QST

March 1973
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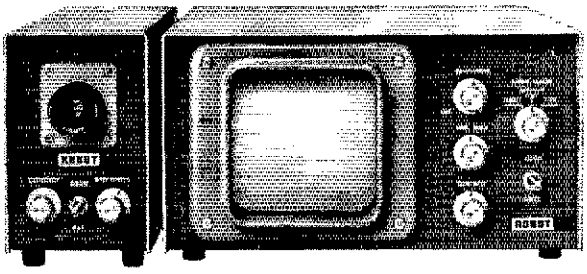

Operating SSTV is easy.
☐ True or ☐ False

How much do you really know about the newest activity in amateur radio? Take this 3 minute TRUE-FALSE quiz and see.

		T	F
1	A slow scan television picture is similar to that projected on TV.	☐	☐
2	Motion can be portrayed on slow scan television.	☐	☐
3	To broadcast slow scan television just add a Robot monitor and camera to your present station. No other equipment is necessary.	☐	☐
4	Slow scan occupies no more space on the band than an audio signal.	☐	☐
5	Any licensed amateur radio operator, except Novice, may operate SSTV.	☐	
6	$295 each for a Robot SSTV monitor and camera is the lowest price in the world for SSTV equipment.	☐	
7	Robot guarantees your satisfaction with all Robot equipment, or your money will be refunded.	☐	
8	New SSTV operators all suffer from lack of sleep.	☐	

ANSWERS:

1. **False.** The slow scan television picture is a greenish-yellow color which takes 8 seconds to transmit. Like radar, the image should be viewed in a darkened room for best results. Also like radar, as the picture progresses it has the appearance of being painted onto the screen by a bright writing line except that the line moves from top to bottom. 2. **False.** Motion results in a blurred picture. 3. **True.** Robot equipment is compatible with all brands of amateur radio equipment and antenna systems. 4. **True.** The SSTV signal contains frequencies ranging from 1200 Hz to 2300 Hz. Therefore, it is comparable to an audio signal. 5. **Tru** 6. **True,** as far as we can determine. 7. **Tru** 8. **True.** New SSTV operators are so enth siastic about the fun of operating slow sc television, they hate to quit.

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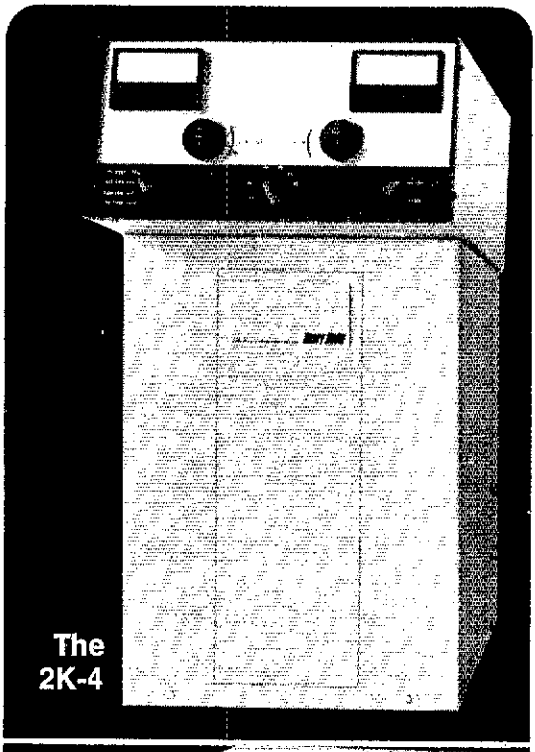

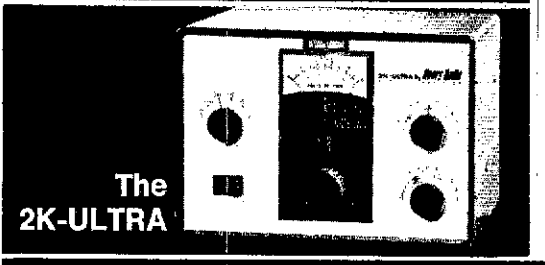

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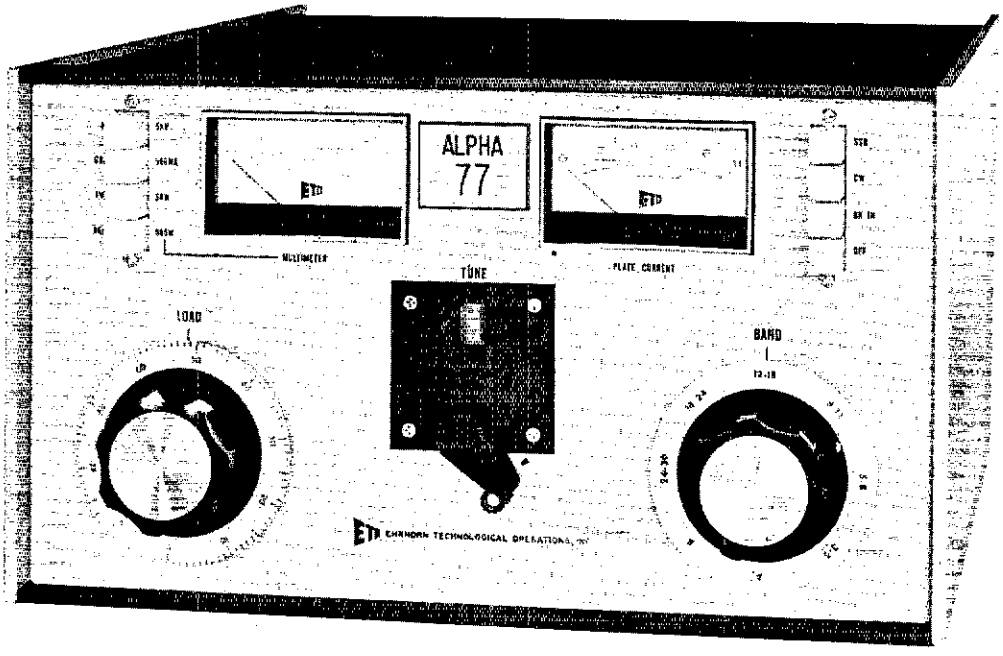

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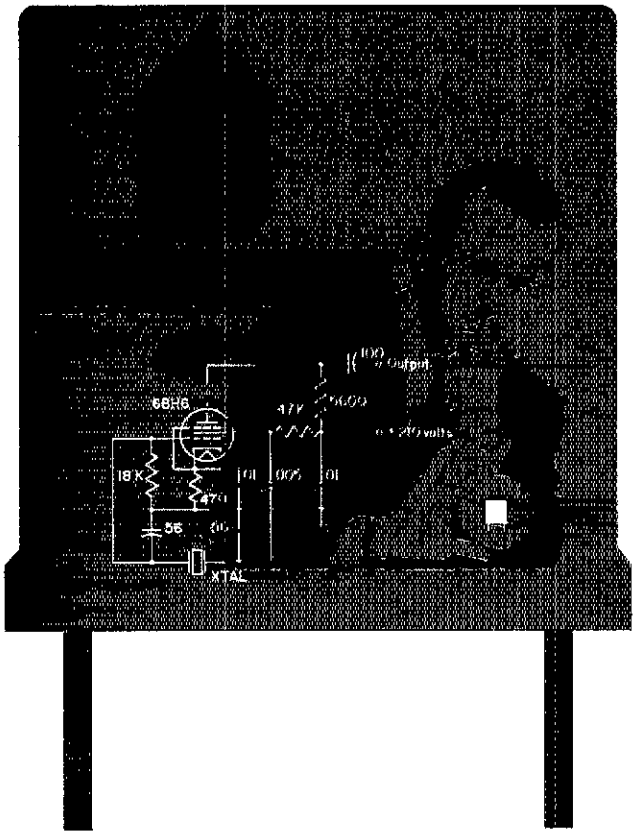

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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.

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"It Seems to Us..."

STRAITJACKET . . . OR FLEXIBILITY?

. . . the time has come to turn away from the condescending policies of paternalism, of "Washington knows best."

– *Richard M. Nixon* (January, 1973)

AT ITS ANNUAL MEETING in January, the ARRL Board of Directors unanimously adopted a resolution expressing deep concern about an increasingly restrictive trend evident in recent FCC amendments and interpretations of the amateur rules. The text of the resolution appears on page 11.

It has been a long time since the League has officially taken such a step – one that can be interpreted as a call to arms. Why has the Board chosen to act at this particular time? Is the traditional concept of amateur radio, as it has evolved so proudly over the years, indeed threatened? The Board thinks so.

In its deliberations the Board discussed at length the views of members, and amateurs throughout the nation, about the unfairness of recent FCC edicts which seem to be aimed at the hard case, the selfish, the undisciplined among us, the anticipated violation as much as the real – while needlessly saddling the rest of us with burdensome and unwarranted restrictions.

Four items came in for major attention: Docket 18803, repeaters; 19245, message-traffic; 19162, phone band expansion; and 19555, environmental protection. The Board's action, however, did not indicate solely that we have already arrived at a near-intolerable situation; it was prompted equally by concern over rumors, as well as some semi-official pronouncements, of more regulations likely to come. For example, one suggestion contemplates variable power input depending on bandwidth; e.g., if sideband were permitted 2 kW PEP, cw might be 20 kW (depending on keying speed!). Another deals with call signs, involving adoption of a brand-new system which apparently would require new calls for many of us.

The Board does not see the necessity or desirability of most of these actions. The situation is reminiscent of Docket 9295 of the early 1950s, in which a new and energetic amateur division at FCC decided we hams needed a "new overall plan or blueprint to provide scope and direction for immediate and long-range development," and then attempted unilaterally to impose some misguided, albeit sincere, Washingtonian views as to what amateur radio should be. Amateur reaction was immediate and near-violent. The League's filing centered around one point (emphasis supplied): "What has made the amateur the invaluable asset he is to this nation is the precious freedom he enjoys to seek his own objectives by engaging in any type of communications he chooses, ***with only a minimum of internal regulation*** once he meets those fundamental regulatory requirements which are designed (1) to prevent his interfering with other established services and (2) to insure his compliance with the provisions for amateurs in international regulations to which the United States is a party." We reaffirm that statement.

The Commission and the League have long had common objectives – to provide for and encourage amateur communication and experimental activities, and the sound growth and maximum strength of amateur radio in the future. The League knows that these motives have prompted the Commission staff in recent decisions and interpretations. It is the more difficult, therefore, to have to differ strongly with government personnel who are friends and supporters of the amateur service. Where we strenuously disagree is not at all on the destination, but on the proper road to get us there.

It is perhaps ironic that our difficulties today, as earlier, likely stem from an honest attempt on the part of FCC to upgrade the Amateur Radio Service, to improve our

stature. But what should the "grade" level be? Set the standards too low, and we'll have a collection of uncommitted curiosity seekers — like the thousands of kids whose parents buy them 100-mW hand sets for Christmas (and most of which end up in the attic or the trash can in a month or so). Set the standards too high, and we'll have a junior IEEE, so small in numbers we'll simply be unable to fulfill the tasks envisioned in Section 97.1, and undermining the Commission's own responsibility under the Communications Act of "generally encouraging the larger and more effective use of radio in the public interest."

Who is to say what amateur radio should be? FCC Commissioners and their staff in Washington? Amateurs across the nation, through their representatives? Is it to be based only on the record of past performance and service over half a century? Are amateurs to be credited with sufficient intelligence to chart their own future course? How much weight should be given pure amateur opinion?

As to the latter, it has been said that the personal opinions of amateurs in regulatory matters don't count, that popularity of a proposed regulation is not a proper measure of its validity or as a guide to whether it should be adopted. Strictly speaking, this is so. Certainly the Commission has a responsibility — legal and otherwise — to develop, propose and enact proper and appropriate regulations. But let the Commission not for a moment forget it is dealing with *amateur* radio. We take part in it because of the love of the game, the challenge, the satisfaction. The effort is entirely volunteer. For a successful amateur service, in the public interest, the regulatory atmosphere must continue to permit freedom and flexibility. Becoming, and remaining, an amateur must continue to be an inviting prospect, promising fulfillment of individual initiative and interest at all levels. If there are too many legal technicalities, the resultant unpopular regulations will stifle amateur radio and could eventually spell its doom. Proposals, therefore, ***must*** have general amateur acceptance — yes, even popularity — if the service is to survive.

An immediate source of concern in this whole situation is that recent Commission actions may tend to create scofflaws among some amateurs. We've already heard rumbles, surprisingly from hams we've considered highly responsible and meticulously law-abiding, that their repeaters will continue operation, strictly legal or not. These amateurs realized, long before FCC and even before ARRL officially, that here was an ideal, untapped source of highly-useful communications, an efficient use of frequencies, an opportunity to organize for emergency communications and public service. The whole setup, nationwide, was developed without any prompting from Washington, without one word in the amateur rules dealing specifically with repeaters. These amateurs used good common sense, showed responsibility, and achieved spectacular results. They know the advantages of what they have created, that they are a credit to the community and to the amateur service, and they know they aren't causing anyone else any trouble. And they aren't going to take kindly to being forced to give up an excellent service of communications because of a difficult — and really unnecessary — burden imposed by technical legalities. They, too, share Richard Nixon's view!

But it is our fervent plea to all amateurs that while we may, and will, spout off, arguing strenuously for our position, let's by no means dishonor our proud name through lawlessness. (If there is scofflaw activity, it will only prove the Commission's point that more strict regulation is needed!) We may have to continue to suffer a few inconveniences, hopefully only temporary. Technical advances may help solve some of the problems. Better understanding by the Commission of amateur radio's needs and desires, and more precisely what makes us tick, will help even more. And if not, we'll just have to search for other routes which could be taken to achieve our aim — none of which would involve flouting authority.

Let us quote some wisdom from a previous League pronouncement: "Amateur radio almost from its start has been allowed comparative freedom from restrictive regulation and freedom from Governmental direction or interference with purely internal activities or with developments within the assigned bands . . . We believe that this philosophy of regulation for the amateur service — that of permitting the amateur body to seek its own objectives, and to request of the Commission such minimum regulation as will accomplish those objectives — is the only system which offers the nation the assurance that amateur radio's record of service will be as brilliant in the future as it has been in the past." QST

A RESOLUTION BY

THE BOARD OF DIRECTORS

WHEREAS, the highly developed radio communications technology existing in the world today is the direct outgrowth of contributions made by radio amateur enthusiasts over a period of more than 70 years; and

WHEREAS, the government of the United States including various administrative agencies, has traditionally followed the policy of permitting and encouraging the development and growth of the amateur radio service by adoption of only minimal regulations and broad general policies; and

WHEREAS, under the policy of minimal regulation the amateur radio service has developed to an extremely high level of proficiency and service to the nation in times of disaster and national emergency as well as in normal periods; and

WHEREAS, the Federal Communications Commission in recent months has adopted a number of amendments to its regulations and issued a number of interpretations of these and other regulations which evidence an abandonment of the policy of minimal and self regulation followed so successfully over the years, and has other proposed restrictive amendments under consideration which, if adopted, will further increase the level of governmental regulations; and

WHEREAS, these developments and trends are a matter of the greatest concern to amateurs throughout the nation and to the American Radio Relay League, the only nationwide membership organization representing active amateur radio licensees of all ages and interests; and

WHEREAS, a great number of amateurs, individually as well as through their local clubs affiliated with the League, have expressed deep concern over the apparent trend toward progressively restrictive and unilaterally-imposed regulations governing the Amateur Radio Service, and the potential inhibiting effect of this upon the orderly development of the Service as a public resource, as well as in carrying out the charter in Section 97.1 of the rules,

Now, therefore, **BE IT RESOLVED**, that the President and the General Manager are directed to undertake a vigorous program to seek reasonable and technically viable philosophies of regulation and interpretation, conferring at all necessary levels with appropriate Government departments and officials, and recommending to the Board of Directors courses of action which may be required to assure the continued availability of traditional latitudes and freedoms, and the full public service capabilities essential to the growth, improvement and usefulness of the amateur radio service.

— Adopted unanimously January 18, 1973, by the Board of Directors of the American Radio Relay League.

FCC has just acted to adopt its proposals for some relaxation of the rules governing model control, substantially as shown on page 99, October QST. Details next month.

The postal service is now universally so poor that fewer members toss rocks in our direction for late or non-receipt of QST -- they understand the real source of difficulty. In Hartford recently, Postmaster General Elmer Klassen admitted frankly, "The mail service is lousy!"

It takes time to process requests through Government red tape, and so FCC is planning to use its stock of Novice and other amateur exams until they are exhausted later in the year. Applicants may be slightly confused by questions relating to pre-October band assignments, but should answer the questions as correctly as possible, and in grading due allowances will be made.

Based on recommendations from the DX Advisory Committee, the separate phone DXCC certificate is being discontinued. See "Op News" this month for details.

If you're planning a foreign vacation in '73 and thinking about taking a rig along, keep in mind that typically it takes 90 to 120 days from initial application to receipt of a license authorization. Forty-three countries currently have reciprocal agreements with the U.S. and several more grant FCC licensees amateur operating privileges on a courtesy basis. Details available from Hq.

In an effort to help repeater groups in filing applications under the new (and complex) regulations, Hq. is mailing these groups clarifying information as it becomes available from FCC. How do you get on the mailing list? Register your repeater with us, form available on request. And remember the April 30 deadline for filing applications for existing repeaters to permit continued operation while the Commission logjam clears.

Hq. was (happily) bombarded with publicity clippings -- mostly good, relating to Nicaragua earthquake traffic; some bad, caused by confusion on the part of the press about CB and amateur radio. We respond to both opportunities with publicity releases But many editors are more apt to use local news, from their readers, than releases from a distant organization; thus, this reminder that a publicity handbook is available to clubs and individuals willing to help with amateur public relations work.

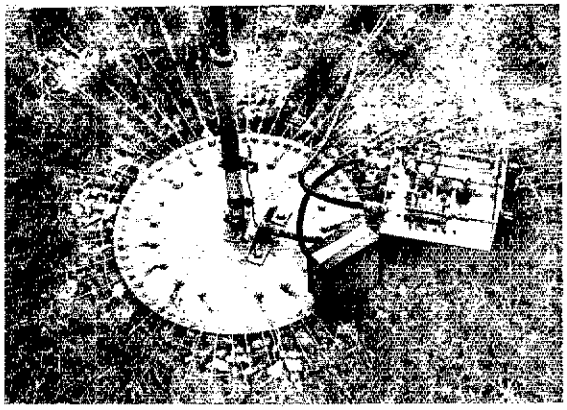
We try to keep up to date on the situation in each state concerning call letter license plates. When something develops in this field, or if it has already in the past year, please post us. The information is available to help other groups who, for example, on occasion may be faced with legislative proposals to do away with the issuance of such plates.

