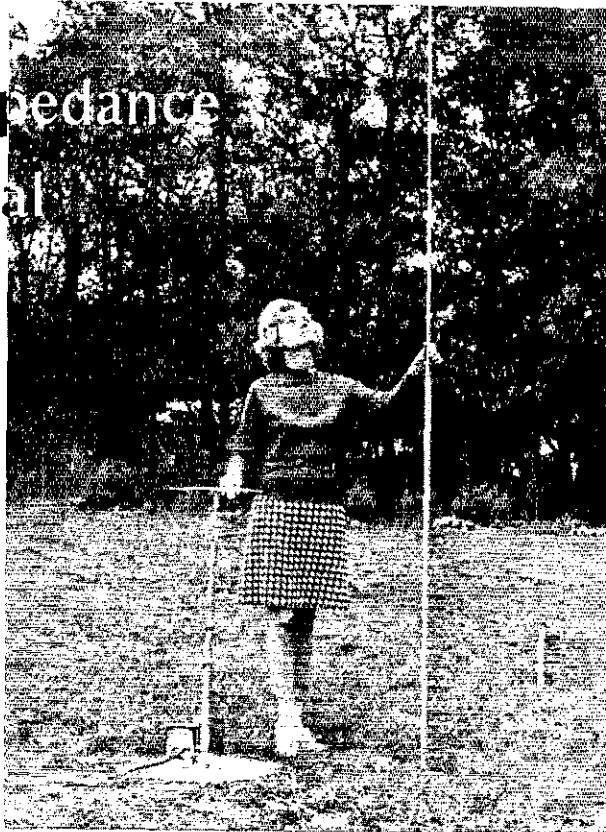


Fig. 3 — Component layout details.

# The Constant-Impedance Trap Vertical

Here is another in the series of vertical antennas by Jerry Sevick, W2FMI. We've never given W2FMI's qualifications so it might be appropriate to provide some background. Jerry is Director of Technical Relations, Bell Labs. He joined Bell Labs in 1956 and until recently was engaged in the development of high-frequency transistors and integrated circuits. Prior to that, he taught physics at Wayne State University in Detroit. W2FMI received his Ph.D. in Applied Physics from Harvard University in 1952. His doctorate thesis was "The Backscattering Cross-section of Coupled Antennas." We are happy that Jerry has applied his antenna know-how to a popular subject for hams -- vertical antennas.



The antenna on the left is the 10-meter setup for the tests on the trap vertical. The pretty gal is Connie, the XYL of W2FMI.

BY JERRY SEVICK,\* W2FMI

**M**ULTIBAND trap-vertical antennas have been used by amateurs for many years -- often as a last resort. They have seldom enjoyed the reputation of being competitive antenna systems. The usual reasons given for their lack of outstanding performance were: (1) lack of gain and directivity, (2) excessive trap losses and (3) not high enough (when ground-mounted). However, previous work<sup>1</sup> by the author has shown that even a short vertical mounted over a low-loss image plane can compete favorably with a dipole at an elevation of one-half to one wavelength.

Popular commercially available trap verticals -- when operated over a good image plane -- can be made to perform in a competitive manner. Certain modifications yielding improved matching can be made to make them perform even better. As will be seen, they can be very efficient radiators and operate practically as well as quarter-wavelength verticals on all bands. The only real compromise is in bandwidth, particularly on the lower bands. On 40 and 80 meters these verticals should be very competitive antennas. On 10, 15 and 20 meters the

\* Bell Laboratories, 600 Mountain Ave., Murray Hill, NJ 07974.

<sup>1</sup> Sevick, "The W2FMI Ground-Mounted Short Vertical," *QST*, March, 1973.

differences from elevated beams should generally be less than 2 to 3 S units.

Since all of the results presented here are only on ground-mounted verticals, the first section of this paper reviews the usual operation of a number of types of vertical antennas. As will be seen, the radials used with vertical antennas can play somewhat different roles. The verticals are classified as ground-mounted, ground-plane, and elevated. This discussion is followed by a characterization and modification of the Hy-Gain 14 AVQ. Two designs are presented which afford a good match to 50 ohms on all bands. A modification of the Hy-Gain 18 AVT/WB is also shown. Finally, results are given comparing a modified 14 AVQ over a good image plane versus a 14 AVQ with four quarter-wavelength radials. The improvement in performance amounts to about 8 dB -- nearly the same as adding a linear amplifier.

Although the dimensions shown on the final designs might not apply exactly to all manufacturers' antennas,<sup>2</sup> the principles involved and tune-up procedures described should be applicable.

<sup>2</sup> The Hy-Gain 14 AVQ antennas were chosen because of ready availability. The 18 AVT/WB traps were made available to me by Hy-Gain.

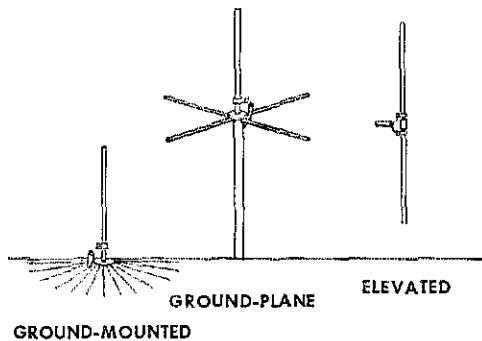


Fig. 1 — The three general class of verticals used by the amateurs.

### Classes of Verticals

Commercial trap verticals are usually accompanied by instructions for ground and roof-mounting the antennas. In most cases, the number of radials recommended, as well as the dimensions of the antennas, differ depending on which of the two mounting schemes is used. In the ground-mounted case an inadequate number of radials is usually suggested and, hence, excessive losses (20-30 ohms) can prevail.<sup>3</sup> In some cases, 8-foot ground rods are also recommended. In the roof-mounted case, usually two quarter-wavelength radials per band are recommended. In the course of contacting amateurs, many questions were asked of me regarding the operation of these antennas. In particular, it was noted there was considerable misunderstanding of the operation of the radials. Therefore, this section attempts to briefly classify the various vertical antennas and explain the operation of the radial systems. As was stated above, the antennas have been classified as ground-mounted, ground-plane, and elevated verticals. They are shown in Fig. 1.

### Ground-Mounted Verticals

A vertical mounted over an ideal image plane (one that is infinite in conductivity and extent) provides an extremely low angle of radiation. Over a lossy image plane, like the earth, the most notable effect is a reduction in performance at low angles. A poorly conducting earth is particularly unkind to rf currents. Therefore, the purpose of a radial system is to make up for the deficiencies of a lossy earth. The radials in this case are usually grounded and really don't operate as resonant elements. They should not be buried deeply since the electric field would then have to travel through excessive lossy earth before terminating on the radials.<sup>4</sup> Their length and number generally de-

pends upon the conductivity of the soil at a particular location. From the author's results,<sup>5</sup> for any vertical antenna less than a quarter wavelength long, it appears that generally 50 radials, 2/10 wavelength long, reduces earth losses to about 1 to 2 ohms. Increasing the number to 100 reduces this loss to a negligible value.

The radials help out on two counts. In close, within about a half-wavelength of the vertical, the radials reduce the near-field losses. These losses generally appear as a resistive term in series with the radiation resistance. Ohmic losses because of traps or loading coils have been found by the author to be extremely small compared to earth losses and, hence, negligible. The radials also assist in reducing losses of the far-zone field — the electric field associated with the radiation resistance. (Increasing the length of the radials has shown improvement in performance at low angles.<sup>6</sup>)

Experiments by the author have shown that ground rods reduce the earth loss by only a few ohms and therefore are of questionable benefit. This is despite the frequent observation that 8-foot ground rods have been recommended for use separately or in conjunction with a radial system in order to improve the efficiency of a vertical antenna. There is considerable confusion between lightning grounds and rf grounds. Ground rods are effective as lightning grounds since they can distribute a large amount of charge. But an image plane of radials has been found to be much more effective in reducing losses of ground-mounted vertical antennas.

### Ground-Plane Verticals

Ground-plane verticals, as shown in Fig. 1, generally use a resonant quarter-wave vertical with four radials. The radials should be a quarter-wavelength long. They not only present a terminating plane for the electric field of the vertical portion, but also reduce horizontal radiation since the horizontal components of the field tend to cancel out in the far-zone. Thus, the predominant radiative component is vertical and the radiation resistance is approximately 35 ohms<sup>7</sup> — one half the value of a dipole in free space. A better match to 50 ohms can be achieved by drooping the radials. This increases the radiation resistance by permitting vertical radiation from the ground plane while still canceling out the horizontal components.

Since the radials of a ground-plane vertical are generally insulated at the ends, the current is zero there and a standing-wave of current results. Thus, the length of the radials should be a quarter-wavelength or odd-multiple therefore, in order to present a low impedance at the feedpoint which is necessary for good current flow.

<sup>3</sup> See footnote 1.

<sup>4</sup> The author has found, experimentally, that radials perform satisfactorily if they are placed on top of the earth and terminated by large 8- to 10-inch long spikes to fix them in place.

<sup>5</sup> See footnote 1.

<sup>6</sup> Seveck, "The Ground-Image Vertical Antenna," *QST*, July, 1971.

<sup>7</sup> The exact value depends upon the thickness of the vertical and the number of radials used.



Several experimental determinations remain to be made in the area of ground-plane verticals; namely, the length and number of radials required for optimum performance, the performance versus height, and the comparison to a ground-mounted vertical over an extensive image plane.

### Elevated Verticals

As was stated earlier, instructions on roof-mounted trap verticals generally include the use of one or two quarter-wavelength radials per band. This is not a sufficient number to cancel out the horizontal component of radiation. Therefore, the input impedance using this type of installation is increased beyond the nominal 35 ohm value because of horizontal radiation. As was also noted earlier, the increase in input resistance in the ground-mounted case is a result of excess earth loss.

With the drooping of the radials, the antenna system approaches that of the elevated vertical as shown in Fig. 1. The input impedance therefore tends to have two radiation-resistance components; one from the trap vertical (which is generally low since it is a shortened antenna<sup>9</sup>) and the other from the so-called radial system.

Elevated verticals tend to have appreciable electric field losses<sup>8</sup> and work remains to be done on understanding their operation over a lossy earth as a function of height. The elevated half-wave vertical has been suggested by many as a system for eliminating radials, but little quantitative information is available on the comparative performance of these antennas. An experimental study of efficiency versus height should yield some interesting and useful data.

### Characterization and Modification of the Hy-Gain 14 AVQ

As was noted in the previous section, ground and roof-mounted verticals have added resistive components which help in offering a better match to a 50-ohm transmission line and increasing the bandwidth. But these components reduce the vertical radiation efficiency of the trap verticals. In order to determine the radiation resistance of a trap-vertical antenna, the input impedance was measured on a 14 AVQ mounted over a system of 100 radials, each 50 feet in length. This assured an earth loss of less than 1 ohm. The values obtained on 10, 15 and 20 meters were all about 36 ohms. But the value on 40 meters was only 20 ohms. This is close to the value expected since, on 40 meters, the antenna operates as a shortened vertical and therefore has a lowered radiation resistance.

Therefore, the objective of this investigation was to modify the 14 AVQ so it presented a more reasonable match to 50 ohms on all bands, and then to compare its performance over a near-ideal image plane with the more common installation of four 33-foot radials when ground mounted. The

modification can be done by either shortening or extending the antenna. Instructions are presented for adjusting the modified antennas for optimum performance. But the dimensions shown in the drawings should generally yield input impedances, and, hence, standing-wave-ratios, quite acceptable over all the bands. The following is a characterization of both modified antennas.

### Shortened 14 AVQ

Since the largest departure from 50 ohms occurred on 40 meters, the first modification involved a shortening of the elements so the vertical operated as a short antenna not only on 40 meters, but also on the other bands and the impedance approached a value of 12-1/2 ohms. A broad-band 1:4 bifilar transformer<sup>10</sup> was then used for a final match to 50 ohms. Antenna A in Fig. 2 shows the dimensions of the shortened antenna. The loading coil L1 consists of 5 turns of No. 8 copper wire, 3 inches (7.6 cm) in diameter and 3 inches (7.6 cm) long. A picture of the coil and base is shown. It is not necessary to use exactly this base arrangement. It could be more convenient to use the existing 14 AVQ base assembly and connect it to the radial system with four heavily conducting straps. This will provide a good low-inductance bond. Also, the rf choke at

<sup>10</sup>Sevick, "The W2FMI 20-Meter Vertical Beam," *QST*, June, 1972.

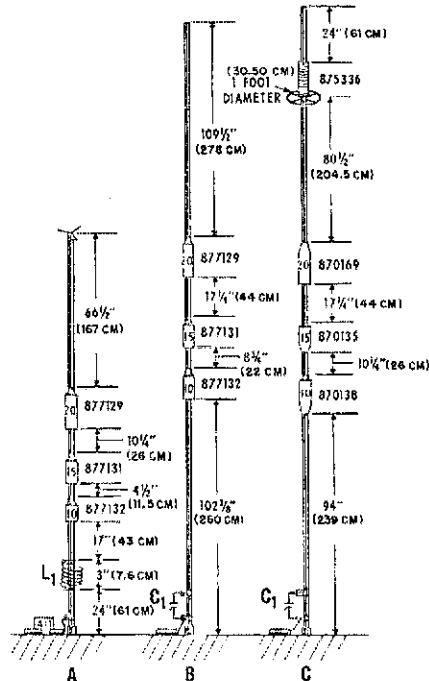


Fig. 2 — Modified versions of Hy-Gain trap verticals: (a) Shortened 14 AVQ; (B) Extended 14 AVQ; (C) Extended 18 AVT/WB; L1 and C1 are described in the text.

<sup>8</sup> See footnote 1.  
<sup>9</sup> See footnote 1.

the base of the antenna, which Hy-Gain incorporates, can be retained since it offers a high impedance to rf while providing a dc return to ground.

The optimum dimensions, shown in Fig. 2, resulted when the 10-meter section was adjusted for an impedance, after transformation, of about 60 ohms. This adjustment then raised the impedance values on 20 and 40 meters, thus giving a better match to 50 ohms. A plot of the SWR versus frequency for the shortened 14 AVQ is shown in Fig. 3. As can be seen in Fig. 3, although the percent bandwidth is quite similar on all bands, the absolute bandwidth (where the SWR is equal to, or less than, 2) on 40 meters has a value of only about 120 kHz. This is close to the expected value since, on 40 meters, the antenna operates as a heavily inductive-loaded eighth-wavelength vertical over a lossless image plane.

Several points should be brought out regarding the adjustment of trap verticals. Probably the most important point is that adjustments should begin on the highest band — the 10-meter section. In the shortened-vertical case, the easiest adjustment is to vary the section below the 10-meter loading coil. Increasing the length of this section raises the radiation resistance without changing the resonant frequency (on 10 meters) a great deal. In fact, the author has found from the previous study<sup>11</sup> the resonant frequency usually increases since the loading coil becomes less effective at a greater distance (and, hence, lower current) from the feed point. This is true with other sections of the

<sup>11</sup> See footnote 1.

antenna, e.g., increasing the length between the 10- and 15-meter traps generally decreases the resonant frequency on 15 meters but increases the 20- and 40-meter resonant frequencies. Conversely, there is little change downward, i.e., changing the length of section between the 10- and 15-meter traps has little effect on the 10-meter operation.

The remaining adjustments are generally done to place the minimum value of the SWR at the desired frequency within each band. The 10-meter portion has two degrees of freedom — compressing or extending the coil or changing the section above the coil.

### Extended 14 AVQ

If one is more interested in 40-meter operation and prefers a broader bandwidth, then the extended version<sup>12</sup> as shown in Fig. 2 can be constructed. The improvement in match over the regular 14 AVQ and bandwidth over a shortened 14 AVQ is shown in Fig. 4. The bandwidth of 220 kHz is nearly twice that of the shortened 14 AVQ. The bandwidths on 10, 15 and 20 meters also improved accordingly.

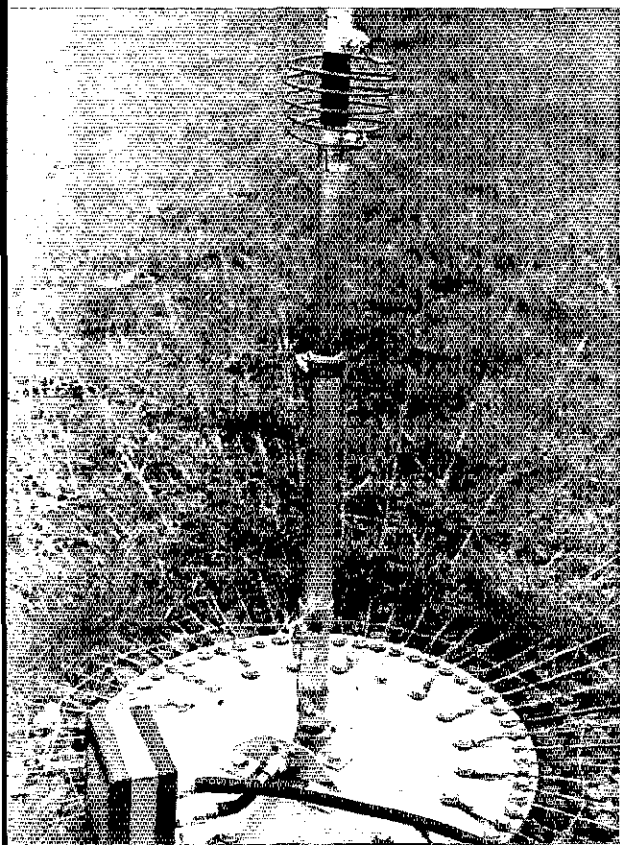
Extending a vertical beyond resonance raises the radiation resistance and makes the antenna inductive. This inductive reactance is then canceled out with the series capacitance, C1. The 10-meter section was lengthened to give a resistance of about 60 ohms in order to raise the 40-meter resistance to an acceptable value. Replacing the top hat by a vertical section also helped in increasing the radiation resistance on the 40-meter band. Since the nominal input impedance on each band is now 50 ohms, a few ohms of loss in the radial system can be tolerated. At the author's location, this means that some 50 radials, 2/10 wavelength long, giving 1 to 2 ohms of loss, would result in a trap-vertical system having an efficiency of greater than 90 percent.

The adjustment of the extended 14 AVQ is similar to that of the shortened 14 AVQ. The difference is that the 10-meter section, which is adjusted for the same resistance of about 60 ohms, is now tuned to resonance by adjusting C1. In the author's case, with 100 radials, a value of 100 pF was optimum. A fixed mica capacitor was used in the final design. If the antenna is to be used with 2 kW peak-input power, then the mica capacitor should be a transmitting type.<sup>13</sup> If the impedance on 40 meters is too low, it can be increased by lengthening the 10-meter section. Since this increases the inductive reactance of the antenna, the value of C1 should be decreased in order to obtain resonance at this higher value of radiation resistance. Since the final value of C1 is somewhat

<sup>12</sup> The theory and practice of extended verticals will be presented in a subsequent article.

<sup>13</sup> Capable of handling 5 A of rf current. The voltage is less than 300 volts and therefore no problem.

The base of the shortened 14 AVQ showing the loading coil and matching transformer.



dependent upon the number of radials employed, a variable capacitor should be used in the initial adjustments. It can be replaced by a fixed capacitor (and one that is not affected by the weather) after its optimum value is determined.

The extended version of the 18 AVT/WB is also shown in Fig. 2. The optimum value of C1 again was found to be 100 pF. As can be seen in Fig. 5, the bandwidth on 40 meters is similar to that of the extended 14 AVQ. But it should be noted, since a high-Q loading coil is used to obtain operation on 80 meters, the bandwidth is narrow (15 kHz as shown in Fig. 5) and the resonant frequency is primarily determined by the coil and the top vertical section. The rating of the loading coil also limits the output power to 500 watts PEP. But within this narrow band of operation, the extended 18 AVT/WB over a good image plane has obtained outstanding reports on 80 meters.

### Comparative Results

The initial comparative measurements were made with the modified 14 AVQ antennas on 20 and 40 meters with resonant quarter-wavelength verticals using the same image plane system of 100 radials each 50 feet long. Field strength measurements were made at a distance of about 600 feet with a hundred watts fed, under matched conditions, to each antenna. The results showed that very little differences were noted between the antennas. This was expected since trap losses are very small (of the order of tenths of ohms) and short verticals have practically the same power gains as their quarter-wavelength counterparts. On-the-air reports also indicated outstanding performances by the modified 14 AVQ verticals.

Finally, a comparative study was made with the shortened 14 AVQ over the low-loss image plane and a 14 AVQ mounted over the usual image plane of four 33-foot radials. The latter system was erected on the front lawn. Each antenna was about 70 feet from the house. Field-strength measurements in the far-field (greater than 10 wavelengths in distance) at twelve points about the neighborhood indicated the shortened 14 AVQ on the low-loss image plane was better by some 7 to 8 dB in signal strength. Fig. 6 shows comparative reports obtained by contacts on the air. Some 100 amateurs were contacted on 40 meters using a constant carrier for greater than 15 seconds on each antenna. This compensated for several fluctuations in signal strength because of polarization rotations and, hence, a fairly accurate comparison by noting the peak and minimum signal strengths of each antenna. As can be seen in Fig. 6, the improvement by using a good image plane is considerable. Fifty-five percent of the reports showed an improvement of greater than 6 dB. Fifty percent of the reports showed an improvement of greater than 9 dB. On the average, the improvement was about 8 dB. It should also be noted that these comparisons were somewhat conservative since these tests were performed in November and December which had heavy amounts of rainfall and reduced the losses because

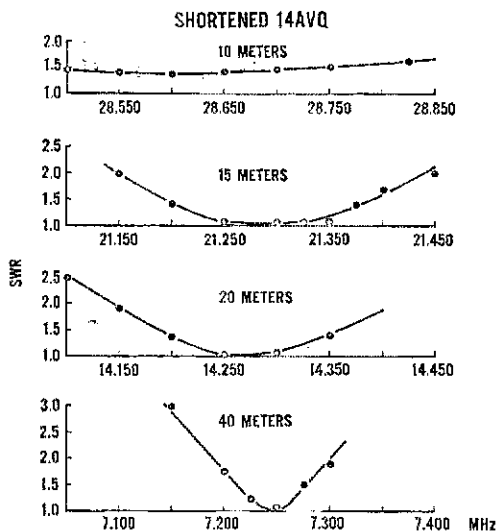


Fig. 3 — Standing wave ratio versus frequency for the shortened 14 AVQ.

of very wet soil conditions) of the 4 radial system by 10 ohms. This equated to a radial system of 10 wires instead of 4 under average soil conditions. The 100-radial system was unaffected by soil conditions.

### Concluding Remarks

Trap verticals can be efficient antennas and thus be competitive, particularly on the lower bands, 40 and 80 meters, where low-angle radiation is more difficult to obtain with horizontal dipoles. But this requires an understanding of the various factors effecting their operation, especially the resistive components which lower their vertical radiation efficiencies. These components appear as earth loss when ground-mounted and horizontal radiation when roof-mounted. Also, these com-

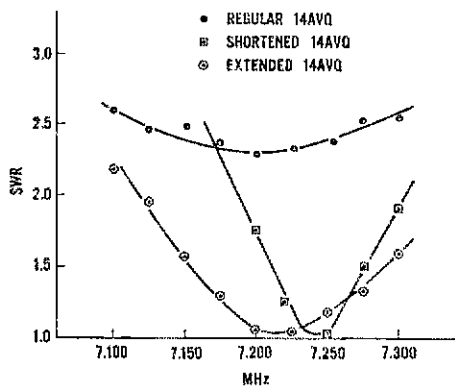


Fig. 4 — Standing wave ratio versus frequency on 40 meters for regular, shortened, and extended versions of Hy-Gain 14 AVQ trap vertical.

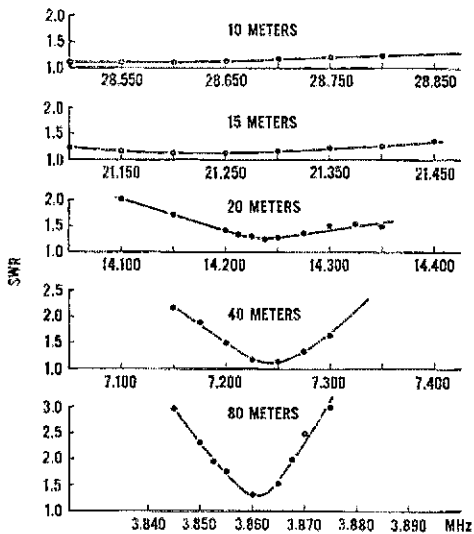


Fig. 5 — The standing wave ratio versus frequency for the extended version of the Hy-Gain 18 AVT/WB.

ponents broaden the bandwidth on each band at the expense of the lowered vertical radiation efficiency. Even though the percentage bandwidth is similar on all bands, the absolute value of the bandwidth can be quite small on the lower bands.

Several misunderstandings have existed among the amateurs and manufacturers which warrant corrections and restatements. Here are some of them:

1) "Full quarter-wave resonance on all bands"

Since resonance, by definition, means the tuning out of the reactive component of the input impedance, this statement implies a resistive component similar to that of quarter-wave vertical. As noted in this work, this is certainly not true on the lower bands. A more accurate and certainly more flattering statement would be that trap verticals over a low-loss image plane, or true ground-plane, operate as well as full size quarter-wavelength verticals on each band. The main compromise is only in bandwidth.

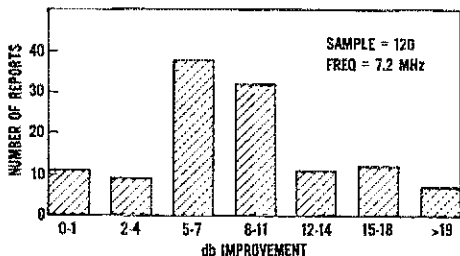


Fig. 6 — Improvement of the shortened 14 AVQ over a good image plane compared to a 14 AVQ with four 33-foot radials.

2) "An SWR of 2:1 or less at band edges"

As will be shown in a subsequent article on extended verticals, the  $Q$ , or the bandwidth, of an antenna is related to the magnitude of the resistive component of the input impedance and the variation of the reactive component with frequency. Additive resistive components due to earth loss and horizontal radiation broaden the bandwidth at the expense of vertical radiation efficiency. Although an SWR of 1 is not as critical<sup>14</sup> as many have thought, an understanding of the factors contributing to the input impedance and their effects on antenna efficiency are important.

3) "Radials operate similarly, whether on the ground or elevated"

This is not true and was explained earlier in the section on classes of verticals. This area is the key to efficient operation of verticals. More experimental work remains to be done on the efficiency of elevated verticals.

4) "A top hat broadens the bandwidth"

A true top hat replaces a portion of the vertical without introducing horizontal radiation. This generally takes four or more top-hat radials. Generally speaking, for two resonant shortened verticals of identical lengths, adding a top hat to one of them would increase the radiation resistance and broaden the bandwidth. Using only two or three radials for a top hat can lower the height of the vertical and effectively introduce some horizontal radiation and, hence, keep the bandwidth about the same.

As was shown by the data presented in this paper, trap verticals over a good image plane can be competitive antennas. They also can be easily modified in order to present a better impedance to 50 ohms when unwanted resistances are eliminated. This can be done two ways: reducing the effective resistance to 12-1/2 ohms on each band and using 1:4 step-up transformer, or extending the antenna beyond resonance to obtain a resistance value of 50 ohms and then canceling out the inductive reactance with a series capacitance. This 50-ohm case is more tolerable to earth losses, and, hence, requires fewer radials for efficient operation.

Finally, we would like to acknowledge the help of some 100 amateurs who contributed the 120 comparative reports on the different antenna installations and to thank the Hy-Gain Electronics Corporation for supplying the traps for the characterization work on the 18 AVT/WB. QST

<sup>14</sup> This was most ably described in recent issues of QST by M. Walter Maxwell, W2DU.

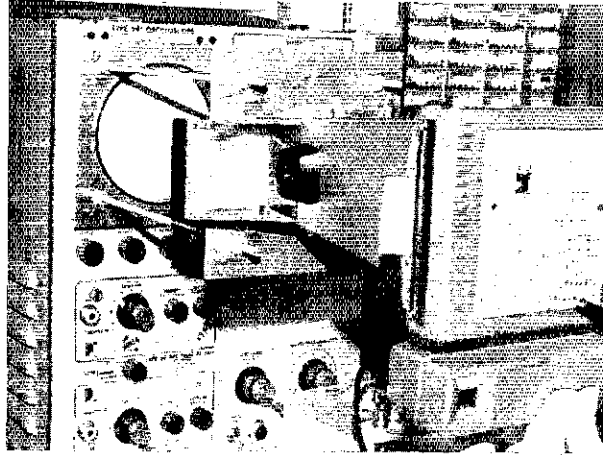
<sup>15</sup> See footnote 12.



To mark the Winnipeg Centennial, amateurs there have been authorized to use the VA4 prefix from January 1 to September 30, 1974.

The Winnipeg Amateur Radio Club Award is now available for working 15 Winnipeg stations during the period. No QSLs necessary; send fifty cents or two IRCs to WARC Award, P.O. Box 352, Winnipeg, Manitoba, Canada. — VE4SW

## A High-Quality Low-Cost Oscilloscope Camera



BY MICHAEL M. DODD,\* WA4HQW

ONE PIECE of equipment that most amateurs and experimenters never seem to have available is an oscilloscope camera. This instrument is extremely useful for making permanent records of almost any pattern displayed on a scope. Probably the major obstacle in obtaining this equipment is the price; most laboratory cameras sell for many hundreds of dollars. Even the new scope camera made by Polaroid lists for about \$180. However, the introduction by the Polaroid Corporation of the new Big Shot camera provides a solution to the amateur for an inexpensive oscilloscope camera.

### The Camera

The Big Shot camera is a fixed-focus, fixed shutter-speed Polaroid camera. Selling for less than \$20, it is designed to take close-up portraits using flash cubes and color film. The shutter speed is set at 1/60 second and the lens opening is slightly adjustable around f/25. With the use of black-and-white (type 107) film and a minor modification, the Big Shot makes a very nice scope camera.

The camera is focused at about 38 inches (97 cm). In order to fill the entire picture area with a five-inch CRT screen, it is necessary to reduce this distance to about ten inches. A Kodak +3 Portra Lens, Series 6 (available at most photography stores) fills the bill quite nicely. The +3 indicates the magnification and the series number indicates the diameter of the lens mount. The Series-6 size fits perfectly over the Big Shot lens and requires no adapters or holders.

### Preliminary Tests

When you have obtained the camera and the Portra lens, some preliminary tests are necessary to determine the correct distance to space the camera from the oscilloscope. Set up the scope with about two feet of table space in front of it. Allow it to

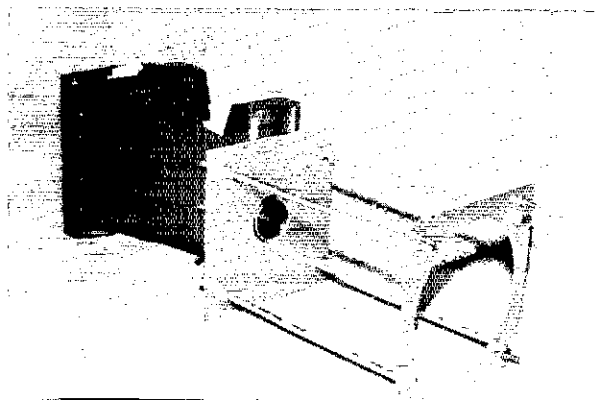
warm up and obtain a stable trace on the CRT, adjusting the controls for a sharp, medium-intensity trace.

Place the Portra lens over the Big Shot lens by carefully pushing and twisting it so that it threads its way into the plastic Big Shot lens mount. When it is securely mounted, adjust the Big Shot lens to the lightest setting (largest opening). Load the camera with type 107 black-and-white film and do not use flash cubes.

Find a method to support the Big Shot, on its side, which will place it about ten inches away from, and directly in line with, the face of the CRT. It is imperative that the camera be exactly perpendicular to the oscilloscope. Find a convenient spot on the front of the scope from which to measure and check the distance at several locations on the front of the camera. Assuming that the face of the CRT is flush with the front panel of the scope, position the front of the camera about 9-3/4 inches (25 cm) away for the first test picture.

When you are satisfied that all is ready, darken the room, hold the camera steady, and snap the shutter. Develop the picture for 15 seconds.

Fig. 1 -- Photograph of the camera adapter mounted on the camera.



\* 114 Waples M. H. Estates, Fairfax, VA 22030.

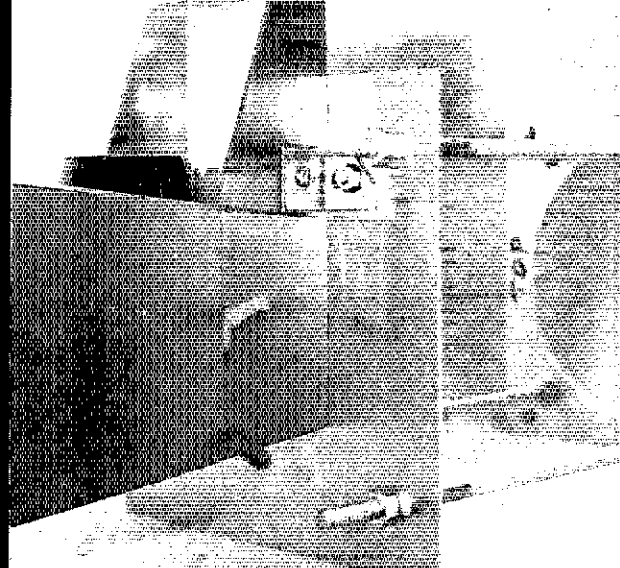
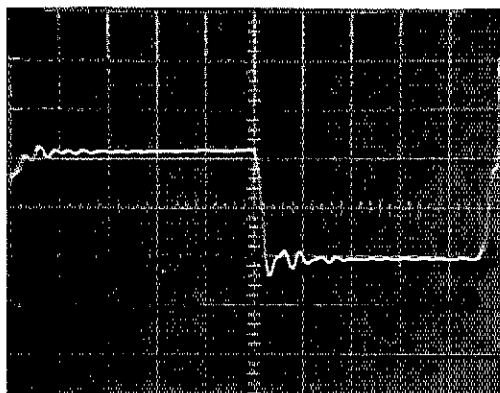


Fig. 2 — Camera-side view of adapter. Note ears for mounting to the flash cube diffuser.

following the instructions supplied with the film. Study the result and make any necessary adjustments to the scope (probably the intensity control will need touching up for best results) or to the lens/CRT distance. After several attempts, you should have a sharp, well-exposed print. At this point, carefully note the distance from the front of the camera to your reference location on the scope. You now know where to locate the camera to produce good oscillograms. The next step is to devise a way to conveniently keep it there.

### The Mounting Bracket

The mounting bracket is nothing more than a simple set of spacers designed to allow repeated positioning of the camera in front of the oscilloscope. It consists of two metal plates and four spacing rods. Fig. 1 shows construction of one bracket which was made for a 4-1/2-inch Tektronix scope. Different scopes may require slight changes.



Sample photograph made with the setup discussed in the text.

Cut two six-inch (15 cm) square aluminum plates and find the exact center of each plate. In one plate, using a coping saw or a nibbling tool, cut a circle which is slightly larger than the face of your CRT. Position the circle so that its center coincides exactly with the center of the square plate. In the other plate, punch or cut a 1-1/2-inch (3.8 cm) diameter hole, exactly centered.

In each corner of one plate, about 7/8 inch (2.2 cm) from each adjacent side, mark the location for a spacer rod. Lay the two plates together and drill the four holes in each plate. The spacers I used were 1/4-20 threaded rod, available at most hardware stores and requires 1/4-inch (0.64 cm) holes.

The plate with the small hole also requires holes for two small mounting ears to attach it to the camera. (see Fig. 2). The ears mount to the housing on the camera which holds the flash-diffusing lens. The sides of this housing are conveniently 90 degrees to the front of the camera and drilling into them will not affect the operation of the camera. Find a location near the bottom of the housing to fasten a small 90-degree ear on each side and drill a hole for a No. 6 machine screw. Attach an ear to each side and lay the aluminum plate with the small hole on the front of the camera. Adjust the mounting ears so that the plate lies flat and tight against the front of the camera. Center the lens in the 1-1/2-inch hole and mark the location of the holes required to attach the plate to the ears.

One other operation may be required on the plate with the large hole. Some oscilloscopes have recessed threaded posts around the CRT. These provide a good way to align the camera with the scope if some sort of mating plugs are provided on the mounting bracket (see Fig. 3). I used 8-32 machine screws located so they would line up with the four posts on my scope. If your oscilloscope has a similar feature, you may want to provide mating plugs.

When all drilling operations are complete, cut four spacer rods about 10-1/2 inches (27 cm) long. Thread a 1/4-20 nut onto each end of the rods and insert one end of each into the 1/4-inch holes in one of the aluminum plates. Thread another nut onto each rod after the plate has been attached, but do not tighten them securely. Repeat the same procedure for the second plate.

Adjust the nuts so that very little of the rod protrudes from the oscilloscope plate; the extra length of the rods should stick out behind the camera plate. Next, space the two plates so that the camera is the correct distance from the scope. Be sure to take into account any space between the scope plate and the front panel of the oscilloscope. In my case, the CRT-to-lens distance was 9-3/4 inches (25 cm) and the space between the plates was 8-3/4 inches (22 cm). Measure carefully at each corner of the mounting bracket and tighten the nuts securely.

Attach the mounting bracket to the camera by means of the two ears and the project is complete. Set up the scope as before, place the front plate against the scope, and take a test picture. If the construction of the mounting bracket was carefully

done, you should have an in-focus, centered oscillogram. If any adjustments are required, the focus can be corrected by changing the distance between the plates, and the centering can be corrected by adjusting the two spacer rods on the side which requires movement.

### Use of the Camera

To use the oscilloscope camera, simply place it against the scope and snap the shutter. The room should be darkened to provide maximum contrast. If desired, the mounting bracket could be enclosed with metal or cardboard sides to keep ambient light off the scope tube. Care should be taken to assure that the camera is held firmly against the scope to prevent movement while providing the proper spacing and centering.

One note of caution should be interjected at this point. Since the camera has a fixed shutter speed at 1/60 second, slow sweep speeds will not be reproduced completely. The shutter will open and close before the electron beam has a chance to move all the way across the screen. On my scope, a sweep speed of two milliseconds per centimeter is the slowest I can expect to photograph well. My CRT is ten cm wide and the shutter remains open for 16 of the 20 milliseconds it takes the sweep to travel the entire width. Therefore, the whole sweep is not exposed on the film. However, the persistence of the CRT is long enough to make a reasonable image show up, even on the unswept portion. A good rule-of-thumb is not to expect to record anything slower than one cycle of a 60-Hz waveform.

### Some Notes

The +3 Portra lens worked out well for a 4-1/2-inch CRT. For smaller oscilloscopes, possibly a +4 or +5 lens will be required to fill the entire picture area. In any case, the Series-6 mount fits nicely over the Big Shot lens.

It is nice to be able to see the graticule lines when viewing an oscillogram. On the Tektronix and some other scopes, graticule illumination is provided. This makes the lines show up as white on

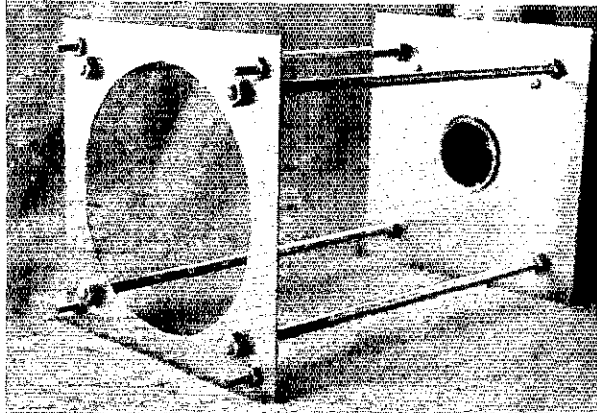


Fig. 3 -- Close-up view of the adapter. Note screws used for aligning adapter by means of scope posts.

a black background. If there is no illumination on the graticule of your scope, the lines will not appear in the picture.

One way to circumvent this handicap is to provide some outside illumination for the CRT. Hewlett-Packard scope cameras have an ultra violet lamp included which makes the CRT glow slightly, causing the graticule lines to appear as black on a white background. You may want to experiment with a small pilot lamp somewhere in the mounting bracket, positioned so that it evenly illuminates the CRT face. An alternative is to try exposing some scope pictures without darkening the room. However, this may produce unwanted shadows on the CRT.

### Conclusion

The oscilloscope camera works extremely well, providing quality almost equal to that from a laboratory camera. By proper adjustment of the scopes intensity control, very fast rise and fall times can be recorded using the type 107 film which is rated at a speed of ASA 3000. The camera is slightly inconvenient to use, because of its large size, but this is overcome by its low price and the excellent quality of the pictures. QST

## CW Receiver (Continued from page 20)

Although spectrum-analyzer measurements have yet to be done, the performance of this oscillator appears to be excellent. Noise-modulation effects are reduced significantly over those observed with an earlier receiver.<sup>6</sup> Stability is more than adequate with drift less than 100 Hz after a short warm-up. Temperature compensation was required in the 16-MHz oscillator, however. The output buffering in the IC is more than adequate.

The LOs used in this receiver are free-running units. However, the intended application of the MC1648P is as a varactor-tuned oscillator in a frequency-synthesizer loop. Several new ICs in the

<sup>6</sup>Hayward, "A Second Generation MOSFET Receiver," *QST* for Dec., 1970.

Motorola MC12000 series make a phase-locked-loop synthesizer similar to that used by Fischer<sup>7</sup> very practical. When designed carefully, such a system should be capable of providing a very low-noise signal. The amateur receivers of the future will most likely use similar oscillator systems instead of the premixing or multiconversion approaches in vogue today.

Part II of this article will appear in a subsequent issue of *QST*. QST

<sup>7</sup>"An Engineer's Ham-Band Receiver," *QST* for March, 1970.

Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for \$1 including postage.

# A Receiving Loop for 160 Meters

Photograph  
of the  
160-meter  
shielded loop  
at WICER.  
Bamboo  
cross arms  
are used to  
support the  
antenna.

**S**MALL shielded loop antennas can be used to improve reception under certain conditions, especially at mf and in the lower portion of the hf band. The foregoing is particularly true when high levels of man-made noise are prevalent, when the second-harmonic energy from a nearby bc station falls into the 160-meter band, or when QRM exists from some other amateur station in the immediate area. A properly constructed and tuned small loop will exhibit approximately 30 dB of front-to-side response, the maximum response being at right angles to the plane of the loop. Therefore, noise and QRM can be reduced significantly, or completely nulled out, by rotating the loop so that it is sideways to the interference-causing source. Generally speaking, small shielded loops are far less responsive to man-made noise than are the larger antennas used for transmitting and receiving. But, a trade-off in performance must be accepted when using the loop, for the strength of received signals will be considerably less than when using a full-size resonant antenna. This condition is not a handicap on 160 or 80 meters, provided the station receiver has normal sensitivity and overall gain. A comparison between the loop illustrated here and a 180-foot end-fed inverted-L antenna (resonated and matched in impedance to the receiver) indicated a signal difference of approximately 15 dB, the loop being the less effective antenna. Measurements were made on local and sky-wave signals while using a calibrated step attenuator in the antenna line to the receiver. A front-to-side ratio of 30 dB was observed while using the same test setup. Thus, a shielded loop can be used as the expurgator of a variety of receiving problems if made rotatable.

In order to assure the sharp directivity (bi-directional) of a small loop, the overall length of the conductor must not exceed .08 wavelength.

The loop discussed here has a conductor length of 20 feet (6 m). At 1.810 MHz, 20 feet is .037 wavelength. With this style of loop .037 wavelength is the maximum practical dimension if one is to tune the element to resonance. This limitation results from the distributed capacitance between the shield and inner conductor of the loop. RG-59/U was used for the loop element in this example. The capacitance per foot for this cable is 21 pF, resulting in a total distributed capacitance of 420 pF. An additional 100 pF was needed to resonate the loop at 1.810 MHz. Therefore, the approximate inductance of the loop is 15  $\mu$ H. The effect of the distributed capacitance becomes less pronounced at the higher end of the hf spectrum, provided the same percentage of a wavelength is used in computing the conductor length. The ratio between the distributed capacitance and the lumped capacitance used at the feed point becomes greater at resonance. These facts should be contemplated when scaling the loop to those bands above 160 meters.

The radiation resistance of small loops is extremely low, thereby rendering them quite inefficient for transmitting applications. However, they can be used for that purpose if one is willing to accept a sacrifice in signal level, and if the impedance of the system is matched satisfactorily. A discussion of this subject appeared in *QST* for March, 1968 (McCoy, "The Army Loop in Ham Communication").

### Construction

There will not be a major difference in the construction requirements of the loop if coaxial cables other than RG-59/U are used. The line impedance is not significant with respect to the loop element. However, various types of coaxial line exhibit different amounts of capacitance per



foot, thereby requiring more or less capacitance across the feed point to establish resonance.

Shielded loops are not affected noticeably by nearby objects, and therefore they can be installed indoors or out after being tuned to resonance. Moving them from one place to another does not affect the tuning.

In the model shown here it can be seen that a supporting structure was fashioned from bamboo poles. The "X" frame is held together at the center by means of two U bolts. The loop element is taped to the cross arms to form a square. It is likely that one could use metal cross arms without degrading the antenna performance. Alternatively, wood can be used for the supporting frame.

A Minibox was used at the feed point of the loop to contain the resonating variable capacitor. In this model a 50- to 400-pF compression trimmer is used to establish resonance. It is necessary to weatherproof the box for outdoor installations.

The shield braid of the loop coax is removed for a length of one inch (2.5 cm) directly opposite the feed point. The exposed areas should be treated with a sealing compound once this is done.

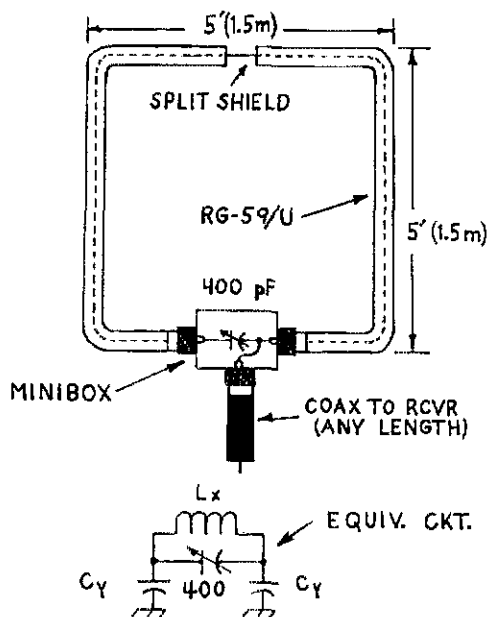
### Performance Notes

This receiving loop has been very effective at WICER in nulling out second-harmonic energy from two local bc stations. During DX and contest operation on 160 meters it helps prevent receiver overloading from nearby 160-meter stations that share the band. The marked reduction in response to noise has made the loop a valuable station accessory when receiving weak signals. It is not used all of the time, but is available when needed by connecting it to the receiver through an antenna-selector switch. Reception of European DX stations has been possible with the loop at times when the transmitting antenna was totally ineffective (noise).

Long-term testing showed that the effects of approaching storms (with attendant atmospheric noise) could be nullified considerably by rotating the loop away from the storm front. It should be said that the loop does not exhibit meaningful directivity when receiving sky-wave signals. The directivity characteristics relate primarily to ground-wave signals. This is a bonus feature in disguise, for when nulling out noise or QRM one is still able to copy signals from all compass points!

Those wishing to compensate for loss of efficiency when using a loop should consider placing a well-designed preamplifier in the line to the receiver. One possibility might be a common-gate JFET (MPF102). The gain of such a preamplifier will be approximately equal to the loss in the loop, and the common-gate JFET preamplifier exhibits good immunity to overloading and IMD products.

For receiving applications it is not necessary to match the feed line to the loop, though doing so may enhance the performance somewhat. If no attempt is made to secure an SWR of 1, the builder can use 50- or 75-ohm coax for a feeder, and no difference in performance will be observed.



Schematic diagram of the loop antenna. The dimensions are not critical provided overall length of the loop element does not exceed approximately .04 wavelength. Small loops which are one half or less the size of this one will prove useful where limited space is a consideration.

Cy — Distributed capacitance between center conductor and braid.

Lx — Inductance of center conductor.

The *Q* of this loop is sufficiently low to allow the operator to peak it for resonance at 1900 kHz and use it across the entire 160-meter band. The degradation in performance at 1800 and 2000 kHz will be so slight that it will be difficult to discern.  
— WICER

## FM Transceiver *(Continued from page 25)*

### References

- 5) A 100-mW, 2-meter fm transmitter, price \$39.95 from International Signal and Control Corp., 3050 Hempland Rd., Lancaster PA 17601. A crystal for 146.16, 146.34 or 146.94 MHz is included. Specify frequency choice with order.
- 6) DeMaw, "An FM Pipsqueak for 2 Meters," *QST*, March, 1971 and Sept., 1972.
- 7) DeMaw, "A Single Conversion 2-Meter Fm Receiver," *QST*, August, 1972.
- 8) DeMaw, "The 2-Meter Fm Pip-Squawk," *QST*, July, 1971.
- 9) DeMaw, "The Pip-Squawk MK-II FM Receiver," *QST*, August, 1971.
- 10) Math, "A Simple IC FM Detector," *CQ*, Nov., 1971, and June, 1972.
- 11) Thompson, "Two-Meter Transmitter-Receiver," *Ham Radio*, Dec., 1971.
- 12) Valeluka and Price, "An FM Receiver for Two Meters," *Ham Radio*, Sept., 1970.
- 13) DeMaw, "The Pip-Squeak Gets Smaller," *QST*, Sept., 1972.

**QST**

# Making Your Own Satellite Tracking Nomograph

**E**XPERIENCED Oscar and APT satellite trackers have their own special techniques to determine azimuth and elevation, but the newcomer is always left with doubt as to where to point his beam. In a previous article<sup>1</sup> WB6MVK has done an admirable job in presenting the mathematical solutions with tables of azimuth and elevation. Taking the WB6MVK article<sup>2</sup> one step further, it occurred to this author that if a template is made for one's own location (Great Circle bearing), not just the polar location, a much better understanding of the path of a sun-synchronous satellite would result. Azimuth, elevation and time for your location become immediately apparent, but the difficulty with this scheme is that each orbital path has a different appearance. To overcome this problem, a family of lines is used. One can easily interpolate between these lines and be within the resolution of this nomograph.

Several alternatives were considered in drawing in the orbital paths, including drawing the lines directly on the map itself. However, when both ascending and descending nodes are drawn, the map becomes a confusing mess. Therefore, it was decided to use a separate transparency for the family of lines which can be flipped over and can also be used for both ascending and descending nodes.

## *Slide Rule for Orbital Prediction*

An additional bonus gained by using a separate transparency is that it can be used as a circular slide rule to predict longitude crossings and times, if appropriate markings are made on the periphery. The slide rule also can be used for obtaining descending node information, a process not too clear on a computer printout. By placing five-minute tick marks on the orbital paths, the time of approach closest to you is easily predicted for ascending and descending nodes.

## *Additional Information*

Referring to Fig. 1, the circle marked 2000 nautical miles (actually 2135 nautical miles or 2445 statute miles) shows the greatest distance at which one can hope to acquire the satellite. The next circle, 4000 nautical miles, gives you the outer limit of locations one can contact through the satellite from your location.

<sup>1</sup> Danielson and Glick, "Australis-Oscar 5, Where Its At," *QST*, October, 1969, page 54.

<sup>2</sup> Edler, "An Aid for Plotting Satellite Orbits," *QST*, March, 1970, page 50.

\* Dept. of Physics and Astronomy, The Mall 2565, Univ. of Hawaii, Honolulu, HI 96822.

BY KATASHI NOSE,\* KH6JJ

## *The Orbital Transparency*

Fig. 2 shows details of the orbital transparency, on the periphery of which is marked the orbital numbers 1 through 13. The index marked with a zero enables one to find the descending node equatorial crossing at 194° "reciprocal" bearing. (The extra 14° takes care of the rotation of the earth.) The dark line at the bottom is the equator.

## *Using the Nomograph — An Example Centered on Washington, D.C.*

Superimpose the transparency on the Great Circle map, being especially careful to line up the equators of both. You now have a family of orbital paths covering every 10 degrees of equatorial crossing (each orbit is 28.8° apart), on the ascending path (south to north).

The orbits of interest, ascending node, are those within the 2000-nautical-mile radius, approximately from 10° to 170°. Flip the transparency over, making sure that the equators and circles coincide, and you will notice now that the orbits of interest, descending node, within the 2000-nautical-mile circle are between 45° and 190°.

If, for example, the initial crossing occurs at 0148 GMT at 74.8° (information of this type is available from Amsat or via W1AW bulletins), set the orbital index number 1 at 74.8°; the next 13 equatorial longitudinal crossings are read off on the azimuth scale. The crossings of interest to us in this example are orbit numbers zero through four. Set orbit number 1 to 0148 GMT and the corresponding equatorial crossing times are read off on the time scale, each division of which represents 10 minutes.

To find the pertinent orbitals in the descending node, north to south morning passes, set the +194° index on 45° (determined above) and find the corresponding "reciprocal" bearing at orbit number "zero" at approximately 210°. Likewise find 356° for a "reciprocal" bearing of 190°.

Armed with this information, you are ready for the day's passes. Superimpose the transparency on the map, again aligning the equators. Select the orbit required and place the elevation reticle, made on a transparency, such that the 90° index (overhead) is at the center of the circle. You can

*(Continued on page 78)*

Sun Synchronous  
 Periodicity: 114 Min.  
 Inclination: 101°

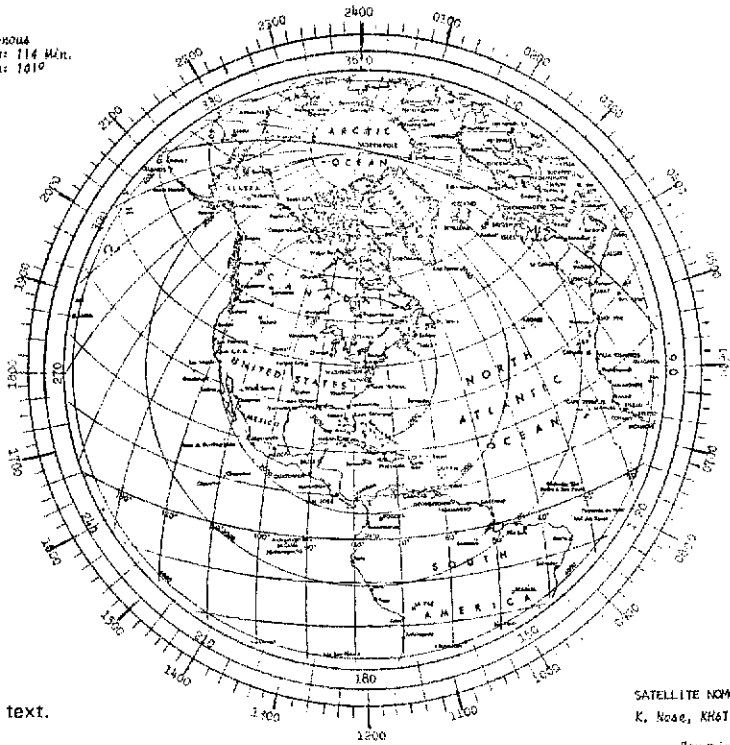


Fig. 1 — See text.

Centered on Washington D. C.

SATELLITE NOMOGRAPH  
 K. Noze, KH61J

Copyrighted

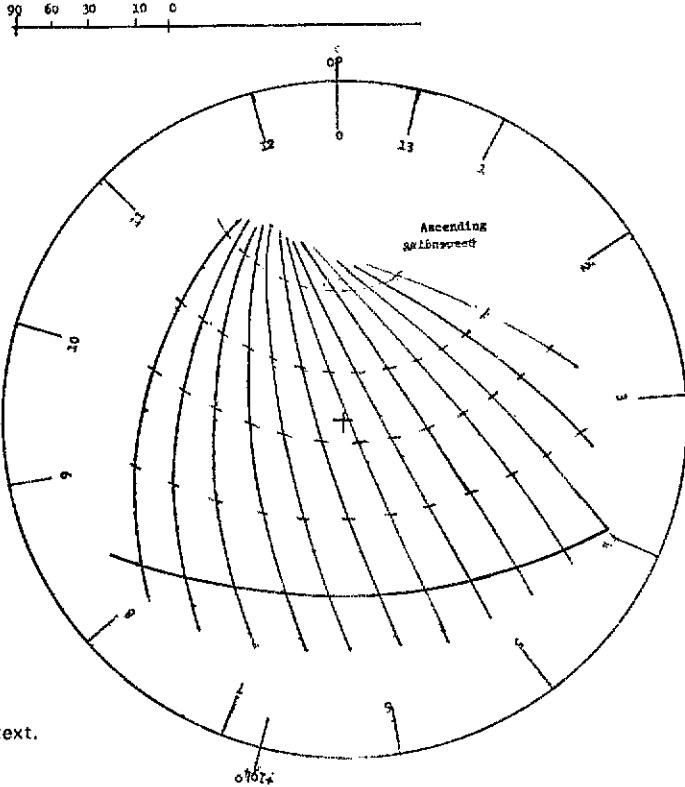


Fig. 2 — See text.

# A Simple Method of Raising Large Antennas

BY STEVE EICHMAN,\* WA6IVN

**O**PERATING in DX contests can be enjoyable. In order to be successful in these endeavors, however, one needs a collection of full-sized, multielement, Yagi or quad antennas. These arrays are most effective when perched on high towers, often more than one hundred feet above the ground.

Due to some limiting factors (my budget), self-supporting towers were not considered. Therefore, since utility poles were relatively unavailable, a guyed tower was the only practical means to a 100-foot high support.

After much thought, it was decided that the antenna farm should consist of Yagis, rather than quads. This decision was an easy one, especially after witnessing a few six-element jobs go up on self-supporting towers! The thought of attempting to launch such a device to the top of a 100-foot guyed tower would make one's blood run cold! Living in an area with an unusually low ham population required a design which would allow a large Yagi to be raised and lowered without counting on the help of anyone other than the immediate family.

## Why A Tram System?

There are several methods of putting a large Yagi on the top of a high, guyed tower. First, it can be taken up in separate pieces and assembled

\* Box 752, Stockton, CA 95201.

on top of the tower. This process may take many hours of hard work. If there is another Yagi on the tower, it makes assembly even more difficult. Or the amateur can physically drag it up from the ground (which requires many strong helpers). Another possibility is to hire a crane and operator to pick up the antenna and place it on top of the tower. This is very expensive.

A tram will allow large antennas to be installed simply and easily upon any height of tower, often with as much as a 10- or 15-mph wind blowing. A tram system consists of a crossarm (approximately 10 feet long) usually made from a 1-1/4-inch dia. steel pipe. Two tram stanchions are needed. They should be mounted in the ground some distance beyond the guy points of your tower. The tram wires are made from 1/8-inch solid or stranded cable.

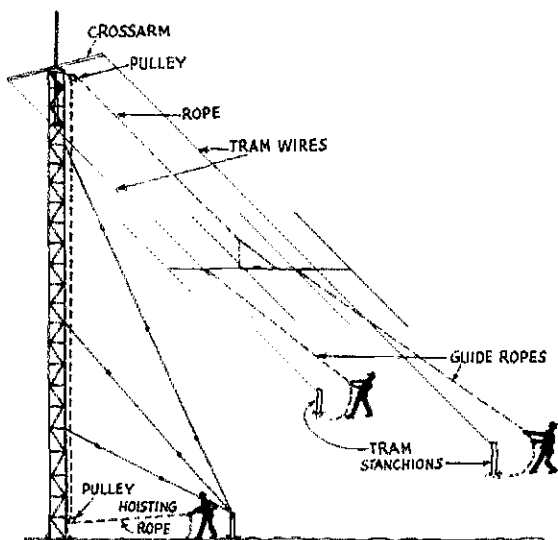
The tram wires are connected to the ends of the crossarm and come down to the tram stanchions. The stanchions are about five feet high and are spaced about 20 feet apart.

The tram wires are tightened with turnbuckles installed at the end of the tram wire nearest the ground. When the wires are reasonably taut (without bending the crossarm) the turnbuckles are adjusted so that the cables are the same level at the center. The Yagi then is placed on the tram with the ends of the elements facing the tower (see Fig. 1). The antenna may be pulled up the tower from the ground through the use of pulleys.

## Construction And Installation

The first thing that the builder must decide is whether or not there is sufficient space available for the tram. The tram stanchions must be far enough away from the guy points (on the ground) so that the antenna clears the guy wires. My tower guy anchors are about 80 feet apart. The tram stanchions are located midway between and approximately 20 feet beyond the tower anchors. If space permits, 30 feet would be better.

Fig. 1 — Complete tram system. The guide ropes can be light-duty material since they do not carry the weight of the antenna. Three persons are required to assure complete safety. If a pulley is placed at the base of the tower, the hoisting rope can be pulled from any place away from under the antenna or its path along the tram wires.



The separation between the tram stanchions depends somewhat on the size of your antenna. If the boom of the smallest antenna that you will put on the tram is 25 feet, then your stanchions must be at least 18-feet apart. The crossarm should be at least 10-feet long to provide stability at the top of the tower. The factor that limits its length is the ability to withstand bending under the heavy stress created by the beam going up the taut tram wires.

The second step is to decide what design of tram stanchion is best suited for your location. This decision depends on where they are going to be located. If a large backyard is available, permanent tram stanchions may be installed. It is important that both of the stanchions be exactly the same distance above the ground so that the tram wires will be on the same plane. Large turnbuckles with at least 10 inches of travel are installed with suitable heavy-duty hardware at the tram stanchion. If a permanent system is not possible, a temporary installation may be used (see Fig. 2). When the temporary tram is no longer needed, just pull out the 3/8-inch bolt and remove the two-inch pipe. Then screw on a three-inch diameter cap and fill in the hole with soil. In a few weeks the lawn will fill in the bare spot and no one will ever know what stood there. Be sure to make a map of the pipe location. Otherwise it may be frustrating when later you try to find the spot.

To install the tram wires, lay them out in a straight line away from the tower in the direction of the tram stanchions. Climb the tower with the tram wires. Lean out from the tower and attach the S hook (which is attached to the tram wire) to the eye bolt installed on the crossarm. Connect and adjust the turnbuckles until the wires are reasonably tight. Be sure not to overtighten to the point of bending the crossarm.

### Preparation And Raising of the Antenna

The antenna was assembled while attached to a five-foot mast stuck in the ground not far from the tram stanchions. If it is not possible to build the beam away from your tram, then it may be built

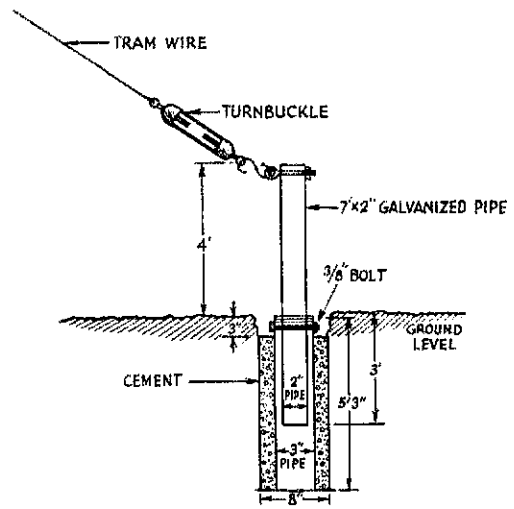


Fig. 2 — Temporary posts can be installed in places like the front yard. When they are not being used for antenna installations, the tops can be covered with soil (and grass!) as described in the text.

on the tram itself. Tape or bailing wire can be used to prevent the boom from rotating. It is important to have the beam perfectly balanced so when it is pulled up the tram, it won't slide from side to side — or off the tram completely! A cradle or sling is shown in Fig. 3. The sling is joined to the boom with two muffler clamps. It is advisable to use heavy nylon (3/8-inch diameter) or similar strength fiber material for the sling. Place a piece of old garden hose over the nylon to prevent the boom-to-mast plate from cutting the rope. The center (exact) is tied to a large S hook or steel 1/4-inch ring. Pick up the beam by the hoisting rope (attached to the ring which is at the apex of the sling). If the beam isn't level, adjust the muffler clamps until the right locations are found.

Now place the beam on the tram and rotate it until the elements are pointing up at the same

*(Continued on page 77)*

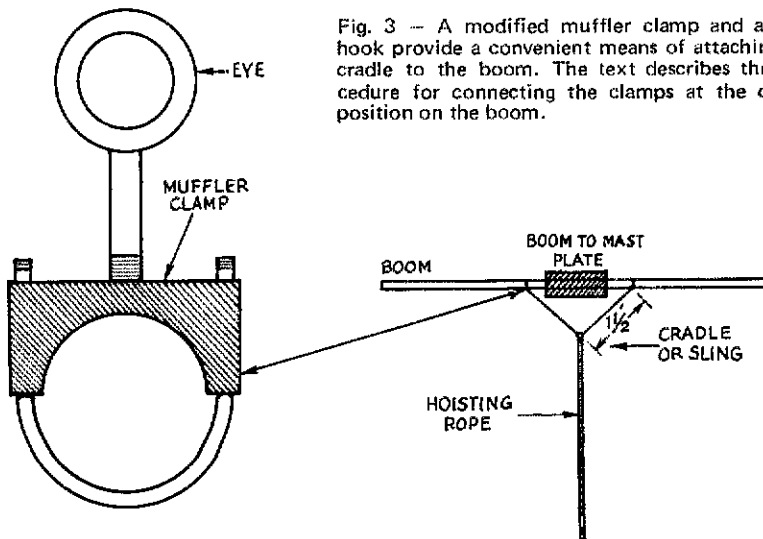
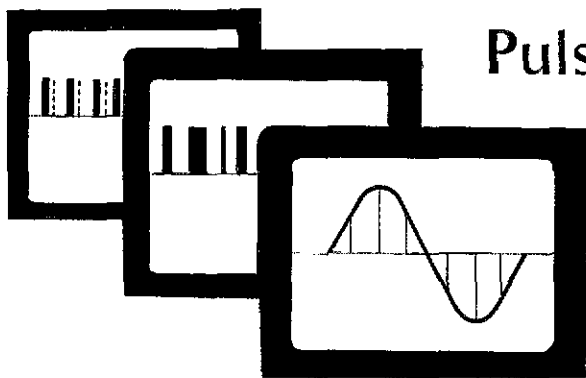


Fig. 3 — A modified muffler clamp and an eye hook provide a convenient means of attaching the cradle to the boom. The text describes the procedure for connecting the clamps at the correct position on the boom.



# Pulse Modulation - A New Look at Old Theory

BY VINCENT BIANCOMANO,\* WB2EZG

**V**ERY OFTEN, innovations in technology appear to materialize miraculously, when, in reality, theories postulating their mysteries have existed for years. Add the fact that many of us behave somewhat like inductors — we resist changing ideas. What results can also be attributed to electrical law — the change comes eventually but there is a time lag. There is no reason for this to happen when discussing digital modulation, because amateurs are aware of the subject, though perhaps unknowingly.

The idea of digital signal transmission is as old as the invention of the telegraph, and the art of combining many telegraph signals over a common wire is almost as old. Representation of analog or varying signals by digital means was first tried about 1900 and continued through the 1930s. (Incidentally, single sideband enjoyed its beginning around 1930 or so.) As regards analog-digital representation, it was found that the methods used yielded little advantage with respect to con-

ventional amplitude modulation; noise, distortion and crosstalk were not noticeably improved. This eventually led to pulse-code modulation, where a given analog amplitude would be represented by a given sequence of equal amplitude digits. This will be better understood later. It is most important now to investigate some familiar ideas under a more powerful microscope.

## A Closer Look at Modulation

All of us have a good idea of what modulation means; we make use of it daily for radio communication. If a beginner were to ask us for a definition of the term, however, could we answer satisfactorily? We must be careful in stating, "It is a process used to vary the amplitude, frequency or phase of a radio wave for the purpose of transmitting information." Such a definition is not incorrect and is acceptable at most social gatherings, but the whole story is not told because the choice of words is too confining. This we wish to avoid.

Initially, we can try to define modulation as the multiplication of any two frequencies. It will be shown that this is a better definition than the previous widely accepted one. Even then, it will be shown that still a better explanation is possible, and what conclusions can be drawn.

Modulating an rf signal with an af one serves two purposes: (1) Many signals in the af range can occupy the spectrum by translation of the audio to chosen radio frequencies. (2) Modulation allows radiation (it is very hard to radiate audio frequencies because of the required physical length of the antenna). Mixing and heterodyning is also modulation in the strictest sense; here, both are radio frequencies.

Now suppose we have a carrier frequency of the form  $\sin \omega t$  or  $\cos \omega t$  (a pure frequency), and we combine (multiply) it with audio frequency  $f(t)$ . What results is the spectrum as shown in Fig. 1. This is nothing new to us; sum and difference frequencies are generated. Now suppose we were to modulate a rectangular wave with  $f(t)$ . What would

*Some form of digital modulation is almost certain to play a role in the future of amateur radio. When? That will depend upon how rapidly the existing techniques are perfected, how superior digital modulation will be to existing modes, and what the final dollars-and-cents outlook shall become. WB2EZG has been doing developmental work along the conceptual lines treated here, and offers an explanation of how pulse modulation can be effected. He also discusses some possible advantages of its use.*

be the spectrum? We can reason the answer intuitively without resorting to mathematical proof. Since in general, the rectangular wave consists of a fundamental frequency plus harmonics of that frequency, then sum and difference frequencies are generated at the fundamental and each harmonic. Thus the modulation theory not only includes trigonometric functions, but any periodic function whether it be square, triangular, rectangular or just about any other wave we will encounter. Actually, the theory is extended to include nonperiodic wave forms too, but there is no need to discuss this. To continue, this immediately gives rise to a discovery. A rectangular wave is a form of dc wave -- a switched wave. If  $f(t)$  could be switched into the circuit periodically as shown in Fig. 2, modulation would be performed. The audio function  $f(t)$ , would be multiplied by  $R(t)$ , the rectangular wave. Thus, there are two ways to modulate: (1) by switching (2) by using nonlinear devices. A good example of (1) is the ring modulator used in ssb, where the diodes serve as switches, not nonlinear elements. We are interested in (1) for obvious reasons.

### Sampling of Wave Forms: Modulation

Fig. 3 shows a sine wave of arbitrary frequency. Suppose we desired to represent it by a great number of amplitude-dependent pulses, as shown. This would mean we would have to measure the original signal periodically for its amplitude value. In other words, we would sample this signal. A sample may be defined as a measure of the amplitude of a wave evaluated instantaneously. If we took an infinite number of samples we would reproduce the given wave perfectly. How many samples are required in order to identify the wave? It can be shown that at least two samples per cycle must be taken in order to meet this criteria. If we are observing many frequencies, sampling must be done at least twice per cycle for the highest frequency present. It turns out that even if a perfect wave were to be transmitted, imperfections in the transmission media would make it impossible to recover the signal entirely at the receiver. We would do just as well to approximate the signal at the transmitter by sampling and *quantizing*<sup>1</sup> because then the contents of the *approximated* wave can be completely recovered at a distant point. Note that sampling does not serve the function of approximating the input signal; this is accomplished by the process of quantization. It is important to understand that the samples should have only a finite number of amplitude values, because if there are an infinite number, we cannot properly detect information at the receiving point in the presence of noise. Therefore, when sampling, we must "round off" amplitudes to the nearest preassigned value (quantize), in order to help the S/N ratio. If this is not quite clear, it will be when pulse-code modulation and quantization relations are made. Note that  $f(t)$  has been multiplied by the periodic sample  $p(t)$ . The connection between modulation and sampling is readily seen.

<sup>1</sup> To subdivide into small measurable increments.

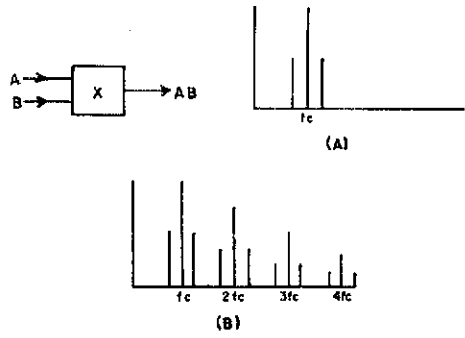


Fig. 1 — The illustration at A shows modulation by means of one frequency. Rectangular-wave modulation is shown at B.

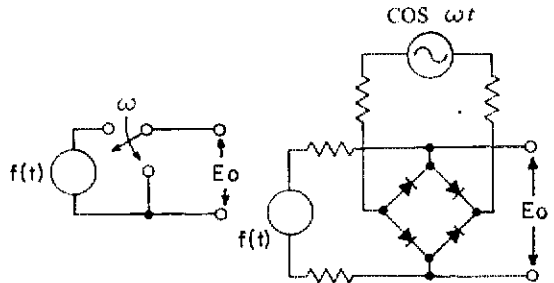


Fig. 2 — Example of the switching type modulator.

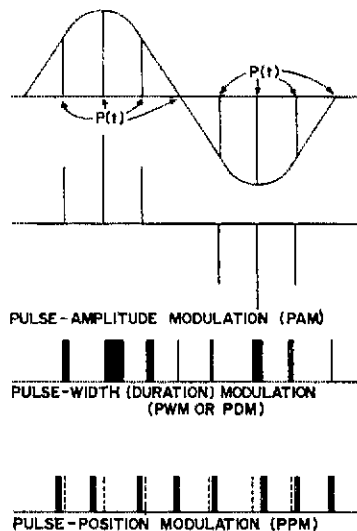


Fig. 3 — Some forms of pulse modulation.

## The Frequency-Time Relationship in Communication

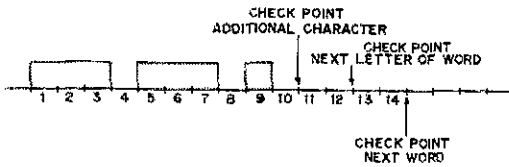


Fig. 4 — Illustration of the formation of Morse code letter G.

It should be mentioned, for the sake of completeness, that a process known as *companding* arranges the preassigned values so that the S/N ratio is kept constant. This means that the size of the quantizing steps will depend on the input amplitude values. It will not be discussed further and is mentioned only to alert the reader to the fact that it is an important consideration.

### Forms of Pulse Modulation

Fig. 3 shows the different ways in which samples may be used to generate pulses which vary according to a given wave form amplitude. The pulses may vary in amplitude themselves; width or position is another way in which this can be accomplished. These types will be corrupted by noise, distortion, and other types of interference. What would result in each analog sample in PAM (pulse-amplitude modulation) form could be represented by pulses of equal amplitude? This would mean that each amplitude would be differentiated from another by the *number* and/or *arrangement* of pulses. Thus, we would have pulse-code modulation (PCM). To fix our ideas, let us give a good example of PCM: the Morse Code. Each letter or number is represented by an arrangement of dots and dashes. In Morse, there is not a fixed number of pulses per letter (this method has merit). In commercial PCM, it is usual that the number of pulses per amplitude is constant. Now, in theory, we may represent a voltage by however many pulses we choose. For speech, it is found that coding by at least 7 pulses is necessary to cover the dynamic range encountered. If we have  $X$  number of pulses used which may take  $h$  values ( $h$  is usually 2.0 and 1), then the number of analog amplitudes which may be represented is  $h_x$ . Note that if the analog amplitudes were not quantized to a maximum number of levels, then we would have to represent an infinite number of analog amplitudes by  $X$  pulses, and this cannot be done! Thus, the need for quantization is obvious in PCM.

We are all aware of the fact on a given band, for  $N$  number of transmissions,  $N$  number of transmitters are needed. Ideally, the carriers should be removed from each other to avoid interference. If it were desired to listen to one of these transmissions, our receivers would be brought to the frequency of interest. This is an example of frequency multiplexing of  $N$  stations — we detect the desired station on the basis of frequency.

Suppose we had one transmitter on which we desired to place  $N$  (separate) transmissions. A way in which we could try this would be to allow a small percentage of the total time for each transmission. In other words, we would sample and transmit each of the  $N$  signals periodically. At the receiving end, we would detect the desired signal by locking onto the desired time slot. In other words, detection would be on the basis of time, not frequency. The bandwidth taken by time multiplexing  $N$  signals in PAM form would be at least equal to the bandwidth taken by frequency multiplexing  $N$  signals, and greater for other forms of pulse modulation, should we desire to again modulate the pulse forms by  $\sin \omega t$  or  $\cos \omega t$ . Normally, PCM is not translated to radio frequency, although there are experimental systems in the microwave range; but if it is done, no bandwidth advantage is gained by time multiplexing.

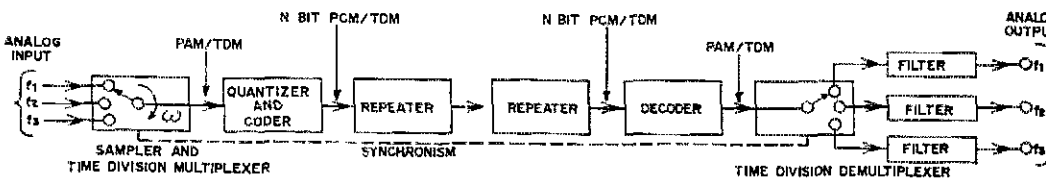
### Time-Division Multiplexing (TDM)

It will be noted that the PCM-like code symbol for  $G$  (Fig. 4) may be broken into time segments. A human can detect the letter because he knows when the letter begins, that there is one unit per dot, three units per dash, one unit between a dot and a dot/dash, three units between letters of a word, and so on. This is another way of saying that a synchronous type of detection is needed when receiving Morse code. We must also have synchronism (electrical, not human) for a PCM time division system if we are to lock onto the desired time slot.

A block diagram of the system is shown in Fig. 5. It should be stated that transmission by cable is as likely as by means of the ether. The figure is largely self-explanatory in light of our discussion, except perhaps for the filters. It will be recalled that the demultiplexer is actually a switch, but that it also performs modulation on any  $G(t)$ , creating higher frequency components. The filters, which are identical, remove these unwanted energies from the output, leaving only the original audio.

(Continued on page 63)

Fig. 5 — Block diagram of a PCM/TDM system.





# A Frequency Extender for Electronic Counters

BY ABRAM L. WINTERS,\* WA4FGN

**M**ANY AMATEUR and MARS stations include 100-kHz or 1-MHz frequency counters such as the Berkeley-Beckman model 7150 and 7160 EPUT meters or the Hewlett-Packard model 523CR electronic counter. These counters are quite useful, although limited in range to audio frequencies. The upper frequency limit of such instruments can be multiplied ten times through the use of an integrated-circuit prescaler. This device divides the applied frequency by ten and supplies an output suitable for application to the counter. Therefore, the prescaler produces a signal at one MHz when the input is ten MHz. The unit shown in the accompanying schematic diagram can accept signals to approximately 11.5 MHz at levels from 0.4 to 2.0 V pk-pk and produces an output of 3.5 V pk-pk.

## Construction

The use of integrated circuits simplifies construction and reduces the size. If desired, the unit and its power supply can be built on a small piece of Vectorbord and mounted inside the counter. No special precautions need be observed in the construction other than the normal practice of keeping leads neat and short. For those not accustomed to working with integrated circuits, it is recommended that dual in-line packages and sockets be used.

Appropriate substitutions can be made provided that the essential characteristics are maintained. Note that only one of the four gates of the SN7400N is needed. This IC was used because it was available; however a dual-gate IC could be

\* 1735 Nursery Road, Clearwater, FL 33516.

employed instead. The unused input must be connected to +5.5 volts. When using a substitute IC be certain that the appropriate power supply voltage changes are made, if required, and that the substitutions are capable of operation at 10 MHz.

## Operation

The wave form to be measured is applied to the amplifier, a high-speed differential comparator. This amplifier produces pulses which are applied to the 7400 gate. The output of the gate is in the form of 4-volt pulses to drive the 7490 decade divider.

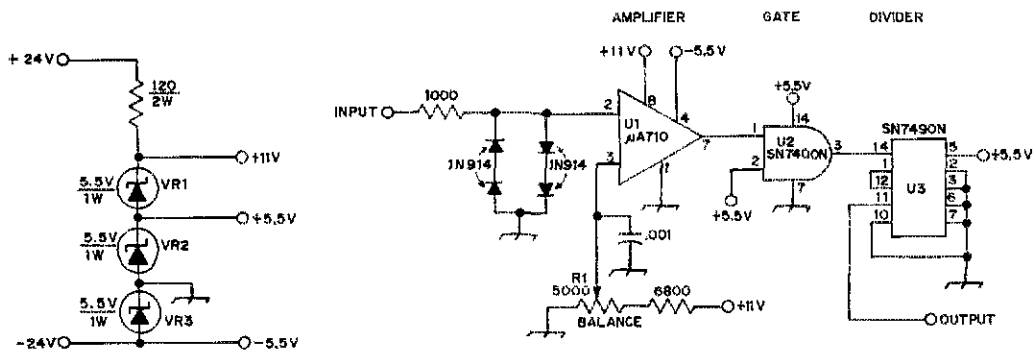
## Power Supply

Because both positive and negative voltages are required, a 24-volt power supply is used and the various operating voltages are derived from a Zener-diode voltage divider. Note that -5.5, +5.5 and +11 volts are all obtained from the same supply by placing the ground at the junction of diodes VR2 and VR3. All grounds shown in the prescaler must be connected to this junction.