One of the many public services provided by amateurs is phone patching remote areas back to civilization, as for example the 20-meter high end activity with Antarctica. While some phone patching (especially domestic) is far from meritorious and perhaps should be ignored, don't fail to make reasonable way for the worthwhile endeavors by QSYing when appropriate.

W5NK points out that astronomers have recently been doing a good bit of monitoring of QSOs on extremely high frequencies. Quasi-Stellar Objects, that is; the means of identification is an excess of ultra-violet -- we'd call it splatter and spurious!

Amateur Radio Week 1973 will be June 17-23, culminating in ARRL Field Day, June 23-24. Plan now (with your club) for displays in bank lobbies, store windows, libraries or perhaps where you work. Also, try for a proclamation in your community or state; if you succeed, we'd like the info for QST.

The W2FMI Ground-Mounted Short Vertical



The matching network and base hardware showing 115 radials with the 6-foot vertical. The pi network is covered with a plastic bag.

BY JERRY SEVICK,* W2FMI

A SHORT VERTICAL antenna, properly designed and installed, approaches the efficiency of a full-size resonant quarter-wave antenna. Even a six-foot vertical on 40 meters can produce an exceptional signal. Theory tells us that this should be possible, but the practical achievement of such a result requires an understanding of the problems of ground losses, loading, and impedance matching. This paper covers design principles which are applicable to all of our amateur bands.

Background

Earlier work by the author[1] on the radiation efficiency of a ground-mounted vertical resulted from the desire to design a simple, inexpensive, low-profile DX beam for 20 meters. This first work reviewed the theoretical considerations involved and pointed out that a good ground system is essential to achieve efficient operation of a resonant quarter-wave antenna. The second work applied these results to a 20-meter beam.[2] In the process of trying to extend the results of these investigations to the 40-, 80- and 160-meter bands, and to possible multiband operation, the need arose to understand the operation of a shortened vertical and the effects of different loading schemes on the input impedance.

The first part of this paper deals with the theoretical considerations of a short vertical antenna and the experimental procedures involved in measuring the various parameters. This is followed by experimental results which show the trade-offs involved in shortening antennas by various loading schemes. Finally, specific designs are given for the 40- and 80-meter bands.

Theoretical and Experimental Considerations

There are several old familiar axioms in amateur radio that are not completely understood by the amateur. I refer specifically to the two sayings: *make the antenna as long as possible and erect it as high as possible*, and, *a full-size beam is better than a smaller beam, and a tall vertical is always better than a short one.* The first axiom is particularly relevant to horizontal antennas where height is most important for reliable DX operation.[3] Increasing the length tends to increase the gain in certain directions. But with the vertical antenna, taking it off the ground and feeding it at a voltage point (like the *J* antenna) in order to eliminate radials can result in poorer performance because of

* Director, Technical Relations; Bell Telephone Laboratories, Murray Hill, NJ 07974.

[1] Sevick, "The Ground-Image Vertical Antenna," *QST* July, 1971.

[2] Sevick, "The W2FMI 20-Meter Vertical Beam," *QST*, June, 1972.

[3] See footnote 1.

The 10-foot, 40-meter vertical designed for an input impedance of 12.5 ohms in order to use a 4:1 step-up bifilar transformer. The top hat has a diameter of 4 feet and the coil, placed one foot below, has 14 turns. Shown at the base is the transformer and impedance bridge.

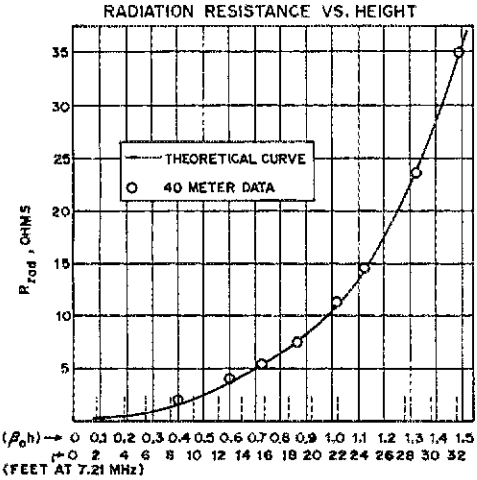


Fig. 1 — Theoretical curve and experimental results for the radiation resistance as function of height.

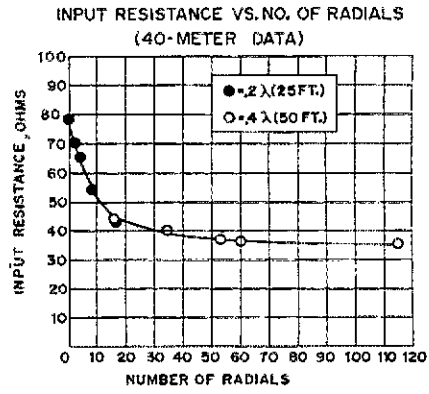


Fig. 2 — Input resistance of a quarter-wave ground-mounted resonant vertical as a function of the number of radials.

increased earth loss.[4,5] More experimental work remains to be done on this phase of vertical antennas. The second axiom noted above is generally true, but misinterpreted by many. I refer to those important properties: power gain – important in transmitting and capture cross-section – important in receiving. (Power gain is the gain, in magnitude, compared to an isotropic radiator; cross-section is a fictitious area related to the ability of the antenna to intercept the radiated power and make it available to the receiver for detection.) As will be seen below, very little is compromised in these properties by shortening the antenna.

The short antenna has been defined as one that is small compared to a wavelength. In a more exact form, it is defined in such a manner as to simplify the mathematics in the theoretical calculations.

[4] Miller, Poggio, Burke, Seldon, "Analysis of Wire Antennas in the Presence of a Conducting Half-Space. Part II. The Vertical Antenna in Free Space," *Canadian Journal of Physics*, Vol. 50, 1972.

[5] Feldman, "The Optical Behavior of the Ground for Short Radio Waves," *Proc. of the Inst. of Radio Engineers*, Vol. 21, No. 6, June, 1933.

King[6] has used the following inequality as the definition

$$\beta_0 h = \leq 0.5$$

where

$$\beta_0 = \frac{2\pi}{\lambda}$$

h = half-length of a center-fed antenna or the height of a ground-mounted vertical.

λ = the wavelength

$\beta_0 h$ is actually a quantity which is used to express the height of an antenna in terms of an angle in radians. Thus, this quantity is independent of the frequency. Since 40 meters was used mostly for experimental results presented in this article, the inequality above assures accurate theoretical calculations for verticals of eleven feet or less.

The theoretical results show that the power gain for a *very* short antenna, even less than one foot high on 40 meters, is 1.5.[7] This increases slowly to 1.513 for an eleven-foot antenna. These gains are to be compared to about 1.62 for a resonant quarter-wave vertical. It can be seen that this difference amounts to less than 0.4dB or 0.07 S unit, based on 6 dB per S unit.

In a similar fashion, the capture cross-sections differ by relatively small amounts. For the *very* short antenna, a cross-section value is 0.119 λ^2, while for the quarter-wave vertical it is 0.13 λ^2. This is surprising to many since it is difficult to visualize a vertical of a foot or two in height on forty meters, having practically the same receiving ability as a 33-foot quarter-wave antenna!

But the important property of a short vertical that makes its capture cross-section nearly the

[6] King, *The Theory of Linear Antennas*, Harvard Univ. Press, Cambridge, MA 1956.

[7] See reference in footnote 6, p. 497.

The author with the 6 foot, 40-meter vertical.

equivalent of a full 1/4-λ antenna is its *very small value of input resistance*. Fig. 1 shows the theoretical curve, and the 40-meter experimental results, for the input resistance of a ground-mounted vertical as a function of height.[8] The experimental data were obtained by essentially canceling out the capacitive reactance of the vertical by an inductance at the base of the antenna and measuring the resistive value with an impedance bridge. Since an extensive, low-loss radial system was used, the resistance measured was actually that of the antenna itself, which is called the *radiation resistance*.

Fig. 2 shows the input resistance of a quarter-wave resonant vertical as a function of the number of radials. At the 115-radial point, the input resistance approaches the theoretical value of 35 ohms which strongly indicates low earth loss and hence reliable data in short antenna measurements. The picture also shows the base hardware for 60 radials. The wire is 15-gauge aluminum and was purchased at Sears. As mentioned in a previous article, there is nothing sacred about 15 gauge. No. 22 wire, or even No. 28, would be just as good.

It should also be noted that very little difference was noted whether 0.2-λ or 0.4-λ radials were used. At 16 radials, the results are practically identical. In fact, this curve is also similar to the one obtained on 20 meters which was reported earlier.[9] More work remains to be done on the trade-offs in performance versus length of radials for ground-mounted verticals.[10]

Experimental Results

In designing a shortened vertical beam for 40, 80 or 160 meters, a most important consideration is the value of the input impedance of the driven element. As seen by Fig. 1, a shortened vertical using base loading has an extremely low value, particularly at one-eighth wavelength and less. This input impedance is then usually lowered in the presence of other elements in a beam array. The resulting very low value of input impedance makes it difficult to design matching networks. Therefore, an experimental investigation was undertaken to see what increases in radiation resistance could be obtained by other methods of loading, i.e., top hat, three-quarter point, midpoint, and distributed (helical antenna). The results of these experiments are shown in Fig. 3. Table I shows the individual points for inductive loading and Table II for top hat and distributive loading. Several interesting points were brought out by these experimental results. Fig. 3 shows that top-hat loading yielded

[8] See reference in footnote 6, p. 190.

[9] See footnote 1.

[10] Weeks, *Antenna Engineering*, p. 48, McGraw-Hill Book Company, 1968.

TABLE I – Inductive Loading

1) *Base Loading*

No. of turns+	*h*	$R_{rad.}$
a) 7	24 feet 3 inches	14.5 ohms
b) 10	18 feet 9 inches	7.5 ohms
c) 12	15 feet 7 inches	5.5 ohms
d) 14	13 feet	4 ohms
e) 18	8 feet 10 inches	2 ohms

2) *Midpoint Loading*

No. of turns+	*h*	$R_{rad.}$
a) 6	28 feet 5 inches	28.5 ohms
b) 11	24 feet 3 inches	25.2 ohms
c) 15	19 feet 8 inches	16.5 ohms
d) 18	15 feet 8 inches	12.3 ohms
e) 24	14 feet 6 inches	10.5 ohms

3) *Three-Quarter Point Loading*

No. of turns+	*h*	$R_{rad.}$
a) 10	29 feet 4 inches	32.5 ohms
b) 18	23 feet	26 ohms
c) 23	21 feet 2 inches	23.5 ohms
d) 24	19 feet 2 inches	22 ohms

+ B & W 3029, 2-1/2 in. dia., 6TPI, No. 12 wire.

TABLE II – Top Hat and Distributed Loading

1) *Top Hat Loading* (4-spoked wheel with 1/8-inch Al wire rim)

Diameter	*h*	$R_{rad.}$
a) 1 foot	30 feet 10 inches	34 ohms
b) 2 feet	28 feet 7 inches	32.5 ohms
c) 4 feet	24 feet	30 ohms
d) 7 feet	19 feet 2 inches	23.5 ohms
e) 4 feet+	23 feet 4 inches	29.4 ohms

2) *Distributed Loading* (Helical Antenna)

No. of turns	*h*	$R_{rad.}$	*Top Hat at 1.5 feet Above Coil*
a) 111	12 feet	8 ohms	1 foot dia.
b) 105	12 feet	10 ohms	2 feet dia.
c) 113	7 feet	6 ohms	2 feet dia.
d) 75	7 feet	7.5 ohms	4 feet dia.

+8-spoked wheel

Eight-and-one-half-foot helical antenna using a 2-foot top hat 1-1/2 feet above the 7-foot helix. The 75 turns have approximately a 3-inch pitch below the midpoint and 1.5-inch pitch above. Very little difference was noted in reversing the pitches. The input impedance was 7.5 ohms.

the largest value of radiation resistance for a particular height. Surprisingly, the helical antenna[11] yielded a value less than midpoint loading. The three-quarter point and midpoint loading curves were not extended to lower values of height because data were very difficult to obtain below the points shown on the respective curves. The combinations of inductances and lengths below the heights shown on these two curves were probably beyond resonant conditions at the frequency used in the measurements. The other curves were extended by dashed lines indicating no difficulties were encountered in the measurements and other lengths were very possible.

Another interesting aspect of the top-hat loading curve is that a four-spoked wheel approaches to a good degree a solid disk. Doubling to eight spokes only improves the loading by about 9 percent as noted in Table II. Thus, *a few radials on the top of a vertical are very effective.*

Four radials at the base, approximating a ground system, are practically *useless* as noted in Fig. 2. Also, it can be seen from Table II that the reduction in length because of top-hat loading is approximately equal to twice the diameter of the disk.

On 160 meters, top hats have been made with sloping wires or struts with success.[12] Because of the sloping nature of this top hat, some cancellation of the antenna current takes place, thus reducing the radiation resistance further.

Although the curves in Fig. 3 were obtained from experiments at 7.21 MHz, these data can be applied to the other bands by proper scaling. For example, by doubling all dimensions, including the number of turns of the loading coils, the radiation resistance values would apply at a frequency of 3.6 MHz. By increasing the dimensions by only 1.85 instead of 2, the results would then apply to a frequency of 3.9 MHz. In like manner, a proper scaling factor could be used to apply these results to a portion of any of the amateur bands.

[11] The diameter of the helical antenna was 1-5/8 inches. Each helical antenna had a top hat 18 inches above the helix in order to terminate the upper turns with sufficient capacitive reactance.

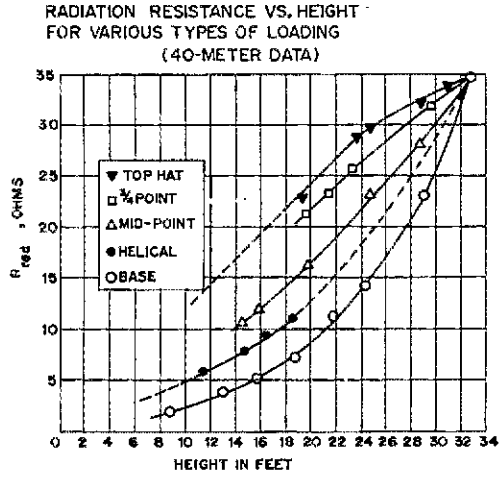


Fig. 3 — Experimental results of radiation resistance as a function of height of antenna for various types of loading (40-meter data).

40- and 80-Meter Short-Vertical Designs

As was stated before, a most important consideration in designing short verticals is a knowledge of the input resistance and how it varies with different types of loading. The objective is to obtain a resistance value large compared to earth losses, so that efficient operation is obtained. In the author's specific case, using 115 radials, practically no earth loss was measured, and, hence, any radiation resistance above a few ohms assured good operation and an opportunity to verify the theoretical predictions for very short vertical antennas.

Since a broad-band, bifilar, four-to-one step-up transformer was available from previous work,[13] the first design was for the shortest vertical having an input resistance of 12.5 ohms. From the curves of Fig. 3, it appeared that a 16- or 17-foot antenna with a coil of some 13 turns (extrapolated from Table I) at 8 or 9 feet from the base would provide the proper impedance at 40 meters. Further, it was decided that some 7 or 8 feet of length above the coil could be replaced by an eight-spoked top hat having a diameter of four feet. The actual design that resulted, after proper tuning, is shown in the

[12] See reference in footnote 10, p. 44.

[13] See footnote 2.

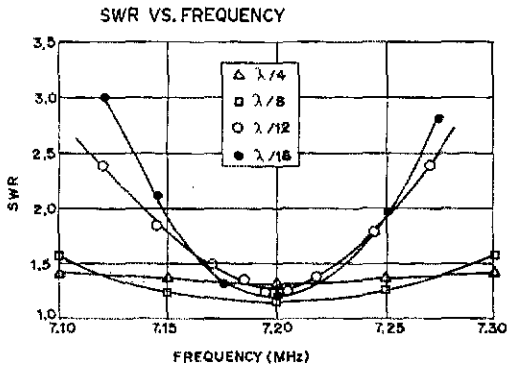


Fig. 4 — Standing wave ratio of various short verticals compared to a resonant quarter-wave antenna. The sixteenth wavelength antenna is the 8-1/2-foot helical design, the twelfth wavelength is the 10-foot antenna, and the eight wavelength is the 15-foot, 10-inch antenna. (All three are described in the text.)

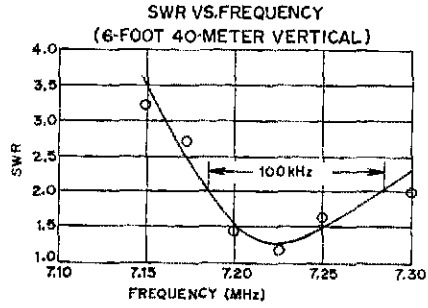


Fig. 5 — Standing wave ratio of the six-foot vertical using a 7-foot top hat and 14 turns of loading 6 inches below the top hat.

picture. The antenna had a total height of only 10 feet and a 14-turn coil placed one foot below the top hat. This height was about one foot higher than first expected, but upon careful examination it was noted that the top hat also reduced the radiation resistance, while replacing a section of the vertical portion. Therefore, the height had to be increased somewhat when considering top-loading effects. Also shown in a picture are the construction details for the top hat.

Two other shortened verticals for 40 meters were investigated. One was an 8-1/2-foot helical using a four-foot top hat and 75 turns on a 1-5/8-inch, 7-foot long, wooden dowel. The input impedance was 7.5 ohms and it was matched with a standard pi network. Pictures are shown with the network. Several tests were made by doubling the winding pitch below and above the midpoint, keeping the number of turns constant, with very little difference in results.

The second antenna, also for 40 meters, using a 7-foot top-hat, resulted in a matched vertical only 6 feet high. It had a 14-turn coil, six inches below the top hat and an input impedance of only 3.5 ohms. Matching was accomplished with the 4-to-1 transformer and the pi network. A picture of the antenna and matching network is shown.

A larger 40-meter vertical antenna was also investigated. It had a four-foot top hat and 7 turns of base loading which resulted in a height of 15 feet 10 inches (approximately 1/8 wavelength) and an input impedance of 12.5 ohms. The purpose of this design was to compare its low-angle radiation and bandwidth[14] with the other antennas. Table III shows the parameters of these various short vertical designs. Fig. 4 shows the SWR curves of three of the short antennas compared to a quarter-wave resonant vertical and Fig. 5 shows the SWR of the six-foot antenna.

As can be seen by the SWR curves, shortening an antenna generally decreases its bandwidth. Also by comparing the 8-1/2- and 6-foot antennas, top-hat loading appears to affect the SWR the least. It should also be noted that an eighth-wavelength antenna appears to have a reasonable bandwidth and would probably result in a practical beam design.[15]

[14] Bandwidth is defined as the range in frequency where SWR is less than 2 to 1.

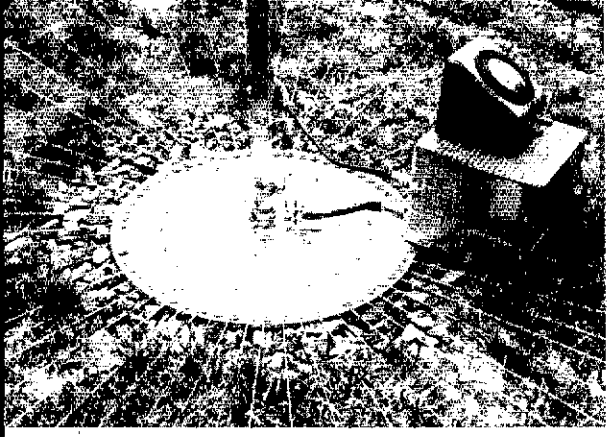
[15] See footnote 2.

Table III

Parameters of the 40-Meter Short Vertical Designs

Total Height	$R_{rad.}$ (ohms)	*No. turns*[16]	*Dia. Top* (feet)	*Bandwidth*
6 feet	3.5	14 at 6 inches below top hat	7	100 kHz
8-1/2 feet	7.5			
8-1/2 feet	7.5	75 on 7 foot dowel 1-5/8 inches in dia.	4	100 kHz
10 feet	12.5	14 one foot below top hat	4	125 kHz
15 feet 10 inches	12.5	7 at base	4	540 kHz

[16] Except for helical antenna, coil wire is same as shown in Table I.



Base of the vertical antenna with 60 radials. The aluminum disk is 15 inches in diameter and 1/4 inch thick. Sixty tapped holes for 1/4-20 aluminum hex-head bolts form the outer ring and 20 form the inner ring. The insulator is polystyrene material with a one inch diameter. Also shown is the impedance bridge for measuring input resistance.

Originally, circular wires were used to connect all radials together. These were positioned every two feet, starting from the antenna base. Then, one at a time, they were removed, meanwhile keeping a check on the antenna radiation resistance. There was no apparent change in the radiation resistance so it was concluded that the interconnecting rings of wire were not needed in the ground system.

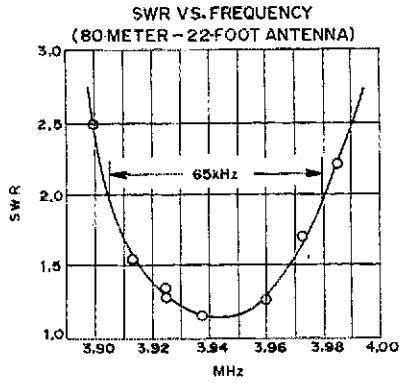


Fig. 6 — The standing wave ratio for the 22-foot, 80-meter vertical.

And finally, the four short-vertical designs described above were compared with a resonant quarter-wavelength antenna for low-angle radiation and on the air with other amateur signals. The low-angle radiation measurements were made at three wavelengths in distance and at heights of 1, 3, 6 and 8 feet. This relates to vertical angles of 0.15, 0.45, 0.90 and 1.2 degrees respectively. All measurements were made under matched conditions and with a constant 100 watts fed into the antennas under test. In no case were there any appreciable differences noted in the field strength measurements. In fact, the six-foot antenna seemed to give slightly higher readings! These measurements certainly tend to verify the theory on the power gain predicted for short verticals. On-the-air checks were again very gratifying and exciting. Over two hundred contacts with the six-foot antenna strongly indicated the efficiency and capability of a short vertical. Invariably at distances greater than 500 or 600 miles, the short verticals yielded excellent signals.

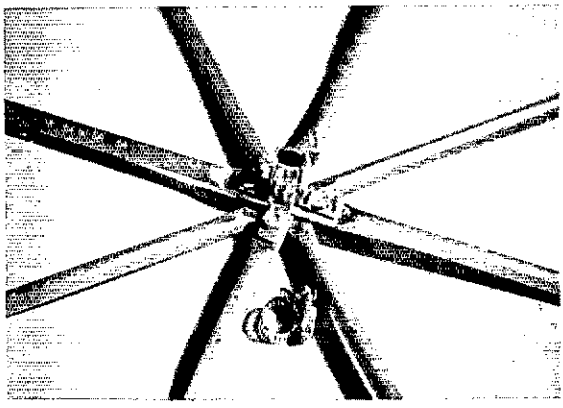
As was stated previously, all of the results obtained by measurements on 40 meters can be scaled, by the appropriate ratios of frequencies, to other bands. This was tried out on 80 meters. Since a seven-foot top hat was available (instead of an eight-foot one), the height turned out to be 22 feet instead of 20. The loading coil had 24 turns and was placed two feet below the top hat. On-the-air results duplicated those on 40 meters. The bandwidth was 65 kHz (half of the 40-meter value) as shown in Fig. 6.

Conclusions

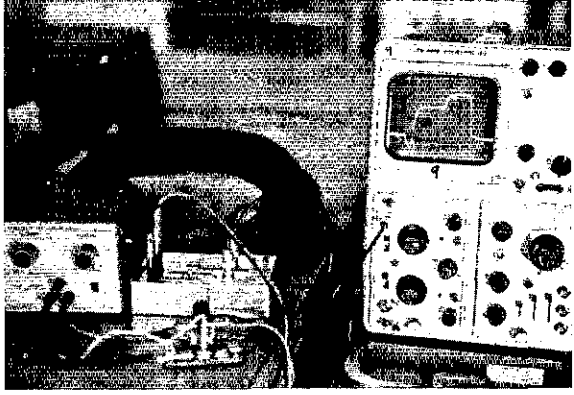
Several interesting results came out of this investigation which, even to one schooled in antenna theory, are difficult to believe. I refer specifically to the ability of very short verticals to radiate and receive as well as a full-size quarter-wave antenna. The differences are practically negligible. But, as was seen, the trade-offs are in lowered input impedances and bandwidths. However, with a good image plane and a proper design, these trade-offs can be entirely acceptable.

As a result of this investigation, other problems were noted which indicate the need for further experimentation. I refer specifically to the trade-offs encountered when shortening the radials (to 0.1 wavelength, for example), the efficiency of ground-mounted versus elevated verticals as a

(Continued on page 41)



Construction details for the top hats. For diameters of 4 and 7 feet, half-inch aluminum tubing was used. The hose clamp is of stainless steel and available at Sears. The rest of the hardware is all aluminum.



The setup for making time-domain reflectometer measurements. The TDR circuit is contained in a Minibox, center. Its power supply is visible at the left. The cable being tested, coiled up in the background, is terminated with a potentiometer mounted for testing, foreground.

An Inexpensive Time-Domain Reflectometer

BY WARREN JOCHEM,* WB2IPF

CHECKING YOUR transmission line with a VOM and SWR meter is easy, but locating the problem may not be. There is a simple technique called time-domain reflectometry (TDR) that works like a closed-circuit radar system to physically locate a fault. More than that, it can find multiple faults along a single line, measure SWR, and even tell you the characteristic impedance of your cable.

Industry has used TDR for some time, but commercial TDR systems are very expensive. For amateur applications a simple TDR can be assembled for only a few dollars, provided a wide-band oscilloscope (10 MHz or better) is available.

Fig. 1 shows a block diagram for a basic TDR. It consists of a fast rise-time pulse generator, a wide-band oscilloscope, and a T connector. The scope should be connected to the T through a short length of RG-62/U, 93-ohm coax. A 10:1 probe can also be used but a short piece of cable will make the system more sensitive.

In operation a voltage step (the leading edge of the pulse) from the generator is sent down the transmission line under test. At the same time the scope starts sweeping to the right to display the top of a single pulse, Fig. 1B. If the voltage step encounters any discontinuities (shorts, opens, or mismatches) along the line, a reflected step will be set up at that point and will travel back up the line. If the line is not too long, the reflected step (or steps) will return soon enough to add algebraically to the forward voltage pulse, Fig. 1C. This produces a series of bumps on the top of the displayed pulse. The position of these bumps on the scope face is directly related to the position of the faults along the line. A nice advantage of this over the old VOM is that all faults on the line will be shown, not just the first one. See Fig. 2.

If a fault is too far down the line, the reflected step may not return to the scope in time to add to the positive pulse, and this information will be lost. Therefore, the wider the pulse, the longer a cable you can test. Using a 1-MHz square-wave source (500 nanosecond duration of the positive portion of the wave), cables up to about 150 feet in length may be tested.

The pulse generator used here is a simple crystal-controlled astable multivibrator. It was constructed from a 7400 series TTL quad NAND/NOR

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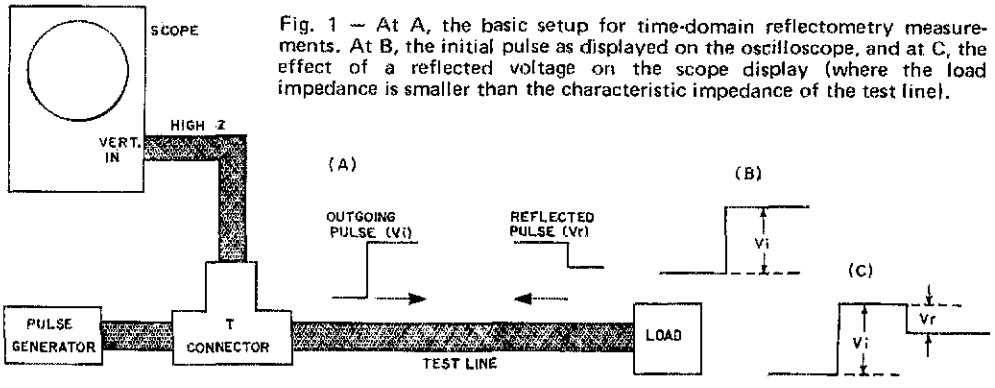


Fig. 1 — At A, the basic setup for time-domain reflectometry measurements. At B, the initial pulse as displayed on the oscilloscope, and at C, the effect of a reflected voltage on the scope display (where the load impedance is smaller than the characteristic impedance of the test line).

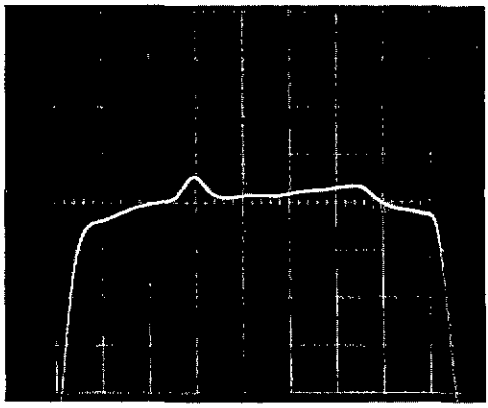


Fig. 2 — The "bumps" on the pulse as displayed on the oscilloscope are related to the position of the faults along the test line.

gate. The circuit (shown in Fig. 3) is straightforward and inexpensive.[1] We have built several on perforated board and others on pc board with no layout problems. R1 should equal the characteristic impedance of the line being tested (i.e., for RG-59/U, R1 = 75 ohms). This prevents multiple reflections on the line, which can distort the scope display.

Multiple reflections result when both the generator and the load end of a line are mismatched. A voltage step partially reflected by the load would be partially rereflected at the generator and will continue traveling back and forth on the line until dissipated by losses. By matching the generator end of the line the second reflection of the voltage step does not occur. Rereflection can also be a problem with more than one fault on a line, so it is best when testing a line to fix the fault closest to the generator and then work on down the line.

The resolution of this system is limited chiefly by the rise time of the pulse. Even so, pronounced faults as close together as one foot can be resolved. Using the generator shown and a 10-MHz scope, the scope is the limiting factor. If a better scope is available, using 74H00 gates or shaping the pulse with a high-frequency flip-flop (7490) will significantly improve the resolution.

[1] For this and subsequent references, see listing at the end of this article.

Testing a Line

In operation the test line is connected as shown in Fig. 1. Here is an important limitation of this simple TDR. The test line *must* be terminated in a pure resistance. For example, it must be disconnected from an antenna, or a tuner, or a loading coil. The display is simply too complex when reactances are present. Once the system is set up and the test line resistively terminated, the scope sweep should be set to display the top of a single pulse across the entire screen (see Fig. 4). In this test a length of RG-59/U was terminated in 150 ohms. To find the length of this line, l, we use the equation

$$l = \frac{V_p T}{2} \qquad \text{(Eq. 1)}$$

where V_p is the velocity of propagation on the line and T is the time it took the pulse to go down to the load and back. V_p equals the velocity factor (VF) of the cable in use times the speed of light. VF varies from cable to cable depending primarily upon the dielectric constant of the cable. The VF for common cables can be found in most electronics handbooks.[2] For RG-59/U, VF = 0.66.

$$V_p = (0.66)\,(9.84 \times 10^8 \text{ ft/s})$$

$$V_p = 6.5 \times 10^8 \text{ ft/s}$$

T is read directly from the scope face. Reading from the midpoint of both leading edges (Fig. 4), T = 4.6 divisions on the X axis, with the scope set to .05 μs/div.

$$T = (4.6 \text{ div.})\,(.05\ \mu\text{s/div.}) = 23 \times 10^{-8} \text{ s}$$

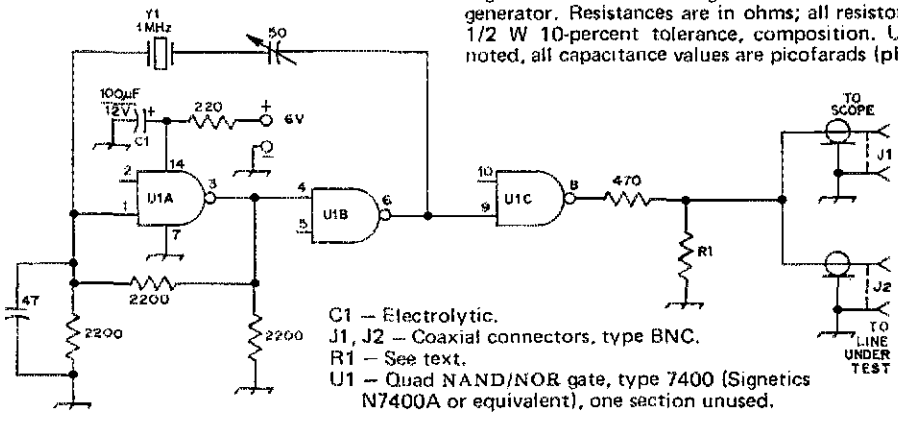


Fig. 3 — Schematic diagram of the TDR pulse generator. Resistances are in ohms; all resistors are 1/2 W 10-percent tolerance, composition. Unless noted, all capacitance values are picofarads (pF).

C1 — Electrolytic.
J1, J2 — Coaxial connectors, type BNC.
R1 — See text.
U1 — Quad NAND/NOR gate, type 7400 (Signetics N7400A or equivalent), one section unused.

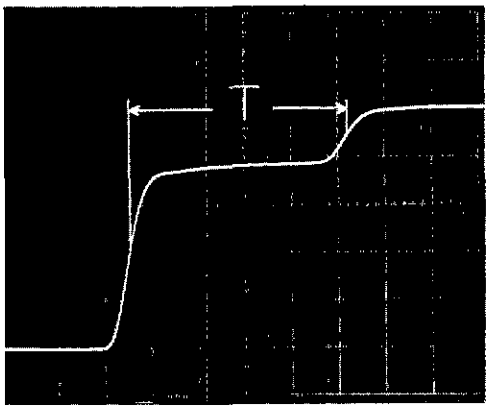


Fig. 4 — TDR display with a 75-foot length of RG-59/U (75-ohm coax) terminated in a 150-ohm resistance.

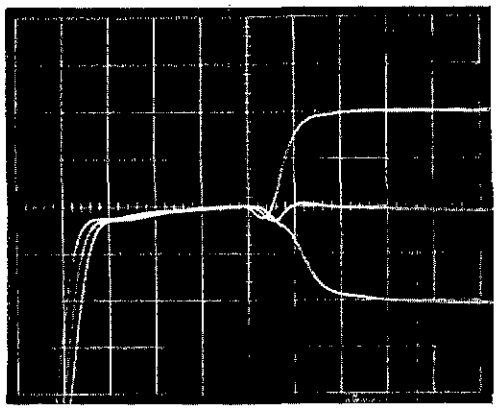


Fig. 5 — Multiple-exposure photograph showing the TDR display with three different values of terminating resistance at the end of the test line. The trace which appears as almost a straight-line extension of the initial pulse amplitude results from a matched condition at the far end of the line.

Therefore:

$$l = \frac{(6.5 \times 10^8 \text{ ft/s})\,(23 \times 10^{-8} \text{ s})}{2}$$

$$l = 75 \text{ ft}$$

We divide by two since we want the cable length — not the distance the pulse has traveled, which is down and back. This 75 feet is in exact agreement with the measured length of the cable. It just happened that the fault was the end of the cable. If it had been in the middle a small bump in the pulse would appear, as shown in Fig. 2.

If you do not know the velocity of propagation simply rearrange equation 1.

$$V_p = \frac{2l}{T} \qquad \text{(Eq. 2)}$$

l = known cable length

T = time down and back, read directly

Now for those skeptics who do not believe in characteristic impedance, connect a 200-ohm potentiometer to the end of the line. Adjusting it through its range should provide a display like that of Fig. 5. When the display is completely flat the pot can be removed from the circuit and its resistance value measured on an ohmmeter. The pot resistance should be within one ohm of the characteristic impedance of the line.