The author's unit was fabricated on Vectorbord with a common ground tie point for the signal circuits. The 24-volt power was provided from a regulated dc supply. However a 24-volt transformer operating into a full-wave rectifier with a large filter capacitor on the output should be adequate since the load will not vary appreciably. The circuit shown draws approximately 60 mA, most of which flows through the Zener diodes. The unit has been operated successfully with both the Hewlett-Packard and Berkeley-Beckman counters. Q57

Fig. 1 — Schematic diagram of the frequency prescaler.

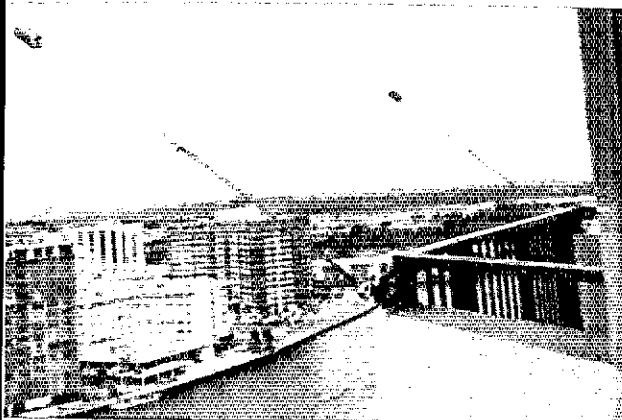
- U1 — Differential-comparator IC: Fairchild  $\mu$ A710 (U5B771031X), Motorola MC1710, or equiv.
- U2 — Quad 2-input NAND gate IC. Signetics N7400A, Motorola MC7400P, Texas Instruments SN7400N or equiv.
- U3 — Decade-counter IC. Signetics N7490A, Motorola MC7490P, Texas Instruments SN7490N or equiv.





# Hints and Kinks

For the Experimenter



## A CLIFF DWELLER'S ANSWER TO THE ANTENNA DILEMMA

I recently moved from my own home in Short Hills, New Jersey, to a 19-story condominium building in Hallandale, Florida. I am on the 18th floor and have an outdoor terrace on the northwest corner of the building with a clear shot in almost all directions. A perfect spot to mount a Hustler 20-meter mobile whip was right on the terrace railing. The results were excellent and I was able to work the world with a transceiver. However, there was one major drawback - QRM from all directions. Receiving was very frustrating especially

when I tried to keep schedules with friends back in New Jersey. I finally obtained permission to put up a long thin wire on the roof of the building. This antenna worked fine on all bands but similar trouble with reception still existed.

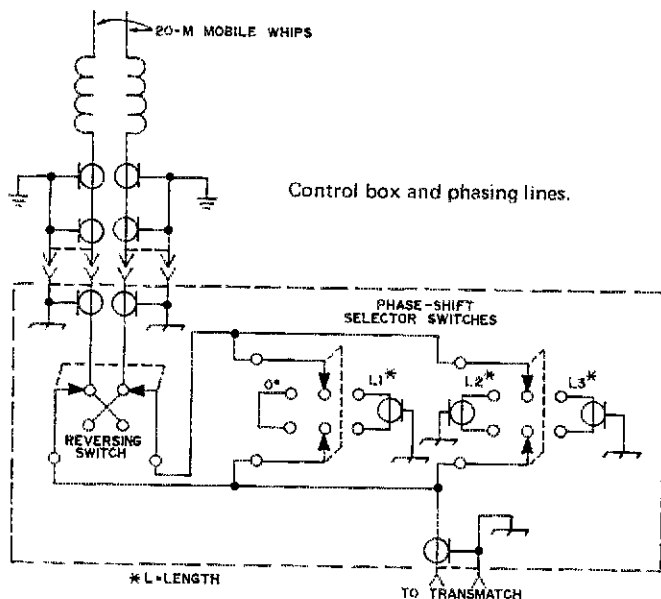
The answer was a directional antenna pointed to the north with a good front-to-back ratio in order to minimize some of the very strong QRM from South and Central America. It was decided to try two Hustler mobile whip antennas fed out of phase for end-fire directivity. Fortunately, my terrace railing ran north-south, making it convenient for a close-spaced two-element array.

Charts showing the horizontal patterns of two vertical antennas for various spacings between radiators and different phase angles between currents can be found in *Antennas*, by Kraus and the first edition of *Radio Engineer's Handbook* by Terman. It was assumed that the currents were equal in magnitude when the patterns were derived.

The charts, at best, could only serve as a rough guide because no attempt was made to equalize the currents in each antenna. Also, both ends of the terrace railing were not identical in respect to the many reflecting surfaces of the building contours. Neither did the terrace railing and supports provide an adequate ground plane for the two whips which, for convenience, were not vertical but pointed away from the building at a 45-degree angle. The whips were originally mounted 1/8 wave apart but later moved to approximately 3/16 wavelength for improved eye appeal. The spacing was not critical. Standard ball type mounts were used and fastened to the railing posts with metal brackets and U

bolts. Two identical lengths of RG-58/U were used as separate feed lines and ran to a junction box in the radio shack.

Considerable experimentation on received signals showed that generally the best phase shift to use was obtained with a 6-1/2-foot (2 m) section of RG-8/U added to the north-side whip. The front-to-back ratio on reception (which was later confirmed on transmission) was at times as high as 6 S units. However, the amount of phase shift necessary and the resultant front-to-back ratio varied considerably with the vertical angle of arrival of the signal. At times during a fade, there appeared to be no rejection and a few seconds later on the same signal the rejection was fantastic. There were



Control box and phasing lines.

times that a greater phase shift was necessary and a 15-foot section (4.6 m) of added coaxial cable was used for best results. If expressed in degrees, the phase shift used varied from about 50 to 120 degrees.

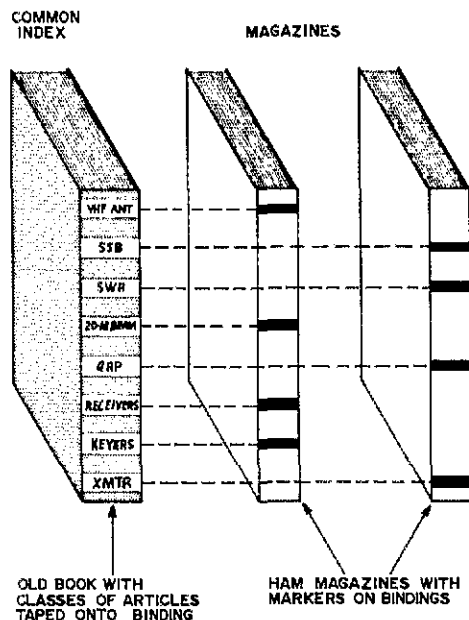
In order to facilitate the rapid switching in of various lengths of phasing line, a control box was built using four Federal switches that I happened to have on hand. However, rotary switches could be used as shown in the diagram. With the control box, I can insert any one of three different phasing lines into either antenna, to reverse directivity. When the two whips are used, it is necessary to match the combination to the transceiver. Any matching network can be used as long as the transceiver sees approximately 50 ohms. The length of line between the control box and the matching network should be as short as practical to minimize losses.

Using the charts as a guide, one can see there are many possibilities for using the phased whips. If conditions permit, three whips can be used in a triangular setup for 6-way directivity switching. — *William Tucker, W4FXE*

### A 15-METER DIPOLE MADE FROM CONDUIT

My place sits in a draw and, in fact, it's almost a canyon. There is a steep mountain within 75 feet of the house and it towers over my roof on three sides. Naturally, the only open direction heads nowhere, so a QSO with a station 200 miles away was DX for me.

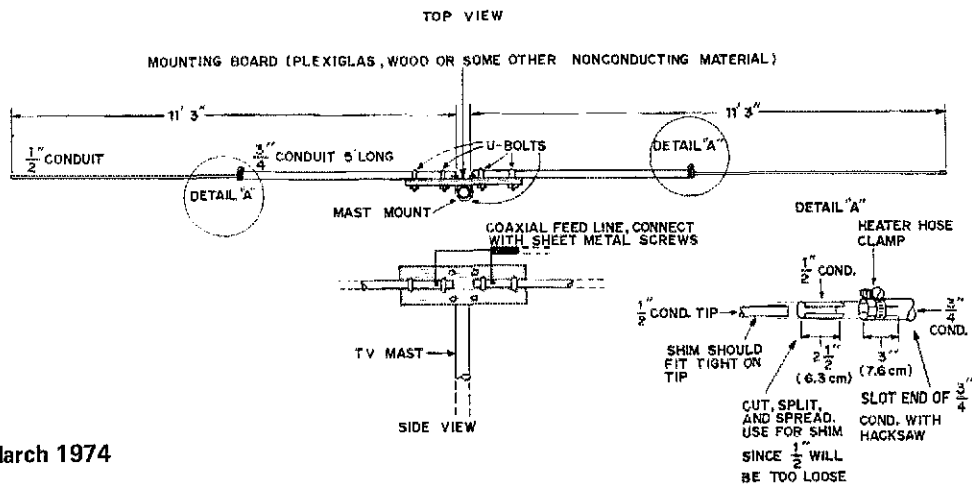
Also there was a problem of where to anchor wire dipoles and this conduit dipole seemed to be the answer. The dipole shown in the drawing is mounted on a 10-foot section of TV mast which is erected on the bottom edge of my roof. Since I have built this antenna, I have been able to work ZLs, KXs, JAs, and VKs. While this may not sound impressive to some, from my location it's terrific! — *Jim Young, WN6SVW*

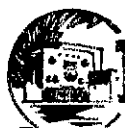


### ARTICLE IDENTIFICATION

Another method of marking publications for easy article identification is to draw a horizontal line on the outer binding. Different vertical heights are used for different classifications of articles. The marks can be made with a heavy-duty felt pen. When all magazines are marked in this manner, it is fairly easy to identify them with the needed construction or information article. The only index used is an old book with the proper labels taped to the binding, corresponding to the vertical heights of the other markers. See sketch. — *Gene Hinkle, W4SKPG*

Construction details of the 15-meter dipole. Conduit comes in standard lengths of 10 feet, and 3 pieces are required — one 3/4-inch diameter piece and two 1/2-inch pieces. Four U bolts to fit the 3/4-inch conduit and two heater-hose clamps for 5/8-inch ID hose are also required. The mounting board is 4 x 18 inches (10 x 46 cm) and is fastened to the mast by means of two 1-1/2-inch U bolts. Tune-up is accomplished simply by sliding the tips in (or out) until the lowest SWR reading is obtained.

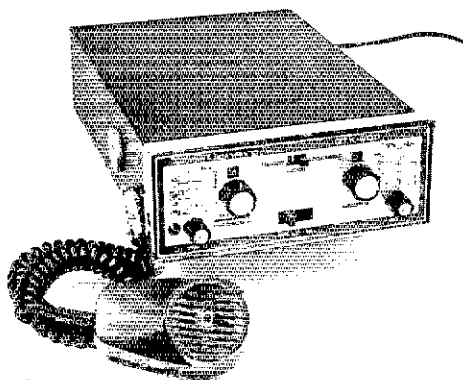




# Recent Equipment



To acquaint you with the technical features of current amateur gear.

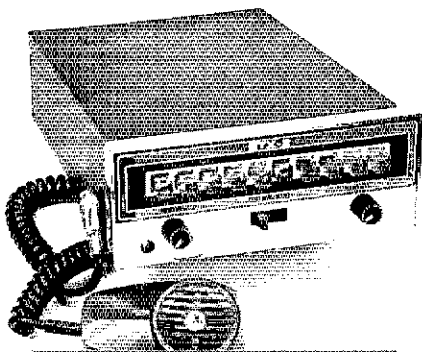


## The Genave GTX-200 and GTX-2 FM Transceivers

**C**ONGRATULATIONS! You now own one of the finest pieces of electronics equipment available for amateur use . . . product of General Aviation Electronics, Inc.

This bit of information from the owner's manual of the GTX-200 perhaps comes on a bit strong, but if all of their little black boxes perform like the particular rig in use at WIUED/mobile for the past six months, the comment isn't too far-fetched.

Dependable is the word — no slug-tuned coils have migrated out of tune, no transistors have gone west, no wandering deviation has been reported, no relays have gotten sticky (minor problems experienced with some other rigs). Intermod has been a problem only in close proximity to the Hartford Fire Insurance skyscraper which has police and amateur repeaters perched on top.



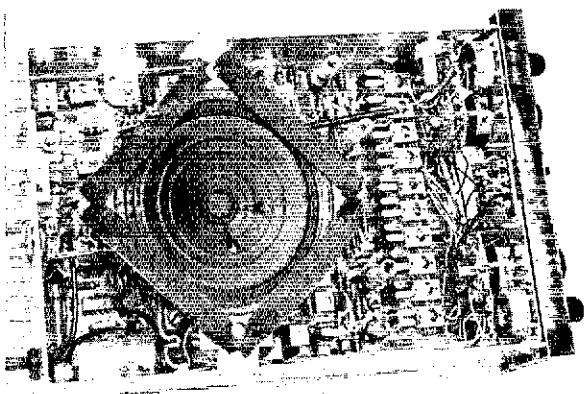
The Genave GTX-200 and GTX-2 are U.S.-made, 10-channel fm transceivers for the 144- to 148-MHz amateur band. The designers have hit upon a good scheme to allow independent crystal switching in the receiver and the transmitter, while preserving the convenience of transceiver operation. Fig. 1 tells the story. When the MODE switch is placed in the left position (LOCKED), the receiver crystals are selected by the TRANSMIT/TRANSCIVE switch. Slide the MODE selector to UNLOCKED and the setting of the RECEIVE switch determines the receiver crystal in use. Two conveniences are presented: the same receiver crystal can be used for both direct and repeater operation without the need for installing jumpers and one can check occupancy on one channel while using another by changing the position of the MODE switch momentarily.

The rig is all solid state employing 11 silicon transistors, 8 diodes, 6 FETs and three integrated circuits. It's golden rule all the way, with design features intended to keep spurious radiations to an absolute minimum. Audio generated by IC 201, an N5558V dual op amp, is passed through a two-pole Chebyshev low-pass filter with a cutoff frequency of 3 kHz and an 18 dB per octave roll-off. The oscillator operates at 12 MHz, with a tripler and doubler each followed by a double-tuned transformer to reduce harmonics. Additional tuned circuits appear after each of the power amplifiers. A complex filter and matching network utilizing five inductors and five capacitors further decreases unwanted products. Finally, between the antenna terminal and the switching relay there is a pi-network low-pass filter which is operative for both transmitting and receiving. All these factors help to make the amateur a good neighbor to the police and other high-band users.

One additional good neighbor feature: the transmitter may be operated at either the one-watt or 30-watt nominal level by the flick of a switch. The writer was able to use the one-watt position for 90 percent of his operation with local repeaters. The other 10 percent of the time, at the edge of the machine's coverage area or when using direct mode, it was very handy to have the higher power capability. The manufacturer markets a battery-pack supply for portable operation as well as components to build your own fixed-station ac supply if you wish. The schematic diagram is given in the owner's manual.

The GTX-2 features pushbutton-frequency selection. A two-position power switch allows for either 1- or 30-watt operation. The left control is volume, the right control is squelch.

Bottom view of the GTX-200. The GTX-2 layout is very similar differing only in the switching area shown at the right.



And that brings us to another important feature of Genave gear: a first-class owner's manual with a narrative on design features, complete alignment procedure (although the factory alignment held constant throughout our six-month trial), installation instructions, schematic diagram and parts layout for a preamplifier, the ac supply, crystal switching, and a main schematic diagram big enough to be read in a straightforward fashion. All in all the 24-page book allows a knowledgeable amateur to troubleshoot the unit easily — on our particular unit, no troubleshooting became necessary!

### The GTX-2 Transceiver

The GTX-2 comes in the same box and has more or less the same circuitry as the GTX-200 just described. The obvious difference is the pushbutton-frequency-selection feature of the GTX-2. Ten backlighted pushbutton switches allow the operator to select the desired transmit/receive frequency by pushing the proper selector button. The GTX-2 comes with 146.94/146.94 installed from the factory. Each transmit crystal can be wired so that it can be used on more than one pushbutton position.

An advantage to the pushbutton feature is soon apparent to the mobile operator who has enough to occupy his attention with steering, shifting gears, and holding a microphone. Even though the pushbutton channel in use has brighter backlighting, it is usually difficult and unsafe to shift your eyes from road to the rig when changing frequency. After some practice, the desired frequency can be punched by *feel*.

A high-low power switch gives a 1- or 30-watt power choice and separate volume and squelch controls complete the front-panel knobs. As in the GTX-200, the microphone plugs into a jack on the left side of the cabinet when facing the unit. — *WIUED*

### The Genave GTX-200 and GTX-2 Transceiver

- Transmitter power output: 1 watt and 27 watts.\*
- Transmitter deviation: Factory set at seven kHz.\*
- Transmitter crystal frequency: Operating frequency divided by 12.
- Receiver sensitivity: 0.3  $\mu\text{V}$  for 20 dB of quieting.\*
- Squelch sensitivity: Opens at 0.1  $\mu\text{V}$ -input signal levels.\*
- Receiver crystal frequency: Operating frequency minus 13.1 MHz divided by three.
- Power requirements: 13.6 V dc at 6 A during transmit, .09 A during receive.\*
- Dimensions (HWD) and Weight: 2-1/2  $\times$  6-1/2  $\times$  2-1/2 inches, 5 pounds.\*
- Price class: GTX-200, \$270; GTX-2, \$260. Both models come with microphone and mounting bracket.
- Manufacturer: General Aviation Electronics, Inc., Indianapolis, IN 46226.
- \* Measured in the ARRL lab.

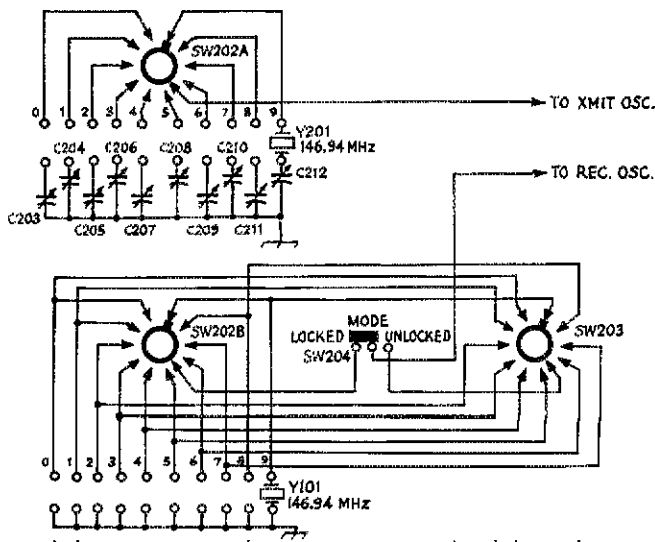


Fig. 1 — Circuit diagram for the crystal-selecting system employed in the GTX-200. The key feature is the ability to select the receive frequency independently of the transceive frequency. This allows front-panel control of a single crystal for possible combinations. Or a favorite repeater-output frequency can be dialed into the receive selector and the MODE switch may be used in the UNLOCKED position to provide a simple method of spot checking it while operating on another frequency pair selected by the LOCKED position.

0F0/0/06\*

# Woes of Babysitting

28/F/8043470/122173/7401/7412/X\*

## a Computer

24/M1/8043473/WILLIAM H/222173/7401/7412/X\*

90/F/8043471/122673/7401/7412/X\*

BY JOHN NELSON,\* WIGNC

A YEAR AGO the records of membership at the administrative offices of the League were converted to automatic data processing. A service bureau near Boston, Epsilon Data Management, was given the job. The firm was selected from many others because it had considerable experience with membership organizations (having started business as "Fraternal Systems"). But Murphy's Universal Law, "If anything can go wrong, it will," is inexorable and inevitable. All the genius of the EDM group — mostly Harvard Business School grads — combined with our own zero knowledge, couldn't avoid the foulups which have occurred. Our only consolation is that, so far as we can tell, practically every other major conversion to computer in history has run into similar difficulties.

All processing is done by a large IBM computer near Boston. For each member, there is a record on tape of the name, call sign, address, zip, membership class, section and division of residence, 7-digit-1-letter identification, date dues received, expiration date, date of last change of address, and such. Our access to the computer is by optical reading (OCR) of lines typed at Hq. on a special machine — with characters something like those on bank checks. Identifying codes indicate whether the transaction is a new member, renewal, change of address, gift, or what have you.

Conversion of records began in October, 1972. A complete printout of our membership on 3 x 5

\* Assistant Circulation Manager, ARRL.

file cards was turned over to the service bureau for taping. Their typists would not win any awards for accuracy, we gradually found out. And the 2% error rate apparently found common in the industry must have been for each stage, 2% by them, 2% by us, and 2% by Gremfins. If a member named Lochner was typed as Lockner, Heaven help him. John Ham in Marion IN might have had his QST's sent to Marion IL until we got it straightened out. And on and on.

The system is set up so that our girls type a 4-digit code for titles. This allows us to write on a member's address label, "The Honorable . . ." while printing the salutation: "Dear Governor . . ." on computer generated letters. (At Headquarters we recently received a letter from a parts distributor with the salutation, "Dear Mr. League:"). The idea is fine in principle, but someone at the service bureau really fouled things up on the conversion — the key-punch operators typed in title code 0500 instead of 0800. All of our "Reverends" became "Madams"! Bishop Edward Turner, KV4BQ, ended up with Rt. Rev. as his first name! Imagine the lambasting we received when we demoted a colonel to captain. There is also a 6-digit code which is supposed to print out the name of the country. The League has members in places the service bureau had never heard of. But when they said they had never heard of the Azores, we sent them our countries list and suggested they adopt it. Let's hope the addition in the next year or two of the Postal Code to all of our Canadian member's records goes smoothly. (The Canadian government is smart — they don't use the word ZIP!)

*ARRL has members with last names from Aab (WB0BSS) to Zymaris (K2OYM). Andersens, Andersons, Anderssons, total 396 of our number. On our membership list there are 17 Nixons and 3 Agnews, but 83 Fords. We have 8 Keys, 14 Keyes, and 2 Lids. We have a Crystal, Pulse, Dials, Mixers, Doublers, Peaks, Ohms, Cables, Mark and Space, Surplus, lots of Powers and lots of Watts, Bias, Coils, Cores, Morse and Code. We have a Jack but no Plug; a Click but no Chirp; a Dash but no Dot; a Hertz but no Cycle; a Gate and Drain but no Source; a Plate but no Grid; Current but no Ampere; several Drivers but no Buffer or Linear. There are nearly 1,000 Smiths — 31 of them James Smiths. We failed to make it plain to the computer that James Victor Smith, K9MHU, of Marion, Indiana, was not the same person as James Victor Smith, WB9NIB, of Fort Wayne, and what resulted got them both upset — and rightfully so. Some of us took it seriously when a glitch in our service bureau's billing program sent us a bill for "Psychiatric Opinion."*



Typist prepares update which is "read" and put on tape, lower right. Four hours are required to print 100,000 address labels for *QST*, compared to 3 days using the old addressograph file in the background.

### Postal Problems

We hear that the Postal Service promises one day delivery of mail up to 600 miles. They don't tell you this applies only to first class mail. Time and time again it takes the postal service a month to deliver *QST*'s that are not mailed on the main run. For example: Copies of November *QST* to late renewals and new members were mailed November 8. A week before, you received a note enclosed with your certificate or card telling you: "*QST*, as second-class matter, requires a little more time in transit than first-class mail; please allow several weeks for your first copy or copies to arrive." Three weeks pass and nothing from us. You write again, and we send you a "Not Had Time" card because we find your name on the carbon of the mailing labels for the *QST*'s mailed November 8. About the time you receive the "Not Had Time" card it is the first of December and two days later your December copy arrives. It was mailed in bulk (five trailers full) on November 23. The Postal Service can't toss a piggy-back trailer load of *QST*'s in the corner and lose it, like the sack that held your November issue. Well, you still don't have the November copy and you write: "I got my December copy, keep your promises, you knuckleheads, and send November!" So we duplicate the November issue which takes another two weeks to reach you. As happened with the November 8 mailing, copies started showing up around the sixth of December, so when the second copy of November shows up you really think we are a bunch of idiots. What is more amazing is that some copies which were mailed last September began to show up the first week of December. It is no wonder that most publishers say it takes from six to eight weeks to process a new subscription.

We are often criticized because the other ham magazines arrive before the first of the month and *QST* after the first of the month. The absolute deadline for *QST* is the fifth of the preceding month. After that no changes can be made. To get *QST* to you before the end of the month means

moving the deadline back. So you receive your December copy on December first. Its deadline would fall during the last week of October. Something big breaks the first of November and we would be criticized for not having something that happened a month ago in the December issue.

We recently received a letter from a member who works for the Postal Service. He apologized for our expense when the label from his *QST* came back to us marked "no such number." We had written him to find out what had happened, and as part of his apology he mentioned that he had been living at the same address for the last ten years.

Why haven't we done anything about the mail service? We have, and every time we end up with buck passing. Once we complained to the Post Master General through our congressman about mail delivery to Long Island. After much searching, the Post Office said they could find no reason why it was taking three weeks for delivery to points on Long Island. Let's hope service will improve with the increased postal rates.

### Computer Pains

We don't blame the Postal Service for all of our woes. We bring many on ourself. As long as human beings are around we are going to have typos and other mistakes. Take the poor fellow who wrote, "I've been trying to tell you for months what my address is, so I'll get *QST*." None of his letters said he hadn't been receiving *QST*, they just said, "My new address is . . . ." The girl who handles changes of address kept going to the book and his address was O.K. on the computer records. It didn't dawn on her that the reason this member didn't receive his copies was because he had a wrong expiration date.

We have twenty-six types of membership and subscribers. This is so we can select who are to receive *QST* and who are not (family members) who are to receive ballot envelopes and who are not, and who get which type of expiration notice, etc. The writer made an error the first month we added the capability to have *QST* sent as a gift to one member, and have the expiration notice go to the person who gave the gift. The *QST* main run for that month was programmed wrong, and the copies not only went to the recipient, but "giver" as well.

Perhaps a few numbers will show you why we can't write a letter to everyone who has a complaint. During the twenty working days of last November, 17,843 transactions were typed on OCR scan sheets and fed into the computer. A transaction can be anything from a change of address to a new member - each new member requires two transactions. We handle an average of 125 changes of address a day. During our peak month of December we received nearly sixty bad checks a week that must be returned to members. (Occasionally it takes three tries before a member's check will finally clear). Almost one third of new members who request to be billed never pay. Then

*(Continued on page 95)*

## COMING ARRL CONVENTIONS

- March 1-3 -- Delta Division, Lafayette, Louisiana.  
March 22-23 -- Great Lakes Division, Muskegon, Michigan.  
May 4 -- Dakota Division, Waseca, Minnesota.  
June 7-9 -- Rocky Mountain Division, Pueblo, Colorado.  
June 8-9 -- Georgia State, Atlanta.  
June 15-16 -- Florida State, Orlando.  
July 19-21 -- NATIONAL, New York, N.Y.  
November 1-3 -- Southwestern Division, San Diego, California.

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

## GREAT LAKES DIVISION CONVENTION

Muskegon, Michigan                      March 22-23, 1974

The Muskegon Area Amateur Radio Council invites everyone to attend the 1974 ARRL Great Lakes Division Convention, March 22-23, at the Muskegon Community College, Muskegon, Michigan. Make plans to arrive early and meet your friends for Friday evening's fun at the nearby Ramada Inn with eyeball QSOs and real ham hospitality. There will be a Wouff Hong initiation at midnight. If you are a League member and would like to join this exclusive group, here is the chance. Check in at the hospitality room for details.

Registration begins Saturday at 8 A.M. In addition to a large swap-shop and manufacturers' exhibits the day will be filled with activities of interest to all. SSTV, RTTY, ssb, vhf fm, repeaters, uhf systems, antennas, DX, Amsat, RACES, ARPSC, QCWA, MIDCARS, and county hunting are among the many aspects of amateur radio to be covered by the various net meetings, forums and technical sessions already scheduled. Be sure to attend the ARRL Forum for all the latest news and the opportunity to meet the ARRL officials and headquarters representatives attending the convention. Net meetings begin at 10 A.M. and forums and technical sessions start at noon. A special program has been planned for the ladies. Be sure to bring the XYL! Saturday evening relax after a busy day with dinner, dancing and libation at the Ramada Inn. Make reservations in advance and pick up your tickets when you reach Muskegon.

Talk-in on 3995 kHz ssb and 22/82 repeat, 52 and 94 simplex. Free parking for 1500 cars. College dining facilities will be open all day Saturday. Room reservations may be made by writing directly to the Ramada Inn, 2967 Henry Street, Muskegon, Michigan 49443 or by calling (616) 733-2651. Reservations should be made early because of other activities taking place in the area the same weekend as the convention. Advance

registration tickets are \$2.25. The Friday and Saturday evening activities at the Ramada Inn are separate. For tickets, information, and reservations contact Hank Riekels, WA8GVK, Convention Coordinator, MAARC, Box 691, Muskegon, Michigan 49443 (616) 722-1378 days, (616) 744-1400 nights.



**Delaware** -- The Kent County Amateur Radio Club's annual auction is March 12 in the basement of the Kent County Court House, Dover. For info contact K3HYG.

**Florida** -- The Bold City Hamfest will be held on March 30-31 at the Municipal Auditorium, Jacksonville Beach FL. There will be an airborne repeater on 347.94 Saturday morning, ARRL Forum, QCWA meeting, commercial tables, exhibits, and special planned activities for the XYLs. Advance registration \$1 per person, \$1.50 at the door. For more information write to Bold City Hamfest, 1644 Mill Creek Road, Jacksonville FL 32211. Tel. (904) 725-5473.

**Florida** -- The Broward Amateur Radio Club's annual auction is March 2 at Broward Community College Cafeteria. Free parking, repeater on 146.31-91. Info from W4UCL.

**Florida** -- The Playground Amateur Radio Club of Fort Walton Beach fourth annual North Florida swapfest is March 31st, 8-5 PM, at the Community Center on Highway 98 in the downtown Beach Area. Tickets and details write: P.A.R.C., P.O. Box 873, Fort Walton Beach FL 32548.

**Maryland** -- The Greater Baltimore Hamboree at Calvert Hall College, Putty Hill and Goucher Blvd., Towson (1 mi. south of Exit 28 of Beltway I-695) is Sunday, April 7, at 10 AM. Food service, flea market, no table or percentage charges. Registration \$2. Info, write Joe Lochte, 5400 Roland Ave., Baltimore MD 21210 or Brother Gerald Malseed, 8102 La Salle Ave., Towson MD 21204.

**New Jersey** -- The Livingston Amateur Radio Club's annual ham radio auction is Friday, March 15, at 8 PM. All are invited to buy and sell gear. No entrance fee, 10% of all sales go to the club. Auction is at the recreation building, Memorial Park, Livingston (next to the high school). For info call (201) 992-0552.

**New Jersey** -- The Knight Raiders VHF Club's auction and flea market is Sunday, March 24, at the YM-YWHA of North Jersey, 152 Van Houten St., Paterson. Free admission, free parking, refreshments available. Talk-in 146.94. Flea market tables \$5 for 8 ft. or \$2.50 for 1/2 table. Reserve your tables in advance. Write: Knight Raiders VHF Club, Inc., K2DEL, P.O. Box 1054, Passaic NJ 07055.

**New York** -- The Radio Society of Greater Brooklyn's annual auction is Sunday, March 24, at St. Camillus School Auditorium, 185 Beach 99 St., Rockaway Beach. (Rockaway Beach Blvd. and 99 St.) Doors open 1 PM, auction at 2 PM. Admission \$1. Info from WB2FIG.

**New York** -- The fifteenth annual hamfest sponsored by the Southern Tier Amateur Radio Clubs is 2 PM March 30, at St. John's Ukrainian Hall, Johnson City. Admission to lectures and flea market is free; awards and excellent dinner, \$6. For tickets and info write: STARC, P.O. Box 11, Endicott NY 13760. Ticket deadline March 27.

**North Carolina** -- March 24 is the Metrolina hamfest sponsored by the Mecklenburg Amateur

(Continued on page 102)



# 1973 ARRL Sweepstakes -

## High-Claimed Scores

The following high-claimed SS scores are those received at Hq. by December 31. From left to right are shown the call, claimed score, number of contacts, number of multipliers. Full results will appear in a later issue. - WA1PID

CW		WB4BGY	
W7RM (K7VPF, opr.)	165,000-1103-75	113,884- 802-71	
W6MAR	157,950-1054-75	W1FLM	113,643- 833-69
W6PAA	157,875-1055-75	W4KFC	113,540- 811-70
W6HX (WB6OLD, opr.)	156,300-1045-75	W5RTX	112,840- 811-70
W3LPL	154,050-1027-75	W7GKF	111,740- 757-74
K1ZND	149,036-1008-74	WA4BWM	111,580- 798-70
K3EST	148,575- 989-75	K4GXR	111,444- 755-74
K6SDR	146,250- 979-75	WB2RJY	111,024- 771-72
W1BPW	145,875- 976-75	W2BQF	110,782- 749-74
E4PUZ	145,632- 985-74	WA6PCB	110,400- 741-75
K5RLW	145,040- 980-74	WR2OEU	109,584- 761-72
KH6RS (K2SHL, opr.)	142,376- 964-74	WA2FAH	108,850- 779-70
WASJMK	141,340- 955-74	W1DAL	107,712- 748-72
W9Y7 (WA9TPV, opr.)	139,750- 933-75	K3OAE	107,670- 728-74
K1VTM	138,627- 951-73	W4OZF	106,344- 742-72
W1ZM (WA1CQV, opr.)	137,738- 932-74	K6SSJ	106,042- 721-74
WASZNY	136,948- 938-73	W6OWQ (WA1ABW, opr.)	105,820- 715-74
W1FBY	135,196- 926-73	W1AF (WA2CNE, opr.)	105,450- 703-75
W5WML	134,904- 930-73	K1OME	105,266- 724-73
WA2UOQ	133,980- 958-70	W8QCV	105,080- 740-71
W9LVT/6	130,950- 902-75	K9IU (WB9GVT, opr.)	104,580- 748-70
VA7WJ (VE7BDJ, opr.)	129,574- 878-74	W6DGH (WB6ZVC, opr.)	104,266- 706-74
W1AINRV	129,168- 901-72	W2FVS	104,171- 715-73
K4VX (WA3IAQ, opr.)	128,772- 890-73	W2AJR (WA2UWA, opr.)	103,806- 711-73
WA1PID	128,464- 868-74	W1MUG (WB2DRW, opr.)	103,660- 732-71
WA1RCP	127,942- 901-71	W1FCC/5	103,222- 708-73
W9DOB	127,896- 879-73	K6OVJ/6	102,948- 751-69
W2CXM (WA1LXK, opr.)	125,670- 885-71	K0JHL	102,564- 781-66
W3CRE (WA3HRV, opr.)	125,487- 860-73	W2REH	102,346- 701-73
K7NHV	124,392- 852-73	WA0VKP (WA0MHJ, opr.)	102,340- 733-70
W3JN	123,881- 849-73	W89GFC	102,240- 731-72
K1JYN	123,876- 837-74	W8AEB	101,814- 717-71
K1JHX	122,840- 830-74	K6MP	101,660- 749-68
WB4AEX	122,830- 871-71	K4VFY	101,237- 703-72
K5MFO	121,360- 821-74	W98QM	101,184- 746-68
WA1JUY (WA2IOZ, opr.)	120,700- 851-71	W4DM	100,008- 700-72
WB5DTX (WBSAAK, opr.)	120,669- 828-73	<i>Multi-operator</i>	
K4POL	120,600- 804-75	WA1KID	126,509- 868-73
W4LBP	119,426- 819-73	WA1KOC	117,216- 792-74
W9AQQ/W8	119,063- 819-73	W9LT	112,536- 785-72
W8SIC	118,728- 832-72	W2SZ	110,600- 790-70
W8KIC	118,400- 801-74	K3JGD	108,750- 726-75
K4BA1	117,956- 797-74	WASRXT	107,565- 759-71
K2AD	117,882- 802-74	K4CFB	105,150- 701-75
WB2RKK	117,530- 841-70	WB4TBO	105,150- 702-75
WB0ANT	117,180- 838-70	K3JUW	103,350- 689-75
WA2SRQ	116,581- 799-73	W44KR	102,450- 683-75
WA7NIN (W6OAT, opr.)	116,581- 803-73	WB8JBM/8	102,060- 786-70
K5OCX	116,362- 805-73	W3ZKH	100,500- 670-75
K4EOA	116,143- 799-73	<i>PHONE</i>	
WA2EUD	115,200- 800-72	W7RM (K7VPF, opr.)	237,600-1587-75
W5QJH	115,070- 785-74	W6HX (WB6OLD, opr.)	198,225-1335-75
W3YF (W3DOG, opr.)	114,404- 773-74	WB5DTX (WA3GBU, opr.)	195,300-1306-75
W2GUH	114,192- 793-72	W9YT (K9LBO, opr.)	193,288-1306-74
		K4VX (K3EST, opr.)	190,200-1272-75

WA8ZDF (WA8RWU, opr.)	189,975-267-75	WA2SIS	125,122- 857-73
WA0CVS (WB0DUJ, opr.)	189,800-1301-73	W3YF (W3DOG, opr.)	125,100- 834-75
WB2OEU	185,775-1239-75	W3IN	124,986- 848-74
WA7NIN (W6OAT, opr.)	183,525-1232-75	W4WSE	124,125- 828-75
W7SFA (VE7ZZ, opr.)	181,843-1252-73	WA6HWR	122,040- 849-72
W3LPL (WA3HRV, opr.)	179,700-198-75	K6OZL	121,800- 812-75
K1VTM	178,340-1205-74	WB4MKB	121,104- 841-72
W3FZT (WA3IAQ, opr.)	178,050-1194-75	W7GKF	119,990- 845-71
W5WML	176,860-1196-74	WA7F1J/7	119,720- 820-73
W1FBY	176,250-1175-75	K9HDP	119,232- 828-72
K1DQV/1	175,200-1169-75	K0UYN	118,425- 790-75
K1ZND	170,850-139-75	K4EOA	117,075- 784-75
W6PAA	170,348-1157-74	WA4VUP	116,946- 801-73
WA2UOQ	167,700-1118-75	WA1JUY (WA1JY, opr.)	116,100- 775-75
W6DGH (WB6ZVC, opr.)	167,700-1121-75	WB0CJV	116,064- 806-72
VA7WJ (VE7BDJ, opr.)	167,240-1131-74	WA0RBW	115,776- 804-72
K7NHV	165,600-1104-75	K7GWE (WA7CWL, opr.)	114,325- 730-75
WA0GQI	165,300-1103-75	W9LT	114,402- 826-69
W2GUH	163,500-1090-75	W2PDB (WB2FGM, opr.)	114,108- 771-74
W6DSQ/6	163,500-1096-75	W0J JF (WB0AM, opr.)	113,812- 769-74
W0LBP	163,392-1105-74	K1OME	111,000- 757-74
W9LVT/6	163,200-1120-75	W5RTX	110,704- 753-74
W5MYA	160,746-1111-73	K1CPF	110,475- 941-75
WA1PID	160,580-1087-74	W1GQQ	110,250- 787-75
W3AZD	159,000-1060-75	WB9HI	109,766- 773-71
W2CXM (WA1LXK, opr.)	158,832-1103-72	WB9HAD	108,000- 723-75
W8DQJ	155,592-1086-72	WA3BGE	107,821- 759-73
W0NUH	154,650-1031-75	WA9UHV	107,712- 744-72
K1CSJ	154,475-1026-75	WA7PMI	107,424- 746-72
K5RLW	154,275-1029-75	W5ZNY	107,164- 734-73
E7JCA/6	153,825-1032-75	W7AWH	106,743- 776-69
WA0ENP	153,446-1055-73	WA2HCK	106,128- 747-72
WA1ABV/1	153,225-1022-75	W1EOT	105,850- 725-73
K1THQ	151,986-1060-73	W5QMN	105,280- 758-70
K0GXR	151,725-1013-75	W5TQG/7 (WA7OGI, opr.)	105,225- 765-69
WB0BYI (WB0LTV, opr.)	150,450-1005-75	W9RQM	105,192- 733-72
WRKIC (WA8RKM, opr.)	149,258-1009-74	WB8AYC	105,000- 703-75
W1MX (WA1KMK, opr.)	149,066-1025-73	K0TMM	103,606- 721-72
WB4DGI	148,680-1062-70	W9VBV	103,514- 710-73
WASQXD	148,309-1019-73	WB2ELX	102,346- 715-73
K0CVA	147,750-1000-75	W4DM	102,268- 700-74
WA3AMH/3	147,168-1009-73	WASWOF	102,150- 681-75
K5FPO	147,112-1047-71	WA9NPM	101,158- 702-74
W5RTQ	146,550-1007-75	WA7MCK	101,150- 725-70
K9IU (WB9DZS, opr.)	146,400-1001-75	VE3ENM	100,788- 683-74
WA4FFW	146,150- 990-74	K4PUZ	100,611- 798-63
WRKGE (K8RMK, opr.)	146,146-1004-73	WB4OSS	100,125- 668-75
WB4MRI	145,425- 973-75	<i>Multi-operator</i>	
W6NUT (WB6AIN, opr.)	144,670- 979-72	W6ONV	172,530-1155-75
K5LWL	144,374- 978-74	W6YRA	163,200-1090-75
WB6VZ1	144,321- 990-73	K0VVY	151,552-1024-74
WB0ANT	144,299- 988-73	WB6OOD	150,750-1014-75
W1ZM (WA1CQV, opr.)	140,026- 937-75	W1FLM	144,374- 987-74
K1JHX	138,750- 926-75	WA1KID	143,500- 953-75
WA3GHL	138,240- 961-72	W0OOQ	139,992-1003-72
W8YVX	138,000- 920-75	W5ZKH	137,100- 914-75
WB4HUS (WB4NO, opr.)	135,707- 930-73	WB9IDS	131,066- 923-72
K3JGD	135,000- 944-72	W6ORX	126,975- 853-75
K4POL	133,500- 890-75	W1AF	126,840- 906-70
K1JYN	133,444- 914-73	WA4KRJ	125,550- 839-75
W5RTQ	131,700- 890-75	WA3EPT	123,922- 842-73
WB2RKK	129,888- 903-72	KZSNG	121,200- 809-75
W0GKE	129,285- 926-75	WA4TOA	121,050- 807-75
K7LTV	125,268- 858-73	W8EDU	120,304- 824-73
		W84TPU	118,800- 798-75
		W2SZ	118,224- 821-72
		K4CC	114,000- 761-75
		W8RBM/8	113,442- 873-73
		W8LT	112,480- 777-74
		KP4US	108,726- 731-73
		K3JUW	106,650- 711-75
		W0AAQ	106,560- 755-72
		W9YH	101,850- 679-75
		KH6RS	101,601- 716-71
		WA1KZE	100,567- 752-67
		W6YX	100,240- 716-70

## Wa-Strays

W8WNA has compiled a list of 81 amateurs, from 7 different countries, who are members of the Independent Order of Odd Fellows Lodge. He has scheduled a number of them on the air.

corresponded with others by letter and tape cassette, and OH2RY and SM5BVU have visited his home. If you are a member of an Odd Fellow Lodge, please send your call to W8WNA, Kirk Sanderson, 1129 E. Wallings Road, Cleveland, Ohio, 44147, so you may be placed on this roster.

# AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

*In the Public Interest, Convenience, Necessity*

CONDUCTED BY BILL MANN,\* WA1FCM

## Become Involved

**T**HIS MONTH'S COVER depicts an emergency situation which required emergency communications by amateur radio. It is through involvement in such situations that we amateurs have acquired an excellent record of public service. Indeed, our public-service function is one of the main reasons amateur radio exists! We urge all amateurs to contribute in some way to bettering our service for the public.

How often do we hear: "If an emergency situation actually develops, I'll be there to help out." Recent disasters have demonstrated that amateurs "off the street," without prior experience in emergency communications can frequently do a good job in a real emergency. But who can deny that the same individuals or groups could do an even better job if they had had some previous experience or training? Thus, one consideration is the gaining of experience, the acquisition of skills demanded by the "real thing."

Fortunately, disasters are not everyday occurrences. Yet, public-service activities can and are performed daily. For example, many traffic nets are operative throughout the year with messages on behalf of third parties being handled each day. Repeaters are available for reporting accidents, disabled vehicles, malfunctioning traffic signals, etc. One need not wait until a disaster develops before performing a public service.

So how does one become involved in the public-service activities of amateur radio? There are many ways, not the least of which is participating in the Amateur Radio Emergency Corps (AREC). The AREC is a voluntary organization of licensed radio amateurs who have registered their capabilities and equipment for providing emergency communications as a service to the community. The purpose of the AREC is to furnish communi-

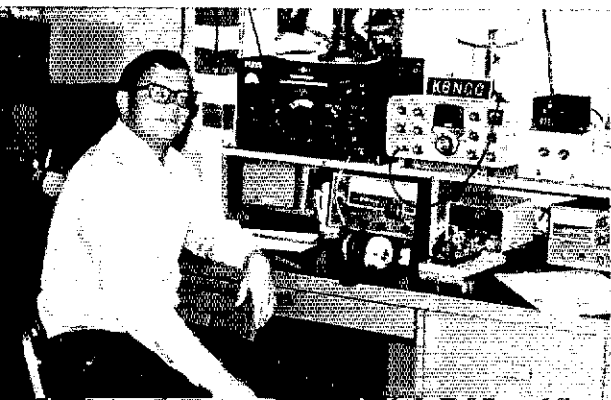
cations in the event of a disaster, when regular communications fail or are inadequate. Active AREC groups will often volunteer to provide communications for special events, such as parades, walk-a-thons, races, etc., in an effort to help members gain experience while at the same time supplying a valuable service.

In addition to holding an amateur license, the only other qualification for AREC membership is a sincere desire to serve. For more information, see "With the AREC," pages 77-78, January, 1974 QST. Then contact your Emergency Coordinator. If you do not know who your EC is, write to your Section Communications Manager (see page 6, this issue) or to ARRL Hq. asking for your EC's name and address and requesting an AREC registration form. Information concerning the AREC is contained monthly in this column under the "With the AREC" heading.

Many repeater organizations are closely associated with the AREC and/or maintain a special public-service committee to plan for emergency use of the repeater and organize communications for special events in nearby communities. Ask club officers how you can help. If there are no special provisions, try to get something started. One of our main claims for repeater existence is service which can be provided to the public; let's make sure this is not an idle promise!

Since the AREC involves localities, one of the functions of the National Traffic System (NTS) is to tie the various localities together through a communications network. Another equally important function of NTS is to facilitate the daily handling of traffic by amateurs for third parties and other amateurs. The two principal objectives of NTS are: (1) rapid movement of traffic from origin to destination, and (2) training of amateur operators in handling of written traffic and participating in directed nets.

\* Assistant Communications Manager, ARRL.



After serving a short time as Daytime Twelfth Region Net Manager, WA0SIG joined the Navy and headed west. He is currently at the Treasure Island Naval Station and is San Francisco section RM. He holds OO, ORS, OPS and is active on the Daytime Sixth Region Net.



From the Emergency Coordinator staff in Northern Florida, we have Jefferson Co. EC W4WSZ pictured in his shack and Calhoun Co. EC WB4UQH standing in front of the c.d. mobile communications vehicle. Royce is also the Calhoun Co. C.D. Director.

The National Traffic System is organized for systematic flow of traffic according to a bi-national plan which includes all of the U.S. and Canada. The traffic handler who can only be active, say one night per week, is an important part of the system just as the guy or gal with more time available. The "iron-man," one-person-does-all approach is discouraged.

To become active in NTS, start reporting into a local or section net. We list all such nets that register with ARRL in the *Net Directory*. As you gain familiarity with NTS procedures, volunteer for an NCS spot or as liaison to other NTS nets.

A government-sponsored activity is the Radio Amateur Civil Emergency Service (RACES). RACES can be defined as a means by which amateurs may serve civil defense communication on an organized basis, using their own bands and in some cases their own equipment. RACES may be authorized to remain on the air in the event of any national emergency resulting from enemy action, when other amateur radio operation would be terminated. Since RACES activity varies with the local entity, check with local c.d. personnel to find what role you may be able to fulfill.

In association with the Post Office Department, a Post Office Net (PON) system is in operation with a national net, a few regional nets and many state PONs. State nets range from weekly to daily operation. Most PONs are listed in the *Net Directory*. Licensed postal employees may seek full membership, while other amateurs may become associate members. For more information, write to National PON Manager, Philip D. Brust, W8OCU, 2008 Maiden Lane, Springfield, OH 45504.

The ARRL *Net Directory* lists many independent (i.e. not affiliated with NTS, PON, etc.) nets. They are set up with varying degrees of coverage: some cover a county or two, others are international. Most are designed to handle traffic and, if the need should arise, emergency communications. Others are specifically established for handling phone patches.

The monitoring services, East Coast Amateur Radio Service (ECARS), Midwest Amateur Radio

Service (MWARS), West Coast Amateur Radio Service (WCARS), Ontario Amateur Radio Service (OntARS), to name but a few, provide a service to amateurs operating mobile who have accidents, disabled vehicles, etc., to report. Service frequencies also serve the amateur who holds message or phone-patch traffic. Again, check the *Net Directory* for times and frequencies. Most "service controls" will be able to advise you whom to write for more information or membership.

Though not strictly an amateur service, since operation is outside the amateur bands, the Military Affiliate Radio System (MARS) provides a back-up communication system for the various branches of the U.S. military. Morale and phone-patch traffic is handled for servicemen overseas. Information concerning MARS may be obtained directly from the individual branches at the following addresses: *Air Force MARS* - Command MARS Director, Headquarters AFCS DOYFM, Richards-Gebaur AFB, MO 64030; *Army MARS* - Commander, USACC-CONUS, ATTN: CONUS MARS Director, ACCN-PO-OP, Fort Ritchie, MD 21719; *Navy-Marine Corps MARS* - Chief, Navy-Marine Corps MARS, 4401 Massachusetts Avenue, NW, Washington, DC 20390, Mail Stop 394.

One of the newer fields for public service communications is through Oscar 6. The potential for emergency communications, particularly from remote areas with modest equipment, is great. Want to get in on this type public-service work? Write to ARRL Hq.

We have only highlighted some of the opportunities available. Omission of other public-service activities is unintentional. Thanks to WA0EYY for our cover photo.

Well, we have attempted to point out some of the ways that amateurs may become involved in public-service-related activities. This is not to suggest that all amateurs should become involved in all of the above activities. Nor do we expect that amateurs will devote all of their hamming time to public service. Yet, if we all do our part, the theme that "amateur radio is more than a hobby, it's a service" will be preserved. - WA1FCM

Public Service Honor Roll December 1973

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below, as reported to their SCM. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with point totals only.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	30	3	3	5	
WA3RCI	10	10	12	12	12	10	3			69
WA2EPT	10	10	9	12	12	10	3			66
WB4SVH	10	10	12	12	12	5				66
WBSAMN	10	10		9	12	20				66
WA0VYB	10	10	9	12	12	8				66
WA8ETX	10	10	12	12	12	4				65
WB2RKK	10	10	12	12	12		3			64
W7OCX	10	10	12	12	12		3			64
K0BAD/4	10	10	12	12	12		3			64
KL7JDO	10	10	12	12		20				64
WA1LIR	10	10	12	12	12	7				63
WA3QLG	10	10	12	12	12	1				62
W4OGG	10	10	3	12	12	15				62
WA0VAS		10		12	12	20	3			62
WA1MSK	10	10	12	12	12					61
WB2JRX	10	10	12	12	12					61
WA3DUM	10	10	12	12	12					61
WA3PXA	10	10	12	12	12					61
WB5EEY	10	10	12	12	12					61
WA5ZZA	10	10	12	12	12					61
K0RUX	10	10	12	12	12					61
WB0GVR	10	10	12	9	12		3			61
WA5THM/5	10	10	12	12	12		3			59
WB8MCR	10	10	12	12	12	5	3			57
W5GHP	10	10	12	12	12					56
K7NHL	10	10	12		12	4	3			56
WB0CZR	10	10	12	12	12					56
WB0HBM	10	10	12	12	12					56
WA0TEC	10	10	12	12	12					56
WA0VYT	7	10		12	12	7	3			56
W3ABT	10	10	9	9	12	2	3			55
K3PIE	10	10	12	6	12					55
WA0MLE	10	10	12	6	12					55
K0JTW		10		12	12	20				54
K20QJ	10	10	9	12	12					53
WB8HUP	10	10	12	3	12	3	3			53
WA3UKZ	10	10	12	6	12	2				53
WB5DLW	10	10	12		12		3			52
WA6TVA	10	10	3	12	12					52
WB8ZNC	10	10	9	6	12					52
W00YH	10	10	12	12	12		3			52
VE3FQZ	10	10	12	12			3			52
WA3GSM	10	10	6	9	12	1	3			51
K6GMI		10		12	12	12				51
K1ONW/5	10	10	9	6	12		3			50
K3OIO	10	10	12	6	12					50
WB4DXN	10	10	12		12			1		50
WB4VYU	10	10	12	12	12	1				50
WB8KZD	10	10	12	6	12					50
WB8NRC	10	10	12	3	12		3			50
WA9OVT/4	10	10	12	6	12					50
WA1PHJ	10	10	12	6	6					5
W2MTA	10	10	12	12						5
WB4TVI	10	10	12	12						5
WB5DBK	10	8	12	12	2					5
K7OUF	10	10	12	12						5
W7UTM	10	10	12	12						5
WA9EED	10	10	12	12						5
WB9KVN	10	10	12	12						5

K0MRI	10	10	12	12						5	49
VE5TT	10	10	12	12						5	49
WB5GZG	10	10	12	12	4						48
K6NCG*	10	10	6	12	10						48
WA1PGY	10	10	3	12	12						47
WA3QIA	10	10	12	3	12						47
WB6AKR	10	10	12	12					3		47
WB0HSZ	10	10	12	3	12						47
WA0RROK	10	10	12	12					3		47
VE3FRG	10	10	12	12	3						47
VE3GJG	10	10	12	12					3		47
W5ABQ	10	10	6	12					3		5
WA7OCV	10	10	9	12						5	46
WA3ATQ		10							3		45
WA3MQP	10	10	12	12	1						45
W4BYG	10	10			9	16					45
WB4ZMK	10	6	12	12						5	45
WB8HWE	10	10		12	12	1					45
WB8KXV	8	10		12	12				3		45
WABUPI	2	10		12	12	4				5	45
W1BVR	44			W2RUF	39			W1UX			34
WA2CWS	44			WA3EOP	39			W2FIR/5			34
K3KAJ	44			W3NEM	39			WB2FWW			34
WA3SWF	44			W3OU	39			W2KAT/3			34
K4KDJ	44			WB4OXT	39			WB2VEJ			34
WB5BFW	44			W4SQQ	39			WA3HV			34
WA6DEI	44			WB4WXX/5	39			K4JJQ			34
W7DAN	44			W4ZJY	39			K4KNP			34
W7WAH/5	44			K5MAT	39			W4UQ			34
WB8JGW	44			W6BVB	39			WB4WIS			34
K8MLO	44			W0HI	39			W5RB			34
WA9ZAZ	44			VE3AW	39			W5RBB			34
W0OF	44			VE3DPO	39			W5TLK			34
VE3SB	44			VE3EWD	39			W6YBV			34
W1LNF	43			VE3GFN	39			W8MZW			34
W6JTA	43			WA1NLD	38			W9OLW			34
WB8TT	43			WB2ELF	38			VE3DBG			34
WB2FCD	42			WA7QCC	38			VE3DVE			34
W2FR	42			WB2ADW	37			WB8GKB			33
WA3RCA	42			WA4BAA	37			WA2RSTJ			32
WA4BCB	42			WB5FML	37			WA2DVE			32
WA5VBM	42			WB0BMG	37			WB2JWM			32
W6LYY	42			VE3RHF	37			WA2MPC			32
WB88ZX	42			W3FCS	36			WA3PHQ			32
WN0HTZ	42			WA3SWC	36			WA4KWC			32
WA3NAZ	41			WB4EKJ	36			WB5EAY			32
W5SHN	41			W6RFF	36			WA5EYA			32
W7BQ	41			W8GLC	36			WA6LBO			32
WA7WIB	41			W9MMP/0	36			VE3FGV			32
VE3GT	41			WB4RUA	35			W4WXZ			31
WA2OVE	40			W6DEF	35			WB4ZQF			31
W2ZQ	40			WB6TYA	35			W9E1			31
K4IAF	40			WBID	35			K8UTQ			31
WA4JOS	40			WB9HEG	35			WA2CCF			30
W4WCG	40			K0CNV	35			WA31YA			30
W6INH	40			K0PIZ	35			WN3SZX			30
W9DND	40			WA1MIE	34			WN3VGN			30
K9LGD	40			WA1PHE*	34			K4FZH			30
WA1SQB	39			K1TMK/7	34			W5QZG			30

\*Denotes multioperator station.

Category Key. (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS cw nets, 3 points each; (4) NCS phone/RTTY nets, 3 points each; (5) Performing assigned liaison, 3 points each; (6) Legal phone patches, 1 point each; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

Aids Available

To assist in performing public-service work, ARRL has several publications available. The *Net Directory* lists all public-service nets which have been registered for directory listing. Similarly, the *Repeater Directory* contains data on all repeaters

which have been registered. Basic traffic-handling procedures and network and emergency operation are explained in *Operating an Amateur Radio Station*. Details on AREC, NTS and RACES are contained in the *Public Service Communications* manual. Each booklet is available from ARRL as a free service to the membership. For first-class

mailing, send a self-addressed envelope (6-1/2" x 9-1/2" or larger) with three units of first-class postage for the *Net Directory*, *Repeater Directory* or *Operating an Amateur Station*, or two units of first-class postage for the *Public Service Communications* manual.

Other aids include: (a) Form 3 - a list of ARRL numbered radiograms (ARL texts) and ARRL recommended precedences and handling instructions; (b) Operating Aid No. 4 - what to do before, in and after an emergency; (c) Operating Aid No. 9B - amateur message form, Q and QN signals, and abbreviations, prosigns and prowords; (d) Operating Aid No. 13 - ready reference information (form on which to list pertinent telephone numbers, net frequencies, alerting procedure); and (e) Operating Aid No. 14 - phoenetic alphabet, time conversion chart, RST system and ending signals. Any of the above fit into a business-size envelope or larger (s.a.s.e. please).

### Traffic Talk

In a recent Detroit Amateur Radio Association Bulletin, W8AP expresses some thoughts regarding net operation. After questioning the public-service objectives of some of the nets crowded into the General-Class portion of the 75-meter band, George goes on to say:

"A net CAN run efficiently; but it MUST have two things going for it: First, the Net Control Station must exercise a polite but always firm control of the net. He should not waste time by over-repetition of his own call, but should assume that the member stations of the net are listening; that they can hear him; and that they will follow his directions. These assumptions are based upon the premise that the net is a regularly scheduled one, that the net control is not trying to run flea-power to an underground antenna, and that the net members understand that a "net control" exists for the purpose of controlling the net, and not as a master of ceremonies for a vaudeville show.

"Second, all transmissions, whether by Net Control or by members, must be as brief as possible. Consider this example:

NCS: All stations call in and report traffic . . .

WB8XXX: W8NCS, here is Whispering Blueberry eight Xylophone X-ray Xylophone in good ole Big Daddy Rapids, where the sun has been shining all day and the moonshine is great tonight. We've got one message for Marquette, in case there's anybody around up that way, and another for our ole buddy Stan, down in Kalamazoo, the celery capital of the world. (59 words)

"If you have restrained yourself from getting sick, we suggest that the following form might save time and promote gastric stability on the part of the NCS and most net members:

WB8XXX: This is WB8XXX, Big Rapids, with one Marquette, one Kalamazoo. (10 words)

"The point is that side comments are not part of nor appropriate to a typical net with numerous participants, having only so much time before another net is scheduled on the same frequency. This applies to net control stations as well as the net members.

"The basic purpose of a 'net' is to promote radio communication through organized channels. It is not a state for individual performances, and any net will function better if the performers will

either stick to CB, or hire a hall. If nets are used for communications, and used with maximum efficiency, there will be more frequencies available for general use. We can't always make the bands wider, but we can open some holes with a little common sense."

■ When delivering a message, particularly to non-amateurs, briefly explain how messages are passed by amateur radio, then offer to send a return message. This not only means more traffic for the nets, but helps to familiarize the public with one of the services of amateur radio.

### BRASS POUNDERS LEAGUE

Winners of BPL Certificates for December Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL/4	249	1185	1096	29	2559
K0ONK	131	677	642	28	1478
W6RSY	68	575	457	33	1133
W0WYX	55	495	104	391	1045
W1PEX	215	389	279	40	923
WA2UWA	15	461	423	2	901
WB2RKK	40	391	358	83	872
WB4AIW	27	399	366	33	825
W3VR/4	212	299	271	6	788
K4SCL	50	361	322	26	759
WA3RBI	23	341	285	45	694
W3EML	24	369	283	3	679
W8PMJ	15	322	306	16	659
WA0VAS	117	264	41	223	645
WA3RCI	117	261	175	77	630
WA2EPI	233	194	122	68	617
W6IPW	6	294	294	-	594
WB9NJA	75	259	169	90	593
W4BMC	33	276	242	34	585
K7NHL	15	299	250	19	583
WA0ROK	8	283	285	1	577
W8SDLW	20	276	261	-	557
WB6AKR	100	221	213	-	534
W2FR	18	280	231	-	529
W6LYY	21	251	232	19	523
W4RPM	19	249	246	1	515
W5QZ	16	249	225	20	510
K1ONW/5	22	243	211	30	506
K4VND	25	249	226	6	506
WB5FML	78	231	194	-	503
W0ZWL	-	281	-	222	503
WA3FXA(July)	81	228	148	53	510

### More-Than-One-Operator Station

W2ZQ	33	314	294	20	661
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### BPL for 100 or more originations-plus deliveries

W5FC	239	WN3VGN	125	W4STM/5	110
WA0AUX	237	WN0KWI	125	K0BFD/4	110
WB8ITT	232	W2OE	124	WN4FZQ	109
K7NTS	217	WN4ECB	124	WA3GSM	108
K4MNF	216	W4BZDE/4	124	W7OCX	108
K6UYK	190	W4BQV	123	WB8NRC	105
WB8LNM	184	WB6MKV	123	WB8QC	104
WB4VBG	183	WB4WCM	122	W7DAN	103
WA0YVT	170	W2URP	121	WB8HUP	103
WB5AXH	166	WB2PYM	119	WB8MGA	103
W4BWFZ	161	WA1FCM	118	WN0JFI	103
WB9GVR	141	WB4REN	117	W63FRG	103
VE1ZH	140	W7EM/4	116	VE3FQT	102
K4KDJ	136	WA3ATQ	115	W3ABZ	101
W4SVJW	134	W5ABQ	114	WA3BOP	101
WA0IEP	134	W4BAZ	113	WN4CL(Mar.)	103
W0OYH	134	W4FSL	112	WA3SWE(July)	136
VE3EHP	134	W4SSWC	110	WB5Y(Nov.)	120
WA4PDM	131	WN3SZX	110	K4KDJ(Nov.)	164
WB8KXV	126			WA1FCM(Nov.)	110

### More-Than-One-Operator Station

K4BFT/4 211, K3CR 101

BPL Medallions (see December, 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings: WA1PHJ, WA3SWE, K7NTS, W9SUF.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.



Seven Enid, Oklahoma, amateurs assisted in the search for a missing flood victim in a rural area southeast of the city, on October 20. The body was recovered and the Garfield Co. Sheriff's Office presented the Enid ARG a Certificate of Appreciation for the group's effort. Left to right, WA5NYX and WA5UJG are shown receiving the award from Sheriff McFadden.

**Caution:** When drafting the return message, get a complete address (unless included in the message you delivered). Do not simply address it to the station of origin or c/o the station of origin. He may be on vacation, off the air because of rig trouble, one who seldom reports into nets, etc., thus the message ends up in suspense, waiting for that particular amateur to show. If properly addressed, the message follows regular channels and may be delivered by the amateur who originated the initial message or anyone else within the local calling area.

Another situation might be that the person for whom the original message was being sent was only visiting with the amateur or was at an exhibit station. The recipient will probably know the correct place to send the return message rather than have it sent to the place the person was visiting.

Although service messages should go to the station of origin, reply messages should be routed to the address of the "signee."

■ Sooner or later, traffic destined for military personnel overseas must be routed through MARS. To effect delivery, a complete address is required. It is necessary that the address include the addressee's rank/grade, name, Social Security number, unit assigned as well as complete address indicating the zip code (APO/FPO number).

■ **National Traffic System.** So how's DNTS doing now? In somewhat less than one year, all but two of the DNTS nets proposed in the "kick-off" article in December, 1972 *QST*, are operational. As of this writing, no manager has been appointed manager for the Daytime Eastern Canada Net (DRN11) or for the Daytime Ninth Region Net (DRN9). The Continental Traffic Net and most region nets are on daily. Most DNTS nets still need more traffic, liaison stations and NCSs, but activity seems to be on the upswing. Check DNTS statistics in the table below. If you haven't tried DNTS yet, what are you waiting for?

**December reports.** WA0MLE advises that CAN now operates on 7067 kHz. Dec. was a big month for PAN and everyone pitched in, according to K7NHL. Bob has assigned WB6AKR as Assistant PAN Manager and expresses thanks to Bill for keeping PAN going between managers. WA1SQB sez all statistics are up on DIRN. Because of poor conditions, an early session of 2RN was set up to handle traffic not cleared on the regular late session the previous night, during the holiday traffic session. The special session met 15 minutes before the early section nets met. WA2UWA reports that much book traffic equals much work

and few points in Dec. on D2RN. Despite bad conditions, missed skeds, etc., 3RN had a very good month with traffic and average up and rate good. D3RN finally saw 100% representation with Mgr. WA3QOZ wishing Christmas was every month with the activity it brings. DRN4 certificates have been issued to K4s EZH FTB IZT, WA4s CGO CSG YTO. K0BAD/4 submits his last report as RN5 manager and indicates that this was the best Dec. since 1967. The need for more NCSs on DRN6 and Hawaiian liaison is expressed by K6GMI. VE6FS has gotten DRN7 started again and submitted the monthly report. Annual TEN certificates for 1973 were issued to W0s BV MA MOQ NEE ZHN, K0s AEM AZJ DDA MRL, WA0s FMD MLE OEX ROK RRA, VE4s PG RO, VE5GL. Finding weekend NCSs and CTN reps is a problem on DTEN. DTWN has moved to 3932.5 kHz at 2230Z.

Net	Sessions	Traffic	Avg	Rate	% Rep.
FAN	31	2455	79.2	1.545	98.4
CAN	31	1923	62.0	1.180	100.0
PAN	31	1879	60.6	1.187	99.5
CTN	28	883	31.5	.378	75.8
IRN	60	520	8.7	.336	82.7
DIRN	31	163	5.3	.288	75.1
2RN	78	725	9.3	.563	91.3
D2RN	31	191	6.1	.333	100.0
3RN	60	630	10.5	.477	91.1
D3RN	31	375	12.1	.536	100.0
4RN	54	862	16.0	.475	84.5
DRN4	12	76	6.3	.189	38.7
RN5	62	1689	27.2	.739	93.9
DRN5	29	247	8.5	.227	63.0
RN6	62	1178	19.0	.561	100.0
DRN6	31	401	13.0	.232	73.3
RN7	61	417	6.8	.412	60.4
DRN7	24	93	3.9	.325	43.3
8RN	61	615	10.1	.368	88.2
D8RN	29	212	7.3	.332	86.0
9RN	62	610	9.8	.426	93.9
TFN	62	843	13.6	.549	86.0
DTRN	31	193	6.3	.219	70.3
ECN	62	512	8.3	.414	93.0
TWN	58	564	9.7	.304	93.5
DTWN	21	43	2.1	.079	38.1
TCC Eastern	120 <sup>1</sup>	1076			
TCC Central	80 <sup>1</sup>	881			
TCC Pacific	123 <sup>1</sup>	1332			
Sections <sup>2</sup>	3603	18753	5.2		
Summary	4736	40341	8.5		
Record	4045	31705	28.5	2,059	

<sup>1</sup> TCC functions not counted as net sessions.  
<sup>2</sup> Section and local nets reporting (114): APSN (AB), MTN (MB), APN (Mar), CM GBN ODN OPN OON (ON), WO-VUHF (PQ), AENB AEND AENM AENR (AL), Snipers (AK), ATEN HARC (AZ), OZK (AER), IEN NCN NEN OrgCo40MAREC (CA), CUN (CO), CN CPN (CT), DEPN DTN (DE), FMTN FPTN GN NFPN QFN QFTN TPTN VEN (FL), GSBN GSN GTN (GA), IMN (ID, MT), LLN (LL), TLCN (IA), KPN KSBN QKS QKS-SS KWN (KS), KNTN KSN KTN KYN MKPN (KY), LAN LSN LTN (LA), SGN (ME), MDCIN MDD (MD-DC), EMN WMN WMPN (MA), MJN MSN MSPN PAW (MN), MNN MSBN MTN (MS), JC2AN MoAREC MoSSB MIN WEN (MO), MTN (MT), NJN

NJPN NJSN (NJ), NLI NLJPN NYS (NY), CN NCSSBN THEN VHF-TN (NC, SC), BMEN BN COAREC-10 OSSBN (OH), OLZ OPEN OPON OTWN SSZ STN (OK), BSN OreAREC OSN PAAREC (OR), FPAEP&TN PITN WPA (PA), RISN (RI), SDN (SD), TN TNN (TN), TEX TFX-SS TTN (TX), BUN UCN (UT), VN VSN (VA), NSN WSN (WA), WVN (WV), BEN (WI).

### Transcontinental Corps

TCC-E traffic down considerably from Dec. '72. W3EML has issued a TCC-E certificate to VE3SB. Oscar skeds included in TCC-C statistics. The success rate for TCC-P is running far behind a year ago, and it is at least partly because of poor conditions. W7UTM has earned a TCC-P certificate.

Area	Functions% Successful		Out-of-Net Traffic	
			Traffic	Traffic
Eastern	132	90.9	2871	1076
Central	96	83.3	1844	881
Pacific	145	84.8	2794	1332
Summary	373	86.6	7509	3289

The TCC roster (Dec.): Eastern Area (W3EML, Dir.) - W1s NJM OYY, W2s FR GKZ, WA2s AYC CXY ICU/4 UWA, WB2RKK, W3EML, K3s CB MVO, WA3OGM, W4s SQO UQ, K4KNP, WB4s OMG SGV, W8s PMJ VDA/4, K8KMQ, WA8PM VE3SB. Central Area (K0AEM, Dir.) - K1ONW/5, W4OGG, W5s GHP QU SBM TNT, WB5s DLW FDP FML, W7WAH/5, W9s CXY NXG, K9HDP, WA9EED, W0s HI LCX ZHN, K0DDA, WA0ROK. Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, W6s BGF EOT IPW ISK MLF RSY VNO VZT, WA6DFJ, WB6s AKR RKV, W7s HQ GHT KZ UTM, K7s NHL QFG, W0LQ, K00TH, WB0s AXW HCK.

### Independent Net Reports (December)

Net	Sessions	Traffic	Check-ins
Hit & Bounce	31	953	436
Clearing House	25	291	477
Northeast Traffic	31	329	230
75 Meter ISSB	31	470	1245
7290 Traffic	40	591	2150
IMRA	28	694	1187
Hit & Bounce Slow	19	92	145
Eastern Area Slow	25	45	122

### With the AREC

**Positions available:** Help wanted, male or female. Experience not required. Leadership capabilities and interest in promoting a service to the public helpful. Pay is self-rewarding, commensurate to effort expended. Should have desire to expand membership in a voluntary organization. For opportunities in your area, contact your Section Emergency Coordinator or SCM and ask for information on possible appointment as an Emergency Coordinator.

Yes, we need more ECs. Some sections have a full complement of ECs, one for each county or group of counties within the section. But many sections are not fully staffed with ECs. A few sections have no active ECs. In almost all cases, the capabilities of the local AREC group are directly proportional to the leadership provided by the EC. Where the EC is actively engaged in bettering his AREC organization, the group is strong; where the EC is merely a certificate holder, or non-existent, the AREC in that area is weak or non-existent.

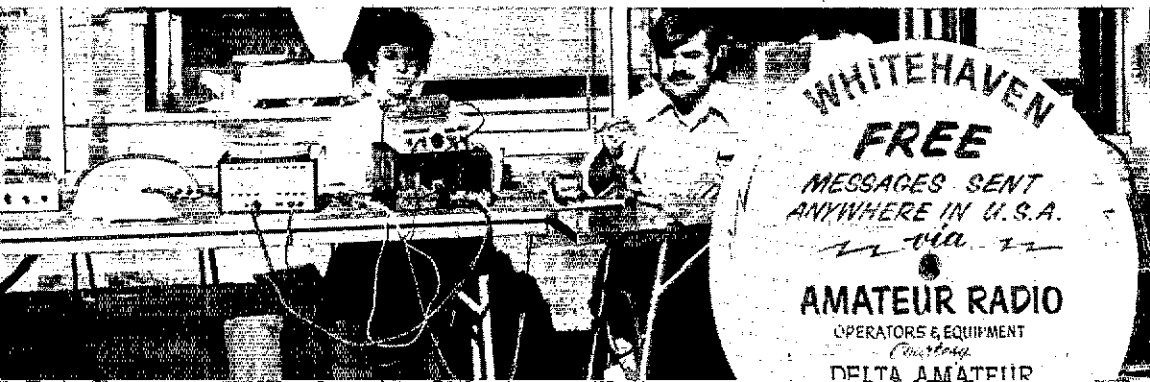
Our goal, of course, is for a strong AREC, capable of stepping in and performing an outstanding service for the public when the need arises. If you tried unsuccessfully to find local AREC activity in which to participate during the Simulated Emergency Test or have applied for AREC membership and never received an acknowledgement, it is likely that your area is without an active EC. Write to Hq. for a copy of the *Public Service Communications* manual (see Aids Available, elsewhere in this column), for background on AREC organization, then contact your SEC and SCM. We amateurs are responsible for providing emergency communications and we need responsible leaders.

As an annual feature in this part of the Public Service column, we call special attention to those sections whose SECs have reported every month during the past year. Although all SECs are expected to report monthly, less than half of our SECs shouldered the responsibility 12 times in 1973.

The lack of SEC reports does not necessarily mean that there is little AREC organization, but the active SEC who endeavors to promote the AREC in his section is usually the person who will fulfill the obligation to keep Hq. informed of his current AREC status.

During 1973, a total of 478 SEC reports were received from 55 different sections. That's only two more reports than received during the previous year and three more sections. Both 1972 and 1973 saw 29 sections whose SECs had a solid reporting record for the year. The number of sections void of any reports dropped slightly from 22 to 19 in 1973. The following sections had perfect SEC reporting records for 1973 (with numbers in parenthesis indicating number of consecutive years of continuous reporting): Alta (12), Ariz (5), Colo (8), Conn (4), ENY (2), EMass (8), Kans (1), Mar (7), Mich (5), Miss (1), Nebr (7), Nev (6), NFla (2), NTex (2), Ohio (5), Okla (2), Org (4), Oreg (1), SV (1), SDgo (3), Sask (9), SFla (22), Utah (6), Va

On December 1, the Delta ARC of Memphis, Tennessee, set up a message center in a shopping mall. Using the club call, W4BS, some 50 messages were taken and relayed across the country. WB4YCV is at the key, while WB4TWL is taking messages.





How do you get warmed up for a TCC schedule? Here's how K00TH keeps in shape. Jim is Colorado RM, Assistant TCC (Pacific) Director and QRS, and is a graduate student at the University of Colorado.

(3), Wash (3), WVa (3), WMass (1), WNY (2), WPa (4). Special mention goes to Ill which we reported last year as having been 4 years without a report now has a solid record since July. STex and Mo had been without reports for over a year and now have perfect records since February and April respectively. What can we say about SFla (formerly EFla)? Will any section ever match their showing?

No SEC reports were received from the following sections in 1973: Alsk, Ark, CZ, EPa, Haw, Me, Man, NH, NMex, NLI, NDak, Que, RI, SF, SNJ, VI, Wind, Wisc, Wyo.

■ Forty-four SEC reports listing 13,340 ARFC members were received in December, making it the best reporting month of the year. In December, 1972, 41 reports were received indicating 12,701 members. The lowest number of reports (34) was in June. Sections from which SEC reports were received in December: Alta, Ariz, BC, Colo, Conn, Del, EBay, ENY, EMass, Ill, Kans, Ky, Mar, MDC, Mich, Miss, Mo, Mont, Nehr, Nev, NC, NFla, NTex, Ohio, Okla, Ont, Org, Oreg, SV, SDgo, SJV, SCV, Sask, SDak, SFla, STex, Tenn, Utah, Va, Wash, WVa, WMass, WNY, WPa.

#### Public Service Diary

■ At 0100, Nov. 23, VE5UZ, who lives at remote Pinehouse Lake, SK, was awakened by a neighbor who said that a man had been run over by a tracked snow vehicle. After administering some first aid, VE5UZ tried unsuccessfully to get help by using government frequencies. He turned to his amateur rig and raised W5QQQ/7 in Tacoma, WA, who contacted VE7BXX, relaying the information to the Royal Canadian Mounted Police and arranging for a plane and doctor. VE5UZ was advised that the victim had already lost a dangerous amount of blood. VE7AOA had come on the frequency and phone-patched VE7CEX, a doctor, who directed how to stop the bleeding. The aircraft arrived at 0402 and flew the victim to a hospital in Saskatoon. Later check with the doctor indicated that the victim could not have survived until morning without the fly-in rescue. — (VE5-UZ)

■ During December, Harris Co. (TX) amateurs, operating through WR5AAA, made initial reports and summoned aid to 6 auto accidents, summoned one ambulance and reported two fires. Also, amateurs made first reports and summoned aid to three auto accidents using WR5ABX. — (WA5ABA, EC Harris Co.)

■ During a 40-meter contact on Dec. 11, W6BLC, WA6KLM and WA6HXJ heard a distress call from a sloop which had lost steering in heavy seas off Big Sur (CA). Contact by marine radio had proven unsuccessful for the sloop. W6BLC called the Coast Guard in Crescent City and the information was passed to the Coast Guard in San Francisco. Shortly, the sloop was enroute back to San Francisco escorted by the Coast Guard. The amateurs probably helped save the lives of the two passengers aboard. — (W6BLC)

■ At about 1400 on Dec. 13, WB4ZMH reported that a tornado had hit Gainesville, GA, then he contacted c.d. and they requested amateur assistance. WA4RNY left for the affected area immediately. A call for mobiles to go to Gainesville was put out on WR4AAE and the W4BOC repeater with about 10 amateurs responding. On arrival, they were given c.d. identification and asked to cruise areas of destruction reporting specific damages and places of human need so rescue crews could be dispatched. A portable beam was used to supply news to radio and TV stations in Atlanta. By 1800, the situation was under control and the amateurs shut down. — (W4BYG, SCM GA)

■ Notification of flooding in Alford, Egremont and Great Barrington, MA, was received by WA1MJE on the morning of Dec. 14. He offered assistance to the Chief of Police in Great Barrington and, with WA1HFB, relayed emergency road conditions, road closings, river conditions and police reports to commercial station WSBS for the local population. WA1s HFB MJE operated for an hour and a half and used 75 meters. — (WA1MJE)

■ When an ice storm on Dec. 17 caused the Red Cross to set up shelters for those without heat on central Long Island, NY, amateurs were asked to set up communications for two of the shelters where telephone service was intermittent or non-existent. The W2OQI repeater and simplex operation were used and portable stations were set up at two schools and at Red Cross Hq. in Patchogue, NY. Thirteen amateurs were involved. — (W2OQI, EC Brookhaven Area)

■ A heavy snow storm hit east-central Illinois on Dec. 19. W9HOH was traveling through Arcola and found most roads closed. Lodging was provided by W9SUV. The next day at 1300, W9HOH was directed by authorities to use U.S. Rt. 45, but found it blocked by drifted snow, which stranded about 60 motorists. Through W9SUV, he reported to police, then they began finding food and lodging for the trapped motorists. It was necessary to coordinate a series of truck trips, especially to transport a pregnant woman in nervous shock back to Arcola. By 2000, about 80 motorists had been taken by trucks to a church where arrangements were made for them to stay at private homes.

On the same day, W9SUV was called by W9QNE to assist a woman in a stalled car on I-57 near Humboldt who was suffering from shock. The woman was rescued by 1900. — (WB9KSF)



■ While on I-4 in Tampa, FL, on Dec. 24, K4YLE came across two auto accidents near each other. He reported to K4RMU who called police. — (WB4TUP, EC Hillsborough Co.)

■ On Dec. 25, KH6AX was called by W7YV who needed help in advising a man in Anchorage, AK, that his father was dying in a hospital in Las Vegas, NV. KH6AX called for an Alaskan station and was answered by KL7HSO. Her husband, KL7HOF, finally managed to reach the son by telephone and the information was phone-patched to him. — (KH6AX)

■ On Dec. 26, WA5BIK mobile-R2 contacted WA5FJN on the 7290 Traffic Net with a report that his vessel had lost one boiler and was steaming at slow speed. Static and propagation prevented him from using normal channels. His agent and the Coast Guard were notified within minutes of the initial contact. — (WA5ABA, EC Harris Co. TX)

■ Near Bloomington, IN, WB9DNB came across a jackknifed trailer truck on Jan. 3. WB9KBJ responded to his 2-meter fm simplex call and contacted police while WB9AKG and W9NZK contacted trucking company officials. — (WB9EAY)

■ At about 1600, on Jan. 11, K4YID called for mobile assistance on the Stone Mountain Repeater to locate a missing girl. Sixteen mobiles responded. Pictures were distributed and a search made of most likely locations in southeast Atlanta, GA. The effort resulted in positive identification and led to information as to her whereabouts. The girl was located and returned to her home. — (W4BYG)

■ While traveling to work on Jan. 14, WA6CPP saw a disabled school bus. He called K6JKQ on WR6ACV and help was dispatched forthwith. — (WA6CPP)

■ W4OYI was called by Kentucky State Police at 2200, Jan. 14, requesting search parties in northeast Daviess Co. for a missing hunter with a known heart condition. He called K4UDZ and WA4FMY to begin the call-up and dispatched

W4EWL and W4TOY to the Emergency Operations Center. W4EWL organized search parties, beginning at 2235, and the victim's body was found a few minutes later. — (W4OYI)

■ A power cable was damaged on Dec. 21, causing a black-out in Anchorage, Spenard and surrounding communities in Alaska. By direction of SCM KL7CUK, KL7FKO started a call-up of stations on the 2-meter net. Mobile units were dispatched to city and state police, fire stations, hospitals and others were roving reporters for further dispatch in case communications were needed. Agencies were advised that the units were operating under the AREC and would stand by in case the agencies' communications became inoperative or overloaded. An emergency generator at one of the hospitals caught fire and was immediately reported and a fire truck responded. In another case, mobile units linked two fire stations until regular communications were restored. — (KL7CUK, SCM AK)

■ *October Special Events.* The Oswego Co. AREC supplied communications for a walk-a-thon on Oct. 14-15. A base station was set up at walk headquarters and 9 mobiles were spaced along the 10-mile walk route. — (K2DUR, EC)

*November.* On Nov. 10, the Alamance Co., NC, AREC assisted in a bike marathon with two mobiles patrolling the route, reporting first aid information. In one case, a car load of men harassing girl cyclists was reported to police. — (WA4FFW, EC)

*December.* Members of the Tampa Bay (FL) Repeater Assn. provided 2-meter communications for a bike ride sponsored by the American Cancer Society on Dec. 15. Amateurs were at each checkpoint, in a bicycle repair truck, with a Red Cross van and the EC rode a radio-equipped bike. — (WB4TUP, EC) To enable handicapped children to visit with Santa, members of the Echo Repeater Assn. arranged for the children to speak to W5HTU (Acting Santa) on Dec. 19, at the Mississippi Hospital for Crippled Children in Jackson, MS. — (WA5FII, SEC MS)

QST

## Pulse Modulation *(Continued from page 46)*

### *Advantages of TDM-PCM*

The following gives advantages and consequently present and future uses for PCM. Please keep in mind that "radio" systems are only one area in which applications appear.

1) Digital signals can be regenerated more effectively by repeaters than can analog signals. This allows virtually undistorted transmission from start to finish.

2) Equipment which handles digital data, including computers, can now effectively process analog data after initial conversion. Communication systems can now have only one type of interface — digital. This cuts cost, because no conversions to analog are needed along the way.

3) A pair of wires can support more than one conversation.

4) Lower costs in producing digital circuits.

5) Waveguides (optical and otherwise) appear to handle digital data with greater efficiency.

6) Advantages in space communications. Signals below noise levels can be detected.

### *Summary and Conclusion*

The idea of modulation has been clarified by considering the multiplication of any two frequencies. The relationship of modulation to sampling has been shown. Different forms of pulse modulation were observed and the reason for coding was explained. A comparison between frequency and time multiplexing was examined. Advantages of PCM were mentioned. There was no attempt to discuss specifics, as the object was to avoid a mathematical treatise. New methods of PCM were not discussed.

One may forecast that PCM will be a byword of future generation communication specialists, and this should include hams. PCM-TDM cannot help but dominate the communications field because it is a good idea, it has been done, and it will be very economical. Now it is up to us to take advantage of the situation and help advance the state of technology.

QST

# Happenings of the Month

- Board Meeting Minutes
- New Vice Presidents
- Repeater Rules Eased
- Alaska Emergency Proposed

## BOARD MEETING HIGHLIGHTS

Raids on amateur frequencies — current and potential — topped the agenda of the 1974 ARRL Board of Directors Meeting, held at the Holiday Inn, Hartford, on January 17-18. The proposals for a Class E Citizens Radio Service on 224-225 MHz and for Emergency Medical Service paging on 449.8-450 MHz, Dockets 19759 and 19880, were specifically mentioned in Minute 56. But long-term strategy was thoroughly discussed as part of "the extensive oral reports of the officers." One manifestation of the Board's concern in this area is the opening of a Washington facility for exchange of information (Minute 28); another is establishment of a periodic bulletin for government personnel and the news media (19). The directors supported (64) the participation of amateurs in the Alaskan Common Emergency Frequency (4383.8 kHz), Docket 19909. Minute 36 expresses the appreciation of the Board for FCC's easing of repeater application procedures, but 70 pushes for revision and relaxation of repeater rules. And a move toward liberalization of mobile signing was made at paragraph 47.

Turning now to League internal affairs, the Board reelected Harry J. Dannels, W2TUK, by acclamation to a second term as ARRL president. Then Victor C. Clark, W4KFC, was elected First Vice President; Noel B. Eaton, VE3CJ and Carl L.

Smith, W0BWI, as vice presidents; and W0BUO, WSQKF, W5NW, W1BDI and W0DX as honorary vice presidents. John Huntoon, W1RW, and David H. Houghton were reelected as secretary and treasurer, respectively. Max Arnold, W4WHN, and Roy L. Albright, W5EYB were newly elected to the Executive Committee; John R. Griggs, W6KW, and Robert B. Thurston, W7PGY, were reelected. Vice President Eaton was also nominated to be president of the International Amateur Radio Union (Minute 17) in accordance with its constitution. A first full Board of Directors was named for the ARRL Foundation, Inc. — W0BB, W1QV, W6KG, W8ETU, W6ZRJ, W4DQD, WA4GFY, W0PAN and W1MBK — and \$15,000 advanced from regular League accounts as initial working funds. Rules and regulations for affiliated societies were broadened (23), now welcoming national and regional associations and federations as well as local clubs and giving youth-group radio clubs the same easier affiliation requirements as school groups. Appointments of divisional public-relations assistants were approved and postage funds of \$150 per division were allocated. A move to amend Article 11 was defeated; the majority feeling was that a court decision already had given the same interpretation to the words of the article, so the amendment was unnecessary. A close vote calls for the second meeting of 1976 to be held at Denver, in connection with the 1976 National Convention

The Board, seated from left: W0BUO, W6KW, W4KFC, W3PS, W2TUK, W5QKF, W1QV, VE3CJ, W7PGY. Second row: W3SW, W9HPG, W6ZRJ, Treasurer Houghton, W1CER, W1RW, W4DQD, W4ACY, W1HHR, W5EYB, VE2MS, K2SJO, W21HA, W8ETU, W0PAN, W1RU, W3KT. Top row: PR Consultant Waters, W0SIN, W0BWI, W0FZO, W0FIR, W1BDI, W8IMI, W1NJM, WB4ANX, W4WHN, W1UED, W9PRN. (Full names and titles are in the first paragraph of the Board Minutes).



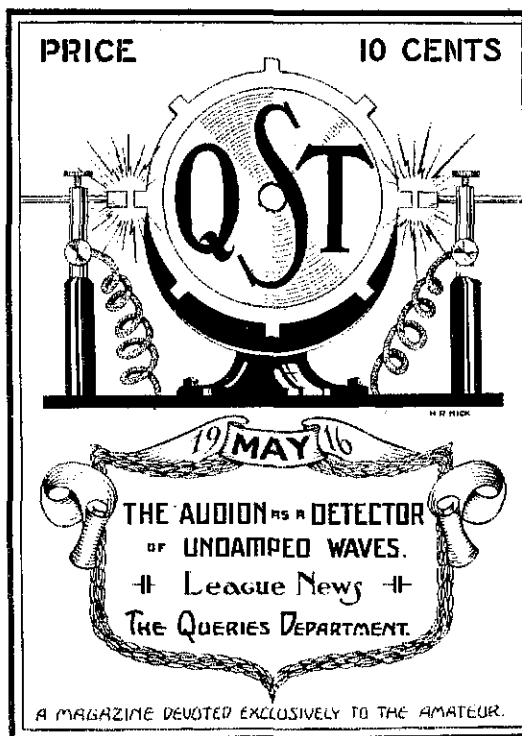
Harry R. Hick, ex-1ESS, who started working part-time for *QST* with this cover in 1916, and has continued lettering, drafting and drawing for the League ever since, died January 17, 1974 at the age of 80. A resolution of the Board of Directors (which was in session when the news came) appears at Minute 34.

the third weekend in July; such decisions require balancing fraternal advantages against practical disadvantages — transportation of records and reports, for example.

On the membership/fraternal side of things, the Board conferred the ARRL Technical Merit Award for 1973 on Larry Kayser, VE3QB, for his work in developing "Smart," the automated control system which has immeasurably extended the useful life of the Oscar 6 space satellite. The Radio Amateur Satellite Corporation, Amsat, was reimbursed for 1973 administrative expenses and mechanism established to review 1974 expenditures. A National Convention was approved for 1977 in the Toronto area, with further details to come later. A new pin will be provided at modest cost for DXCC members, with provision for updating their countries total. *QST* will have additional constructional and technical articles when space permits, and continue to use quality papers despite the shortages. The Board dedicated silence at the start of its meeting to the late Alban A. Michel, W8WC, director from the Great Lakes Division. There was also a motion of condolence for Harry Hick, ex-1ESS, *QST* draftsman/artist since 1916. Commendations were offered to the Intruder Watch, and to the retiring vice presidents, Charles G. Compton, W0BUO, R. O. Best, W5QKF and Robert W. Denniston, W0DX. Studies by committees were ordered concerning the sister cities program; Novice privileges for Technicians; the ARRL field organization in the territories and possessions; emergency communications literature, uses of the League logo; a membership amateur radio reference library; the ARRL QSL Bureau; repeater frequencies in the six-meter band; guidelines for League elections; Rule 9 of DXCC and a periodic listing of 6-Band Winners; and the possibility of establishing an executive vice presidency in lieu of the general manager office. The full minutes appear elsewhere in this department.

### REPEATER APPLICATIONS EASED

Life for repeater licensees has been simplified, and processing time for applications hopefully reduced, by an action of the Federal Communications Commission on January 10. It deletes from application requirements the need to furnish height above average terrain (HAAT) and effective radiated power (erp). This information now will be filed as part of the repeater station log. Thus, changes in antenna configuration or power can be put into effect at will, without a wait of several months for approval from FCC. Additionally, the



words, "as installed," relative to antenna patterns have been eliminated, as has the word, "automatic" with respect to shutdown in case of malfunction.

These changes came as a result of FCC experience with application processing and at the urging of the League, its VHF Repeater Advisory Committee, regional repeater associations, local clubs and individual licensees. Incidentally, Motion 36 of the Annual ARRL Board meeting expresses the appreciation of the League for the changes; but Minute 70 urges continued efforts for further revision and relaxation of repeater rules.

The new rules became effective on January 23, 1974. The texts of the Order and the rule changes follow:

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of

Amendment of Part 97  
regarding the showings  
required with applica-  
tions for repeater  
stations.

### ORDER

By the Commission: Commissioner Hooks absent.

Adopted: January 10, 1974

Released: January 11, 1974

1) The purpose of this Order is to amend the rules for the Amateur Radio Service to change the requirement that certain technical data related to a repeater station be filed with the application for that station. The data now only need be entered in the station log. It will no longer be necessary to include the data with the repeater station application.



The team: Vice President Carl L. Smith, W0BWJ; President Harry J. Dannals, W2TUK; First Vice President Victor C. Clark, W4KFC and Vice President Noel B. Eaton, VE3CJ, who is also nominee for IARU president.

licensing those applications already on file, and as a result of these amendments, we should have the backlog eliminated in a matter of weeks.

Any station involving remote control or an auxiliary link will still be required to make the showings for applications and modifications required by the remaining paragraphs of Section 97.41.

6) Authority for these amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended. The prior notice and effective date provisions of the Administrative Procedure Act (5 U.S.C. 553) do not apply since the amendments are procedural in nature and relieve previously imposed restrictions and requirements, and since early adoption will simplify application filing requirements. Application processing and the issuance of licenses will be accelerated, thus allowing the Commission to eliminate its substantial backlog in this area.

7) IT IS ORDERED, that effective January 23, 1974, Part 97 of the Rules and Regulations are amended as set forth in the Appendix hereto.

FEDERAL COMMUNICATIONS COMMISSION  
Vincent J. Mullins  
Secretary

NOTE: Rules changes herein will be covered by T.S. VI (72)-4.

### Changes and Additions

Part 97 of the Commission's Rules is amended as follows:

1. 97.41(f) and footnotes 1 and 2 are deleted and part (f) is designated [Reserved].

2. In 97.108, paragraph 97.108(a)(4) is revised as follows:

97.108 *Operation of a remotely controlled station.*

a) . . .

4) Provisions must be incorporated to limit transmission to a period of no more than 3 minutes in the event of a malfunction in the control link.

3. Section 97.111(c) is amended and part (f) & footnotes 1 and 2 are added as follows:

97.111 *Operation of a repeater station.*

c) A repeater station may be concurrently operated on more than one frequency band. Crossband operation of repeater stations is prohibited, i.e. both input (receiving) and output (transmitting) frequencies for a particular repeated transmission must be within the same frequency band. Operation on more than one output frequency on a single frequency band is prohibited except when specifically approved by the Commission. Repeater stations authorized to operate in conjunction with one or more auxiliary link stations may utilize an input frequency in a different frequency band provided the input frequency of the auxiliary link station(s) is in the same frequency band as the output frequency of the repeater station.

f) When in operation, the log of a repeater station must also show the following information for each frequency band in use.

2) It is evident to us, from the experience gained in processing almost 500 applications for amateur repeater stations, amateurs have developed the knowledge and capability to properly determine the parameters of antenna height above average terrain and effective radiated power, in accordance with our rules. Therefore, data on these parameters are changed from application requirements in Section 97.41(f), to logging requirements in Section 97.111 (f). This revised procedure will benefit applicants, since they will no longer need to include data with their applications. It will also benefit repeater station licensees, since they must no longer submit proposed changes to the Commission, before making modifications to their stations which would change these parameters. It will benefit the Commission, since it will not be necessary for us to review and approve data. Therefore, these amendments offer mutual benefits to amateurs and to the Commission.

3) In Section 97.108(a)(4), the word "automatically" is deleted from the requirement for provisions to limit the transmissions from a remotely controlled station in the event of a malfunction in the control link. The purpose of the requirement is to have a backup method of terminating transmission. It is immaterial whether the method is automatic or manual, and many systems have been licensed that use backup shut-down methods that are more manual than they are automatic.

4) The words "as installed," which were contained in the deleted Section 97.41(f)(6), are not included in the new counterpart Section 97.111(f)(7). We have learned from our processing experience, it is overly difficult for most amateurs to determine radiation patterns of an antenna as installed. We feel this requirement can be deleted without seriously compromising the overall results.<sup>1</sup>

5) The net effect of these amendments will be a reduction in the initial showings required for all repeater station applications, and the elimination of showings with applications for repeater stations not proposed for remote control or involving auxiliary link stations. Licensees will now be able to make modifications to their repeater stations, except for changes involving remote control or link aspects, without the need for prior Commission approval. Our processing is making headway

<sup>1</sup> Also deleted is the requirement that contour gradations on topographic maps only be 50 feet.

1) Location of the station transmitting antenna, marked upon a topographic map having a scale of 1:250,000, and contour intervals.<sup>1</sup>

2) The transmitting antenna height above average terrain.<sup>2</sup>

3) The effective radiated power in the horizontal plane for the main lobe of the antenna pattern, calculated for maximum transmitter output power.

4) The transmitter output power.

5) The loss in the transmission line between the transmitter and the antenna, expressed in decibels.

6) The relative gain in the horizontal plane of the transmitting antenna.

7) The horizontal and vertical radiation patterns of the transmitting antenna, with reference to true north (for horizontal pattern only), expressed as relative field strength (voltage) or in decibels, drawn upon polar coordinate graph paper, and method of determining the patterns.

<sup>1</sup>Indexes and ordering information for suitable maps are available from U.S. Geological Survey, Washington, DC 20242, or Federal Center, Denver, Colorado 80225.

<sup>2</sup>See Appendix 5.

#### W4KFC, VE3CJ, W0BJ VICE PRESIDENTS

At the Annual Meeting of the ARRL Board of Directors held January 17-18, 1974, Victor C. Clark, W4KFC, was unanimously elected First Vice President; the incumbent, Charles G. Compton, W0BUO, declined the nomination, feeling his background and skills might be more effectively used in activities of the new ARRL Foundation. Vic is 56, lives in Clifton, Virginia, and has just retired as laboratory director, U.S. Coast Guard Electronics Engineering Laboratory. He has been director from the Roanoke Division since 1967 and a member of the Executive Committee since 1969 (on which he continues, *ex officio*). Other leadership activities: Board liaison to the ARRL Contest Advisory Committee since 1968; SCM Arizona, 1938-1939 and Virginia, 1950-1952; past president, Potomac Valley Radio Club; past radio officer, Northern Virginia RACES; ORS, AREC, A-1 Operator Club. He is a Charter Life Member of ARRL and has been licensed since 1933.

Noel B. Eaton, VE3CJ, of Waterdown, Ontario, who is 64 and retired, has been elected a vice president, again unanimously, when Robert W. Denniston, W0DX, declined to run for reelection, because of the pressure of personal affairs. Noel was vice director from the Canadian Division from January 1 to May 13, 1960, advancing to director upon the election of the late Alex Reid, VE2BE, to a vice presidency. He has served on the Executive Committee of the League since 1962 and as Treasurer of Region II IARU since that division was constituted in 1964. VE3CJ is a past president of the Hamilton Amateur Radio Club and of the Ontario Amateur Radio Association (now the Radio Society of Ontario). Licensed since 1937, Noel is also a Charter Life Member of ARRL.

The third vice presidency went to Carl L. Smith, W0BJ, who edged out Robert York Chapman, W1QV, 9 votes to 7. Carl is 55, lives in Denver, Colorado, and is an airline captain with

Western. W0BJ was vice director, Rocky Mountain Division, 1957-1958, director 1961-1970, vice president-ARRL, 1970-1972 and honorary vice president-ARRL, 1972-1974. He was SCM of Colorado from 1959 to 1961, is a past president of the Denver Radio Club, and served on the ARRL Executive Committee from 1966 to 1969. He is also a Charter Life Member of ARRL.

Charles G. Compton, W0BUO; Roemer O. Best, WSQKF; Wayland M. Groves, W5NW; F. E. Handy, W1BDI and Robert W. Denniston, W0DX, were elected as honorary vice presidents. President Harry J. Dannals, W2TUK; Secretary John Huntoon, W1RW; and Treasurer David H. Houghton all were unanimously reelected. All will hold office through the Annual Meeting of 1976.

#### W4ACY, VE2MS NEW DIRECTORS

Filling the Roanoke director vacancy caused by Vic Clark's election as First Vice President and subsequent resignation as director is L. Phil Wicker, W4ACY, 65, president, Standard Theatre Supply Company of Greensboro, North Carolina. Phil has been vice director from the Roanoke Division since 1967 and assistant director, 1953-1966; past president, Greensboro Radio Club; radio officer, Greensboro RACES, EC, PAM, OPS, OVS, and AREC. He is a Charter Life Member of ARRL and has been licensed since 1930.

Similarly, A. George Spencer, VE2MS, has assumed the post of director from the Canadian Division. George lives in Beaconsfield, is 52 years old, and is engineering manager of Bechtel and Company, Montreal, engaged in design of large industrial plants. VE2MS has been vice director of the division since 1970 and is past president of Niagara Peninsula Amateur Radio Club; Buncombe County (North Carolina) Amateur Radio Club; and the Montreal Amateur Radio Club. He's been licensed since 1948.

#### MORE TIME GRANTED FOR SPACE STUDY

Last month in this department we presented the ARRL request for more time for comment in Docket 19852, FCC's Inquiry into suggestions for rules governing the Amateur-satellite Service.

On January 4, FCC released an Order extending the time for comment until April 8, 1974, in place of the original date, January 7. An original and 14 copies of comments is called for; the address is simply FCC, Washington, DC 20554.

#### COMMON EMERGENCY FREQUENCY, ALASKA

The Federal Communications Commission has issued a Notice of Proposed Rulemaking, Docket 19909, looking toward the establishment of 4383.8 kHz as a common emergency frequency for Alaska. Stations in the amateur, fixed and mobile services (regulated by Parts 81, 83, 87, 89, 91, 93 and 97 of the FCC rules) could intercommunicate for emergency traffic, using single sideband (emission 2.8A3J) with peak envelope power of 150 watts. The proposal originated with the State of Alaska Department of Public Works, and

originally was to include the Citizens Radio Service. On this point, however the Commission said:

"Also, it is believed that the question of whether the system proves workable would depend largely upon the degree of cooperation and discipline on the part of all of the participants, both Government and non-Government. Because of the past history of operating rule violations in the Citizens Radio Service, their inclusion could jeopardize the success of the emergency network . . . Because of the proficiency of the Amateur Radio Service in effectively employing high frequency equipment to provide valuable emergency communications over the years, it is proposed to permit this Service to participate in the use of the common emergency frequency in Alaska . . ."

Deadline for comment was February 4 and reply comment February 22. A League filing in support of the proposal was authorized by Minute 64 of the January ARRL Board Meeting.

### KØTVO JOINS REPEATER ADVISORY COMMITTEE

ARRL President Harry J. Dannals, W2TJK, has appointed D. J. Manson, KØTVO to the ARRL VHF Repeater Advisory Committee for a two-year term which began on January 1. Don lives in Columbia, Missouri, where he is trustee of WAØVWP. He serves the Missouri Repeater Council as chairman and state frequency coordinator and is emergency coordinator for Boone County. KØTVO has been licensed for twelve years, currently as Advanced Class. The holder of a PhD in physics, Don is Associate Professor of Radiology and Electrical Engineering at the University of Missouri.

### TWO LICENSES: ONE PAPER

Occasionally some confusion is caused by the fact that an FCC amateur operator license and primary amateur station license appear on the same form. A secondary amateur license, on the other hand, is alone on its form, and does not contain any information about operator privileges. One of the members asked the Gettysburg processing office a question on the subject, and received an answer which did not tally with earlier information from the Commission. We asked for clarification from Washington; the answer may prove helpful to all amateurs:

Thank you for bringing the matter contained in your letter of October 31, to our attention. You are correct in your interpretation of the rules.

A better reply [from the FCC office] would have been:

Section 97.83 requires an amateur radio operator to have his original operator license in his personal possession while he is the control operator of any amateur radio station. Since Section 97.40(b) requires every amateur radio operator to have a primary amateur radio station license, the operator license and primary station license are combined on the one instrument of authorization. Operator privileges cannot be authorized on an additional station license, only a primary station license. Therefore, when an amateur is the control operator of his secondary station, he must have his original operator license, which also happens to authorize his primary station, in his personal possession. In addition, he must have the original, or a photocopy, of his secondary station license posted in compliance with Section 97.85, or in his personal possession.

Possibly you could remind your members to refrain from directing inquiries on rules and policy to our Gettysburg Processing Section. First, they should consult the rules (which are quite specific in this particular case), and if they still need an answer, to contact this office. Not only will we be able to better respond, but it also gives us additional insight on the types of questions our licensees have.

Sincerely yours,

A. Prose Walker  
Chief, Amateur and Citizens  
Division

### TRAFFIC INTERPRETATION FROM FCC

The controversial decisions on third party traffic handed down by the Federal Communications Commission in Docket 19245, the "Eyebank Matter," have been further interpreted in a letter authorized by the Commissioners on November 28, 1973. The letter replied to one from the trustee of a club station interested in handling international message traffic for a missionary organization. The club had requested a waiver of section 97.114 (which limits third-party traffic) and a declaratory ruling that the missionaries' messages could legally be sent and received by amateur radio.

The Commission letter offers insights into current thinking and thus may be of interest to other amateurs faced with decisions on what is acceptable traffic:

You request exemption from the Amateur Radio Service rules which prohibit the use of an Amateur Radio Service station for business purposes. The rules in question, 97.112 and 97.114, prohibit the use of an amateur station for the transmission of messages for hire or for communication for material compensation. Further, the rules prohibit third party traffic involving a material compensation to any party or to facilitate the regular business or commercial affairs of any party.

Under these rules personal and emergency third-party communications are permitted. In ad-



New  
Canadian  
Director  
A. George  
Spencer,  
VE2MS.

At the 1923 ARRL National Convention in Chicago, ARRL Traffic (Communications) Manager Fred Schnell, then 1MO, met with Leon Deloy, 8AB of France, to schedule tests in what became the first short-wave transatlantic amateur communication. It was the revolutionary breakthrough which opened short-waves to general communications use. Fifty years later, now W4CF, Fred Schnell sends the message which follows:

To the many amateurs of France, Belgium, Germany and Bulgaria, who so kindly sent to me such warm messages of congratulation on the 50th anniversary of the first Transatlantic QSO, my sincere thanks. They made me feel very happy, proud and humble. I only wish Leon Deloy could have been here to share in the memories brought about by this historic event, and that I again could have said to him "OH BOY - F.B." May each of you in some way become involved in making history in the future of amateur radio. This, I assure you, would be most rewarding. Many of you have asked for QSL cards, but due to illness since June of 1969, I have not been able to operate my station, W4CF, and I do not have any cards. Sorry. Again my sincere thanks and 73 to each of you.



dition, third-party traffic on behalf of an organization is permitted to the extent it does not involve the regular business or commercial affairs of the organization, or during emergencies. Organizational third-party traffic involving regular business or commercial affairs is, however, prohibited. Under these rules an organization like the Red Cross is allowed to use amateur radio to coordinate disaster activities but not for its day-to-day functions.

The rules adopted in Docket 19245 were written, among other reasons, so as to preclude non-amateur communications and organizations from encroaching upon the amateur radio frequency spectrum, and legitimate purposes of the Amateur Service. In adopting these rules, it was the Commission's belief that amateur radio should not become a quasi-business type radio service. Such activities would be outside of the scope and purpose of the Amateur Service. (See 97.1).

The Amateur Service was never intended to take the place of a two-way business radio communication service or a common carrier operation. Simply because a non-amateur organization finds amateur stations convenient with which to meet its regular non-emergency communications needs cannot justify the use of amateur frequencies. While the Commission encourages amateur operators to handle and develop a message handling capability, it would not be consistent with the purposes of the Amateur Radio Service to permit an amateur station to operate what amounts to a communications service for a third-party entity — notwithstanding the fact that the entity may be highly meritorious.

The rules you question were not directed to any particular group, charitable or other, or individual. While they do prohibit some of your proposed activities, except as set forth below, they also apply to all third parties, including amateur repeater organizations, amateur club stations, and

phone patch type operations, all of which are subject to the temptation to transmit non-emergency commercial and business messages.

We find that you have not shown that you are in any different circumstances than any other group which desires to transmit business-related communications using amateur stations. Other charitable groups have apparently been able to function effectively within the limits imposed by the Amateur Radio Service Rules. In fact, we note that the rules adopted in Docket 19245, the primary subject of your waiver request, liberalized the types of permissible organizational third-party traffic, primarily for the benefit of eleemosynary groups. Moreover, we also take note that you admit, and the logs of your amateur station clearly show, that you ignore the International Telecommunications Union Radio Regulation's requirement that third-party traffic be carried only between countries assenting thereto. Even if we granted your waiver request, it appears that you would still not have achieved adequate relief. Attached to this letter is a list of countries which permit third-party traffic with the United States.

The material submitted with your waiver request tends to indicate a misunderstanding of our rules. These rules prohibit communications, the purpose of which is to facilitate your organization's routine business activities. Personal messages as well as emergency communications are permitted. We take particular note that your construction and interpretation of the definition of emergency communications are apparently narrower than the Commission's. For instance, we would consider that messages to save eyesight, or a limb, or to aid persons subject to severe disasters, e.g., the Nicaraguan earthquake, would come within the present definition of emergency communications. The use of amateur radio stations to facilitate related activities, although not an integral part of the emergency itself, would also

come within the scope of an emergency communication. An example of this would be the ordering of a part needed to repair a vehicle so that an injured person could be moved to medical aid.

We believe amateur operators are fully capable of determining whether, given a specific set of circumstances, a message is an emergency communication as opposed to being for the conduct of the regular business affairs of a third party. However, the Commission recognizes that rule making may be needed in the future if amateur have difficulty applying the rules and conducting a reasonable amount of self-enforcement on the use of amateur stations on behalf of non-amateur organizations.

Accordingly, your waiver request is hereby denied.

BY DIRECTION OF THE COMMISSION  
Vincent J. Mullins  
Secretary

### GUNTHER PRESIDENT OF QCWA

Frank A. Gunther, W2ALS, has been installed as president of the Quarter Century Wireless Association, receiving the gavel from its immediate past president, Senator Barry M. Goldwater, K7UGA. Frank is the retired president of Radio Engineering Laboratories; retired executive vice president of Dynamics Corporation of America; past president, Armed Forces Communications and Electronics Association; and a Life Fellow, IEEE. Other officers of the national QCWA are W6ATC, vice president; K4IDC, treasurer; W1DJ, secretary; W4YK, W0HG, W8KW, W4QR and W2KW, directors. Information on QCWA, an international organization of amateurs who have been in the hobby for 25 years or more, can be obtained from the executive secretary, Gus Girona, W2JE, 1417 Stonybrook Avenue, Mamaroneck, NY 10543.

### NEW VO BUREAU MANAGERS

William Coffen, VO1KM, of St. John's, has been named QSL Bureau Manager for VO1, replacing the late Ernest Ash, VO1AA. The bureau address continues as Box 6, St. John's.

Handling cards for VO2s now is Stan L. Parsons, VO2AS, stationed by the Royal Canadian Mounted Police at Goose Bay, Labrador. Box 232 will continue as the Bureau address.

### AUGUSTUS M. WILSON, WINPG

It is with considerable regret that we report the death of Augustus "Gus" Wilson, WINPG, an important member of The ARRL Hq. technical staff. He passed away on January 19 after a short illness. Gus joined the Hq. staff in 1964, at which time he served as a laboratory technician. Later, he transferred to W1AW, where he served as one of the station operators. He rejoined the technical department in 1967, and became laboratory manager, the position he filled until his death. Many of the unique and interesting construction projects carried in *QST* and other League publications were designed and built by Gus. There is scarcely a recent issue of *QST* in which his handiwork is not exhibited. Many of you will remember Gus as a friendly tour guide who conducted visitors through the Hq. building and W1AW. WINPG will be deeply missed by the Hq. employees, as well as by his many amateur radio friends. Gus was 62 years old at his passing, and lived in Wethersfield, Connecticut.

### ERNEST ASH, VO1AA

We're sorry to report the death last November of Ernest Ash, VO1AA, QSL manager for Newfoundland for some 25 years. Ernie was founder and first president of the St. John's Radio Club in 1921. His first license came in 1923 - 8AA, followed by 8EA, 8ERN, VO8A, VO1A and, finally, VO1AA. He was a member of the Society of Newfoundland Radio Amateurs from its beginnings, and rarely missed a meeting. (Incidentally, SONRA is seeking issuance of VO1AA to the club as a memorial to Ernie). Our sympathies to his wife Mary.

### FCC Examination Schedule

For the convenience of those planning to take an FCC examination for General, Advanced, or Extra Class license, we present a tentative schedule of dates and places. (Applicants for Novice, Technician, or Conditional Class licenses should follow procedures outlined in Chapter 5 of the *Radio Amateur's License Manual*.)

The ARRL Foundation Inc. gets its Board of Directors - the "inside" crew posed here: W6ZRJ, W8ETU, W1QV, W4DQD, W0PAN. Not shown are the "public" directors: W1MBK, WA4GFY, W6KG and W0BB. Donations, memorials and bequests are now in order and can be addressed to ARRL/ Foundation, Inc., Newington, Connecticut 06111.





These schedules change from time to time, and thus it would be advisable to verify the examination times by phone before visiting an FCC office. Of course, no tests are administered on national holidays. Additional examination points are listed after the office schedule in most districts; at such places, appointments should be made during the month previous through the district engineer. He will probably ask that the completed form 610 and check or money order for \$9 be filed in advance. An applicant may appear at any FCC examination point regardless of where he lives. Recent changes are in bold face.

1 Boston, Mass. 02109; India & State Streets; Tues.-Wed. 9-11 A.M. Exams with code test, Wed. only, 9 A.M. Also conducts examinations at Bangor, Me. in May and Nov.; Hartford, Conn. in April and Oct.; Portland, Me. in April and Oct.

2 New York, N.Y. 10014; 641 Washington Street; Tues.-Thurs., 9-noon. Also conducts examinations at Albany, N.Y. in Mar., June, Sept., and Dec.

3 Philadelphia, Penn. 19106; 2nd & Chestnut Streets; without code test, Mon.-Wed., 10-12 A.M.; with code test Tues.-Wed., 8-9 A.M.

4 Baltimore, Md. 21201; 819 Geo. M. Fallon Federal Bldg., 31 Hopkins Plaza; Mon., 8:30 A.M.

5 Norfolk, Va. 23502; Military Circle, 870 North Military Highway; Thurs., 9 A.M. Also conducts examinations at Salem, Va. in Apr. & Oct.; Wilmington, N.C. in June & Dec.; Winston-Salem, N.C. in Feb., May Aug., and Nov.

6 Atlanta, Ga. 30303; 1602 Gas Light Tower, 235 Peachtree Street, N.E.; Tues. and Fri. 8 A.M. to noon; exams with code test, Fri. only, 8-9 A.M. Also conducts examinations at Columbia, S.C., May and Nov. Nashville, Tenn. in Feb., May, Aug., and Nov.; Memphis, Tenn. in Jan., Apr., July, and Oct.; Knoxville, Tenn. in Mar., June, Sept., and Dec.; Birmingham, Ala. in Mar., June, Sept., and Dec.

6S Savannah, Ga. 31402; York & Bull St., P.O. Box 8004, by appointment one week in advance only.

7 Miami, Fla. 33130; 51 S. W. First Avenue. Exams with code test, Thurs. 9 A.M.; others, Tues., Wed., 8 A.M. - 1 P.M. Also conducts examinations at Jacksonville, Fla. in Apr. and Oct.

7T Tampa, Fla. 33606; 500 Zack Street; by appointment made one week in advance only.

8 New Orleans, La. 70130; 600 South Street; with code, Tues., 8:30 A.M., others, Tues.-Wed., 8:30-noon. Also conducts examinations at Jackson, Miss. in June and Dec.; Little Rock, Ark. in Feb., May, Aug., and Nov.

8M Mobile, Ala. 36602; 113 St. Joseph Street; call Monday for appointment.

9 Houston, Texas 77002; 515 Rusk Avenue; without code, Fri. 9 A.M. to noon; with code, Thurs., 8:30-9:30 A.M. Also conducts examinations at San Antonio, Texas in Feb., May, Aug., and Nov.; at Corpus Christi, Texas in June, and Dec.

9B Beaumont, Texas- 77701; 300 Willow Street; by appointment one week in advance only.

10 Dallas, Texas 75202; Rm 13E7, Federal Bldg., 1100 Commerce St., Tues 8-noon. Also conducts examinations at El Paso, Texas in Feb., June and Dec.; Lubbock, Texas in March and Sept. Oklahoma City in Jan., Apr., July, and Oct.; Tulsa in Feb., May, Aug. and Nov.

11 Los Angeles, Calif. 90012; Rm 1754; 312 N. Spring St.; Wed. 9A.M. and 1 P.M. Also conducts examinations at Bakersfield, Calif. in May; Las Vegas, Nev. in Jan. and July; Phoenix, Ariz. in Jan., Apr., July, and Oct.; Tucson, Ariz. in Apr. and Oct.

11SD San Diego, Calif. 92102; 1245 Seventh Avenue; by appointment one week in advance

only.

12 San Francisco, Calif. 94111; 555 Battery Street; Fri., Extra 8:30 A.M.; General and Advanced 10 A.M. Also conducts examinations at Fresno, Calif. in Mar., June, Sept., and Dec.; Reno, Nev. in Apr and Oct.

13 Portland, Ore. 97204; 319 S. W. Pine St.; Fri. 8:45 A.M. Also conducts examinations at Boise, Idaho in Apr. and Oct.; Klamath Falls, Ore. in May.

14 Seattle, Wash. 98104; 909 1st Avenue; Fri. 8:45 A.M. Also conducts examinations at Billings, Mont. in Apr.; Helena, Mont. in Apr. and Oct.; Spokane, Wash. in Apr. and Oct.

15 Denver Colo. 80202; 19th Street between California and Stout Streets; 1st and 2nd Wed. 8 A.M. Also conducts examinations at Albuquerque, N. Mex. in Apr. and Oct.; Rapid City, S. Dak. in May; Salt Lake City, Utah in Mar., June, Sept., and Dec.

16 St. Paul, Minn. 55101; 4th and Robert Streets; Fri., 8:45 A. M. Also conducts examinations at Jamestown, N. Dak. in Oct.; Marquette, Mich. in May; Sioux Falls, S. Dak. in Mar., June, Sept., and Dec.

17 Kansas City, Mo. 64106; 601 E. 12th St.; Thurs., 1 P.M. Also conducts examinations at Des Moines, Iowa in Mar., June, Sept., and Dec.; Omaha, Nebr. in Jan., Apr., July, and Oct.; St. Louis, Mo. in Feb., May, Aug., and Nov.; Wichita, Kans. in Mar. and Sept.

18 Chicago, Ill. 60604; 219 South Dearborn Street; Fri., 9 A.M. Also conducts examinations at Davenport, Iowa in Jan., Apr., July, and Oct.; Fort Wayne, Ind. in Feb., May, Aug., and Nov.; Indianapolis, Ind. in Feb., May, Aug., and Nov.; Louisville, Ky. in March, June, Sept. and Dec.; Milwaukee, Wisc. in Jan., Apr., July, and Oct.

19 Detroit, Mich. 48226; Washington Blvd. & Lafayette Street; Fri., 9 A.M. and 1 P.M. Also conducts examinations at Charleston, W. Va. in Mar., June, Sept., and Dec.; Cincinnati, Ohio in Feb., May, Aug., and Nov.; Cleveland, Ohio in Mar., June, Sept., and Dec.; Columbus, Ohio in Jan., Apr., July, and Oct.; Grand Rapids, Mich., in Jan., Apr., July, and Oct.

20 Buffalo, N.Y. 14202; 905 Federal Bldg., 111 West Huron St.; Fri., 9 A.M.; for groups of 8 or more, by appointment. Also conducts examinations at Pittsburgh, Penna. in Feb., May, Aug., and Nov.; Syracuse, N.Y. in Jan., Apr., July, and Oct.; Williamsport, Penna. in Mar., and Sept.

21 Honolulu, Hawaii 96808; 502 Federal Building; Wed., 8 A.M. and by appointment. Also conducts examinations at Hilo in March and Sept., Lihue, Kauai in April and Oct.; Wailuka, Maui in March and Sept.

22 San Juan, P.R. 00903; 322 U.S. Post Office and Courthouse, P.O. Box 2987; Fri., 9 A.M.

23 Anchorage, Alaska 99501; Rm G-63, U.S. Post Office Bldg., 4th & G Streets; P.O. Box 644; Mon.-Fri., by appointment only. Also conducts examinations at Fairbanks, Juneau, and Ketchikan in Apr. and Oct.

24 Washington, D.C. 20554; 1919 M Street, N.W.; Fri. 9:00 A.M. and 10:30 A.M.

## COVER PLAQUES FOR 1973

Each month the Directors of ARRL select by mail vote the best article of the month contributed by a volunteer (staff-written articles are not in competition). The award itself consists of a zinc printing plate of the front cover, mounted on a walnut board.

Winners last year were:

- January:* "Crossed Yagi Antennas for Circular Polarization," by Katashi Nose, KH6UJ  
*February:* "An IC Keyer with Programmable Erasable Memory," by Thomas P. Riley, WA1BYM  
*March:* "The W2FMI Ground-Mounted Short Vertical," by Jerry Sevick, W2FMI  
*April:* "Another Look at Reflections," by M. Walter Maxwell, W2DU  
*May:* "A Medium-Power HF SSB/CW Transmitter, Part I," by Timothy P. Hulick, W0MIJ/4  
*June:* "A Practical Approach to Two-Meter Frequency Synthesis, Part I," by Peter J. Bertini, K1ZJH and Richard Van Hooft, WB2MBI  
*July:* "A Simple Computing SWR Meter," by David Fayman, W0GI  
*August:* "The Micromountaineer," by Wes Hayward, W7ZOI  
*September:* "An HF-Band Solid-State Amplifier," by Jack Mannon, W6FIG  
*October:* "The Tunable Crystal Oscillator," by Larry Lisle, K9KZT  
*November:* "The Log-Periodic Dipole Array," by Peter D. Rhodes, K4EWG  
*December:* "How to Build an SSB Transceiver," by Howard J. Stark, WA4MTH

## GEORGE BENNETT JAILED

George Bennett [of Detroit, Michigan] and the United CB'ers of America (UCBA), of which Bennett is founder and President, were found guilty on December 20, 1973, on all charges of an 11-count indictment following a trial before a Federal Jury in Detroit, Mich.

The defendants were convicted of violating various provisions of the United States Code by distributing counterfeit radio station licenses purportedly issued by the FCC. Bennett and the United CB'ers of America were also found guilty of making false statements to the Federal Communications Commission in an application for a license in the Citizens Radio Service.

The jury found that Bennett and the United CB'ers of America had devised a scheme intended to defraud members of the public and the Government of the United States and that the defendants' activities had impeded the lawful regulatory functions of the FCC.

Bennett and the United CB'ers of America were also convicted of violation of the mail fraud statute and conspiracy.

Judge Cornelia Kennedy, who presided at the trial in the United States District Court for the Eastern District of Michigan, revoked Bennett's bond and placed him in the custody of the Marshal pending sentencing.

The case was prosecuted by Gordon S. Gold, Assistant United States Attorney for the Eastern District of Michigan. The evidence presented was

developed by the FCC and resulted from an investigation conducted by the Commission over the past three years. — FCC News Release.

## PETITIONS FOR RULEMAKING

Albert E. Coolen, W1PJ, has petitioned for a change in the cut-off date for the Extra Class "grandfather clause" from May 1917 to December, 1941; this is RM-2276, recorded at FCC on November 8, 1973. RM-2277, dated November 12, 1973 is a request from Ronald J. Potaczala, WA2BGT, asking that Section 97.7(d)(1) be amended to omit screen and grid power consumption when figuring power input at a Novice station. Sam E. Green, W5TON and James W. Robinson, K5PNV, have asked in RM-2284 for Technician privileges in the entire 144-148 MHz band.

## MINUTES, THE 1974 ANNUAL MEETING

### BOARD OF DIRECTORS

### THE AMERICAN RADIO RELAY LEAGUE

January 17-18, 1974

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Holiday Inn, Hartford, Connecticut, on January 17, 1974. The meeting was called to order at 9:33 A.M., with President Harry J. Danna's, W2TUK, in the Chair, and the following directors present:

Roy L. Albright, W5EYB, West Gulf Division  
Max Arnold, W4WHN, Delta Division  
Robert York Chapman, W1QV, New England Div  
Victor C. Clark, W4KFC, Roanoke Division  
Charles M. Cotterell, W0SIN, Rocky Mountain Div.  
Noel B. Eaton, VE3CJ, Canadian Division  
Richard A. Egbert, W8ETU, Great Lakes Division  
J. A. Gmelin, W6ZRJ, Pacific Division  
Paul Grauer, W0FIR, Midwest Division  
John R. Griggs, W6KW, Southwestern Division  
Philip E. Haller, W9HPG, Central Division  
Harry A. McConaghy, W3SW, Atlantic Division  
Larry E. Price, W4DQD, Southeastern Division  
Larry J. Shima, W0PAN, Dakota Division  
Robert B. Thurston, W7PGY, Northwestern Div.  
Stan Zak, K2SJO, Hudson Division

Also in attendance, as members of the Board without vote, were Charles G. Compton, W0BUO, First Vice President; R. O. Best, W5QKF, Vice President; and John Huntoon, W1RW, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; George Spencer, VE2MS, Canadian; Edmond A. Metzger, W9PRN, Central; John H. Sanders, WB4ANX, Delta; William E. Clausen, W8IMI, Great Lakes; George Diehl, W2IHA, Hudson; Richard W. Pitner, W0FZO, Midwest; John C. Sullivan, W1HHR, New England; L. Phil Wicker, W4ACY, Roanoke; and Ted R. Wayne, WB4CBP, Southeastern. There were also present Honorary Vice Presidents F. E. Handy, W1BDI, and Carl L. Smith, W0BWJ; Treasurer David H. Houghton; General Counsel Robert M. Booth, Jr., W3PS; Assistant General Manager Richard L. Baldwin, W1RU; Communications Manager George Hart, W1NIM; Senior Assistant Secretary Perry F. Williams, W1UED; and QST Technical Editor Doug DeMaw, W1CER.

2) The Board stood in a moment of silent tribute to the late Alban A. Michel, W8WC, former Great Lakes Division Director.

3) On motion of Mr. Gmelin, seconded by Mr. Shima, unanimously VOTED that Items 10 and 11 of the agenda (election of officers and Executive Committee) be moved forward to follow Item 5 (reports of committees); and that Item 12 (appointment of committees) be moved up to follow Item 7 (acceptance of director's reports).

4) On motion of Mr. Thurston, seconded by Mr. Chapman, unanimously VOTED that the minutes of the 1973 Second Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) At this point, extensive oral reports were offered by the officers of the League, during the course of which the Board was in recess from 10:37 to 11:03 A.M., and again for luncheon from 12:33 to 1:32 P.M. Public relations consultant Don Waters joined the meeting.

6) Mr. Eaton, as Chairman, presented the report of the International Affairs Committee; Mr. Griggs, as Chairman, presented the report of the Plans and Programs Committee; Mr. Arnold, as Chairman, presented the report of the Membership Affairs Committee; Mr. Shima, as Chairman, presented the report of the Management and Finance Committee; Mr. Gmelin, as Chairman, presented the report of the Legal and Regulatory Committee.

7) As liaison directors, Mr. Albright presented a report for the VHF Repeater Advisory Committee; Mr. Shima for the Contest Advisory Committee; Mr. Chapman for the DX Advisory Committee, Mr. Arnold for the Emergency Communications Advisory Committee; Mr. Clark for Amsat; Mr. Gmelin for Project Oscar; and Mr. Compton for the Amateur Satellite Service Council.

8) Proceeding to elections, the Chair appointed Messrs. Wicker and Metzger as tellers, and announced the opening of nominations for the office of President. Mr. Chapman nominated Mr. Dannals. On motion of Mr. Clark, seconded by Mr. Albright, unanimously VOTED that the nominations are closed. On motion of Mr. Thurston, seconded by Mr. Albright, unanimously VOTED that the Secretary is instructed to cast one ballot re-electing Harry J. Dannals, W2TUK, President of the League for the ensuing term. (Applause).

9) The Chair announced the opening of nominations for the office of First Vice President. Mr. Eaton nominated Mr. Clark. Mr. Cotterell nominated Mr. Compton; but, after expressing appreciation, Mr. Compton declined the nomination. On motion of Mr. Price, seconded by Mr. Griggs, unanimously VOTED that the nominations are closed. On motion of Mr. Gmelin, seconded by Mr. Arnold, unanimously VOTED that the Secretary is instructed to cast one ballot electing Victor C. Clark, W4KFC, First Vice President of the League for the ensuing term. (Applause).

10) The Chair announced the opening of nominations for an additional vice president. Mr. Gmelin nominated Mr. Eaton. Mr. Eaton nominated Robert W. Denniston, WØDX. Mr. Dannals reported to the Board a message from Mr. Denniston expressing sincere regret that he must decline because his personal affairs would not permit his continuing as an officer of the League or IARU, and his endorsement of Mr. Eaton for the post. On motion of Mr. Zak, seconded by Mr. Griggs, unanimously VOTED that the nominations are closed. On motion of Mr. Arnold, seconded by Mr. Haller, unanimously VOTED that the Secre-

tary is instructed to cast one ballot electing Noel B. Eaton, VE3CJ, a Vice President of the League for the ensuing term. (Applause).

11) The Chair announced the opening of nominations for an additional vice president. Mr. Cotterell nominated Mr. Smith. Mr. Price nominated Mr. Chapman. On motion of Mr. Griggs, seconded by Mr. Zak, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as follows:

Mr. Chapman	7
Mr. Smith	9

Whereupon Carl L. Smith, WØBWJ, was declared elected a Vice President of the League for the ensuing term. (Applause).

12) The Chair announced the opening of nominations for honorary vice presidents. On motion of Mr. Shima, seconded by Mr. McConaghy, unanimously VOTED that Charles G. Compton, WØBUO, is elected an Honorary Vice President of the League for the ensuing term. (Applause). On motion of Mr. Albright, seconded by Mr. Griggs, unanimously VOTED that Roemer O. Best, W5QKF, is elected an Honorary Vice President of the League for the ensuing term. (Applause). On motion of Mr. Thurston, seconded by Mr. Griggs, unanimously VOTED that Wayland M. Groves, W5NW, is elected an Honorary Vice President of the League for the ensuing term. (Applause). On motion of Mr. Chapman, seconded by Mr. Clark, unanimously VOTED that F. E. Handy, W1BD1, is elected an Honorary Vice President of the League for the ensuing term. On motion of Mr. Grauer, seconded by Mr. Eaton, VOTED that Robert W. Denniston, WØDX is elected an Honorary Vice President of the League for the ensuing term.

13) The Board was in recess from 2:43 P.M. to 3:05 P.M.

14) The Chair announced the opening of nominations for Secretary. Mr. Haller nominated Mr. Huntoon. On motion of Mr. Eaton, seconded by Mr. Shima, unanimously VOTED that the nominations are closed and that the Secretary is instructed to cast one ballot electing John Huntoon, W1RW, Secretary of the League for the ensuing term. (Applause).

15) The Chair announced the opening of nominations for Treasurer. Mr. Shima nominated Mr. Houghton. On motion of Mr. Shima, seconded by Mr. Eaton, unanimously VOTED that the nominations are closed and that the Secretary is instructed to cast one ballot electing David H. Houghton as Treasurer of the League for the ensuing term. (Applause).

16) The Chair announced that the Board would now proceed to the election of four directors to the Executive Committee for the ensuing year. Mr. Zak nominated Mr. Thurston. Mr. McConaghy nominated Mr. Griggs. Mr. Eaton nominated Mr. Albright. Mr. Thurston nominated Mr. Arnold. Mr. Chapman nominated Mr. Price. Mr. Price nominated Mr. Gmelin. Mr. Grauer nominated Mr. Cotterell. On motion of Mr. Zak, seconded by Mr. Chapman, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows:

Mr. Arnold	16
Mr. Thurston	14
Mr. Griggs	11
Mr. Albright	10
Mr. Gmelin	5
Mr. Price	5
Mr. Cotterell	3

Whereupon Max Arnold, W4WHN, Robert B. Thurston, W7PGY, John R. Griggs, W6KW, and Roy L. Albright, W5EYB, were declared elected as members of the Executive Committee for the ensuing term. (Applause).

17) At this point President Dannals reiterated his position that the offices of President of ARRL and President of IARU are each so important and demanding of time and energy that they should be held by separate individuals, and that therefore he again chooses not to serve as IARU President. Concurring with Mr. Denniston's recommendation, Mr. Dannals moved, seconded by Mr. Compton, the nomination of ARRL Vice President Noel B. Eaton, VE3CJ, as the ARRL official to be recommended to the IARU headquarters to serve as President of the IARU, the matter then to be voted on by IARU member societies as specified in the IARU constitution. The motion was unanimously ADOPTED.

18) Moved by Mr. Zak, seconded by Mr. Cotterell, that this Board establish a new ARRL appointment category in the Public Relations field effective immediately. This appointment will be designated as a "Public Relations Assistant," and will be appointed by the respective Division Directors with a maximum of four appointments per Division. The Plans and Programs Committee will provide assistance with guidelines. After extended discussion, on motion of Mr. Price, seconded by Mr. Shima, unanimously VOTED to delete the words, "with a maximum of four appointments per Division." The question then being on the motion as amended, the same was unanimously ADOPTED.

19) On motion of Mr. Cotterell, seconded by Mr. Griggs, after extended discussion, unanimously VOTED that a trial program be instituted to disseminate information among government agencies and news media through the use of an information bulletin on amateur radio activities following the guidelines initiated by the Plans and Programs Committee. Such trial to commence for a one year period from this date, monitored on a continuing basis and evaluated at the end of that time by the Plans and Programs Committee in consultation with the President, General Manager and Public Relations Consultant.

20) On motion of Mr. Griggs, seconded by Mr. Cotterell, after discussion, unanimously VOTED that the Management and Finance Committee, by recommendation of the Plans and Programs Committee, study the desirability of changing the title of the General Manager to Executive Vice-President but without right of succession to the Presidency.

21) Moved, by Mr. Haller, seconded by Mr. Arnold, that the Editor of QST provide additional space in the journal for non-staff technical articles and that more such articles be in each issue of QST, the supply permitting. After discussion, moved, by Mr. Arnold, seconded by Mr. Gmelin, to amend the motion by deleting the words, "in each issue of". After further discussion, on motion of Mr. Gmelin, seconded by Mr. Price, VOTED, 12 in favor to 3 opposed, that the matter is laid on the table.

22) On motion of Mr. Thurston, seconded by Mr. Clark, unanimously VOTED that Larry Kayser, VE3QB is awarded the 1973 ARRL Technical Merit Award in recognition of his efforts and abilities in acting as a control station for Oscar 6 and his development of "Smart" - "System Multiplexing Amateur Radio Telecommands."

23) On motion of Mr. Arnold, seconded by Mr. Clark, unanimously VOTED that the Rules and Regulations Concerning Affiliated Societies are amended to read as follows:

1. It shall be the policy of the League to affiliate with itself organized, non-commercial amateur radio groups or societies of kindred aims and purposes with a view to forming a homogeneous organization for unity of action in matters affecting amateur welfare. This policy shall embrace three categories of affiliation, as follows:

Category 1 - Local amateur radio clubs.

Category 2 - Regional or National organized amateur radio groups.

Category 3 - Local school or youth group amateur radio clubs.

2. (As currently written.)

3. (As currently written.)

4. In a Category 1 or 2 society, at least 51% of the voting membership must be full or associate members of the League, and at least 51% of the total membership must be licensed amateurs to be eligible for and to maintain affiliation status. In a Category 3 society, affiliation status may be granted if the sponsor, faculty advisor, president or trustee of the society is a licensed amateur and a League member, and where the society's name clearly shows that it falls within this grouping.

5. (As currently written.)

6. (As currently written.)

24) On motion of Mr. Price, seconded by Mr. Shima, unanimously VOTED, at 4:32 P.M., that the Board now resolves itself into a Committee of the Whole to take under consideration the candidacy of directors for the ARRL Foundation, Inc. The Committee rose at 5:42 P.M., and reported to the Board.

25) On motion of Mr. Shima, seconded by Mr. Chapman, unanimously VOTED that the following persons are elected as directors of The ARRL Foundation, Inc., for terms in the number of years indicated:

Edward J. Bock, W0BB	1
Robert York Chapman, W1QV	3
Lloyd Colvin, W6KG	2
Richard A. Egbert, W8ETU	1
Jean A. Gmelin, W6ZRJ	1
Larry E. Price, W4DQD	2
Peter J. Schenk, WA4GFY	3
Larry J. Shima, W0PAN	3
Harry V. Williams, W1MBK	2

26) The Board was in recess for dinner from 5:46 to 8:31 P.M.

27) On motion of Mr. Chapman, seconded by Mr. Shima, unanimously VOTED that the Board of Directors hereby appoints the accounting firm of Ernst & Ernst as auditors for the ensuing year.

28) Moved, by Mr. Price, seconded by Mr. Chapman, that the League establish an office facility in the Washington, D.C., area, operated under supervision of the President for the purpose of expediting information on amateur radio matters to and from various agencies; the Management & Finance Committee to assist in developing operational and funding procedures. After extended discussion, the motion was ADOPTED, on a roll-call vote, 12 in favor to 3 opposed. All the directors voted in favor except Messrs. Grauer, Haller and Zak, who voted opposed; and Mr. Eaton, who abstained.

(Continued on page 158)

# Spectrum Allocations for the Amateur Service

A FEW WEEKS ago I was in contact on 40 meters with my old friend W5BMI. I told him I was planning to attend your convention and asked him what I should talk about. His response was something to the effect that, why don't you do like the politicians, promise that all the amateur bands would be expanded by a few hundred percent, and that would make everyone happy! I hope I'm not naive enough to make such promises. No individual can do that either on the domestic or international front. However, the general subject of frequency management has always interested me. It has seemed that entirely too few amateurs are sufficiently informed on the subject to make reasonable evaluations of situations which arise. Judging from comments I overhear on the amateur bands (remember, "Prose is listening") not many of us really understand the prevailing sharing arrangements, the application of reservations and footnotes in the table of allocations, and similar details bearing on much of the QRM heard on "our bands." Although I won't go into detail about all of these subjects, I would like to discuss with you the established methods by which any change in our frequency allocation picture might be made.

The usable radio spectrum is a valuable, free, natural resource, available to and used by all nations to satisfy their communications requirements. It is not depleted with use, although it is subject to pollution, as all of you know. Amateurs generally consider that the bands of frequencies occupied by our service are more or less sacrosanct and immune from take-over from outside sources, although recently this concept has become somewhat subject to question. (Note the EIA proposal on 220 MHz, Docket 19759). Except for the communication professionals among the amateur ranks, it is a natural reaction for amateurs to believe that our service is ranked close to the top in value, among the recognized users of the spectrum. However, in the vital omnipresent role in our lives which communications and electronics involve us on a national basis, would you believe that amateur radio ranks close to the bottom?

## Communications Functions

Some years ago when we spoke of the spectrum, we meant from about 300 to 30,000 kHz, the area termed the medium and high-frequency spectrum. Developments over the years have pushed the upper limit higher and higher. In 1906 the usable spectrum was between 500 and 1000 kHz, and in 1971 at the Geneva space conference the spectrum was considered to include frequencies from 10 kHz to 275 GHz. Throughout this spectrum, amateurs are allocated bands of frequencies, known to you all, so I won't repeat them. In terms of the value of amateur radio to the nation, what are the criteria for judgement? According to a publication of the Office of Telecommunications Policy<sup>1</sup> issued in January 1973, there are twelve major functions which are performed in the spectrum. They include:

- Carrying out national policies;
- Maintaining international and domestic security;
- Safeguarding life and property<sup>2</sup> on land, sea and air;
- Preventing crime and upholding the law;
- Conserving natural resources;
- Providing education, information and entertainment<sup>2</sup>;
- Making possible safe mass air travel;
- Delivery of materials on time, and so on.

Users of the spectrum are continually being challenged to do more and better jobs, and as you should by now expect, none of them relates exclusively and specifically to any of the points covered in the "basis and purpose" of amateur radio, contained in Section 97.1 of the FCC Rules and Regulations. Which is one of the chief reasons I have asked the question before:

*"Should this portion of our basis and purpose be modified to include better justifications for our existence?"*

During the period around 1978-80 it is expected that there will be an international conference of the International Telecommunication Union dealing with a reallocation of the hf spectrum covering at least 3-30 MHz, probably below 3 MHz, and perhaps above 30 MHz.<sup>3</sup> The last

*These are the words of A. Prose Walker, W4BW, Chief of the Amateur & Citizens Radio Division of FCC, to the ARRL Midwest Division Convention in Lincoln, Nebraska, last autumn. As a member of the government team researching appropriate band assignments for the amateur service in advance of a 1979 world allocations conference, his remarks are particularly pertinent.*

<sup>2</sup> Probably amateur radio falls in these categories.

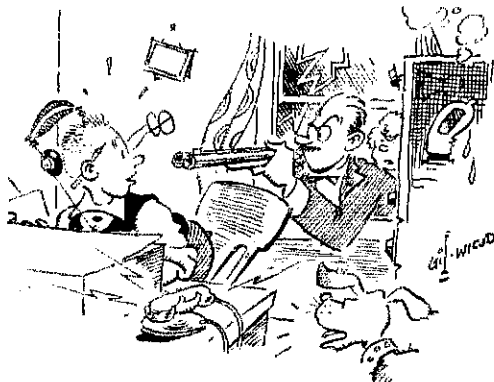
<sup>3</sup> The recently concluded ITU Plenipotentiary Conference decided there should be a World Administrative Radio Conference in 1979.

<sup>1</sup> Office of Telecommunications Policy, *The Radio Frequency Spectrum, United States Use and Management*, (January 1973).

time this was done was at Geneva in 1959. Since 1959, the initiation of satellite communication and cable expansion has had great influence on telecommunication. An appraisal of the amateur population of the world by around 1980 indicates there may be about a million of us. Our international hf allocations over the years have steadily declined while our population has risen. That is contrary to the situation for other users of the spectrum. What do we do about this and how can we approach the problem to convince first our government, and then others, that Amateur Radio warrants additional allocations in the hf portion of the spectrum?

The mechanism of arriving at our *national spectrum position* has been established over the years and involves first, preparation and negotiation among the users of the spectrum in the United States. This is only the first step. If the OTP and FCC agree on the "preliminary views," parallel recommendations are then submitted to the Department of State that those preliminary views be sent to other administrations and discussed with friendly countries. Following this step in the procedure, which eventually includes consideration of public views on the matters, the OTP/FCC proceed to formulate the United States position and recommend that the proposals be sent to the Secretary General of the ITU for consideration by the appropriate conference.

Where do amateurs fit in this picture? Do we really have much of a chance to obtain additional spectrum space? If the answer is affirmative, how do we go about it? . . . What do we do? What are the generally applied criteria to a determination of a frequency allocation? . . . In other words, what would influence a decision either in favor of or against amateurs' obtaining some additional hf spectrum space? It must be considered from both a domestic and international aspect because, obviously, unless our own government's position contains the right proposals for amateurs, it is highly unlikely that any other government of the world would espouse our cause. What do we use as justification before "hard-nosed allocators" in this country, to convince them that we actually *need* additional frequency space. Let's examine some of the matters bearing on the subject.



Amateurs generally consider that our bands are immune to take-over from outside sources . . .

## Allocations Considerations

It is no secret that groups of persons are currently meeting to prepare an advance position of the government for frequency allocations to the various services, *amateur included*. Recognize, if you please, that each group is favorably biased toward his own service and that eventually negotiations, sometimes on a "horse-trade" basis, must decide which service gets priority in particular areas of the spectrum for inclusion in the United States' position before the ITU. What are some of the considerations which those "hard-nosed allocators" will use?

Why is the communication needed?

Is the requirement valid, i.e., can it be performed in another manner?

Is the amount of spectrum requested the minimum needed?

Is there redundancy or duplication included in the proposal?

What is the impact on other users of the spectrum, such as from spurious emissions? or displacement etc.?

Are the technical parameters to be used up to the state-of-the-art?

Is full use being made of propagation data so that the correct portion of the spectrum would be used for the requirement?

What are the economic factors involved in the request?

Is it more in the national interest to accede to the request or to consider other means of providing the communication, such as through a common carrier concept?

Directly related to national allocation priorities are five major criteria generally applied to requests for frequency space:

1. Inability to use wirelines or other substitutes for radio.
2. Contribution to maintaining safety of life and property.
3. The number of people who would benefit.
4. The demands of the public for the output of the service, and
5. The technical suitability of the spectrum requested for the requirements of the service.

## The Amateur Bands

It would be almost impossible here to evaluate the efficiency of utilization of the spectrum by the various services, *amateur included*. However, taking some of the frequencies used by services other than amateur, let's make a few broad generalizations. If we begin at the lower end of the spectrum such as the 1750-2000 kHz area, we find that the old amateur band known as 160 meters was taken away from our service about thirty years ago and has been returned only in dribbles since that time. Why? Well, no answer is simple and far be it from me to attempt one. However, from the documents of the OTP I find that:

"there is need for national policy with respect to radio-navigation systems. At present there is a proliferation of such systems (medium frequency

(Continued on page 152)

## Silent Keys

IT IS with deep regret that we record the passing of these amateurs

W1BCM, Raymond A. Colvin, Seekonk, MA  
 W1BCR, C. Newton Kraus, Warren, RI  
 Ex-1ESS, Harry R. Hick, Rocky Hill, CT  
 W1FAQ, Richard T. Merwin, Milford, CT  
 W1WOL, Norman Ash, Newton, MA  
 W1JAX, Victor F. Kaiser, Meriden, CT  
 W1KDI, Michael Kelly, Needham, MA  
 W1LBJ, George W. Parkhurst, Berwick, ME  
 W1LK, Ettore Gola, Lakeville, MA  
 W1NPG, Augustus Wilson, Sr. Wethersfield, CT  
 W1QKE, Harry J. Patterson, Chelmsford, MA  
 W2AB, Robert B. Haner, Jr., Scottsville, NY  
 W2CNL, Harold C. Kuoepfel, North Bergen, NJ  
 W2GNF, Arthur J. Stobart, Lakewood, NJ  
 W2HFE, Calvin E. Backstrom, Penn Yan, NY  
 W2IE, Francis G. Mackie, Cranford, NJ  
 W2IUM, Dennis F. Mahoney, Lake Neekskill, NY  
 W2KCE, William F. Johnson, Closter, NJ  
 W2QCF, Harry E. Stewart, Buffalo, NY  
 WA2QKJ, Thomas W. Butler, Sr., Niagara Falls, NY  
 WB2SGV, Harry C. Henderson, W. Creek, NJ  
 W2SP, Gilbert E. Voiles, Cherry Hill, NJ  
 WA2SUD, Chanton E. Culver, Middletown, NY  
 W2TU, Nelson A. Otto, Niagara Falls, NY  
 Ex-2XE, Paul F. Godley, Little Falls, NJ  
 W3DQL, Theodore E. Allen, Annapolis, MD  
 WA3GPA, Joseph W. Babcock, Pittsburgh, PA  
 W3LIE, Ernest D. Heintz, Sharon, PA  
 W3MLO, Frank W. Cook, College Park, MD  
 W3QHS, Paul V. Trice, Glen Burnie, MD  
 W4ABW, J. Maynard Styers, Statesville, NC  
 W4CIP, Nestle Lines, Palm Harbor, FL  
 W4DWY, Arthur J. Swanick, Southern Pines, NC  
 W4EA, Frank J. Kaufer, Miami, FL  
 WN4EOS, Charles J. Myhan, Pensacola, FL  
 W4VY, George H. King, Boynton Beach, FL  
 WB4KZN, Robert F. Gray, Chamblee, GA  
 K4LV, Owen A. Thompton, Umatilla, FL  
 WA4MLE, John R. Stork, Sr., Louisville, KY  
 W4PGT, Robert W. Leedy, Goodlettsville, TN  
 K4QF, Elmer G. Moffatt, Ft. Pierce, FL  
 W4VSK, McClaren Johnson, Jr., Atlanta, GA  
 W4YJ, Hale T. Cottrell, Owensboro, KY  
 W5CUA, Albert L. Burke, Waco, TX  
 W5CZS, Colonel V. Sober, Oklahoma City, OK  
 W5GFI, Lee Roy Carter, Highlands, TX  
 K5HVI, Harry L. Huston, Baxfield, TX  
 K5LEP, Jimmy D. Gardner, Houston, TX  
 WA5MER, Joseph R. Beavers, Plainview, TX  
 K5OLF, Robert D. Barton, Littlefield, TX

K5RZE, Herbert C. Fink, El Paso, TX W5VP, Edmund W. Lewis, El Paso, TX  
 W5YX, William H. Ratliff, Jr., Jackson, MS  
 W6AH, Joseph W. Tufts, So. San Gabriel, CA  
 W6AHN, Clifford F. Mason, Sacramento, CA  
 W6ESH, Benjamin L. Dance, Redwood City, CA  
 WA6HWB, Harry R. Smith, LaCanada, CA  
 WB6JWW, Ignace L. Malm, Santa Paula, CA  
 W6LY, Irving W. Pinkerton, Laquna Hills, CA  
 WB6MEF, Clifford T. Reeser, La Crescenta, CA  
 W6QGG, Hillard A. Pratt, San Diego, CA  
 W7QWE, Donald W. Misner, Portland, OR  
 K8BMU, Orin C. Cole, Mackinaw City, MI  
 WA8DVP, William M. Jones, Tiffin, OH  
 W8EHD, Elwyn J. Finehout, Millington, MI  
 W8EJ, W. James J. Walls, Parma, OH  
 W8FT, Paul W. Watson, Six Lakes, MI  
 WN8JVN, Edward L. Crowley, Cincinnati, OH  
 WSJWD, Harvey J. Miller, Tiffin, OH  
 W8MPJ, Richard E. Lauth, Dayton, OH  
 W8PGR, Clarence L. Nunemaker, Columbus, OH  
 W8STR, Meredith G. Bargar, Gnadenuhnten, OH  
 W8UHK, Robert E. Alfred, Charleston, WV  
 K8VKV, John S. Hopper, Dunbar, WV  
 WA8YKX, Howard C. Goodrich, Elyria, OH  
 Ex-9AMB, J. L. Hathaway, Denver, CO  
 K9BQZ, Aloysius S. Kaszynski, Springfield, IL  
 W9FR, Lawrence F. Pfeifer, Lake Geneva, WI  
 W9HOQ, Fred B. White, Libertyville, IL  
 K9HTE, Brian G. Smith, Spencer, IN  
 W9IP, George R. Mathias, Brookfield, IL  
 WA9JH, Charles R. Young, Eaton, IN  
 W9KCS, Dean W. Loken, Schaumburg, IL  
 W9KLO, Joseph F. Sheffer, Chicago, IL  
 W9LLX, Wilber L. Harrison, Midlothian, IL  
 W9MEY, Robert W. Scribner, Attica, IN  
 K9PGH, Herbert F. Griem, Chicago, IL  
 WA9RKJ, Harry J. Ray, Anderson, IN  
 W9TRN, Robert A. Hawk, Goshen, IN  
 W9WB, K. C. Axline, Wenona, IL  
 W9WER, Harry J. Leddy, Joliet, IL  
 W0BRU, Carl D. Marsden, Pueblo, CO  
 W0EOO, Orville R. Foster, Wetmore, CO  
 K0GRP, Richard J. Giesen, Estelline, SD  
 K0PSD, Albert O. Spear, Topeka, KS  
 VE3BPC, A. A. Christie, Merrickville, ON  
 VE3FUQ, H. G. Jeffery, Galt, ON  
 VE6SR, Sidney J. S. Read, Glenwoodville, AB  
 VO1AA, Ernest Ash, St. Johns, Newfoundland  
 PA0UD, G. van Draanen, 's Gravenhage, The Netherlands  
 ZS6AM, George J. Dent, Walkersville, TVL, So. Africa  
 ZS6JF, Dave Kramer, Johannesburg, TVL, So. Africa

## Raising Antennas

(Continued from page 43)

angle as are the tram wires. Adjust the muffler clamps so that the eye-bolt is parallel to the ground. This angle is important because it will force the elements to rotate in an upward direction. This is desirable to keep the beam from getting fouled in the guy wires.

Next, install the guide ropes. Strength isn't an issue here since there is very little tension applied to them. The guide ropes should be attached no further out from the boom-to-mast-bracket than you can reach from the top of the tower when the beam is finally in place. A pulley at the base of the tower, as shown in Fig. 1 will allow all the helpers to be positioned at the stanchion.

If the antenna is very heavy, it may be difficult to lift it from the tram to the mast. With a

100-pound antenna plus the weight of the rope and the sling, that can be a nasty 1-1/2 feet. The use of a block and tackle hooked to the mast will serve nicely.

### Additional Suggestions

If a five-element beam is to be installed, the first director may be very close to the boom-to-mast bracket and it may be advisable to take that element off and reinstall it at the top of the tower. In the event something goes wrong during the antenna-raising period, lower it and do it again!

### Strays

Members of the Charlotte ARC (W4CQ) and Mecklenburg ARS (W4BFB) participated in the radio show "Two Way Talk" on WSOC a-m and fielded telephone calls from the listeners about amateur radio for more than 2 hours.

QST



# 50 Years Ago

this month

March, 1924

... Current regulations specify 150-200 meters as the basic amateur band; work on shorter waves requires a special "X" license. Editor Warner argues hams should have more short-wave territory - at minimum a band around 40 meters, and another around 5, "to develop totally new methods and brand-new apparatus to make them work." He promises ARRL efforts to obtain such bands for amateurs.

... Technical trends are wisely to the development of better receiving gear and antennas rather than higher power. Stuart Ballantine describes the design of r.f. amplifiers, effective use of regeneration, and the need for quality components in tuned circuits. John Reinartz has a treatise on "How Antennas Work," while Technical Editor Kruse lists the good and bad points of series antenna condensers, and of lead-in insulators.

... Italy lists the growing list of Transatlantic ham participants, most work still being done around 100 meters. WNP in the Arctic maintains contact for the MacMillan expedition despite poor conditions.

... Perry Briggs reports the systematic location of a power leak in the Hartford area, plotting signal strength by using a "two-step" amplifier, working from an eight-turn loop, installed in his car. The offending light pole had caused difficulty throughout much of the city.

... If you pass the civil service exam for assistant radio engineer, the pay is \$2,000 a year.



March, 1949

... Editor Budlong announces the imminent return of portions of the old 160-meter band, lost to the vital Loran service during World War II. ARRL negotiations with government agencies, primarily the Coast Guard, have borne fruit. The U.S.A. will propose such privileges officially at the forthcoming Inter-American (Region 2) allocations conference to be held in Washington.

... W3GAU gives us a lucid series of antenna patterns, measured both in vertical and azimuth, for different spacings of parasitic array elements.

... W7JYZ takes pride in the compactness of his cool kilowatt amplifier, a rack and panel job on casters "only 42 inches high." W6ZF's explicit warnings about the dangers of high voltage shock should be the next subject for such constructors!

... The 1948 Simulated Emergency Test activity was up 100% from the previous year. W3CDO and other Washington notables personally delivered to President Truman a series of messages from state governors with inaugural congratulations.

... W3MBY unravels the mysteries of bandpass filter design, taking another giant step away from phasing systems in the rapid growth of sideband.

... W1AW and W6PSW complete the first trans-continental teletypewriter contact - on 11 meters, a.f.s.k. - W1RW

## Satellite Tracking (Continued from page 40)

now keep track of the azimuth, elevation and time simultaneously by moving the reticle. Note that the nomograph also enables you to find the length and time of acquisition. When calculating the time for the descending, north to south morning pass, add 57 minutes (one-half of 114 minutes) to the equatorial pass to find the time of crossing for the reciprocal bearing.†

### How to Make Your Own Nomograph

1) Procure a Great Circle map centered nearest to your location, one marked with the equator and longitude and latitude.<sup>1</sup>

2) Normalize the chart on page 54 of the October, 1969, issue of *QST* by plotting latitude against inclination on graph paper such that you can find the inclination for 0° through 90° on the even 10°. It is too difficult to use the numbers given by the chart.

3) Delete the portion of the map outside of 4000 nautical miles (actually 4900 statute miles) by cutting it off with a pair of scissors, and mount the result on white paper.


4) Draw in compass bearings every 10 degrees on the periphery of the white paper.

5) Divide the outside portion of the circle into 24 one-hour segments (from 0100 to 2400 hours) so that one hour is 15°; further subdivide the 15° into six segments, making each represent 10 minutes.

6) In dividing the segments, don't use dividers since you are liable to end up with cumulative errors. Use a protractor instead. Now use a copying machine to make a montage.

7) The elevation-azimuth reticle should be subdivided such that 2455 statute miles is 0° and suitable subdivisions (90°, 60°, 30°, 10°, 0°) in accordance with the table on page 54 of the first reference article.

8) Certain models of copying machines can reduce the large Great Circle maps. The orbital transparencies are the 8 × 11-inch size, which most copying machines will handle.

The author has available 8 × 11-inch size nomographs centered on Washington, D.C., San Francisco, and Hawaii. 

†EDITOR'S NOTE: While the method used and illustrated here by the author is valid for tracking any satellite, the actual figures shown pertain only to the orbits of Osear 6.]

<sup>3</sup> Great Circle, equidistant projection, maps are produced by the U.S. Coast and Geodetic Survey. They are centered on major cities and are generally available through city libraries.

The publishers of *QST* are obliged to announce a new cover price of \$1 per copy, effective with the April issue. This is the first such increase in nearly seven years, and is made necessary by continuing and substantial rises in the cost of publishing, paper in particular. There is no change in membership dues at this time.





# Correspondence From Members -

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## SELF IMPROVEMENT

● I was a Citizens Band bootlegger a few years back and believe me, I left for the friendly confines of amateur radio pretty quickly after I acquired the technical know-how for my Novice license. Now I just received my General Class license through the mail a couple of days ago and I can be thankful that I did make the decision to improve myself by taking the amateur radio road even though it meant much studying and mental concentration. I could have just as well stayed with Citizens Band operation and I could have operated as much as I wanted to without having to work for the privilege to do so. But I did not and I thank the ARRL for helping me make my decision. Here is my contribution for another year of ARRL services and by all means do not let up your pressure on the FCC. — *Name Withheld*

## DUES

● When are dues going to \$10 a year? I feel a bit like I'm robbing you people with the dues I'm paying now. I don't see how *QST* gets produced, considering subscription rates of other magazines of similar size. I know that when I was in school, and dues were \$5, it seemed like a fair amount of money. I would favor a \$5 fee to people under 17, both associate and full members, and a dues increase to \$10 for everyone else. Life membership sounds like a bargain to me. But what happens to the ARRL in 20 years when that money doesn't come in? I guess by then many lifers will be Silent Keys and the young blood will carry on. *Curtis R. Holsopple, WB9CAF/WA8VRM, Edgerton, OH*

## ASTOUNDED

● I was astounded to read the letter from WNØJLS in the August issue, though some of it can be excused on account of his being a Novice. The degree of spurious radiation that electronic equipment emits does not depend essentially on the devices used therein and I am sure that no reasonably competent and unbiased engineer would claim that semiconductor devices produce a lower level of spurious output than vacuum tubes; in fact, some might say the opposite.

I am sure that WNØJLS would resent very much being told that the use of frequencies below 30 MHz was poor engineering practice and that to be up-to-date he had to use 1296 MHz tropospheric scatter. I am similarly resentful of anyone who tries to tell me that I must use semiconductors, of which I have no interest whatsoever; and none of my equipment, including ssb transmitters for 432 and 1296 MHz, a 144/432/1296/2304 MHz receiver with digital readout, amateur color television equipment, and RTTY gear, all home-brewed, all vacuum-tube, falls in any way below the standards of performance expected of professional radio equipment in 1974, let alone amateur equipment. I would add that I design professional electronic equipment for a living.

The possibilities of vacuum-tube techniques are far from exhausted and this is a field in which amateurs can play an important part, with industry obsessed with semiconductors at the present time. I look forward to seeing many more vacuum-tube articles in *QST*. — *Gregory S. Trice, G8DAV/G6SXX/T, Chelmsford, Essex, England*

## TRACK RECORD

● You may not be right on every issue, but your track record sure is better than that of others who are trying to build magazine circulation by nit-picking every controversial issue that comes along. — *Robert W. Green, KAUF, Conover, NC*

## POSTAL PROBLEM

● I hereby apologize for all the rough letters (6 or 7) I've written ARRL this year about non-delivery or very-late delivery of *QST*.

I took your advice. I contacted first my letter-carrier. Turns out HE was to blame for the whole non-delivery mess. And he was stupid enough to admit it to me! He's an old guy (about 15 years younger than I) and he said he wasn't going to deliver magazines unless they paid him more overtime. Really! Like other letter carriers, they gave him a Jeep to haul from the P.O. to my door, but still he's looking for more. More overtime yet.

I phoned his boss right after his admission of dereliction of duty. The boss made SURE this guy takes ALL the magazines ALL the time now. The December issue of *QST* got delivered in November. We're back on the ball now, I guess. — *F. Wendell Tietsworth, W2SUE, Nutley, NJ*

## RST OBSOLETE?

● I cannot help but wonder why, with the art in its current state, we continue to use the obsolete RST system of reporting signals on the cw sectors of the ham bands.