If you ever wanted to actually visualize the VSWR on a line, set up a test to produce the displays shown in Fig. 6, and make calculations with this equation.

$$\text{SWR} = \frac{E_i + E_r}{E_i - E_r} \qquad \text{(Eq. 3)}$$

where E_i = incident voltage and E_r = reflected voltage.

Using Fig. 4 as an example,

$E_i = 3.8$

$E_r = 1.2$

$$\text{SWR} = \frac{3.8 + 1.2}{3.8 - 1.2} = \frac{5.0}{2.6} = \frac{1.9}{1}$$

Fig. 6 — TDR displays for SWR measurement, where Z_L is purely resistive.

Using another formula from which the SWR may be found if Z_L is known and is purely resistive,

$$\text{SWR} = \frac{Z_L}{Z_o} = \frac{150}{75} = \frac{2.0}{1}$$

As you can see, these two values are in very close agreement.

There are many other applications of this unusual measuring technique but I'll leave them open to amateur ingenuity. I would like to thank Dr. Allen Katz, K2UYH, Head of the Electronic Technology program at Trenton State College, for his help in this project and Paul Lamhut, WB2HHH, for the photography.

References

1) Pollock, "TTL Crystal Oscillator," Technical Correspondence, *QST*, October, 1971, p. 54. Also see Feedback, *QST*, December, 1971, p. 47, and Estes, "More on the TTL Oscillator," Technical Correspondence, *QST*, February, 1972, p. 55.

2) Antennas and Feed Systems chapter, *The Radio Amateur's VHF Manual*, or Transmission Lines chapter, either *The ARRL Antenna Book*, or *The Radio Amateur's Handbook*.

3) Allen, "A Practical Experimenter's Approach to Time-Domain Reflectometry," *Ham Radio*, May, 1971, p. 22.

4) Lenk, "Time Domain Reflectometry," *Electronics World*, September, 1966, p. 48. QST

Because worldwide DX on 10 meters is most consistent in times of high sunspot activity, there has been a tendency to regard the band as useful for only a small percentage of the time. Actually, there are many interesting things to be done on ten, night and day, through the year, and in any part of the sunspot cycle. Though aimed at potential Novice users of the 10-meter band, this two-part series will have much for any reader who has an interest in propagation possibilities and antenna information. With the enthusiasm that newcomers can bring to it, opening of 28.1 to 28.2 MHz to the Novice should help to make the band more useful and interesting to everyone.

Tips on Ten

The Nature of the Band, and Some Simple-Antenna Ideas

BY EDWARD P. TILTON, W1HDQ*

A HUNDRED KILOHERTZ on 10-meter cw? Big Deal! I never heard any cw on 10! It is easy to imagine this as a typical Novice reaction to the recent FCC move making 28.1 to 28.2 MHz available for use by Novices. Beginners could not be blamed for feeling this way, for they've probably heard similar opinions expressed by more experienced amateurs, most of whom should know better.

The 10-meter band can sound like a pretty lonely place to a casual listener. It even fools long-time users like the writer, at times. One of the delights of 10-meter life is working a lone station in a remote part of the world, soon after his appearance, out of nowhere on a seemingly unoccupied band. The author had just such a surprise QSO one recent morning, when ZE3JO, Salisbury, Rhodesia, materialized out of a band almost given up for dead that day.

How can a band so good be so quiet? We'll get to such things a bit later. We mention this experience to affirm that surprize is the 10-meter band's stock-in-trade. Novices who take the trouble to learn its ways will find it a most exciting place to operate, though admittedly it can be frustrating, as well.

Ten is different from other bands covered by the usual 5-band receiver or transceiver. With even random-length antennas, you can expect to hear some activity on 80, 40, or 20, almost around the clock. Even 15 is usually jumping, at least in daylight hours, most of the year. But when you throw the band switch to the 10-meter position you may hear nothing at all, unless you know where, when, and how to listen. In this the band is more like its vhf neighbors higher in frequency than it is like 20, 40, or 80 meters.

A properly adjusted antenna, a sensitive receiver, and some propagation know-how are very helpful in enjoying the 10-meter band. When conditions are good, almost anything may work, but don't let this fool you into thinking that a good antenna is not worth the time and trouble, or that just any old receiver is good enough. Some familiarity with the band's bag of tricks has kept 10-meter enthusiasts going through thick and thin, for years at a time.

Local Coverage

Because Ten is a prime DX band part of the time, its potential for reliable local communication is largely ignored by DX-oriented hams. Yet here is a band that is fine for distances up to at least 50 miles or so, around the clock, at any season. Just how far you can work depends on many factors, the antenna being one of the most important. It should be high enough to clear obstructions in the immediate vicinity, and preferably should be rotatable. If it has some gain with respect to a half-wave dipole, that will help too.

We're on the downslope of the current sunspot cycle, the 20th in the recorded history of sunspot

* VHF Editor, *QST*, Retired

observation, which goes back some 200 years. Using the 10-meter band when it *isn't* open for long-distance communication thus looms large in any plan for full use of the band in the next few years. Much of what has been written about the 50-MHz band in ARRL publications such as *The Radio Amateur's Handbook* and *The Radio Amateur's VHF Manual* applies quite well to 28 MHz, so a reading of the propagation chapters of these works is recommended.

Weather affects the operating range on 28 MHz in the same way, though not to quite the same extent, as it does the vhf bands. Tropospheric propagation (wave bending at atmospheric boundaries close to the earth's surface) may keep signals following earth curvature for 100 miles or more, instead of their going out directly, to be lost in space. This effect shows every morning, when the sun warms the air aloft before the earth's surface temperature rises. It also shows at dusk, when surface air cools quickly, while higher up the atmosphere is still sunlit.

Such extensions of the radio horizon are most common in the warmer months, spring and fall being most favorable. Fair, calm weather, usually with high barometer readings, is a reliable indicator. Even midwinter will bring some good times, usually during a warming trend associated with an advancing rain area.

Willingness to work with weak signals is a must, if you would extend your local coverage. DX signals on 10 are usually very strong, so many operators tend to neglect weaker signals as unusable. In doing this they miss chances to work adjacent areas when the band isn't open for the ionospheric DX modes shown in Fig. 1, and discussed below.

The Novice restriction to cw only is a blessing in disguise for extended-local work. The useful range of cw on a quiet band is limited only by receiver noise. If you can hear a cw station just above the noise, you can work him, if he's a good listener too. This rarely applies to voice communication on any frequency. A bigger and/or higher antenna may bring him in better. Improved reception, especially in the front-end stage or stages, is more important here than when the DX is in.

Call anyone you can hear. Call lots of CQs. Set up evening skeds with friends 50 to 100 miles or more away. You'll be surprised how often you can work them on 10-meter cw. Take a leaf from the vhf man's book, which as an axiom that "If everybody listens, nobody hears anything!"

The Ionospheric Modes

Several types of propagation involve bending or reflection of the wave by ionized regions far above the earth's surface. See Fig. 1. How far we can work via these layers is mostly a matter of simple geometry – the higher the layer, the greater the distance for a single hop. But because there can be more than one hop the picture for longer hauls is harder to sort out. With at least three ionospheric modes encountered fairly often in 10-meter communication, it is not surprising that many amateurs have only very hazy notions of how their signals get where they do. The fact that the various modes have fairly well-defined seasonal characteristics, and are effective over different distances and in some instances in different regions of the earth, helps to clarify the propagation picture. It is worth the trouble to learn a little about these modes.

F-Layer Properties

The *F* Region, highest in the ionospheric layers, is responsible for most of the real DX work on 10. The reflection area is roughly 200 miles up, so the skip distance in *F*-layer communication is seldom less than about 1500 miles. It can be longer, and skip goes through a daily cycle of long-short-long, when layer density and "virtual height" change, as the result of action by the sun.

Because the sun is responsible, *F*-layer DX is a daylight phenomenon, mainly. It reaches a peak at roughly noon for the midpoint of any path. How early a given east-west path opens, and how long it remains open, is related to conditions on the sun, and the position of the earth with respect to the sun. Any long path worked on 10 via the *F* layer must be mostly in daylight, except near the peak of the "11-year" solar cycle. Europeans or Africans in the morning, Texas and farther out in the Southwest or West in the afternoon, California and the Pacific Northwest at dusk, Hawaii and the far Pacific in the first hours of darkness – such is a typical "dream day" for the 10-meter operator in the Northeast. Other areas of the country will encounter somewhat similar sun-related activity.

The maximum usable frequency (muf) for *F*-layer communication varies with sunspot activity, and with the point in the solar cycle:

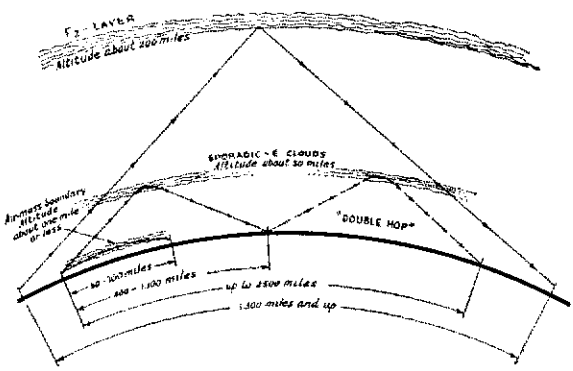


Fig. 1 – The principal modes of propagation on the 10-meter band are F_2-layer DX, which provides the greatest distances; sporadic-*E* skip, allowing work over shorter hauls, mainly in the summer months; and tropospheric bending at airmass boundaries in the atmosphere close to the earth's surface.

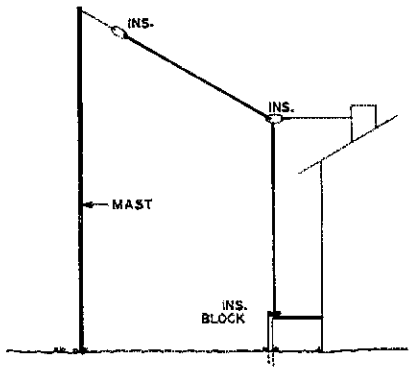


Fig. 2 — A typical end-fed sloping wire, usable on several amateur bands if tuners such as those in Fig. 4 are used to match it to the station equipment. Small wire and light-weight cord can be used to make such an antenna practically invisible.

highest muf near the cycle peak, lowest at the cycle minimum. Cycles 18 and 19, peaking roughly in 1947 and 1958, reached the highest levels of solar activity ever observed. The muf is known to have risen to approximately 70 MHz for the North Atlantic path in 1958. No such thing happened in Cycle 20, though some *F*-layer DX was worked in the 50-MHz band in the more-favored areas of the world between 1968 and 1971.

Currently the muf is reaching 33 MHz or so most days, for long paths that do not pass through the polar regions. The 10-meter band can be expected to provide *F*-layer DX between September and May, for at least another year or so, though openings will be shorter in time, with longer skip distance, in the near future. DX tends to be more restricted to low-latitude paths as sunspot numbers decrease. How far these factors will drop is not known for Cycle 20 as yet, as cycle lows vary appreciably, just as the highs do, from one cycle to the next. We do seem, however, to be in a long-term period of declining solar activity.

There are redeeming features in this picture for the 10-meter enthusiast. Most important is the nature of propagation near the MUF. When there are any DX signals at all on 10 these days, they are usually very strong. At frequencies just below the maximum usable, the ionosphere is an almost perfect radio mirror. Working into Europe or Africa may not be possible every day for the Northeast, but when the paths are open they are superb. Very low power works amazingly well, and simple antennas may suffice for exciting DX work.

As an example, during the morning of October 27 the writer worked the following 10-meter cw stations on five consecutive calls: UB5UAO, Kiev, Ukraine, USSR; LA8LA, Oslo, Norway; YU3TSM, Ljubljana, Yugoslavia; DJ2SB, West Germany; and F8WK, Bordeaux, France. Not bad for less than 2 watts output, and the end-fed wire shown in Fig. 2. The rig was an Argonaut solid-state transceiver.[1]

[1] Recent Equipment, November, 1972, *QST*, p. 52.

Many other Europeans and several African stations have been worked since, and with the erection of a 4-element beam we've had fine ssb and cw contacts almost every day — northeast, southwest, and west — with the little two-watter. The cw contacts include many with 10-meter Novices, who were out in force the first Saturday after the band was opened to them.

When the frequency being used is near the muf, the area open for long-distance communication at any one time is usually relatively small, at each end of the path. This has the effect of making the band seem dead, when it is actually open to some area of the world where there is little or no activity. This explains the condition alluded to in our first few paragraphs, where a single station may be heard in a distant area, even though the band is open well, for very long-distance communication. We may lose chances to work someone merely because nobody makes any noise in the right places at the right time — but we also have little interference trouble, even when using very low power.

Even with Novice power, an extraordinary mode of communication is possible with cw, when working near the muf. Known as *back-scatter*, this results when signals traverse an *F*-layer path, strike the earth at some distant point, and are scattered in all directions. A minute portion of the scattered energy is detectable in any other area where the frequency is open to the ground reflection point. The intriguing aspect of back-scatter is that when the band is open to Africa, for example, you may hear U.S. stations in any part of the country who are also working into Africa at that time. They are usually weak and fluttery, but especially on cw "if you can hear 'em you can work 'em," to paraphrase an old adage in ham radio.

High-gain directive antennas help in back-scatter work, but don't let that stop you from trying with less. Directive antennas at both ends of a back-scatter path usually must be aimed at the common "open" area. Turning them toward each other may result in loss of signal, except within the tropospheric range. A 10-meter WAS looms as a possibility, if back-scatter is used to knock off those hard-to-get close-in states. Plenty of 10-meter men have done it this way.

Sporadic-E Skip

Here is a real "fun mode" on Ten. Usually written E_S, it works best over intermediate distances, 400 to 1200 miles, filling in the *F*-layer gaps nicely. Signals are usually strong, and high-gain antennas and high transmitter power are definitely not needed. Except in general seasonal ways, E_S is almost unpredictable. It is most common in May through July, with a minor season in December and January. It is heard only occasionally at other times of the year. It is most often encountered in the early evening hours, and in mid-morning, though the best early-summer openings may hold almost around the clock for days at a time.

There is still much to be learned about this tremendously popular "short skip." The best recent treatment of it in print is a two-part *QST* series by an almost lifetime amateur student of the mode, Mel Wilson, W2BOC.[2] Probably the greatest thing about E_s is that it is only vaguely related to sunspot activity, if at all. Some of the wildest sporadic-*E* seasons have occurred at or near the bottom of the solar activity curve. Anything works for E_s: dipoles, ground planes, random wires, mobile whips. As with any other mode, good antennas help, but they are much less needed for fun with sporadic-*E* skip than for other 10-meter modes.

Marginal Modes

In addition to back-scatter, there are several other marginal propagation modes available to the alert 10-meter operator. For those in the higher latitudes (mainly above latitude 35) the aurora can turn the 10-meter band wild. See the *Handbook* or *VHF Manual* for more on this. During auroral conditions 28 MHz is much like 50, though with somewhat less signal distortion. There is some sunspot-cycle correlation, but it is minor.

A variation of the *F*-layer mode involves trans-equatorial paths, in the early-evening hours. Though related to the sunspot cycle, the *TE* mode has a considerably higher muf. It is unlikely that the 10-meter band ever goes completely dead for appreciable periods in the spring and fall *TE* seasons, in areas of the world most favorably situated for this mode. The southern tier of states should have considerable 10-meter activity on paths crossing the equator, throughout the solar cycle. Those of us farther north will not enjoy such a wide range of possibilities, but in past solar cycles we've had some openings to South America, and to places like the Canal Zone, through the quietest times on the sun.

There are also the "scatter modes," both tropospheric and ionospheric. What these amount to is that, if we throw enough power into the ether, in any direction, some of it can be heard when it scatters back to earth at distant points. Tropospheric scatter is detectable out to 400 miles or more, under optimum station conditions as to transmitter power, receiver sensitivity, and antenna gain and directivity. Ionospheric scatter is detectable over 500 to 1300 miles or so, similarly. Meteor pings, much used for marginal communication by vhf operators, are more numerous and of longer duration on 28 MHz.

We have called these "marginal modes," and that they certainly are – but this makes them no less interesting, especially to fill in the years when more conventional DX modes are not a daily fare. Exploiting them, and catching the stronger-signal openings when they come along, can keep the avid 10-meter man going, around the clock, through the seasons, and around the world. This band is *never* truly dead!

[2] Wilson, "Midlatitude Intense Sporadic-*E* Propagation," *QST*, December, 1970, and March, 1971.

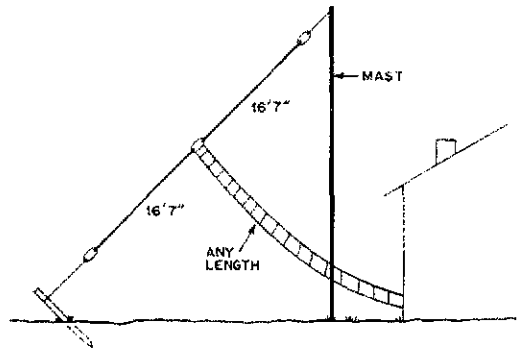


Fig. 3 – A "guy-wire doublet" usable on 10, 15 and 20 meters. The balanced transmission line can be TV-type open-wire line, or hand-made. Any length can be used if the system is matched to the equipment by means of a coupling circuit such as that of Fig. 4B.

Some Simple Antenna Ideas

The best antenna you can put up is a good investment, but if your circumstances do not permit erection of a large rotatable array, take heart. Lots of fun can be had on 10 with simpler systems. The important thing is to be sure that whatever power you can generate is put into the antenna, not lost in poor feed lines or wasted through mistuning.

End-Fed Wires

A simple wire antenna can be managed almost anywhere. It can be horizontal, vertical, or anything in between. The "in-between" may be most interesting, as sloping wires have various directional, radiation-angle, and polarization characteristics that can give them useful lobes on a band as unpredictable as Ten. There are classic theories to cover all this in any edition of the *ARRL Antenna Book*, but local circumstances usually dictate how such an antenna goes up, rather than theories.

An end-fed wire strung up by the writer to try the Argonaut transceiver under typical beginner conditions is shown in Fig. 2. The wire runs through the shack wall a few feet above the ground. It is supported on a wooden post with an insulator at the top end, then it runs vertically to an insulator and rope attached to a chimney. It runs loosely through the insulator, then up at about 45 degrees to a rope-and-insulator tie point near the top of a 60-foot tower. (Tower not important here; could be a tree or whatever, just as well.) This antenna is the "invisible" type, being No. 22 enamel, which happened to be on hand.

The wire length was never measured, though it is roughly 100 feet. Two simple antenna couplers (one for 40 and 80, the other for 10, 15 and 20)

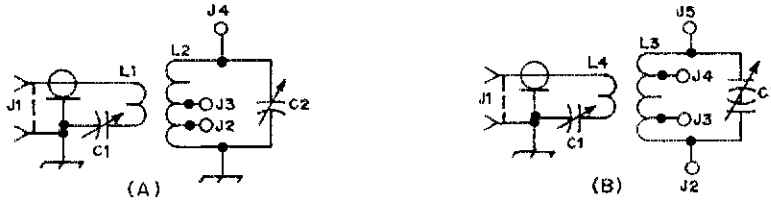


Fig. 4 — Two typical Transmatch circuits. The one at A is for use with end-fed wires. Circuit B can be used for either balanced-line or end-feed systems. Both capacitors are adjusted for lowest reflected power (close to zero) as shown in an SWR indicator connected between J1 and the transmitter output. Making the adjustments carefully for best received signal will also come close to optimum setting for transmitting.

The end-fed wire can be used with either coupler, plugging it into whichever tip jack allows the best matching. The balanced-line type of feed must be plugged into J2 and J5, or J3 and J4, in Fig. 4B. Values for 10- and 15-meter operation are given below.

C1 — 140-pF miniature variable.
C2 — Like C1, but wider spacing if more than 75 watts is to be used eventually.
C3 — 100-pF per section, split-stator variable.
J1 — Coaxial jack.
J2, J3, J4, J5 — Insulated tip jack.
L2 — 8 turns No. 20 tinned, 1-1/2-inch dia, 1-1/2-inch long. Tap J2 at 2 turns, J3 at 4 turns, and J4 at top end.
L1 - 2 turns insulated hookup wire, wound over bottom end of L2.
L3 — 8 turns No. 20 tinned, 1-1/2-inch dia, 1-1/2-inch long. Tap J2 and J5 at ends and J3 and J4 at 2 turns in from each end.
L4 — Like L1, but over middle of L3.

tune and match this wire for five bands. So far, we've had quite good results on 80, 15 and 10 with the two to three watts delivered by the Argonaut. The 40- and 20-meter bands sound a bit formidable as to QRM, so have not been given much of a try as yet. Some early 10-meter results have been described.

Center-Fed Systems

The center-fed "two half-waves in phase" of Fig. 3 was first used by the writer during his initial foray into the world below 50 MHz in 1935. We had a great time with it on 10, back then, and one about like it currently serves as a guy wire on one of the station towers. It loads up nicely on 20, 15 and 10, using the coupling circuit shown in Fig. 4B. The whole thing is made of two pieces of No. 12 copperweld wire, pulled tight, the feed-line portion being spaced about one inch on ceramic spreaders. Half-inch polystyrene rod is fine for spreaders if you want to make them yourself. Don't use Nylon; it won't stand appreciable rf voltages for long.

The Ground Plane

An effective nondirectional vertical that can be put up almost anywhere is the ground plane. The radiating element and radials can be wire, or metal tubing, and mechanical details can be improvised to fit available materials and installation requirements. The horizontal radials simulate ground, and can be grounded directly, if it is convenient to do so. If a vertical antenna is to be erected directly above a metal roof, the radials can be dispensed with, and the outer conductor of the coaxial line connected directly to the metal.

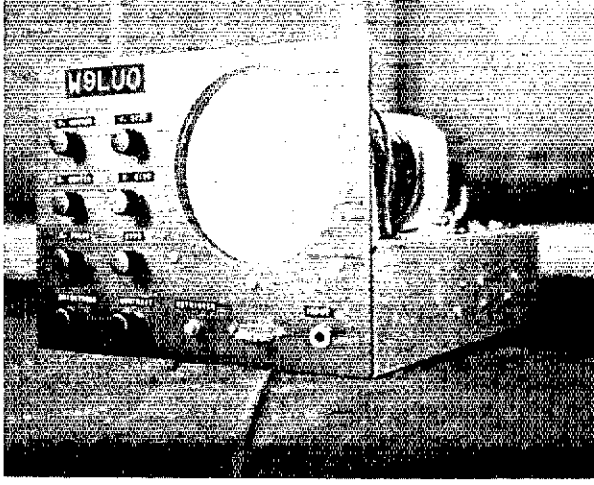
The impedance of a true ground-plane antenna is about 35 ohms but the mismatch is rarely enough to affect operation adversely, when 52-ohm coax is used. Drooping the radials raises the feed impedance. Properly erected, a ground-plane antenna has a low radiation angle and an omnidirectional pattern. It does very well in certain kinds of DX work, and is useful for local work, if the other station antennas in the area are vertically polarized. Polarization with this and other antennas described is generally not too critical a factor in work over ionospheric paths.

Using Other HF Antennas

Unless your 10-meter work is your first effort in ham radio, you probably already have one or more antennas for other amateur frequencies. If such systems are fed with open line or Twin-Lead, they can be made to take power by using the coupler methods described. Try anything you have, first. If you can match it to your transmitter and make it take power, don't hestitate to try it for working out on Ten. Though there are times when nothing seems to work on this band, there will be other days when *anything* will. As we've said, this is a band full of surprises.

The simple antennas described will do a very good job. For maximum results, a rotatable beam antenna is the answer. A 4-element array for the two high-frequency Novice bands, 15 and 10 meters, is described in the antenna chapter of the 1972 and 1973 editions of *The Radio Amateur's Handbook*, and also in a past issue of *QST*.[3] Although the construction and cost of such an array might discourage the newcomer, take our word for it — the resulting improvement in transmission and reception is more than worth the cost and work. QST

[3] McCoy, "Why a Beam Antenna," *QST*, January, 1972.



A Solid-State SSTV Monitor — Mark II

BY ROBERT F. TSCHANNEN,* W9LUO

THE MARCH, 1971, issue of *QST* presented a description of a solid-state SSTV monitor which contained triggered sweeps, separate power supply system, and a large number of discrete components.[1] The unit has enjoyed considerable popularity, as the volume of technical correspondence will attest.[2]

The Mark II version of this monitor offers improved performance and further simplification. The new unit employs more integrated circuitry and has an improved sync separator, horizontal phase-locked loop, operational amplifier drivers for the deflection outputs, and a simplified power supply system. The design aim was improved performance with simplicity.

Signal Handling

The effective use of the fm-subcarrier mode of transmission in SSTV requires signal processing with adequate selectivity and bandwidth, good limiting, and faithful demodulation and reproduction of the video. Simultaneously, the sync and deflection circuits must provide accurately timed sweeps, good scan linearity, and be as immune to interference and noise as possible.

The majority of good-quality ham receivers provides sufficient selectivity, together with adequate bandwidth for SSTV reception. Greater selectivity and bandwidth reduction are normally neither desired nor necessary. All of the remaining fm-subcarrier process functions are conveniently handled in the monitor.

Video and Sync Circuits

With reference to Fig. 1, three inputs are provided on the monitor to provide patch-through connections for other slow scan equipment, as well as a monitor test point. The inputs are connected to a single op-amp limiter stage, U1. Effective limiting action begins with input signal levels of about 0.25 V pk-pk. A simple *LC* discriminator circuit, equivalent to the one used in the original monitor, follows the amplifier-limiter. The parallel-resonant circuit consisting of L1-C2 is tuned to 2300 Hz. This permits slope detection of fm-subcarrier signals up to 2300 Hz. The discriminator output is split into two paths to (1) drive the push-push sync separator, and (2) drive the video subcarrier amplifier.

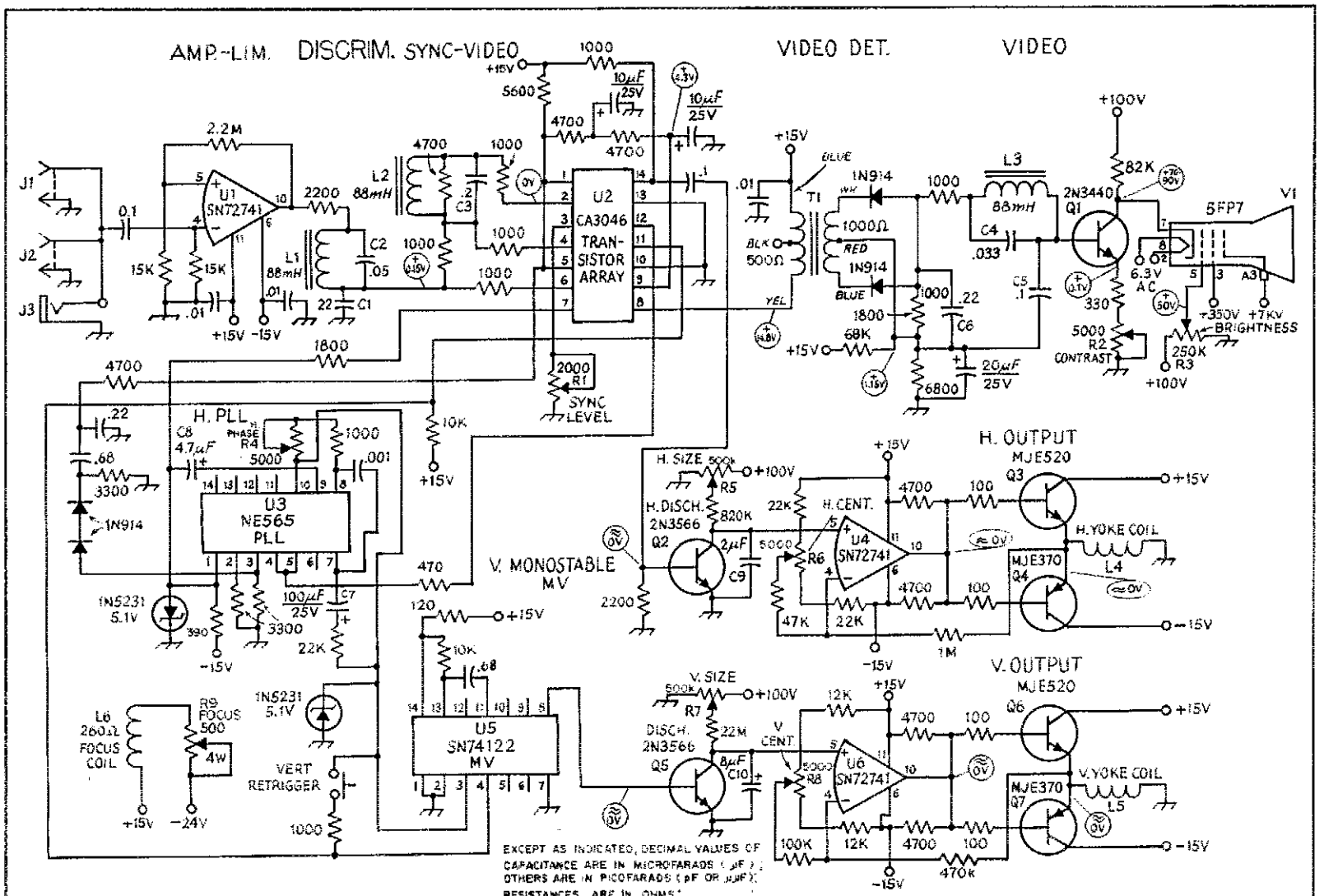
The tuned circuit, L2 and C3, is adjusted for 1200-Hz resonance. This circuit provides a voltage gain at the sync subcarrier frequency. A small amount of damping is used with this circuit in order to produce a selectivity characteristic that is wide enough to accommodate a modest range of sync-frequency variation. The push-push sync separator is forward biased by positive peaks of sync, and an output is developed across the 5600-ohm load resistor on terminal 1 of U2, the CA3046 integrated circuit. A sync level control permits adjustment for optimum sync stability. Sync pulses are integrated in separate networks for application to the horizontal phase-locked loop and vertical monostable multivibrator.

The video subcarrier amplifier (which is another part of U2) drives the video detector through T1. High-frequency components of the subcarrier which are present after the detection process are

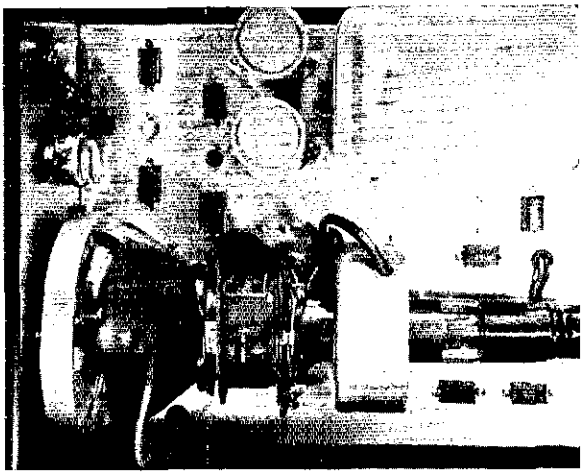
* 354 N. Stewart Ave., Lombard, IL 60148.

[1] Tschannen, "A Solid-State SSTV Monitor," *QST*, March, 1971, p. 35.

[2] Tschannen, "Feedback on the Solid-State SSTV Monitor," Technical Correspondence, *QST*, August 1971, p. 41; also Tschannen, "Questions and Their Answers on the Solid-State SSTV Monitor," *QST*, September, 1972, p. 56.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS;



Top view of the Mark II Monitor chassis. The ICs are located in sockets, which, in turn, are mounted in rectangular openings cut into the chassis. C11, C12, and the shield for the high-voltage circuitry are prominent in the upper portion of this photograph.

removed by C6, L3, C4, and C5. The video amplifier, Q1, is connected to drive the cathode of the CRT, thereby minimizing cathode degeneration in the CRT stage.

Horizontal Phase Locked Loop

U3, a Signetics NE565 IC provides a convenient phase-locked loop (PLL) for low-frequency operation. The advantage of the PLL over one-shot triggered sweeps is appreciable. The oscillator continues operation at very nearly the correct frequency, even though several sync pulses may be lost because of interference or noise. C7 determines the amount of integration in the control path of the VCO. The 100-μF value was chosen as a good compromise between reasonable noise integration and capture range.

The square-wave output of the PLL is clipped and differentiated in another section of U2 and is then applied to Q2 as a positive discharge pulse. C9 is discharged by this pulse at a 15-Hz rate to provide a sawtooth wave form to an op-amp driver, which in turn drives a complementary pair of transistors, Q3 and Q4. These transistors drive the horizontal deflection coils.

Vertical Deflection System

Vertical sync pulses, supplied from a two-section integrator, trigger the SN74122 monostable multivibrator, U5. The narrow positive output pulse at pin 8 turns Q5 on which discharges C10, thereby providing a field-rate sawtooth at 1/8 Hz. The vertical op-amp driver and output system are similar to the horizontal system.

Centering System

Dc offset in the input of the op-amp drivers provides offset to the output amplifiers and in turn controls the dc through the yoke coils. This is a simple and stable means of obtaining picture centering.

Power Supply System

The original monitor used a total of five transformers in order to provide the six different dc supply voltages needed for operation. The Mark II power supply provides six different supply voltages with two transformers. The voltages provided are +15, −15, +24, +100, +350, and +7000. The 15-volt supplies were designed around Signetics NE550 voltage regulators. Excellent regulation and hum filtering are achieved in these supplies, shown in Fig. 2 at A.

Fig. 1 — Schematic diagram of the SSTV Monitor — Mark II.
C1-C6, incl. — Mylar or polystyrene.
C7 — Electrolytic.
C8, C10 — Tantalum.
C9 — May be either Mylar or tantalum.
J1, J2 — Phono jacks, rear-panel mounted.
J3 — Phone jack, front-panel mounted.
L1, L2, L3 — Surplus 88-mH toroids. (May be obtained from Typetronics, P.O. Box 8873, Ft. Lauderdale, FL 33310 or from W2DLT, 301Z Passaic Ave., Stirling, NJ 07980.)
L4, L5 — Deflection-yoke coils. See text.
L6 — Focus coil. See text.
Q2, Q5 — Transistor type 2N3566. HEP55, 2N3392, or HEP736 also suitable.
Q3, Q6 — Motorola transistor. HEP245 or 2N4910 also suitable.
Q4, Q7 — Motorola transistor. HEP700 or 2N4898 also suitable.
R1-R8, incl. — Linear-taper controls, low wattage.
T1 — Audio driver transformer, 1000-ohms ct to 500 ohms ct, Calectro Type D1-728. See text.
U1-U6, incl. — See text.
V1 — Cathode ray tube, type 5FP7. (A list of surplus dealers offering suitable tubes at reasonable prices is available from ARRL Headquarters, Newington, CT 06111. U.S. residents should enclose a stamped business-size envelope bearing their return address.)