Almost every signal is of the "pure dc note" type, these days, and I would suggest that some serious thought be directed towards the establishment of a new system, which might be called the R S system, in which the report states the (1) "R" level, or "Receivability, and (2) the signal strength . . . much the same as what we now refer to as the "S" level, in current reporting jargon.

The "T" is utterly *passé*, as I see it. You either have a legal, "pure dc note," or you *don't*. There just isn't any in-between. Your note is either good, or it just isn't. So then, why not establish an "A" category for the pure, legal, acceptable dc note, and a "B" category for whatever comes forth that doesn't meet the "A" standard.

Thus reporting would be something like this: "Your sigs 4/7/A hr at Coolspot Florida," or "Your sign 5/6/B at Frigidaire, Alaska," and so on.

One report, (the first) would state the signal as one with slight QRM/QRN, but easily readable,

with loudness level of 7 on a scale of 1-9, and with an acceptable grade of tone. The other report would suggest a signal in the clear, with loudness level of 6 on the 1 to 9 scale, and with a tone *not* meeting the pure dc standard. One can imagine some sort of embellishment here, as for example, a report of 4/7/B40 would indicate a 40% line frequency hum modulation. But I see nothing to advocate such efforts at descriptive nonsense. The tone is either good or it isn't. That's all!

Nobody pays much attention to "tone" reports any more. With some 80% of all operators using either crystal control, or commercial grade VFOs, and with filtering circuits easily constructed with easily available and relatively cheap components, I would guess that 95% or more of the signals you hear are good enough to classify as in the "A" category. Why, then go to all the bother and nonsense of attempting to tell the other guy how his tone sounds? Tell him it is "good" or "punk," and let it go at that. — *M. Crosby Bartlett, W9MC/WB4OFE, Boca Raton, FL*

### NINE DOLLAR ISSUE

● In reading the January Correspondence from Members, I noticed the letter from WB2ZBI under "Test Credit." I agree. I am a 16-year-old Novice with 4 months left on my license. I have planned on taking my General test many times but the fear of the possible loss of the \$9 has made me procrastinate longer and longer.

WA4WME/Ø said no one minds the money. I know many hams and ex-hams that mind the loss of \$9. It could buy several crystals, pay a down payment on a new rig, buy a new key or even renew a subscription to *QST*!

I hope the FCC understands the financial problems of many amateur operators. It is hard to get money for two or three or more trips to the exam office when your income is small. — *Mark Farrall, WN2FTK, Schenectady, NY*

### AN APPRECIATION

● I must thank ARRL for its many kindnesses and considerations to me, especially for my donated membership/subscription.

I'm in Vocational Electronics at this prison and have a good man, Mr. Cunningham, for an instructor. He's scrounged me a telegraph key and another ham sent me a code machine with ten tapes; and my code proficiency improves daily.

I have an old short-wave receiver at the shop, and I use a signal generator to VFO the amateurs on 80, 40, and 20 meters every day, listening to their QSOs. I'll be going up for parole again in March and perhaps I may make it this time. I can see no reason not to.

Since SWLING and writing you wonderful people and reading *QST*, I can hardly wait to get out there, get my license, and get on the air myself. — *Name Withheld*

### AUTISTIC THOUGHT?

● A word for cw: amateur radio has been directed to promoting progress, new ideas and in general the pushing of spiraling technical knowledge. The FCC directs its utterances to our existence as to how much new technology we can produce.

An autistic thought came to me. Ham radio should also include as a hobby our well being, why

just progress? Why not some therapeutic use as an aid to preventing "old folks" from drifting into fantasy from boredom and becoming senile? What better use than cw? It is something to do with the hands, and occupy the mind, and promotes camaraderie unknown to the voice man. Why the push to do away with cw? The cw men have been more gentlemen than the rabble one hears on the 30-meter phone band these evenings.

The incessant "jamming" going on every evening to duly licensed stations by those getting their "kicks" will certainly, eventually, ruin ham radio and put us off the air. One wonders why the FCC allows the buzz saws, music, and unidentified cat calls to go on month after month. Apparently the radio journals have suppressed any comments or letters on the subject of this new field of fun which is widely spread on the West Coast.

Fortunately, cw seems to be free of it, and is one place a person can go for a clean evening's entertainment. It is still a good form of communication, and gives old folks something to do. Why knock it? — *Ed Marriner, W6BLZ, LaJolla, CA*

### RECENT EQUIPMENT

● I am of the opinion that your "Recent Equipment" section is not fulfilling the function that might reasonably be expected of it.

If your intention is to present more than a reiteration of manufacturers' claims, as I think it should be, and if the section is to be oriented towards the membership, i.e. the consumers of the equipment and not towards the manufacturers, then recent reviews seem to indicate a regrettable trend.

I cannot see any reason for you to condone the present amateur manufacturers' system of rating distortion products against the two tone peak of a test signal rather than a single tone, as is used by valve and commercial equipment manufacturers. Page 56 of the August 1973 *QST* gives us an example of a spectrum display being adjusted so as to give an impression which corresponds to a manufacturer's claims, rather than the true "picture," which is much less satisfactory.

If sweep tube amplifiers are not satisfactory for linear amplifier service, please say so in the equipment review, not in another article in another issue (October, 1973, page 16). If a blower is necessary, but not supplied as standard equipment, point this out, and publicly ask the manufacturer, "Why?" As modern equipment becomes more densely packed, life expectancy will be a function of cabinet temperature, so one might reasonably expect you to key the transmitter automatically at a predetermined duty cycle, and relate cabinet temperature to component rating and consequently make an informed comment on equipment reliability.

We have already moved completely away from the only true power rating, output power, and if we uncritically accept manufacturers' puts, then we will likely follow the audio amplifier manufacturers down the bull-path of British watts, American watts, IHE watts, continuous watts, peak watts, music watts, etc.

Such degeneration results when the manufacturers have completely lost respect for the intellect of the consumer. I think we deserve better! — *Ian N. Cousins, VK5IK, Eudunda, South Australia*

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* W3WRE

## YLRC

GERTRUDE STEIN'S well known words about a rose are often applied to organizations particularly when people aren't too interested and are hunting for an excuse to avoid meetings. But Miss Stein's rose, and the more modern expression, "you join one, you join 'em all," are not applicable to YL radio clubs. True, they are radio clubs; also true, they cover the basic format of all radio clubs with committee reports, publicity to newspapers, and attention to club business. And the program is always interesting with the best part of all radio club meetings after adjournment; the lingering rag chew sessions in little groups over the refreshments. But there the similarity ends. Across this continent, and around the world, YL clubs go just a little bit further in their organizational purpose.

Formed first for association of women amateur radio operators with each other, they hold the membership wide open to all the YLs from Novice through Extra Class. It is an incentive to progress and to upgrade because others within the club managed and somehow set an unconscious example to follow.

Many YL groups have projects that are not usually planned by most social organizations. There are those who assist local school programs with amateur radio demonstrations, or by making schedules with DX operators so that school classes may learn about other countries directly from people who live there. These skeds have in turn required that the classes who participate learn more about their own community to be able to answer questions as well as ask them.

There are the YL clubs that sponsor code and theory classes and whose membership increases each year from the women who have benefited from them. Others are active with handicapped persons, people in Veterans Hospitals, or with shut-ins, taking amateur radio to these people who are interested in acquiring a license, and then finding civic groups to assist in getting them on the air.

\*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

WB5CUR received the Certificate of Merit from West Gulf Division ARRL Director W5EYB for having handled the most traffic in the South Texas ARRL section during the year 1973. (Photo courtesy W5EYB)

And, YL clubs plan typical amateur radio activity operating their own Field Day, in some cases from putting up the antennas, through the last contact and taking down the equipment. Or they are the club most often called upon to plan the program, and hospitality room for the women who attend division, and national ARRL conventions. They set up a dual program of YL forum and luncheon for licensed women operators, as well as providing entertainment for the wives of amateurs who plan to be there but who are not particularly interested in the technical sessions.

About 90% of the clubs in this country sponsor a certificate, in some cases, as with the Colorado YLs more than one, and with the clubs of international scope many varied certificates, for proof of contact with the membership. Many of them have their own nets, both cw and phone, to encourage the members to keep in contact with each other, and welcome anyone who wishes to join them.

Internationally women amateur radio clubs have been growing from informal on the air groups to national clubs formed mostly by these YLs meeting in person at amateur radio conventions. Their purpose too, is association, and to encourage newly licensed YLs to become more active on the air.

The local YL clubs in this country, the three major area clubs in Canada, the nation-wide YL clubs in many countries, and the two world-wide YL clubs YLRL and YLISSB, all began as groups of women meeting through a common interest. Through that interest they have grown into clubs that are helping, and giving, and building. Unlike the Stein simile that might be the statement of someone who joins for the status of just "belonging" and gives nothing, the membership here are bringing friendship to amateur radio through their activities.





NYC YLRL members who will be working on the YL activities committee for the 1975 National ARRL Convention, to be held at the Waldorf Astoria Hotel, July 19-21, 1974. L-R: Madeline Greenberg, W2EEO, YLRL Disbursing Treasurer; Ruth Schlitt, WA2RIX, NYC YLRL President; Christine Haycock, WB2YBA, YLRL Vice president, and official photographer at the convention; Barbara Neiman, WA2RDU, YLRL Second District Chairman. (K2BM photo)

### Official Novice Rule of YLRL Contests

Because of a misunderstanding of the Novice rules in the YLAP contest the YLRL announces the following rule to be respected in all YLRL sponsored contests.

"No credit will be allowed for Novice contacts in YLRL contests on any frequencies outside of Novice bands. Although Novices may operate legally with another amateur's call on other bands from that amateurs station, the Novice is not licensed to operate on any band except the Novice band, and all YLRL contests are for licensed YL amateur radio operators."

This ruling issued by Ella D. Russell, WA8EBS, 1974 YLRL President should eliminate any further questions regarding the participation of Novice licensees in the club sponsored contests.

### DXCC-YL Certificates

CLARA, Canada's national YL club, will sponsor a DXCC-YL certificate this year. Requirements for this certificate are submission of proof of two-way contact with YL amateur radio operators in 100 different countries. The club will also issue stickers for each additional 20 countries.

This certificate will be available to all amateur radio operators who can qualify. The requirements set by the club are: complete log data with self addressed envelope plus postage, the signature of the applicant, and \$1.00, or 10 IRCs. No QSLs are necessary.

The certificate custodian is Cathy Hrischenko, VE3JGH, 30 Lisburn Crescent, Willowdale, Ontario, Canada, M2J 2Z5.

YLRL has announced through the bi-monthly club publication *YL Harmonics*, that a YL DXCC Award has been under consideration since last fall. Rules and details will be announced following action of the YLRL Board of Directors' January meeting.

### YLISSB QSO Party Planned

The YL International Single Side Banders system have planned their annual QSO party for 1974. The cw segment will begin at 0001 GMT, on May 10, and end at 2400 GMT, May 10. The 24 hour operation will include a 6 hour rest period.

The phone segment 0001 GMT ending 2400 GMT, May 19 and includes two six-hour rest periods in the 48-hour operation.

Awards are planned for high scores, and for team participation. Complete rules can be found in the "Operating Events" column of QST.

### 1910 "FNFN" and "OHK"

"YL News and Views" has received several inquiries regarding the identity of one of the two YLs who were listed in the 1910 Gernsback *Blue Book*. It is well known that Olive Heartberg, of New York, who shared the call OHK was a YL, but the queries were regarding the listing "FNFN - Herrold, and Glass," for there was no identifying given name for the "Glass."

W6LM, G. S. Corpe, has cleared the mists away, and most successfully classified the feminine touch to that call. He writes:

"Mrs. Glass worked with, or for Charles Herrold in his wireless school in 1910, in San Jose. Her health went bad, and early in 1911 she came to Santa Barbara. We had an amateur radio club there and she came to some of our meetings."

"YL News and Views" is very grateful to W6LM for his assistance in identifying that call "FNFN" as Charles Herrold, and Mrs. M. J. Glass thus verifying that 1910 was the year that introduced what has been called the "distaff side of amateur radio" with these two YLs in this country.

### Second International Italian YL "Jolly-Flower" Contest

Dates: Start April 1, 1974 0000 GMT  
End June 30, 1974 2400 GMT

Rules:

*Exchange:* Reports, call sign name.

*Scoring:* Italians - contact one Jolly Station, plus 2 other Italian YLs, not Jolly Stations. Europeans - Contact one Jolly Station, plus one other Italian YL who is not a Jolly Station. Extra Europeans - Contact one Jolly Station only.

*Awards:* The "Jolly-Flower Award," an artistic lithograph of a well-known Venetian painter signed by the author, for the first 100 winners. All following winners, handsome certificates.

*Logs:* All logs must show call signs, reports given and received in GMT. All Italian YLs must be in possession of QSLs from the contacted stations. Send application with logs (no QSLs) to I2CYB, Carla Benatti, POB 155, 46100 Mantova, Italy.

Italians include 12 IRCs, Europeans - 15 IRCs, Extra Europeans - 20 IRCs.

Contacts during the contest also count towards the WIYL Certificate.

The WIYL certificate requires proof of contact with members of the YLRC Italiano "Elettra Marconi." Charter members 3 points, ordinary members, 2 points, non-members 1 point, Jolly Stations, 5 points.

### 34th YLRL Anniversary Party Results

#### CW Winners

YV5CKR	1764	Gold Cup, First place
I3MQ	1440*	Certificate, Second
K1QFD	1350*	Certificate, Third
WN0GQL	137.5*	Novice Certificate

#### Phone Winners

HC2YL	7599	Gold Cup, First Place
K6KCI	4830*	Certificate, Second
K6DLL	4758.75*	Certificate, Third

#### Combined CW and Phone Scores

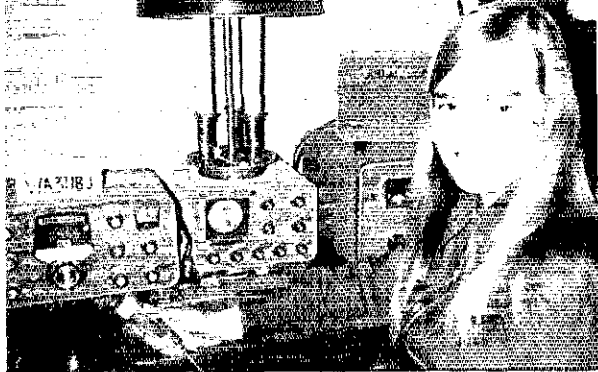
HC2YL	8,226 <sup>1</sup>	W8IEO	1,221
YV5CKR	8,004	WASZZA	1,063.5*
K6DLL	5,183.75* <sup>2</sup>	G8LY	618.75*
W8FSX	3,997.5*	SM5CXC	330
K4RHU	3,722.25*	OK2BBI	312
K8ITF	3,483.75*	JA1YL	58.75*
K1QFD	3,240*	JA1AEQ	53.75*
WA0YNC	3,118	VK3KS	5*
VE1AMB	2,985 <sup>3</sup>	W4TVT	714
VE3GTI	2,632	K5OPT	3,555
G2YL	2,350*	WASZZA	517.5*

#### CW Scores

K1QFD	1,350*	K6DLL	4,758.75*
WA2DMK	891.25*	W6JZA/6	467.5*
W2HFR	520	K6KCI	4,830*
W3CDO	432	W6NLM	1,612
K4RHU	1,031.25*	WA6PZC	96
WB5EAY	960*	K6QPG	1,505*
WASZZA	546	WA6UBU	216
K6DLL	425*	W7NJS	1,176
W8FSX	625*	W7WLX	1,938
W8IEO	168	W8FSX	3,372.5*
K8ITF	315*	W8IEO	1,053
K8ONV	776.25*	K8ITF	3,168.75*
W8USU	600*	W8KMT	300
WN0GQL	137.5*	K8TVX	225*
WA0YNC	528	W8VXE	1,725*
VE1AAO	135	K5YIB/0	1,110*
VE1AMB	840	WA0YNC	2,590*
VE3GTI	744	W0ZWL	1,802
F2SQ	12	VE1AMB	2,145
G2YL	700*	VE3GTI	1,888
G8LY	78.75*	DJ1TE	3,547.5*
HC2YL	627	DJ0EK	4,140
I3MQ	1,440*	DL3LS	3,640
JA1AEQ	1.25*	G2YL	1,650
JA1YL	18.75*	G8YL	540
OK2BBI	42	HC2YL	7,599
SM5CXC	80	HYTL	1,175
VK3KS	2.5*	I3MQ	30*
YV5CKR	1,764	JA1AE	52.5*

#### Phone Scores

WA1JYO	1,612.5*	JA1YL	40*
WA1NXR	2,557.5*	JA2QEW	35*
K1QFD	1,890*	J8KDW	18.75*
W1ZEN	925*	JR1UNE	15*
WA2DMK	1,017.5*	JR1GWS	16.25*
W2GLB	2,850	JE1IWR	21.25*
WB4NKO	2,376	JH1SSE	20*
WB4QDE	1,768	J8EJH	16.25*
K4RHU	2,691	JH1ANX	15*
WB4TIV	3,382.5*	JR3MVF	45*
K6QPG	2,045*	OK2BBI	270*
WA2DMK	1,808.75*	PA0HL	4
I3MQ	1,470	SM5CXC	250*
		VK3KS	2.5*
		YV5CKR	6,240



WA3UBJ, Gaylen Reiss, Secretary of Penn State Amateur Radio Club. Daughter of W3HR, and W3PUD, Gaylen is a sophomore at Pennsylvania State University. She is majoring in pre-medicine.

Congratulations to the winners. This was the first contest in which there was an award for Novice participation in a YLRL sponsored contest. WN1GQL was the only Novice to submit a log for this new form of award, she is, therefore the Novice winner. QST

### FEEDBACK

The "Heterodyne Exciter for 432 MHz," November, 1973 *QST*, has an error in pin connections for the doubler stage (Fig. 1). For the 6888 tube, the cathode connections are pins 1 and 3, the control grid is pin 2. The suppressor grid is not connected to the cathode internally; therefore pin 8 must be grounded directly. Pin 9 is the screen-grid connection, and pin 7 is the plate. Also, the .01- $\mu$ F capacitor shown connected from pin 8 of the oscillator (6922) should be changed in value to .001. The larger value shown will work in most instances, but a few crystals may exhibit instability with too much coupling. RFC2 may be deleted.

There is an error in the schematic diagram in Part I of "A Complete 2-Meter FM Transceiver," by Bernard, February, 1974 *QST*. On page 21, Fig. 4, the 0.1  $\mu$ F capacitor and 3300 $\Omega$  resistor in series from the top of the volume control should connect to the collector of Q3, not to the Zener diode as shown. R4 should be 47K $\Omega$ . In the i-f section, Fig. 2, T2 and T3 should be J. W. Miller 2071, T4 is a J. W. Miller 9-C1.

In "The Thirty Dollar Counter," Anderson, *QST* for January, 1974, pins 1 and 12 on each IC, U1 through U5, should be jumpered (Fig. 1). Also, in the connections from the SN7490 decade counters (U1-U5, incl.) to the SN7441 decoder/drivers (U6-U10, incl.), there is an error. Connect pin 8 of U1 to pin 7 of U6, pin 9 of U1 to pin 6 of U6, pin 11 of U1 to pin 4 of U6, and pin 12 of U1 to pin 3 of U6. Use this same sequence in the rest of the digits for U2-U7, U3-U8, U4-U9, and U5-U10. The caption for the neon tubes should be NE2 and not NE1.

In *QST* for January, 1974, page 37, the integrated circuit mentioned in the caption of Fig. 2 is not a CA3021E. The correct number is the same as that used elsewhere in the article QST CA3102E.

# IARU News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

## EATON NOMINATED TO IARU PRESIDENCY

The offices of IARU president, vice-president, and secretary normally are filled by the individuals holding the counterpart offices in the Headquarters society, *ARRL*, as provided for in the IARU constitution. Upon his election as *ARRL* president two years ago, Harry J. Dannals, W2TUK, indicated his feeling that the duties of *ARRL* and IARU president were too demanding to be filled by one man. Therefore, the *ARRL* Board of Directors at its 1972 annual meeting nominated Robert W. Denniston, WØDX, to continue in the IARU office for another two-year term. This nomination was confirmed by unanimous vote of the IARU member-societies.

This year, Mr. Denniston indicated that he was unable to continue as IARU president due to the press of personal affairs. In his place the *ARRL* Board has nominated Noel B. Eaton, VE3CJ, to assume the office. Mr. Eaton has long served as the *ARRL* Canadian Division director and is a newly-elected vice-president of the League. He has an extensive background in IARU affairs, including attendance at IARU Region I conferences, participation in the 1971 ITU Space Conference, and service as treasurer and executive committee member of the *Union Interamericana de Radioaficionados - IARU Region II*.

A proposal to elect Mr. Eaton IARU president is now circulating to the member-societies. Election requires the concurrence of a majority of the societies.

Newly-elected *ARRL* First Vice-President Victor C. Clark, W4KFC, joins the IARU official family, while John Huntoon, W1RW, continues as secretary.

## PROPOSALS BEFORE THE UNION

Proposals concerning the membership and organization of IARU, as well as amateur radio internationally, are regularly offered to the members of the Union. Voting on two such proposals has just been concluded, and two more are currently before the membership.

The *ARRL* proposal providing for five and six-band versions of the Worked All Continents award has been approved. Exact rules are now being formulated and will appear in this column next month. A proposal by the *Japan Amateur Radio League* calling for the use of the sub-bands 144.0-144.1 and 435-438 MHz by future amateur satellites has been defeated. It is pertinent to note that the IARU Region I Division, comprising Europe, Africa, and the USSR, has just revised its band plans for 144 and 430 MHz to provide for the use of 145.845-146.0 and 435-438 MHz by satellites.

Now before the Union are proposals to admit the *Radioklub der DDR* to membership representing DM amateurs, and to elect Noel B. Eaton, VE3CJ, president of the Union.

## IARU HEADQUARTERS VISITORS

The year 1973 was a busy one in terms of international visitors to *ARRL*/IARU headquarters. Amateurs from all continents and nearly 30 countries signed our guest book. Prefixes represented included CE, CR6, CT1, EL, F, FM7, FP8, G, GM, HH, HR, JA, KG6, KV4, ODS, OH, OZ, PAØ, PY, SV, VK, VP7, XV5, XW8, YU, 4X, and 9M2.

New president of the *Liga Colombiana de Radio Aficionados* Elie Rezk, HK3AFB, makes a presentation to Jorge Goldstein, HK4BNC, at the 1973 *LCRA* convention. The *LCRA* marked its 40th anniversary last year. (Photo by WA4ZZG)

## Strays

### QST Congratulates . . .

Dr. W. C. Hess, W6CK, Major, CAP/USAF, recipient of the Gill Robb Wilson Award, the Civil Air Patrol's second highest award.

Merrill Fraser, WSALL, Mayor of Cloudercott, New Mexico, recent recipient of the QCWA's 50-year certificate.





CONDUCTED BY BILL SMITH,\* W5TVB

*Where Has All the Tropo Gone?*

**T**HE PERIOD January 14 through 17 produced excellent long-haul tropo conditions over nearly two-thirds of the United States. It appears, that for the most part, the opening went unused by amateurs. Bob Cooper, W5KHT, observed the opening from Oklahoma City. Here is his report and some remarks by him regarding amateur vhf DXing.

Heading home from my Oklahoma City office the evening of January 15th, I flipped the two-meter fm rig to 22/82 as is my custom for the 45-minute drive. It was foggy at ground level, in patches, and at 600 feet a low overcast hung over several states. A local on 22/82 was discussing how few and far between tropo openings had been during the past year. "We used to have openings every week or so," he noted, "but for the past year or two there have only been a handful," he explained.

Punching up channel 6 audio (87.75 MHz) on the car fm radio I noted full quieting signals from Tulsa (100 miles) and Wichita Falls (140 miles). Punching up several other fm broadcast stations, I noted Kansas City (295 miles) and St. Louis (460 miles) good copy. *I wasn't surprised.*

That morning I had arisen at 0520 and found vhf high-band (Channels 7-13) signals from Cincinnati (740 miles), Columbus (845 miles) and Roanoke (960 miles) and uhf TV signals from Roanoke, Ohio, Illinois, Indiana, West Virginia, and Kentucky were all over the dial, ranging from 500 to 960 miles distant. A quick check of the fm broadcast band had revealed signals from as far east as Pittsburgh (990 miles).

The fellow on 22/82 concluded with the thought that the jet stream was out of place again and when it returned to its normal position vhf tropo openings would return. Arriving home I found Kingsport, Tennessee (720 miles) on Channel 19 and Norton, Virginia (801 miles) on Channel 47.

The "mid-winter tropo opening" *this year* began from Oklahoma around 1830 CDST on

\*Send reports and correspondence to Bill Smith, W5TVB, ARRL, 225 Main St., Newington, CT 06111.

14th. It ran more or less nonstop through 0730 on the 17th. The opening from Oklahoma ended only because a low-pressure trough formed locally over Oklahoma and eliminated our end of the "ducting."

This year's session was not unlike others in past winters. A large, stable high-pressure dome stagnated over the mid-south. The high-pressure area dominated the region from the Texas panhandle to the eastern slope of the Smokies. It ran from as far north as a line between Sioux City, Iowa, on the west and Cleveland on the east, to as far south as Houston on the west and Atlanta on the east. Essentially, everything east of the high plains and south of the Great Lakes, west of the eastern slope of the Smokies and north of the Gulf was involved. This was enhanced by a low-level moisture flow that created a moist, wet blanket over much of the region (most affected areas reported high fog) between dusk and mid-morning.

In spite of the greatly enhanced signal levels and unusually wide-spread nature of the opening, DX contacts on 144, 220 and 432 were apparently all but nonexistent. Locally K5PJR heard the K8DEO beacon on the morning of the 15th. Schedules hastily set up on the headline for the evening of the 15th between Oklahomans W5ORH and K5PJR and eastern stations W4EJ, Virginia, and K4EJQ in eastern Tennessee failed; no signals. W4EJ was just too far east, but the Oklahoma-to-K4EJQ failure is not so easily explained. While the schedule was failing this writer was watching two eastern Tennessee uhf TV stations with beautiful, stable signals!

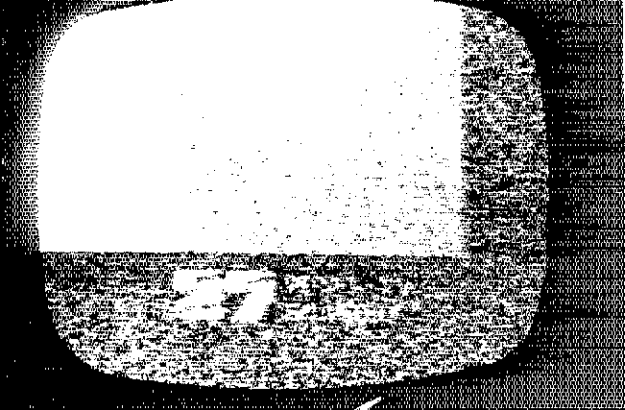
In the past, objective vhf-uhf amateur DXing types have argued that high-power TV stations, often located on mountain tops and always operating with tower heights far above the amateur heights are *not* good warning indicators for vhf and uhf tropo. *I disagree.*

First of all, the fact that these TV (and fm broadcast band) signals *are* coming through enhanced indicates that tropo conditions *are up*. Six-meter types monitor the two-way services just below 50 MHz for signs of a rising muf to tip them to six-meter openings. The principal is the same; commercial services simply providing an early warning.

Secondly, during the past five years that my efforts have concentrated on vhf and uhf TV signal

Test pattern from WLWI, Indianapolis, channel 13 as seen at W5KHT, January 15th, at 0551 CDST. Path distance is 671 miles.





Split-screen color bar test pattern of WRFT, Roanoke, Va., channel 27, as seen in Oklahoma City at 0615 CDST, January 15th, a path of 963 miles on 550 MHz.

research, I have had several hundred opportunities to compare *locally* with W5ORH, K5PIR and others results I have noted on TV and fm with results they had (i.e. *contacts*) on 144 and 432. There has been *no* relationship noted during that period between my various observations and their contacts. That is, conditions that *have* produced contacts for one or both have repeated very closely many times for me on TV, with no contacts for either W5ORH or K5PIR.

It seems clear that contacts are being missed on 144 and up, not because of idiosyncrasies of tropospheric propagation, and the often-used excuse that TV stations have big towers and lots of power. They are being missed because of a simple lack of activity. People have quit looking, and they have ceased transmitting. A handful of lookers is no substitute for plenty of guys calling CQ at the right places and right times. Keeping regular skeds is productive, too.

As I see it, many of the serious long-haul 144 and 432 operators have abandoned the tropo mode for moonbounce. And the less serious spend so much time listening to their local fm repeaters that they have ceased to pay close attention to the usual tropo warning indicators. There are some quick solutions. One is to hang a good deep-fringe vhf TV array at least 50 feet above ground, then check the TV band conditions several times per day, *every day*. When conditions start to improve, get on the air and call CQ more often. Listen more . . . yes. But transmit more for sure!

You can take advantage of the fm repeaters on two meters, too. Put up a reasonable-gain array centered on 146.5 and acquaint yourself with the repeaters in the 100- to 300-mile range. You need to be checking on their signal level every morning and every evening. Most fm repeaters are in exceptional vhf locations. Some have antennas side-mounted on TV towers, giving them the same advantage for getting into a "duct" as the TV transmitter antennas. If you start to copy good long-haul repeaters on 2 meters, and the TV band is open, you *know* that some DX should be workable via other modes than fm.

We have become too channelized. We sit with 19-inch whips on our two-meter fm transceivers, on our local repeater channel(s), and complain that the band is never open anymore. It is worth noting that while TV signals were rolling through here on the 14th-17th of January, I unhooked my 200-foot high Channel 7-13 antenna and plugged it into my Tempo hand-held unit. On .94 and .76 I logged numerous W8 and W4 repeaters, at the same time locals on .82 and .94 were remarking that the band conditions "might be up some" because

mobiles in Tulsa (100 miles) were getting into the local machines.

Perhaps tropo DX work on two meters is dead. It may be a thing of the past. Perhaps fm has so completely taken over our most popular vhf band that long-haul tropo work will become a thing of the past. There will always be a handful of dedicated practitioners who will pursue meteors, moonbounce and long-haul tropo ducting, but it takes more than a handful to take full advantage of conditions such as existed January 14-17 over nearly 60 percent of the United States. The spirit of vhf/uhf exploration may be dying. If it is, the tombstone should be erected with a 19-inch whip prominently affixed to the top. And the engraving should read "Here lays Sam Q. VHF . . . he died with his receiver frozen on 94!"

*About the author:* W5KHT became a vhf'er at the age of 12 and shortly thereafter filled his 17haea, New York, backyard with rhombic antennas for the reception of long-distance television signals. As K6EDX in the 1950s, Bob gained 50-MHz WAS certificate number 21 and also holds a six-meter WAC. He has since operated as KV4FU and W5KHT. Mr. Cooper must be considered one of the foremost amateur radio experts in the field of propagation. It was at my invitation that he prepared this month's guest editorial.

#### OVS and Operating News

50-MHz sporadic E watchers found some happiness during the winter season, but from the number of reports received, openings were not plentiful. The New Year began with what W4LNG in Atlanta calls a "wild opening." Beginning about 1930 GMT and lasting until 0020, Ruddy logged W1s, 5s, 8s, 9s and 9s. Your column editor was in Nassau this particular day wishing he had six-meter gear. Watching channel 4 from Miami showed strong E cochannel interference to New Year's Day football. In Virginia, K4MSG noted the same opening and worked 5s, 9s and 9s, but with *one* watt to the antenna could not raise WA6JRA. Paul worked Florida the following day and on the 7th reports an opening to Tennessee and 9s worked by neighbors W4DNK and WA4ZWB. Also in Virginia, former WA3SKT/4 now signs WA4GPM from Norfolk. Kentucky can be tough on a vhf band, but WB4BVI at Burnside represents the state on six with a 9-element wide-spaced Yagi fixed on New York City looking for 700-mile scatter contacts with a pair of 3-500Zs.

That January 1 opening satisfied W0OPN/5, New Mexico, as Lea found 4s, 5s, 6s, 8s and 9s. On the third California, Ohio, Illinois and Oklahoma were workable, and the following day 4s, 5s and Montana. In six months W0OPN/5 has worked 33 states from Portales, NM with 20 watts ssb. K5ZMS/5, San Antonio, says E this past December was down from a year ago. But on the 29th Ray says there was extensive E throughout the eastern and central states, moving late that evening into



the Pacific Northwest. The next day stations from Florida to California were worked, leading to the January 1 opening. That opening, from San Antonio, spread from New Hampshire to Nevada with most everything in between being worked. Ray says the Bowl games carried on San Antonio — channels 4 and 5 were nearly wiped out by strong E from stations in the midwest, causing one TVI complaint to him. An explanation to the neighbor solved that “%! ham radio” problem, but left the fellow still unhappy about the E interference to his Bowl games. Six was open again the evening of the 2nd to 4s, 5s, 6s, 7s, 8s and 9s. The morning of the 4th produced much scatter associated with the Quadrantid meteor shower. Ray says W7ZBS, Tucson, worked Delaware during the early January E, for state number 50. WASHNK is back active from Pearland, about 20 miles south of Houston.

From Las Vegas, K7ICW reports E December 22, 29 and 30 and says the winter E season just past was nearly identical to one year ago. Near Portland, K7ZCB worked a minor opening to California December 8th and an extensive opening the afternoon of the 30th. On January 1 six meters was open from the Portland area to Florida, Louisiana and Texas.

WAØVJF, near Kansas City, says the January 1 opening was “fantastic.” Jon worked several stations on 50.4 a-m, running a Heath 6er. Contacts included Florida, Georgia, Kentucky, Pennsylvania, Ohio, Virginia and Maryland. The following day was nearly a repeat performance, with 4s and 5s being worked. Jon says the opening on the first was one of the best he has ever heard. But from the Minneapolis area, WBØIWG says the E season was poor. Jim goes on to list openings December 9, 10, 15, 25 and January 1 calling the latter ‘a major opening.’

144-MHz DXers sampled tropo, meteors and moonbounce during the midwinter months. K2EVW, N.J., reached 22 states, adding one during the Geminids. He experienced QRM which prevented a Georgia contact. He says the Geminids were good, but that results during the Quadrantids were poor and he made no contacts. WA2UDT, also N.J., adds two more states reaching 24, but says a recent marriage and graduate school keeps him occupied. W4LNG, Atlanta, has 22 states worked thanks to winter tropo and WSVUY in Louisiana, worked in late November. He and W4LRR were aware of excellent tropo January 1 throughout the southeast from what was heard on the repeater channels, but Ruddy bemoans the fact that the DXers were caught asleep. You are so right, Ruddy. Much good winter tropo is missed by those who pack-up when cold weather arrives. WB4OMG says there is much DX activity on the .52 and .94 simplex channels; so much that the QRM is a real problem. But says, “Hopefully fm operators will discover there are other channels for simplex.” He says in Florida and southern Georgia there are numerous DX-equipped fm stations and 500-mile contacts are not unusual. WA5HNC, near

Houston, says ten others and himself are regularly active around 144.1 ssb looking for tropo. On moonbounce, W6PO continues to lead-the-way on 144. Stations worked in a 30-day period ending January 8 include W8KPY, VK5MC, WASUNL, K4IXC and VE2DFO. Bob now has 20 states worked, mostly via the moon and says he will soon have a 40-element collinear available for tropo and meteor work to add states within range of those modes. Bob knows of perhaps two dozen operators preparing for EME activity this year. I predict that it will not be long before there is at least one active 144-MHz EME stations active in each state, including Hawaii and Alaska. Two-meter WAS is not far away!

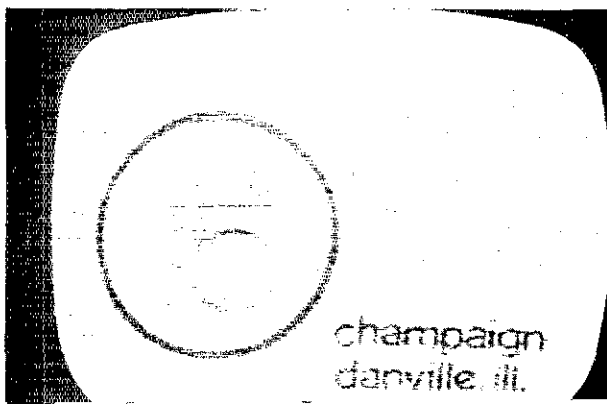
At Tucson, WA7BBM added three states during the November Leonids: Nebraska, Montana and Colorado, to reach 14; not easy from southern Arizona. In Fort Wayne, K8UNM's mighty 50-watter has now accounted for 33 states, the latest being K4IXC, Florida, on meteors. Speaking of John, K4IXC, he recently had his first EME contact with W6PO and is now directing his talents towards EME activity. John is one of those individuals who starts a project and completes it in fine fashion. Over the years John has done much for vhf activity through his vast patience to work with those needing his state on 144, 220 and 432. Well done, K4IXC!

220-MHz news this month comes from the western states where WA6MBP, Glendale, says he is active with a homebrew transverter and 7-element Yagi on ssb and cw. Jerry indicates he will add more power later. WB6NMT continues to “father” 220 at his San Diego location. Recent meteor scatter work includes a contact with K7BBO, Tacoma, during the Geminids. Louis says W7CNK will soon be returning to the 220 EME game, probably with a 160-element collinear. Louis may meet him on that mode with a 28-foot dish that is in the “bidding stage.” He says further that a number of Los Angeles stations are new to 220: WA6GUY running all solid state, K6PYH, WB6OKK and K6QEH (who?). WB6CXF is working on a new home being built on 2-1/2 acres near Julian, to be equipped with 16- and 28-foot dishes.

432 MHz and Up news centers mostly on moonbounce. K2UYH, Trenton, says foul weather has hampered some of his schedules, but that on January 8 he worked WØYZS and WAØJMC on EME schedules, following which a QRZ brought a response from VE7BBG on ssb. The following night echo tests using fm at K2UYH brought results. Later that evening Al again worked WØYZS on cw and VE7BBG on ssb. Other stations identified off the moon were W4NUS, W6FZJ and WØEYE. Al says 2304-MHz EME tests were postponed until March because of weather, but he is

Identification slide of WICD, Champaign, Ill., taken at W5KHT, January 15, 0625 CDST, over a 580-mile path. Channel 15 is 476 MHz.

March 1974



ready anytime to schedule well-equipped stations on 432, using arrays on the horizon or tilted. In Maryland, W3CJG has reached 10 states on 432 after a contact December 12 with K8UQA, Ohio. Bill runs about 300 watts to a 27-element Yagi and desires late evening schedules. In Pennsylvania, W3OMY has 11 states on 432, the new ones being W3CJG, Md., and WA0JMC, Missouri, both on tropo.

At San Jose, W6FZJ says about ten states and four continents are represented on 432 EME. Joe has 8 states worked; 5 via moonbounce, with the latest being Kansas and Missouri. December 9 Joe scheduled G3LTF, England, and got all he needed for a contact, but was not sure that G3LTF did, so further schedules will be made. KH6BZF heard W6FZJ, also on December 9, via the moon. Five minutes later Joe heard the Hawaiian station, but too weak to work. KH6HZE was running but 200 watts and four W0EYE Yagis, so a contact between Joe and Lee can't be far off. W6BZI reports he is building towards 1296 and 2300, but that the finished product, all solid state and new designs, is still in the future. Joe has had to cancel publication of his gratis 432 newsletter, but will continue to answer specific letters about EME. A self-addressed stamped envelope is appreciated as Joe says he gets 15 to 20 letters per week, and he answers them all! Joe says 1974 will be the year of EME on 432, with the present number of stations active expected to double this spring.

From Topeka, W0DRL has 24 states worked on 432, the latest being an EME contact with W6FZJ. Al has increased his power output to 350 watts, feeding his homebuilt 20-foot dish. The reason Al has not been heard on tropo lately is that his effort has all been toward developing his EME system, and he has but one Yagi in the air for other work. Obviously the system is working well as Al has consistent contacts with VE7BBG and K2UYH, and is hearing some 9 dB of sun noise.

Bad news from the Crawford Hill VHF Club. The 60-foot dish, drive system and controls, used so effectively in recent years by W2NFA, have been scrapped, so no more 1296-MHz work from W2NFA will be possible. There exists some possibility of 2300-MHz work with a different antenna.

Meanwhile, the big array is not totally lost to the amateur scene. Vic Michael, W3SDZ, has acquired the complete system at considerable personal expense. It is being transported to the

hill-top site of W3SDZ, Muncy, Pa., with reerection to start in the spring. This will be a tremendous project, both physically and financially. Anyone who might be able to help with the very heavy steel and concrete construction work is asked to contact Vic at Box 80, Muncy, PA 17756, or Dick Turrin, W2IMU, Box 45, Colts Neck, NJ 07722. Phone numbers are W3SDZ, (717) 437-2119, and W2IMU, (201) 462-8721. Daytime, at work, (201) 949-3504.

### Simple Approach to 2300-MHz Space Reception

Inspired by the work of W4HHK and K2RIW, described by them in two *QST* articles,<sup>1,2</sup> Preston Rice, W4FIG tried Apollo reception with simpler equipment. The Apollo program ended with the flight of Apollo 17, but other uses of frequencies near our 2300-MHz band are in prospect for NASA probes, as mentioned in Reference 1, and W4FIG's results may be of interest to those getting set for reception of the forthcoming 2300-MHz Oscar beacon.

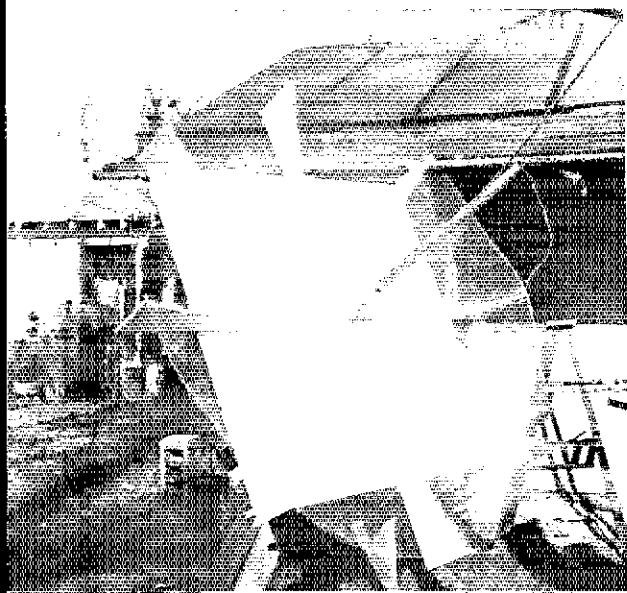
K2RIW's estimated 29-dB s/n ratio on the Apollo signals indicated that a simpler receiver and a dish as small as 6 feet might be usable, so W4FIG built a basic converter, and a 6-footer made of plywood and hardware cloth. Only the latter two items were purchased, though W4FIG admits to a well-stocked "junk-box," after 30 years of vhf and uhf experimenting. The project was a one-man effort, with the *Handbook* and *QST* the only aids.

Voice modulation of the Apollo signal was not heard, but the main carrier and the two subcarriers were plainly audible. Identification of the signal as being from Apollo was made by the position of the subcarriers, 1.25 MHz either sign of the main signal, and by the aiming of the antenna needed to maintain reception. The main signal was 8 to 9 dB above the receiver threshold, and the carriers 2 to 3 dB, on the last night before splashdown. First reception was obtained the previous night, with signals some 4 dB weaker.

Tests were made nightly, after Apollo 17 left the launching pad, but a problem of calibration apparently delayed any positive result. A careful recheck of the variables in the communications receiver, uhf converter, and 27-MHz converter turned up errors totalling about 200 kHz. When these were eliminated the signal was found at once, right where it should be. Aiming was also a problem. Alignment on the moon visually was prevented by bad weather, and is useful only when the source of signal was still on the moon. K2RIW's clues for finding the CSM after takeoff helped W4FIG to locate the CSM finally, roughly 15° WNW of the moon the first day, and 20 to 30° west the second day.

<sup>1</sup> Wilson and Knadle, "Houston This is Apollo -" June, 1972, *QST* p. 60.

<sup>2</sup> Knadle, "Twelve-Foot Parabolic Dish," August, 1972, *QST*, p. 16.



Six-foot parabolic-reflector made by W4FIG for Apollo reception. Backboard is plywood, four feet square. Ribs of the same material support the reflector, made of half-inch hardware cloth.

## Antenna

W4FIG built his dish using a plywood supporting frame (backboard) and 8 radial ribs, also of plywood, cut to the formula given by K2RIW.<sup>2</sup> The edge-mounted ribs held the reflector, cut from 1/2-inch hardware cloth. A 6-foot aluminum tube, 1-1/4-inches in diameter, through the center of the dish, served as positioning rod, counterbalance support, feedline conduit, and as a support for the feed horn and 2300-MHz converter. The feed horn was a one-pound coffee can (3-7/8 inches inside diameter) with a 1-1/4-inch antenna rod mounted to a BNC jack, 1-11/16 inches from the closed end of the can. The open end looks into the center of the dish, 3.6 feet from the dish surface. A short piece of RG-58 coax runs from the BNC jack to the converter input. W4FIG intended to build a W21MU dual-mode horn, as used by K2RIW, but ran out of time.

The contour of the hardware cloth could not be kept to within the recommended maximum variation of plus-or-minus 1 inch from a true parabolic surface, just fastening it to the ribs. At first it appeared that a laborious cutting and shortening of some wires between ribs might be necessary, but a satisfactory alignment was achieved by means of short wires between the reflector and the backboard. The hardware cloth was nailed to the ribs, and the excess cut away with tin shears, leaving a circular reflector.

The center support was mounted to a home-made equatorial telescope tripod, which gave only one arc through the sky. For other arcs the tripod was turned or tilted, adding to the task of finding the signal.

## Converter

The 2300-MHz converter was patterned after the 1296-MHz model found in several editions of the *Handbook and VHF Manual*,<sup>3</sup> except that trough dimensions were cut approximately in half. A BNC jack about 1/2 inch from one end of the assembly was used to couple the 2287.5-MHz signal into the trough, by means of a small tab. The tab position was adjusted with respect to the

<sup>3</sup>Also Troetschel, "1296 Revisited," July, 1973, *QST*, p. 40.

trough inner conductor, for maximum response to an external signal source.

The oscillator chain used a 90-MHz overtone oscillator, and a doubler stage, both 2N5130s, and a 2N3866 tripler to 540 MHz. This drove a 1N914 biased-diode multiplier to 2160 MHz. Up to 0.6 mA crystal current could be obtained with a 1N21F diode mixer, but best noise figure was achieved with 0.3 mA. A built-in low-noise FEI amplifier at 127 MHz follows the mixer. Its output is fed through 50 feet of RG-58 to the 127-MHz converter in the station.

## Signal Source

A test signal is essential in a project of this kind. W4FIG used an overtone oscillator with a 40.85-MHz crystal. The 56th harmonic could be heard (2287.6 MHz) when the oscillator was placed a few inches from the converter front end. Identification of the correct harmonic was established by the input trough's peaking at the right position, slightly higher in frequency than the point at which the crystal current is "sucked out" by trough resonance at the injection frequency, 2160 MHz.

## Miscellaneous Hints

A word about the 2N5130 transistors may be in order. These low-cost items have many uses. W4FIG gets 100 mW out of them easily in a 2-meter QRP rig, and they work well as rf amplifiers at 50 or 144 MHz, as well as for applications such as those described above.

A useful tool for testing the feasibility of vhf or uhf communications circuits is the "Communications System Calculator," a slide rule available from American Electronic Laboratories, Box 522, Lansdale, PA 19446. W4FIG obtained his by circling a number on a requisition card from *Microwaves Magazine*, but he feels at even the marked price of \$5 it would have been a good investment. Using conservative values for the W4FIG Apollo system — 1-kHz receiver bandwidth, receiver NF of 10 dB, a 3-dB S/N ratio, a 10-watt Apollo transmitter, and a range of 200,000 miles, the calculator tells you that a system antenna gain of 40 dB is needed, relatively easy to develop at 2300 MHz.

1057

## Strays

Radio City, New York has nothing when it comes to cornering the market on city names which deal with radio and communication.

After all, there are the cities of NOVICE and TECH in Texas, along with TELEPHONE and TELEGRAPH which are also in Texas.

TECH is shared with the states of Louisiana and Arkansas and DIAL, another city in Texas, is also a city in Georgia.

To ADVANCE, one must go to Missouri in order to handle the TRAFFIC from Minnesota.

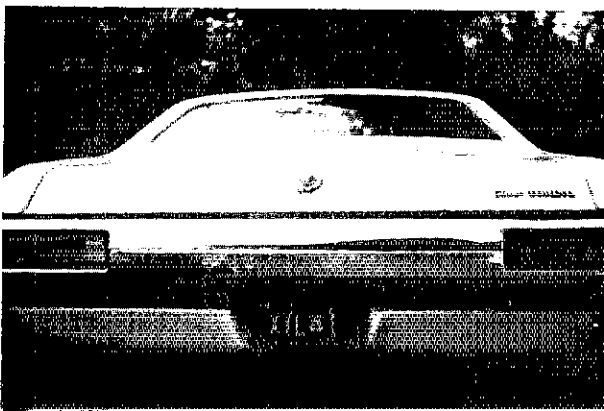
Spark gap transmitters are evidently still being used because of all the SPARKS in Georgia, Kansas, Nebraska, Nevada, and Oklahoma. Some people are CRYSTAL controlled, especially in Kentucky, Minnesota and North Dakota.

As far as measurements go, the BEL is recognized in Louisiana. WATTS in California, Kentucky, and Oklahoma, the CYCLE is recognized in North Carolina, and MILLS in Kentucky, Nebraska, New Mexico, Pennsylvania, and Wyoming.

SWAN is located in Iowa, DRAKE is in Colorado, Kentucky, and North Dakota, COLLINS is in Arkansas, Georgia, Iowa, Mississippi, Missouri, Ohio and Wisconsin.

But I wonder how band conditions are between SIGNAL HILL, California and SIGNAL MOUNTAIN, Tennessee? — WB5AXH/S

Although W3AX's XYL, Mary is not a ham, she sports a pretty nifty license plate on her own car!



# FM REPEATER NEWS

## Good News From FCC

With the issuance of report No. 07886, FCC has relaxed the requirements for licensing a repeater, and, even more important, changed the rules so that repeater groups can experiment and modify their installation without having to notify FCC and await approval. Simply, here is the way it goes:

When applying for a repeater license, it is no longer required that you furnish FCC with HAAT, erp, maps, and antenna information. However, you still have to make all the calculations, including laying out the map radials, but that information is retained by you and becomes a part of your log. In other words, all the information that was required must be a part of your log, but is not sent to FCC. This also means that if you want to change your HAAT, erp, (within the permitted limits for your HAAT), or your antenna installation, you can make the change and enter the information in your log. If for some reason, the FCC Field Engineering branch has to check your station, the information must be in your log for the field engineer making the inspection.

However, in the case of a *remotely* controlled station, such as a remotely controlled repeater, you must still provide, and send to FCC, all of the information required under the rules for remotely controlled stations, system network diagrams, functional block diagrams of controls, control station authorizations and so forth. But in the case of a remotely controlled repeater, you still do not have to send the information on HAAT, erp, the map, and antenna information; that information is retained with your log.

Also, the information required on a system network diagram is simplified. No longer do you need to furnish the gains, powers, and frequency bands of the repeater or control stations. All you need do is show the location and distances of the control stations to the remotely controlled station and the type of antenna used at the control station, directional, nondirectional or steerable (with a symbol).

This change in the rules means a repeater group can add bands (or eliminate them) and freely experiment with the installation without seeking approval from FCC. Keep in mind that a complete record should be maintained in the repeater log of these changes. The effective date for these changes is January 23 1974.

In line with the above rule changes, ARRL is in the process of modifying the repeater licensing forms. You'll still need the forms when filing for a remotely controlled repeater or remotely controlled station (remote base). It is suggested that you still use the repeater portion of the forms and attach that portion of the forms to your logs. The latest edition of the forms will be available from ARRL Hq.; please include s.a.s.e.

An additional word about antenna information: The information on the antenna you use must be attached to your log. This consists of the horizontal and vertical radiation patterns of the transmitting antenna, with reference to true north (for the horizontal pattern only), expressed as relative field strength (voltage) or in decibels,

drawn on polar coordinate graph paper, and method of determining pattern. This is as simple as using the polar plots taken from any handbook or antenna textbook. If it is a commercially manufactured antenna, the manufacturer should be able to provide the plots.

It is very apparent from these latest changes that FCC is well aware of the problems in licensing repeaters and is making every effort to simplify procedures. Let's be very honest with ourselves. Repeaters and remotely controlled stations are *not* the simplest forms of amateur radio. This type of operation is by no means uniform across the country with different areas having unique problems. Trying to come up with one set of rules to take care of all contingencies is extremely difficult and the FCC and the amateur fraternity need time to smooth out all the wrinkles. Let's give the amateur division of FCC a big "F" for effort on the latest changes.

## Repeater Directory - Call for Information

As you may or may not know, ARRL has a repeater directory that is available, free of charge, to any interested amateur. The directory lists all the repeaters in U.S.A. and Canada who have registered with us. The information includes their access frequencies, area coverage, and other pertinent information. The directory is updated every year and *now* is the time we need your information. If you want your repeater listed, please write us for a registration card. When you receive the card, fill it out in detail and please be explicit about area coverage including town and country. The deadline is May 1st. - *W1ICPIWR1ABH*

There were several errors in the 2-meter band plan shown in January *QST*. The plan given below shows the correct frequencies.

### Repeater Channels (27 Channels)

Input	Output	Output	Input
146.01	146.61	147.09	147.69
146.04	146.64	147.12	147.72
146.07	146.67	147.15	147.75
146.10	146.70	147.18	147.78
146.13	146.73	147.21	147.81
146.16	146.76	147.24	147.84
146.19	146.79	147.27	147.87
146.22	146.82	147.30	147.90
146.25	146.85	147.33	147.93
146.28	146.88	147.36	147.96
146.31	146.91	147.39	147.99
146.34	146.94		
146.37	146.97		
146.40	147.00*	National Simplex Freq.	
146.43	147.03*	146.52	
146.46	147.06*		

### Simplex Channels (13 Channels)

146.49	147.51		
146.52**	147.54		
146.55	147.57		
146.58	147.60		
147.42	147.63		
147.45	147.66		
147.48			

\* Optional in region, check with frequency coordinator.

\*\* National Simplex Frequency, U.S.A. and Canada.

<sup>1</sup> Any contour lines now acceptable.

# How's DX?

CONDUCTED BY ROD NEWKIRK,\* W9BRD

## How:

Take heart! March high-frequency propagation almost always outshines February DX conditions. If last month's opening 40th ARRL International DX Competition weekends were something less than sensational, hang on and hang loose. The action should pick up appreciably as we approach another equinox, even near the bottom of a sunspot curve.

Incidentally, though we've been rather spoiled by the seeming regularity of recent solar cyclic activity, it should be noted that said bottom need not necessarily be "normal." We're more or less groping our way along on the deal, you know, guesstimating where we are by where we were and where we should be. This gives us grounds to be optimistic that those upstairs ions will start thickening next year or next, but double bottoms unfortunately are on record along with happy double tops.

It's somewhat sobering to be reminded that the half-century sunspot drought of 1676-1724 produced only about two dozen measly pimples on the face of Old Sol. From 1676 to 1684, in fact, not one single blackhead blemished his brow. What did *that* do to 20 meters? OTs with really ancient QSTs probably know but our own file doesn't go back that far. Say, you don't suppose there's a superimposed 300-year solar cycle we're about to become aware of. . . .

Oh, no need to overreact to such a remote possibility and sell all your gear. There is talk already among solar scholars that enough signs have been detected to be assured that the next activity ascent is just around the corner. Let's hope the prospect of this predicted probability turns out to be brighter than Kohoutek's fuzzy old comet.

† † †

## Who:

"Energy Crisis in Paradise!" goes a recent headline in the daily press. Sure enough, another story about VR6TC, often very audible near 14,225 at 0500-0600, and 21,350 kHz at 2300 GMT. Tom Christian, great-grandson of Fletcher Christian of 'Mutiny on the Bounty' fame, radioed California that the folks on Pitcairn Island are

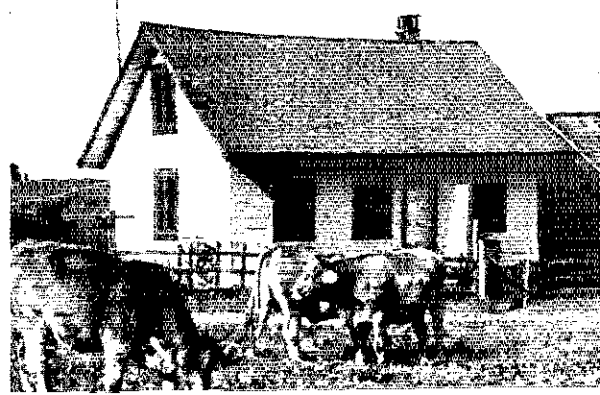
running short of gasoline for their electricity generators and motorbikes. Christian said the people on that one-by-two-mile mid-Pacific island hope to build a giant windmill to power their generators."

Ah, a good DX man will always find a way.

† † †

## What:

**75** PHONE, designated batter for 20 and 40 on the night shift these days, hits the long ball with impressive consistency. Sure, QRM is rough enough to make a preacher cuss but there's plenty of juicy DX to spread around and the game begins well before sundown. "How's" dispatches from Ws 3HNK 6AM, K9RGM, WAs 2EAH 9AUM/1, WB9DRE and literature of clubs and groups tell us of all sorts of goodies infesting our spectrum around and just below 3800 kHz: A2s CCV CCY CJP, A6XB, C31s BM DM FO GN, CNs 2BS 8BD 8BF 8CG 8GG 8HD 8MN, CO2s AA FA, CPs 1EU 1MK 3CA, CRs 3WB 4BS 6IS 7FM 7IZ 7JS, CTs 1MK 1UE 2AK 2BG 3AB, CX2AX, DA2LJ, DJ3GX, DJS 2EY 2MM 7ZG/CEØ 9GD, DKs 3SD/CT3 2BW 4TP 5WK ØUB, DKs 3SM/YV5 4NY 7OK, DM3ABL, DT1TB, DUs 1BSØ 1CH 1NYP 1EJ 6HG 6RH 7RLC SBA, DX6CO, EAs 3JE 3KO 6BJ 6BN 6BZ 3CE 8BK 8CR 8FO 8ID 9EU 9EY, EIs 1AA 1CJ ØRFI, ELs 2BA 2DK 7D ØH, EP2s DW WB, ET3USF, Es 2MD 2MO 5LQ 5UM 6ACM 6AEM 6AGM 6BKW, 9IE/6W8 9YZ ØWV/FC, FG7s AN XT, FPs 8AA 8CH 8DA 8DH ØSS, EY7AL, Gs 2PU 3DDK 3GKA 3KFT 3OZM 3PHU 3TJW 3YDX 3ZPW 5CS/HBØ 8PO, GB2SM, GCs 3GS 3NCJ 3YLZ 5AØV, GD3s KHE MØC UA, GIs 3OQR 3WEA 6VU, GMs 3TSC 6RV, GWs 3AX 4BVN 6GW, HAs 2GS 5KRB, HBs 9ADQ 9ZE ØAIC ØUB, HCs 1HA 2NN 2NW 2TC 2TV 2YL, HH2s WF V, HIs 7BJB 8LC 8XAA, HKs 4CST ØBKX, HP1s AH DV KC LR XIF XIS XTW, HRIKAS, HSs 3AJJ 4AGN, HV3SJ, HZ1SH, Is 1RB 8FTE ØAKU ØLLZ ØMOL, IG3OQR, ISØMFN, IT9s MPS PNZ, JAs 2IKL 9WB, JX3EN, JYs 3ZH 9GR, K3WEU/6YS, KCs 4USP 6SK, KGs 4FO 4BS 6JBO 6SW, KH6s AQ RS, K16s BZ DI, KL7s AIZ FA HIY HQM HRY, KP4s AN DJE DLW, KS6s DH DY, KV4s AB AM FC FZ, KX6s BU LA, KZ5s BP CQ JM PW, LA3NQ, LUs 2DKG 2ESB 4CAM 5HFI 6FEP 7AAC 7DZS,



HB9HK's peacefully pastoral QTH of the Month, complete with COWS in the foreground, is your "How's" preview of spring. Dr. Rogg finds little difficulty working the world with a Yagi at the 3400-foot level in lovely Schwyz canton. (Photo via WB2FSC)

\*c/o ARRL, 225 Main St., Newington, CT 06111.

LXs 1BJ 1RW 1JAE 1JAI 1PD 2HH, LZs 1HD 2IF, M1C, MP4s BIN BJS, OAs 4AGR AJL 4CS 4OS 6CT, OHs 1IW 1TY 1XX SNW 0MAS 0NI, OKs 1JAX 1MF 2KBR 2KBS, ONs 4LJ 4UN 5DD 5DO 5NO 5TW, OX3s JW XE YY ZO, OYs 2Z 5NS 7CT, OZ5KE, P29AH, PA0EG, PJs 1DA 1ML 2AE 2AR 2JW 9GIW, PYs 1HA 1LW 1RO 1SQ 2CI 2FIQ 2FIZ 2FMX 2FUS 3APN 4BTK 4PA 6AHM 6AHX 7BLV 7DW 7VNY 7ZAG 8AFV, PZIs AK CQ CU DF, SMs 5BLA 5SB 6GZ, SPs 3DOI 5PWK 6HQE, TA2BK, TFs 3EB 5TP, TG9s CO EP EQ G, TIs 2AD 2WD 2CF 2BY 2PE 8PE, TU2DO, UAs 2EC 9MS 0FBJ 0FGM 0NT, UC2s LAM TZ, UD6DER, UH8HAT, UI8LAG, UI8SAI, UL7s GW IAF, UO5OAB, UQ2GBU, UR2ROE, VE8s PS RA, VOs 1AM 1CE 1DW 1FG 1FO 1FY 1JN 2GD, VKs 2AVA 2RS 3AUS 6CF 9DJ, VPs 1BH 1TL 2AA 2EN 2EQ 2GAI 2KH 2LL 2MBO 2MDB 2MU 2MZ 2SAE 2SG 2SQ 2VAM 2VAN 2VBU 5GR 7EK 7NA 7ND 7NX 8IV 8ML 9AG 9BK 9BO 9DV 9EJ 9GR 9HH, VR4BS, VSs 5MC 6GM, Ws 3HK/6Y 4GIW/VP7 6LIU/KB6, WBs 2KEA/VP7 6OOL/6Y 6VGI/VQ9, XE11J, XG1J, XF4YK, XU1AA, XV5AC, XW8EB, YBs 2AU 6GJ, YIRs BL GH, YNs 1AJC 8AJK 8JES 9GL, YO2BF, YSIs CCK FOM RU RFE, YUs 2BNC 2CDL 2CDS 2HA 3APR 3EU 3OV 4ERL, YVs 1KZ 1YD 3FN 3UF 4AGP 4WT 5AAQ 5BBG 5BBQ 5BBU 5BP 5BTS 5DM 7BI 9AF, YK5AJ, ZB2s BL CF CH, ZC4LC, ZDs 3Z 7BB 7FT 8DX 9GC, ZEs 1CU 6JL, ZFIs AK GC JA JW, ZK2s AL BD, ZIs 1GH 1BKN 2ANT 2BT 3GS 3PX 4AV 4KF 4NH 4NJ, ZPs 1AA 5AL 5JX, ZSs 1ME 1MH 2GH 2MI 3B 3AK 3PT 4LW 5EL 5LB 6BLK 6DW 6TE, 3A2s AL BE, 3B6CF, 3D6AY, 3V8BD, 4W1AF, 4X4s HF NJ ZE, 5B4s FF KP, 5T5LO, 5U7BB, 5W1AU, 5X5NK, 5Z4s KL LW, 6G1AA, 6H6AA, 6W8s AL DY, 6Y5s AK BH ED PO RM, 7P8AY, 7Xs 2MD 6GM, 8P6s AH AU CX FX FE, 9H1s AF BW CE D DW DX HC K, 9G1s DY HE, 9J2s DT WR, 9K2AR, 9M2s BX CD CI CW DP DW PV, 9X5VA, 9Y4s AM AR HR LA MH T VT and 9Z4LO. More than enough variety to satisfy any ARRL Five Band DX Century Clubber in this sampling. Tables have turned and now 10 is the toughest! Or would you prefer 160?

† † †

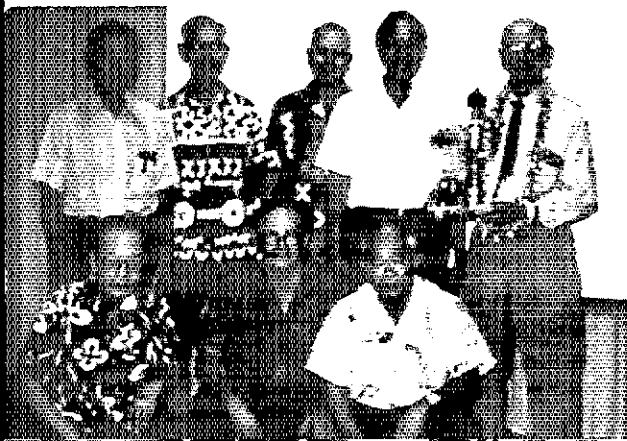
**NORTH AMERICA** - This month's "QSLers of the Month," each saluted for footsweat QSLing reliability, include FA9EJ, FG0AFA, HI8NAH, KC4USX, KH6IJ, KS6ER, KX6BQ, OE1ZGA, TU2DV, UAs 2FAT 9AAX, UC2WR, UK2s GAA GAN, UL7GAN, UW0AJ, VPs ISYL 2EY, VQ9s DC MI, WB2KEA/VP7, YA0CDRC, YK1AA, YU1BCD and 5T5CJ, plus QSL tenders Ws 3HNK 5SYL, Ks 2BPP 6SE/2, WA6NFC and DK5AR. They are resoundingly applauded in "How's" mail from Ws 2GEY 7YF 9OW, Was 3SWF 6SXL and WB2EOO. Any commendable candidates in your recent collection? . . . My assumption of FG7XZ's QSL chores dates from January 1, 1974 (WB4SRX) . . . Looking over my books I find about 95 percent returns from stations who asked for my Montana QSLs. Not bad! (W7QB since '72) . . . I volunteer to serve as QSL aide to busy ops

at the DX end. (WA2TUJ) . . . 'O8RCB's QSL came through in 25 months, better late than never for a new country here. (WB4NXX) . . . Winnipeg VE4s can sign the VA prefix this year, suffixes unchanged. (VE4SW) . . . VX is an additional Canadian prefix following CI and VA models. (DXNS) . . . W4JVN, WBs 2EXK and 4UKA join our DXpedition of the Month staff as volunteer assistant QSL managers. I believe we are up to date on KV4EZ QSLing but if you have not received yours, better reapply. XE11J's 4A4AA/a QSLs are in the mails and cards for other calls used by Scotty at the same Mexico location are being processed. Logs for his operation as 4Cs 5AA and 9AA were expected in January. (W2GHK) . . . 'alp! WA2TUJ seeks the secret of glossing wall-paper from CO2FC, HI3PC, KZ5s MM RU, ZP5RD all worked in 1972; WA3SWE likewise re FO8BJ, OY5NS, VP2DAI; WB4PZM is frustrated by VPs 1SYL 2MDX, ZD3Z, 9Z4LO; WB4TPH will settle for scoop on 9G1AL; KL7HMO is stuck at 9Z confirmed because of tardy AC3JA, F0AVG/FC, HB0AWW, IS9EPH, JT1KAA, 1X8FG, LX1HD, VS5MC, ZF1FOC, and 9V1OY. Any 'alp??

**ASIA** - DK5AR, who can probably help you run a down truant YA pasteboards, states that under present unfortunate circumstances you should avoid sending QSLs and other mail concerning ham radio to any address in Afghanistan. (W2GEY) . . . Just ran out of cards for my operation of HZ1AB from mid-November to mid-December '73 but I'm having more printed. I intend to answer all QSLs received at my Stateside address: 13036 Clarion Rd., Oxon Hill, MD, 20022, (W6QJ1/3) . . . Requests for 9V1RF cards are arriving at DXotM desks but we know nothing about him as of this writing. (W2GHK) . . . JG joins the JA-JE-JH-JR lineup in Japan's prefix parade. (WCDXB) . . . W11FL expects to be filled in on late QSO records by A51PN sooner or later. (DXNS) . . . 9M2IR declares XU1AA logs incomplete, some possibly lost in the mails. Multi-operator confusion increases likelihood of some disarray among XV5AC records as well. (LIDXA)

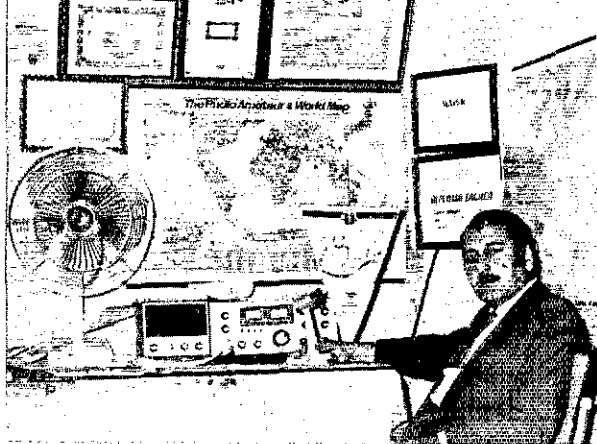
**EUROPE** - There is evidence that my C31EF call was pirated in late October of '72 by someone who worked mostly Russians on cw. (W4WF1/1) . . . I now hold logs for the second Mt. Athos DXpedition of April 21-25, 1973. Self-addressed envelopes with International Reply Coupons, please. (DL1CU) . . . Box 25, Cagliari, appears to be a maildrop for numerous Sardinian DXers in case you encounter unlisted ISs. (W9BRD) . . . Still no luck in securing LA0AI logs by early January but we're still trying. (W2GHK) . . . As a favor to OK1APV I forwarded his QSLs along with self-addressed stamped envelopes to several U.S. stations. Their lack of response is a poor reflection on W/K QSLing habits. (W2NC1) . . . A four-month Russian return here from UK2GAA. (W2GBY)

**OCEANIA** - P29 is the latest Papua-New Guinea identifier, suffixes usually the same. Philippines amateurs occasionally swap their DU prefix for DX and 4D tags in special circumstance, suffixes unchanged. (DXNS) . . . ZK1DX testifies that ZK1CL is an unauthorized callsign down his



KH6s AYG KH 1J (front), JW CS IU CW and W7JKU (rear) recall DXciting days of the '30s at last year's 40th reunion of McKinley High School Radio Club in Honolulu. In that halcyon period the eight OTs respectively signed K6s ALM ETF CGK BAZ GOM GHL GNW and CIB. W7JKU, now 88 years young, was the school's radio instructor and club advisor.

JY3ZH is among Jordan's most active DX chasers with more certification awards than his Amman walls have room for. This photo comes courtesy Zedan's QSL manager, K6AQV.



way, operation strictly spurious, (JDXRC) . . . Some of you 'lip-seekers may be interested to know that my QSLs from JA1MCU/C21 and JE1CKA/C21 came through nicely from JAQCUV/1, JDIYAA's card via JAIWU. (KL7HMO) . . . Antarctica's ZL5AL warns that QSLing will be slow from his remote outpost at Scott Base. (ZL2GX)

**A**FRICA — I hold the logs of EL2s DG DS and NS dating from February, 1972. S.a.s.e. are answered regularly, and others go out via bureaus in bulk every two months or so. (WB4SRX) . . . My QSL duties in behalf of 9L1JT expired June 1, 1973. (WA4ZYQ) . . . WA4WTG's QSLing stewardship for T11BF terminated a year ago. (WCDXB) . . . Now a few specifics that could mean new countries for the needful. Be aware, however, that each suggestion is necessarily neither accurate, complete nor "official." Like:

FY7AQ, P.O. Box 89, Cayenne, French Guiana  
 G5BCK, D. Reed, Box 302, APO. New York, NY 09194  
 H18HAM, Box 951, Santo Domingo, D.R.  
 H18RFM, P.O. Box 516, San Pedro, D.R.  
 JH3HPX, Takaomi Taira, 9-13, Koyoen Honjo-cho Nishinomiya 662, Hyogo, Japan  
 KP4DLW, G. Kratz, K4LRA, U.S. Army Hospital, Redstone Arsenal, AL 35809  
 KW6GO, L. Hargis, Box 416, APO, San Francisco, CA 96501 (or via WA7GQA)  
 OE1ZGA, T. Gabbert (K3NZV), Vienna, Dept. of State, Washington, DC 20521  
 P29s EM FV GR, P.O. Box 204, Port Moresby, Papua  
 P29PK, P.O. Box 219, Madang, New Guinea  
 P29s CK FD (to VK9s CK FD)  
 PJ3AG, Box 273, Aruba, Netherlands Antilles  
 TU2EE, P.O. Box 1127, Abidjan, I.C.R.  
 TU2EM, Box 7011, Abidjan, I.C.R.  
 VE3AI1/SU, c/o A. Leith, VE1AL, 200 Willett St., Apt. 525, Halifax, N.S., Canada  
 VK3s BDJ/P29 NZ/P29 (via WIA)  
 VP1JWV, Box 526, Belize, Br. Honduras  
 WILXE/VE8, N. Lyons, Box 9850 (Hall Beach), Winnipeg, Manitoba, R3C 3A4, Canada  
 WITZ1/HR6 (via W4ZVX)  
 WA7TFY/HR8, W. Cox, Box 1411, Santo Domingo, D.R.  
 WB6VGI/VQ9, L. Minnis, 1826-B Annapolis Rd., Ft. Meade, MD 20755  
 XE1EQ, P.O. Box 19-B, Morelia, Mich., Mexico  
 ZD7SS, Box 16, St. Helena Island  
 ZS1ANT, P. Els, P.O. Box 130, Ramsgate, Natal, S. Africa  
 3D6AZ, D. Mather, P.O. Box 626, Manzini, Swaziland  
 5U7BC, P.O. Box 855, Niamey, Niger  
 5Z4OM, Box 280, Nakuru, Kenya  
 8R1AY, P.O. Box 813, Georgetown, Guyana

A51PN (see text) C31FB (to F9AP)  
 AP2MR (via HB9MX) CH1ADV (to VE1ADV)  
 C31FF (see text) CP3BY/1 (via WA0EMS)

ZF1s HU and DH, left and right, were among the more radioactive ham visitors to gather under Grand Cayman's famous sunshine last autumn. ZF1DH, former ARRL Director W5LDH, intends to hit 160 hard next trip.

CT2AZ/3 (to W0JHY)  
 EL8A (via WA6WTG)  
 EP2GG (to K5BGG)  
 FH8WA (via F5QE)  
 FG7XZ (via WB4SRX)  
 GM5AXV (to WA8GDU)  
 HC1XG (to G8XG)  
 HS3AIG (to WA4BKC)  
 HW8TT/FC (to F8TT)  
 HZ1AB (see text)  
 JG1AAA (via JA1SEQ)  
 JX2FL (to LA2FL)  
 JX4GN (to LA4GN)  
 P29FH (via W0KHI)  
 P29IF (via JA2KLT)  
 P29MC (via K6ZDL)  
 P29RJ (via JH3HPX)  
 PJ1DA (to W3BYX)  
 PJ1MI (via VERONA)  
 PJ1VD (to PJ2VD)  
 PJ8HS (via W2GHK)  
 TA1KT (via DJ0IJ)  
 VE3AI1/SU (via VE1AL)  
 VP2EV (to G3TXF)  
 VP2MSS (via WA9VLI)  
 VP2VBW (via WB8LSD)  
 VP7BC (via WB4YHN)  
 VU2ABO (to HB9ABO)  
 VX1XXV (to VO1AA)  
 WA3EFH/mm (to WA3EFH)  
 WB2RLA/mm (to WB2RLA)  
 ZF1AG (via K8SWW)  
 ZF1RD (via W3KT)  
 ex-3B6CZ (to 3D6CZ)  
 3V8CM (via F2MO)  
 4D50BSP (to DU1BSP)  
 4M5ANT (to YV5ANT)  
 4W1GM (via W3HNK)  
 7P8AM (to G3SGK)  
 7X2BK (via CN2CT)  
 9H3M (to G3CDK)  
 9L1JT (via W3HNK)

For the preceding you can help tip the "How's" hat to contributing W1 1CW 1JUB 1YL 2GEY 2GHK 6AM 7YE, K2SJO, WA2UJ 3EFH 3SWF, WBs 2EOO 4NXV, VEs 3CUI 7BAE, Columbus Amateur Radio Association *CARscope* (W8ZCO), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich N. 72T, England), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3GZN), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 5, Box 167, Stevens Point, WI 54481), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), *VERON's DXpress* (PA6s INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB). Your turn?



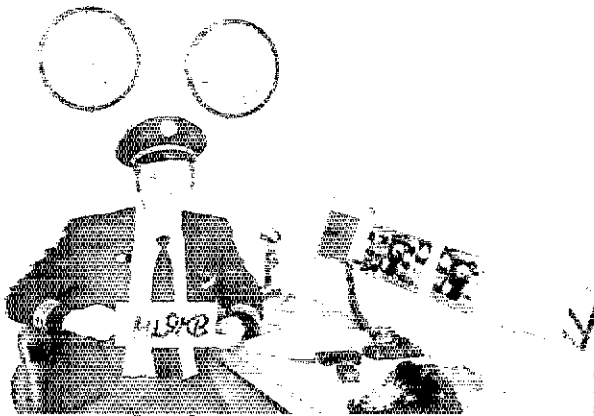
## Whence:

**ASIA** - HZ1AB is not very active because only one ham is assigned there full time and he is quite busy with other communications matters. Military personnel in the area are quite isolated from home, mail requiring two or three weeks round trip, so most activity is on MARS frequencies. I operated HZ1AB last November-December and may be back there this month. Watch 14,233 kHz at 1200-1900 GMT. (W6QDI/3) . . . UAØFGM likes sideband contesting on 40 meters at 0600-1200 GMT, on 80 at 1200-1500. Walt transmits on 3620 while tuning 3800-3807 kHz, or on 7090 while receiving 7228. If propagation is poor on 80 (UAØFGM makes an earlier switch to 40. (W6TSQ) . . . UAØFGM often rounds up arish Russians for 3625-kHz sideband work with W/Ks upband, usually Tuesdays from 1300 GMT. (WCDXB) . . . 4X4NJ was my No. 16 on 160 meters in December, Riki operating from the high-rise QTH of VE3MR/4X. 4X4NJ worked thirty stations in ten countries on 1.8 MHz before Murphy intervened with a blown power transformer. Perhaps Riki shouldn't have tempted him by operating from the 13th floor! WØNFI reports breaking the Loran 1.9-MHz reception barrier thanks to 40 dB attenuation from his version of W7DOL/6's loop antenna, working JA1MCU (1911 kHz) at 1305 GMT while hearing JAs 2GQO and 3NQ. (W1BB) . . . Come March I'll be back in the U.S. after fifteen wonderful DX months as HS3AIG. (WA4BKC) . . . Good friends 4X4s DF and NJ indicate the possibility of Sinal operation this month or next. (DL1CU) . . . Far eastern addenda courtesy club and group literature: Phhom Penh's XU1AA is spracially heard with its KWM1, 3ØL1 and vertical. Operator K7CBZ also puts Saigon's XVSAC on the air occasionally. . . . HL9VR hopes to complete his WAS with Alaska near 3800 or 7090 kHz before heading homeward. . . . Turkey is not entirely quiescent thanks to TAs 1KT and 2QR on 14,298 kHz around 0930 GMT. TA2BK, sometimes TA2BK/1, also is available on 3795. . . . Ex-SVØWU presents himself as 4W1GM on 15 and 20 ssb with a 500, SB200 and 45-ft.-high TH3. SVØ, WEE and WMM still radiate Crete on 15 and 20 by mike and key. . . . JA8AIP hungers for Delaware and Vermont near 14,050 kHz at 2100-2200 almost daily. . . . UAØs QAA QAU and QAY activated 4LØK from New Siberian Islands in December. . . . Taiwan tickets are still taboo according to research by WØOL on the scene. . . . YK1AA replaced his windblown TA33 with a temporary vertical. There's a YK1KAS on 14,045-kHz cw around 1100 GMT. . . . We hear that JA3KWJ takes over IARL's awards desk. . . . 4W1AF and FL8OM still have sights set on Kamarin isle whenever the civil situation cools down thereabouts.