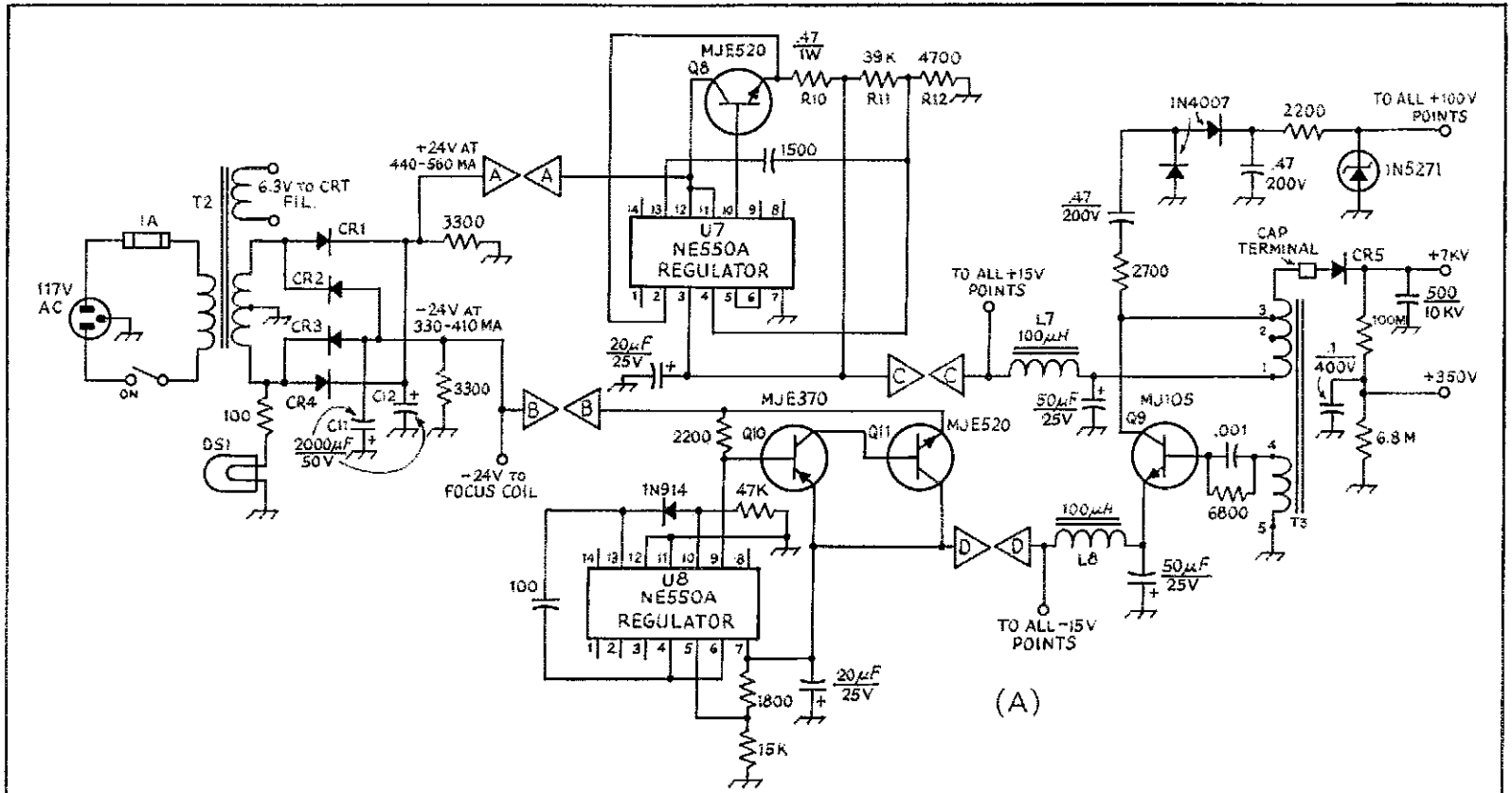
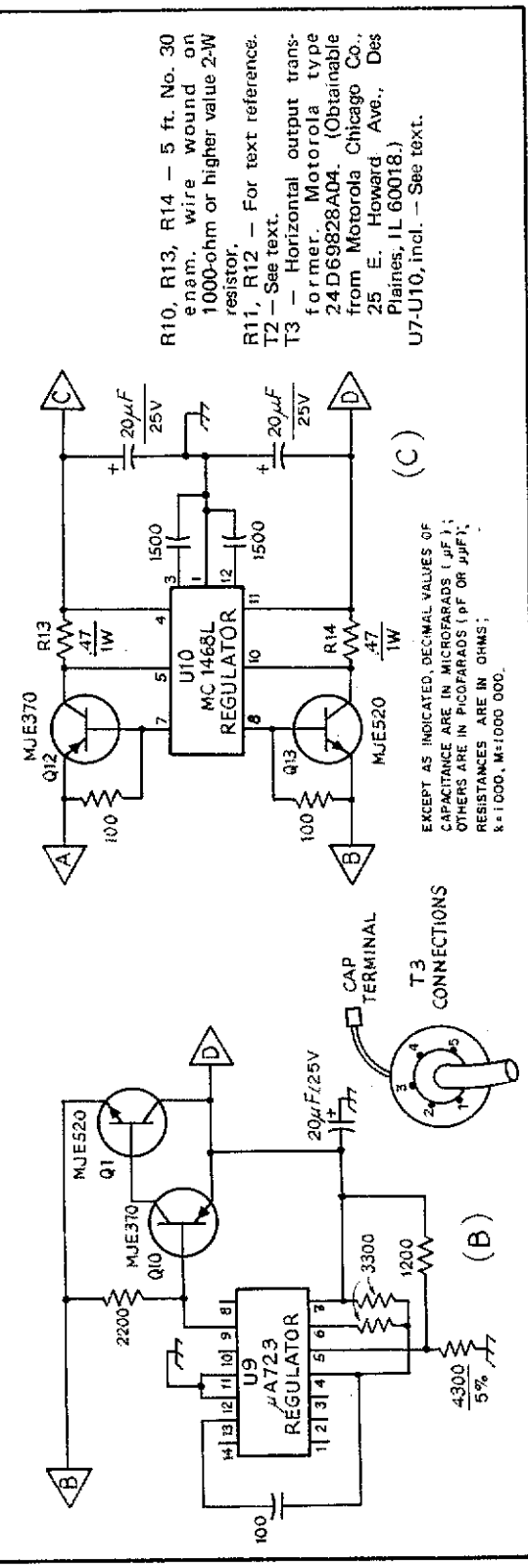


Fig. 2 — Power supply for Mark II SSTV Monitor. Shown at A is the complete supply using Signetics NE550A voltage-regulator ICs. At B and C are suitable alternative regulator circuits using other IC types, as discussed in the text.
C11, C12 — For text reference.
CR1-CR4, incl. — 1N4002 or equiv.
CR5 — High-voltage silicon rectifier, Varo H410 or equiv. (Varo Semiconductor, Inc., P.O. Box 676, Garland, TX 75040.)
DS1 — 12-V pilot lamp.
L7, L8 — Rf choke, 100 μH (J. W. Miller 4632 or equiv., Newark Electronics No. 59F289).
Q8, Q11, Q13 — Motorola transistor. HEP 245 or 2N4910 also suitable.
Q9 — Motorola transistor. Motorola 48S134995 also suitable.
Q10, Q12 — Motorola transistor. HEP700 or 2N4898 also suitable.



A µA723 regulator may be used in place of each NE550 regulator which is shown at A of Fig. 2. From checks made with a breadboard version using these regulators, performance appears to be identical provided that the proper component changes are made. For the positive regulator with a µA723, the values of R11 and R12 shown in Fig. 2A should be changed to 3300 and 3000 ohms, respectively. For the negative regulator, the connections are as shown in Fig. 2B. Points B and D in this section of the diagram correspond with those shown in Fig. 2A.

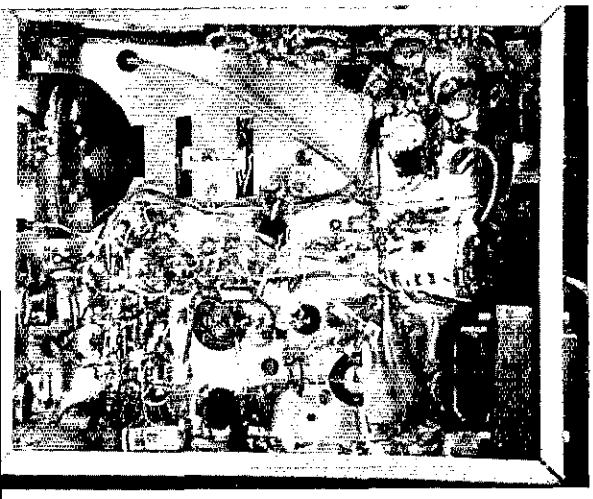
A real "nifty" new dual 15-volt regulator has just been announced recently by Motorola, the MC1486L. I have also built a breadboard circuit using this regulator, shown in Fig. 2C. A single MC1486L may be used in place of both NE550 IC's, with the alternative circuit connected at points A, B, C, and D, as indicated. C11 and C12 should be located as close to the MC1486L as possible. A 0.1-µF ceramic capacitor may be required at each point, A and B, if the regulator is located an appreciable distance from the filter capacitors.

T2 is a rewound power transformer incorporating two low-voltage secondaries. One is a 35-V ct winding; the other is a 6.3-volt winding for the CRT filament. The transformer uses the original primary of a small power transformer which had about a 60-VA capability. The turns per volt required for each of the secondary windings was determined by counting the turns used on the 6.3- and the 5-volt filament windings as they were removed. The wire size used for the 35-volt winding was No. 18, while No. 22 was used for the 6.3-volt winding.[3]

For the less adventuresome builder who is not interested in the rewinding chore and not concerned in space saving, a Triad type F54X and a Triad type F13X may be used to supply the correct voltages. Whether the single or the pair of transformers is used, *it is imperative* to place the transformers as far as practicable from the CRT neck. It is also necessary to determine a transformer position where the stray-field influence upon the CRT is minimum. This condition was obtained in the original monitor by using a separate power supply. This type of construction is worth considering if small size is not an objective. The single rewound power transformer, mounted in the position shown in the bottom view of the chassis, produced negligible stray-field influence on the CRT.

The horizontal flyback transformer, T-3, is used to supply 7 kV, +350 V, and +100 V. The transformer is connected as a self-oscillating circuit which operates at a frequency of approximately 20 kHz. Because the 5FP7 CRT requires very low current for the No. 2 grid supply, a high-resistance divider is used across the output of the high-voltage system to provide this potential. This has an

[3] [EDITOR'S NOTE: For further detailed information on the procedures to be followed in rewinding transformer secondaries, see Chapter 5, Power Supplies, *The Radio Amateur's Handbook*, 49th or 50th editions (1972 or 1973), or McCoy, "How to Wind Your Own Power Transformer," *QST*, February, 1970, p. 26.]



Bottom view of the monitor chassis. Components in the video stages are visible in the upper right portion of the chassis, while the phase and sync circuits are shown at the lower left. The U-shaped opening in the lower portion of the photo exposes the terminals of T3, located inside the high-voltage compartment.

advantage in that the No. 2 grid voltage of the CRT then tracks the second-anode potential, regardless of beam current. The regulation of the high-voltage supply is somewhat better than that of the original monitor. A simple voltage doubler and Zener regulator provide +100 volts to the video amplifier and sweep charging circuits.

Obtaining the Parts

Many builders are likely to desire information on component substitutions. The parts lists accompanying the schematic diagrams provide some such information, and the following paragraphs may also help the would-be builder in finding suitable components at low cost.

L4 and L5 are deflection yoke coils such as those used on old 10-, 12-, and 16-inch TV receivers. The minimum recommended inductance for the horizontal coils is 10 mH. The inductance of the vertical coils should be no less than 30 to 40 mH.

L6 is a focus coil from an old magnetic-focus TV set, having 260 ohms dc resistance. Usable substitutes include the focus coil from 1P41/ARR-27 or 1D30/APS-2 radar indicators. High-resistance focus coils (20,000 ohms) require a supply of 190 volts at 11 mA for proper focusing.

Also suitable are permanent-magnet assemblies, some of which are called Quam Focalizers. An excellent-quality but higher priced unit is the Syntronic F10C 360-ohm focus coil, obtainable from Syntronic Instruments, Inc., 100 Industrial Rd., Addison, IL 60101. If money is no object, a type 5AHP7 electrostatic-focus cathode ray tube may be used for V1, thereby eliminating the need for a focus coil.

T1, the audio transformer in the video detector stage, may be obtained at many electronics outlets for approximately $1.10, or from Calectro, GC Electronics, Div. of Hydrometals, Inc., 400 S. Wyman St., Rockford, IL 61101. (Note that the 1000-ohm winding is connected to the 1N914 diodes.) Also usable for T1 is a Thordarson TR-213, 1500 ohms ct to 600 ohms ct, Newark Electronics No. 5F1527.

If the Triad transformers are used in place of T2, as mentioned earlier, they may be obtained from Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624. Their stock number for the F54X is 5F1378, and for the F13X, 3F958.

The NE565, NE550, 74122, and 741 ICs are all available from Solid State Systems, P.O. Box 773, Columbia, MO 65201, and also from many other suppliers. Other transistor and IC types are available from Newark Electronics.

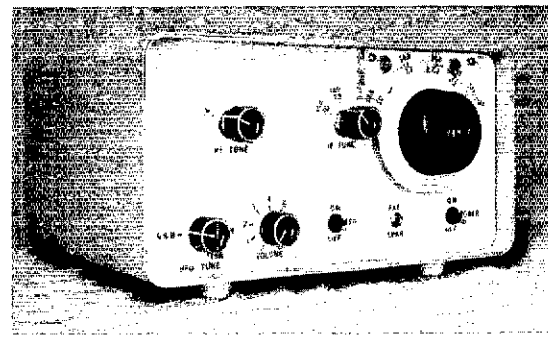
Mechanical Details

The number of integrated circuits used in the monitor may prompt some to consider printed wiring for the monitor. This should offer an interesting exercise for those who enjoy this aspect of construction. The author's view is that a main chassis is required, in any case, for mechanical support of the yoke, CRT, power supply components, and so on. Therefore, with a little additional hand wiring the unit is complete and readily modified if, indeed, one cares to experiment after the monitor is initially "completed."

The unit is constructed on a 10 × 12 × 3-inch aluminum chassis. A wooden support with a cutout corresponding to the CRT maximum bulb diameter is used to cradle the bottom of the 5FP7. A flat aluminum panel about 10 × 7-1/2 × 1/8-inch is used with an appropriate CRT cutout. A light-shield cover (not shown), extending several inches beyond the front panel, may be formed easily from stock aluminum material and used to reduce the glare from overhead lighting. A coat of dull black paint on the front panel and on the inside of the light shield helps to reduce reflections.

(Continued on page 62)

An SSB Receiver for 7 and 14 MHz



The W6MLV receiver.

BY JOHN L. EARLE,* W6MLV

ALTHOUGH VERY NICE commercially manufactured equipment is available, even in kit form, the author has always enjoyed operating with homemade gear. So, after a long period of inactivity, it was decided to build the receiver that is described in this article. The 7- and 14-MHz bands are covered by means of one set of tuned circuits, which eliminates the need for mechanical band switching of the rf and mixer stages. Using triple conversion, with a final i-f of 100 kHz, a passband of 3 kHz is obtained. This is adequate for ssb reception, but if greater selectivity is desired, the 100-pF coupling capacitors (Cc, Fig. 2) could be reduced in value.

Circuit Details

Surplus i-f transformers were modified for use in the input and output circuits of the rf amplifier. They can be made to track from 7 to 14.4 MHz by adjusting the slugs at the low end, and the trimmers at the high end of the frequency range. Diodes CR1 and CR2 protect the MOSFET rf amplifier from high-level signals which might damage the transistor. Diodes CR3 and CR4 are used to bias the 40603 MOSFET, Q1. The voltage drop across CR3 (0.7 volt dc) appears at gate 1 of Q1, and the source is 0.7 volt above that because of CR4, giving a total source-to-ground voltage of −1.4. Gate 2 of Q1 is used to control the gain of the stage, and with the GAIN/VOLUME control all the way off (zero potential at gate 2), the source-to-gate voltage is −1.4, cutting off Q2. As the GAIN/VOLUME control is advanced, a positive voltage is applied to gate 2, increasing the gain. The upper limit is 2.4 volts (1 volt positive, source-to-gate) at which point oscillations occur. Since a similar biasing scheme is employed at the other stages, they all can be operated from a single control line.

The first mixer uses a 40604 MOSFET, which is designed for mixer service. The output gives both the 3.3-MHz i-f which is used for the 14-MHz band, and the 3.7-MHz i-f for the 7-MHz band. Band switching is simply accomplished by peaking the rf and first i-f tuned circuits to the desired frequency. The second i-f (455 kHz) is obtained by heterodyning the 3.3- to 3.7-MHz first i-f, with the 3N128 VFO.[1]

The 555-kHz oscillator (Q10) uses a 40604 transistor, although a 3N128 could be used as well. The oscillator coil (T7) is a modified 455-kHz i-f transformer, a Miller type 1726, which is designed to work with a crystal filter. The reason it was chosen was because it had the secondary tap needed for this type of oscillator. The internal capacitors which come with this transformer must be removed in order to permit operation at 555 kHz.

The third i-f stage at 100 kHz uses six Miller 1709 transformers, which determine the receiver's selectivity. As pointed out previously, they are presently overcoupled for ssb reception, but the selectivity could be sharpened by reducing the coupling capacitors.