**AFRICA** - Warmed up my Apache in time to catch SØ7BB on ordinary old a-m around 28,600 kHz, Carlos with his ancient but potent 35-watter. Let's keep CQing on ten! (K3DE) . . . Anyone needing Ghana should tune around 14,333

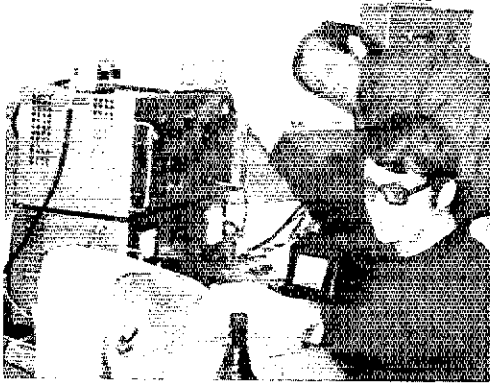
kHz for 9G1s GG and GV. Also I note EA9EU spending a lot of cw time near 3527 kHz. (WA3SWF) . . . The scarcity of nationals among amateurs in many African and Asian countries is unfortunate. It seems that local conditions cause most of them to emigrate elsewhere in freer pursuit of radio and electronics interests. (W5QPX) . . . Enjoyed visiting sunny ports in south and east Africa this winter as relief radioman aboard SS *African Mercury*. No hamming, though. (WØTUT) . . . My brother WA3EFH/mm spent Christmas in the Seychelles as radio operator aboard *Yankee Trader*, later heading for Mombasa, Capetown, St. Helena, Rio and the Caribbean. He's quite active on 20 phone. (WA3EET) . . . 9L1JT commenced another Sierra Leone tour in October after Tennessee leave. (WA4ZYQ) . . . Additional African oddities via aforementioned publications of clubs and groups: 9G1AR watches for 10-meter breakthroughs from 1300 GMT and meditates on spring Mali DXpeditionary possibilities. . . . The VØ9 group of recent Farquhar fame contemplates Desroches doings by July. . . . After 3520 October QSOs as ZD3X under severe tropical stress and strain OH2BR left his linear and antennas in Gambia for future use. . . . WB2VUØ/VØ9 expects a year in the Chagos on 28 through 3.5 MHz while distant neighbor VØ9HCS sets up on Astove isle for a two-year tour. . . . Canadian Ghaza activity resumes once more with VE3AU/SU near 14,175 or 14,220 kHz almost daily. . . . HB9TZ seems determined to take his SR150 and 2-el. beam to Mali by August, possibly sooner. . . . ZS2MI keeps Marion Island coming with an FT200 and rhombic on 21,307 or 14,225 kHz mornings and afternoons. . . . XT2AE directs Ouagadougou's technical school when not frolicking on 20 sideband with neighbor XT2AK. . . . 9X5VA likes to tune 7212-7216 kHz for Yanks while transmitting on 7080-7085 kHz Sundays at 0400 GMT. . . . Transception in 3B9-land is the goal of 3D6AX, the sooner the better. . . . FB8XA is adding 80 to his 20- and 40-meter cw repertoire. Remote neighbor FB8WA departs those regions in favor of a nonham replacement. . . . Afrikaners Net hopes to resume festivities on 21,355 kHz at 1800 GMT with this month's improved 15-meter conditions. . . . K6WR's QSL from CN8BF gives him the 80-meter century, no simple stunt out west. . . . TR8SS pursues his 3C Equatorial Guinea ambitions with scant official encouragement. . . . Navyman CT2AZ enjoyed portable-CT3 DXing in January. . . . Ex-ZD3D now signs 7P8AY on 21,410 kHz at 1600 GMT or so.

**OCEANIA** - I'm regularly active on 40 and 80 meters voice and code from KX6BU and my own Kwajein station. Watch 3895 kHz at 0700-0900 GMT weekends, 7098 kHz daily (tuning 7225-7230) at 0700-1000. I also get a kick working Novices on 15 and 80. DX is great in the Marshalls despite weird conditions. (KX6LG) . . . Please mark your shack calendar now for the '74 VK/ZL/Oceania Contest in which amateurs world wide are invited to work Oceania stations with emphasis on VKs and ZLs. It's next October 5th-6th for phone, 12th-13th for cw. (ZL2GX) . . . More Pacific patter via newshawks of DX clubs and groups: KC6SK laments the general shortage of reading material in the Western Carolines. Any old unwanted paperbacks kicking



HL9KB sports a snappy DX set-up at Seoul's international airport. Ken, who signs W7IQF when home in Seattle, has also enjoyed the DX end as DJØCI, ON4KT and SM5CTS.





4U11TU is activated on RTTY, left, by DJ9LS at printer with DL2XP looking on. At right WB2FSC, former HB0HMW, monitors printed proceedings at HB9HK while his host hits the keyboard. DX-oriented radioteletype enthusiasts proliferate despite sagging hf communications conditions.

around your shack? . . . VK0WW's Macquarie Island relief is expected to be quite active as VK0DM. . . YB0AAH-9M2IR-VE7IR reports increased restrictions on the licensing of noncitizens in the Philippines where he had hoped to settle down as DU1IR. . . ZK1TA trades his Manihiki location for less rare Rarotonga status. . . Commonwealth Net may try Sunday sessions at 1100 GMT on 14,170 kHz with VK4UC net control. . . The Campbells are coming for the next six or eight months courtesy ZL4NJ/a near 3800 or 14,265 kHz at 0600-0900 GMT.

**NORTH AMERICA** — Long time since I wrote you from EL4A, DL4IO, etc., and at the moment I'm strictly QLF. Yes, sending with my left foot! A temporarily disabling problem involving my shoulders leaves me barely able to tune a receiver. A good DX hound used to being on the air all the time will find a way — with the XYL's help in rigging some gadgets and a floor-level straight key. I'd hate to try a DX contest or high-speed traffic this way but I refuse to QRT. (W7VCB) . . . My 20-day December hospitalization for a heart problem and check-up was just what the doctor ordered. Feeling fine now and looking for the gang on 14,289, 14,081 and 7195 kHz at 1130-1230, 2200-2300 and 1110-1125 GMT respectively. That 20-cw spot is great for QSOs in Russian, French and Spanish with the European radioteletype crowd. (KV4AA) . . . Dayton Hamvention's DX forum will be conducted on the 27th of next month at 0900-1200 GMT, yours truly emcee. I've been active on 10 through 160 from a new QTH at Vienna, Virginia. (W2GHK, DX0TM) . . . "DX and the Blind Ham" is a 78-page Braille DX handbook prepared by the Peninsula Braille Transcribers of San Mateo, California. S.a.s.e. inquiries to my address are welcomed. (WB6FIS) . . . Forty cw's 7000-7025-kHz notch sure is a happy DX hunting ground for my old 75-watt Ranger and low dipole. Two or three new countries almost every night. (VE3CUI) . . . The General portion of 7-MHz cw brought this 40-meter newcomer a dozen countries in a hurry including CR6DA, H18CT, JA1CWZ, KL7FAE, KH6RS, KP4AST, KV4IC, KX6AH, PJ1AA, VK3QP, YV5CVC, ZD3X, ZF1s CW TW, 4C5AA, 5M5ANT, 6Y5BF and 9Z4AA. A mere dipole and a 5000 do the job. (WA5SOG) . . . I'm manager for the Caribbean Service Net meeting every Sunday on 14,313 kHz at 1900 GMT, a good time to clinch your WAG (Worked All Guantanamo) certification. I sign WB4STH back home. (KG4CA via K2SJO) . . . Cw signals traveling through northern latitudes develop such severe echoes that copy often becomes difficult, especially with speedy dots. How about popularizing a "Q" signal to indicate this con-

veniently, such as "QRSE" for "send slower, echo"? (W7QB) . . . I'm QRT for the moment because of too much wind in the rigging. Guess I'll redesign the skyhook for 40 meters. (KL7HMO) . . . Fifteen still comes through for the alert DX digger with stuff like ET3USC, UK2GAY, WB2KEA/VP7, ZF1s AG FOC and 9J2BO. (WA2TUJ) . . . Check with WARC, P.O. Box 352, Winnipeg, Manitoba, for data on our new City of Winnipeg Centennial Award. (VE4SW) . . . Periodicals of clubs and groups contribute more chatter on the local and semilocal DX front: W1VYS should be signing FG0GE/FS7 on Marigot for another month or so. Neighbor VP2VV/FS7 now holds tickets as FG7AK and PJ8AK. . . WA8RXU and WB8LSD are behind that VP2VBW contest outburst from Tortola. . . A multinational scientific expedition may study Clipper-ton Island this fall. Let's hope for DXtensive ionospheric inclusion. . . Rugged VP2LI is said to be wintering in Scotland. . . VP2s KF KH KN and KX keep St. Kitts workable, the latter mostly on cw. QST

## Computer

(Continued from page 53)

some of these people wonder why we cut them off after they have received only two QSTs.

Members who continually move are a big problem. Suppose you write us and tell us on December 10 that you want your January copy sent to your new address effective January first. Sorry, but the cut off for new addresses for the main run of QST was yesterday. With the old Addressograph system a change would have had to be in November 20 to make the January run. Suppose a month later you move, and tell us again on the tenth. We have to send another copy by hand. Some members move five times a year.

It is often said that computers make no mistakes, people do. Our system is set up so that companies such as RCA will be alphabetized under the word "Radio"; not "Corporation" or "of" or "America." This sort field is printed on each record. We are still trying to figure out how WN9LLA was given the sort field "All India Radio"; alphabetized under the word "All." Like our IBM salesman said after they fouled up a billing: "We can't guarantee that it won't happen again." QST

# Operating News

GEORGE HART, WINJM  
*Communications Manager*  
FLUEN WHITE, WIYL  
*Deputy Communications Mgr.*

ASST. COMMS. MGRS.: DXCC, R. L. WHITE, W1CW; *Hq. Station*, C. R. BENDER, W1WPR;  
*Contests*, F. D. NISWANDER, WA1PID; *Public Service*, W. C. MANN, WA1FCM.

**New Affiliated Club Rules.** Effective as of the publication of this announcement, we now can include just about any kind of organized amateur radio activity among ARRL affiliates. The newly revised rules authorize the affiliation of amateur organizations in three categories, as follows:

## DXCC Notes

In the October, 1972 issue of *QST*, announcement was made of the addition to the ARRL Countries List of Mellish Reef and that submission for DXCC credits for Mellish Reef would be accepted as of November 1, 1972. However, after the October announcement was in print (and prior to November 1, 1972) ARRL Headquarters received specific written and signed allegations pertaining to alleged "padding" of the VK9JW log with contacts which had not actually taken place, and alleged unauthorized operation from Mellish Reef under the call sign VK4FJ/Mellish Reef. In view of the nature of the allegations, an announcement appeared in the December 1972 issue stating that no DXCC credits would be given for Mellish Reef contacts until the validity of the allegations had been ascertained.

A request by ARRL Headquarters was made to the Wireless Institute of Australia for their assistance in determining the validity of the allegations inasmuch as they were made by and about Australian amateurs. The WIA accepted the request for assistance and copies of all written material which had been received at Headquarters concerning the allegations were forwarded to the WIA. A subsequent report was received from the WIA and that report was reviewed by both the ARRL Awards Committee and the ARRL DX Advisory Committee.

After thorough review and study of the WIA report by the ARRL Awards Committee and the DX Advisory Committee, it is the consensus that confirmations for contacts with both VK9JW and VK4FJ/Mellish Reef be accepted for DXCC credit. Submissions will be accepted starting April 1, 1974.

**Category 1** - Local amateur radio clubs, as now. This includes all existing affiliates except for two or three "exceptions" that got by unnoticed - such as YLRT and AMSAT, and one which was affiliated in anticipation of this action, the Central States VHF Society. These will be placed in Category 2, and future local affiliates will be in Category 1.

**Category 2** - Regional or National organized amateur radio groups, such as those mentioned above and certain others which meet affiliation requirements and wish to become officially affiliated. Note that this category can include club federations, monitoring groups and fraternal amateur radio organizations. It would *not* ordinarily include traffic nets and most emergency nets, especially those already a part of NTS or AREC (affiliation enough, eh?), or fraternal groups already sponsored by ARRL, such as OTC, RCC, A-1 Op Club, etc. Those which do not already carry the official badge of ARRL connection may, however (if they qualify, of course), become affiliated.

**Category 3** - Local school or youth group amateur radio clubs. These are the present school and college or university radio clubs which affiliated under the one-amateur-one-ARRL-member rule, plus additional in this category, plus any formally organized youth group amateur radio club. The latter will take in amateur radio clubs formed within the Boy Scout organization and any sponsored by churches, the YMCA or YWCA, or similar Hebrew organizations, by Boys' Clubs or any other type of youth organization. In other words, the "youth" field is being opened up so that the League can serve such groups and so that they can be more closely identified with ARRL. The criteria for affiliation will, however, guard against "fly by night" unsponsored and perhaps irresponsible cliques of under-aged youngsters.

The qualifications are simple and straightforward, differing but little from the former qualifications applying to local clubs. Those in Categories 1 and 2 will require at least 51% licensed amateurs and 51% ARRL members in their membership, while those in Category 3 will require one licensed amateur/ARRL member in a key position, exactly the same as at present. Indeed, the only difference in rules qualifications is that a wider scope of organizations is embraced.

But criteria are an entirely different matter. These are now a part of each ARRL director's "work book" but are due for some revision to

## W1AW SCHEDULE

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M. - 1 A.M., Saturday 7 P.M. - 1 A.M. and Sunday 3 P.M. - 11 P.M. (all times local Eastern). The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed Jan. 1, Feb. 18, April 12, May 27, July 4, Sept. 2, Nov. 28, Dec. 25, 1974.

Times/Days GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000		← CW Bulletin <sup>1</sup> →					
0020-0100 <sup>4</sup>			3.7 Nov. 5*	14.080*	14.080*	7.15 Nov. 5*	14.080*
0100	Oscar <sup>10</sup>	← Phone Bulletin <sup>2</sup> →					
0105-0130 <sup>4</sup>			3.990*	50.190*	145.588*	1.820*	21.390*
0130		CODE PRACTICE <sup>1</sup> (35-15 wpm TThSat, 5-25 wpm MWF(Sa)) Details Below					
0230-0300 <sup>4</sup>			3.580*		1.805*		3.580*
0300	RTY Bull. <sup>3</sup>	← RTTY Bulletin <sup>3</sup> →					
0330	Phone Bull. <sup>2</sup>	← Phone Bulletin <sup>2</sup> →					
0335-0400 <sup>4</sup>			7.290*	3.990*	7.290*	3.990*	7.290*
0400	CW Bull. <sup>1</sup>	← CW Bulletin <sup>1</sup> →					
0420-0500 <sup>4</sup>			3.7 Nov. 5*	7.080*	3.990*	7.15 Nov. 5*	3.580*
1240		← Oscar <sup>9</sup> →					
1300		CODE PRACTICE <sup>1</sup> (5-25 wpm MWF, 35-15 wpm TTh) Details Below					
1700-1730		21/28 cw <sup>7*</sup>	21/28 ssb <sup>8*</sup>	21/28 cw <sup>7*</sup>	21/28 ssb <sup>8*</sup>	21/28 cw <sup>7*</sup>	
1730		CTN <sup>6</sup>					
1800		← Oscar <sup>9</sup> →					
1900-2000		7.080*	7.290*	14.095 RTTY*	7.290*	7.080*	
2000-2030	Oscar <sup>11</sup>	DIRN <sup>6</sup>	21/28 cw <sup>7*</sup>	21/28 ssb <sup>8*</sup>	21/28 cw <sup>7*</sup>	21/28 ssb <sup>8*</sup>	
2030		CW Bull. <sup>1</sup>					
2100-2130		7.15 Nov. 5*	21.1 Nov. 5*	7.15 Nov. 5*	21.1 Nov. 5*	7.15 Nov. 5*	
2130		RTTY Bull. <sup>3</sup>					
2200		CPN <sup>6</sup>					
2300		RTTY Bull. <sup>3</sup>					
2330		← CODE PRACTICE <sup>1</sup> (10-13-15 wpm) Details Below →					

<sup>1</sup>CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.\*\*

<sup>2</sup>Phone Bulletins on 1.820, 3.990, 7.290, 14.290, 21.390, 28.500, 50.190 and 145.588 MHz.\*\*

<sup>3</sup>RTTY Bulletins, on 3.625, 7.095, 14.095, 21.095, and 28.090 MHz.\*\* Bulletins repeated when time permits.

<sup>4</sup>Starting time approximate, following conclusion of bulletin or code practice.

<sup>5</sup>W1AW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.

<sup>6</sup>Participation in traffic nets.

<sup>7</sup>Operation will be on one of the following frequencies: 21.02, 21.08, 21.1, 28.02, 28.08, 28.1 MHz.

<sup>8</sup>Operation will be on one of the following frequencies: 21.260, 21.390, 28.590 MHz.

<sup>9</sup>When an Oscar satellite is in orbit, daily updated orbital data is sent at 18 WPM on cw frequencies.

<sup>10</sup>Oscar orbital data for the coming week, on RTTY frequencies.

<sup>11</sup>Oscar orbital data for the coming week, on cw frequencies.

\*General contact period.

\*\*No 10- or 15-meter activity from 0130-0500.

### W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	Local Times/Days	GMT
10-13-15	7:30 PM EDST dy	2330 dy
	4:30 PM PDST	
5-7½-10-	9:30 PM EDST SntTThs	0130 MWFSn
13-20-25	6:30 PM PDST	
5-7½-10-	9:00 AM EDST MWF	1300 MWF
13-20-25	6:00 AM PDST	
35-30-25-	9:30 PM EDST MWF	0130 TThs

20-15	6:30 PM PDST
35-30-25-	9:00 AM EDST TTh 1300 TTh
20-15	6:00 AM PDST

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and QST practice text (from the issue 2 months previous) to be sent in the 0130 GMT practice on the following dates:

Mar. 11:	It Seems to Us	Mar. 26:	ARPS
Mar. 14:	Correspondence	Apr. 3:	World Above
Mar. 20:	League Lines	Apr. 5:	YL News

prevent our affiliated club program from becoming a hodge podge of semi-organized or "paper" organizations. Although all the details have not yet been thought out, and some problems which will arise but are unforeseen now will have to be dealt with, the intent is to widen the scope of ARRL affiliations to include bona fide organized amateur radio groups. Generally speaking, this will not include ragchew fraternal or social groups, but it is

intended to bring into the family many public service and amateur service organizations that do not at present have any official ARRL ties but are desirous of same. Further information will be forthcoming as procedural details are worked out.

Meanwhile, if you belong to or work with an amateur radio activity group of some kind that does not at present have any official ARRL

(Continued on page 100)

# DX CENTURY CLUB AWARDS

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC submissions received through December 31, 1973.

## Honor Roll

DL3RK	321/345	ON4NC	319/347	DL7HU	317/333	K9LUI	316/330	W5PM	315/335	K6ZM	313/328
G3FKM	321/345	VF2NV	319/344	G2BOZ	317/342	OH2BH	316/325	W5PWW	315/333	KP4RK	313/330
G5VT	321/348	W1AX	319/349	G2RVN	317/342	OH2QV	316/328	W6ABA	315/325	PY1HX	313/337
K2BK	321/342	W1HX	319/346	G3HCT	317/335	PY2PA	316/324	W6FL	315/325	PY2BKO	313/321
LU6DJX	321/352	W2AGW	319/350	G13IVJ	317/339	PY2PF	316/324	W6LUF	315/322	SM6AEK	313/320
OE1ER	321/350	W2HTI	319/342	G131MI	317/336	W1BPW	316/332	W6HOC	315/325	SM6CKS	313/317
W1BIH	321/351	W2YY	319/334	H0AMU	317/343	W1GYF	316/338	W6KG	315/334	UA1CK	313/325
W2BXA	321/352	W2YRAU	319/327	HT1TAI	317/340	W1HH	316/334	W6KZS	315/324	VF1VR	313/320
W2CTO	321/348	W3AFM	319/336	K2UVU	317/336	W2BMC	316/335	W6LN	315/342	VF2WA	313/331
W2DXX	321/334	W3GRS	319/338	K2YXY	317/331	W2CR	316/341	W6SQP	315/337	VE6RU	313/332
W2NUT	321/344	W3LHM	319/348	K3BW	317/338	W2CYS	316/345	W6TA	315/335	W2AYJ	313/339
W2OKM	321/346	W3LMO	319/339	K4KQ	317/344	W2DOD	316/341	W6GLD	315/323	W2NO	313/324
W2SSC	321/344	W3NKM	319/343	K4MOG	317/327	W2FZY	316/336	W6GOO	315/328	WA2HOK	313/322
W2TP	321/337	W4AIT	319/349	K6AN	317/345	W2GKZ	316/325	W7ADS	315/340	WB2FMK	313/322
W3KT	321/351	W4BF	319/338	K6LGF	317/336	W2QK	316/327	W7JG	315/330	W4BFR	313/329
W3MP	321/350	W4EJ	319/350	K7GCM	317/332	W2SAW	316/340	W8CUT	315/329	W4HOS	313/322
W4GXB	321/349	W4NJF	319/329	K8KKB	317/335	W2WVG	316/334	W8KHT	315/337	W4MR	313/339
W4VPD	321/345	W4QCW	319/342	K8RTW	317/333	W2ZY	316/341	W8MB	315/333	W5CGK	313/338
W6AM	321/353	W4SSU	319/334	LU4DMG	317/340	W3GAU	316/346	W8ONA	315/338	W5FT	313/338
W7PHO	321/346	W5QK	319/337	OK1ADM	317/329	W4IC	316/328	W9FKC	315/342	W5GR	313/340
W8BH	321/349	W6KTE	319/327	SM3BHZ	317/341	W4IH	316/335	W9QUN	315/323	W5KBU	313/337
W8BT	321/344	W6NJU	319/340	W1BAN	317/337	W4JDR	316/338	W0AUB	315/330	W5LCI	313/331
W8DAW	321/352	W6OSU	319/338	W2FXA	317/337	W4LYV	316/343	W0HFB	315/340	W5NMA	313/338
W8GZ	321/351	W6WQI	319/343	W2GLF	317/337	W5FFW	316/340	W0BK	315/331	W5LRC	313/334
W8MPW	321/346	W6WQJ	319/342	W2MJL	317/336	W5FO	316/343	W0CKL	315/335	W5WZQ	313/334
W8PHZ	321/343	W6SYK	319/344	W2GT	317/343	W5K1W	316/326	W1FAI	315/331	W6WZ	313/332
W8RG	321/353	4X4DK	319/344	W2PDR	317/335	W5O1G	316/344	YV5ANF	315/320	W6KNH	313/317
W8WB	321/349	DL6EN	318/340	W2ZTV	317/325	W5T1J	316/336	DL1BO	314/338	W6WX	313/327
W8DU	321/350	G3FXB	318/342	W3DJZ	317/331	W6GPB	316/344	DL8NU	314/318	W7BA	313/330
W8ELA	321/351	G4MJ	318/342	W3RNO	317/342	W6TSQ	316/330	F3AT	314/333	W7E-NW	313/344
DL2BW	320/344	G6TA	318/340	W4DOS	317/331	W6KPK	316/337	F9RM	314/331	W8DA	313/331
DL9OH	320/338	K2TOC	318/332	W5GC	317/333	W6ZM	316/333	IT1ZGY	314/334	W8K1A	313/344
K2FL	320/343	K4EZ	318/332	W5POA	317/342	W7CMO	316/333	JA1AG	314/334	W8LY	313/334
K6ZO	320/351	K8LSC	318/335	W5QKZ	317/332	W8CT	316/327	JA3UI	314/330	W9UD	313/330
W1DK	320/344	K9ECE	318/334	W6ANN	317/343	W8LVL	316/326	JA4JY	314/334	W9TKD	313/330
W1MV	320/344	K0PHX	318/345	W6BZF	317/344	W8JVN	316/348	K4TDL	314/330	YV5BNW	313/317
W1NU	320/342	W1AZY	318/339	W6CHV	317/342	W8UAS	316/343	K6LV	314/323	YV5ROA	313/321
W2BOK	320/344	W1CBZ	318/340	W6EPZ	317/345	W9GIL	316/340	K6GA	314/331	DL1JC	312/315
W2JLV	320/348	W1CKA	318/335	W6FZL	317/329	W9RCJ	316/335	K6OH	314/321	DL7CX	312/320
W2LV	320/346	W1FZ	318/344	W6HX	317/347	W9RKP	316/340	R9HGM	314/321	G3JFC	312/318
W2QHH	320/348	W1GKK	318/350	W6ID	317/343	W9SFR	316/338	OK3MM	314/336	G6XL	312/334
W2OM	320/342	W1HZ	318/343	W6REH	317/330	W0BN	316/329	PY2CQ	314/322	JARADQ	312/319
W2RCV	320/343	W1JNV	318/342	W6LZD	317/344	W0CJZ	316/337	PY2SO	314/322	K4HJE	312/316
W3CCS	320/346	W2AO	318/342	W7OF	317/341	4X4UJ	316/338	W2RDD	314/335	K4IKR	312/319
W3E-VW	320/348	W2CP	318/331	W8ARH	317/327	C86RX	315/338	W2WZ	314/344	K4TWF	312/325
W4RYU	320/345	W2HO	318/341	W8DMD	317/345	DLSDA	315/323	W4EEE	314/338	K6EK	312/316
W4LRN	320/339	W2PV	318/327	W8K1I	317/330	HH9KB	315/336	W5MMD	314/340	K8DYZ	312/320
W4OM	320/349	W2RLQ	318/326	W8QJR	317/341	IK8DH	315/336	W5EFL	314/322	K9WTS	312/321
W5UX	320/342	W3WGH	318/340	W8WZ	317/346	JA2C	315/326	W6RGG	314/322	ON4DM	312/339
W6CYV	320/345	W4MCM	318/336	W91LW	317/330	K4YYL	315/323	W6UGV	314/335	PY4AP	312/318
W6PT	320/344	W4OPM	318/340	W9JIV	317/343	K6AHV	315/326	W6AEPQ	314/326	W2BQM	312/334
W7MB	320/351	W4PLL	318/340	W0A1H	317/339	K6CH	315/341	W6AWG	314/322	W2IT	312/338
W8LWS	320/351	W5ABY	318/342	W0M1Y	317/340	K6OI	315/343	W7AC	314/345	W2MS	312/337
W8LKH	320/346	W5AO	318/343	W0NK	317/346	K6WR	315/328	W7OPK	314/326	W3BWZ	312/315
W8OK	320/338	W5KC	318/348	W0PGI	317/340	K6YRA	315/323	W8EV	314/339	W4TM	312/341
W8ZCQ	320/341	W5MML	318/346	YV5AB	317/342	K8OHG	315/327	W8KPL	314/338	W4ZXL	312/317
W9GJF	320/339	W6KZL	318/341	ZL1HY	317/348	LU5AO	315/337	W9QLD	314/324	W44WIP	312/319
W9HH	320/341	W6ZO	318/346	DL0KO	316/324	PY2CK	315/345	W9WYB	314/335	W5EJT	312/326
W9LNM	320/350	W7AOB	318/337	CF3AG	316/346	PY7YS	315/334	W0NVZ	314/323	W5HDS	312/335
DL11W	319/338	W7RH	318/348	DL1IN	316/339	VK4OM	315/345	YV5AJP	314/330	W6CAE	312/339
DL1KB	319/346	W7SGN	318/341	DL1HH	316/332	W1DGI	315/326	DL3BK	313/333	W6CTE	312/321
G8KS	319/344	W8R1B	318/344	G3AAE	316/342	W1GL	315/323	G3DO	313/342	W6DZZ	312/341
GW3AHN	319/345	W8NGO	318/342	HB91I	316/339	W2HNM	315/336	JA1ADN	313/327	W6POZ	312/337
HB9J	319/350	W9DWQ	318/338	IK2MG	316/323	W2GM	315/323	JA1BRK	313/323	W6HVN	312/331
HB9MO	319/344	W9HUA	318/344	K11XG	316/330	W2PCJ	315/339	JA1DM	313/335	W6KUT	312/339
HZL	319/337	W9NDA	318/349	K1SHN	316/327	W42DG	315/331	JA1MIN	313/318	W6VMV	312/325
JA1BK	319/334	W0KF	318/342	K2PKX	316/328	W8BHXD	315/323	JA2JW	313/331	W7OK	312/333
K2BZJ	319/343	W0LWG	318/335	K2Y1M	316/323	W4BQ3	315/337	K1YZW	313/319	W9GB	312/336
K2LWR	319/340	ZL1SI	318/338	K4VW	316/332	W4ML	315/342	K2DA	313/337	W9TKV	312/335
K4LNM	319/340	ZS6LW	318/338	K6NA	316/344	W5GJ	315/329	K4CD	313/323	W9ZTD	312/328
K6BC	319/342	DL7GZ	317/325	K6OW	316/330	W5GO	315/335	K4MZU	313/322	Y5IO	312/335
K6BC	319/340	DL7AA	317/346	K6RQ	316/333	W5HF	315/323	K5AAD	313/323	YU2DX	312/316
LA7Y	319/348	DL7EN	317/340	K8ONY	316/332	W5HJA	315/332	K5QHS	313/317	YU5RPJ	312/321
OH2NB	319/347			K9KYF	316/331			K6K1I	313/332		

## Radiotelephone

W2BXA	321/350	ØAMU	318/343	DJ2BW	316/333	K4TJL	315/334	W4LEE	314/338	W2GKZ	313/321
W2TP	321/334	K1LXG	318/332	DJ7ZG	316/324	K5JEA	315/333	W4SKO	314/335	WA2EOU	313/321
W6AM	321/351	K2FL	318/332	DL6EN	316/335	K6LGF	315/331	W6LEL	314/323	W3GRS	313/324
W8BF	321/349	W2OKM	318/341	K2YLM	316/333	LL9DAH	315/334	W7OPK	314/325	WASEFL	313/321
W8RT	321/344	W3NKM	318/341	K9KYF	316/331	QY4DM	315/341	WARAJI	314/322	W6HAF	313/330
W8CZ	321/351	W4OM	318/341	K9LUI	316/330	P2PE	315/323	W9JIT	314/321	W9HJ	313/332
D19OH	320/338	W5JWM	318/336	PAØHBO	316/339	W2OK	315/324	W9WHM	314/338	WØGKI	313/332
G5VT	320/347	W9NDA	318/345	PY2CK	316/345	W4PDL	315/332	YV5AIP	314/330	YV5BNW	313/317
W1IFG	320/342	WØCM	318/342	PY2PA	316/324	W6EUF	315/321	YV5BBU	314/321	G3DO	312/340
W2RGV	320/341	ZS6LF	318/337	SM5CZY	316/326	W6KTF	315/323	ZL1HY	314/344	G3JEC	312/318
W6GVM	320/348	GL3IV	317/332	VE3QA	316/338	W6RKP	315/331	DL7FT	313/321	IØZV	312/327
W7PHO	320/345	K8R'GW	317/333	YK5MS	316/342	W9DWQ	315/325	DL7HU	313/328	K4HEF	312/328
WØBW	320/342	K9FCE	317/332	W1BAN	316/335	W9RNX	315/339	P2MO	313/325	K4HJE	312/316
DI2YI	319/341	LU4DMG	317/340	W1ONK	316/339	WØGAA	315/325	I8AA	313/319	K5OHS	312/316
TI2HP	319/348	W2GLF	317/337	W2FGD	316/324	XE1AE	315/331	ØL1LZ	313/316	ØE1ME	312/332
W2HTI	319/341	W2PV	317/326	W2ZX	316/341	YV5ANF	315/320	IT9GA1	313/317	VE5RU	312/330
W2YY	319/329	W2ZTV	317/324	W3KT	316/341	DL1IN	314/336	JA1BK	313/326	W2LV	312/333
WA2RAU	319/327	W3DJZ	317/328	W5IO	316/342	F9RM	314/331	K2BZT	313/330	W2WMG	312/323
W4EX	319/348	W3WGH	317/333	W5LZW	316/330	I2KMG	314/321	K4JC	313/320	W3RIS	312/344
W4QCW	319/338	W4NF	317/326	W6ZM	316/328	F19T	316/318	K4MOG	313/320	W4IC	312/319
W8MPW	319/335	W5GC	317/333	W7SGN	316/329	K4YYL	314/320	K6YRA	313/321	WA4WP	312/319
4X4DK	319/344	W6NJU	317/332	W9LNM	316/334	K6WR	314/327	KP4CL	313/323	W5SZ	312/318
5Z4FRR	319/347	W6REH	317/326	W9NZM	316/327	ØK1ADM	314/322	ØZ3SK	313/325	W6YV	312/324
G3URM	318/339	W8QJR	317/341	4X4TU	316/334	ØN4DH	314/337	PY2CYK	313/318	W8VZ	312/321
G6TA	318/339	W91LW	317/330	HB9J	315/342	SM3BFZ	314/337	PY2PC	313/319	W9SFR	312/326
G8KS	318/339	YV5AB	317/342	HB9TL	315/337	W1DGI	314/325	W5SBCO	313/330	WØAAA	312/321
		ZP5CF	317/340	IKKDB	315/336	W3AZD	314/324	VF3MR	313/324		

## New Members

Radiotelephone listings follow the general-type "New Member" and "Endorsement listings - December 1-31, 1973

ZL3OY	217	WB9AOC	115	SM5DXE	106	WA1OFP	108	W4TYZ	103	W3MLX	101	WB6FRG	100
Z3BTK	206	YU4VXW	115	WB4RFZ	106	W2JI	104	VE7AUA/W6	102	W5TWI	101	W7OK	100
WA3MPH	145	WA5STI	113	K8MNP	105	W61QO	104	WB6WVO	102	K4FD	100	WA9BXB	100
JA3DNL	137	JA3BLN	112	L1APG	105	YU2RLV	104	WA1AGN	102	K8GYV	100	WAØBATY	100
K2IAB	117	SMØXT	109	PY1EMM	105	JA6UCS	103	G3SKJ	101	W3GQC	100	WBØRIY	100
		W3HCF	109			K4YDE	103			W6UFJ	100		

ØN8XA	310	ØØAG	127	LA6UL	113	VE3FJE	108	WØNG	106	WB6WPO	102	VE3QFH	100
W9BZW	303	I3GRX	122	G4AMT	110	E3JVM	107	ØZ5EV	105	5U7BA	102	W5TWI	100
WB5HH	135	DK5OG	121	K2IAB	110	JA3BLN	106	WA3MPH	105	W6BWG	101	WA7GYR	100
JA3DNL	134	WA1NSJ	117	ZP5HZ	109	K6ELX	106	LX1LF	104	W8KFL	101	YU1OBA	100
GM5AFF	133	DR5WL	115	KZ5LZ	108	L8BBM	106	PY1EMM	102	ZP5AQ	101		

## Endorsements

In the endorsement listings shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W5KGX	330	ØH2BR	310	W3BRB	280	WA8GPX	250	K2BMI	180	W4BAA	160	W2ABE	140
DL7AH	325	W6GMF	310	WA4YVO	280	DK9FB	240	ØK3BH	180	W7JHO	160	WB2EKK	140
W1AXA	325	PY41W	305	WA9SLD	280	E9ZAG	240	PY1BDU	180	W8PK	160	WB5HH	140
W1DEP	325	K2AGZ	300	W3AXW	270	ØF3HOW	240	RE6EO	180	WØNG	160	WA7GYR	140
I4ZJG	320	ØH2BAD	300	WA3ATX	270	W2PSU	240	W1RED	180	YU1TFD	160	W8L7	140
ØH2QQ	320	SM6AFH	300	W6TPT	270	WB2BNJ	240	W6CLM	180	DK5WL	140	K1WVX	120
W8JQ	320	SM6CVX	300	F2OQ	260	DLØWV	220	WB4OGW	180	HIS AIG	140	JA6SVP	120
K4CFB	315	WB2NYM	300	W1AB	260	JA3MXR	220	WØKZ1	180	JA3PPR	140	W2HDF	120
K4CIA	315	WB6DXU	300	W1EHT	260	K4ZYU	220	HB9ANZ	160	K4EJT	140	W2CU	120
W1YRC	315	DL1YA	290	W2IOZ	260	W1ARR	220	K4CK	160	K4ZPT	140	W21BR	120
W2HI	315	G3JAG	290	WB4SIJ	260	WB2AOC	220	KØIKZ	160	ØZ4HW	140	WA2JLM	120
W7DY	315	K4MG	290	ØE1CP	250	JA1WSA	200	SM6BZF	160	SPØUR	140	W6NHX	120
WØPAH	315	WB6APX	290	W4GIW	250	K3ZOL	200	WA1PID	160	VE2RB	140	W8KFL	120
DK3PO	310	W8OA	290	W7GSP	250	W4ZVX	200	WA3DFV	160	W1DKU	140	WB8SWM	120
K6BCE	310											YU2RKC	120

DL1KB	330	DI1JC	305	ØH2BAD	290	W61QC	280	W4GIW	250	W7KOI	200	VE2RH	140
PY7YS	325	DK3PO	305	ØK1MP	290	YV4QD	280	W7FSE	250	JY3ZH	160	WA9DJO	140
W5HJA	325	E44LH	305	W1YRC	290	WA9SLD	270	W7GSP	250	K4MEZ	160	E33HL	120
W4SSU	320	PY2DSC	305	WØBK	290	KH6GLU	260	WA4NRF	240	K4BKJ/6	160	I13RS	120
W5KGX	320	PY3BXW	305	YV5ANQ	290	W2OVC	260	W5NQN	240	PY2YJ	160	JA1WSA	120
W8ZOK	320	VE1VR	305	DI7CX	280	W4BQY	260	HK4CJ	220	PY9FJ	160	JA6SVP	120
DL8NU	315	WA5IEV	305	ØE3SA	280	WB4SU	260	K1GNU	220	WA3GYV	160	K1WVX	120
I4ZIG	315	W81TD	305	W1JKV	280	W9HJ	260	W2PSU	220	W8SBJ	160	PY1BDU	120
ZL3OY	315	YV4UA	305	W2GT	280	CT1ZW	250	WB2BNJ	220	W6MEC	160	VE1US	120
W3MP	310	DL7AH	290	WB2NYM	280	JA6BSM	250	DI3QX	200	JA3PPR	140	W21BR	120
W5QKZ	310	K4MG	290	WA4YVO	280	K6BCE	250	W6GTL	200	JH1AGU	140	WB4OVX	120
W8VHY	310											W5EFA	120

affiliation, by the time you read this would be a good time to make further inquiry.

**SWL Cards.** If you are active on the "DX" bands, your shipments of cards from the QSL bureaus may have as many "heard" reports as QSO confirmations. Most will be from Eastern European countries, including the U.S.S.R. There is a reason for this. In most of those countries an aspiring ham is expected to participate as a SWL for a period of time before he obtains a license to transmit. These foreign country SWLs are the hams of the future, more so than in this hemisphere.

We need more amateurs, both here and abroad, to strengthen our numbers to compete with other services for frequencies. So, even if you don't ordinarily answer SWL cards, how about taking the time to reply to these? They can be packed up and mailed to one of the several outgoing bureaus, and you may be encouraging a prospective ham and helping foster international good will. Next time he hears you, he'll recognize you as one of the "good guys" and by that time may be able to give you a call.

**New DXCC Pins.** Approved by the Board of Directors at its January '74 meeting were new DXCC pins carrying an insert reflecting the number of "countries" worked by that individual. The small insert can be replaced each time he reaches a new milestone in his progress up the DXCC ladder. The pin will be issued to present and new DXCCers at a very nominal cost. Further details as soon as available, but this will announce the new availability. Thanks are due to the DX Advisory Committee, its liaison director, WIQV, and its headquarters liaison, WICW, for getting this new recognition for DXers. — WINJM.

**Amateur Instructor Corps.** With only a limited response to our latest plea for volunteers (p. 108, Oct. QST), we were starting to become a little discouraged with the whole idea. Few people on the list mean few opportunities for service. Recently, however, the first real breakthrough came in the form of one handicapped ham-prospect and one AIC member getting "hooked-up" in Massachusetts.

Seems like that one instance almost makes the whole effort worthwhile, but we still need many more of you on the list. C'mon, fellers, all we need is a postcard from you saying you *might* be able to help if called upon. You're not obligated in any way. If lending a helping hand to some really deserving person is your bag, there's no better way than by registering with the AIC! — WA9AUM

#### 5-BAND AWARDS

(Updating the February 1974 listing.)

5BDXCC: (Starting with number 295),  
DK4TP, WA3ATX, OK1AWZ, W4UQ,  
PJ2CW, DL9DY, EA4LH.

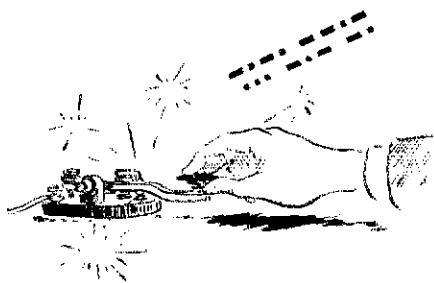
5BWAS: (Starting with number 165),  
HK0BKX, W7VMF, KS6DY, WB4RUA,  
W9VBV, K7IVJ, WA1MQO.

#### New A-1 Operators

WB2UDQ K4MNF WB4WUZ WA6MAR  
K7RQZ OE1NP ZS6DW

#### STRAIGHT-KEY NITE . . . W1YL

Four in a row for SKN, with reported participation on New Year's Eve up to 138 (113 last year). A total of 97 votes were cast for "best fist of the night." We have a tie this year, with W8JO and W0GMO vying for the honors. A close runner-up was K2KTK, followed by a group of illustrious key men including W3ADE W4KFC W4YZC K4HUZ W5KII W8NJC and G8NF/W4. Reported participation was considerably higher than the 3rd event, 796 calls shown vs 646.



Thanks to sustained interest and the many requests, we'll be holding two of these events annually, next one the night of July third, continuing into the fourth. Full rules June QST.

#### Soapbox

SKN was fun! — W7YS. I covered quite a span of ages and dates of licensing, from W8WYU (late 60s) to WB4VVP age 15. — W1BDV. Finished with no apparent symptoms of permanent disability of my right wrist. However, as far as personal comfort went, it was more blessed to receive than to give. — W9LNB. Suggestion: list all stations submitting logs/reports (ouch), feature pictures of stations using older keys or equipment. — K4CAK. (Fine, send the photos and we'll use 'em! — W1YL.) My station is all homebrew and my morse key is the only piece of equipment I brought over from England! — G3PPE/W6. Please arrange more activities of this kind. — G8NF/W4. A note to those who accused me of using a keyer, try using a straight key every night for 2 years without touching a keyer or bug. — WB5FML. Despite your statements to the contrary, I submit that SKN IS a contest, between the operator and the key. — WB4OQN. Note to WA1PWZ, you can vote for the best fist heard, not just the best one worked. Found after using a keyer for the past year that the old arm muscles tend to go spastic and throw in a couple of extra dits on the 6s and Ls. — WB0GGO. Hats off to W6YZW who struggled with my 579 signal on 40 for 34 minutes of fb ragchew. — K4WLS/KL7. A high noise level and anemic signals seemed to be the rule rather than the exception on 80. — K4MD. At the end of one of my QSOs, the op. switched over to his electronic keyer and said 'I can't hack this straight key any longer, I've been a ham for 40 years and I'm too old now to change back to a straight key again.' — K4QG. The

(Continued on page 102)

# Operating Events

de W1YL

## MARCH

- 2-3 DX Competition** phone, p. 54 Dec.
- 6 W6OWP Qualifying Run** (W6ZRI, alternate) 10-35 wpm at 0400 GMT on 3590/7090 kHz. This is 2100 PDST the night of March 5. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid, and send to ARRL for grading.
- 9-10 YL/OM Contest cw**, p. 83 Dec.; **Worldwide VHF Activity, Virginia QSO Party**, p. 82 February. **Spokane Dial Twisters ARC Weekend**, contact with 10 members of the club will qualify any ham for the certificate, schedule of operations as follows: March 9, 14340 1800-2000Z; 21375 2000-2200Z; 7270 2200-2300Z; 3915 2300-0000Z; 7270 0200-0230Z; 3915 0230-0300Z; March 10, 14340 1800-1900Z, 21375 1900-2000Z; 7270 2000-2100Z; 3915 2300-0000Z. Please send a copy of your log to Tony, K7VNT, Spokane Dial Twisters ARC, Box 9064, Garland Station, Spokane, WA 99209. An s.a.s.e. would be appreciated.
- 15 WLAW Qualifying Run** (10-35 wpm at 0130 GMT) on 1.805 3.580 7.080 14.080 28.080 50.080 and 145.588 MHz. This is 2130 EDST (9:30 PM EDST) the night of March 14. Underline one minute of top speed copied, certify copy made without aid and send to ARRL for grading. Include your full name, call (if any) and complete mailing address.
- 16-17 DX Competition** cw, p. 54 Dec.
- 18 WINJMCWA High Speed Code Test**, p. 82 Feb.
- 23-24 BARTG Spring RTTY Contest**, p. 82 Feb.
- 24 Worked All Britain by cw**, p. 82 Feb.
- 25 WIAW Morning Qualifying Run**, 1300 GMT (this is 9 AM EDT). Same frequencies and details as under the March 15 listing.

## APRIL

- 1-June 30 International Italian YL "Jolly-Flower" Contest**, exchange report, call, name. Scoring: Italians contact 1 Jolly station plus 2 other Italian YLs (not Jolly stations); EU stations contact 1 Jolly station, plus 1 other Italian YL not a Jolly station. Outside-EU contact 1 Jolly station only. Log must show calls, reports, time(z); Italian YLs must be in possession of QSLs from the stations contacted. Send application with log (no QSLs) to: Carla Benatti, 12CYB, P. O. Box 155, 46100 Mantova, Italy. Italians enclose 12 IRCs, EU 15 IRCs, non-EU 20 IRCs.
- 4 West Coast Qualifying Run**.
- 6-7 CD Party** etc. This is a quarterly event for League appointees and officials, notified separately by bulletin. The July Parties are open to all ARRL members. Check with your SCM (p. 6) to see if you can qualify for an appointment. Remember the event starts at 2300Z April 6 and ends at 0500Z April 8. **SP DX Contest**, sponsored by the Polish Society the PZK, from 1500Z Sat. through 2400Z Sun. The object to work as many SPs as possible in as many different SP powiats as possible, 80-10 cw only. Single operator single band and multiband, multiplieroperator multiband only. Send RST plus QSO no. starting with 001. SPs will send RST plus an abbreviation of their powiat. Each SP (or 3Z) QSO worth 3 points, the same station may be contacted once per band. A multiplier of one for each different powiat which counts only once in the contest. Score equals QSO points times no. of different powiats on all bands. Multiops may not use more than one transmitter with the same call. Certificates. Usual logs, separate for each band, fully summary info, plus signed declaration. Entries must be postmarked no later than May 1 and sent to: Contest Mgr. PZK, Box 320, Warsaw 1, Poland. **VHF Space Net Contest**, honoring Skylab 1, same rules as for Apollo series. Starts 6, ends 6, any band 50 MHz and above (no repeaters), exchange RS(T) and zip code. Non-U.S. use P.O. name. Two points per QSO on each band, multiplier is the sum of different zip codes and p.o. areas worked (counted only once). A bonus of 10 is added to your multiplier. Logs and requests for additional info. go to Space Net Contest, Tony Slapkowski WR2MTU, Box 909, Sicklerville, NJ 08081.
- 12-14 Novice QSO Party**, sponsored by the International Novice Amateur Radio Assn., from 1800Z April 12 to 0600Z April 14. Any class amateur works novices, exchange RST and handle. Work each station only once. Multiplier total no. QSOs by the no. of different prefixes worked (note: WN4, WN8, OA3N, etc. are different Novice prefixes). Appropriate awards. The following are novice calls with a

dash indicating a numeral and an X indicating a letter assigned in sequence: EL-NX, HC-NXX, HI-NXX, K4NXX, KZ5XXN, LB-XX, OA-NXX, OI-XXX, VU2XXZ, WH6XXX, WL7XXX, WN-XXX, WP4XXX. Logs go to: Andi Anderson WB9JGM, RR 3, Box 85-26, Belvidere, IL 61008 by May 1, 1974.

**12-15 County Hunters SSB Contest**, sponsored by the Mobile Amateur Radio Awards Club, from 2200Z April 12 to 0500Z April 15. Use low end of general phone segments of each band suggested. No credits for contacts on the 14.336 7.243 or 3.943 nets. A fixed station may be worked only once during the contest. Portables that change counties during the contest may be worked again for point/multiplier credit from each new county. A mobile may be worked from each new county or county line. Stations worked on a county line count for one QSO but two or more multipliers. Portables are considered fixed for scoring purposes. Exchange signal report, county and state (country for DX). All U.S. stations are encouraged to listen for DX. Mixed mode permitted but one station must be on ssb. Scoring: contacts with a fixed U.S. station 1 point, with all DX (including K116, K1.7, VE) 5 points, with a mobile 14 MHz and up 5 points, with a mobile 160 through 40 ten points. Multiplier for fixed stations equals total no. of U.S. counties worked, for mobiles equals U. S. counties worked plus no. of counties given out. Log data: date/time, stations, reports, county, state, band, claimed points (1, 5, 10), no. each new multiplier. Submit all entries to KØARS, Jim Willingham, Route 2, Bevier, MO 63532. They must be received by June 1 to be eligible for awards.

**14 WAB LF CW Contest**, from 0900Z until 2100Z, 160-80-40 meters. Logs from FOC competitors go to G3ABG. Score 5 points per QSO. Work UK stations only. Same station may be worked on different bands. Give RST and serial starting with 001 (UK stations will also send WAB area and country). Multiplier is no. of different WAB areas. Certificates. Logs to G3ULH.

**20-21 CD Party**, phone. **Zero District QSO Party**, sponsored by the TRA ARC of Iowa State Univ. at Ames. -Stations outside of the zero district will exchange reports with zero stations only. Zeros may work other zeros as well. Be sure to watch for mobiles changing counties. Contest runs from 2000Z April 20 through 0200Z April 22. Suggested spots around: 3570 7070 14070 21070 28070 3900 7270 14300 21370 28570. Novices try 3725 7125 21125. Send RST and QSO no. Zeros will also send county and section. A station may be worked once per band (phone and cw count as separate bands). If a mobile changes county he may be worked again. To score: zeros multiply QSOs by no. of ARRL sections plus no. of zero district counties plus no. of foreign countries. Non-zero use no. of zero counties plus no. of zero sections worked. Certificates. To compete: logs and claimed score by May 17 to TRA ARC: WAØTK, Wilson Hall, Iowa State Univ., Ames, Iowa 50010. **RTTY WAEDC**, sponsored by the DARC, the full GMT period, 80-10 meters. Single op. single transmitter and multiop. single transmitter. Only 36 hours operation permitted for single ops. The 12 hours of nonoperation may be taken in one but not more than 3 periods anytime during the contest. The periods need not be of equal duration but must total a minimum of 12 hours and be clearly indicated in log. Exchange QSO no. and RST. Two-way RTTY contacts with one's own continent count 1 point, with stations outside your continent 3 points. Contacts of non-EU with EU will count 5 points for the non-EU and 3 points for the EU. Work a station once per band. Each QTC given or received counts a point; each QTC must contain the time, call and QSO no. of the station being reported. A QTC may be reported only once and not back to the originator. A maximum of 5 QTCs to a station is permitted per band. Keep a list of QTCs sent. Multipliers are the no. of countries worked on each band plus call areas in JA PY VO VE VK WJ ZL ZS plus UA9 and UAØ. Three classifications, up to 200 watts dc input, over 200 watts, SWL. A reasonable score is required for one of the several awards. Excessive dupes or unsportsmanlike conduct are grounds for disqualification. Logs must contain all the usual info, plus QTCs sent/received. Separate logs per band. Enclose a summary showing scoring, rest periods, classification, plus your name and address in block letters. Deadline June 10. Contest Committee decisions are final. Sent to WAEDC Committee, D-8950 Kautbeuren, Postbox 262, West Germany.

**20-22 QRP QSO Party**, from 2000Z April 20 to 0200Z April 22. Members send report plus state/province/country, QRP no. Non-members use power instead of QRP no. Scoring: 3 points per QSO, 4 points if non-W/VE; non-member 2 points per QSO, 3 points if non-W/VE. The same station may be worked only once per band. Multipliers equal total of states, provinces, countries worked on

each band. Power multipliers: 25-100 watts X 1.5, 5-25 watts X 2, 1-5 watts X 3 and under 1 watt X 4. Final score equals QSO points X mult. X power mult. Suggested freqs.: cw, 3540 7040 14065 21040 28040; ssb, 3980 7280 14330 21430 28600; novice, 3710 7160 21120. Appropriate awards. In reporting, indicate all usual log data, equipment used, plus usual declaration. Deadline for logs is May 18, send to Jim Hadlock, K7JRE, 3701 S.W. Morgan St., Seattle, WA 98126.

**27-28 Florida QSO Party**, sponsored by Florida Skip, the all-Florida Amateur Radio Publication. Florida amateurs work in state as well as out-of-state stations. Periods: Sat, 1500-2000, Sun, 1000-1500, 1400-2359 (times GMT). Suggested freqs.: cw, 1808 3580 7080 14080 21080 28080 (please avoid W1AW); phone 1818 3980 7280 14318 21380 28580. No power restrictions or time limit. Fla. stations send RS(T) and county, non-Fla. send RS(T) state, province or country. Do not exchange QSO no. Stations may be contacted once on each cw band and once on each phone band. These modes are separate entries and are to be summed for Fla. club aggregate entries only. Fla. stations score 1 point per QSO times no. of states, provinces, countries (DC counts as MD). Other Fla. stations may be worked but only for contact points, not for a mult. Max. mult. is 73 (49 states, 12 provinces, and at most 12 DX countries). Fla. clubs may total their members' single-op. scores for a club aggregate (a score may be counted by just one club). For non-Fla. stations, a point a QSO times no. of Fla. counties (67 max.). Trophies, certificates. All logs must be postmarked no later than May 30 and mailed to Florida Skip, Box 5011, Miami Springs, Florida 33166. A summary sheet with name, call, address, claimed score, category and usual declaration must be included or the entry will be subject to disqualification. Messy entries will not even be considered. All scores will be published in the June issue of Florida Skip. Include an 8 cents stamp with your logs for an issue. Only Florida clubs may compete for the club aggregate. Committee decisions are final. **PACC Contest** sponsored by the VFERON, from 1202Z April 27 to 1800 GMT April 28, 160-10 meters. Crossband and crossmode not permitted. (Note, FA stations on 160 operate 1825-1835.) Exchange report and QSO no. starting with 001. PA/PI/PE stations will send their province indicator (as follows: GR Groningen, OV Overijssel, NH Noord-Holland, ZL Zeeland, FR Friesland, GD Gelderland, ZH Zuid-Holland, NB Noord-Brabant, DR Drente, UT Utrecht, LB Limburg, YP Ysselmeerpolders). These are multipliers for non-Holland stations. Three points per complete QSO. Final score is sum of QSO points on all bands times the sum of multipliers on all bands. Appropriate certificates. Logs must show date/time in GMT, stations, province/country worked, multiplier column for each band (to be checked only when the QSO represents a new multiplier), exchanges, points. Send logs by June 30 to Contest Mgr., C. v. d. Nadort, PA0LOU, Bospolderstraat 15, Nieuwerkerk a/d IJssel, Netherlands. Include usual contest statement. **H-22 Contest**, sponsored by the Swiss society the USKA, from 1500Z April 27 to 1700Z April 28. All bands 160-10, no crossmode. Send R1(F) plus serial no. starting with 001. Swiss stations will also add abbreviation of their canton. Each contact with an HB station counts 3 points. A station can be worked once per band either on cw or phone. Multiplier is the sum of cantons worked on each band making a possible multiplier of 22 per band. Final score equals sum of QSO points times sum of cantons worked on each band. Certificates. Abbreviations for the 22 cantons are: AG AR BE BS FR GE GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG ZH. OSs for each of the 22 cantons for the H-22 award go to Walter Blattner, WB9ALF, Box 450, CH 6601 Locarno, Switzerland. Logs for the contest must be postmarked no later than 30 days after the contest and go to: TM USKA, HB9AHA, im Moos, 5707 Seengen, Switzerland.

#### MAY

- 1 West Coast Qualifying Run.
- 10 YL ISSB Contest, cw.
- 11 Frequency Measuring Test, World Telecommunication Day.
- 11-12 Georgia QSO Party.
- 15 WIAW Qualifying Run.
- 18-19 Connecticut QSO Party, V1. ISSB phone.
- 25-26 One-Land QSO Party.
- June 8-9, VHF QSO Party.
- June 22-23, Field Day.
- July 3-4, STRAIGHT-KEY NIGHT!
- July 13-14, Open CD Party, cw.
- July 27-28, Open CD Party, phone. (Note date change to avoid conflict with the ARRL National Convention.)

Sep. 7-8, VHF QSO Party.

Nov. 9-10, SS phone.

Nov. 16-17, SS cw.

All sponsors of the above activities are reminded to seek all possible avenues of publicity for them, especially methods of letting the general public know what is going on. Don't miss these opportunities for good public relations!

## Operating News (Continued from page 100)

breadth, scope and extreme popularity of SKN was heartwarming. Almost all the cw portions of the 40/80 meter bands were covered. There were so many good fists, it was impossible for me to single out any one. — W3CU. As someone remarked, "A stiff arm tomorrow beats a hanger." — W4FC. SKN is actually an effort on the part of ARRL to keep us sober on New Year's Eve. — WN2IYZ. I'd like to suggest that everyone start at the same time, perhaps 0100Z. — W9RC. I liked the relaxed and congenial atmosphere. — WB5CWG. Used Mac Stream Key instead of Clapp-Eastham this year. — K4QF. A respectable way of exercising a faded art. Bravo! — W4MGE. I'm going to buy an HW-7 with a battery and strap it on my back. Then I can work SKN-QRP during my New Year's Eve Party and conserve energy at the same time! — WA3TMR. I suggest a quarterly session, I was impressed by the number of confirmed phone men who showed up. I'm sure they came "down" because they felt they would be treated gently during SKN. — W5VZO/4. I used a Pendolita antique straight key from Argentina. It is hand made, solid copper mounted on a wooden base. They sure don't make 'em like that any more! — WB5GYF. And what about that local in the Richmond VA area who was driven to using an open relay mounted by channel locks and hooked up with alligator leads for a hand key! — CU July 3-4!

## Hamfest Calendar (Continued from page 54)

Radio Society at the Carolina Trademart in downtown Charlotte. All indoors, free covered parking, bingo auction, food available. 9-5 PM.

**Ohio** — The Canton Amateur Radio Club's annual auction and flea market is Friday, March 8, at the Imperial House Motel in Canton, at 7:30 PM. Doors open for set-up at 5 PM with mobile check-ins on 147.06 and 146.94 simplex and Stark County repeater 146.19/79. Free coffee and donuts. Motel is located just north of Canton on I-77. (Take the Everhard Rd. Exit West just .2 miles). For exhibit and display reservations or info write: Mark Schontz, WB8NUA, 601 Perry Dr., N.W., Canton OH.

**Ohio** — The 19th annual hamfest and auction is Saturday, March 9, at the Lucas County Rec. Center, 290 Key St., Maumee. Registration \$2 at door; \$1.50 advance. For further info write: Toledo Mobile Radio Asso., P.O. Box 273, Toledo OH 43695.

**Oklahoma** — The Great Plains Amateur Radio Club second annual hamfest-swapfest is March 30-31 at the county fair building in Woodward.

**Puerto Rico** — The annual hamfest of the Radio Club of Puerto Rico is March 24 at the Club House of the Colonia Hispanoamericana located at road 840 Km 0.7 of Bayamon, PR. From 9-6 PM. Also, guest speaker, dinner and music.

**Washington D.C.** — The QCWA annual Old Timers Dinner is March 9, at the Washingtonian Motel, Gaithersburg MD, Route 70-S at Shady Grove Road. For info contact Stan Brigham, (301) 436-6337.





All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

### ATLANTIC DIVISION

**DELAWARE** SCM, Roger E. Cole, W3DRX - SEC: K3KAJ. PAM: WA3GSM. RM: W3EEB. Jan. endorsements: WA3DUM, W3DEO, OPS; WA3LMY OBS; K3NEZ OO; W3BDP OVS; W3HKS, W3TRC ORSS. K3KAJ has an SB220 boosting his already potent signal. An early Jan. ice storm took its toll of antennas in lower Del. W3YAH uses his new digital clock and weather station to keep us timed to the second and informed weatherwise. WA3PCC has completed his term as pres. of the First State ARC. Fred's club newsletters have been masterpieces and his efforts to unite all Del. amateurs are noteworthy. New First State Pub. Dir. K3EWK announces WA3UHV as club prize winner of the Dec. QSO party contest. BPL: WA3GSM. PSHR: WA3DUM 61, WA3GSM 51, K3KAJ 44. Traffic: W3EEB 251, WA3DUM 237, WA3GSM 137, K3KAJ 93, W3SL 73, W3DKX 47, K3YHR 17.

**EASTERN PENNSYLVANIA** - SCM, George S. Van Dyke, Jr., W3HK - SEC: W3FBF. RMs: W3EML, WA3QLG, K3MVO, K3PIL. PAMs: K3BHU and WA3PZO. OVS reports from W3ZRR, W3CL, W3ID, W3GOA. OBS reports from W3ID, W3CL, OO reports from K3OIO, K3RDT, W3NCC, W3MFY, W3KEK. BPLs: W3EML, WA3ATQ, W3ABT. PSHR: WA3UKZ, K3PIE, WA3PHQ, WA3RCA, WA3MOP, W3ABT, K3OIO, WA3ATQ.

Net	kHz	Operates	QNI	QTC	RM/PA
EPA	3610	6:30 PDy	472	583	K3PIE
PTTN	3610	7:00 PDy	98	45	WA3QLG
EPEP&T	3917	6:00 PDy	366	177	WA3PZO
PEN	3960	5:30 PMF	595	602	K3BHU

W3EML still battling with eye problems. Back in the BPL anyhow! Our PAM WA3PZO has the tlc. job at WA3TVT Temple ARC. WA3ATQ still waiting to be snowed in in Poconos! W3ABT in the BPL again and should be ready for the medallion. WA3QYY has a busy school, basketball and ham schedule! The Penn ARC boys got on two TV shows demonstrating ham traffic handling, nice PR work. PTTN working liaison locally with 2-meter fm hoping for more traffic. W3BNN again on the road, this time vacation! WA3TMP got 25 wpm cert. W3MFY made a whopping score in the VHF contest! Glad to hear W3BUR XYL on the mend. W3EU reports 160 getting crowded. New 1974 officers for Philmont Mobile RC: W3EXY, pres.; W3GIE, vice-pres.; K3HIE, secy.; K3SPS, treas.; K3KNH, W3ADV, K3GNM, dir. WN3UPX reports one piece of traffic this month and says W3CUL look out! Nice report on EPA from K3PIE. Hope you all took part in the SFT. Net certificates were awarded to W3OY, W3VA, W3ABT, W3ADF, W3AXA, W3EML, W3IPO, K3DZB, K3MVO, K3KTH, K3OIO, WA3MOP, WA3QLG, WA3QYY, WA3QLZ, WA3OGM, WA3JY. WA3KUW, WA3UKZ, WA3EXW/2. Nice report from WB2PWW re W3ABT activities. Thanks for all the well wishes from you guys, 73 and be seen ya on the nets. Traffic: (Dec.) W3EML 679, WA3PZO 325, WA3ATQ 233, K3PIE 233, WA3UKZ 183, K3OIO 174, W3ABT 159, WA3MOP 158, WA3QYY 155, K3MVO 138, WA3RCA 109, WA3PHQ 75, WA3QLG 75, W3HNR 62, K3KTH 28, WA3TMP 25, W3MFY 22, W3CL 18, W3ADF 12, WA3CFU 12, W3WRE 12, W3LC 8, W3OY 8, WA3TJV 5, W3BUB 3, W3ZRR 3, WA1DJC/3 1, WA3BJQ 1, W3EU 1, W3GKM 1, W3GOA 1, W3HK 1, W3ID 1, W3KEK 1, WA3RKJ 1, WN3UPX 1, W3VA 7. (Nov.) K3BHU 140.

**MARYLAND-DISTRICT OF COLUMBIA** - SCM, Karl R. Medrow, W3FA - SEC: K3LFD. RM: W3QU. PAM: K3TNM. NCM: W3LDD. The section lost W3BWT on Jan. 4. He had been an ORS since 1934, he will be missed. WA3RBI and WA3RCI are the top traffic leaders for Dec. with WA3EOP and WN3VGN right behind. W3QU nominates W3FBF, W3QU, WA3DUM and K3KAJ as top

MDD Brass. MEPN has W3ADQ, W3DKX, WA3HIV and W3LDD as toppers with W3FCI and W3QON others. Plan ahead for the MDD-MEPN-MDCTN picnic scheduled for Sat. July 27 at Patpasco. W3LDD makes all of his originations informals! WA3HIV makes all the fone spots with an occasional foray in cw. W3FZV made 23 contacts in the Ten Meter test. WA3OJA does a lot of hamming as well as full studies at CU. K3TFZ settled at Frederick. WA3URV quiet while WB2NOM goes home for the holidays. WA3RVU makes it a dual mode operation. K3ORW little more time with the energy thing slowing things up. WA3AFQ resting up for the DX tests. WA3EOP handled the most messages on the VA PON for Dec. WA3PIG makes the scene while home from school. W3FCS old reliable on those NCS hot spots. K5TFM/3 getting ready to change his prefix. WA3IYS moved to SNJ, but continues school at WDS. W3BHE says Cumberland starts new training classes, WA3TMO married, in the Air Force and with the XYL in Miss.; lets the newcomers listen to DX on his new beam. K3RUO says the Western shore gets rain, the Eastern shore snow, result no tri-bander. W3EOV is into all sorts of nets. WA3RBI along with the Md. Mobileers put on quite a show at Harundel Mall and made the local TV stations. W3QU had Christmas traffic and very poor band conditions. W3FCI likes his new speech processor. W3CSZ finally got his OO Certificate. W3GN cleaned out everything and starting fresh. WA3RDU says the tempo of the job and travel are increasing. WN3VGN manages FEFN on 3733 kHz and RNN with good traffic counts. K3NCM says some of the traffic spills over to him. W3JZY has a new 40-meter dipole on his mountain top. WA3RCI had a fine Christmas with no noticeable drop in traffic despite the job. The latest trip took W3OKN to Spain and England getting ready for the Maritime Mobile Conference. W3ABC and W3CQD made it to SAROC. W3LMP reports 19 patches in his first retirement month. New K3DI is old W2ZCC and at Arundel. WA3CZT is a new OO. K3STU sends in an FB report of past observations. MDD 61 meetings, QTC 358, QNI 6.8 average. MEPN 21 sessions, QTC 110 and 23.9 QNI average. MDCTN 18 sessions, QTC 66 with 15.6 QNI average. FEFN 29 sessions, QTC 89 with 4.8 QNI average. W3FA retired in Jan. Traffic: (Dec.) WA3RBI 694, WA3RCI 630, WN3VGN 305, W3QO 226, WA3HIV 157, WA3EOP 152, WA3QIA 145, WA3AFQ 88, K5TFM/3 76, W3FA 61, W3FZV 58, WA3URV 43, W3FCS 38, WA3IYS 30, W3LDD 29, W3EOV 28, K3NCM 22, WA3RVU 21, K3RUO 18, WA3PIG 15, W3BHE 13, W3FCI 7, K3ORW 6, WA3RDU 3, W3CSZ 1. (Nov.) K3TEZ/3 50.

**SOUTHERN NEW JERSEY** - SCM, Charles E. Travers, W2YPZ - Acting SEC: W2YPZ. RM: W2JL. PAM: WB2FE, WB2FJE, mgr., NJPON, reports five sessions, 95 stations and 26 traffic. The net convenes each Sun. at 6 P.M. on 3930 kHz. Congrats to OO W2FBF now an Extra Class licensee. Appointment: WA2RKE as ORS. Welcome Mike and looking forward to your monthly activity report. W2ZI enjoyed recent Straight Key Nite sponsored by ARRL on Dec. 31. Ed worked W8AQ, W2FDE, W9PKM and W9GF using an old World War I Morse Type key PEJ-2. Newly elected officers of the Burlington Co. RC are W2QXG, pres.; WA2QZO, vice-pres.; WA2SNO, treas.; WB2JZZ, secy. Rancocas Valley ARC elected K2YBN, pres.; WA2QZO, vice-pres.; WB2JNN, treas.; K2JBG, secy. WB2UON now an Extra Class licensee. Congrats. A recent speaker at Gloucester Co. ARC was W2JZC, on his recent experience in KC4-Land. Syd helped to install an IFF system for the Navy. 1974 officers of GCARC are WA2MEM, pres.; WA2NPD, vice-pres.; WA2SFA, rec. secy.; W2AFZ, corr. secy.; WB2OER, treas. Gloucester Co. EC, Harry McCormick reports on AREC activity for Dec. as does W2YPZ, Mercer Co. EC and acting EC for Burlington Co. Interest is being shown in this program with enrollment of several new members from various counties. Many more are needed. Let us make 1974 a banner year for this activity. GCARC was invited to participate in the planning and developing of activities for the coming ARRL Convention to be held in Philadelphia as part of the bicentennial celebration. It is hoped that many of the affiliated clubs will contribute to the plans. Traffic: W2ZQ 661, WB2VEJ 301, WA2TRK 47, WB2FJE 45, WB2FCD 25, W2HIT 25, W2YPZ 14, WB2SFX 8, K2PWK 2. K3MTS/2 2.

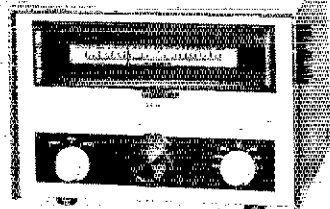
**WESTERN NEW YORK** - SCM, Richard M. Pitzeruse, K2KTK Asst. SCM: Rudy Ehrhardt, W2PVI. SEC: W2CFP. The Monroe County FM Net operates every Sun. at 1230 local time alternating

# AT THE HEAD OF THE NOVICE CLASS

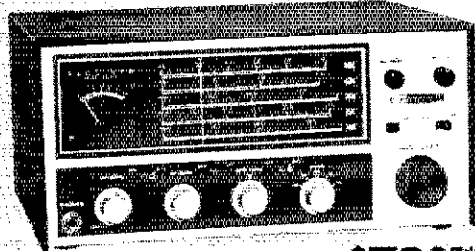
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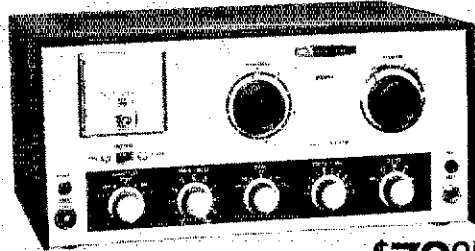
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**HW-16 SPECIFICATIONS—TRANSMITTER SECTION:** RF power input: 50-90 W (adjustable). Frequency control: 80-meter crystal or VFO on 80-meter band, 80- or 40-meter crystal, or VFO on 40-meter band, 40-meter crystal or VFO on 15-meter band. Keying: Grid-block. Break-in with automatic antenna switching and receiver muting. Output impedance: 50 ohm unbalanced SWR less than 2:1. Sidetone: Neon lamp relaxation oscillator. **RECEIVER SECTION:** Sensitivity: Less than 1  $\mu$ V for 10 dB signal-plus-noise to noise ratio. Selectivity: 500 Hz at 6 dB down. Intermediate frequency:

3396 kHz. Antenna impedance: 50 ohm, unbalanced. External speaker impedance: 8 ohm. GENERAL: Frequency coverage: 3.5 to 3.75 MHz, 7.6 to 7.25 MHz, 21.0 to 21.25 MHz. Power: 120 VAC, 50-60 Hz. Dimensions: 6½" H x 13¾" W x 11½" D.

### HR-10B 5-Band Receiver

Top performance, low price. The HR-10B is the receiver for novice or beginning general class hams. Tunes AM, CW & SSB with excellent stability for CW and sideband. Covers 80 through 10 meters with each band separately displayed on the accurately calibrated illuminated slide-rule dial. Separate RF and AF gain controls provide extra convenience and the BFO permits quick and easy sideband tuning. A high quality crystal lattice filter delivers sharp 3 kHz selectivity. 1 uV sensitivity provides capability that puts many more expensive receivers out of the QSO. Built-in "S" meter, switchable AVC and automatic limiter provide the versatility you expect in a first-rate communications receiver. Provision for the optional HRA-10-1 kHz crystal calibrator. Alignment requires an RF signal generator and VTVM. Kit HR-10B, less speaker, 20 lbs. Kit HRA-10-1, plug-in 100 kHz crystal calibrator, 1 lb. . . . **9.95\***

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complement: 6BZ6 RF Amplifier; 6EA8 Mixer Oscillator; 6BA6 1st IF Amplifier; 6EA8 2nd IF Amplifier-BFO; 6BJ7 Detector-AVC-ANL; 6EB8 1st Audio-Audio Output; 6X4 Rectifier. Power requirements: 120/240 VAC, 50/60 Hz, 50 watts. Cabinet size: 6½" H x 13¾" W x 11½" D.

### DX-60B Phone & CW Transmitter

Run 75 watts CW input for novice operation — a full 90 watts phone or CW when you move up to general. Pi output provides fast, easy tuneup into any 50-75 ohm resistive load. Drive Level control, grid/plate current meter and Drive Tune control enable proper tune-up for maximum output, minimum harmonics, best quality audio. Four crystal sockets and provision for operation with external VFO such as the HG-10B below provide maximum operating versatility. Easy assembly... requires only a VTVM for alignment. Kit DX-60B, 24 lbs., less crystals.

**DX-60B SPECIFICATIONS** — Power Input: 90 watts, peak; controlled carrier phone, or CW. Output impedance: 50-75 ohm (coaxial). Output coupling: Pi-network. Operation: CW or AM phone — crystal or VFO control. Band coverage: 80 through 10 meters. Power requirements: 120/240 VAC, 50/60 Hz, 225 watts. Dimensions: 6½" H x 13¾" W x 11½" D.

### HG-10B 80-2 Meter VFO

Our HG-10B VFO covers 80 through 2 meters with separate calibrated scales for each band. Has smooth 28:1 vernier tuning; temperature compensated circuitry for drift free tuning. Provides 5 V rms in the 3.4-4, 7-7.425 and 8-9 MHz ranges. Compatible with virtually all grid-block keyed, transmitters and most cathode-keyed transmitters. Alignment requires receiver of known accuracy covering either the 80-2 meter bands or 3.5 to 8.222 MHz range. Kit HG-10B, 12 lbs.

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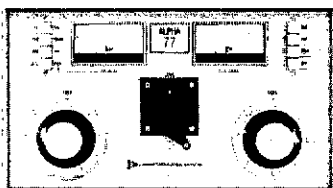
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between the 28/88 and 19/79 repeaters in Rochester. The Rochester Area KTTY Net operates on 146.70 every Mon. at 2130 local. EC WB2YEM with assistants K2HYO, K2DWI and WA2KTI are moving right along organizing the Niagara Frontier AREC. SEC W2CFP is still hunting for ECs in some counties. Do you know who your EC is? If not write to W2CFP and he will tell you. If there isn't one, he'll be glad to sign you up. WA2CIY has his quad back up (4th time) and eagerly awaits the DX Contest. Congratulations to K2UIR, K2IML, WB2VND, W2DSS and W2RUT, WNYers who did outstanding jobs for ESS in 1973. For those who don't know, ESS is the Empire Slow Speed Net, meeting daily on 3590 kHz at 1800 local time. It is an excellent training net and your SCM has fond memories of participating in the mid '50s. NYS reports handling 364 messages with 597 check-ins for Dec. The ESS totals were 82 traffic with 385 check-ins. Congrats to WA2HQH, a new General Class licensee. W2GLB and W2GTK have a new GE prog-line on 2 meters. A hearty welcome to WA2UYK of Rochester. Thanks go to WR2NRK on a remarkable job as 1st asst. mgr. of the NYFON. K2DWI, WB2HCT and W2PVI are the new officers of the WNY Emergency Net. They replace WA2MPC, K2HYO and WA2ABL whose efforts are most appreciated. WA2TSR is asst. mgr. of the Post Office Net. BPLs this month go to W2FER and W2OE. SEC W2CFP, has resigned as Editor and Public Relations Director of ECARS. WA2KAT has been named Program Director for the Hamburg International Hamfest. New OVS is WA2TPR of Liverpool. New officers for the North Country Radio Club are: WA2TSR, pres.; K2UAN, vice-pres.; WA2HEC, secy.-treas. WA2AIV joins the 2-meter fm gang with an HR-212. Traffic with \* indicating: PSHR: W2FR\* 529, W2OE\* 433, W2RUF\* 350, W2MTA\* 300, WA2AYC 187, WB2ADW\* 163, WB2JRX\* 162, WB2VND 81, WB2JWM\* 74, WA2HSB 73, WA2TPC 73, WA2DRC 71, W2HYMM 71, K2KTK 70, W2MSM 62, WA2PUU 58, W2ROF 42, WA2TLB 42, W2PNW 36, W2PVI 30, WB2QAP 29, W2FZK 28, W2RUT 26, WA2LUF 23, WA2MPC 21, K2OFV 18, W2PZL 18, WA2ABL 16, W2EAF 16, WB2JNW 16, WA2TWX 14, WA2TSR 12, WA2QMF 7, WA2AIV 4, W2CFP 3, WA2GLA 2.

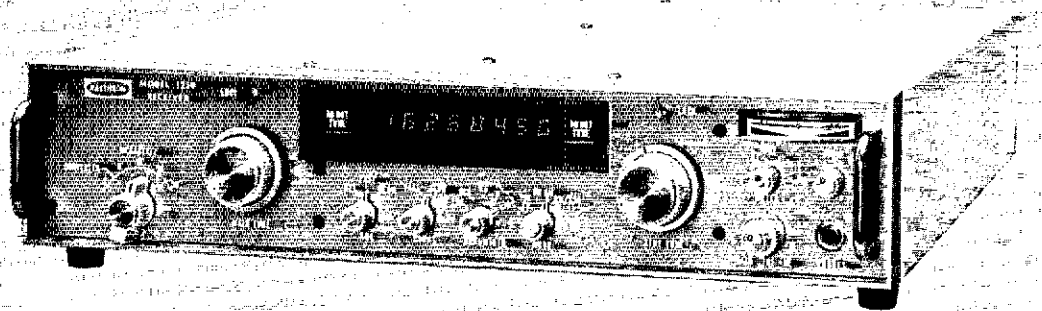
WESTERN PENNSYLVANIA — SCM, Robert E. Gawryla. W3NEM — SEC: W3KPI. PAM: K3ZNP. RMs: W3KUN, W3LOS. WA3PXA. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. local time. KSSN meets daily at 6:30 P.M. local time on 3585 kHz. WN3VTE is a new Novice in the Meadville area and K31LP/3 is a new voice in the same area. WN3SWP and WA3RHM are new General Class holders. Congrats men. K3RYA is now on 2-meter fm with a new Drake and K3SHU is experimenting with facsimile on 2 meters. The Foothills ARC announced via their newsletter that they had a very nice Christmas party with a real good turnout. They also announce the following new officers for 1974: WA3SPG, pres. WN3SWA, vice-pres.; WA3UTL, secy.-treas.; K3JAN, act. mgr. The Indiana County ARC says the Slinky Toy makes a beautiful antenna on 80, 40, and 20 by just clipping on the end with RG-58 Coax feedline. The Indiana ARC and the Nittany ARC are still waiting for their repeater calls. WN3SZX has qualified for his third BPL also for the BPL Medallion. He may be one of the first Novices to qualify. Congrats Tim. Check your license for expiration. Upgrade if you are due. WPA had 31 sessions, 384 stations check in, and handled 345 messages in Dec. PSHR: WA3PXA 61, WA3SWF 44, WA3NAZ 41, W3NEM 39, WA3SWC 36, W2KAT/3 34, WA3IYA 30, WN3SZX 30, K3CR, WA3SWC, and WN3SZX made BPL for the second month in a row. Congrats. Traffic: W2KAT/3 302, K3CB 227, WA3SWF 203, WA3SWC 189, WN3SZX 180, K3CR 172, WA3PXA 168, W3NEM 160, W3KUN 107, W3LOS 99, WA3IYA 84, K3HCT 56, WA3TMR 48, W3RUL 35, W5JTW/3 30, K3VQV 27, K3ZNI 22, W3IDO 15, K3SNJ 14, W3ATQ 10, WA3NAZ 10, WA3JH/3 6, WA3LDA 1, WA3TXQ 1.

### CENTRAL DIVISION

ILLINOIS — SCM, Edmond A. Metzger, W9PRN — Asst. SCM Harry Studer, W9RYU. SEC: W9AKS. RM: W9NXG. PAM: WA9LDC. Cook County EC: W9HPC.

Net	Freq.	GMT/Day	Traffic
IEN	3940	1400 Su	
ILN	3690	0030 Dy	27
		0400 Dy	
NCPN	3915	1400 M-S	12
		2300	13
III PON	3915	2245	33
		1430	
III PON	145.5	0200 MWF	2
III PON	50.28	1200 M	
ILNN	3720	0000 Dy	1
		2215 Dy	

The 9RN mgr. reports 401 messages for Nov. WN9LNH has passed his General. K9ZTV of Carrollton is seeking a manual for an old



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AA-190 Receiver	RV-4 Remote VFO	69	SX-130 Receiver	139	HRA-10-1 calibrator	6	LA-400C Linear	1700X AC supply	85
SP-190 Speaker	RV-4C Remote VFO	79	SX-140 Receiver	69	HO-10 Monitor	59	PALOMAR	14-117 DC supply	94
AMECO	TR-4 Transceiver	99	R-46B Speaker	199	58-601 freq. display	169	Freq. Modulator for	14X DC module	30
CN-50 (14-1B)	TR-4 w/blanker	469	R-50 Speaker	12	HW-202 2m FM Xcvr	169	Const. Communi-	117X basic AC sup.	65
CN-144 (10m r.f.)	AC 4 AC supply	75	HT-32 Transmitter	189	JOHNSON		ators	600R Receiver	225
CLB 6m mod. conv.	DC 4 DC supply	89	HT-32A Transmitter	219	Challenger	\$ 54	500R Speaker	117X basic AC sup.	65
FM-62 VHF Xmt	T-4B Receiver	175	HT-32B Transmitter	279	Viking II	69	600R Speaker	117X basic AC sup.	65
CENTRAL ELECT.	T-4C Transmitter	299	HT-40 Transmitter	49	177 VFO	19	600R Speaker	117X basic AC sup.	65
20A Exciter/tables	T-4AB Transmitter	375	HT-44 Transmitter	159	Ranger	89	600R Speaker	117X basic AC sup.	65
QT-1 Ant-trip	TC-6 6m Xmt. conv.	169	HT-46 Transmitter	209	Salant 1	139	600R Speaker	117X basic AC sup.	65
PM-2 Analyzer	L-4 Linear	475	HT-45 Linear w/		PA-walker	129	600R Speaker	117X basic AC sup.	65
CESCO	TR-2 2m FM Xcvr	149	Homebrew supply	175	Invader 2000	319	600R Speaker	117X basic AC sup.	65
CM-52 SWR bridge	ML-7 2m FM Xcvr	199	SR-150 Transceiver	269	Invader 2000	475	600R Speaker	117X basic AC sup.	65
CLEGG	CC-4 Xmt. control	269	SR-160 Transceiver	169	275W M-box/SWR	79	600R Speaker	117X basic AC sup.	65
SQUIRES-SANDERS	SNB noise blanker	49	PS-150-170 AC sup.	75	4N2 VHF Xmt	89	4300A Receiver	1700X Linear	199
66-2m 6m Xcvr	SCC-4 Calibrator	19	PS-150-170 DC sup.	75	TR switch	19	4300A Receiver	1700X Linear	199
66-2m 6m Xcvr	DYCOM		SR-400 Xcvr	45	KW ELECTRONICS		4300A Receiver	1700X Linear	199
99-2m 6m Xcvr	500C 2m Amplifier	\$ 39	SR-400A AC supply	75	PS-204 SSB Xmt	\$299	4300A Receiver	1700X Linear	199
99-2m 6m Xcvr	500E 2m Amplifier	\$ 39	PS-500C DC supply	85	KENWOOD		4300A Receiver	1700X Linear	199
Ther 6 VHF caly.	900C 100W Amplifier	129	PM-100 Xcvr	349	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
417 AC sup./mod.	100-100W Amplifier	129	MR-400 mobile mt.	15	T-599 Transmitter	289	4300A Receiver	1700X Linear	199
418 DC sup./mod.	EICO		SR-2000 Xcvr AC	875	TS-511 Xcvr	289	4300A Receiver	1700X Linear	199
Zeus VHF Xmt	751 Transceiver	5119	HA-6 Amplifier	89	TS-511A AC supply	79	4300A Receiver	1700X Linear	199
Interceptor Rec.	751 AC supply	49	SR-34 (AC DC)	189	ZF-555	79	4300A Receiver	1700X Linear	199
Altander HF timer	752 DC supply	49	SR-42 2m Xcvr	59	PS-900 AC supply	89	4300A Receiver	1700X Linear	199
Zeus w/ SSB Ant	717 Keyer	49	SR-46 6m Xcvr	69	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
SS-1A Receiver	220 Transmitter	49	HA-26 2m VFO	59	T-599 Transmitter	289	4300A Receiver	1700X Linear	199
SS-1S Noise	740 Modulator	39	HA-1 Keyer	59	TS-511 Xcvr	289	4300A Receiver	1700X Linear	199
Sulener (48-15)	GELOSO		HA-5 VFO	49	TS-511A AC supply	79	4300A Receiver	1700X Linear	199
SS-1A Band Scanner	GZ-208 gen. cov. Rec	\$89	HAMMARLUND		ZF-555	79	4300A Receiver	1700X Linear	199
22-12m FM Xcvr	GZ-209 Ham Rec.	89	HQ-100 Receiver	\$109	PS-900 AC supply	89	4300A Receiver	1700X Linear	199
FM-27A 2m FM	GENAVE		HQ-110C Receiver	119	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
FM-27B 2m FM	GTX-200 2m FM	\$189	HQ-110C Receiver	119	T-599 Transmitter	289	4300A Receiver	1700X Linear	199
811 AC sup./mod.	GLOBE GALAXY/WLR		HQ-110A Receiver	139	TS-511 Xcvr	289	4300A Receiver	1700X Linear	199
COLLINS	Hubander 62 6R 2m	\$189	HQ-110A Rec.	149	TS-511A AC supply	79	4300A Receiver	1700X Linear	199
75A-2 Receiver	6-7 VFO	39	HQ-110A VHF Rec.	149	ZF-555	79	4300A Receiver	1700X Linear	199
75A-4 (ser.#1713)	Galaxy 300 Xcvr	179	HQ-110A VHF Rec.	149	PS-900 AC supply	89	4300A Receiver	1700X Linear	199
75A-4 (ser.#2081)	Galaxy 2 DC supply	49	HQ-110A VHF Rec.	149	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2101)	Galaxy V Mk I	235	HQ-110C Receiver	159	T-599 Transmitter	289	4300A Receiver	1700X Linear	199
75A-4 (ser.#2120)	Galaxy V Mk II	235	HQ-110C Receiver	159	TS-511 Xcvr	289	4300A Receiver	1700X Linear	199
75A-4 (ser.#2140)	Galaxy V Mk III	235	HQ-170A VHF Rec.	249	TS-511A AC supply	79	4300A Receiver	1700X Linear	199
75A-4 (ser.#2160)	Galaxy V Mk III	235	HQ-180AX Rec.	359	ZF-555	79	4300A Receiver	1700X Linear	199
75A-4 (ser.#2180)	GT-550B Xcvr	299	HX-50A Transmitter	219	PS-900 AC supply	89	4300A Receiver	1700X Linear	199
75A-4 (ser.#2200)	GT-550A Xcvr	349	HEATKIT		R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2220)	AC-35 AC supply	65	GR-81 Receiver	\$ 19	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2240)	DC-35 DC supply	65	GR-1 Receiver	129	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2260)	AC-400 AC supply	75	RS-100 Receiver	309	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2280)	RV-1 Remote VFO	59	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2300)	PS-35 VFO	15	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2320)	PS-45 VFO	15	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2340)	CAL-35 Calibrator	7	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2360)	PS-15 Speaker	17	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2380)	DAC-35 DX console	69	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2400)	SC-550 Speaker	19	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2420)	Omni-Handler Xcvr	99	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2440)	PS-400 AC supply	39	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2460)	E-Summary DC supply	39	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2480)	Receptor	6	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2500)	Receptor AC supply	4	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2520)	AC-10 AC supply	19	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2540)	Booster	19	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2560)	6-10 (new demo)	795	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2580)	CONSET		SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2600)	Column II 6m	\$ 69	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2620)	Column III 2m	74	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2640)	Column IV 6m	119	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2660)	GC-105 2m Xcvr	119	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2680)	6m Linear II	69	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2700)	900A 2as Xcvr	199	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2720)	901A AC supply	199	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2740)	910A 6m Xcvr	199	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2760)	911A AC supply	39	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2780)	OSB-201 Linear	199	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2800)	HALLCRAFTERS		SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2820)	SB-62A Receiver	\$159	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2840)	SX-71 Receiver	99	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2860)	SW-100 Receiver	139	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2880)	SX-101 Mk II Rec.	119	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2900)	SX-101 Mk III Rec.	139	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2920)	SC-101A Receiver	169	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2940)	SL-102 Receiver	99	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2960)	SX-111 Receiver	129	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#2980)	SX-117 Receiver	189	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3000)	HP-23 AC supply	45	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3020)	HP-23A AC supply	49	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3040)	HRA-10-1 calibrator	6	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3060)	HO-10 Monitor	59	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3080)	58-601 freq. display	169	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3100)	HW-202 2m FM Xcvr	169	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3120)	JOHNSON		SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3140)	Challenger	\$ 54	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3160)	Viking II	69	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3180)	177 VFO	19	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3200)	Ranger	89	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3220)	Salant 1	139	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3240)	PA-walker	129	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3260)	Invader 2000	319	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3280)	Invader 2000	475	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3300)	275W M-box/SWR	79	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3320)	4N2 VHF Xmt	89	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3340)	TR switch	19	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3360)	KW ELECTRONICS		SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver	1700X Linear	199
75A-4 (ser.#3380)	PS-204 SSB Xmt	\$299	SB-300 Receiver	289	R-599 Receiver	\$239	4300A Receiver		

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## SBE SB-144

Reg. \$259.—NOW only \$179.

Top performing 2-meter FM transceiver, outfeatures everything in its class—stands apart as the exceptional dollar value in VHF/FM gear for the radio amateur. Beautifully constructed—compact and conveniently installed, SB-144 has what it takes for rock solid, "through the repeater" contacts. 12 separate crystal positions for both transmitter and receiver allow all-repeater pair off or combo repeater/inter-mobile operation. Three sets of crystals are supplied with frequencies most widely used nationally for repeaters. Extra power 100—10 watts output at only 2.5A from 12V car battery. "Hot" double conversion receiver features FET front end for high sensitivity, low cross modulation. Panel meter shows relative power output or receive signal strength. Set is all solid state including an FET and three I-C's. Supplied with quality dynamic mic w/coil cord/plug.

Freq. range: 144-148MHz.

Channels: 12

Power output: 10 watts

Emission: F3

Max. deviation: ±15kHz.

Mod. system: Phase

Osc. freq. range: 6MHz band

Operating voltage/power:

Transmit: 13.8V @ 1.9A approx.

Receive: 13.8V @ 0.35A approx.

Size: 5-11/16"W, 2-3/8"H, 9-1/16"D.

Antenna impedance: 50 ohms

Rec. sensitivity:

0.5 μV for 20 db quieting.

AF output: 1 watt.

Selectivity:

± 12.5 kHz @ 6db.

Filter: Ceramic type

Crystals supplied:

34-94, 94-94, 16-76.

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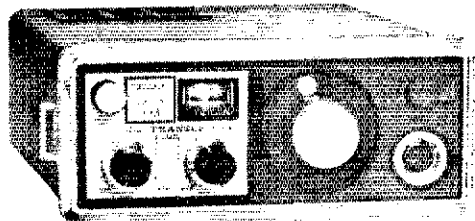
\* Clegg AC Supply for FM-27B \$79.95

\* Cushcraft, Gam, Hy-Gain, Larsen Antennas

\* Bird Ham-Mate 4352 wattmeter \$79.00

\* If you can't think of anything—Phone us or write for our "Condensed listing of Amateur Radio Equipment".

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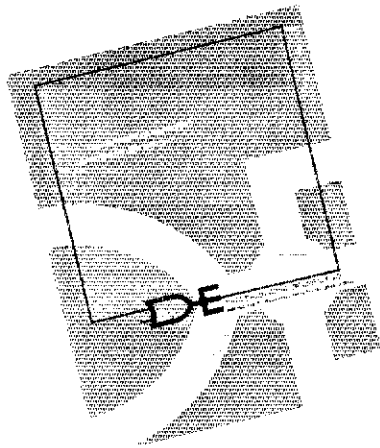
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National NC-2-40D. WA9VGW has received his A-1 operating award. The I.L.N. CW net would like some more of the Chicago stations to check in and all interested are invited. K9DQU/WB9AIE is back mobilizing after repairing the antenna. Silent Keys this month include W9NAB, W9HOQ, W9IP, K9CSA and K9AVQ. Our sympathy goes to their families and many friends. K9FHI, SCM of Wis. is asking for assistance from the I.L. gang in checking in on the Badger Weather Net at 6:45 A.M. on 3985 kHz. With the bad weather this month would be of great help. WA9MZS received the League's Public Service award for locating and shipping a rare drug to Lima, Peru. He also is conducting Novice and Technician exams at his OTH Skokie, Ill. WSUH reports he is maintaining an emergency traffic net on 7.070 kHz at 8:30 A.M. and 4:30 P.M. local time. WA9LRI and WA9FNO are vacationing in Los Angeles and having an FB time with their two meter transceivers. The Chicago FM Club elected WA9DZS, WB9EPO, K9FIR, WB9IEN, K9IPR, WB9KLE, WB9KNN, WB9LCL, W9MDX and WA9TWA to their board of directors for the coming year. SARA of Chicago has received a repeater call WR9ACK. The Egyptian Radio Club is refurbishing their club house. New officers are WB9HZG, W9MXX, K9KX, W9YZE, WA9QWB, W9QMG, W9PHO, W9YTY, W9IHE, W9RVV, W9IHE, W9RVT, W9CYF, K9LIT and W9SAP as trustees. New appointees this month include WB9JPS and WB9NDP as OR, WB9NDP as OPS; WB9HGG as OVS and OBS. W9HFC, WB9BBI and WB9MJQ were elected as officers of the Chicago Amateur Radio Club. Traffic: W9MTT 279, W9ALS 278, W9NXG 27, WB9JPS 178, K9MWA 151, WA9OBR 143, W9MUC 138, WB9TF 135, W9JXV 126, W9UYL 108, K9ZTV 103, W9LDC 95, W9LH 80, W9KR 39, WB9DED 35, W9HOT 35, WA9ULP 29, W9BGL 2, WB9ELP 14, WB9HEG 14, K9DQU/W9AIE 9, WA9MZS 8, W9PFI 8, WA9LHU 4, W9RYU 4, W9TAL 4, W9LDU 1.

INDIANA - SCM, Michael P. Hunter, WA9EED - SEC, WA9YXA. PAMs: WB9FOT, W9HWR, W9PMT. RMs: WB9LH, W9HRY, WB9KVN, WA9EED.

Nets	Freq.	GMT/Days	QNI	QTC	Mg
ITN	3910	1330-2300 Dy 2130 M-S	3293	520	WB9LH
QJN	3686	0900-0300 Dy			WB9LH
IPON	3910	1300-2130 Su 2000 S		28	WB9AIE
IPONVHF	50.7	0100 M-F		55	WB9C
IPONCW	3712	0000 Dy	55	58	WB9K
IPONSSB	50.2	0200 Dy		42	WA9U

By the time you fellas read this, the new year will already be underway. Some of the annual operating activities are already behind us. I apologize for lack of news in this issue. I think that the majority of the section is not yet aware of the change in SCM. This gives me a chance to point out a few of my objectives for the section during the year. I hope to be able to represent all factions in our operational activities. With a little feedback from you fellas it will be easy. I am looking into some suggestions for the nets operation and better ways to obtain cooperation between them. You know, I am primarily a traffic man, so I will begin with my efforts in this area. I trust I will have your cooperation and support. If there is a problem, get word to me and we will sit down and discuss it. That's basically it. I want to publicly thank W9BUQ for his many years of service to the hams in the Ind. section. Bill would disappear because I've got future plans for him. This column belongs to the members - use it! Traffic: WB9NJA 593, WA9EED 29, WB9FOT 255, W9EI 202, WB9KVN 186, WB9IHH 171, K9H 143, W9JGF 140, WA9TGS 98, K9RPZ 90, W9QLW 80, K9RV 74, WA9OAD 65, W9BUQ 60, W9FHH 46, W9DKP 43, WA9ZC 35, WB9DIX 30, W9KX 28, K9CXY 26, W9DZC 26, K9YBM 24, WA9OHX 24, W9KWB 23, W9UEM 21, WB9EAP 20, KOY 19, K9DHY 13, K9FQT 12, K9LZN 11, W9ULH 10, K9ILK 7, W9U 7, W9RDP 6, WB9BAP 5, WA9OKK 5, WB9BEE 3.

WISCONSIN - SCM, Roy Pedersen, K9FHI - SEC: W9NOC. PAMs: K9UTQ, WB9CVB, WA9OAY. RMs: W9UCR, K9LDC, K9KSA.

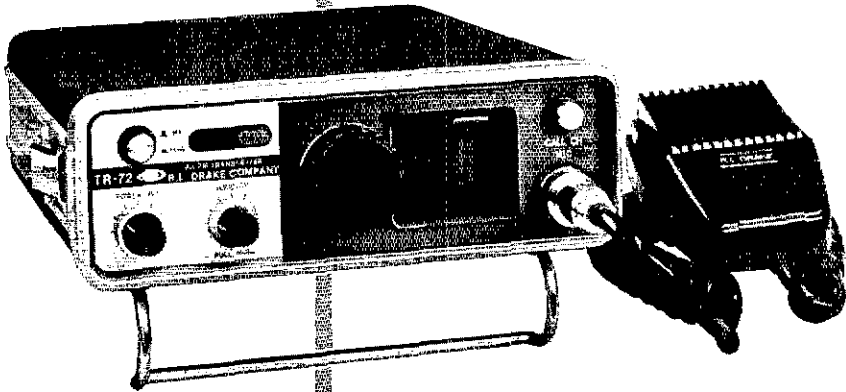
Nets	Freq.	Time(Z)/Days	QNI	QTC	Mg
BWN	3985	1245 M-S	475	352	WA9O
BEN	3985	1800 Dy	792	134	WB9C
WIPON	3925	1801 M-F	603	188	WA9N
WSBN	3985	2330 Dy	1166	126	K9U
WIN(L1)	3662	0100 Dy	286	151	W9UC
WIN(L)	3662	0400 Dy	102	76	K9L

Christmas parties were held at Baraboo, West Allis, Manitowoc and Madison. Lots of traffic passed on all nets. FB, fellows. Sit conditions bothering WSBN and WIN. PAM certificates to K9UTQ, WB9CVB, OPS to W9NLE. BEN certificates to W9NLE, WA9NKW/9, W9CTI, WB9KKQ. WSBN certificates to WB9JIM, WB9KKQ. ORS to W9MFG. EC renewal to W9SZL Racine Co.; O



# NEW DRAKE TR-72

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- Completely Solid State

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**GENERAL:** • Frequency coverage: 144-148 MHz • 23 channels, 2 supplied (.52/.52 and .34/.94) • Completely solid state • Current drain: Rcv 0.4 A, Xmit 2.7 A (Hi power) or 1.2 A (Lo power) • Voltage required: 13.8 VDC • Antenna impedance: 50 ohms • Frequency adjusting trimmers on every crystal • Size: 7 $\frac{1}{8}$ "W x 2 $\frac{3}{8}$ "H x 9 $\frac{1}{8}$ "D (18 x 6 x 24 cm) • Weight: 5 $\frac{1}{2}$  lbs. (2.5 kg).

**TRANSMITTER:** • RF output power: 10 W min. (Hi power) or 1 W (Lo power) at 13.8 VDC • Frequency deviation: adjustable to  $\pm 15$  kHz max., factory set to  $\pm 6.5$  kHz • Automatic VSWR protection

**RECEIVER:** • Crystal-controlled, double conversion superhet • Sensitivity: Less than .35 $\mu$ V for 20 dB quieting • Selectivity: 20 kHz at -6 dB ( $\pm 30$  kHz and adjacent channel rejection at least 80 dB down) • Audio output: 1 W • Audio output impedance: 8 ohms • Modulation acceptance:  $\pm 7$  kHz • Image rejection: -65 dB • Intermodulation and other spurious responses: at least 70 dB down.



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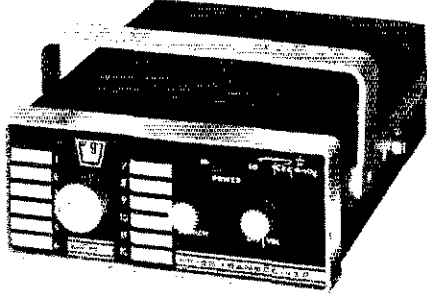
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to W9KXK; OBS to K9UTQ. New officers for West Allis Club WA9KRC, pres.; K9ILV, vice-pres.; WN9MFC, secy.; WN9J treas.; WB9IYR, Sgt.-at-Arms. New officers for YTARC: WB9E pres.; WB9BPL, vice-pres.; K9PKO, secy.; WB9EWR, treas. N officers for Mancorad Club: WB9DOD, pres.; K9LWJ, vice-pr WB9FMB, secy.-treas. Don't forget WNA picnic July 14, 19 WIPON picnic July 21 at Adams County Castle Rock Park. K9O worked N.H. on 2-meter meteor scatter. FLARC started Nov program Jan. 18, 1974 at 7:00 P.M. K9CPM traffic count amateur bands 4841, MARS count 3387 for 1973. WA9PW W9RTP new WSBN delegates to the WNA. Look for slow speed Feb. or Mar. Glad to have K9KSA back after a bout w pneumonia. Remember the Swapfest at Whitewater Mar. Renewal WSBN certificate W9JHF, K9LJU, WIN certificate K9LJU. OPS certificate to K9LJU, ORS certificate to K9LC OPS certificate to W9ESJ. Traffic: (Dec.) K9CPM 382, W9C 340, W9DND 299, K9FHI 125, W9AYK 90, K9LJU 71, WB9A 60, W9UCR 51, K9UTO 46, W9IHW 44, W9CTI 42, WA9OAY WB9CVB 37, W9MMF/Ø 32, W9MFG 31, W9KRO 30, K9JPS W9DXV 26, WA9ZAZ 26, W9BKD 21, WN9LSS 21, WA9PKM W9ESJ 17, K9KSA 5. (Nov.) W9UCR 44.

## DAKOTA DIVISION

MINNESOTA - SCM, Casper H. Schroeder, WAØVAS - N officers of the Rochester Amateur Radio Club are WØOXN, pr WØJCS, vice-pres.; WØJCT, secy.; WAØFWK treas. We regret report the passing of WAØSVD. Nets: MSN (Minn. Sr. CW N WAØFRA, temp. RM - 1st session - session 31, QNI 248, high low 4, average 8; QTC 145, high 14, low 0, average 4.7. N WØZHN, KØZXE, WAØUPR, WAØURW, WAØJNF, WAØYA, WAØRRA, WØØCNM. Ten reps.: WØZHN, WØPET, KØZ WAØBWM, WAØRKF, WAØUPR, WAØJNF, WAØRRA, WØØCN WAØFMR, 2nd session - sessions 19, QNI 58, high 6, low 1, aver 3; QTC 4, high 4, low 0. NCSs WØZHN, KØPIZ, WAØYA, WAØVYB, WAØRRA, WØØCNM. MIN (Minn. Jr. CW Net) WØØG RM - session 21, QNI 79, high 10, low 1, average 3; QTC 17, h 3, low 0. Novices WNØJZF, WNØIZH, WNØIZI, WNØIDO; N WAØYAH, WAØRRA, WAØTFC, WØØGKH, MSPN (Minn. Sect. Phone Net) Noon session KØFLT PAM - session 31, QNI 808, h 43, low 13, average 26; QTC 91, high 28, low 0, average 2. Evening Net WAØVYB PAM - sessions 31, QNI 925, high 48, 18, average 29.9; QTC 114, high 21, low 0, average 3.7. Piconet Day Watch, Net Mgr. WAØYVT - QNI 4068, QTC 317, 163 ho of operating time, phone patches 91, average per hour 24. Traffic: WAØVAS 645, WAØYVT 291, WAØGRX 238, WAØR 186, WAØIEF 140, WAØVTZ 132, WAØTFC 125, WØØFTL 1 KØPIZ 110, WAØONE 84, KØCSE 63, WAØURW 63, WAØVYB WØØQA 51, WØØCNM 43, WAØJNF 31, KØFLT 30, WØØFMI KØZED 28, KØFTW 24, WAØIIB 21, WAØJPR 21, KØZBI WØØCYM 18, WAØYAH 11, WAØCCA 10, KØZXE 10, KØWXE KØSXQ 7, KØGNI 4, WØØFCX 3, WAØNOH 3, WØØMX 3.

NORTH DAKOTA - SCM, Harold L. Sheets, WØDM - S! WAØAYL. OBS: KØPVG/Ø. RM: WAØMLE, OO: WØBF, WØH much improved and home from the hospital. WAØGWD rep beam now working. KØPYZ working portable Ø from Chicago w WØECX has been long gone to Fla. WØTUF spent the holidays in Twin Cities and prospecting for a new rig. The Dakota Feedba RC, membership of which takes in Cavalier, Pembina and W Counties met in Pebina with 15 hams attending. Discussion 2-meter repeater station for the area; 160 meters, and c membership were taken up. A tech talk on how a simple comp functions finished it off. WAØWBU is pres.; WAØIAS, secy.-tr Congrats to WØØBMG on making PSHR for Dec. WAØRWL mad back from Merchant Marine Academy for the holidays. WAØS was honored with a nice write-up and photo in the Bisma Tribune for his outstanding work with the nets, DX and chewing. Nice going Lyle. We are sorry to hear of the passing ex-WØSSW of Bismarck another OT.

Net	MHz	CDT/Days	Sess	QNI	QTC	M
Goose River	1990.0	0900 S	5	85	2	WØC
POH	3996.5	0900 S	15	343	25	WØQB
		1830 S-S				
RACES	3996.5	1730 M-F	41	633	65	WØØ WAØS
VLWX	3994.0	0730 M-F	20	479	436	WAØG WAØR

Traffic: WAØRWM 351, WAØMLE 323, WAØSUF 74, WØWWL KØGGI 59, WØCDO 42, WØDM 35, WØØBHI 33, WAØIPT WØØBMG 10, WØMXF 4.

SOUTH DAKOTA - SCM, Ed Gray, WAØCPX - WØZWL - the WX Net reports are called into the National WX service at Si Falls every morning. FB WØZWL and WØMZL. KØTXW is on

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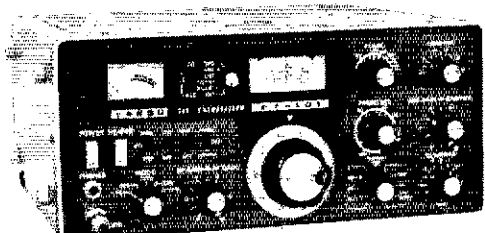


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FTV-650	Transverter	149
YC355	35 MHz Counter	229
YC-355D	200 MHz Counter	289
FT-2FB	2m mob. Xcvr	239
FT-2 Auto	Auto-Scan 2m FM	379

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meter fm. Because of FCC issuing the same call to the Sioux Falls repeater and another repeater, FCC has now issued WR0ACK to Sioux Valley Repeater Assn. The James Valley Repeater Assn. call WR0ACO. They are operating on 22/82 from Pony Hills in Westington Springs with excellent results. The Brookings repeater call is WR0ACP. K0GRP is a Silent Key. I've had a number requests for information on SSTV operation from South Dak. anyone knows of activity please let me know. WX Net - 2 check-ins, 149 formal; NJQ - 731 check-ins, 24 formal; EA Evening - 753 check-ins, 34 formal; Late Evening - 14 check-ins, 35 formal; SD NCW - 223 check-ins, 104 formal. BP WA0ROK, W0ZWL. Traffic: WA0ROK 577, W0ZWL 50 WA0TNM 286, W0HOJ 111, K0GYSY 40, W0MZI 22, WA0KCR 1, WA0RIQ 6, W0SMV 2.

## DELTA DIVISION

LOUISIANA - SCM, Robert P. Schmidt, W5GHP - Asst. Sec. John R. Souvestre, WA5NYY. SEC: K5SVD, RM: WA5ZZA. PA: WB5EQU. VVHF: PAM: WA5KND. The Greater New Orleans Area has moved into new quarters on the 9th floor of the Causeway Plaza Bldg. New officers of the I.A. Tech. Univ. ARC are WB5GVE, pres. WA5THI, secy-treas.; WB2URF, trustee. Welcome to the Bon River Repeater Assn. with WA5LGO, pres.; K5AIM, secy-treas. They will operate a 16/76 repeater in Rayville. Congrats WA5ZZA who received her RN5 Net Certificate and her FCC Medallion. WNSHIV is now WB5HIV! The following have been appointed as Asst. Dir. by W4WHN: W5GHP, K5SVD, K5D, W5SKW, WA5LGO and W5EXI. Let them know how you feel about ARRL policies! The New Orleans VHF Club gave W5GXP FM-27B for Christmas! Don't forget about the new slow-speed net. It's a very easy way to break in handling traffic on cw. Don't forget LAN and LTN either! Still more people are needed to help out with these nets.

Net	kHz	Time (CDST)	QTC	QNI	M
LAN	3615	6:30 & 10:00	154	205	WA5Z
LTN	3910	9:45	46	106	WB5E
LSN	3703	8:00 M & T			WA5Z

Traffic: WA5ZZA 375, W5GHP 253, WB5FRQ 149, W5HGT 1, WA5NYY 4.

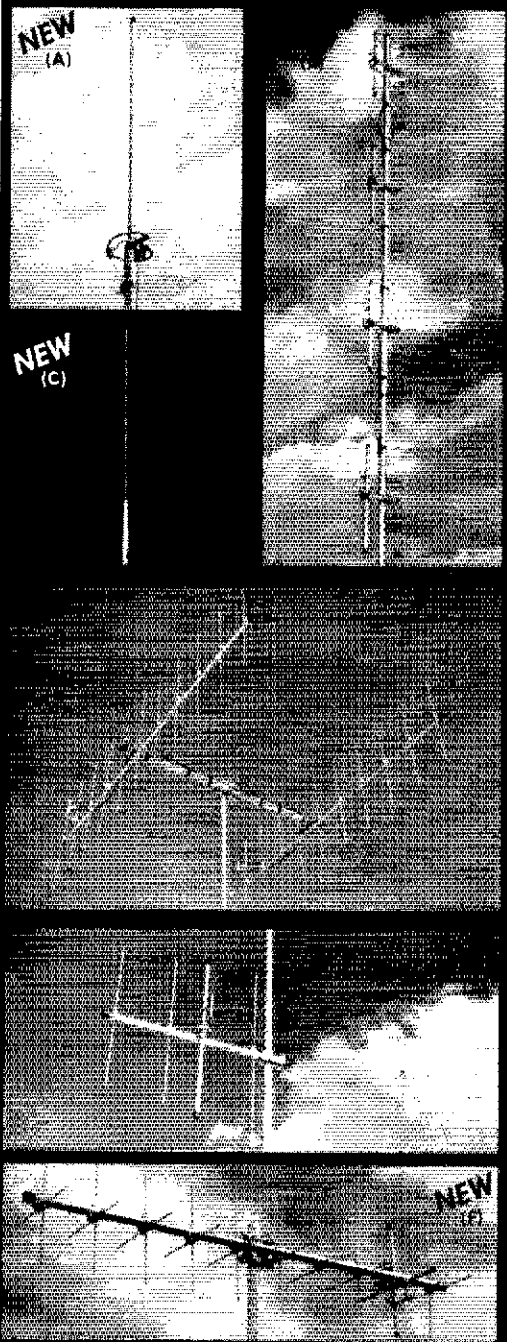
MISSISSIPPI - SCM, Walker Coffey, W5NCB - Asst. Sec. Gene McGahay, WA5IWD. SEC: WA5FH. RMs: WA5Y, WB5DLW. PAMs: WA0GVO/5, WA5KEY, WB5DCY. Officers: JARC are W5OFE, pres.; W5MUG, vice-pres.; W5NGAW, secy-treas.; W5QDC, treas. Congrats to WB5HIZ, WB5HPZ and WB5KJ for General Class. WNSHFA now Advanced Class, call WB5HF. MS Net Certificates to K5TFV, K5VVM, WB5IRR. Appointment: WB5HVV, K5YN, WB5AHL, W5OFE, WA5JDH, W5M, W5QDC, OPS; W5EYV, ORS: WA5FH, OVS. Congrats to W5R recently appointed to Contest Advisory Comm. Officers for EC repeater Assn. are WA5FH, pres.; K5RSI, vice-pres.; WA5D secy-treas.; WA5IXC, equip. officer. WA5THM/5, WB5FML WB5DLW (made BPL, third one for WB5FML. Endorsements: WA0GVO/5, PAM; WB5DLW, W5IHS, W5BW, ORS; W5BW, O, K5HYE, W5CUU, W5BW, WB5CKK, W5JHS, OPS. Our sympathy to the family of WB5EIO now a Silent Key. Don't forget the tests in Mar. We need your check-ins on our nets. Stations in Section reported more than 2100 messages handled in Dec.

Net	Freq.	Time (Z)/Days	QNI	QTC	M
MTN	3665	2:345 Dv	152	189	WA5Y
MNN	3733	2:300 MWF	58	45	WB5D
GCSBN	3925	2:300 Dv	-	-	W5
CGCHN	3935	0:000 Dv	1477	143	WB5I
MSPON	3970	2:345 MS	318	43	WA0GV
MSN	146.52	0:000 Th	-	-	WB5D

Traffic: WB5DLW 557, WB5FML 503, WA5THM/5 195, W5S 167, W5EDT 131, WA5YZW 128, WA5UJH 73, W5NCB 69, W5 65, K5YTA 65, W5QDC 44, WB5BKM 33, WA0GVO/5 24, W5 14, WB5BUE 11, W5SHYR 10, W5NSIU 8, WA5KEY 6, W5SY.

## TENNESSEE - SCM, O.D. Keaton, WA4GLS -

Net	Freq.	Time (Z)/Days	Sets.	QNI	QTC	M
TPN	3980	1140 M-F	77	3509	114	W4W
		1245 M-F				WA4EV
		0030 M-S				K4M
		1400 SSH				
TPON	3980	00:30 Su	10	133	10	WB4B
TN	3635	0000 Dv				W4Z
TNN	3707.5	2:300 Dv	21	111	36	WB4N
ETVHFEN	50.4	0000 MWF	13	111	0	W4S
ETVHFEN	145.2	0000 TTh	3	30	0	WB4D
ETVHM	28.7	0200 WF	9	70	0	WB4I
MTTMM	38.8	0200 TTh	8	49	0	W4E
ACARECNI	146.28	0100 T	4	50	0	WA4B



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AR-2	100 watts	135-175 MHz	\$14.50
AR-25	500 watts	135-175 MHz	18.50
AR-220	100 watts	220-225 MHz	14.50
AR-450	100 watts	420-470 MHz	14.50
AR-6	100 watts	50-54 MHz	19.50

(B) **4 POLE:** A four dipole gain array with mounting booms and coax harness 52 ohm feed, 360° or 180° pattern.

AFM-4D	1000 watts	146-148 MHz	\$46.50
AFM-24D	1000 watts	220-225 MHz	44.50
AFM-44D	1000 watts	435-450 MHz	42.50

(C) **FM MOBILE: IMPROVED** Fiberglass 3/4 wave mobile antenna with new molded base and quick grip trunk mount. Superior strength, power handling and performance.

AM-147T	146-175 MHz mobile	\$26.95
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(D) **POWER PACK:** A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22	1000 watts	146-148 MHz	\$56.50
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(E) **4-6-11 ELEMENT YAGIS:** The standard of comparison in VHF/UHF communications, now cut for 2 meter FM and vertical polarization. 4 & 6 Element models can be tower side mounted.

A147-4	1000 watts	146-148 MHz	\$11.95
A147-11	1000 watts	146-148 MHz	19.95
A220-11	1000 watts	220-225 MHz	17.95
A449-6	1000 watts	440-450 MHz	11.95
A449-11	1000 watts	440-450 MHz	15.95

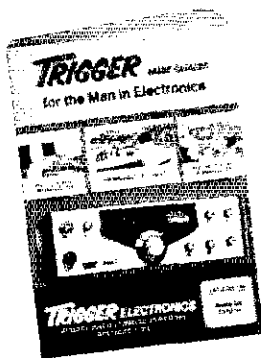
(F) **FM TWIST:** A Cush Craft exclusive — it's two antennas in one. Horizontal elements cut at 144.5 MHz, vertical elements cut at 147 MHz, two feed lines.

A147-20T	1000 watts	145 & 147 MHz	\$39.50
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Now that we are back on daylight saving time again maybe we can get in the groove without changing twice yearly. The SEC met with the west Tenn. EC's in Pickwick Landing on Jan. 5 to discuss the 1974 SFT exercises. I want to remind you that K4PR is in the process of organizing a Middle Tenn. Chapter of the Old Timer Club, be sure to contact him for further details. K4MOI has resigned as net mgr. for the evening session of TPJ; we want to thank Bill for the good job he did and welcome him back when his work load permits it. Everyone be looking forward to the haintest this coming summer and make early plans to attend them. Traffic: W4OG 225, WB4NJR 125, WB4DJII 102, WB4DCO 91, WB4DYJ 52, W4RUW 50, W4PFP 49, K4SXD 46, W4ZJY 39, WN4TOY 35, WB4MPJ 31, WB4ANX 30, W4CYL 26, K4PUZ 26, W4GLS 24, WB4ZSZ 22, WA4BMV 19, W4IYV 18, K4UMW 12, WB4YPO 12, W4SGI 6, WA4ZXZ 5, WA4FWW 4.

**GREAT LAKES DIVISION**

KENTUCKY - SCM, Ted H. Huddle, W4CID - SEC: WA4GHG. Endorsements: WB4ZSA as ORS; WB4ILF as EC; WB4EOR as OBS. BPLs: WB4REN, WB4VBG, WB4WCM, K4MNF, W4BAZ and WN4ECB.

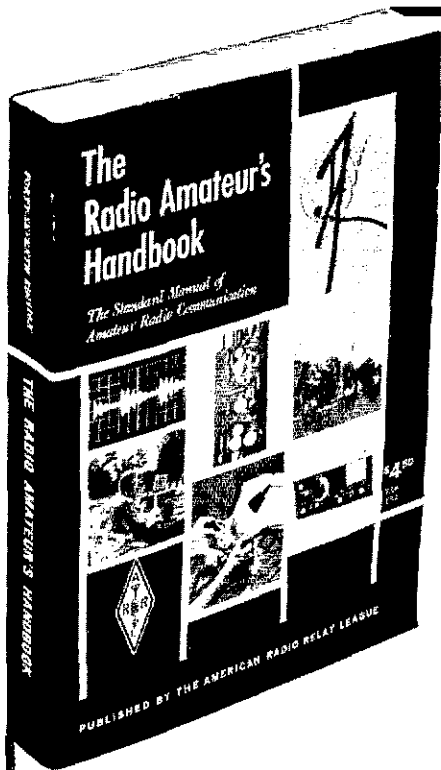
Net	QNT	QTC	Net	QNT	QTC
KRN	241	31	KYN	298	24
MKPN	922	117	KNTN	172	15
KTN	1179	254	KPON	98	11

Plenty of traffic activity in Dec. as evidenced by 6 BPLs! The 1974 Kentucky QSO party was won by WB4DSS. WA4GLG's XYL is now WA4GRV. WB4SJI now has his DXCC-260. The Bowling Green ARC now conducting Novice classes. W4BAZ was recently listed as one of 77 hams having 50 years ARRL membership. The following Owensboro amateurs were active in a recent successful search for drowning victims: WB4ZSA, W4OYI, K4UDZ, WA4RTI, WB4CFI and WA4TTC. Traffic: WB4VBG 412, WB4WCM 406, K4MNF 377, WA4JQS 319, WB4REN 206, WN4ECB 202, W4BAZ 201, WB4EOR 149, K4UNW 141, WB4ZML 123, WB4ZMK 118, WB4AUN 86, W4CID 81, WA4VZZ 81, WB4NHO 58, K4DZM 57, WA4GHO 57, W4IQZ 52, WB4QVS 44, WA4AVV 37, WA4FAF 36, WB4EWG 35, WN4GRF 34, WA4ENH 30, WN4CKW 23, WB4SKT/4 21, WB4FAT 20, K4AVX 17, W4YOK 17, W4C4A 15, W4OYI 14, WB4ZSA 8, K4LOL 7, K4HOE 6, WB4YAF 4, WB4NFT/4 1, WA4WWA 1.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM. A.L. Baker, W8TZZ. SEC: W8MPD. RMs: W8IYA, W8WVJ, W8RTN, K8KMQ, W8GLC, W8BIM. PAMs: W8GVS, W8NDL, VHL. PAMs: K8AEM, W8WVV.

Net	Freq.	Time/Days	QNT	QTC	Sess.	Mgr.
QMN	3663	2200 Dy	1346	596	64	W8IYA
WSBN	3935	2300 Dy	520	91	29	W8GV
BR/MEN	3930	2130 Dy	985	192	31	WRND
UPEN	3920	2130 Dy	690	65	35	WB8LE
GLETN	3932	0130 Dy	250	40		WB8CH
PON	3955	1500 Dy	1056	491	31	E8LN
PON/CW	3645	2300 M/S	122	11	26	VE8DPO
MI6M.	50.7	2300 M/S	162	8	24	W8VXX
MIJNN	3720	2130 Dy	178	112	31	W8RIAL

The SW Mich. 2-Meter Net had 54 QNT, 2 QTC in 5 sessions as reported by WA8WVV. The 2-Meter Catfish Net had 79 QNT in 5 sessions as reported by WA8WVV. The Mich. Wolverine SSB VHF Net had 51 QNT during 5 sessions as reported by K8AEM. Wayne Co. AREC 2-Meter FM Net had 4 sessions. The new Lin Lizz 2-Meter FM Net is 0100Z each Tue. on 146.94. SCM Olie is home from the hospital. While he is recuperating Asst. SCM W8TZZ is filing this month's report. K8BBN moved to Grand Rapids area. W8CJT and K8SME both moved to Traverse City. During a judgement, W8JZG took a bad fall and broke his leg. W8VVD now W8OX. W8DOI now W8QC. Ex-WA4CDO, formerly from Battle Creek, back in Mich. as WB8RAZ. W8RRWL says he hopes to be operating from Japan under the call KA2JL. The FCC office in Detroit now giving amateur exams at 9 A.M. on Fri. ONLY. WA8SZY is reported to be using solar cells to power his 2-meter gear. Election results for GRARA are: W8RUCG, pres.; W8RDUJ vice-pres.; K8EFK, treas.; W8KIZ, trustee and his XYL Bernice secy. 1974 officers for the Saginaw ARA are: K8RWC, pres.; W8CPY vice-pres.; W8OM, secy.; W8RMCN, treas.; W8RHOH, trustee. Muskegon amateurs elected Frank Hannum, pres.; Leo Bachello vice-pres.; Bob Pulsifer, treas.; Carroll Skeels, secy. CMARA 1974 officers are: W8FSZ, pres.; K8ILF, vice-pres.; W8SAA, treas. W8BQPE, secy. I am informed that W8DNK, WA8ALD, W8KR has become Silent Keys. Don't forget the Great Lakes Div. Convention on Mar. 22-23. Traffic: (Dec.) W8SPIM 515, W8RIT 46, W8RIAD 412, W8WZF 358, K8KMQ 412, W8RBPY 147, K8DY 124, W8ENW 121, W8TZZ 117, W8IYA 116, K8LNE 10, K8MXC 89, W8NDI 87, W8ZBT 84, W8NOH 79, W8RHG 7.



# 1974 EDITION



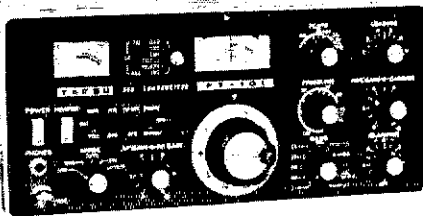
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OHIO - SCM, William E. Clausen, W8MI - Asst. SCM: Kenneth L. Simpson, W8ETX. SEC: WANCOA. RM: W8WAK. PAMS: KRUBK, W8YLW. VHF PAM: W8ADU.

Net	QNT	QTC	Secs.	Freq.	Time(Z)	Mgr.
OSSBN	2781	1289	84	3972.5	14.30/2000/ 2245	K8UBK
BN	557	373	63	3577	2245/0200	W8WAK
O6MtrN	483	81	31	50.16	0100	W8ADU
OSN	265	114	31	3577	2210	W8KRI
BN-RITTY	167	52	31	3605	2200	K8NCV
OH-Novice	74	31	17	3740	2230	W8WZZ

New appointees: W8RHWL, W8RZX, OPSs; W8MXU, ORS. Renewals: W8AMAZ, W8PMJ, W8HGH, ORSs: K8NYN, CO; W8KHUP, ORN & ORN. Dec. was a big traffic month with 7676 message handlings and 8 BPLs earned. All net mgrs. and ECs are urged to send SET reports to ARRL Hq. TODAY, Mar. 1 is the due date. New officers of the Champaign-Logan Co. ARC are W8RBYZ, pres.; W8GKI, vice-pres.; K8YRH, secy-treas. OOs: K8IOB, W8ZCO, W8BU, W8DPW and W8MCR were active in Dec. and K8NYN is feeling better and back at OO duties. W8ZBA has worked 2981 U.S. counties. New officers of the Buckeye Shortwave RA are KR8EG, pres.; W8SXI, vice-pres.; W8PVS, treas.; W8LZE, secy. Columbus and Franklin Co. RACES sponsored a Weather Bureau storm spotting school. Congratulations to W8FBS, new YLRL pres. K8ONA's Cleveland Plain Dealer column tells about engineer W8DMX operating locomotive mobile. New Lake Erie ARA officers are W8IYR, pres.; W8GRG and KR8GK, vice-pres.; W8EHG, treas.; W8APD, secy. W8HUP reports that Ciney has a new repeater: 147.99/39, W8BACC. Nat'l PON Mgr. W8OCU says all nets suffered unstable conditions. New officers of the G.E. Evendale ARS are W8SSI, pres.; W8LPS, vice-pres.; W8STX, secy.; K8RAX, treas.; W8TYF, trustee. New Miami Valley FM Assn. officers are W8ZAL, pres.; W8ED, vice-pres.; W8GWO, secy.; K8EMN, treas.; K8YQH and W8KUH, dir. W9IOP was guest speaker at the Massillon ARC. K7UGA is scheduled to speak at the Dayton Hamvention banquet Apr. 27. W8LBP discussed Oscars 6 & 7 at the Dayton ARA meeting. The Westpark Radiops Log reports that several clubs in the north central area will sponsor a 6-meter fm repeater at Deshler to be public service oriented. Central Ohio ARS has a new portable repeater, contributed by AYH-TOSRV, the bicycle tour organization. The Buckeye Bells award certificates to Ohio stations for 12 member contacts - K8TTF is in charge. Scioto Valley RC's Operation Santa Claus provided North Pole contacts for 900 Chillicothe kindergarten children. W8COA's Cincinnati Enquirer column tells about W8MIX who used his 2-meter walkie-talkie to summon aid after being a hit-skip victim. Traffic: W8PMJ 659, W8MCR 585, W8LNM 381, W8HGH 290, W8WAK 262, W8HUP 257, W8JGW 228, W8HWE 215, W8RNI 214, W8KXV 203, W8ETX 187, W8YLW 187, W8JKA 181, W8OCU 176, W8KRI 175, W8AYC 172, W8MGA 168, K8MLO 144, W8ZNC 144, W8RZX 136, W8KFO 136, W8NRN 132, W8OZA 127, W8TIF 127, W8RMKZ 125, W8QZK 124, W8TYF 100, W8CHF 99, W8MOK 99, W8CXU 98, W8JD 98, W8SED 96, K8UBK 91, W8STX 82, W8SELZ 74, W8SSI 74, W8DDG 71, W8MFD 71, W8CUT 69, W8GUG 68, W8AMAZ 66, W8DCX 46, W8FGD 42, W8HLL 41, K8BYR 39, W8GGR 37, W8KZD 34, W8LZE 33, W8KPN 30, W8UPI 30, W8ADU 32, W8IHW 28, W8VWH 27, W8OE 24, W8VZ 24, W8WEG 24, W8MHO 17, W8DWL 16, W8ILC 16, K8PBE 14, K8CKY 13, W8AKW 12, W8CXM 12, W8NAL 12, W8ARW 11, K8BNL 11, W8GOE 9, W8KWD 9, W8MIH 8, W8BLH 6, K8IOB 6, K8GRO 5, W8RAR 5, K8RXD 5, W8FSX 3, W8VND 2, W8DYF 1, W8MGI 1.

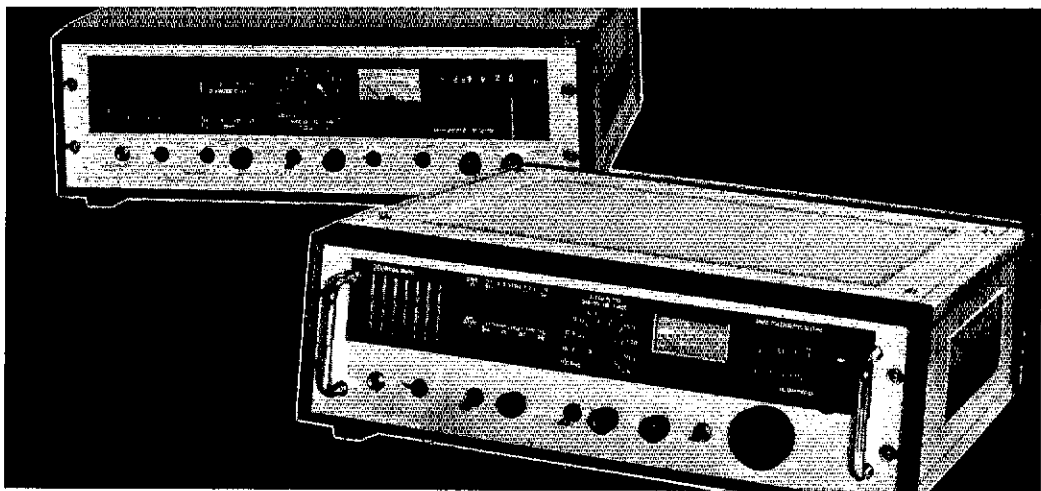
#### HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SNJ - Asst. SCM/PAM: Kenneth Kroth, W82VB. SEC: W2URP. RMs: W2FBI, W8ZIX and K2DN for RTTY. Nets: NYS twice daily at 0001Z and 0300Z on 3.675 MHz; ESS daily at 2300Z on 3.591 MHz; Novice Training Net Mon. thru Fri. at 2200Z on 3.728 MHz; NYSPT&EN daily at 2300Z on 3.925 MHz; Hudson Division P/B Net open to all on 2nd and 4th Sun. at 2200Z on 3.925 MHz; RTTY Net daily at 2330Z on 3.613. Note to all section members:



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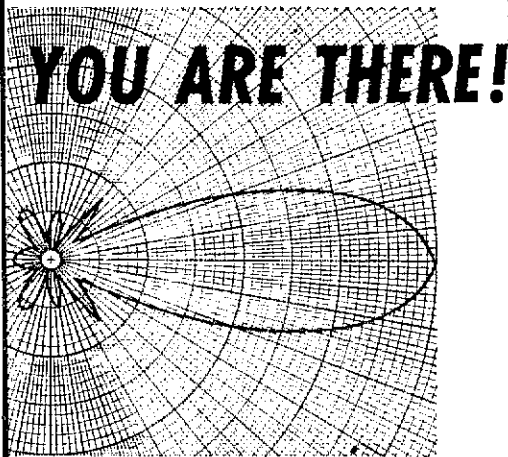
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With the time lag between writing and publication of this column, may be the election for SCM will be in progress as this column appears. Regardless of outcome, many thanks to all for continuing help for the past 6 years — and whoever your next SCM may be for '74-'76, keep it coming! Albany Area had visit from SCM at elected new officers: W2ODJ, pres.; WB2DXM, vice-pres.; W2CQ secy.; WB2DBX, treas.; K2DYP, WA2ETB, WA2KUL and W2AN dir. Other speakers were WA2GJJ and W1FSM, who have been visiting many clubs with prototype of EBC 144 FM "dream machine." Harmonic Hills election and social evening: WB2KD pres.; W2AO, vice-pres.; WB2UYD, secy.; WB2ISL, treas.; K2C WA2KXM, WA1OFP and W2PEP, dir. Westchester ARA held Christmas Banquet Dec. 13 with W2SKE as speaker. Schenectady ARA held Ladies Night with W1YL as guest speaker. RPI Club W2SZ elected WA2FBI, pres.; WA2DFI, vice-pres.; WB2FWQ, secy.; WB2LKK, treas.; WB2PWS, equip. supervisor. Communications Club of New Rochelle had visit from EBC representatives listed above. Rensselaer Co. AREC reports 23 stations active in Walkathon. W2AZO has built memory keyer. WA2ZWS has Albany Co. Red Net on RTTY on 80 and 10. New calls in Yonkers area WN2TIL a WN2MFI — welcome aboard. WA2RAU writes column on DX for Communicators Club of New Rochelle's "Communicator" and thus far has been reprinted in 7 languages including the Swedish and in Cleveland "Plain Dealer" amateur radio column! WB2BY and WB2OHQ handled reservations for SARA Dinner. Schenectady area hams check WB2VJB re charter bus to ARRL National in June. Will you be there? All clubs note many are organizing car pools to lick gas shortage meeting nights. Traffic: W2URP 208, WA2R 159, WA2IQQ 81, WB2IXW 52, K2SIN 47, W2SZ 25, WN3UHI 16, WB2FOT 8, WB2VJB 8, WA2FBI 7, WB2AEQ 4, K2HNW WA2HGB 2.

NEW YORK CITY AND LONG ISLAND — SCM, John Sinate, WR2CHY — SEC: K2HTX. RM: WB2LZN. PAM: WA2UW VHF PAM: WR2RQF. The following are major AREC/RACES Net join one.

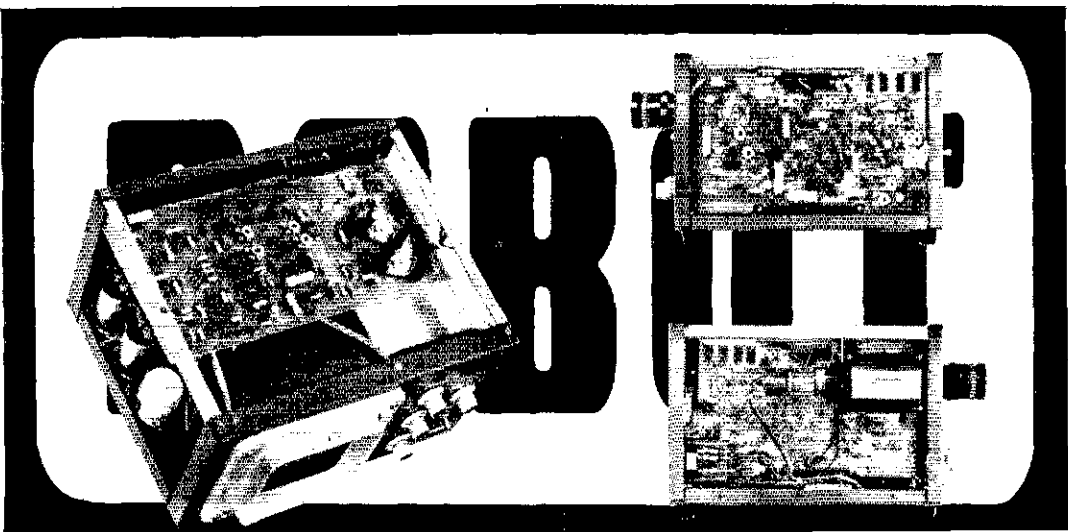
Bronx	28.64 MHz	50.35 MHz	146.88 Em
Kings	28.64 MHz	50.35 MHz	146.88 Em
Richmond			146.88 Em
New York	29.5 MHz	50.48 MHz	146.88 Em
Queens	29.5 MHz	50.20 MHz	146.88 Em
Nassau	28.72 MHz		145.68 MHz
Suffolk(West)	28.73 MHz(Hunt.)		145.59 MHz
	28.65 MHz(Smith)		147.21 MHz
Suffolk(East)			146.82 Em

Note: Net times between 2000 and 2100 local, Mon. Congratulations to new club officers for the Larkfield ARC: K2HTX WA2FAK, WB2PUG, trustees; WB2OYV, secy.; WB2DEW, treas. WA2NVJ reports that NLS needs help, not only from Novices, but also from the experienced crowd. W2FVS is getting ready for upcoming contest season with a new SB200 linear, he's also moving to a new QTH, right near the Russian Embassy; I wonder if he listens to Radio Moscow. WA2RSP is now net mgr. of NYSPTF. W2PF was in the Miami area during Dec, and met many long time friends, both ex-W2s and W2/4s. WA2PLI was vacationing 9Y4-Land. WA2EXP and W2JNO spent two weeks on St. Pierre EP9SS and FP9AO, establishing a first for SSTV and also needed RTTY QSOs. A lot of people lost their antennas during recent ice storms. WB2WFJ lost his to somebody who needed a hunk of copper real bad. Thought for the month: Save a hunk, operate QRP: WB2LZN is still working with 2 watts out with good results in the afternoons. BPLs for the month: WA2UWA a WB2PYM. WB2CHY is back on the air after getting an HX-10 and lot of help from W2BFN. WB2EDW recently moved to section 10 WNY and has passed his Extra and his XYL is awaiting her Nov ticket. Traffic: WA2UWA 901, WB2PYM 482, WB2LZN 318, W2 214, WB2FLF 177, WA2CLB 172, WB2OYV 104, WB2WFJ 172, W2MLC 47, WA2NVJ 41, WB2AEK 26, WB2LGA 26, W2FVS 22, K2JFE 15, W2PF 8, K2FV 7, WB2MHT 5, WB2DAR 4, WA2PLI W2EW 3, WB2FIG 1.

NORTHERN NEW JERSEY — SCM, John M. Crowe. WA2UOQ — SEC: K2KDO. RMs: W2ZEP and WB2RKK. PA: K2KDO and WA2PVB.

Net	kHz	Time(PM)	Days	Secs	QNI	T/c	A
NJN	3695	7:00	Dy	31	565	283	W22
NJN	3695	10:00	Dy	31	187	66	W22
NJSN	3730	8:15	Dy	20	52	30	WB2R
NJPN	3950	6:00	M-S	31	578	302	W22
NJPON	3930	6:00	Su	5	95	26	WB2F
PVTEN	145710	8:00	Dy				K2K

New appointments: WB2RKK as RM; WA2OYV as OPS. OO reported received from WB2TFH, W2DYS, WB2IEC, K2EK, WA2DNY, W2TPJ. The Don Bosco High School ARC has added a tri-band Quad to their station. WA2RYD passed the Amateur Extra



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WN2KFE of St. Peters Prep ARC the General. Congratulations. WA2OVE now using an SB102 and was appointed an AEC for the Waldwick AREC. WB2ELF is using a new TR-23C on two meter fm. WA2SLR looking for RTTY contacts on 146.420. WB2NOM has erected a 40-ft. mast to support new 80/40 dipoles. W2GCT in Dumont quite active on NJN and NJPN. WA2BSU has returned from a Fla. vacation and has added RTTY equipment to his shack. WA2EXX has joined AMSAT. WA2VET is now active down the block from WB2RJJ in Tuckerton. WB2FWW reports that PVETN active again on 2-meter am with WA2JSX and WA2OPY handling the chores of NCS. WA2DIW took a trip to France. WN2SCS in Rahway joined Union County RACES. WB2CMO operating QRP with 4 watts has 30 states and 8 countries as well as being a regular member of NJN. WA2GAX is becoming a familiar face on NJN and NJPN and is contemplating addition of a linear. Rutgers Univ. ARC is looking forward to Oscar VII operation. BPI's go to WB2RKK and WA2EPI. Band conditions less than ideal on 80 meters during the month. WA2RYD has a new 4-400 linear and a new 40-ft. tower. Best of luck to all in the ARRL DX Contest. Traffic: (Dec.) WB2RKK 872, WA2EPI 617, K20QJ 240, W2ZEP 155, WA2CWS 135, WA2DVE 110, WB2AEH 108, W2CUU 98, WA2UOD 64, WB2CST 48, WB2FWW 48, WA2CCE 45, WB2NOM 41, WA2EXX 40, WA2BSU 36, WA2SHT 36, K2ZF1 26, WB2ELF 24, WA2VET 24, W2CVW 23, WA2OVE 20, WB2RJJ 20, WA2NPP 19, WB2KNS 18, WA2EUO 12, WA2DIW 11, WA2NLP 10, WA2QJU 10, W2ABL 9, WA2GAX 9, WA2FIB 8, WA2OPY/2 8, W2WOJ 8, W2NKG 6, WA2NRD 6, WA2VFT 5, W2DYS 2. (Nov.) WA2OPY/2 8.

### MIDWEST DIVISION

IOWA - SCM, Al Culbert, K0YVU - The biggest news I have to offer this month, is the appointment of K0OOD as SEC for Iowa. His address is 3726 SE 14th, Des Moines, Iowa 50315. Al is no stranger to most of us on 75 meters and is also no stranger to heli work. K0YVU announces that the Hawkeye Hamfest will be held Sun., June 16 at the "Teen-Town" complex on the Iowa State Fairgrounds in Des Moines; so mark that calendar now and plan to attend. It is hoped that Governor Ray will proclaim that week an Amateur Radio week in Iowa. New club officers: 3900 Club W0FGC; pres.; K0RSL, veep; W0FZU, secy-treas. North Iowa ARC K0IDN, pres.; WA0NYU, veep; WA0AMH, secy-treas. Des Moines Radio Amateur Assn.: WA0JOC, pres.; W0ZAO, veep; K0OOD, secy-treas. Vice-Director Pitner, W0FZO is airing a weekly "news letter" after the noon session of the 75-meter net each Tue. for those who want to hear the latest. Sadly, I must report that W0DWD of Clarinda is a Silent Key. Heard some horsepower representing Iowa in the 160-Meter Contest with W0LL, W0MOO, W0NPL, W0PKH and WA0VDX in the foreground. W0BW has recently returned from 6YS-Land where the daily temp is 83 degrees. I can understand someone going there, but returning W0WIT is sporting a new FM-27B at Fort Dodge.

Net	QNT	QTC
75 meter (noon)	1551	121
75 meter (eve)	817	4
TLCN (cw)	147	9

Traffic: WA0AUX 393, K0DDA 351, K0AZJ 315, W0MOO 99, W0LCX 79, WA0TAQ 56, WA0VZH 35, W0BW 18, WA0ZVF 1, K0YVU 9, K0JGI 5, WA3PWL/0 4.

KANSAS - SCM, Robert M. Summers, K0BFX - SEC: K0JMF, RM: K0MRI, PAMs: W0GCI, WB0BCL, VHF PAM: WA0TRO. With deep sympathy I report WA0JDB joined Silent Keys Jan. 13. On this sick list again this month - K0LPE, K0DVN, W0RBO is home recuperating from surgery. Don't forget to wire or write your senator with reference to house bill No. 1716-CB Auto license plates. A couple of missed reports due to a break down in the relaying station - KWN for Sept. QNI 485, QTC 15; WA0LLC/W0FIR traffic for Sept. was 131. Sorry Paul, I guess we do find there are weak spots here and there. Been lookin' for WNTS? Try W0LLMH. Net reports for Dec.:

Net	Freq.	Time(CDT)/Days	QNI	QTC	Mgr
KSBN	3920	6:30 P.M. M-S	710	76	W0GCI
KPN	3920	6:45 A.M. MWF-Su	263	23	W0GCI
		8:00 A.M.			
QKS-SS	3735	6:00 P.M. Dy	212	276	WB0GV
KWN	3920	6:00 P.M. Dy	550	161	W0ET
QKS	3610	7:00 P.M. Dy	513	310	K0MRF
		10:00 P.M.			

Mid-States Mobile Monitor Service reporting for Oct. 1630 QNI serving 45 mobiles handling 23 calls or patches and 115 QTC. For Nov. 1206 QNI, 58 mobiles being served, 50 calls or patches and 130 QTC. Looks like that time of year again where new club officers appear. Be sure you let the SCM know of election results. Will try and get as many of these results in one article. Don't forget those hamfest and picnic dates also. Traffic: (Dec.) W0HJ 35

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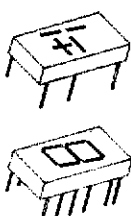
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176, WØFIR 114, WØOF 103, WØMA 89, WØCHJ 77, WBØCZR 6  
KØJMF 52, KØBKF 53, WØPB 53, KØYTA 41, WNØGOL 2  
WØGHZZ 16, WØMCH 13, WØAØWH 7, WØØCUY 6, WØNYG  
WØRRO 5. (Nov.) WBØCZR 65, WØMA 34, WØØCUY 3.

MISSOURI — SCM, Larry S. Phillips, KØVVH — Asst. SCM/SE  
Clifford E. Chamney, KØBIX. New appointments: WAØAZ  
WBØFNV as ECs; WBØCIB as PAM; WBØFKY as OBS; WØOAU  
ORS. Endorsements: WAØITU as OO; WAØJOG as EC.

Net	Freq.	Time/Day	Sess.	QNI	QTC	M
MOSSB	3963	2300 Dy	31	1113	101	KØP
MOPON	3963	2200 M-S	26	529	90	WAØT
MEN	3963	2230 MWT	13	174	10	WØNI
MON	3585	0000 Dy	31	174	118	WØ
MON2	3585	0245 Dy	31	91	25	WØ
PHD	50.45	0130 T	5	87	9	WAØK
ISCN	7273	1730 M-F	14	70	5	WAØR
MSN	3715	2100 Dy	31	62	49	KØP
MOAREC	3963	2245 M	3	41	0	KØP
WEN	28.6	0130 M	5	33	0	OWAS KØB
JØTAN	146.28	0230 T	2	27	0	WAØR
MTN	3950	1900 S	2	3	0	WBØC

I would like to thank the amateurs of Missouri for the help & encouragement they have provided while I have been SCM. I hate to leave this fine group but a promotion dictates that I move to Michigan to report as a Silent Key WØWRD. We have 175 AR members in 10 nets reporting in 32 drills. Congrats to new office of Mid-Mo ARC, KØLVR, pres.; WBØATD, vice-pres.; KØJ secy.-treas. We welcome new Advanced Class WBØKXP and new Novices WNØKIC, WNØKVK, WNØKXM, WNØLGZ, WNØLI, WNØLNQ, WNØLPI and WNØLOO. Don't forget the Missouri Speed Net on 3715 every evening at 4:00 P.M. Traffic: KØO 1478, WØBV 159, KØBIX 105, WAØFMD 73, WAØVBG 1, WØOUD 65, WBØCKI 64, KØVVH 56, WBØFOM 19, WØEPI 1, KØPCK 16, WAØFKD 14, WAØKUH 13, WØFOF 12, WBØFKY, WØGBJ 6, WØRTO 5, WAØWA 3, WAØJOG 2, WAØABI, WBØCXI 1, WØGAU 1.

NEBRASKA — SCM, V.A. Cashon, KØOAL — Asst. SCM: Vel Saver, WAØGHZ. SEC: KØODF. Appointments: WBØCLP, WØA as ECs. Endorsements: WAØDXY, WØVQR as ECs.

Net	Freq.	GMT/Day	QNI	QTC	M
NSN I	3982	0030 Dy	1065	10	WAØL
NEB I-JI	3700	0100 Dy	30	4	WAØG
NSN II	3982	0130 Dy	534	31	WAØL
NEB. 160	1995	0130 Dy	384	366	WAØP
NMN	3982	1330 Dy	1157	47	WAØ
WNN	3950	1400 M-S	480	8	WØN
AREC	3982	1430 Su	261	2	WØP
CHN	3980	1830 Dy	1240	49	WAØQ
SHN	3950	1930 M-S	242	3	WØL
NAN	3980	2100 M-F	515	32	WAØA

WAØHOQ reports a 2-meter repeater should be on the air in Valentine area in July. WØOFL getting a 2-meter rig. Nice hear KØUWK back on the air. WØKKD going sbb with FT101B. WØE and GPX doing some 220 MHz operating. Net mgrs. welcome voluntary help for NCSs. If interested let the mgrs. know. reminder — let's listen before transmitting during nets. CW (NEB) looking for more QNI. Traffic: WAØQEX 101, WØLOD, WAØCJ 63, WØSGA 26, WØVEA 25, WBØEVS 22, WØCSW, WØHOP 15, WØMW 15, KØODF 12, WAØQX 12, WØDMY, WØGEO 11, WØNIK 11, WAØPCC 11, WAØHOQ 9, WØEFV, WAØGHZ 8, WAØYG 8, WØAFG 7, WØHTA 7, WØLCE 7, KØP 7, WØBFRG 6, KØHNT 5, WØRJA 5, WØPQB 4, WØVYX 4, KØB 3, KØSDG 3, KØSFA 3, WAØEEI 2, WAØFIN 2, KØFJT, WBØGMQ 2, WØIRZ 2, WAØLOY 2, WØLWS 2, KØPTK 2, WØY 2.

### NEW ENGLAND DIVISION

CONNECTICUT — SCM, John McNassor, WIGVT — SE  
WIHHR. RM: KIEIR. PAM: KIYGS. VHF PAM: KISXF.

Net	Freq.	Time/Day	Sess.	QNI	QTC
CN	3640	1900 Dy	62	493	
		2200			
CPN	3965	1800 M-S	31	532	
		10 0 Su			
VHF 2	145.98	2200 M-S			
VHF 6	50.6	2100 M-S			

High QNI: CN - WIBYW, WIKV and WIMPW, CPN - WIBI, WIMPW, WAINLD and WINQO. SEC WIHHR suggests the recent Ice Storm and Power Failure may induce all of us to acquire Emergency Power Source to fulfill our task. hcs should sur

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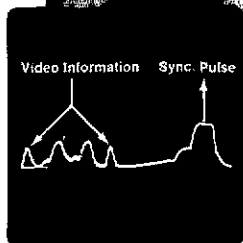
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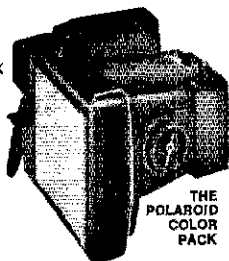
Actual unretouched photo taken from the Venus SS2 using a Polaroid Color Pack II Camera mounted on the Venus P-1 Camera Adapter



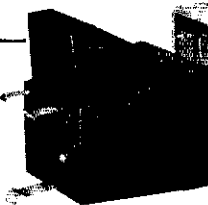
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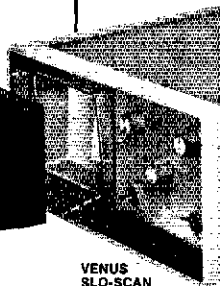
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clubs to be prepared! Director W1QV recommends the ARR produced films for Club meetings — book them via W1HHR and give at least 3 weeks notice. Candlewood ARA will sponsor the Conn. QSO Party again this year — details later. Christmas Party to Murphy Marauders and also Tri-City ARC well attended and much enjoyed. K1ZND and WA1ABV co-editors for the Murphy Messages. New officers: Glastonbury ARC — WA1QEP, pres.; W1QJR, treas. WA1PUL, act. East Conn. ARA — WA1HYN, pres.; K1SY, vice-pres.; K1MYF, treas.; K1VGF, secy. K1PNB notes excellent work as NCS by W1PXM on N.E. Novice Net — also extend invitation to other Novice operators to join. With deep regret we add the call of W1JAX to the list of Silent Keys. Navy MAR member W1FUF (N0KKS) has moved to W6-Land. Congratulations to: WA1FCM for Dec. BPL; W1MPW for High QNI Dec. on CN and CPN! Too cold now to work on that antenna but an ideal time to make use of the material in the Handbook — learn what makes your rig tick! DO IT NOW! Traffic: (Dec.) W1MPW 287, WA1FCM 221, WA1GFH 200, WA1LR 199, WA1PH 184, WA1PHF 129, WA1V 97, W1CTI 94, W1KV 87, WA1NL 83, WA1RZC 52, K1YGS 50, W1KAM 44, K1SRF 43, WA1SQB 41, WA1QZH 37, W1GVT 31, W1DGL 28, WA1IKN 23, WA1JCN 20, WA1RYL 19, WA1MBK 9, W1CUH 8, W1QV 5, WA1PPD 3, W1BDI 2, WA1HYN 2.

**EASTERN MASSACHUSETTS** — SCM, Frank L. Baker, W1AL — SEC W1AOG received reports from ECs: WA1DZL; K1s ZUR, NFW, CCW; W1s BAB, LE. W1AOG going to Fla. for the winter. K1YQK, W1HOL are Silent Keys. W1NF lost two antennas in ic storm. Lower Net had its 5600th session awhile ago. T9 RC met at W1MNK's QTH. W7ZJ, ex-W1EEF heard here on 75 in the early A.M. with a good signal. WA1MZF overseas has call PA9ACE. South Shore RC had Christmas party. W1N1SSC is a YL in Maynard. K1C1LM had a lot of illness in the family. W1LID on the air regularly. Congrats to W1DJ secy. of QWT now a General. K1EUD gets on 20- and 2-meter fm. W1N1RF had new HD-10 keyer and still needs K1.7. W1N1SSL is brother of W1N1RF. WA1PGY on air with new keyer. W1EMG went to Hawaii. WA1RIW now a General on 2-meter fm. K1JJI has SB303 and SB401 on 75. K1REW in Fla. Barnstable RC held a meeting at Canal Power Station with trou: W1UX now liaison station by NYSPT&N to VTSSBN. W1N1SSC active on 15 and 40 cw. W1TK's 100-ft. tower and TH6DX blew down in a storm. W6JUT and W1ATD have a sked on 21320 during the week, sends his 73 to all. K1EMO gets on 3999 and 20 for old friends overseas. WA1FE worked WB4GU on 6. WA1SOO in WA1QQV's wife. W1DKD's son Tom would like one of your old ham license plates. New officers of So. Eastern Mass. ARA, WA1EC WA11FD, pres.; W1LE, vice-pres.; W1LAZ, treas.; WA1GXV, secy. K1VJP, WA1FNM, dir.; W1KHV, treas. WA1s PYW, PWS no Generals. W1LE has HW202. W1EIH building 500 watt linear. Quannapowitt RA held a Family Party. WA1HTP has Extra Class Reading RC has repeater application in by WA1RHN. Officers of North Shore Repeater Assn., W1RIAAC are WA1DZM, pres. W1TTO, vice-pres.; W1VYO, secy.; meetings on the 2nd Monday Danversport Yacht Club. W1MWF active on 52 direct. W1GL retired. Endorsements: W1BVV, WA1OWQ, K1NLQ as ECs; K1YB ORS; W1PEX, W1QYY ORS; WA1NKE OPS; W1BGW OO. K1PN says W1N1PXM has a 4:00 PM session MWF of our New England Novice Net on 3720.

Net	Freq.	Time/Days	QNT	QTC	Mgrs
NEEPN	3945	08:30 Su	123	8	K1EPN
NENN	3720	1830 M-W-F	24	11	K1PN
NENN(Nov.)	3720	1830 M-W-F	27	9	K1PN
NFNN(Oct.)	3720	1830 M-W-F	63	30	K1PN
EM2MN	145.8	2000 M-F	134	152	W1AB
FMN	1660	1900/2200	315	196	WA1MS

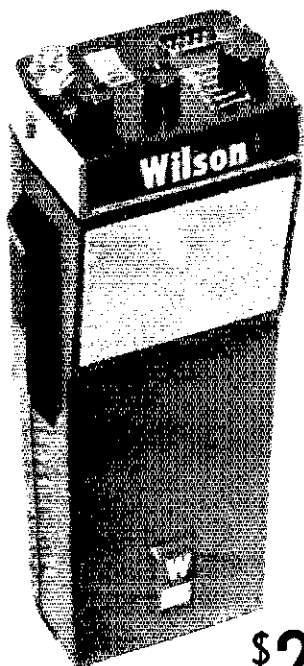
Please note: Eastern Mass/Rhode Island Net on 3660 at 1900 and 2200 daily (EMRD). WA1POJ now RM in RI and WA1MSK RM in EM, give them your support. Massachusetts ARA now meet at Bryantville Methodist Church, they had their annual MARA night Capeway RC met at K1LOE's QTH. WA1KTY gave a talk at the Middlesex ARA on his job. Note: WA1GL Nov. traffic is 120. Traffic: (Dec.) W1PEX 923, WA1MSK 426, WA1OWQ 183, WA1GL 137, W1N1RF 115, W1UX 106, WA1MXV 88, WA1OM 72, WA1PGY 67, W1ABC 57, W1EMG 51, W1CE 38, WA1FE 36, WA1MYK 38, W1AOG 35, WA1FNM 23, K1UIW 12, K1EPL 10, WA1EY 8, W1PL 8, WA1NKE 6, W1MX 4. (Nov.) K1EPL 20 (Sept.) W1UX 37.

**MAINE** — SCM, Peter E. Sterling, K1TEV — SEC: K1C1L PAM: K1GUP. RM: W1RIG. WA1GTT will soon be headed for Thailand for a year of duty. K4BSS back in Brunswick, hopes to be active soon. I am sorry to report the passing of W1BRR formerly of Phillips. Ex-WA1AIM is now WB4GIM and stationed in North Carolina. He is quite active on 3935 in the evenings. W1LZT now has a new FM-27B and quite active on fm. The Northeast Area Barnyard Net reports 26 sessions, 808 check-ins, 3 traffic for Dec.



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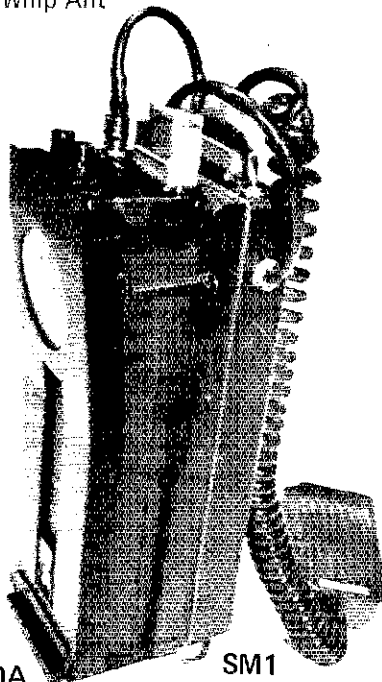
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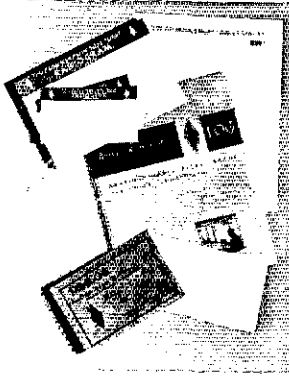
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New hams in Maine are WN1SQY, WN1SRT, WA1SRV, WN1SR. Congratulations fellows. W1GZS, K1MTJ, K1VBL represent Maine in the VHF Contest. I am sorry to report the passing of W1BGZ. W1BJG still looking for new NCSs for PJN. K1DAP built new linear which is working out very well. DX news anyone? Traffic: K1TFV 7, W1OTQ 3.

**NEW HAMPSHIRE** - SCM, Robert C. Mitchell, W1SWX - SEC, K1RSC, RM: W1UBG, PAM: K1YSD. New officers for the Cent. New England Net are K2BK1, mgr.; K1JFQ, asst. mgr.; WB2JN secy.-treas. K1YSD has a new Drake L-4B and an AA-10/AC 2-meter power supply/amplifier. W1EUI won the NH June VHF QSO Party. He also is planning on working 75 and 160 with ne dipoles for these bands. W1BYS is vacationing in Fla. W1UBG NHVT Net report shows 90 traffic, 89 check-ins in 25 sessions. Bob needs more help in keeping the net going especially net control volunteers. WA1JSD says The Granite State ARA will have a new repeater operational soon and the club is welcoming additional members. K17HRK (WA1JTM) sends regards to all his NH friends. W1YWC and W1SWX are the only two NH stations belonging to the TDPS Club, an exclusive world wide cw organization. K1WKS has moved to Hampton, NH from Mass. Traffic: W1UBG 90, WA1OJ 65, K1ACL 4, W1BYS 4, W1SWX 2.

**RHODE ISLAND** - SCM, John E. Johnson, K1AAV - (Nov. late report. The URL Radio Club has been reactivated and for schedule of meeting and other information write to URI Amateur Radio Club, URI Kelley Hall Kingston, R.I. 02881. WIOP, T Providence ARC is back in operation on all bands and all modes and are planning operation in the 160-Meter test. WA1QOG active emergency work and operating on all bands. WA1POJ modifying HW-7 and building a QRP keyer. WA1RET operating portable for URI during the week and worked in the Nov. sweepstakes. He also working lots of DX on 15 meters. RISN reports: 18 sessions, 1 QNT, traffic 47. Traffic: (Nov.) WA1POJ 238, K1OPD 18, WA1R10, WA1QOG 7, W1OQ7.

**VERMONT** - SCM, James H. Viele, W1BRG - SEC: W1VSA

Net	Freq.	Time(Z)/Days	QNT	QTC	Mg
VTSB	3909	2200 M-S	534	143	WA1QOG
	1130	Su			
V1PO	3909	2200 Su	91	21	E1B
Carrier	3935	1300 M-S	445	27	W2D
Green Mt.	3932	2100 M-S	305	15	W1J
Vt. Phone	3932	1230 Su	84	3	W1K

Welcome new Amateurs WN1SOD in St. Albans and WA1SRY Winouski. K1RMI is ready for his General Class exam and you will hear him shortly on the DC bands. Jay Kinck, who was station engineer at KC4AAD at Siple Station in the antarctic for more than a year, has returned to VT and has married Karen Zinke. Welcome home and congratulations! Traffic: K1BQB 184.