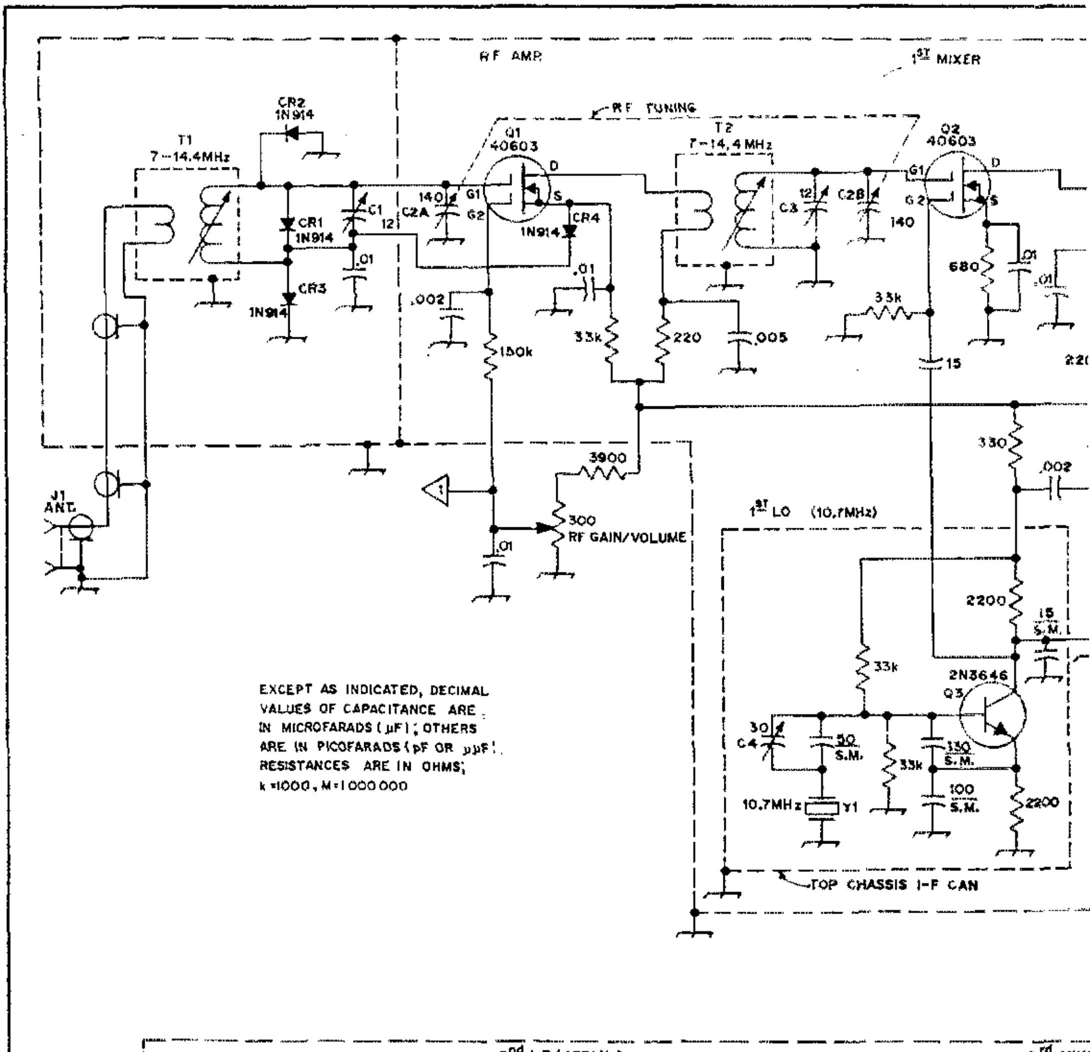
Following the 100-kHz i-f is the product detector, and voltage-variable-capacitance diode-tuned BFO. Since the BFO circuitry was inaccessible from the front of the chassis, a remote tuning scheme was employed which allowed control without having rf leads running through the chassis.

The dc-coupled audio-amplifier input stage is an emitter follower with a dc gain of ten ending in the emitter-follower, output stage. Biasing is established by the voltage on the base of Q14. The arrangement used with Q14 and Q15 balances out the base-emitter voltage drops, which improves bias stability. With a 12-V supply, it is desirable to have the junction of the two output resistors (Ro) at 6 volts for optimum swing. This means that the dc input bias must be 0.6 volt, since the overall dc gain is 10. Idling current in the output transistors is determined by the voltage drops across Q16, Q17, and Q18, and the output resistors, Ro. Since the voltage drop across these forward-biased transistors

(Continued on page 37)

* 4024 S. Hempstead Circle, San Diego, CA 92116.

[1] Hanchett, "The Field-Effect Transistor as a Stable V.F.O. Element," *QST* for December 1966, page 11. Also, *The Radio Amateur's Handbook*, 45th — 47th editions.


RF AMP
1ST MIXER
RF TUNING
CR2
1N914
T1
7-14.4MHz
CR1
1N914
CR3
1N914
C1
12
Q1
40603
C2A
140
G1
G2
D
S
CR4
1N914
T2
7-14.4 MHz
C3
C2B
140
Q2
40603
680
33k
220
.005
15
.002
150k
.01
3900
300
RF GAIN/VOLUME
J1
ANT.
330
1ST LO (10.7MHz)
2200
15
S.M.
33k
2N3646
Q3
C4
30
50
S.M.
130
S.M.
100
S.M.
10.7MHz
Y1
TOP CHASSIS I-F CAN
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k=1000, M=1 000 000
2ND I-F (455kHz)
T5
455kHz
Q7
40603
.05
1N914
150k
27k
220
T6
455kHz
3RD MIXER
Q8
40604
100k
680
15
S.M.
DO NOT SHORT BRAID TO CHASSIS
3RD LO (555kHz)
T7
555kHz
NOT USED
Q10
40604
68
S.M.
680
300
S.M.

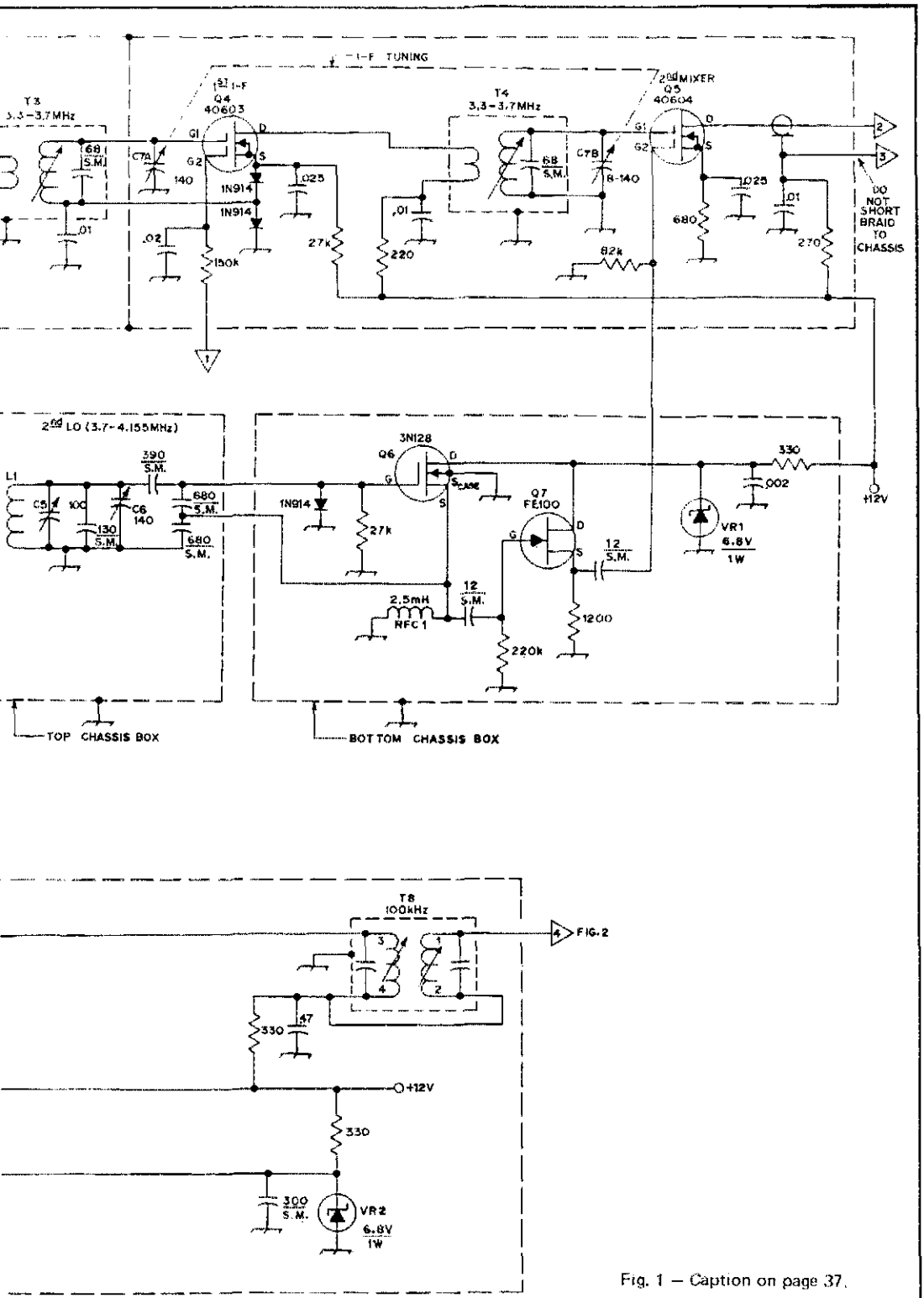
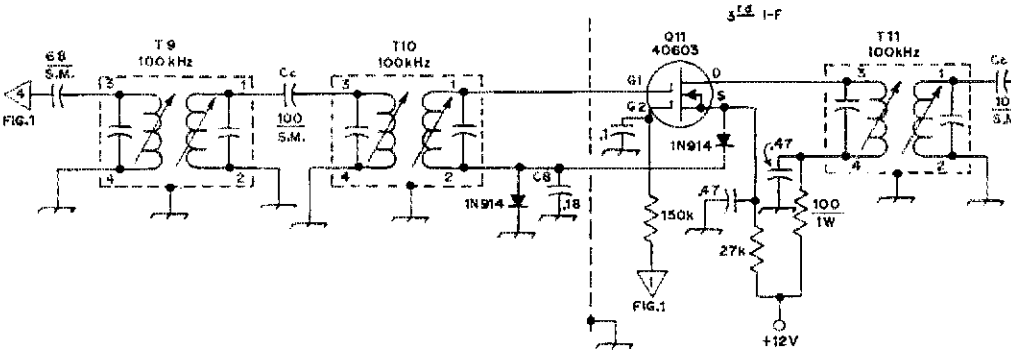
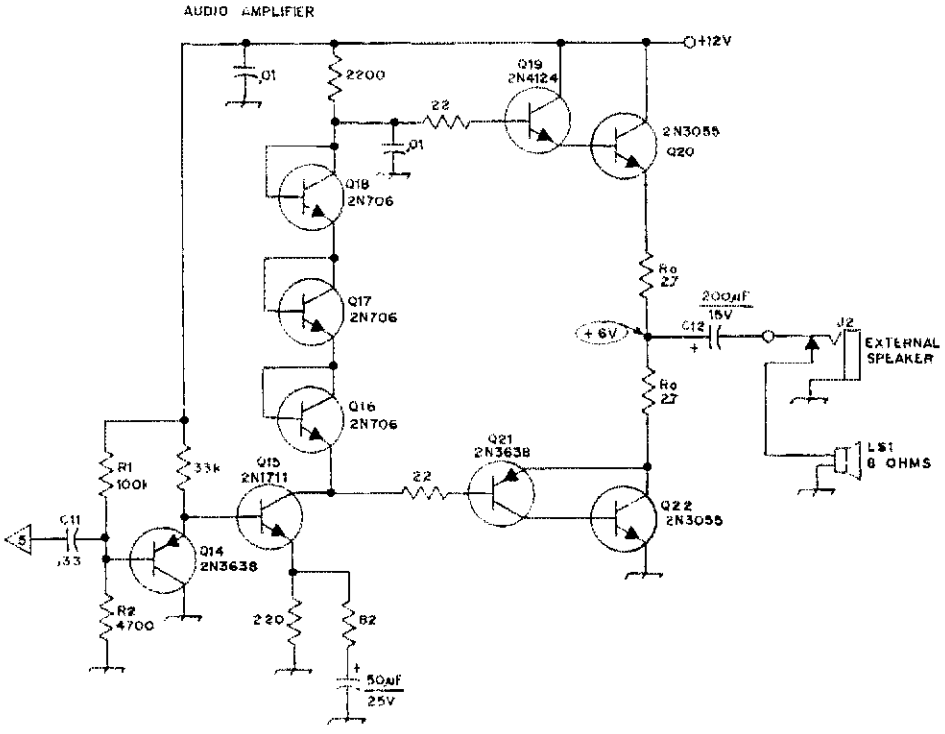
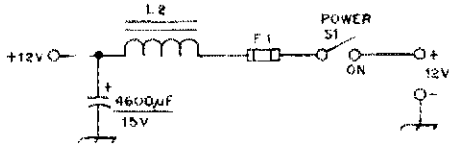


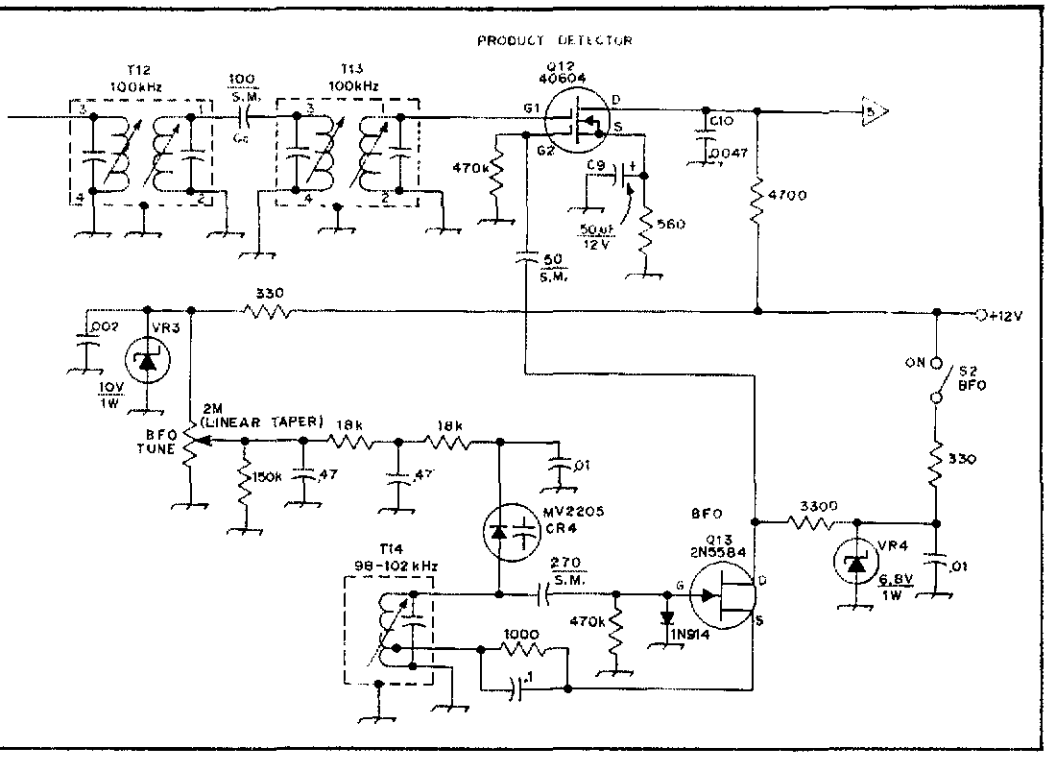
Fig. 1 — Caption on page 37.







EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF). RESISTANCES ARE IN OHMS; k=1000, M=1000000



Figs. 1 and 2 — Schematic diagram of the W6MLV receiver. All capacitors are disk ceramic with a 25-V rating, unless otherwise noted. All resistors are either 1/4 or 1/2-watt carbon composition type, with a 5- or 10-percent tolerance, unless otherwise noted.

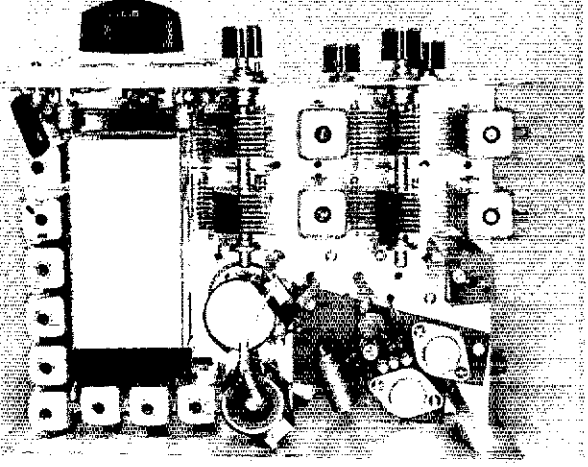
C1, C3 — 3-12 pF ceramic trimmer (Centralab 822 FZ).
C2, C7 — 7.8-140 pF, dual-variable capacitor (Hammarlund MCD-140-M or Millen 26140-RM).
C4 — 3-30 pF mica trimmer.
C5 — 4.5-100 pF air trimmer (E. F. Johnson 148-6-1).
C6 — 8-140 pF (Hammarlund MC-140).
C8 — 0.2-µF, 16-V disk ceramic.
C9 — 50µF, 12-V electrolytic.
C10 — .0047-µF, 100-V Mylar or disc, 20 or 40 percent tolerance.
C11 — 0.33-µF, 110-V Mylar or metallized type. Do not use electrolytics.
C12 — 200-µF, 15-V electrolytic.
C13 — 4600-µF, 15-V electrolytic.
CR1 — Voltage-variable-capacitance diode (Motorola MV2205 or equiv.).
F1 — 3-A fuse in chassis-mounting clip.
J1 — BNC chassis-mounting type with single nut.
J2 — Miniature phone jack, circuit-switching type.
L1 — 22 turns, No. 22, silver plated. Air-core type, 3/4-inch diameter, 1-3/8 inches long.
L2 — 2.5-mH rf choke.
L2 — 11-mH filter choke having less than 1-ohm dc resistance, with 250-mA current rating (Stancor type TC-2 or equivalent).
RFC1 — 2.5-mH rf choke (J.W. Miller 4530).
T1, T6 — 455-kHz universal i-f transformer (Radio Shack No. 273-1382 or J. W. Miller 12-C2 or 12-C1).
T7 — J. W. Miller No. 1726. Remove (or disconnect) capacitors inside can.
T8-T13, incl. — J. W. Miller 100-kHz i-f transformer, No. 1709.
VR1, VR2, VR4 — 6.8-V Zener diode, 1/4 to 1-watt rating (International Rectifier, Z 1106-C).
VR3 — 10-V Zener diode, 1/4 to 1-watt rating (Motorola HEP-101).
Y1 — 10.7-MHz crystal, parallel resonant type. (Available from Crystek or JAN Crystal Co.).

(Continued from page 33)

is independent of the current through them, and since it follows the variations with temperature of the emitter voltage drops of Q19, Q20, and Q21, very stable idling current results.

Mechanical Layout

The receiver is housed in an attractive cabinet made by LMB, which comes with a chassis attached to the front and rear panels. The dimensions of the one chosen are 5 × 10 × 8 inches (HWD). The biggest metalwork chore was making the elongated holes in the chassis for the clips on the i-f cans. Pattern files such as those made by the Nicholson Co. are a great help here. Careful planning of all component mountings can reduce any extra drilling required after circuitry has been added to a minimum. Use the layout shown in Fig. 3 as a guide for parts placement.



Top view of receiver (without speaker).