**WESTERN MASSACHUSETTS** - SCM, Percy C. Noble, W1BV - SEC: WA1DNB. West Mass. now has an even 100 ARRL members. WMEN held 5 sessions with QNT 78 on ssb plus through 2-meter repeaters with traffic 11. W. Mass. AREC Net meters WA1KHC) 20 sessions, QNT 139, traffic 7. Berkshire Co. W1KZS 4 Sun. sessions AREC through K1FFK repeater with Q 60. Net was on flood watch several hours. CW RM W1DVW WA held 31 sessions, QNT 147, traffic 141. Top 5 in attendance: W1BVR, W1DVW, W1TM, WA1NF, WA1OUZ. PAM: WA1WMPN held 20 sessions, QNT 296, traffic 28. NCSs: WA1W1OJA, K1RGO, WA1MJE, WA1FBE again did fine job in the EMT. WN1RJW (son of W1BZ) passed General Class exam. W1B1 now getting to be a real DM - now 68. WN1QNC should WA1QNC by the time you read this. WN1QHR/I worked 26 stations on 40 with 5 watts. HCRA reports K1HYL is having a ball with 3-watt QRP rig. Congrats to WA1LP on his handling of WMN his NCS nights. MARC reports the club held a Chinese auction. Membership now approximately 50. NOBARC says Berkshire has approximately 30 AREC members. V. of Lincoln says WA1K suffered 24 "Time Outs" during the month (automatic 3-minute timer). WA1NXG gave a talk on Oscar. WA1IOB, WA1DNB, WA1ORT gave a talk to the Sunderland Firefighters Assn. ARRLC. Traffic: (Dec.) W1TM 199, WA1NF 161, W1BVR 1 W1DVW 79, WA1LP 70, WN1RSY 35, WA1MJE 24, WA1OUZ K1RGO 11, WA1DNB 9, WA1FBE 8, W1KZS 4, W1BZ 1, WA1P10 14.

## NORTHWESTERN DIVISION

**ALASKA** - SCM, Roy Dawie, K17COK - SEC: K17HFM, E K17JDO, K17FPK, K17HAB, K17FKO. K17DG reports the the for OCWA Alaska Group is "Light a lantern for peace - understanding throughout the world by communications w

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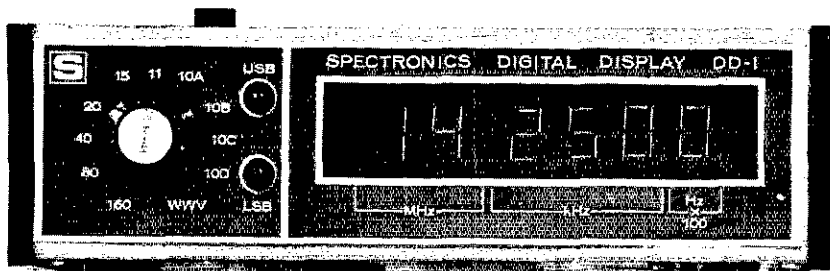
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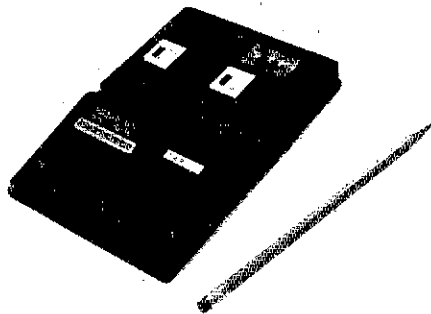
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amateur radio." KL7HAB busy with EC duties. KL7HNIH back on the air after rig troubles. KL7HMU RM for the AKN Net was busy with SET. KL7HAO has a new 110-ft. tower "top hat" loaded on 160 and looking for contacts. KL7HFR a faithful net participant. KL7GGH complains of bad band conditions. KL7JDO busy with E duties. KL7CFX acted as PR man for the Fairbanks area during SET. He also is Asst. Dir. for Alaska. PLEASF mail reports in time so I can mail my report by the 7th of the month. Anchorage had major power failure. KL7FKO with 20 stations on 2 meters mobile or emergency power covered police, fire and hospital locations to provide back up communications. Ten stations stood by on 2 meters in case long haul communications was required. Many thanks to all who participated. AKN Net 3735 kHz cw Mon.-Fri. 074 GMT. AKW Net 3745 kHz cw 0545 GMT Mon.-Fri. Alaska Signal Net 3920 phone 7 days a week at 0300 GMT. Traffic: KL7JDO 1, KL7HMU 11, KL7GGH 10, KL7CFX 3, KL7HFR 3, KL7HAB 1, KL7HAO 1.

IDAHO - Acting SCM, Dale A. Brock, WA7EWV -

Net	MHz	Time(D)/Days	QNT	QTC	Sess.	Mgs
FARM	3.945	0200 Dy	901	23	31	WA7RO
IMN	3.582	0130 M-F	98	29	20	W7GHO
RACES	3.990	1415 M-F	581	35	21	K7UR

WR7ABX, the Moscow Mtn. Repeater 22/82 is giving us coverage from Lewiston to Yakima, Spokane and Walla Walla. WA7EWF working 2 watts cw with a Ten-Tec PM2B from his camp. WA7PEL reports teaching a very large class of prospective hams. Kantiak. W7RKL reports Boise to Twin Falls on two repeaters 34/94 and 28/88 and 16/76 Auto Patch. W7AWS and WA7MXN are working each other on ATV. Coeur d'Alene, KARS, will be studying transistors with an Army Training Film. Regular meeting on 2nd Mon. of each month at 7:30 P.M. Lewis-Clark Club of Lewiston meets 1st Thur. at 8:00 P.M. Traffic: W7GHT 274, WA7EWF 7, W7NHV 5, W7HIS 2.

MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM, Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7IZR. The Yellowstone Radio Club held their Christmas Party and a good time was had by all. The Ham of The Year Award was presented to K7GHE. Radio classes are starting at FMC. Some of the hams at Great Falls held a dinner at Fiddys Supper Club and are starting another club in Great Falls. The 31-91 Repeater has been taken on the air in The Falls area and will soon be heard in The Cheyenne Wyo. area. New officers of the Hellgate ARC are WA7TZP, pres. K7IMZ, vice-pres.; WA7IQU, secy.-treas. The new officers of the Butte ARC are W7ROE, pres.; W7DB, vice-pres.; WA7GFM, secy. Ellen Bodenburger, treas. Butte also is sponsoring code and theory classes. The Capital City Radio Club held an auction with a lot of goodies being offered. K7OZU was reappointed as EC. Mont. Traffic: Net had 784 check-ins, 58 pieces of traffic and 18 sessions. The IM had 20 sessions, 98 check-ins and 29 pieces of traffic. Traffic: WA7KMP 56, WA7IZR 7.

OREGON - SCM, Dale E. Justice, K7WWR - SEC: W7HL. RM: K7GGO. PAM: K7ROZ. Section nets: WA7RWM reports for AREC Net sessions 31, traffic 5, contacts 23, check-ins 24. WA7NWV reports for BSN for Dec. sessions 62, traffic 17, contacts 199, check-ins 1156. WA7EUQ reports for Portland Area AREC Net sessions 20, traffic 10, check-ins 93. W7FFF reports for Nuclear Net sessions 5, check-ins 35. Eager Beaver Ham of the Month is WA7NUZ. I would like to express my appreciation for the fine support received during the past six years as your SCM. WA7KIU will be your new SCM. Traffic: K7NTS 346, K7OTG 29, W7ZB 255, K7OUF 210, W7DAN 116, WA7NWV 79, WA7MC 46, K7WWR 24, WA7MHP 17, WA7QCC 17, W7LT 11, WA7KRP 5, W7IWN 4, W7MLJ 2.

WASHINGTON - SCM, Mary E. Lewis, W7QGP - SEC: W7LIE. RM: W7IWI. PAMs: W7PWP, K7OUV, VHF PAMs: K7BB, K7LRD.

Net	Freq.	Time(L)	QNT	QNT	Sess.	Mgs
NTN	3970	11:40	1801	174	51	W7P
WARTS	3970	17:30	1814	201	31	W7Q
NSN	3700	0300Z	261	131	31	WA7Q
NWSSB	3945	1900	423	45	31	K7OU

Saturday Nite ARC new officers K7GHZ, pres.; WN7TA, vice-pres.; WN7TAD, secy.; meetings 3rd Sat. each month. Low Columbia ARA has made application for W7DG as their new call, replacing W7NCW. W7DG club founder and license trustee joined Silent Keys in Dec. Stations needing Mont. for WAS get news; active Amateur Radio Operators of G.P., Mont. rep. K7IDZ 160-10 cw and ssb, W7MD 80-6 ssb, W7EJ 80-6 ssb, W7FY all on 2, 10 and 450 fm and WA7UMX, W7WYG 80-10 ssb. Here's your stations, good luck. WN7VMS worked on General test

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Jan. K4ZDK/7 discharged from Air Force has a job in Oak Harbor and applied for a W7 call also received notice of Life Membership in ARRL. W7HHU has a new 2-meter rig. W7RXH left for Canal Zone Jan. 6 for a month. W7IEU SEC has openings for ECs and members in AREC, drop him a line for application. K7GGD new treas. Tacoma ARC. K7BBO reports K7VNU, W7MCT and W7SCW also active on Oscar G. WA7BB1 a student in college at Newburg, Ore. Traffic: W7PI 335, W7DPW 227, K7OZA 171, WA7OCV 167, W7GYF 121, W7POE 117, W7BQ 89, K7OXL 83, W7APS 71, WA7OKZ 59, WA7KNW 56, K7CTP 51, W7AXT 50, W7PWP 48, K7VNI 40, W7IEU 37, WA7DZL 34, W7BUN 30, WA7RCR 30, WN7VNG 14, WA7GVB 10, W7RXH 8, K7VNI 5, W7AIB 3, K4ZDK/7 2.

### PACIFIC DIVISION

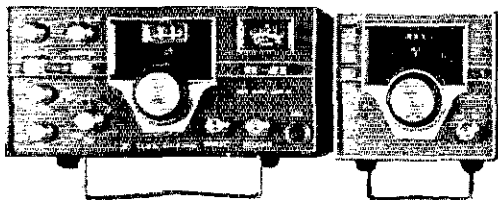
**EAST BAY** - SCM, Charles R. Breeding, K6UWR - Asst. SCM: Ronald G. Martin, W6ZF; SEC: WBGRPK, RMs: W6IPW, WA6DIL, ORS: K6PJ, WB6DHH, WB6VEW. Congratulations to W6IPW on making BPL this month. The traffic net system offers a valuable means to you, of moving traffic. Contact one of our RMs or ORS for help. The Oakland Radio Club's officers for 1974 are W6FSY, pres.; WN6SLN, vice-pres.; WB6VFW, treas.; W6TIO, sec.; K6CFL, EC; K6OXX, chief op. The Oakland Club has started a new Novice class. Contact K6CFL for information. Worked All California Counties number 74 was issued to W6KDL. Congratulations. This certificate is available from the Oakland Club. It is one of the more difficult awards, but well worth the effort. One has been issued to a European, so it can be done. WB6GFG is busy working on 450 MHz gear, but still finds time for the low bands. W6TIG has a new sports car complete with 450 MHz rig. W6ZF reports progress on his new antenna system. The project is not interfering with his West Coast Bulletins heard on the 1st and 2nd Mon. at 8 P.M. on 3540 at 22 wpm. W6VFW now is W7JLB in Ariz. WB6BJW lost his beam in one of the recent wind storms. Traffic: (Dec.) W6IPW 594, W6JXX 67, W6ZL 4, K6UWR 2. (Nov.) W6JXX 36.

**HAWAII** - SCM, J.P. Corrigan, KH6GOW - PAM: KH6GMP. Appointments: KH6GPO, KH6IGI as OOs; KH6HHG EC (Maui). SW1AU possible visit in Mar. with KH6HDA hosting, also tentative visit with the Honolulu DX Club. New pres. of that club is KH6IGI; KH6GMP, vice-pres.; KH6BVS, sec.; KH6 DVI, HPK have new HW-101 on the air and a different beam. FARC planned new equipment for the Haleakala site. KH6IAX, XYI and harmonic visited the big island for 4 days, had eyeballs with KH6s C.J. E.J. Wood also recently acquired WAU; KH6ICP active from Guam with EI-101. KH6GOW found Santa brought him a 755-3 in addition to a new motorized tower. Looking for someone who would like to liaison with W6 for cw traffic bound for KH6. KH6GPO still topping contest rolls. KH6IGA getting up a tower to replace super vertical. KH6BZF plugging away at 432/220 tropo and moon bounce. Lee says W6LZJ heard via the moon. KH6IBH gearing up for 432/1296. KH6IU visiting West Coast. Pappy heard often on 80/40 from W6NHD, ex-islander Al DeLong. KH6GMP now subscribes to the National Contest Journal. KH6KH stood by helplessly as his 40-meter balun went up in flames. Traffic: (Dec.) KH6BZF 113, KH6IAC 5. (Nov.) KH6IAC 18.

**NEVADA** - SCM, Harold P. Leary, K7ZOK - SEC: WA7BEU. W7ILX says it is a pleasure to be a part of 6RN. WA7TY checks into WCARS regularly. W7ABX has FR-6 ready for 6 meters. W7JRW and WA7MRS getting ready for DX with new rotators purchased at SAROC. WA7MRY has new Yaesu PL-2100. WA7MRS has AC supply now for Clegg 2-meter rig. W7OK and WA7MKI have emergency high capacity generators working FB. A group of hams with swapping of antennas have made three 70-ft. ones from one 90-ft. one. The question is how they did it! Handi talkies are now becoming the "word" in the Las Vegas area. Write me for appointments or endorsements of Communications Dept. activities. Remember to send in news of activities prior to 5th of month. Traffic: W7H X 121, WA7TY 34.

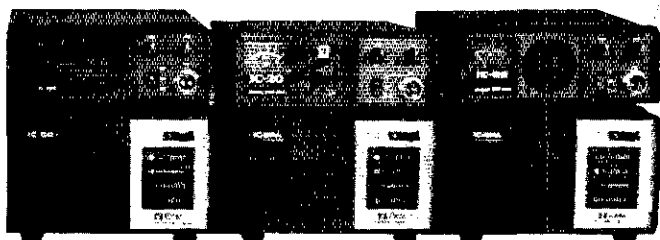
**SACRAMENTO VALLEY** - SCM, Norman A. Wilson, WA6JVD - SEC: W6SMT. New officers for the Sacramento Army Depot Radio Club are K6RHM, pres.; WA6NWE, vice-pres./treas.; WN6SST, sec.; K6VOC, sp. at arms. WB4NXY/6, a VHF/UHF DX enthusiast, hopes to be active soon and for the duration of his stay at Mather AFB Grant High and the McClellan MARS group have started another code and theory class and will stress higher speed code proficiency see WA6TON. The Orville ARS (W6AL) has commenced regular meetings once again. Interested locals see WA6GKY or W6DHI. WA6VYZ is now W6PZG. E6HFM's paper on 160-meter loop antennas has been accepted for publication. K6ZY has joined WB6MDP with the ARRL Intruder Watch. The recent

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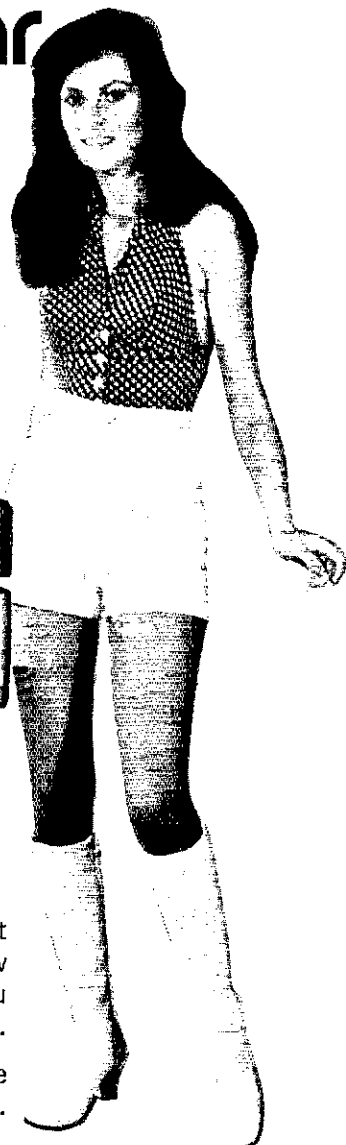
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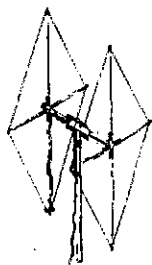
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rain/wind/snow storms took their toll of local antenna systems and WA6JVD is still looking for the end 120 feet of his 160-meter wire. Traffic: WA6OWH 5, K6YZU 5, WA6JVD 4, WB6MDP 3.

SAN FRANCISCO - SCM, Tom Gallagher, W6NUT - RM: WA0SIG/6. VHF PAM: WA6PYN. Max, our RM, who operates K6NCG made PSHR and sent out 200 OO reports in between his Navy studies. W6RO was apparently the section's only representative on Straight Key Night. Sorry to note that the SF (City) EC K6HWI has moved to Ore. W6QIE continues to run code practice from 5 to 30 wpm at 8:00 P.M. local time every day except Mon. on 3590 kHz. Don has brought scores of newcomers into amateur radio. W6NUT teamed with WA6UZA in the ARRL 160-Meter Contest on a mountain top in the Santa Cruz Mountains. This was a lean month for news. Perhaps the heavy snows hitting this area are a reason. Drop me a note and let me know what you are doing for inclusion in this column. Traffic: W6RNL 231, K6NCG 115, WA6ICQ 52, W6OAT 1.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6PJU - The new officers of the Stockton Amateur Radio Club are W6NDJ, pres.; K6JOK, vice-pres.; W6YKS, secy. New officers of the Delta Amateur Radio Club are WA6FBY, pres.; K6OZI, vice-pres.; WN6SSE, secy.; WA6FBL, treas. WB6SPU is heard on 75 sb. W6ALR is on 65 sb. W6QFR holds daily skeds with W6KB. W6ASV has a new home built linear amplifier on all bands. W7CWC now located in Visalia. WA6IRR has a new 2-meter fm transceiver. WA6IMN building a new shack. WA6CPP and W6YKS participated in the 10-Meter Contest. WA6JDB is on 2 meters fm. W6PNY participated in the 10-Meter Contest. K6SDZ is on 6 meters. WA6IQM, W6YKM, WA6IRR are some of the new calls heard on 2 meters fm. WA6BUH has a KWM-2. WA6RXI is the new hC for Western Kern Co. Anyone desiring to give Bill a hand will be appreciated. WA6SKL has an HW17. The Kern County Amateur Radio Club's new officers are WB6RAG, pres.; K6GHT, vice-pres.; K6APE, treas.; WA6RXI, secy. W6LLF, K6PKO, WB6KKB, W6NRO, W6DPD, WB6NSZ and WA6FWS are heard on 145.35 MHz am. Traffic: WA6SCE 286, WA6RXI 60, WA6CPP 3, WA6JDB 3.

SANTA CLARA VALLEY - Acting SCM, Jim Maxwell, W6CUI/K6AQ - SEC: WA6KXB. RMs: W6BVB, W6RFF. PAMs: WA6GYD, WA6YDF. Thanks from all hands in SCV to Jim Hauser, WA6LJA, who retires this month as SCM after nearly two busy years at the helm. W6RSY made RPL. W6YBV reports success working daytime NTS CW to phone. Dec. NCN activity 617 QNT, 393 Q1C, 62 sessions, 1720 minutes, according to NCN Mgr. W6BVB. W6FZJ has stopped publication of his popular 432 MHz newsletter, but promises swift replies to inquiries from 432 enthusiasts. 59 attended the Dec. Pacific Division Director's meeting hosted by W6ZRJ in San Jose. A surprise guest was ARRL Pres. W2TUK, visiting the SCV on OSCAR/AMSAT business. W6DEF and W6NW are concerned about 8HM conditions, but hope daylight time will give relief. WA6IDL, W6JZU and WA6ISX practice typing by working one another on new RITY gear. W6RFF penciled 4000 QSOs into his log in 1973 between traffic sessions. W6AIC has been busy handling Christmas phone patches to KH6 and KL7. WB6IYA is mgr. of CNN, helping Novices learn the ropes every Sat./Sun. noon on 7135. New NCN secy. is W6QNB, recruited by W6BVB and W6RFF. WA6HAD reports daily ten meter activity, and hopes his presence will help maintain interest in the band through the sunspot low. W6MMG reports W6OWO is readying a new 70-ft. tower. W6KZJ and WA6NDN are both regulars on NCN. Our Jan. snow storm closed down virtually every mountain top repeater in SCV as the power lines came crashing down. Take heed when planning for emergencies! WB6OOP has new JA transceiver. Traffic (Dec.) W6RSY 1133, W6YBV 343, W6BVB 247, W6NW 156, W6RFF 107, W6AUC 77, W6DEF 40, WB6TYA 36, W6QNB 33, W6KZJ 27, K6AD 11, WA6HAD 10, W6QII 10 (Nov.) W6RFF 49, WA6HAD 11, W6KZJ 8.

#### ROANOKE DIVISION

NORTH CAROLINA - SCM, Chuck Brydges, W4WXX - SEC: K4FBC. PAM: WB4JMC. VHF PAM: K4GHR. RM: WB4EUF. Five stations made the PSHR listings this month, please check the latest QST for category listings and report your activity. K4BE now retired and active in OO activities. K4BE also active in Telephone Pioneers of America. W4HIE, WA4VHC and WB4KGO passed traffic in an exercise for the Cape Fear ARS. The Aquinace ARC now has six prospective Novices with classes by WA4FVW, WB4U3H and WB4NU1 have 8 in code and theory classes ranging in age from 9 to 66! The XYI of WA4CBB had a telephone pole slipped into the yard for Christmas. New officers for Charlotte ARC (W4CO) are WB4ZTH, pres.; WB4EUF, vice-pres.; WB4HZV, treas.; G8NF/W4, secy.; WB4PWS, act. mgr. Raleigh ARS now boasts 90 members.



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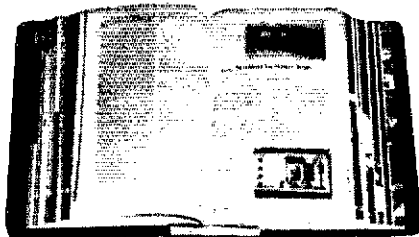
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latest bulletin features W4HJZ a very active VHFer and ex-VHF PAM. New officers for Buncombe County ARC are WA4NUO, pres.; K4HCU, vice-pres.; K4IGC, secy.; W4DPF, treas. The Raleigh ARS sponsored a special events station KH4NCA at Kitty Hawk, NC in memorial to the first airplane flight by the Wright Brothers with WA4PE-N, WB4VBM, WA4DKZ, K4CIA, K4MC, WN4EKJ, WA4ZNA, W4WWD, DL1ZC/W4, KL7HIX/W4, WA4JZX, WB4YNF and one XYL who fixed a big plate of spaghetti for the crew participating. QSLs go via K4CIA. New officers for the Alamance ARC are WB4VHE, pres.; K4VHO, vice-pres.; WB4SGB, secy.-treas.; WA4FTW, ch. engr. WB4JPP is member at large. Two of the officers, WB4VHE and WA4FTW fought a newly listed city ordinance limiting the height of towers and won their case by stating the emergency case for Amateur Radio. 73 Traffic: K4MC 202, W4OFO 169, K4EZH 130, WB4TNB 129, W4WCG 126, K4FTB 68, WB4OXT 64, W4WXZ 56, K4VVBG 38, WB4UOU 26, W4EHF 19, W4ACY 18, WA4KWC 6, WB4CES 5, WA4VBC 5, WB4HDS 2, WB4KGO 2.

**SOUTH CAROLINA** - Acting SCM, Elizabeth Y. Miller, WA4EFP - SEC: WA4ECI. RM: K4LND. PAM: WB4KNB. OO: W4NTO. Many thanks to those who responded to our Jan. appeal but we still need additional information on all SC nets and repeaters. This column proposes to list the data, thus serving as a monthly mini-directory. Wanted is net name or repeater call, frequencies, schedule, area covered, and mpr, if any. Duplications will be sorted out. Lets have similar data on clubs throughout the Section. Where and when does your club meet, and who are the officers? If all these details won't fit in this column, maybe a monthly bulletin can be published. Others do it; why can't we? The Swap Net is increasingly popular. See listing below. For the first time in more than 15 years the SSBN missed a daily session. It was wiped out on Dec. 10 due to long skip conditions.

SC SSBN	3915	0000Z Dly (2300Z DST) Mgr.: WB4KNB
CN	3573	0000Z/0300Z
SCPN	3930	1700Z Dly (1330/2030Z Su)
CRSN	34/94	0100Z Th (1800Z tone burst)

Swap Net: 1st and 3rd Sun. 3915 kHz 3 P.M. EST or EDT. Union County 2-meter net 1st Mon. each month 146.97 MHz at 7:30 PM EST or EDT. SSBN held 30 sessions with 776 check-ins and 103 messages handled. Traffic: K4OCU 89, K4EAR 31, WA4ECU 10, K4FRX 8.

**VIRGINIA** - SCM, Robert J. Sagle, K4GR - Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG. PAM: W4HIR. RMs: WA4SMR, W4SOQ, W4SHJ, K4FBY. Don't forget Va. QSO Party 1800 GMT Mar. 9 through 0200 GMT Mar. 11. Regret that WB4HKN was in hospital in Dec. Vienna Wireless Society: K4EXW, pres.; W4JSX, vice-pres.; WA4GPT, secy.; WN41-HZ, treas. LARC ended the year with 50 members and guests at annual banquet. Va. welcomes W2TPV/4 and XYL WB2UYK/4 to Norfolk. American U ARC publicly thanks K4DDX and WN4GFG for equipment donations and is looking for more. WA4BUE reports repeater interlink between WR4ADN in N.C. and WR4ACN in Hampton Roads area; happy first birthday to WR4ACN. W4KAO installed a new Tri-Bander and 2-meter beams and rotator broke. WB4DRB assisting OVA with RITTY gear. WB4WIS working on new TR switch. K4KDI should be on 2 m by now. K4IAF had 10 day vacation with WA2BEX. K0PIV/4 favoring 2 m. W4JHK funning with new 2 m rig. W4WSI finding ten hot. W4UQ got 5BDXC. Straight-Key night seemed well received. Bad skip on 80 this month bothered traffic nets. W4JUI won 1st place in Delta and 2nd in Ga. QSO parties. WB4PDT has ordered new transceiver. W4TZC new grandfather. WB4DA/4 started new year with the 10! Director W4KFC attended Amateur Satellite Service Council meeting in San Francisco, and LARC and PVRC banquets; active in 160 and 10 meter contests. WN4CHQ now WA4CHO. W4DM, WB4OLB, W4KX and WA4EPH report slow month. Counties W4JUI 2909, WA4WOG 3050, VFN QNI 713, QTC 45; VSN QNI 319. QTC 188. Look for WR4AEN Lynchburg on 16/76. BFL: K4KDJ for Dec. & Nov. Traffic: (Dec.) K4KNP 384, WB4DA/4 382, K4IAF 463, W4SQQ 329, W4UO 301, WB4KSG 210, K4KDJ 192, K4JM 180, WB4SGV 174, WA4SMR 109, W4HIR 108, K4GR 97, W4LDF 92, W4QDY 87, WB4EJK 86, WB4KIT 82, WB4WIS 77, WA4AVN 75, WA4PBG 74, W4YZC 73, W4TE 64, WA9MWF/4 50, WB4RZW 48, K4KA 44, WA2ICU/4 42, K0PIV/4 36, W4KIC 28, WB4RDV 22, WB41-DT 21, WB4PNY 17, WB4YH 11, W4DZL 10, K4VIG 10, K4MLC 9, WB2RYK/4 8, W2TPV/4 8, W4MK 8, W4SIG 8, K4GTS 7, WB41-WL 6, WB4DRB 5, WA4EDW 3, K4MLD 3, WA4EPH 2, WA4WOG 2, W4KX 1. (Nov.) K4KDJ 204, K4IAF 101, WB4WIS 90, WA9MWF/4 39, W4KFC 29, K4VIG 13, K4GTS 6, W4MK 6.

**WEST VIRGINIA** - SCM, Donald B. Morris, WBJM - SEC: WA8NDY. PAMs: W8DIW, W8IYD. RMs: WBHZA, WB8BBG. CW Net Mgr.: WBHZA. Phone Net Mgr.: WB8DQX. WVN CW Net, 3570

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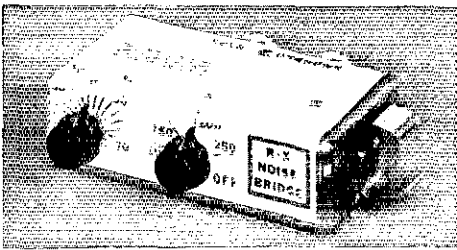
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**INSERTION LOSS:** None. Typical gain 1.2 at 180 Hz BW, 1.5 at 110 Hz BW. 2.4 at 80 Hz BW  
**INDIVIDUAL STAGE Q:** 2 (minimizes ringing)  
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**MFJ ENTERPRISES**

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at 7:00 PM. Phone Net, 3990 at 6:00 PM local time. Kanawha ARC held annual installation officer's dinner with K8LOU, pres. WBRCQV, vice-pres.; WB8MAV, secy.; WA8HJC, treas.; W8BT, act. mgr. W8DUV and W8DUW started the New Year off right, breaking the cover page of Jan. 1974 QST. WVN CW Net, 25 sessions, 100 stations and 41 messages. WVN Phone Net 31 sessions, 652 stations and 224 messages. W8JW active on 8RN and D8RN, active from W8CUI at WVU. Opequon Radio Society, Martinsburg held annual covered dish dinner at Club house. K8OFO new high power linear on 2, pays off with consistent DX QSOs. K8MYU completed solid-state repeater for WR8ABB. WA8DOY provides contacts for those needing a WVA. YL. Good attendance at State Radio Council meeting in Buckhannon, with K8WMX, pres., presiding. State ARRL Convention, Jackson's Mill, July 6 and 7. Traffic: W8JWX 74, WB8DOX 54, WB8JW 54, W8HZ 53. W8JM 16, W8ZNH 13, WB8EC 12, K8OEW 12, W8ANDY 9, W8YCD 9, W8EUE 8, W8BZL 8, W8ET 7, W8LFW 6, W8GDP 4, W8EMAV 4, K8IXO 3, W8BBSN 2, W8BCVG 2, W8CZT 2, W8BDF 2, W8DYB 2, K8TNY 2, K8ZDV 2, K8CFT 1, W8CMV 1, W8CEN 1, W8GWR 1, W8HIH 1, K8LSN 1, W8NBP 1, W8NCH 1, K8NQQ 1, W8OKG 1, K8OOL 1, W8RPF 1, W8ROPA 1, K8UUD 1, W8WEJ 1, K8ZDY 1.

## ROCKY MOUNTAIN DIVISION

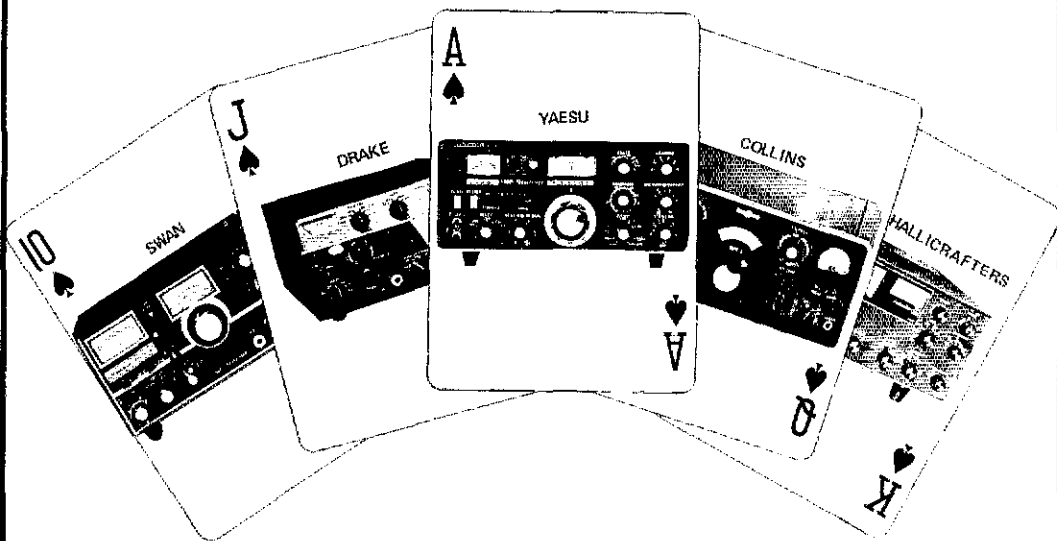
**COLORADO** — SCM, Clyde O. Penney, WA0HLO — SEC, K0FLQ. RM: K0OTH. PAMS: K0CNV, WA0WYP, WA0YGO. A warm welcome back to the air waves to W0LLA who is enjoying his new ham shack. K0SPR continues to perform creditable service tri-handling phone patches to South America. K0PGM Inst all 2-meter beams and 40-meter beam in recent high winds. WA0LVM is enjoying his new 5 watt Argonaut. K0LCZ is now home and recovering nicely following recent surgery. WA0JUP is out of the hospital and getting along very well. W0NCH has been hospitalized in the intensive care unit with heart trouble. W0FPT is home from the hospital following treatment for a leg fracture. W0JTZ was elected secy. of the Pikes Peak Radio Amateurs Assn. to fill vacancy left by resignation of W0CNY. Newly elected officers for the Boulder Amateur Radio Club are WA0ZON, pres.; K0GZG, vice-pres.; W0BEM, secy.; W0FFV, treas. Newly elected officers of the Pueblo Ham Club are W0DMO, pres.; W0KWV, vice-pres. WA0WAD, secy.; W0BSV, treas. Net traffic Dec.: Columbine QJ 881, QTC 51, informals 132, 21 sessions. YCN QNI 165, QTC 79 25 sessions. Traffic: (Dec.) W0WYX 1045, W0HSH 233, W0LQ 183, W0IW 131, K0SPR 122, WA0YGO 65, W0NZL 41, WA0LYM 37, WA0TMA 29, W0YCD 26, W0LAF 23, WA0ZPP 22, W0LLA 21, W0GAO 19, W0HBT 19, W0JRW 13, K0CNV 10, WA0YET 10, W0LGC 6, WA0HLO 4, W0BY 2. (Nov.) W0SIN 14, K0PHF 4.

**NEW MEXICO** — SCM, Edward Hart, Jr., W5RE — SEC, W5ALR. RMs: W5UH, K5KPS. PAMS: W5PNY, W5DMG. New manager of NMN is K5KPS. W5CSO was forced to resign because he found going to school and working was enough to keep him busy. W5UH still trying to get something going on 7070 kHz during the day. If you have any traffic or can participate, call him. W5YH now set up to receive SSTV. W6HZH/5 and K7PQ/5 are now permanent Las Cruces additions. K5YRY working on SSTV W6CZB/5 on 2 fm. W5UJ tried to reach Las Cruces repeater, but so far no sale. Traffic: W5UH 440, K5MAT 383, W5RE 152, W5TLK 130, K5KPS 79, W5ENI 70, W64WXX/5 58, W5PDY 17, W5OHI 14, W5YQ 13, W5QNO 2.

**UTAH** — SCM, John H. Sampson, Jr., W7OCX — SEC, W7GPN. RM: W7UTM. BUN meets daily 1830 GMT on 7272 kHz, 103 check-ins, 103 messages. UCN meets daily at 0130 GMT on 357 kHz, 263 check-ins, 112 minutes. The Utah ARPSC Net meets Sat and Sun. at 1400 GMT on RACES frequency of 3987.5 kHz. More check-ins are needed. Your Utah SEC reports 55 AREC members in the section with 63 WA7OAR in Davis Co., WA7SYU Salt Lake and K7ZOF in Weber Co. 1964 officers for the Ogden Amateur Radio Club: W7LLH, pres.; WA7OF, vice-pres.; WA7GTI, secy. W7GPN, dir. The annual banquet and installation of new officers was Jan. 9. WA7MEL passed his 2nd class phone license exam. WA7BO still has big trouble. Couldn't someone help this YL to get back on the air? Based on early reports the annual Straight Ke Night was highly successful in this area. Former SCM W7MWR has all antennas damaged in a windstorm. W7TUM had a very busy month; also earned ICC certificate for traffic handling. The BU certificate earned by WA7RSS. WA7WIB sporting a new Swan 351 W7DRB in the hospital and is now doing fine. WA7BSG filed 2 intruder reports in Oct., 48 in Nov. and 54 in Dec. Traffic: (Dec) W7UTM 421, W7OCX 184, WA7OAU 157, K1IMK/7 58, W7FY 46, WA7WB 46, K7PFB 35, W7DKB 21, WA7MEL 12, WA7QA 9, K7CLO 8, W7JXK 8, WA7BAQ 7, W7GPN 6. (Nov.) W7JXK 2, W7DKB 9.

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WYOMING - SCM, Wayne M. Moore, W7CQI - SEC: K7NQ PAMS: W7SDA, WA7NHP, K7YUG. OBSs: K7NQX, W7SDA, WA7FHA, K7YUG. Nets: Pony Express Sun. at 0800 on 3920; Y daily at 1830 on 3597; Jackalope Mon. through Sat. at 1215 & 7260 (alt. 3-920); Wx Net Mon. through Sat. at 0630 on 3920; P Net 1900 Mon. through Fri. on 3950. K7AHO is home after vacationing in Mexico. W7PVN vacationing in Hawaii. W7TBB getting started with SSTV. WA7BDI has moved to Tex. - sorry to lose her pleasant voice from Sheridan. Plan now to nominate candidate for the office of SCM. My term expires on June 25 and will not be a candidate for reelection. We finally had a PICCON award winner for the state for 1973 announced - W7TVK. Traffic: W7SDA 165, W7TZK 70, W7RHH 49, K7VWA 44, W7HNI 3, WA7HAB 19, K7SLM 6, K7BMT 5, K7RFL 1.

### SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4EKJ - SEC: W4DGH. RM: W4HFU. PAM: W4RQS. Congratulations to K4V and W4YFN who recently received their 50 and 25 year (respectively) ARRL membership pins; quite an accomplishment. WB4UHC, WB4SRG and W4GYA all doing OK after recent surgery. K4JK reports WB4UNM discovered DX (worked a Russian station) will be hard to hold now! K4HNY busy ratcheting and monitoring. K4HJM reports lots of 2-meter activity. He has earned certificate for Midwest; Western and Southern Section Country Cousins Net and is NCS for Breakfast Club Net. The AFNM having lots of Q and QTC. The AENM also had another emergency session (88 mins) on Dec. 29 when tornados touched down in various parts of the Section. New officers of Mobile ARC are WA4OSR, pres.; K4LXI vice-pres.; W44CVP, secy.; WB4OCU, treas. K4BFT/4 operated station from G.E.X. (Dept. Store) on Dec. 15 '73 to originate holiday messages for the public. More than 200 messages were originated and we want to extend a special thanks to G.E.X. personnel for allowing the station and to WA5ZZA, WB4ZOC, WB5DLW and WB5ML - the out of town/state stations who helped with the traffic. W5UEI, RM NM has advised that 7070 kHz is monitored daily 0830 to 1630 for emergencies and traffic. K4FZQ/4 been helping with OSP between AENB and AENM. Appointed WA4AJA as ORS. Traffic: (Dec.) W4HFU 281, WB4EK 272, K4BFT/4 211, WN4FZQ 172, WB4JMH 102, W4USM 99, WB4SVH 79, W4MOQ 77, K4AOX 74, WA4AJA 62, WB4ZOG 3, WB4KSL 32, WB4ZQ/ 21, K4LJM 8, K4LJC 6, K4INY 4. (Nov. WB4ZQF 21.

GEORGIA - SCM, Ray LaRue, W4BYG - Asst. SCM/RM: John Boston, WB4RUA. PAM: K4JNL.

Net	Freq.	Time (Z)	QMI	QTC	Mgr
GSN	3595	2300/0200	723	366	WB4RU
GSBN	3975	0000	717	67	K4JNL
GTN	3718	2300	217	105	WB4TV
CVEN2	146.94	0030			WB4A

The Bi-City VHF Soc. meets each Mon. at 2100L 28/88. The CVE meets each Sun. at 1330L 3950. New appointments: WA4BA/WB4ABY, K4GBL, WB4TVU, OBSs: K4JJO, WB4DBO, ORS WB4NMA, OVS: WB4ARY, OPS, GSN honors the following for valued assistance during net sessions in Nov. and Dec. due to severe BC ORM: WB4DRM, WA4POM, K3DPY, K4DPL/2 and K4AVO. Supplement to last month's repeater listings: 223.23 in, 224.94 on Mableton (W Metro Atl), 52.760 in, 52.525 out, Kennesaw (N Ga.). K4BAI says the Ga. QSO party will be May 11-13. Check QS for details. W4JM now has 55 countries on 75. Is there any interest in a Ga. QCWA net? He suggests 7254 at 1100L Sat. WB4ED reports NEGARC officers: K4OSE, pres.; WB4EDD, vice-pres.; WB4OJC, secy.; K4TOU, treas.; K4IRJ/WB4F.H, editors. WB4NI says new SAV ARC officers are WA4BOD, pres.; WB4NS, vice-pres.; WB4NTW, secy.; K4CCI, treas.; Carrol Baker, A. Mg SAV Amateur of The Year is W4ZLV! Nancy also reports 3 stations on 2 meters in SAV. W4NXD now has his Advance K4CBO now Extra Class and active as 00 and reporting. Comments to W4LXL, A1-Op! 5RWAS Nov. 175 in WB4RU. WB4UHI heard working SKN New Year's eve. Also heard poundin' away during Jan. CW-CD party was K4KZP, WB4RUA, WB4UI W4DQJ seen on SSTV with NBF gear. WA4VWV asking if anyone interested in a 2-meter traffic net? Contact Steve for more detail. W4LRR says K4FRH, WB4DRZ, WB4PYL active on 144.110 is Traffic with \* indicating PSHK: K4JJO\* 316, WB4TVU\* 25, WA4BAA\* 155, WA4NI 142, W4BYG\* 110, K4OSL 10, WB4RUA\* 80, WA4AY 74, K4JNL 41, WB4WOL 31, WA4LLI 2, W4AMB 22, W4CZN 22, WB4DHO 22, WA4VWV 22, WA4BRO 2, K4PLR/4 18, K4NM 18, K4MOG 13, WB4FDD 11, W4PIM, WB4OYV 8, W4JM 7, W4FDN 6, K4CBO 4, K4WC 2.

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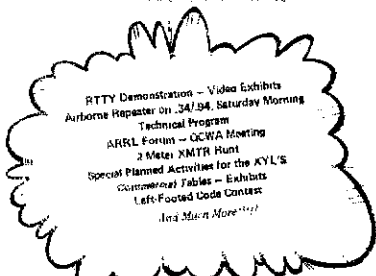


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**NORTHERN FLORIDA** - SCM, Frank M. Butler, Jr., W4RKL - SEC; W4IKB, RM: W44BGW, RTTY: W44WIV, PAM: W44IZM/75, W4SDR/40. Congratulations to WA4BQV, W7EMJ, WA8ZDh/4, K0BAD/4 and especially K4VND on BPI's. DST upon us; nets moved meeting time back one hour GMT, kept same local time. Two big hamfests, FWB and Jax, on the same date this year - Mar. 31. ARRL Hq. will record your hamfest date up to 10 years in advance; check with them to avoid possible conflict. Special awards went to W4GSY, WB4SKI, K0BAD/4 at Pensacola FFARA Christmas party. Les also was named "Ham of the Year." WB4ZPC renewed OVS. Oldtimers, new to Fort Walton area, are W6BYB and W8SON. A work party repaired rig and installed antennas to get WB4NHH back on the air. WA9QVT received certificates from CAN and RN5. The Tallahassee ARRL Christmas party showed two ARRL films. Gainesville E-M considering a separate group to operate WR4ACE repeater. WB4OMG has a new synthesizer for 2-meter fm. WB4UAV won award for naming the Jacksonville repeater - Always Ahead Florida - for WR4AAF, W4IA renewed ORS. WN4CHU a new hz in Ormond Beach. Sorry to report WB4LQE a Silent K. VE3CIX/W4 put up a 4-band vertical at new QTH. K4CVO reports Citrus ARA applied for ARRL affiliation. Traffic: (Dec.) K4VNV 506, K0BAD/4 434, WA9QVT/4 399, WB4DXN 323, W7EM/4 15, WA4EYU 179, WB4VYU 176, WA8ZDh/4 145, WA4BQB 12, K4CVO 109, WB4OMG 105, W4SDR 99, WB4SKT 75, K4IZT 5, W4RKH 52, WA4IZM 50, W4VSO 49, WB4IER 45, WN4GHU 4, WA4FJA 34, WB4SRJ 20, W4SQO 30, W4GLU 30, W4AFT 2, WA4BGW 22, WB4FJY 18, WB4ADI 17, W4LSR 16, WB4VDM 1, W4IA 13, WB4ZOC 13, WA4VZF 11, W4YPA 10, W4IKB WB4VAP 8, K4EZE 6, K4RNS 6, K4FLV 5, WA4NAP 4. (Nov.) WA9QVT/4 396, K4BSS/4 175, K0BAD/4 174, WB4IER 13, W4NGR 48, WA4IZM 46, WB4FJY 21, WA4BGW 20, WB4JHO 1, W4IA 6, WB4TCW 3.

**SOUTHERN FLORIDA** - SCM, John F. Porter, W4KGI - AS SCM; Woodrow Huddleston, K4SCL. SEC: W4IVT. Asst. SF: W4SMK. RMs: WB4NCH CW and K4EBE RTTY, PAM: W4OG WA4BPE is new FAST Net Mgr. WB4ZZB new Q-TN Mgr. W4O has new F-101B. Bob also was active in the ARRL 160-10-meter Contests in Dec. K4NE was active in the same contests. also participated in Straight Key Night. Club station W4EHW Q on each club night to QFN via various cw operators for training. A other clubs doing the same? WB4TUP has new S-Line gear and three-element Triband up 118 feet. Wayne must have latched on part of a 1V mast with that height. New Everglades Chapter OCWA has been formed. Territory coverage is Broward and Palm Beach County. This will be the 8th. chapter in Fla. Southern F 2-meter RTTY Net on 147.03 is progressing rapidly. K4DXB WB4PCZ, K4LIX of Miami are spearheading this project. Contact K4DXR for details. Also Key West stations K4OFG and WA4O are running regular 2-meter skeeds to Miami. W4ILE, W4IJK a WA4SCK are again active on the Traffic Nets. Welcome back fellows. W3CUH and W3VR, winter guests from Pa. handling majority of Fla. State Fair traffic again this year in cooperation with Tampa ARC. Fla. QSO party, sponsored by "Florida Skip," will Apr. 27 and 28. Rules same as last year. W3CUL/4, WB4AJL W3VR/4, K4SCL and WA4PDM made BPI. this month. WA4G made PSNR for Dec. This will be my last report to you as SCM. I been a pleasure serving you and the League these past years. Wood K4SCL of Largo, will have taken over as of Jan. Please continue give him the fine cooperation you gave to me. He is a good man a will serve you well. 73. Traffic: (Dec.) W3CUL/4 2559, WB4A 825, W3VR/4 788, K4SCL 759, WA4IJK 382, W4DOS 3, WA4GBC 277, W8RZY/4 228, W3AI2/4 226, WB4ZZB 21, WB4FEC 143, WA4HDH 142, WA4PDM 138, W4DVO 104, W4L 104, WA4ATF 90, W4FH 84, K4SJK 80, W4WYR 70, WA4SCK WB4QID 57, K4BLM 55, W4TJM 52, WB4AID 36, W4IVT W4SMK 33, W4GDK 29, W4BCZ 25, K4QG 25, WA4BPE W4KGI 16, W4MML 14, W4NTF 14, W4DDW 12, WB4AJL W4EHW 8, WB4TUP 8, K4ERO 7, WB4INC 5, W4LK 4, W4ILE (Nov.) WA4SCK 27, WB4AJL 5, WB4TUP 2.

## SOUTHWESTERN DIVISION

**ARIZONA** - SCM, Gary M. Hamman, W7CAF - RM: K7NF PAM: W4JCK. The annual Winter Hamfest, sponsored by Amateur Radio Council of Ariz. (ARCA) will be held on Mar. 15 at El Dorado Park, Miller Road between McDowell and Thomas, Scottsdale. Activities include a pot-luck lunch. New officers: ARCA are WA7NXL, chmn.; W4JCK, vice-chmn.; WA7TGB, sec; W7IWL, treas. New officers of the Ariz. ARC are WA7KEV, pr W7CPC, vice-pres.; W8KTH, secy.; WA7VLA, treas.; WA7NXL, i

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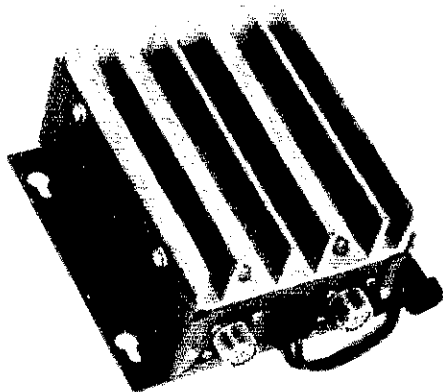
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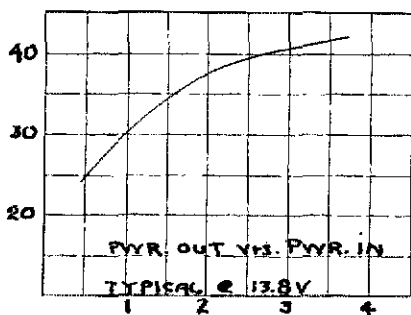
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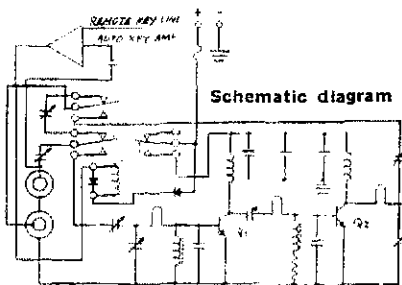
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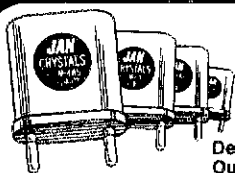
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ing. The Ariz. ARC meets the first Thur. at 1510 E. Flower Phoenix. The Old Pueblo ARC meets the 3rd Wed. at the Randolph Park Clubhouse, Tucson. New officers are WA7JKS, pres. WA7KLF, vice-pres.; WA7HEH, secy.-treas.; W7MGF, comptroller. K7BGW, W7EAH, W7IFG, K7KNP, WA7NYC, K7OMR, WA7PFO dir. The Scottsdale ARC elected WA7OVH, pres.; W7JSA, vice-pres. VE2US, secy.; WA7OYX, treas.; W7FBU, member-at-large. The meetings are now the 4th Tue. at 6950 F. Camelback, Scottsdale. Congrats to K7NHL, elected to Pacific Area Staff chmn. He also earned BPL and PSHR listing for Dec. activities. Traffic: (Dec. K7NHL 583, W7DOS 42, W7PG 30, WB0HZE/7 19, K7MTZ 17, W7CAF 13, (Nov.) K7NHL 295, W7DOS 39, K7MTZ 17, W9PG 17, WB0HZE 13, K7IPZ 4, WA7JCK 4, WA7KQE 3, K7NMQ 2, K7GLA 1, WA7NHO 1. (Oct.) W7UOQ 33, W7DOS 25, W7PG 19, WB0HZE 13, K7MTZ 12, K7GLA 3, WA7KQE 3, W7LXX 2.

LOS ANGELES — SCM, Eugene H. Violino, W6INH — SUC WA6OZY. RMs: W6LYY, K6UYK. Holiday traffic has been good on all nets Phone/CW thanks to all those hard working good-minded fellows. The Daytime National Traffic system going great guns with K6GMI at the local helm. The So. Calif. reports success this year with the Barstow to Las Vegas Motorcycle Race communications. Thanks to the untiring work of WB6EYH who handled the paperwork to obtain what appears to be the first portable repeater license. This was a one-day call WR6MCR located at Clark Mountain. WA6VLF is getting married, he and XYL plan to move to San Diego. The Ramona RC recent 1st hunt was won by WA6NRR and WB6NGC. The JPL RC (W6VIO) plan to upgrade their station capability. New antenna for 80/75 meters, reposition and repair of 40-meter antenna, rebuilding and refurbishing the transmitters is part of the program. The ARALB held new officers installation at the Petroleum Club in Long Beach a nice evening enjoyed by all. W6BXR has been on RTTY with Auto-Start says the frequency has to be held very closely, and a good frequency meter is necessary. The TELCO RC had a get-together at the Golden West Ballroom for the purpose of drawing the tickets for the Christmas raffle. The Santa Clarita RC held their Christmas Party at Joe Hodgson's QTH in Newhall. The Palisades RC had the new Radio Inspector as guest speaker. Marty is a very good speaker and has many interesting yarns to tell about past experiences. He did say the FCC expects amateurs to help keep our bands clean. Sooo—How about some of our ambitious members looking into the requirements for an OC appointment, we can use several interested members who want to make our section be the one with the best signals, and at the same time protect our frequencies. WA6ZNO back home and on his feet after a bout with heart surgery; good luck Forrest. The SF RC issued Rotary Club award to WA6UX, W6LPI and WA6YIZ, also WB6JQP received the popular W6IN award. W6SZH has taken the reins as daytime instructor as well as nights at Carson High School good luck John. The TRW RC is sporting a new ICOM 230 for the club shack, also a second club station is being considered. WA6TLY now has a new four-element triband beam up with the help of the West Valley Club members. WA6GTU having TVI trouble so has to stay on 80 meters for the time being. WA6TCH active on DRN6 with new two-element beam. WA6BCO must have had a very good Christmas, has new FM27 and FT101B. Traffic: (Dec.) W6LYY 523, K6UYK 409, W6INH 256, WB6MKV 180, WB6OYN 136, W6OFO 97, WB6OYD 97, WA6GTU 76, WA6ZKI 46, W6OAE 44, WA6BCO 28, WA6TCH 27, WA6FLV 24, W6USY 20, WA6EWT 15, W6DGH 9, W6NKE 8, W6QAW 8, WB6YIZ 7, W6HUJ 4, W6IVC 2. (Nov.) WB6YIZ 6, W6DGH 5.



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ORANGE — SCM, William L. Weise, W6CPB — Asst. SCM Richard Birbeck, K6CID, SFC: WA6TVA, PAM: K6YCL. RMs: WB6AKR, W6BNX. McDonnell Douglas RC is engaged in DX hunting to complete their DXCC. New officers are WA6HJK, pres. WB6BTE, vice-pres.; W3CEQ/6, treas.; W6LGO, secy. W6HAW/6 now WA6GRJ. Welcome to the Orange Section. Duane, W6BUJ reports traffic light but maintains skeds on MTN. WA6YWS reports new repeater call WR6ACG 34/94 covering Owens Valley. Glad to report XYL of W6WRJ is improving. Alex is still chief mess Sgt. K6GMI has been having linear trouble. Hope it is fix soon. HA DRN6 traffic, QN1s and sections has increased approximately fifteen percent during the first three months of operation. Very good showing, congrats to all. Energy conservation is hitting everyone, look for a reduction in many activities such as SFT, Drills, Field Day, etc. The NFN Novice Emergency Net is going great. Much activity and the training is very beneficial. Novices are urged to check in Sat. 9 A.M. local time on 3730 kHz. With Daylight Saving Time in effect many nets may change time. Be sure you check the frequency for your favorite net. Traffic: WB6AKR 534, K6GMI 445, W6LSC 289, WA6IVA 77, W6CPB 54, WA6YWS 13, W6WRJ 7.



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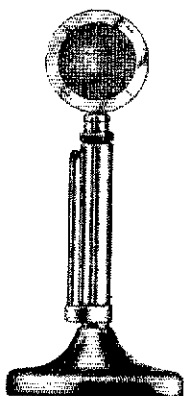
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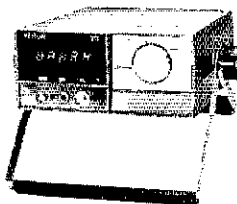
SAN DIEGO - SCM/SEC: Cy Huvar, W6GBF - Asst. SCM: Art Smith, W6INI, SOBARS elected WA6ENU, pres.; K6BTO, vice-pres.; W6BURI, secy.; WA6JOM, treas. El Cajon ARC WB6VKV, pres.; WA6BDW, vice-pres.; WN6WWP, secy.; WN6YQE, treas. W6RHL, chmn. of Council RFI Committee and chmn. of homebrew contest had quite a job determining the winners as the items built were outstanding. *Congrats to junior winners* - WN6WWR 1st prize for line freq. deviation meter; 2nd WA6HOH for crystal testing osc.; 3rd WB6NTA for 40-meter ORP rig; 4th WA6PKK for thingamajig. Advanced winners were W6NVV for 40-meter rig; WA6NVI for VHF amplifier; and K6DS for IC tester. My congrats to all elected club officers; may all have a most successful year. WA6VOW has 2 fm and Advanced Class ticket. W6MAR enjoyed 160-Meter Contest. K6BTO is looking for contacts on 1220 MHz, any takers? AREC has a new FT for the Eastern District, WB6MAG. There are more than four thousand licensed amateurs in the SDgo Section (SDgo and Imperial Counties). In the event of serious disaster such as the San Fernando earthquake in 1971, it is reasonable to expect that a high percentage of these hams would stand by ready to do their part by volunteering their services and equipment. How can the right man with the proper equipment be integrated into a system under chaotic conditions? By rehearsing the Section Mobilization Plan. Traffic: (Dec.) W6VNO 307, WB6PVH 250, WA6BFM 215, W6BGF 143, W6DEY 41, WA6DMB 7, W6BDW 6, W6PZU 5. (Nov.) WA6AMK 9. (Oct.) WA6AMK 98.

SANTA BARBARA - SCM, D Paul Gagnon, WA6DEI - WA6YPK the new EC for the So. Santa Barbara Co. area. Contact him, volunteer yourself and equipment for emergency planning. The Conejo Valley Club now meets in the First Federal Bldg. in IO. W6GEB showed slides of his trip to Iran at the Jan. meeting. New CVARC officers for 1974 are K6LHA, pres.; W6WGE, vice-pres.; WA6YUW, secy.; W66NYH, treas. New Novices in Santa Maria include WN6AXK, WN6AXM, WN6BAM, WN6BFP a new Novice in Oxnard. WA2BCT/WB6KBJ a student at Cal Poly. KH6FRI has been transplanted in Santa Barbara. K6VFE and W6GH have received 50-year pins from ARRL. A new "ham" restaurant in SB opened by K6VMJ. The new editor of SBARC "Keyklix" is WA6QUS who replaces W6POU who did a great job starting this fine paper. Bill Nelson from SCE spoke on interference at the Poinsetta ARC. W6KW was guest speaker at SHARC Christmas dinner. A Christmas

smorgie was held for the MAKRAC/POINSETTIA/ VENTURA CITY Clubs in Oxnard. W6TYP has done extensive research into the 150 kHz license free band. Anyone interested in communications on the VLF band contact Art. W6PYD worked the Bay area from Mojoro Bay on 2 meters. WB6PGK and WA6DHS have new 2-meter fm rigs. OBS W6LDU sends bulletins daily at 6 A.M. on 7045. Also on RTTY tue. at 7 P.M. on 3617. *Don't forget to send me your traffic totals each month even for 1 msg.* Appointees must report monthly to keep their appointment. PSHR: WA6DEI 44, W6JTA 43, WA6LBO 32. Traffic: WA6DEI 249, W6JTA 113, WA6LBO 57, WA6WYD 47, WB6PGK 31, WB6MXM 21, WA6MBZ 18, WA6GEN 6.

#### WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Harrison, W5LR - Asst. SCM: Frank Sewell, W5IZU. SEC: K5KOM. RM: W5QU. Dallas ARC exhibit at Northtown excellent. WASZN has new tower. WBSKWD made tech. Plano ARC reports lightning struck K5AT's vertical and again his entire station. W5ABQ pens FB N/L re cw activities. Net Certificates being issued to deserving stations. Remember to become ORS Class I or II you must be appointed by SCM. See your RM in NoTex. W5KZN has latest on Class D and E. Tex VHF FM news reports 200 FMers met in Houston Aug. '73 to invert top MHz of 2-meter Tex plan thereby aligning with Calif. Prose Walker of FCC spoke in Dallas early Jan. Temple ARC reports VHF Assn. received new call late Dec. 22/82. WRS5ACP serving Belton, Killeen and Temple area. RM W5QU NTex. says he needs help with his RM work. How about lending a hand? The regular Comm. Mgrs. semi-annual letter of Dec. '73 contains complete data re: Class I and II QOs effective 2-1-74. Measurement requirements discussed in last issue QST. W2DY5 OO-1 says FMT is a means to an end and not an end in itself. Hdq. advises. K5OIF, W5CBT, W5LWT and W5TVS membership expired, appointment cancelled. The same for W5CPG and WA5QWA OPSs. WA6SLU/5 OO and W5UF ORS. The 14th Annual CD Conference scheduled for Austin was postponed because of the energy crisis. The Houston Chapter of OCWA held its mid Dec. meeting at Wyatts in Sharpstown. The Arlington ARC annual Christmas Ball held at the Rodeway Inn on Highway 360. The Kilo-cycle Club of Ft. Worth annual Christmas Party turned out with grand attendance. W5VEZ was eye-baller recently at the Hurst P.O. and doing just fine. The Tex VHF-FM



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7489	64 Bit RAM TTL	3.25
8223	Programmable ROM	6.50
MM520	1024 Bit RAM	7.95
MM5262	2048 Bit RAM	9.95

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538	5 Times faster than 741C	2.10
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702C	Hi-grain, DC amp (TO-5)	.49
703C	RF-IF, amp, 14 ckt (TO-5)	.69
704	TV sound IF system	1.50
705C	Operational amp (A)	1.00
709CV	Op amp (mini DIP)	.47
710C	Differential amp (A)	.47
711C	Dual diff. comp (A)	.47
723C	Voltage regulator (A)	.75
733	DIP, Video Amp	1.00
741C	Freq. comp. 709 (A)	1.75
741CV	Freq. comp 709 (Mini DIP)	.49
747C	Dual 741C (A)	.98
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753	Gen Block (DIP)	1.75
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759-739	Dual stereo preamp	1.98
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Any Type Clock less time-base

NEW FOR 1974!

With TIME BASE \$64.95

Scientific Devices introduces the new 5s LED Kronos digital clock. That's right, you can choose the "ALL LED" Man-1, Man-3, and Man-4, and the new reflective bar type with the larger digits, at only one price, \$47. This is a Scientific Device first! We even have the GREEN LED readouts at a slightly extra cost. We have more... for \$19.95 we have available as an extra option to Naval Observatory your clock, or making it an all-purpose all-duty unit, for indoor and outdoor activity. "TIME BASE" is the simplest on the market today with the help of one of the largest time base manufacturers for the famous digital wrist watches. Therefore, current drain is negligible, not like other cumbersome types. It's easy to construct, easy to slip into the Kronos of your choice and connect with easy instructions. Its overall design is simple and easy to construct. The kit is complete with famous black-and-white TRN-TRC cabinet, plus all accessories with booklets. Features include 3 setting controls, 1-hour per second, 1-minute per second, and hold button. KR100 series is a Scientific Device exclusive!

Type	LED	Charac.	Sale
KR-101	MAN-3	.12	\$47.
KR-102	MAN-4	.19	47.
KR-104	MAN-3	.12	47.
KR-108	7071	.33	47.
KR-106	7041	.33	47.
KR-107	SLA-1	.33	47.
KR-108	Same as SLA-1	.33	47.

add \$12.

## LITRONIX-OPCOA-MAN "7-SEGMENT" LED Readouts

All fit 14-pin IC sockets. All 7-segments. MAN Series "ALL LED" and made by well-known West Coast mfg. Others Reflective Bar type made by OPCOA and LITRONIX. The Reflective Bar types are low-cost versions of the MAN's except character height! If one LED blows you lose a segment. MAN's you DO NOT! All readouts 0-to-9 numerals, plus letters and decimal. \*Opcoa and Litronix products pin-for-pin replacements for MAN-1 MAN-4. All SV TTL compatible.

ALL LED READOUTS	CHARACTER	TYPE	SIZE	COLOR DISPLAY	DECIMAL	MILS	DRIVER	EACH	SPECIAL
MAN-3 equal	.115	Red	Yes	10	SN7448	1.69	3 for \$4.50		
MAN-3 equal	.115	Red	***	10	SN7448	1.50	3 for \$4.		
MAN-3M equal*	.127	Red	Yes***	10	SN7448	1.50	3 for \$4.		
MAN-4 equal*	.190	Red	Yes	15	SN7448	2.50	3 for \$6.		
MAN-4 equal*	.190	Red	Yes***	15	SN7448	2.25	3 for \$5.		

### "REFLECTIVE LITE BAR" (Segment LED Readouts)

707** (MAN-1)	.33	Red	Yes	20	SN7447	2.75	3 for \$6.
704** (MAN-4)	.33	Red	Yes	20	SN7448	2.75	3 for \$6.
SLA-1** (MAN-1)	.33	Red	Yes	20	SN7447	2.75	3 for \$6.
SLA-1** (MAN-1)	.33	Red	No	20	SN7447	2.25	3 for \$5.
SLA-3H Giant	70	Red	Yes	20	SN7447	6.50	3 for \$18.
SLA-11C** (MAN-5.33)	Green	Yes	40	SN7447	4.95	3 for \$13.	

\* Red epoxy eye, others clear. \*\* Litronix and Opcoa's pin-for-pin equals and electrical specs as MAN-1 or MAN-4. \*\*\* LED "dot" missing

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5313	28-pin, ceramic, any readout, 6-digits: A-C	\$8.88
5314	24-pin, plastic, LED and incandescent readouts, 6-digits: A-B	\$8.88
5316	40-pin, normal alarm, snooze alarm, sleep timer, 4-digits	\$14.95

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15c CATALOG on Fiber Optics, IC's, Semi's, Parts

News reports FCC Commissioner Wiler while speaking before Roanoke ARRL Convention stated that he intends to explore with the FCC staff the possibility of reconsidering their action in Docket No. 18803. May I suggest we include the Commissioner on copies of letters of interest to "affairs of mutual interest." Traffic: W5QZ 510, WSOU 481, WASVJW 344, W5FC 249, WBSBFW 183, WSSHN 151, WASNSJ 115, W5TI 80, WASGOE 61, WSOWV 53, K5OKM 34, WASPUC 17, WBSBFX 13, W5YK 8, W5LR 5.

**OKLAHOMA** - SCM, Cecil C. Cash, W5PML - Asst. SCM/SEC: Leonard R. Hollar, W5FSN. RM: W2FIR/5. Asst. RM: WBS5EY. PAMs: WBSAZS, W5SOUV. Glad to hear Okla. is going to be represented at SORC - K5LUJ reports he is going and W5JJ usually goes. If you haven't been to Las Vegas you ought to go at least once. Sorry to hear that K5LUJ lost half of his Quad. Congrats to WBS1UI, (awaiting his W call), on his being number one from Okla. in both the Calif. and the Delta QSO parties. Lee is one of our most faithful OLZ and RN5 members of which we need many more. We surely need some help also on SSZ especially as NCS. SSZ meets daily on 3682.5 kHz at 2145 (9:45 PM) local time, and SS stands for slow speed yaw'll. We are surely happy to see some of the Old Timers W5MEX and W5QMJ back on OLZ. Congrats to new Novice WNSHSZ, also to the latest two ORSs WBS5EAY and WBS5GWB. Let me hear the news from your station! Traffic: (Dec.) WBSAXH 285, W5RBB 265, WBS5EY 228, W2FIR/5 86, K5OTM 79, WBS1UI 71, W5S1GU 46, W5ZOO 43, W5PML 34, WBS5ELG 31, W5FSN 28, K5ZDB 26, W5FKL 22, W5SOUV 12, WBS5EAY 9, K5LUJ 4, W5JJ 1. (Nov.) WBSAXH 185, WBS5EY 144, W5RBB 139, W2FIR/5 122, WBS5ELG 53, W5ZOO 39, WBS5EAY 27, W5MEX 27, K5OTM 23, W5PML 21, W5SUG 20, WBSAZS 10, WBS1UI 10, K5ZDB 9, W5SOUV 7, W5SWRC 6, W5FKL 4.

**SOUTHERN TEXAS** - SCM, Arthur Ross, W5KR - SEC: W5YXS. RM: W5ABQ. PAM: W5HWY. OOs reporting: W5RBB, W5SEEM, W5MIN, K5MEN, W5LES. ORS W5AZBN had fun on Straight Key Nite. ORS K1ONW/5 gave Novice test to nephew of RM W5ABQ. OO W5EEM enjoying 2-meter fm with new HR2B. ORS/IW W5AFDT/5 has new Ten Tec Triton II; has 61 countries from Tex. WBSGQH passed Advanced Class exam - congrats! OBS W5AIR reports NTF on 7070 kHz is lifesaver for passing traffic -

big thanks to W5UH. WNSKCM worked XV5AC on 15; passed General Class exam. WBS5BFX reports from Univ. of Tex. Club station, W5EHM. WBS1OG reports from Rice Univ. Club station. W5YG. W5JVR joined the pipe and slipper set when he was married in Jan. OBS K5HUA joined Silent Keys in Jan. OO K5MEN reports being Extra Class since last Sept. W5ARJ moved to Kingsville to work in FCC monitor station. OO W5LES figures he finished in the top five nationally in the COWW CW DX test: says he single-opp'd the ARRL 10 Meter Contest from W5SSKY at NASA. OO W5MIN shot a buck; sent a photo and the buck appears to have a passel of 5/8 wave antennas. W5DH reports trouble with long antenna and short lot. OVS K5ZMS sent a whale of a vhf report. Silent Key W5LOW has been honored by having his call assigned to the Red Cross Amateur Radio Station in Oklahoma City. (W5LOW former resident of Corpus Christi.) WNS1MW has worked 21 states. Traffic: K1ONW/5 506, W7WAH/5 382, W5ABQ 219, W5AZBN 202, WBS5DBK 198, W5YEA 190, WBS5BWV 168, W5VBM 158, K5HZR 140, W5HWY 129, WBS5CUR 111, WBS5AMN 96, WBS5GZG 94, W5KLV 78, W5TOP 75, W5TJH 67, W5RBB 57, W5TST 53, W5YXS 41, W5EZY 40, W5TPOE 39, WBS5FMA 33, W5BGE 31, W5LENV 30, W5KR 24, WBS5FOU 22, K5ROZ 22, W5TFW 19, W5UKN 17, W54FDT/5 16, W5AIR 14, W5EHM 12, WBS5CYP 10, WNSKCM 9, W5CBT 4, W5YG 1.

#### CANADIAN DIVISION

**ALBERTA** - SCM, Don Sutherland, VE6FK - Asst. SCM: Mrs. Dorez Booth, VE6YL. SFC: VE6XC. ECs: VE6AGZ, VE6WJ, VE6AW. PAM: VE6ALQ. ORS: VE6YL, VE6LZ, VE6BAT, VE6WG. OPs: VE6ASL, VE6ADS, VE6VS, VE6AXH, VE6FS. OOs: VE6HM, VE6MJ, VE6TY. OVS: VE6MX. PAM VE6ALQ reports long skip bothering APSN. EC VE6AW is in hospital. VE6FM has found a new location for repeater VE6RPT. CARA had recent election of officers and picked the following: VE6SA, pres.; VE6AEY, vice-pres.; VE6AQU, secy.; VE6RO, treas.; VE6SB, pub.; VE6AZL, act. VE6FK should have much to report on his return from SAROC and sunny Calif. Cold Lake and Medicine Hat are new repeater locations. Traffic: VE6FK 112, VE6ES 80, VE6XC 34, VE6PV 14, VE6YW 14, VE6ALQ 8, VE6AMU 6, VE6AEA 4, VE6AJ 4, VE6VF 4, VE6VI 3, VE6IK 2.

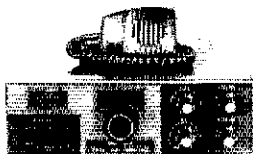


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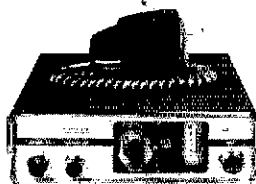
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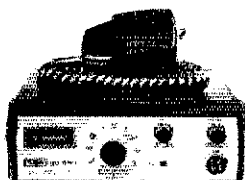
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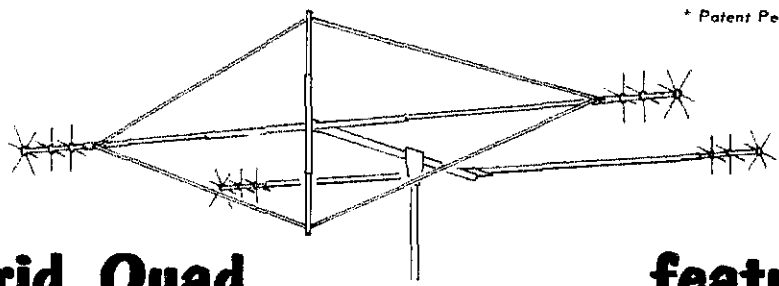
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## ENJOY THE OLD DAYS !

**BRITISH COLUMBIA** - SCM, H.E. Savage, VE7FB - I visited OO VE7TT who gave me a fine demonstration, on frequency check and quality. VE7BIO has his tower up and antennas hanging from it. VE7GR is showing off his 1S-510. Vancouver ARC's Christmas dinner was well attended and good evening by all. Postal Code now in effect and I am told mail will move faster, so give it to me. I wish to thank all the Clubs for their news letters which I received each month of 1973. They sure are well done and I do read them all. We have not heard from our VE8 contact this month. Traffic: (Dec.) VE7ZK 412, VE7QQ 80, VE7CDF 62, VE7BLO 52, VE7AKG 32, VE7TT 32, VE7CCJ 18, VE7MW 4. (Nov.) VE7CUI 27, VE7MW 22, VE7AKJ 13.

**MANITOBA** - SCM, Steve Fink, VF4FQ - Initial reports show encouraging response to the VA prefix being used by Winnipeg stations this Centennial year. Christmas traffic load was heavy, and very poor band conditions. Thanks to all who helped out. We welcome VE4OY and VE4TR to MTN. VE4HE now active on hf with a Tempo after sticking it out on VHF only for many moons. With regret we report the accidental death of VE4RA, best known for designing the popular "Gem Quad." Make sure you have a supply of self-addressed envelopes and postage on hand at our VE4QSL Bureau, handled by VE4OX, 647 Academy Road, Winnipeg. MTN: 48 sessions, 203 QNL, 176 QTC. MEPN: 31 sessions, 904 QNL, 84 QTC. Traffic: VE4OW 188, VE4FG 168, VE4TR 60, VE4JA 46, VE4NE 31, VE4UN 23, VE4JP 17, VE4RL 13, VE4OY 12, VE4FK 9, VE4XA 8, VE4YC 8, VE4LU 7, VE4DR 6, VE4BM 4, VE4CR 4, VE4EG 4, VE4HR 3, VE4AX 2, VE4DS 2, VE4HA 2, VE4LN 2, VE4HE 1, VE4LA 1, VE4NC 1, VE4XN 1.

**MARITIME** - SCM, W.D. Jones, VE1AMR - SEC: VE1HJ, RM: VE1ARB, PAM: VO1FX. I regret to report that VE1XF is now a Silent Key. Congratulations to VE1AHM on getting his Advanced Class license. Congratulations to VE1AMB on winning the 1973 YLAP N.A. Hager Award. The boys in Nfld/Labrador can use VX1 or VX2 for their prefix this year. The reason being 25 years as a Canadian Province. The VO QSL Bureau has been taken over by VO1KM, P.O. Box 6, St. Johns, Newfoundland, A1C 5H5. Its nice to hear VE1YO and VE1ALV active again after several months absence. BPL: VE1ZH. Traffic: VE1AMR 418, VE1ZH 199, VE1ARB 59, VE1AKB 53, VE1HC 37, VE1AYJ 6, VE1AWP 4, VE1AMB 3.

**ONTARIO** - SCM, Holland Shepherd, VE3DV - Soon those great mounds of snow that we have had to put up with for so many months will be nothing more than gentle rivulets. Happiness is when the snow disappears for this OT. But back here on the 3rd of Jan. as I write this column winter is still with us and will be for some months yet, however, it does give my spirits a distinct lift just to write about the coming Spring. ARRL Hqs. must feel the same way because they have the big annual DX competition slated for Mar. and there is no better way to beat "the druthers" than to grab a couple of new countries for your DXCC. I must mention again that my second term as SCM Ont. expires on May 11 and that I hope to step down to devote more time to my other duties on the ECAC and as Ont. Sec. I have generally enjoyed being your SCM these past four years and a great deal of the credit must go to the very solid and friendly support given me by the large group of Ont. appointment holders. Thank you gentlemen and ladies. Recently I had occasion to discuss the many advantages for our OTs to belong to an organization such as the QCWA which brought up the question, "what are the Ont. ARCs and Societies doing about the OTs who are no longer being heard on the bands although they still hold a valid license and were active amateurs for many many years?" I don't think it is just a case of a youth oriented society but perhaps it is a case of "out-of-sight-out-of-mind." How about it clubs? Here is a real good program for you! Traffic: VE3SB 409, VE3EHF 286, VE3FQZ 237, VE3GFN 207, VE3FRG 191, VE3DBG 146, VE3DPO 140, VE3DV 138, VE3AWE 130, VE3ATR 127, VE3DVE 89, VE3FWD 68, VE3FGV 62, VE3ASZ 43, VE3GT 35, VE3EHL 29, VE3GCE 17, VE3DH 13, VE3ECJ 8, VE3GCC 4.

**SASKATCHEWAN** - SCM, P.A. Crosthwaite, VE5RP - VE5TT has been appointed as RM. Because of the time changes in the U.S. and Canada SATN will move its time schedule to 0330 GMT. This is a trial only. Amateurs from Manitoba, Sask. and Mont. monitored frequencies during search for plane which was lost on Dec. 12, 1973. On Jan. 3, 1974 the search was cancelled; the Cessna 180 had crashed and all lives were lost. I wish to thank all amateurs for their support and cooperation. Traffic: VE5BO 102, VE5TT 45, VE5XC 43, VE5HP 37, VE5OS 26, VE5DN 24, VE5MP 10, VE5RP 8, VE5UK 7, VE5OO 5, VE5HF 4, VE5NJ 2, VE5UX 2, VE5PD 1.

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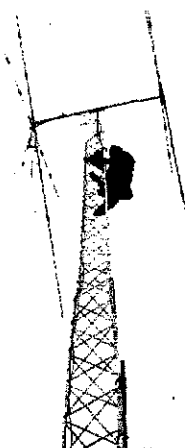
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## Spectrum Allocations

(Continued from page 76)

beacons, LORAN A, LORAN C, TACAN, VOR/DME, satellite, etc.)"

Next in line is our 80-meter band, which in Region 2 (the Americas) is shared with fixed and mobile. In other areas of the world we find that such services as aeronautical mobile and broadcasting also share certain portions of the band. Here in the mid-west it may be that you do not hear some of the stations which are heard on the east coast, but in turn you may hear some that we do not. Use of frequencies in this area of the spectrum for mobile operations is highly questionable relative to the state of the art. However, we must recognize that all countries do not change at the same rate and therefore what appears to us to perhaps be an incongruous matter may be an economic necessity for them. However, we must push diplomatically and with a firm technological basis for updating operations throughout the world in conformity with the most efficient spectrum use principles.

Forty meters has long been a "vast wasteland" in the true sense of the word, not in the context as it was first used by Newton Minow, former Chairman of the Commission, in respect to the broadcasting industry. Except during the daytime, amateur use of this band is difficult or impossible, depending on the season and period of the sunspot cycle. As you know, 7100-7300 is shared with hf broadcasting in both Regions 1 and 3. Although broadcast stations are not supposed to direct their transmissions across Region 2, both you and I know they do so in contravention of Resolutions Nos. 10 and 117 of the Radio Regulations. Operation of hf broadcasting stations practically nullifies use of over 230 kHz of that band (77%) during a major portion of the day in Region 2. Note should be taken also that significant broadcast operation occurs in the so-called "exclusive amateur" portion of that band from 7000-7100 kHz. This stems from countries which take exceptions to the table of allocations, or have appended a footnote to the table indicating that they will use whatever frequencies are in their national interests. Include the jamming emissions which still occur regularly, and we have a real mess in the exclusive amateur portion of this band!

In the twenty-meter band, the records do not indicate there should be such a plethora of interference as we experience. It is shared with the fixed service in the USSR over the upper 100 kHz of the band. However, that does not support the terrific interference that is experienced. It is common to hear RTTY emissions, broadcast, multi-channel multiplex, as well as spurious emissions every 4 or 5 kHz throughout the band. We know where they originate and from time to time, can do something about them. However, fixed service or military operation in that portion of the band, does not appear to be justified. Our 15- and 10-meter bands are probably the cleanest of all and are extensively used by amateurs throughout the world.

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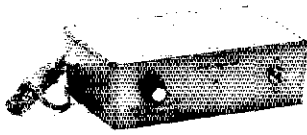
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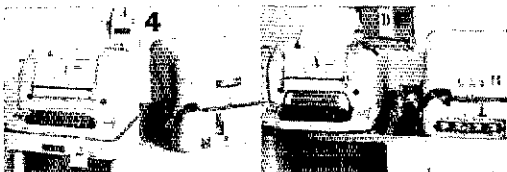
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## Spectrum Management Objectives

An examination of the criteria applicable to the spectrum indicates that logically we must consider:

1. More effective use of the spectrum
2. The national goals of spectrum use
3. Decide which ones are most useful overall
4. Plan ahead for orderly changes in use of the spectrum
5. Implement desirable changes on a schedule basis taking into account amortization of equipment which must be changed, and
6. Constantly monitor the administration of the spectrum to ensure that our national interests are being served.

So what about amateur allocations of spectrum space? As we look back in history we find that blocks or bands have usually been awarded to the amateur service on the basis of their contributions to the radio art, to national goals, or for communication in time of emergency. We can point with pride to the amateurs' role in these areas. The sophistication of electronics, which has enabled us to carry a small calculator in one hand and perform mathematical functions faster than dreamed of a few years ago, has made our role in development of the art a tough one. The individual can now produce a large scale integrated circuit (LSI) or MOSFET in his basement. Amateurs are applying modern, sophisticated techniques to their equipment and operational systems, however, and doing so with only a small amount of inducement. We amateurs should concurrently ensure that we utilize the spectrum as efficiently as possible. That means a variety of things such as:

- using minimum power for the communication
- using one frequency rather than two or more merely for the sake of convenience
- using narrow-band techniques whenever practicable and
- applying ourselves to becoming "professionals," if you please, in the business of communication techniques; not just in the transmission of our voices which sometimes have dubious public interest values . . . and doing all this because we like to do it personally and because it is good for our country.

Amateur communication in the hf area takes place in the ionosphere or the troposphere with a small amount via the direct or ground wave. I amateurs throughout the world grow as expected they *must not be crowded* in the various bands to the extent that they are unable to communicate with each other, and therefore lose interest in the avocation. You know that the ionosphere exhibits diurnal, seasonal and solar-cyclic variations which have a profound effect on the ability to communicate. I think we have to depend on the basic reasons for the service itself being satisfactory to our continued existence. The next question concerns,

### What Kind of Existence?

There are significant technical aspects of amateur communication and their bearing on spectrum utilization. *No other service utilizes its allocation*

as efficiently as the amateur service. The reasons for this are not always well understood nor taken into account. Amateurs take advantage of practical relationships between radiated power, operating frequency and other variables, in unique ways. For any value of radiated power, the lower the frequency of operation the lower the available power at the receiver input terminals, due to ionospheric absorption and other factors.

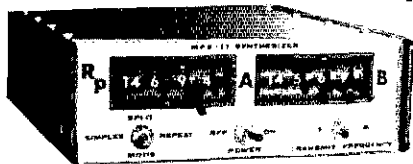
We know that noise power at any receiving site is dependent upon the bandwidth of the receiver, operating frequency, time of day, season of the year, and geographical location of the receiving site. Noise power is of interest in respect to the manner by which signal-to-noise (S/N) decreases and the reliability of reception deteriorates. Let's not confuse reliability in amateur communication with commercial or government services. We utilize techniques which perhaps only slowly come about in other services. Amateurs reduce system bandwidth consistent with intelligibility for whatever mode of emission is used.

For example, the improvement of S/N ratio by reducing the bandwidth from 2.5 kHz to 75 Hz is computed to be 15 dB. Typical receiver S-meters show relative signal strength over an agc threshold of about 1.5 microvolts, with S9 representing 100 microvolts or 40 dB over the reference. One S unit therefore amounts to about 4 dB. In our example, reducing the bandwidth from 2500 Hz to 75 Hz is the equivalent of raising the signal strength by nearly 4 S-units. This kind of improvement coupled to the human ear without psophometric weighting, is of paramount importance to amateurs. A radiotelegraph emission at 25 wpm occupies a nominal bandwidth of 75 Hz, and in relation to such an emission the significance of the foregoing becomes comprehensively clear.

Amateurs also utilize other techniques such as in-band frequency changes to avoid interference; speech compression, whereby practicable intelligibility can be achieved with 200-800 Hz reduction in analog bandwidth, while improving the speech-to-noise ratio by as much as 6-12 dB. Although amateurs are not yet utilizing digital transmission except for experimental purposes, the potential exists for communications by voice beyond the range of conventional voice transmission with a slight reduction in speech quality. Amateurs also utilize speech clipping to achieve higher average modulation and therefore higher "signal-power" at the receiver terminals.

Inasmuch as we communicate via the ionosphere, we must abide by the laws of physics which apply to it. The maximum usable frequency (muf) is the highest value which will support transmission through the ionosphere between any two points on earth. By contrast, the frequency below which the reliability is unacceptable is known as the lowest useful frequency (luf). The former cannot be exceeded and the latter governs the lower frequency limit beyond which communication is lost. The muf may decrease to very low values during magnetic disturbances, and the D-layer absorption can increase the value of the luf, thus making communication difficult to impossible unless suitable frequency bands are made available to ama-

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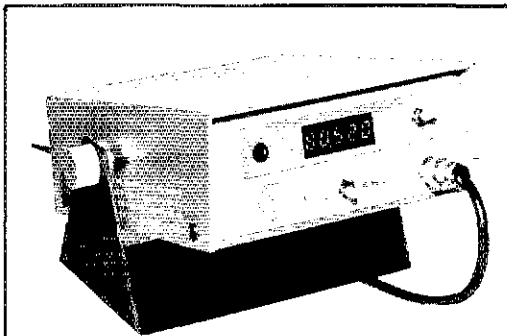
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teurs. The muf depends entirely on the characteristics of the ionosphere. The luf, by contrast, depends on many variables, one of which is radiated power. Experience in the commercial world indicates that an increase in radiated power of 10 dB can lower the luf by about 2 MHz. Unfortunately, the amateur upper limit is 1 kW input power. Therefore, when that won't do the job, we're out of luck!

### A Useful Family of Bands

However, if we have suitably located bands of frequencies allocated to the amateur service, our communication efficiency will be immensely improved. Considerable work has been done using ionospheric predictions applied to various domestic paths over which amateurs communicate. Including proposed new bands at 10, 18 and 24 MHz<sup>4</sup> as well as the return of our old 160-meter band (1750-2000 kHz) and then analyze improvement in communication over certain paths vis-a-vis bands now allocated, we find some startling information. Over the Washington, D.C., to Kansas City path the improvement is 145%; over the Washington-Denver path it is 65%, and between Washington and San Francisco the figure is almost 130% improvement. Short distance communication would particularly benefit by the return of our 160-meter band. In fact, use of that band in critical areas of our country and at particular times is almost a necessity. The State of Alaska is a very special case where normal rules of the ionosphere do not behave very well. Especially for emergencies, we need the entire band for short range communication. We can hope that a resolution of national policy regarding navigational systems, to which I referred earlier will enable favorable consideration of our requests.

You might be interested to know who has the lion's share of the hf spectrum, and how amateur radio compares at present with other established services, keeping in mind that some land mobile operation still occurs in the hf spectrum. Between 3 and 30 MHz, the following is the "box-score" of allocations to major service categories.

Radio Astronomy	20kHz	—
Aeronautical	1770 kHz	( 8%)
Broadcasting	2150 kHz	(10%)
Amateur	2600 kHz	(13%)
Maritime	3650 kHz	(18%)
Fixed	10157 kHz	(50%)

### Effects on Other Users

Suppose amateurs were to "push" for exclusive amateur allocations throughout the various bands including those new ones which are most desirable. What would be the impact on other services? Well if we look at the current allocations throughout the entire world to the various services we find the following amounts of spectrum they would have to

<sup>4</sup> Frequency bands tentatively selected for study purposes.

give up in favor of amateur radio:

**1750-2000 kHz**

250 kHz by the Fixed Service; the same on behalf of Maritime; Aeronautical and Land Mobile each 85 kHz, & nav aids/meteorological 250 kHz.

**3500-4000 kHz:**

500 kHz by the Fixed Service in various parts of the world; the same for the Maritime service; 450 kHz from Aeronautical; 300 kHz from Land Mobile in Region 2; and, Broadcasting would lose 50 kHz.

**7000-7500 kHz:**

Broadcasting would have to release 200 kHz, and the Fixed Service 200 kHz.

**10.1-10.6 MHz:**

500 kHz from the Fixed Service

**14.0-14.5 MHz:**

The Fixed Service would have to release 100 kHz in the USSR and 150 kHz throughout the world.

**18.1-18.6 MHz:**

500 kHz from the Fixed Service

**21.0-21.5 MHz:**

50 kHz from the hf Broadcasting Service

**24.0-24.5 MHz:**

The Fixed, Maritime and Land Mobile Services would have to relinquish each 500 kHz.

**28.0-29.7 MHz:**

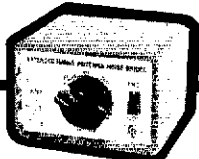
This band is exclusive amateur and no change would occur.

So there you have it. As noble as the goal of exclusive amateur bands may be, perhaps you can understand the difficulties, not only with our own government but with others as well. Remember that not many countries in the world have enough amateurs to make it terribly important to them. They look at such allocations from their own national interests, and if there are only a few amateurs in their countries, adverse decisions are understandable. It is up to us to find every way conceivable by which amateur allocations may be not only preserved, but improved throughout the hf spectrum. It certainly is significant that for the first time, some hard work is being done well in advance of a World Administrative Radio Conference of the ITU. If hard work produces beneficial results, our chances for the future should be better than in the past. Coupling that with submarine cable expansion and the satellite communication service which carry the bulk of the fixed service traffic, perhaps we have a right to be cautiously optimistic.<sup>5</sup> But remember that services, represented by people, give up spectrum space with great reluctance. Therefore keep your fingers crossed that the future will be kind to our hf allocations. The endeavor has only just begun. As time passes, the picture will become sharper and undoubtedly you will hear more about it. Give those involved in the effort your total support as well as indication of how very interested you are in their success.



<sup>5</sup> Recent voting trends in ITU indicated that increased difficulty may be encountered in the future in obtaining majority concurrence to expanded amateur frequency allocations.

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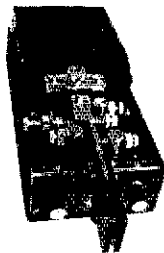
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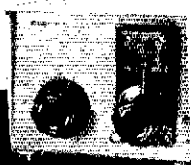
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## Happenings

(Continued from page 74)

29) On motion of Mr. Gmelin, seconded by Mr. Price, unanimously VOTED, at 9:25 P.M., that the Board now proceed as if in the Committee of the Whole for the purpose of considering various procedures of the Legal and Regulatory Committee. On motion of Mr. Gmelin, seconded by Mr. Thurston, unanimously VOTED, at 9:57 P.M., to proceed as a Board.

30) On motion of Mr. Chapman, seconded by Mr. Shima, VOTED that the ARRL Communications Department be empowered to issue DXCC membership pins with provisions to indicate the holder's current country status. The cost of the basic pin to be paid by the applicant and duplicate endorsements provided at no extra charge.

31) At this point the following committee appointments were announced by the Chair:

International Affairs	Mr. Albright, Chairman Mr. Spencer, Mr. Wicker
Plans and Programs	Mr. Zak, Chairman Mr. Arnold, Mr. Thurston
Membership Affairs	Mr. Griggs, Chairman Mr. Haller, Mr. Grauer
Management & Finance	Mr. Shima, Chairman Mr. Cotterell, Mr. Egbert
Legal and Regulatory	Mr. Price, Chairman Mr. Gmelin, Mr. Chapman (Mr. McConaghy, alternate)

32) On motion of Mr. Gmelin, seconded by Mr. Thurston, unanimously VOTED that the reports of the directors to the Board of Directors are accepted and the same placed on file.

33) The Board recessed at 10:05 P.M., reconvening at 9:02 A.M. on January 18, with all directors and other persons hereinbefore mentioned in attendance.

34) On motion of Mr. Chapman, seconded by Mr. Zak, the following resolution was unanimously ADOPTED:

WHEREAS, Harry R. Hick, a superb artist and draftsman, made his first contribution to *QST* in the form of a cover on the May 1916, issue; and WHEREAS, his artwork has appeared in every issue of *QST* since then; and

WHEREAS, he has similarly contributed in his distinctive fashion to all of the publications of the League; and

WHEREAS, he was a good and true friend of the staff of the League; and

WHEREAS, Harry R. Hick was suddenly called from this life on Thursday, January 17, 1974, Now, therefore, be it RESOLVED that the Board of Directors of the American Radio Relay League expresses its deepest sympathy to the family of Harry R. Hick on behalf of the Board, the headquarters staff, and all of amateur radio.

35) On motion of Mr. Gmelin, seconded by Mr. Price, after discussion, unanimously VOTED that the International Affairs Committee investigate the possibility of establishing a cooperative effort with the "sister cities" program to help advance the status of radio amateurs among the countries of the world.

36) On motion of Mr. Clark, seconded by Mr. Albright, unanimously VOTED that the Board of Directors notes with approval the accelerated processing of repeater license applications by FCC expresses its endorsement of the recently announced re-regulation of amateur repeater rules, and compliments the Commission for its initiative in



taking this step. The ARRL will cooperate in continuing efforts to resolve remaining points of concern.

37) Moved by Mr. Cotterell, seconded by Mr. Grauer, that the Management and Finance Committee investigate the possibility of owning or leasing the League's own computer. But, after discussion, on motion of Mr. Gmelin, seconded by Mr. Albright, unanimously VOTED that the matter is laid on the table.

38) On motion of Mr. Price, seconded by Mr. Thurston, after extended discussion, unanimously VOTED that the Membership Affairs Committee is directed to prepare a study of the ways in which the League field organization can be strengthened in the U.S. territories and areas outside of the continental U.S.

39) Moved, by Mr. Griggs, that the Board of Directors does hereby instruct the Membership Affairs Committee to undertake a study to determine the desirability of revising the eligibility requirements of candidates seeking election to the positions of Directors, Vice Directors and Section Communications Managers so as to require them to have a publicly listed telephone number. But there was no second, so the motion was lost.

40) Moved, by Mr. Albright, seconded by Mr. Arnold, that the League prepare a pamphlet to be used by AREC units and radio clubs in organizing, training for and conducting emergency communications. But after extended discussion, on motion of Mr. Clark, seconded by Mr. Gmelin, unanimously VOTED to amend the motion to instruct the Communications Manager and the Emergency Communications Advisory Committee to study the need for revisions to existing publications and to take appropriate steps to accomplish the objectives of the motion. The question then being on the motion as amended, the same was unanimously ADOPTED.

41) On motion of Mr. Eaton, seconded by Mr. Price, the following resolution was unanimously ADOPTED:

WHEREAS, Robert W. Denniston, W0DX served as Director from the Midwest Division for ten years, and

WHEREAS, he also served as president of ARRL for six years, and as vice-president of ARRL and president of IARU for two years, and

WHEREAS, his enthusiasm for and dedication to national and international cooperative efforts have won him world-wide recognition as a spokesman for and supporter of amateur radio's present and future,

Now, therefore be it RESOLVED that the ARRL Board of Directors here assembled does express its appreciation to Robert W. Denniston, W0DX, for his long and enthusiastic service to amateur radio and to the American Radio Relay League.

42) On motion of Mr. Zak, seconded by Mr. Griggs, after discussion, unanimously VOTED that the Membership Affairs Committee investigate the feasibility of providing, at nominal charge, various mementos, embossed with the League logo.

43) Moved, by Mr. Gmelin, seconded by Mr. Griggs, that Article 11 of the Articles of Association of the ARRL be amended to read as follows: Add the words "immediately prior to the election" after the words "at least four continuous years . . ." so that Article 11 shall read "No person shall be eligible for the office of Director, Vice-Director, President or Vice-President who has not been a full member of the League for at least four continuous



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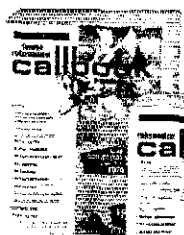
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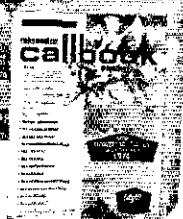
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years immediately prior to the election, and which has not held continuously . . ." But, after discussion, a roll-call being required, the motion to amend was rejected, 2 votes in favor to 1 opposed. Messrs. Gmelin and Griggs voted in favor and all other directors voted opposed.

44) On motion of Mr. Clark, seconded by Mr. Cotterell, after discussion, unanimously VOTED that the Plans and Programs Committee, in cooperation with the staff and the Membership Affairs Committee, conduct a study of the need and feasibility of establishing at ARRL headquarters a membership amateur radio reference library.

45) Moved, by Mr. Price, seconded by Mr. Shima, that the Editor of *QST* shall cause to be published in *QST* from time to time a cumulative list of holders of the 5B-DXCC award. After discussion, on motion of Mr. Chapman seconded by Mr. Clark, VOTED to refer the matter to the DX Advisory Committee.

46) The Board was in recess from 10:15 to 10:32 A.M.

47) On motion of Mr. Griggs, seconded by Mr. Albright, after discussion, VOTED (Canadian Director Eaton abstaining) that the General Counsel be directed to request the Federal Communication Commission to amend Section 97.87(b) of the Commission's Rules to eliminate the requirement for transmission of the number of the call sign area when operating mobile in the station's own call sign area.

48) On motion of Mr. Albright, seconded by Mr. Price, unanimously VOTED to take from the table Mr. Haller's motion pertaining to increased space in *QST* for technical articles. On motion of Mr. Albright, seconded by Mr. Haller, unanimously VOTED to amend the motion by striking the text and substituting therefor: "that in view of the large number of favorable comments received by directors, it is recommended the General Manager increase the amount of space in *QST* devoted to constructional and technical type articles, wherever page space availability permits." The question then being on the motion as amended, the same was unanimously ADOPTED.

49) On motion of Mr. Eaton, seconded by Mr. Thurston, after discussion, unanimously VOTED that the 1977 ARRL National Convention be scheduled for Toronto, Ontario, at a specific date to be later designated; this to be sponsored by a group to be headed by the Scarborough Amateur Radio Club.

50) On motion of Mr. Haller, seconded by Mr. Shima, after extended discussion, unanimously VOTED that the DX Advisory Committee review Rule 9 of the DXCC rules with a view to eliminating the possible inequities in mileage limit between moving location in a call area and moving to another call area.

51) On motion of Mr. Shima, seconded by Mr. Thurston, the following resolution was unanimously ADOPTED:

WHEREAS, Charles G. Compton served as Director from the Dakota Division for ten years, and WHEREAS, he also served as vice president of ARRL for four years, and WHEREAS, his notable expertise in management and fiscal matters has long and generously been shared with the Board and the management of the League,  
Now, therefore, be it RESOLVED, that the Board of Directors does hereby express its appreciation

Charles G. Compton, W0BUO, for his long, faithful, and dedicated service to the ARRL and to amateur radio.

52) On motion of Mr. Zak, seconded by Mr. Eghert, unanimously VOTED that a maximum of \$150 per division be allocated to the public relations assistants for postage reimbursement.

53) Moved, by Mr. Grauer, seconded by Mr. Griggs, that the Membership Affairs Committee study current election procedures with particular attention to the dissemination of the candidates for director/vice director's statements of qualifications and to submit their recommendations to the Board at the July 1974 meeting. After discussion, on motion of Mr. Price, seconded by Mr. Shima, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: "that the Membership Affairs Committee study director elections to review present procedures and, where appropriate, make recommendations to the Board for the adoption of additional guidelines designed to insure a continuation of the high standard of ethical conduct required." The question then being on the motion as amended, the same was unanimously ADOPTED.

54) On motion of Mr. Gmelin, seconded by Mr. Zak, unanimously VOTED that the Board commends the General Manager for his continuing efforts to use only high quality paper for the cover and pages of QST and the Board recommends that these efforts continue in order to give the membership the highest quality publications possible.

55) On motion of Mr. Price, seconded by Mr. Shima, after discussion, unanimously VOTED that the General Manager of the League is directed to advance \$15,000 to the ARRL Foundation, Inc., for initial working funds.

56) On motion of Mr. Griggs, seconded by Mr. Thurston, after extended discussion, unanimously VOTED that the League continue its opposition to proposals of the Federal Communications Commission and other agencies and groups to use presently allocated amateur radio bands for non-amateur purposes (other than those now authorized on a sharing basis) including but not limited to FCC Dockets 19759 and 19880.

57) On motion of Mr. Albright, seconded by Mr. Cotterell, the following resolution was unanimously ADOPTED:

WHEREAS, Dr. Roemer O. Best served as director for the West Gulf Division for eight years, and WHEREAS, he also served as vice president of the League for six years, and

WHEREAS, "Doc" Best has endeared himself to the Board as an able and exceptionally dedicated representative of amateur radio, the ARRL, and, especially, Texas and Oklahoma,

Now, therefore, be it RESOLVED that the Board of Directors of the ARRL does hereby express its admiration and deep appreciation to "Doc" Best, W5QKF, for his long and capable service to the League.

58) On motion of Mr. Eaton, seconded by Mr. McConaghy, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1974 in the proper administration of ARRL affairs in their respective divisions, up to amounts as follows:

Canadian Division	\$2000
Atlantic Division	4000
Central Division	2400

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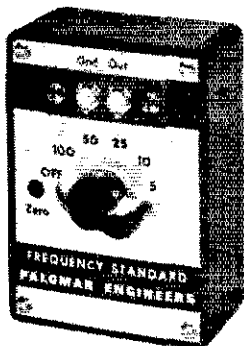
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59) On motion of Mr. Griggs, seconded by Mr. Gmelin, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers and QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1974 a total amount not to exceed \$15,000 under terms prescribed by the Communications Manager for SCMs, and the General Manager for QSL Managers, following the general pattern established by the Board.

60) On motion of Mr. Thurston, seconded by Mr. Egbert, unanimously VOTED that, to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1974 a total amount not to exceed \$8,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

61) On motion of Mr. Shima, seconded by Mr. Haller, after discussion, unanimously VOTED that, to continue the Board's policy of reimbursing National Traffic System officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1974 a total amount not to exceed \$6,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

62) On motion of Mr. Arnold, seconded by Mr. Thurston, unanimously VOTED that the additional sum of \$334.19 is authorized as expenditure for the Canadian Division during the year 1973.

63) The Board was in recess for luncheon from 11:57 A.M. to 1:14 P.M.

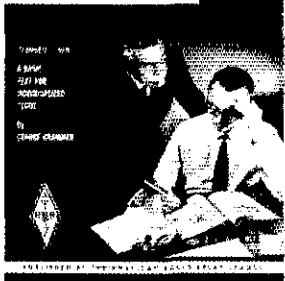
64) On motion of Mr. Thurston, seconded by Mr. Arnold, unanimously VOTED (Mr. Eaton abstaining) that the League file comments in FCC Docket 19909 supporting amateur radio participation in an emergency communications system in Alaska.

65) On motion of Mr. Gmelin, seconded by Mr. Clark, unanimously VOTED, at 1:20 P.M., that the Board now proceed as if in the Committee of the Whole for the purpose of discussing procedures and operation of ARRL QSL bureaus. On motion of Mr. Gmelin, seconded by Mr. Thurston, unanimously VOTED, at 1:50 P.M., to proceed as a Board.

66) On motion of Mr. Clark, seconded by Mr. Gmelin, unanimously VOTED that the Membership Affairs Committee, in cooperation with the General Manager, undertake a study of the ARRL QSL bureau system to appraise its effectiveness and viability, and to make appropriate recommendations at the July 1974 Board meeting.

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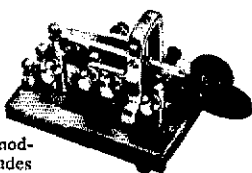


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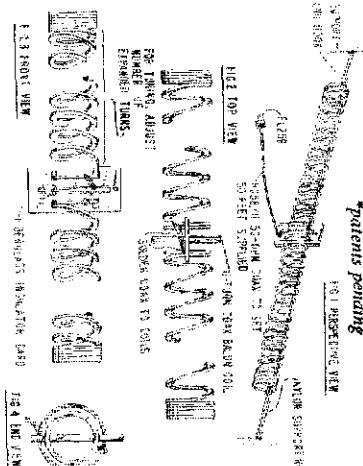
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**MARCH OF DIMES**

THIS SPACE CONTRIBUTED BY THE PUBLISHER

67) On motion of Mr. Clark, seconded by Mr. Zak, after discussion unanimously VOTED that it shall be the policy of the American Radio Relay League to lend support to the objectives of the American Revolutionary Bicentennial Celebration and to encourage amateur radio participation in this event.

68) On motion of Mr. Cotterell, seconded by Mr. Griggs, after extensive discussion, on a roll-call vote, VOTED, 9 in favor to 7 opposed, that the July 1976 ARRL Board meeting be convened on the Wednesday and Thursday preceeding the Friday, Saturday and Sunday 1976 ARRL National Convention scheduled for the third weekend of 1976 in Denver, Colorado. Those voting in favor were Messrs. Albright, Arnold, Clark, Cotterell, Eaton, Griggs, McConaghy, Thurston and Zak; those voting opposed were Messrs. Chapman, Egbert, Gmelin, Grauer, Haller, Price and Shima.

69) Moved, by Mr. Price, that the General Counsel is directed to explore with the FCC the possibility of making examinations for Elements 3, 4(A) and 4(B) optionally available in the Spanish language at Commission examining points located in the Commonwealth of Puerto Rico. But there was no second, so the motion was lost.

70) On motion of Mr. Griggs, seconded by Mr. Albright, unanimously VOTED (Mr. Eaton abstaining) that the General Counsel, in cooperation with the VHF Repeater Advisory Committee, continue efforts to bring about revision and relaxation of repeater rules by the Federal Communications Commission as authorized by Minute 21 of the July 1973 meeting of the Board of Directors.

71) On motion of Mr. Albright, seconded by Mr. Griggs, after discussion, unanimously VOTED (Mr. Eaton abstaining) that the Legal & Regulatory Committee study the question of granting Novice privileges (A1) to Technician licensees.

72) On motion of Mr. Gmelin, seconded by Mr. Zak, after discussion, unanimously VOTED that the VHF Repeater Advisory Committee study repeater allocations in the 50-54 MHz amateur band and submit recommendations for changes if found desirable.

73) On motion of Mr. Albright, seconded by Mr. Arnold, unanimously VOTED that the Board of Directors expresses its continued appreciation to the ARRL Intruder Watch for their efforts in preserving the amateur bands by reporting the presence of stations which cause harmful interference to the amateur radio service.

74) On motion of Mr. Compton, seconded by Mr. Clark, after discussion, unanimously VOTED that the General Manager is authorized to reimburse the Radio Amateur Satellite Corporation the sum of \$1847.40 for administrative expenses incurred during the fourth quarter of 1973; that applications for reimbursement of administrative expenses during calendar year 1974 should be submitted to the Executive Committee for consideration.

75) There being no further business, on motion of Mr. Compton, seconded by Mr. McConaghy, unanimously VOTED that the Board now adjourn, sine die, at 4:01 P.M.

76) (Total time in session, as a Board, 12 hours, 15 minutes; as a Committee of the Whole, 1 hour, 10 minutes; total direct appropriations \$79,081.59.)

Respectfully submitted:  
JOHN HUNTOON, W1RWJ  
Secretary

VHF  
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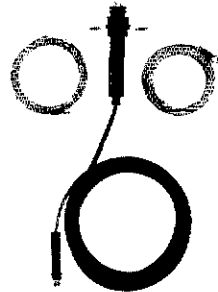
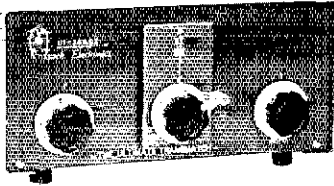
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QS3-74

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QSS-74



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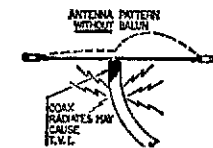
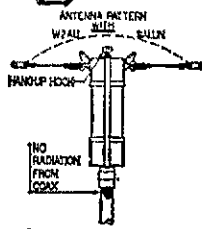
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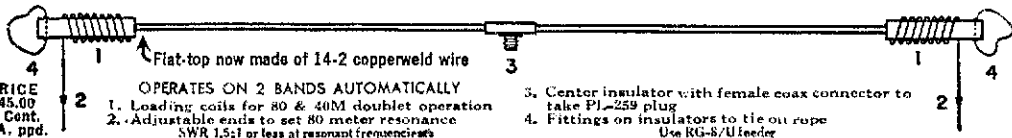
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DAYTON Hamvention expands to three days April 26, 27, 28, 1974 at Hara Arena and Exhibition Center. Brochures mailed March 15th. Write for information if you have not attended the last two years. P.O. Box 44, Dayton OH 45401.

MOULTREE Amateur Radio Klub, 13th Annual Hamfest, Wyman Park, Sullivan, Ill., April 28, 1974. Indoor-Outdoor market. Ticket donation \$1. In advance - \$1.50 at the door. For information write M.A.R.K. Inc. PO Box 327, Mattoon, IL 61938.

TRI-STATE ARS will hold their annual hamfest on May 18, 1974, at the 4th fairgrounds, US 41, 5 miles north of town. Overnight camping, auction, flea market, door prizes and ladies bingo. For information or advance registration contact Steve, WB9MDB, 5805 Berry Lane, Evansville IN 47710, Tall-in '94.

RADIO Society of Greater Brooklyn annual auction Sunday March 24, 1974 at St. Camillus School auditorium, 148 Beach 99 Street, Rockaway Beach, NY (Rockaway Bch Blvd & 99 St.) Doors open 1 PM to accept equipment, auction starts 2 PM. Admission \$1. Info from WB2FJG, WA2CPT.

19TH ANNUAL hamfest and auction to be held Sat. March 9, 1974, at the Lucas County rec. center, 290 Key St., Maumee OH. Registration \$2 at door, \$1.50 advance. For further info write Toledo Mobile Radio Assn, PO Box 273, Toledo OH 43695.

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WANTED: Tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 237, Canal Station, New York NY 10013

MANUALS for most ham gear made last 25 years. Send SASE for quote, W0JJK, Hobby Industry, Box 864, Council Bluffs IA 51501.

WE BUY electron tubes, diodes, transistors, integrated circuits, semiconductor, Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

TELETYPEWRITER parts gears, tape, supplies, machines, toneroids. S.A.S.E. list, Typetronics, Box 8873, Fort Lauderdale FL 33310. WANNF, Wanted: parts, late machines.

MOBILE ops - Write for info on shielded ignition systems and noise suppression components. Summit Enterprises, 36 Winchup Road, Summit NJ 07901.

CRYSTALS irregularly: general purpose, MARS - Novice, active FT-243, all frequencies maximum five, 40 m 15 m, 10 m - 99c each, 80 m \$1.59. Covers bands inexpensively - rock solid. Less than five, 80 m - \$1.75 other \$1.50. Novice - with VFO or no - four bands - eight crystal package just inside bands for QSO or band limits - \$9.95. General purpose: FT-243 .01% 32 pf. 2500-3600 kHz. \$1.60. (five \$1.75), (one, ten, 20, 50 \$1.45). 1700-3499, 8601-13000 fundamentals, 10,000-30,000 overtones \$2.95. Add 60c each for .005%, 75c for HC-6/u above 2000. Airmail 15c/crystal, 1st-cl 10c. Free listing. Bob Woods, W0LPS, "Since 1933" C-W Crystals, Marshfield MO 65706.

MONITOR police/fire dispatchers in connection with GD, MARS, RACES work. Official directories show channels, nationwide. Catalog +10 sales. Communications, Box 56-AR, Comack NY 11725.

WANTED: QST's 1920 and before. Also ARRL Handbook before 1940. W6ISQ, 82 Belbrook Way, Atherton CA 94025.

QST's of 1916. March through July, wanted for any unreasonable price. Also, any tubes purchased at 5% over prevailing market price. Ted Dames, 308 Hickory St., Arlington NJ 07032.

FAX PAPER: For Desk-Fax, new (not surplus), precut (not rolls), \$15 per thousand sheets, postpaid worldwide. Bill Johnston, 1808 Pomona Drive, Las Cruces NM 88001.

HALLICRAFTERS SR400A (550 Watts) W/Mitch Supply, C.W. Filter and built-in Noise Blanker, (Reg #1354) Limited Special: \$795.00 Ham-M Rotors, \$99.95 prepaid from L.A. Electronic Sales, 23044 Crenshaw Blvd., Torrance CA 90505 (213) 534-4402 (closed Sundays and Mondays).

TOROIDS - 44 & 88 mhy by \$2.75 Postpaid. M.L. Buchanan, P.O. Box 74, Soquel CA 95073.

SPEECH Amplifier for Heath SB400-SB401 plug in model AU3 no wiring necessary. Just plugs in. \$14.50 plus postage. American Sales Co., 6306 Kings Knoll Road, Grand Blanc MI 48439. Phone: (313) 694-1129.

FOR SALE: HT-37, mike, co-ex switch, \$135.00 firm. SX-117 mint cond. \$135.00 firm. TA-33 Jr. \$50.00 firm. TR-34 \$20.00. FIB WB4BYJ (904) 264-5529, Orange Park FL.

MAGNUM SIX for Heath SB-401 \$100.00 postpaid. K9HJU (512) 348-9002.

HAM with General Class license, high school graduate minimum. To teach radio to campers at outstanding Co-ed Camp. Write for application to New Jersey YMHA-YWHA Camps, 539 Central Avenue, East Orange NJ 07018. Phone: (201) 878-7070.

VK. 2 + V.F.O. \$85. Gonsel G5B-100 775. 6146 \$2.30; 6853 \$1.50; 304 TL-TH \$15.00; IN-60 1000 \$15; IN-R2 A. 1000 \$5; Weston No. 45 200-0-200 CA \$25. K2JSG, DE8 3313, 2043 E. 52 St., Bklyn NY 11234.

BOOKS used in electronics writing projects for sale cheap. Some oldies. Send stamped envelope for list. McKenzie, 245 Poplar, Hackensack NJ 07601.

JAMAICA: Hams invited to rare DX location. For information on available gear, accommodations, reciprocal licensing, write 6Y5BF, Box 92, Montego Bay, Jamaica.

CLEAN R390A receiver, \$450 prepaid or trade for transceiver. Stamp for pictures and specs. W6ME, 4178 Chasin St., Oceanside CA 92054.

WANTED - Collins 30S1, K3FHP Wilkes, Bella Vista Acres, Bethlehem PA 18017.

WANTED: Plastic tuning knob for a Collins 75A4 or KWS1. Also interested in a 75A4, not working but complete and repairable. Also interested in 513-4. State price and condition. Deal Point, WA 38811, R.D. 3, Box 302, Greensburg PA 15601. PH (412) 837-7411 after 6 PM.

WANTED: Johnson Viking II transmitter, good condition. K4DNO, Box 248, Waxhaw NC 28173.

JEHOVAH's witness who are amateurs write Box Ellis WA4UQQ, 160 Lagoon Rd SE Winter Haven FL 33880 or call (813) 293-3595.

ATTENTION Heathkit owners! Service and modification manual for the SB and HW series transceivers and transmitters. Over 125 troubles and their possible causes. RF voltage charts, resistance charts, and trouble shooting procedures that are easy to follow. Transmitter and receiver modifications that will improve your system in minutes. Act now and become your own expert, send \$7 for prepaid manual in U.S.A. \$8 elsewhere for: Data Service 9460 Wilshire Blvd., Beverly Hills CA 90212.

TTY C Size Schematic - \$1.50. 33 Schematics, PO Box 4057, Alexandria VA 22303.

CAPACITORS wanted: Computer grades, tantalum, mylars, mica. Write for top cat. offer. National Electronic Supply, Dept. Q1, 7231-B Garden Grove Blvd., Garden Grove CA 92641. Phone (213) 597-7010 or (714) 893-2900.

NCX5 \$270; NCXA supply \$70; National 200 transceiver \$179; Galaxy V MkII \$215; AC35 \$55; Cal35 \$31; SC35 speaker \$10; Turner 454C mike \$12.50. All clean and like new. W9EJF, 505 Roxbury Ct., Ft. Wayne IN 46807.

WANTED: Early wireless/radio sets, books, magazines, tubes, etc. Write for top cat. offer. National Electronic Supply, Dept. Q1, 7231-B Garden Grove Blvd., Garden Grove CA 92641. Phone (213) 597-7010 or (714) 893-2900.

STANDARD 146A (1-2) 238.7 0, (3-11) \$212.30. Ni-nad batteries \$1.58. Stubby antenna \$5. Standard 876MA (1-2) \$324.50. (3-11) \$306.90. Standard 861T-25 w/m \$420.20. Standard RPT-J repeater \$600. HM157 antenna \$16. Base station antenna HM191 8.25dB (list 169.50) net 119.95. Send check and we'll pay postage or we'll ship COD. Electronics Communications Co., PO Box 17222, Nashville TN 37217. 24 Hr (615) 834-8999.

KWM1 excellent condition. Mobile supply, mount, DX adapter, 2.1 and 3.1 kc filters. Frank McJannet, 11567 Evanston N., Seattle WA 98135.

WANTED: Heathkit SB110A or HX30, WAIDE, James Moore, 16 Curve St., Springfield MA 01104.

FOR SALE: Heathkit reflected power meter HM15 - \$8. Remember the HR-13C? This one completed to last available improvements. Coils wound, ready to test, knife coils and align. All data and photos - \$100. You pay shipping. WB4QPH, 1549 Findlay St., Deltona FL 32763.

FOR SALE: KW5-1 plate transformer part No. 682-0155-00 - \$100, or best offer. Paul Neveu, Jr., WICKA, 60 Northwestern Dr., Bristol CT 06010. Phone (203) 582-4885.

PC boards fabricated, supplies. S.A.S.E. for information. CDR, 115 Clinton Street, Mount Vernon NY 10552.

CASH waiting for a mint unmodified, like-new Yaesu FTDX401 Transceiver. All letters answered. Michael D. Harrison, 431 Windsor Pl., Oceanside NJ NY 11672. (516) 536-5320.

TRIPPLITE PV200B - 200 W inverter, 5 A charter - \$35. 12 V 115 V, brand new, firm. Dick Myers, Broward Rd., Hyde Park NY 12538.

WANTED: 5181, Serial above No. 500, excellent condition with manual, boxed, delivered to airline. State serial and condition. Arthur S. Cohen, Kisco No. 437, Mexico 20, D.F. Mexico NE1LL.

WANTED: Commercial Marine long-wave 115 V ac receiver in good condition. W1BEH, 36 Bayview Ave., East Greenwich RI 02818.

COLLINS MBF model transceiver, plans for six-meter conversion included. Navy surplus, 1955. \$35 or 7. W6NSQG, (213) 473-6607.

TEMPO-1, excellent cond. with AC/1 supply, mini-Quad, 18 AVT, RBF-1 meter, Viking Patch, Turner nipper. Can't ship - \$300. 6510 Le Ver, Rancho Palos Verdes CA 90274. (213) 377-5741.

WANTED: Grid-dipper, VTVM, tube-transistor testers. Kohlsier, 1790 Bruckner, Bronx NY 10472.

WANTED: Old Hallcrafters, and E. H. Scott non-chrome plated receivers. Robert Halser, W9LMS, Rt. 1, Box 8, Stanley IO 50671.

COLLEGE expenses force sale. Hallcrafters HT37 - \$160. Johnson Ranger 475, Veece Commander III - \$50. J. Skilton, Warren Hall, Yuba Community College, Marysville CA 95901.

HALLICRAFTER S118 - \$125; recvr. Flight monitor radio receiver - \$50; Simplot 380 wavemeter, modulation indicator, all coils - \$25. FOB, K47G.

CLEANING out. Eico new 723TX kit - \$60; Hallcrafters new S140 kit - \$60; Hallcrafters SX100 - \$150; SX130 - \$135; S102; S106; CRK 4 receivers - \$49 each. Army Signal Corp GSCT1 Morse Code Training Unit with 10 J37 keys in portable case, manufactured by McElroy, new - \$125; Army Signal Code Morse Code Signal lamp, new - \$25; J5A Signal Corp Key, new - \$6. Wanted: Seica mint M4. Foucault enlarger, other Seica items. Ben Fisher, 335 Adams Street, Brooklyn NY 11201.

SWAN Cygnat 280. Perfect mobile rig, built-in speaker, w-dc supplies, plus AVC mic, included. Manual plus carton - \$300. W2IWH, (201) 779-2552.

SIGNAL/ONE repair and alignment CX7 updating. References. Dick Cunningham, K9HHP, 1477 N. 96th Ave., Omaha NE 68114. (402) 391-6230 (nites).

SWAN Cygnat-260, sbb built-in ac/dc excellent condition, factory ovl - \$275; Regency HR-2A, 15-watt fm with 52-52, 94-94, 04-64, installed. Factory carton, mint condition - \$160. K4HHH/6, Box 81652, San Diego CA 92138.

GONSET GC105 Communicator - \$50; Heathkit SR300 receiver - \$165; Heathkit Apache TX1 transmitter - \$65. D. R. Berkeley, P.O. Box 775, Corona CA 91720. 734-0621.

SILENT Howard fans, frame 11.75 cm - \$10; Lynmar 501c7b ohm unbal. xformer, 1.5to40 MHz 1 kw - \$8. WA2ECJ, 11 Fort George Hill, NYC NY 10040.

WANTED: Good clean Squares Sanders 701 series SS-IR revr. Lee 1217 Westerly Terrace 2, I/A CA 90226. (213) 566-5832.

WANTED: Relay rack cabinet, par-metals brand. Six-foot square corners. WA4LK, 5012 Perrine Drive, Jacksonville FL 32210.

Ten-Tec power mite 2B, complete, good condition - \$40. Eico 250 ac VTVM w/probes - \$30. All postpaid. W2G5T, 200 East 63rd Street, New York NY 10021.

DRAKE R4A, joint, late model - \$245 postpaid, firm. Heath SB301 and SB401 combo in excellent condition - \$395 postpaid, firm. CW and an-m filters included with SB301. Sam Leslie, WA4EY, 1307 E. Astor St., Orlando FL 32806. (305) 898-9413.

WANTED: Old ARRL handbook circa 1929. Paul Sengel, P.O. Box 1265, Rome NY 13440.

WANTED: Collins 62S1, Gonset 903A, 2-meter sbs-cw gear. Have the following for trade or best cash offer: Collins 7533; 32S1; 516F2; 30L1; 312B4, all in very good condition. Standard C-145 Walkie, new, still in factory plastic - \$200. KF6IHP, 1624 Kaweloka Street, Pearl City HI 98782.

DRAKE 2B receiver, good condition, with calibrator and extra crystals - \$160. Philip Schwebler, W9GGG, 4536 N50 St., Milwaukee WI 53218.

FOR SALE: Excellent condition, 7 months old, Heath DK60B - \$60; Hammarlund HQ110C - \$115. WA6NZO, 3228 N. Alder Ave., Merced CA 95340.

HW101, cw filter, RB-23B ps - \$300; D104 w/g stand - \$20; Lafayette SWR-5 meter - \$10. All excellent. W0DKX/4, 2941 Redron, Winston-Salem NC 27106.

SELL: SB400 transmitter, good condition - \$200. K3NVO, 6526 Blueflag Ave., Harrisburg PA 17112. (717) 7401.

HEATHKIT IG-574 sweep generator, brand new, factory wired - \$125. Peter Carron, 205 Edgewood Road, Easton PA 18042.

WANTED: Millen Grid-dip meter, give model number and price. L. Marko, 70 Beach, Wayne NJ 07450.

SB-303; expertly wired, factory aligned, mint - \$275. Dan Ringer, WAHMU/9, 1415B Spruce Dr., Grand Forks AFB ND 58201. (701) 594-2228.

FREE: 18 crystals of your choice with the purchase of a new Geavue GTX-200 at \$269.95. Send cashier's check or money order for same-day shipment. For equally good deals on Drake, Swan, Standard, Clegg, Regency, Hallicrafters, Permo, Kenwood, Midland, Ten-Tec, Galaxy, Hy-Gain, Cushcraft, Mosley, Sony, and Hustler, write to Hoosier Electronics, your ham headquarters in the heart of the Midwest. Become one of our many happy and satisfied customers. Write or call today for our low quote and try our individual, personal service. Hoosier Electronics, R.R. 26, Box 403, Terre Haute IN 47802. (812) 894-2397.

SELL: Hammarlund HQ170 - \$140; Heathkit HW16 - \$85; DX190 - \$85. All in present use. Want: HW22, HP23. Bill Henderson, Talala OK 74080.

WANTED: SB401; SB200 and keyer with paddle prefer Ten-Tec. Give condition and best price in first reply. WB5BOP/5, 1407 Loper Houston TX 77017. (713) 644-6782.

SELL: Heath HX-20 transmitter with ac power supply or HP-10 will consider swap for Ham-M rotor. L. A. Munson, 2605 Cedar Drive, Loveland CO 80537.

DRAKE 2NT transmitter, excellent condition - \$60. WN4EJP, 9907 Stoughton Rd., Fairfax VA 22030. (703) 273-6644.

SELL: R4A - \$250 and HX50 - \$150. Both excellent. RW8WBV, 4176 Wendell, Orchard Lake MI 48033, 851-2375.

DRAKE SW-4A shortwave receiver with speaker, extra crystals, like new, original cartons - \$225. Smolowitz. (212) 376-4842.

SWAN Cynet 270B w/SS16B filter - \$350; D/C module - \$25; Shure 444 desk mike - \$15; original cartons. Will ship. Neils Knutzen, 2250 Midland Grove Road, Rossville MN 55113.

SELL: Drake 2B, 2A-Q - \$180; Gonset Comm. III, 2-meter - \$85; Heath HW12 - \$65; Central Elec. 20A, 45B VFO - \$45; Heath Twoer - \$25; Heath CB, 110 V ps - \$50; Will Decker, R20RN, 2536 River Road, Manassas NJ 08736.

SELL: Homebrew cw xmt, 30 W - \$25; Linear amp, 100 W - \$60; From 1963 Handbook pg. 169 & 184; Heath HG-20B VFO - \$30; R-26/ARA with control box - \$25. Good condition. Bill Matthews, WA1SGE, 14 Greenbriar Lane, Wilton CT 06897. (203) 762-5486.

SB-401 transmitter with xtal pack - \$185. WA5BCB, Box 30141, New Orleans LA 70190.

HP 524B counter 525 A converter - \$135; 75A4 PTO reconditioned by Collins - \$50; Collins finger-spin knobs - \$3; 301-1 cabinet, ring (new) - \$22.50; Collins filter 2.1 kc @ 455 (new) - \$21.50; Collins 312S3 speaker - \$22. Items. FOB. R0ARV, 2925 Wildwood Ct NE, Cedar Rapids IA 52402.

FOR SALE: Collins 32S-3 serial 100683 round emblem - \$750; 75S-3 serial 12982 - \$350, or both for - \$1000. These units are in new condition in original cartons with all manuals, cables. Frazier, Box 943, Pruitland Park FL 32731.

WANTED: Henry 2 K, any condition, W2SK, Geo. Conn. 412 Old Boonton Rd., Boonton NJ 07005.

SELL: Motorola P35BAC 2 mtr. Handi-talkie and National HRO serial no. 87B with all coils and spare tubes, unmodified. George White, 119 Tunyo, Los Alamitos NM 87544.

DISCOUNT prices, plus full warranty. Call or write for last quote and details. All items new, guaranteed 2 m. Midland - \$85; 15 W/12CH - \$219.95; SB114 - \$199.95; SB450PBC converta 2 m/3 4 m - \$149; Standard 826 MA - \$299.95; Ham-M - \$39; TR44 - \$69.95; Belden 8 wire rotor cable 10c/ft; AR22R - \$31.95; Hy-Gain TH6DXX - \$43; TH3MK3 - \$124; 2M4A - \$129; 402B - \$164; Mosley Classic 33, CL36, MCQ35, quad, MP33; Belden, consolidated RG8 foam coax 17c/ft; Cushcraft A147-22 - \$49; Johnson kW Matchbox - \$219.95; 15% discount Trax Tower, quote Swan, Drake, Ten-Tec, Kenwood, Prices FOB Houston. Free flyer. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668, nite/weekend (713) 497-5883.

NOVICES: Heathkit DX-60B xmt, HR10B, revr, HG-10B VFO, HM-15 swr meter - \$150. Contact Ches Rehberg, 3339 Shaw Drive, Macon GA 31204, Phone (912) 742-8604.

QST 1957-1972, incl. in binders, Ameco model CSB converter selector Box, sell or trade. KZ2DS. (914) 698-1154.

DRAKE L4 upgraded by Drake to use 500-Zs, excellent condition - \$615. Delivered to first money order, Stan, WB2QXX, 15 Myrtleclade, Scarsdale NY 10583. (914) SC3-6050.

SELLING OUT WHOL, now a Silent Key, CX7 - \$995; 75A4 - \$325; 32S2 - \$375; P.S. 516F2 - \$75. Send s.a.s.e. for balance of list. Robert Ash, 45 Druid Hill Road, Newton Highlands MA 02161.

MSSIONARY Society urgently needs towers, linears, excitors, receivers, beams for overseas. Donated gear welcome or send absolute low price. Gifts tax deductible. Missionary Radio, Concordia Seminary, Box 366, Springfield IL 62702.

WANT: R4A, T4X, reasonable. Sell: 3600-0-3600 x fms at 1 amp with 110/220 primary - \$30 FOB. W0AIH, 814 4th St. S., Virginia MN 55792.

MAGNUM Six for T-4XB/C, used one-month guaranteed - \$110. WA2SON, 135 Theodore Street, Buffalo NY 14211.

SELL: Drake R-4B revr and MS-4 splr - \$350; T-4XB xmt and AC-4 power supply - \$450. Excellent condition. Frans Liem, WB8EJ, 5732 Rosebury Dr., Dayton OH 45424. Phone (513) 286-2050.

SALE: Hammarlund HQ-170C with matching speaker in original cartons, manual, excellent condition - \$135. W3CM, Sheridan St. N.E., Wash. DC 20011.

HEATH SB-100 converted to SB-101, excellent condition, with HP-23 power supply, SB-600 speaker, sideband microphone. Everything in excellent condition - \$275. Steve Barrett, 30856 Via La Cresta, Rancho Palos Verdes CA 90274. Phone (213) 371-2827.

QST 1952 through 1973 most bound, best offer. Marvin Fein, Scarborough Mandz., Box 307, Scarborough NY 10510. (914) 762-5343.

SELL: Swap, heterodyne freq. mtrs. - FR4/FR5 & FR6.1 to 500-MHz. All \$300 or equiv. Marv, K2VHW, 1504, New Durham Rd., So. Plainfield NJ 07080.

WANTED: Small prop pitch motor or Telrex rotator. W6KQY, 1502 E. Mission, Escondido CA 92027. (714) 743-5061.

SELL: Heath station console, SB-630 - \$60; Digital frequency display - \$180; Both like new. WA4EPH, 6300 Binna, Richmond VA 23225.

SELLING: excess equipment, W1YPK, 92 Woodland Road, Holden MA 01520. (617) 829-5607.

ANYONE interested in trading Yeasu FT-101 or similar for Romanian Handicrafts of equal value? YO2AFB, Eugene Badea, P.O. Box 14, Hateg Romania.

DX Awards log, 150-page book lists contacts for over 100 major worldwide awards. Individual logs for each award for record of contacts and confirmation - \$3.95 (\$4.95 foreign). McMahon Co., 443C Orange Grove Circle, Pasadena, CA 91105.

HEATH QM-1 Q-eter - \$29; Heath IM-12 harmonic distortion meter - \$29; Heath EUW-16 voltage reference source - \$14; Navy LM19 test meter - \$30. All with manuals & PE condition. FOB, Joe Harms, W4BLQ, B158, Edgewater FL 32032.

ANTIQUE equipment, Western Electric D.B. Model 287 B.C. Studio Mike, 2 W.E. "Peanut Tubes" 215N with sockets work. Also W.E. 205 type repeater tubes, buks, 1000 kc, stat, working Hallicrafters "Sky Champton". Many ancient xmt & roy tubes. Make offer. S.a.s.e. for list. F. Harms, W1JWW/4, B158 Edgewater FL 32032.

REGENCY HR2A, 34-76, 31-91, 67-67, 94-94. Complete with mike, manual, bracket, original box. First \$150. K9PYV, 5271 North Shoreland Ave., Milwaukee WI 53217. (414) 962-7775.

HALLICRAFTERS RFM-300 - \$625. \$499 our discount price. New units. Full factory warranties. Cashier's check or M.O. at these prices, please. Custom Engineering Co. 102 Hill, Big Rock TN 37023.

QST library 1935-1970, all 420 issues, plus some extras - \$100. FOB Yoakum, Texas P.O. Box 14, Cecil Rowan, K5JQS.

SELL: 3XC1500A/8877 tube, new, never used - \$150. W6IG, Latourell, 7350 W. 87th, Los Angeles CA 90045. Tel. (213) 670-3260.

Ten-Tec Argonaut w/210 supply - \$225; 405 Linear w/250 supply - \$150; AC-4 - \$8; AC-5 - \$15. All mint w/manuals in original cartons. Leroy. K6SGD, 135 Iris, Redwood City CA 94062. (415) 364-1256.

HATE to part with a friend but license expired, must sell HW22A transceiver with HP23A supply. Beautiful. Three hours use - \$105. Shupe, Park Ave., Harland W 33029.

ROBOT: Monitor, camera, 60/80, excell. condx - \$440. Tony, K3JGL (215) 789-2490.

FOR SALE: Heath HW-32A, HP23 as supply in very good condition. Galen Wenger, 3509 Stearns Hill Road, Waltham MA 02154.

3283; 516F2; 76S3B; 312B4; 30L1; Shure 444. All late round emblem, original cartons - \$2,250. Mint. F. D. Flynn, 3118 N. Francisco Ave., Chicago IL 60618.

HEATH HW-16 w/HM-15 SWR meter and crystals, excellent condition - \$65, postpaid. E. Heckel, 1619 Corral Dr., Houston TX 77090.

WANTED: Hallicrafters HT-33A or B. Must be in mint condition. Bob Higginbotham, 7750 Kingsbury, Clayton MO 63105. (314) 727-4810.

SELL: Clegg 27-B, late model, used very little - \$300. Will ship I.P.A. W4SD, A. G. Shafer, 683 SW 7 St., Boca Raton FL 33432.

DRAKE TR-4 (w/8-pole filter), RV-4 VFO, excellent condition - \$470. L. Bahr, W9DRC, 8111 Eastwood Ln., Woodridge IL 60515.

HEATH HW-17A 2 m a-m transceiver - \$95. WA2PWI, Ralph Uttaro, 118 First Place, Brooklyn NY 11231.

SELL: Collins 7583; 32S1; 312B4; 516F2 - \$1000. CE100 V - \$500. Kent Merke 728A MEMQ USNAS, Patuxent River MD 20670. (301) 863-6848.

SELL: HRO-60, ABCDEF & ac coils. NFM - \$150; DX-100 - \$60; Instructograph complete - \$30; VHF, 672A - \$25; SBE Coadaptor - \$15; LM-10 WFS - \$50. W5JFQ, 1514 Amsel N.E., N. Canton OH 44721.

QSTs: have April, July, Oct., Nov., Dec. 1924; Aug., Sept., Oct., Nov., Dec. 1934. Need: Jan., April 1920; Sept., Nov., Dec. 1921. Will swap or? WA0LLB, 10417 Spring Garden Dr., St. Louis MO 63137.

FOR SALE: Drake 2 C receiver and Drake 2 NT transmitter. Both in mint condition - \$300, plus postage. Richard Neill, 633 Lock 4 Road, Gallatin TN 37066.

SELL: KWM-2; 30S-1; 312-B5; 516F-2, m/mount 351D2; DCPS linear ACDN - \$1,995. WBKFD, P.O. Box 45-588, Houston TX 77045. (713) 437-9386.

TEKTRONIX 514D oscilloscope recalibrated with P6052 (1X-10X) probe and instruction manual. Will trade only for 301L in operating condition. Write K7CUN, 21220 S.W. Murphy Ln., Beaverton OR 97006.

COLLINS 75A1 Receiver No. 453 - \$250 or 2-meter fm gear. 17 Richmond Pl., Huntington NY. (516) 271-3864.

SELLING Everything: HQ-145C with speaker, excellent CDR yoke, complete Heathkit two-cw'er transmitter, microphone. Dozens of extra tubes, old QST and 73 - \$150, takes all. Must Be Picked Up. W2QFP, Box Aberle, 33 Falcon Drive, Hauppauge NY 11787.

TRANSCIVER Heath HW-100 with HP-23A supply. Excellent condition - \$240. Also HP-23 supply - \$20. WB2LOA, R.D. 1, Box 166, Skillman NJ 08558. (609) 466-2008.

QRP Station Ten-Tec PM3A transceiver 210 ps ACB tuner used 2 hours - \$75, postpaid. Cal Cornils, 1293 West L., Benicia CA 94510.

WANTED: Mohawk Heathkit receiver. Contact John R. Diehl, 1675 "Q" Ave., New Castle TX 77362. Phone (317) 529-7654.

FTDX-560 w/manual, excellent condx - \$375; FRDX-400SD w/manual, mint - \$250, or best offer. SB-144 factory sealed carton - \$160. You ship. James O. Davis, Box 282, Greensboro NC 27402.

HEATH SB-10 ssb adapter - \$65; DX-40 ymitter - \$40; Heath twoer - \$20; Halliater's SX-101A - \$150, all excellent with manuals. WB4FDK, Route 7, Richmond KY 40475, 623-7108.

LIKE New Kenwood TS811S transceiver, w/cw filter & ps 5115 - \$400, or offer. Vegatel. (714) 830-9821.

RECEIVER: Heathkit SB-301 with SBA-301-2 cw filter; SBA-300-3 6-meter converter. Excellent condition, must sell - \$175, complete. Daniel Rosen, RR 2 Box 36, Kalona IA 52247. (319) 556-3292.

FOR SALE: National Geographics 1948/1973, mint condition - \$160. FOB, W9AYL, 2003 Newton, Parkridge IL 60068.

FACSIMILE ready for your rig. Write Airfax Supply, Box 49, Evanston IL 60204.

WANTED: Kit wiring. Reasonable, neat and guaranteed. Robert Townsend, W5MYZ2, 1115 Capps Road, Hazlewood AKK 72601. (601) 565-9305.

QST magazines 1947-59, inclusive, bound, excellent condition and valuable single copies 1921, 1922 and 1948, 49, 50, 51 and 52, not all months. Also Radio 1924-30, inclusive, bound, excellent condition and single copies 1040, 41, 42, 43 and 44, not all months. Make best offer to D. Higgins, 19 W 146 Ave., Royal Oak Brook IL 60521.

WANTED: Receivers R388, 390, 390A or 5134, also R-13, R-19 or R-508 and AN/JUR13. Please write to Klaus Fetzer, DK4EB, D-4082 Hoesel Bruchhauserstr. 5A.

PIONEER Model T-6500 tape deck, stereo, automatic reverse, hi-motor, servo-aid switching, dual-tape speeds, many features, mint condition. S.a.s.e. for details - \$320. Vandegriff, 4250 Heidelberg, St. Louis 63123.

EXCELLENT Collins R-390A receiver - \$420; Hy-Gain 402B, 40-meter beam - \$2; m/mount 3042; 100-watt Superette mobile converter - \$50. K6HER, 585 Grand Ave., Colton CA 93234.

WANTED Drake SW-4 receiver, please quote condition and price to WA2RJV, 80 Huxley, Buffalo NY 14226.

COLLINS 75S-3 serial 14K. Complete with 200 Hz filter. Very clean, top dxnd - \$400. Brand new 2-meter TRIO 2200-G - \$170. Both firm FOB. San Diego, W6KS, (714) 274-7050.

LINEAR IC's surplus only 10 kits of 12 IC's - \$5; 741/723/703/709 types. W6HXL, 3B Ranch Rd., Woodside CA 94062.

SEMICONDUCTORS: Tested assortments, npn transistors, 2N3641, etc. 10/82; pnp transistors, 2N3632, etc. 10/82; GP pnp transistors, 2N3638, etc. 10/82; diodes, 1N914, etc. 20/82; 7F NFFETs, 2N5496, etc. 4/82; GP NFETs, 2N5163, etc. 8/82; linear ICs 741/709, etc. 4/82. All assortments include specs, pin-outs and circuits. Adva Electronics, Box 675-Q, Cupertino CA 95014.

WANTED: TX-62, good condition. Will pay top dollar. A/C (201) 679-8657 NJ.

FROM estate of W2CIR. Tempo I transceiver, power supply SWR Wattmeter, Cost \$500, sale at best offer. Stehle, 256 Center St., Pearl River NY 10965.

WANT: SB110A, SB640, HP23A, good condx. J. Bedovics Jr., 239 Dover St., Bridgeport CT 06610.

THE Canton Amateur Radio Club will be holding it's annual Auction & Flea Market Friday March 8, 1974 at the Imperial House Motel, Canton, Ohio. All dealers and companies invited to set-up displays. For further information and reservations contact Mark Schomtz, WB8NUA, 601 Perry Dr. N.W. Canton OH. Phone 477-6185.

HOSS Trader Ed Moory says he will not be undersold on cash deals! Shop around for your best price and then call or write the HOSS before you buy! New Galaxy GT-550A transceiver, reg. \$595, cash - \$449; Demo TR-4C - \$459; new Swan 270B transceiver - \$369. Factory authorized dealer for Drake, Collins, Swan, Clegg, and others. New Rohm 50 tube, foldover tower, heavy-duty prepaed - \$279; new Mosley CL-33 and demo Ham-M rotor - \$234. Used equipment: R-4C - \$369; T-4-XC - \$399; Swan 700 CX - \$449; T-4-XB - \$339; mint KWM-2 - \$649; Ham-M - \$79; L-4-B - \$575; perfect NCX-1000 - \$489. Moory Electronics Company, P.O. Box 506, DeWitt Arkansas 72042. Tel: (501) 946-2620.

COLLINS mechanical filters, new F455H-21, F500Y-31S - \$15 ea.; F455Z-7; F45Z-10 USB & LSB set - \$25 or \$15 ea.; xint SSTV ISB others, S.a.s.e. list. New CTS Knights JKTO-47 1 MHz PCXO, Aging 2 X 10, 10 day. 100 plug-in. 100. cost \$239, sell - \$35. Add 50c postage. WB6GRT, C. Isham, 6275 Arnold Way, Buena Park CA 90620.

MANUALS wanted, old Dumont labs mobile communications department. W4J transceiver type 5858 (A) and power supply type 580 (C)-2. Also military b-meter, mobile radio VRC-46. Also TH-6 telegraph terminal, WA6DLE, 1791 Hedon Circle, Camarillo CA 93010. Tel. (805) 484-1951.

FOR SALE: Ten-Tec Argonaut with matching power supply and antenna tuner. Mint condition - \$255. Roy Durso, R4DJN, 1102 East 6th Street, Kumball NE 69146.

SELL: NRI FCC First Class license course, complete - \$75. Coax 100 receiver - \$25. Conax 400 transmitter - \$20. WA3EQM, (301) 472-4845.

BUY-Sell-Trade. Write for monthly mailer. Give name, address, call letters, complete stock of major brands new and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc. sb & fm. Associated Radio, 8012 Conser, Overland Park KS 66204. (913) 381-5901.

COLLEGE student looking for job as summer camp counselor. Advanced class in Water Safety and First Aid instructor certified. Dave Ritter, WB4GMC, 1311 Willow Wood Drive, Norfolk VA 23509.

LIGHTNING arrestors. Joslyn DMA 969 feedthru. Rated 10 amp, 9 kv. V. 332 Mhz. \$50. Vacuum capacitors, UMC 1500 - \$150; MMC 3000 - \$200; MMC 5000 - \$350. All unused. H. G. Husbands, 6626 Talmadge, Dulles TX 75230.

2 mt transceivers: Gemset Comm. III, ARC-I, Heath Twoer. All good offers - \$125. David Sarno, WA2JBE/6, 513 Center St., Costa Mesa CA 92627. (714) 648-5277.

SELL: Heathkit SB-220, mint, WA7RGZ, Karl Haley, Box 1231, Globe Arizona 85501. (602) 425-9655 or (602) 425-4404.

SIX meter tevr Knight T-106, new condition. Needs some work - \$25. Robb, W9BHA, Birdsland MN 55310.

TELETYPE Model 28 KSR, RD, RD, typing reper, parts. Best reasonable offer. WB2AEQ, 843 Main St., Middletown NJ 07748.

RIDER manuals VII, IX, X, XI, XIII, XIV. Sell for best offer or trade for GC receiver, 2 in fm gear. Describe fully. Almond Merrill, 138 Middle Street, Oakland ME 04963.

COLLINS 75S-3 receiver for sale. Perfect condition - \$395. R. Myers, 225 Mann Street, Newington CT 06111.

DRAKE R4B; T4X with AC4 supply, MS4 speaker. Absolutely mint condition without a scratch - \$600. WA1STN, 61 Cedar Ridge Road, Newington CT 06111. (203) 666-0822.

WANTED: Collins KWS1, state condition and price. W3ZDF, 24 Lincoln, Jeannette PA 15644.

FOR SALE: Swan 160X ssb transceiver, mint condition - \$295. Want late model, Elmac PMR-7 receiver. Loren Shultis, 58 Lowndes Ave., Huntington Sta NY 11746.

SELL: Complete Novice station. Drake 2-C revr, 2-AC calibrator, 2-CX speaker, Heath DX-60B xmt, Johnson TR-switch, Mint cond. Less than a year old - \$300 or best offer. George Kirvan, 19 Huckins Ave., Quincy MA 02171. (617) 328-1356.

SELL: Johnson Invader KW - \$375; Collins KWS-1 No. 1377 with SC 101 Sta. Control with accessories - \$1,000; ST-5 TU - \$275; Halliater's HA-1 keyer and key - \$65; Ray-Tract Special Processor - \$45; 2 Johnson Low Gain Filters - \$20; 2 Tymmer GMT Clocks - \$8 ea. You ship. Varney. Tel. (603) 332-7321 after 6 PM daily.

SELL: SB-301, SB-600, all filters - \$225; IO-14 scope PKW-1 probe - \$170; 275-watt Matchbox - \$65, all equipment like new. K2TWK, (201) 573-9743.

CENTRAL Electronics 200 V, 160-10 meter capability, all mode transmitter. Swap for Swan 500C or equivalent or reasonable cash offer. Rotunno, WA2CKM, 1816 Park View, Bronx NY 10461.

COLLINS 75S1/32S1 mint, trade for KWM2, trade - \$150 Kronatron calibrator gift watch, boxed, for 2-meter fm. W9RNF, Box 105, Kearney NE 68647.

SELL: HW7, new, calibrated, best offer. K2CSA, 1131 Edgebrook Dr., Toms River NJ 08753.

REMOTE control system RCA BTR11A top condition - \$250 or late model, two-meter transceiver, W6VOF, 182 Entrada W., Pismo Beach CA 93449 or call (805) 773-1317.

SELL: SR150 vcr ac/dc supplies, mobile rack and antenna - \$350; SX111 vcr - \$130; Collins PM2 - \$125; 72 Pro Line 6 RC like new - \$300. R. Shaw, 8001 F 54th Terr, Kansas City MO 64129.

WANTED: Rimac socket for 4CX1000A. R. Strandberg, Box 226, Alma Center WI 54611.

BUILD Digital multimeter using standard parts. Four digits display ac/dc, volts, amps, ohms, 27 ranges very accurately! Price: \$298. Green Bank Scientific, Box 100N, Green Bank WV 24944.

HAMMARLUND HQ-170-ac, 160 through 6 meters. Good condition with manual - \$150. All offers considered. Must sell. You pay shipping. Greg, WB2ZSH, 108 Valley Drive, Watchung, NJ 07060.

SELL: seldom used equipment; unaltered 75S3B No. 15688 w/200 cycle filter \$600; R4A and T4X - \$550. Jones Micromatch - \$35, freight collect. Bornemann, W5FV, Oaklawn 12, Lacombe LA 70445.

HALLCRAFTER SX-88, needs minor repair in power supply section. You repair or scrap for lots of parts. Will package, you ship. Make offer. Richard Bender, 3501 E. 500 South Lafayette IN 47905.

HALLCRAFTERS SX-220, Globe Scout 6-80 xmt, Heath Q-Multiplier - \$115. Firm, you ship. Ex-WN3SAR, 53 A.C.T., New Kensington PA 15068.

DRAKE 2-C vcr, 2-CX speaker - \$160. Excellent condition. Will ship UPS. WB6NGF, 823 Linden Ln., Davis CA 95616.

HW-16, HG-10B, HS-24, 8 months old, excellent condition - \$110. You ship. Can be loaner operate in barracks. WA0TRY, CMR Box 1038, APO NY 09458.

SELL: RTTY Hal ST-6 demodulator, models 15 page printer, 14 typing reper, 14 test des also tape & paper - \$250. Plus freight. Bob Ruffer, W5LGD, 4013 Cleveland Place, Metairie LA 70003.

HAVE tubes, parts QST's early 1920s, S.A.s. for list. No swaps. Ectnard M. Susman, 3212 So. Ocean Blvd, Highland Bch FL 33444.

DRAKE TR-4 with noise blanker and AC-4, excellent condition - \$475. WB5CB5/9, 1374 Brentwood Lane, Wheaton IL 60187. (312) 665-8777.

HEATH DX-60B and Globe V-10 VFO, both mint, \$60 and \$25 respectively; NC-300 reconditioned, excellent - \$110. WNRUY, Paul Lender, 427 Main Street, New Canaan CT 06840. (203) 972-0245.

QSTs for sale, January 1933 through December 1960 in 60 bound volumes, lot only \$120 including shipping. Emory Cox, W0MA, 916 North 13th Street, Leavenworth KS 66048.

FOR SALE: complete Heathkit station; SB101, SB200, HP23, SB600 and D104 microphone; package only - \$600. K3DPQ, John Salver, 45 Briar Road, Wayne PA 19087.

HEATH SB-401, SB-303, SB-600, IB-101 15 MHz counter, HD-10 keyer, HP-21A mkr, HM-102 SWR meter, IM-38 ac VTVM, IG-102 rf generator. All mint, except HP-21A, IG-102 fair. All manuals and cables. Will ship. Best offer over \$695 received before April 1. Hal Dunlap, WA1RUG, RFD Box 26E, Norwich VT 05055. (802) 649-1709.

YAesu FTDX560 & FTV650 6 m vcrs scarcely used in original cartons - \$450 or best offer. Charlie Lilly, WA1NNT, 790 Boylston, No. 8-1, Boston MA 02199. (617) 262-1295.

NOISE retractor, Hum, hiss, clicks and other annoying noises eliminated during reception. Operates with any receiver. Only \$24.95. Write or specifications. New England Electronics Engineering, Box 145, Wethersfield CT 06109.

TEN-Tec Model 315 receiver with cf filter, excellent condition - \$125. firm, W4OR, Box 151, Huntsville AL 35804.

HEATHKIT HW-100 with power supply and SB-600 speaker - \$220. All are in good condition and rig is on the air. First one with the money takes it away. John Small, WB2HOM, 78 Croft Lane, Smithtown NY 11787. (516) 265-0457.

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GONSET 913A, 500-watt 6-meter amplifier requires only 5-watt driver - \$175. Harvey Watkins, 160 West End Ave., New York NY 10023.

SSTV monitor tubes, focus magnets, yokes, 5 amp and 500 ML, 27 meters, S.A.s.e. Lotz, W5HCO, 750 Florida Blvd., New Orleans LA 70124.

SELL: Hallcrafters HT-37, SX-117 - \$170 each, Heath HW-10, 6 meter receiver - \$100, all with manuals. Don, WA0YJQ, 2051 Suburban, St. Paul MN 55119.

WANTED: Collins cw filters for 75S-3B, Jim Rafferty, WA9UC6/6, 555 W. Middlefield, Apt. H-103, Mountain View CA 94043.

FOR SALE: QST magazine, in QST binding from 1945 to 1972. Also diff. ham gears and hooks. WA2EUS, C. Doby, 110 Lafayette St., Copiague NY 11726.

10-12 - \$70 pp. HW7, HW7A - \$75 pp. SB310 - \$175 pp. Want 2 m fm. WB5FQV. (504) 888-6306.

WANT: Buy & Selling: wanted Collins 1.5 & 2.1 mechanical filter for 75A-4. Selling (cw operators & novices take note!) the Douglas Randall Scrubber. All solid state noise free cw reception, practice oscillator and station speaker. Unit is hardly used and really mint and please see November '71 QST Recent Equipment. Connects to speaker terminals of any receiver - \$55 & will ship. Answer all replies immediately. WA6AC, 240 Graves St., San Luis Obispo CA 93401. (805) 643-4844.

LINEAR system 350-12 dc supply for Swan, Drake, Collins transceivers - \$55. Heath SWR AM-2 - \$9. Wanted: Kluwert transmatch, Magnum Six for TR-4. W6LXZ. (408) 379-8562.

WANTED: SX62A, SX62, SX42 in good condition. Local only. J. D. Grigas, 10137 S. Prospect, Chicago IL 60643.

SELL Mini-Products HQ-1 beam, perfect condition. Two Hy-Gain 2 m model 341 one new one used with stacking harness. Old CDR Ham-M, Hagle pipe and pickup here only. Art. WA4WS, 2984 Los Gatos Dr., Delair Bluffs FL 33540.

WANTED: QSTs of January 1922, April 1922, September 1922, November 1922, and any issue before January 1922. G. T. Mozochi, W1LYQ, Box 1315, Hartford CT 06101. Call collect (203) 633-1211.

HEATHKIT SB-102, HP-23A power supply, speaker, 48TV ant. all in mint condition. Also Comrad 6CM and 4042 transmitters. Make offers to WB6XGD, Box, 11900 Carlton Road, Box 330, Cleveland OH 44188.

WANTED: Instructograph, trade new TH6DXX, Ham-M, tripod for 2 m gear or Drake MN-4, Denis Allen, K6GHT, 4750 N. Clarendon, Chgo IL 60640.

WANT complete station less antenna. Prefer full legal power but will consider 2-watt linear. Mainly interested in Collins, Drake, Heath. Swan less than 3 years old. No homebrew. Send complete details and asking price. Ted Skoriand, W2GCQ, W. Lake Road, Czenovia NY 13035.

WANTED: SB-500, W5IOV, 2025 Bingle, Houston TX 77055. (713) 464-1200.

CDR TR-44 rotor with control, excellent - \$45. Hustler BBL142 2 m mobile gain antenna, excellent - \$15. R. F. Phelps, KIUBE, 14 Ridgewood Dr., Rockville CT 06066.

DRAKE T-4X, R-4 realigned by Drake, still in factory sealed cartons, like new. Included are AC-3 pwr. supply, cables and manuals. I pay shipping charges. Asking \$870. WA4GGF, P.O. Box 374, Nicholasville KY 40356. (606) 883-6920.

SELL: Hallcrafters HA-5 VFO, 80-2 meters, with manual - \$35; P & H LA-400C linear amp, 800 watts PEP, with manual - \$75; Dow-Key relay, 110 V ac coil - \$10. WB8HAT, Stan Dicks, 11 Curtis St., Athens OH 45701.

GROUNDED grid filament chokes 30 amps - \$5; plate chokes 800 mA - \$4; 2 amp - \$6; 3-30 Mcs 1/2" X 5" ferrite rods - \$3. PPOSA 48 William Deane, 8831 Sovereign Rd., San Diego CA 92123.

SWAN 500, 117 XC power supply, perfect - \$400. Two meter fm, Gladding 25 - \$200. Glen Kirkpatrick, WB9IBY, 6218 North Keele, Chicago IL 60644.

SELL: SB-102 ac/speaker - \$400; SB-200, spare tubes - \$260. Make offers. WA0CAE, Bruce, Mount Ayr IA 50854.

WANT Mkds for 5BWAs and 160 m. K5MHG/6. 419 Westbourne Dr., Los Angeles CA 90048.

COLLINS 75A-2 with match spkr, VY good cond - \$125; Hallcrafters SR-46A, 6 m transcr, vy good cond - \$50 or both for \$150. A. J. Boudreau, W1LMA, 17 Hancock St., Lynn MA 01904. Tel. 599-1984.

DXers - new Logarithmic speech processor. Nominal 8 dB increase in average power. Less than 5% distortion @ 1 kHz. L/C filter. Hi-Z meter - \$49.95. Also, low noise dual gate MOSFET receiver - preamplifier. Nominal 20 dB gain. 10-30 MHz. - \$34.95. in cabinets. Dynacomm, 1183 Wall Road, Webster NY 14580.

CQ Ham Lawyers for QSOs on 40/20/15/10 bands. W2RBV, 654 Freeman, Orange NJ 07050.

SB-200 linear, excellent condition with brand new tubes - \$200 with old tubes included as spares; TX-62 with Ameco 621 VFO - \$130; Ten-Tec QRP transmitter - \$50. Looking for HA-6 transcr in good shape. Hill, K2JOC, 130 W. Central Ave., Moorestown NJ 08057. (609) 855-7362.

HAVE you many rigs. HW-16 with HG-10B VFO both used very little and for only - \$100. Pick-up only. W2DYS, Bill Fazio, Teaneck NJ. (201) 836-5244.

COLLINS mesh filters for 75A-4; 3.1 kHz, 1.5 kHz - \$40 a piece or offer. W5OVO.

GALAXY 300 and console - \$149; Galaxy GT550 w/ac - \$399; Drake RA-74X C4 MS - \$595; Heath 442 digital VOM - \$225. Wanted Heath frequency meter and scaler. W2FNT, 18 Hillcrest Terr., Linden NJ 07036. (201) 486-6917.

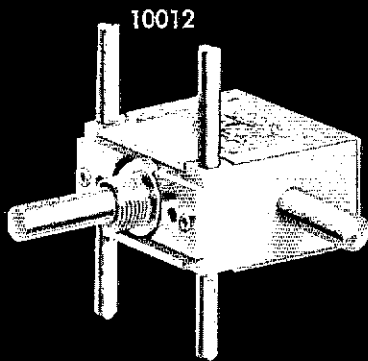
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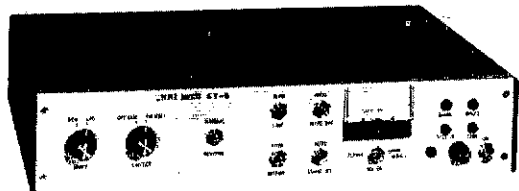


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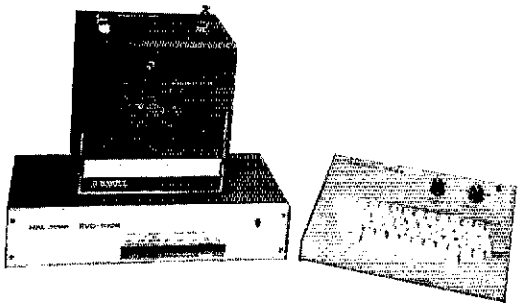
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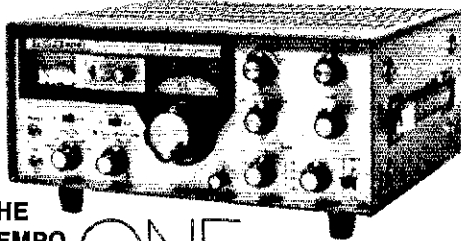
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**DIAL CALIBRATION:** Vernier scale marked with one kilohertz divisions. Main tuning dial calibrated 0-500 with 50 khz. points.

**FREQUENCY STABILITY:** Less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change.

**MODES OF OPERATION:** SSB upper and lower sideband, CW and AM.

**INPUT POWER:** 300 watts PEP, 240 watts CW

**ANTENNA IMPEDANCE:** 50-75 ohms

**CARRIER SUPPRESSION:** -40 db or better

**SIDE BAND SUPPRESSION:** -50 db at 1000 CPS

**THIRD ORDER INTERMODULATION PRODUCTS:** -30 db (PEP)

**AF BANDWIDTH:** 300-2700 cps

**RECEIVER SENSITIVITY:**  $\frac{1}{2}$   $\mu$ v input S/N 10 db

**AGC:** Fast attack slow decay for SSB and CW.

**SELECTIVITY:** 2.3 khz. (-6 db), 4 khz. (-80 db)

**IMAGE REJECTION:** More than 50 db.

**AUDIO OUTPUT:** 1 watt at 10% distortion.

**AUDIO OUTPUT IMPEDANCE:** 8 ohms and 600 ohms

**POWER SUPPLY:** Separate AC or DC required. See AC

"ONE" and DC1-A.

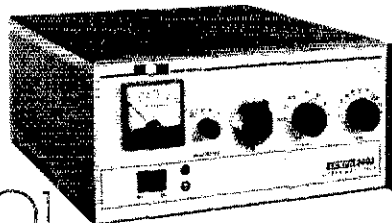
**TUBES AND SEMICONDUCTORS:** 16 tubes, 15 diodes, 7 transistors

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