The 3N128 VFO is housed in two compartments. In the top compartment, which is a 2 × 2-1/8 × 5-inch aluminum box (such as the LMB T-F778), are housed the main-tuning capacitor C6, trimmer C5, coil L1, and the rest of the components within the shield compartment as shown in Fig. 1. The general layout of the parts can be seen in Fig. 3. Below the chassis, in another aluminum box [LMB J-870, or a 1-5/8 × 2-1/8 × 2-3/4-inch (HWD) equivalent] are placed the rest of the VFO components as shown within the shield enclosure in Fig. 1. The main-tuning dial used in the original receiver was a National Radio Co. Velvet Vernier design, but since it is no longer available, the builder will have to find a suitable substitution. Actually, the Velvet Vernier had to be modified to fit the cabinet, so any dial that suits the builder's preference will serve best.

Next, the lower shield compartments must be laid out and fabricated. Small metal boxes could be used, but in the original receiver, brass strips were shaped into a U, with the side wall of the chassis forming the fourth wall. Mounting tabs were left on the brass shields, and holes were drilled into the tabs to permit fastening the shields to the chassis with sheet-metal screws. Additional tabs were left on the other side of the shields to permit fastening of the bottom covers in a similar manner.

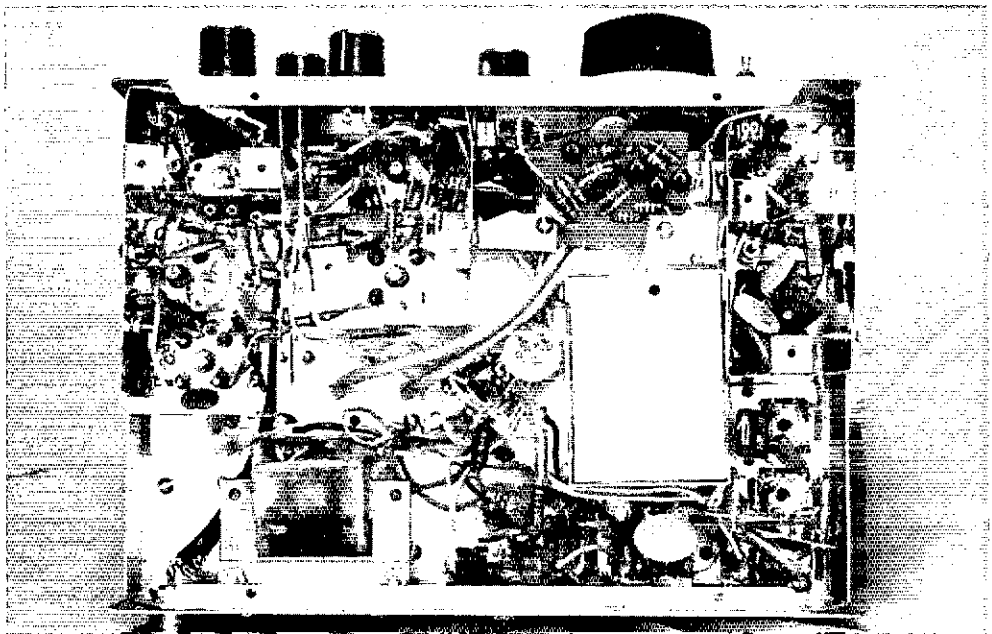
The shield for the 10.7-MHz crystal oscillator is a surplus i-f can, 15/16 inch square by 2-1/2 inches high. The components are assembled in such a way as to permit them to be placed inside the can.

In general, the rf and i-f amplifier stages have their respective output transformers mounted on the chassis above the shield enclosures, with the transistors placed near the shield wall adjacent to the input side. The signal-gate leads are then run through small holes in the separating shields.

Point-to-point wiring was used for the most part, with the rf and i-f transformer terminals providing the tie points. Either printed circuit or Vectorbord type of construction could be used for the audio amplifier. Since the idling current is low, heat sinks are unnecessary with the output transistors chosen. This should be true for other types, provided they are as large physically as the TO-3 type.

Because of the cabinet style chosen, a small problem exists if an internal speaker is to be used, and if it is desired to mount it on the cabinet. Since both front and back panels are attached to the chassis, the speaker must rest on the supports shown in Fig. 3. When the chassis is in place within the cabinet, long screws are threaded into nuts previously soldered on the speaker mounting holes, and the speaker is drawn up to the top of the cabinet where it can be fastened with shorter screws.

Bottom view with shield covers removed.



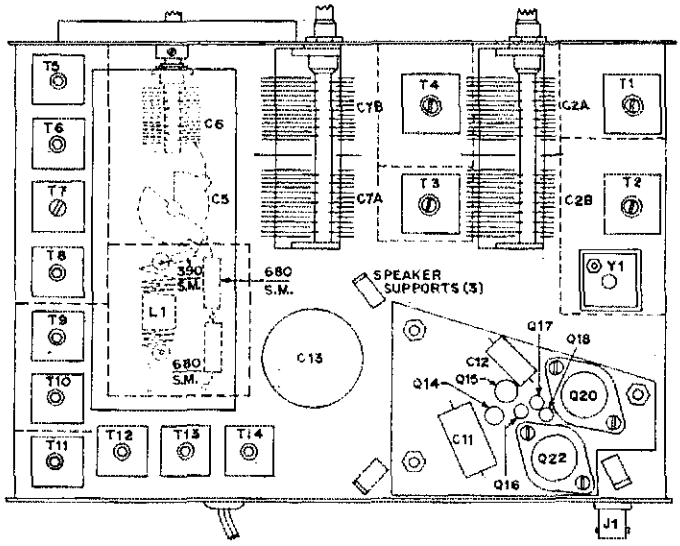


Fig. 3 — Major components layout, top view. Dotted lines show approximate shield locations (beneath chassis) *except for* VFO components in box above chassis.

The transformers used in the rf and first i-f stages were modified surplus 5.25-MHz i-f transformers. They contained 1/4-inch diameter, slug-tuned coil forms, with additional components which had to be removed. The coil type used in T1 and T2 was rewound with a single-layer, close-wound secondary of No. 30 wire. The coil was started 1/2 inch below the center of the form, and consisted of 54 turns. A thin layer of tape or paper separation was wrapped around the form, and then a primary of 12 turns of No. 30 wire was wound on the center, also close wound. T3 and T4 were identical to T1 and T2 except that the secondary consisted of 88 turns of No. 30 wire, shunted by a 68-pF capacitor. The cans were marked Collins Radio, 278-0086-00. An alternative form would be a Miller type 4307 or 4504 coil. Add a 3-turn primary, and mount in a shield can such as a Miller type S-34.

The rest of the construction is straightforward, but note that drain current flows through the braid on the output of Q5, and care should be taken in order to prevent shorts to ground.

Alignment Procedure

Either a signal generator, or a 100-kHz crystal calibrator with 10-kHz markers can be used to align the receiver. First, check the voltage at the junction of the two output resistors (Ro) which should be close to 6 volts. Some small adjustments in R1 and R2 may be necessary because of differences in Q14 and Q15.

Next, apply a 100-kHz signal to gate 1 of Q12, the product detector. Set the BFO tuning knob to about midposition. Adjust the slug in T14 until a low-pitched beat note is heard. Then tune the BFO control from one end to the other of its range, and observe if the note goes up in pitch on each side. The note should be about the same on either end of the range; if not, then readjust the slug.

Set the BFO control for a low pitch, and attach the signal generator to the primary of T13. Align the top and bottom slugs for maximum signal, as determined by the note in the loudspeaker. Continue until the rest of the 100-kHz transformers are aligned, lowering the output of the signal generator each time in order not to overload the amplifiers.

The 555-kHz oscillator coil should be aligned next. Since most broadcast receivers cover this range, couple some output from the oscillator and the signal generator (set at 555 kHz) to one, and tune the oscillator until a zero-beat note is heard in the receiver (also set near 555 kHz). The ssb receiver should now respond to 455-kHz signals, and T5 and T6 should be aligned with a 455-kHz signal (the i-f output of a bc set with a 455-kHz i-f could also be used).

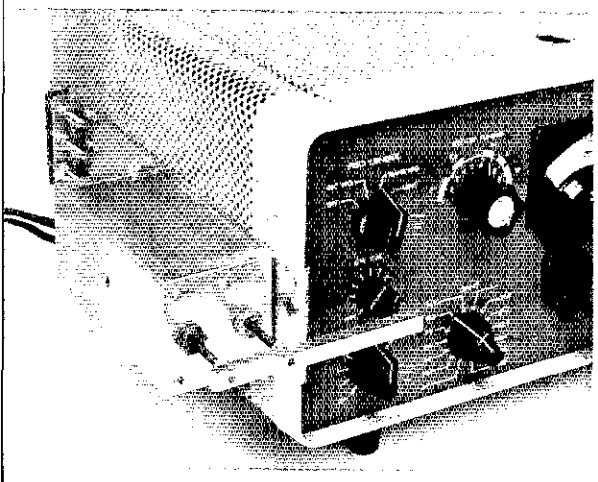
The VFO is aligned next, and if a receiver that covers the 75-meter phone band is available, find the VFO signal and align C5 so that midscale on the dial is approximately 3.955 MHz. It should now be possible to tune in 80-meter signals by coupling in an antenna to the drain of Q4. Either connect the antenna or the signal generator to the drain of Q2 and align T3 and T4. Many 80-meter signals should now be heard, and they should peak up when the first i-f peaking control is varied.

Next, adjust the trimmer until the 10.7-MHz crystal oscillator is on 10.7 MHz (it could be set up in the same fashion as the 555-kHz oscillator, only an hf receiver must be used).

If all the steps so far have been successful, then connecting an antenna to the drain of Q1 should bring in signals on either 40 or 20 meters, depending on the setting of C2 and T2. Adjust C3 and the slug in T2 until 40- and 20-meter signals are approximately equidistant from the ends of the C2 tuning range. Move the antenna lead to the input at J1 and align T1. Note that the high end (twenty meters) is to be trimmed by capacitors C1 and C3, and that the low end of the range (40 meters) is set by the slugs in T1 and T2. It will be

(Continued on page 62)

A Contest Spotting Switch for the 32S-3



External actuator allows convenient spotting of the 32S-3 without internal modification.

BY JIM WHITE,* WA1NNC

FOR THE cw contest operator, spotting with the Collins 32S-3 can be difficult. It is a two-handed job, one hand on the VFO knob, the other on the spotting button. Some operators have big enough hands so that they can actuate the spotting button and turn the VFO knob at the same time, using one hand. Most don't. Now the question was, "How to remedy this situation?" An obvious answer was to obtain a duplicate of the spotting switch and place it in a more convenient position.

* RFD 1, Burlington, CT 06085.

After opening the cabinet of the 32S-3, this little spotting switch was found to be a multilayer, multicontact type. The switch is by no means of the common junk-box variety. Since the idea of handling the problem electronically was rejected, the prospect of a mechanical solution was considered. The next step was to find a means of closing the existing spotting switch. After taking a relay, and building a mechanical linkage for it, it was found that the relay could not deliver enough force to actuate the switch. Something bigger was needed. While digging through the junk box, an old washing machine solenoid was found. Once it was determined that the solenoid still worked, and more importantly, definitely had enough power to actuate the switch, work on developing a mechanical linkage was started.

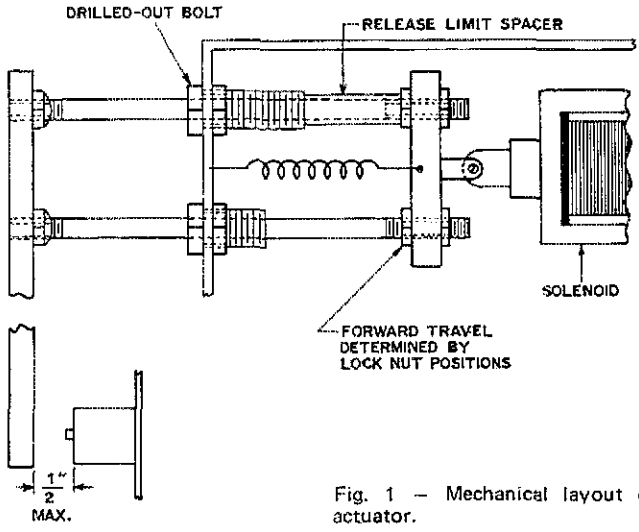


Fig. 1 — Mechanical layout of spotting-switch actuator.

Construction Details

The major problem that presented itself was how to mount the unit without causing damage to the cabinet of the 32S-3. A 2-inch aluminum bracket was made and hooked at one end to the front lip of the transmitter, and through the mobile mount in the rear. The bracket is made taut by bolts which can be tightened. This system means that no holes need be drilled in the cabinet. To this bracket a 2 × 2 × 6-inch aluminum box (which houses the solenoid and its mechanism) was riveted. The solenoid was then mounted to one end of the aluminum box by means of two aluminum straps.

The actuating mechanism consists of a 1/4 × 3/16 × 1/4-inch aluminum bar which reaches from the outboard solenoid box to the spotting button. Two 1/8-inch rods are tapped into the bar and backed up with stop nuts. These rods run from the actuating bar into the solenoid box. The reason that two 1/8-inch rods were used was to assure the positioning of the aluminum bar over the spotting button. A spring is utilized to return the bar to the neutral position after the solenoid has been released. Bearings for the two linkage rods are made from two 3/8-inch bolts. A hole is bored through the center of each bolt, slightly larger than 1/8 inch, to provide a sliding fit for each rod. In order to limit the outward travel of the arm when the solenoid is released, a sleeve is fabricated and slipped over one of the rods. The inner diameter of the sleeve should be slightly larger than 1/8 inch, to provide either a sliding or snug fit with the rod. Inward travel of the rod is limited by the position of the bar itself. Adjustment of this inward travel is accomplished by adjusting the depth of the rods into the bar. Once the adjustment is made, the stop nuts are tightened.

The travel of the spotting bar should be setup as shown in Fig. 1. This is important since if the arm is allowed too much travel, the force of impact is increased and the chances of damage to the 32S-3 spotting switch are greater.

Using the Switch

A momentary switch located at the key for easy access, is used to actuate the solenoid (Fig. 2). Now spotting is much simpler, since one hand can be at the key while the other is turning the VFO knob. As soon as you have spotted, you can start sending, not having to take your hand off the transmitter and reach back over to the key. During about two months of operation, no problems have been encountered with the spotting unit.

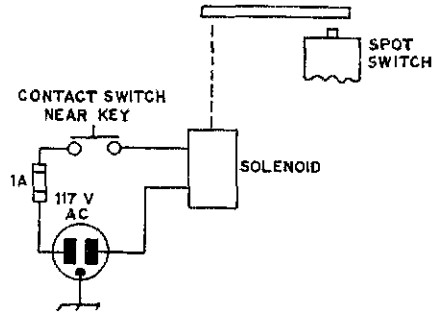
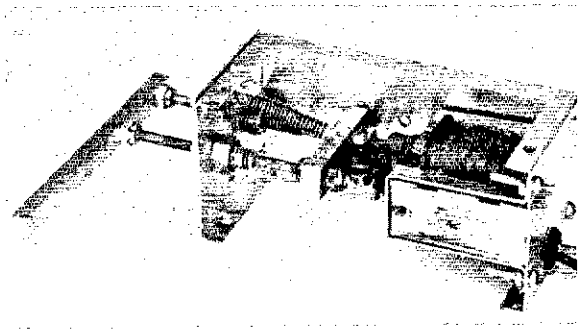


Fig. 2 — Schematic diagram of solenoid and momentary switch.



Close-up view showing solenoid, actuating mechanism, and return spring. The limit sleeve is on rod behind return spring.

The solenoid which was used in the system was found to have much more pull than was necessary. If a smaller one could be obtained, it would be advisable to use it. The aluminum box was purchased at Radio Shack. The rest of the parts were of junk-box origin and a homemade spring was used to return the solenoid to the neutral position. QST

W2FMI Vertical

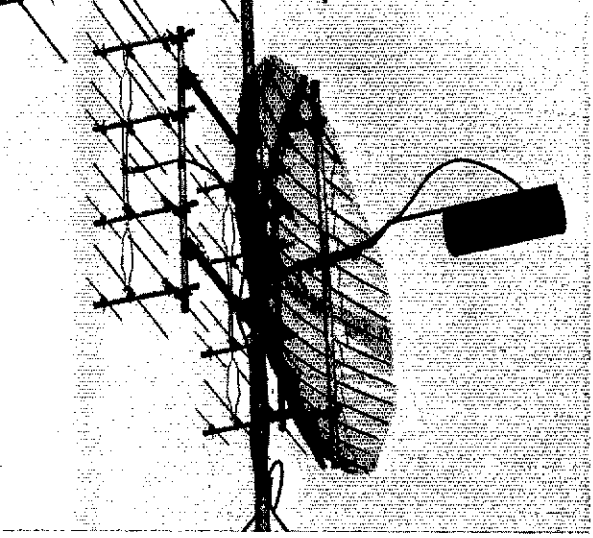
(Continued from page 18)

function of height above ground, the characteristics of a multiband vertical over a low-loss image plane, and a shortened vertical beam using elements of the order of an eighth wavelength. These, I hope, will be reported in subsequent articles.

Another point should be mentioned in relation to the results reported here. Even though they were obtained on short ground-mounted verticals, they are valid for center-fed verticals or horizontal antennas as well. The only differences are that the impedance values should be doubled and the effect of the image antenna accounted for.

I would like to acknowledge the support of many amateurs for their fine words of encouragement and excellent reporting during on-the-air contacts. In this study, some 350 amateurs reported on comparisons between signals from these short verticals and those of other stations.

QST



Converted uhf TV dish, with wave-guide-transition feed, used at WA2LTM on 1296 MHz.

Simple and Efficient Feed for Parabolic Antennas

Low-Cost Waveguide Transition Feeds for 1215 and 2300 MHz

BY DOLPH VILARDI,* WA2VTR

MANUALS ORDINARILY AVAILABLE to amateurs do not discuss simple antennas for frequencies above 1000 MHz in full detail. The writer described conversion of readily available parabolic TV antennas about three years ago in *QST*.[1] Since that time much information has been accumulated regarding the performance of these converted antennas. Many 1296-MHz stations have used them with good results. Example: WA2LTM, the current 1296-MHz states-worked leader, is using such an antenna, with the feed system about to be described. What appeared at first to be rather fragile construction has been shown, over several years, to be adequate for amateur use. Performance has been outstanding, and the only difficulties encountered have been with the feed systems originally described.

Experience shows that coaxial transmission line is practically a necessity for reliable performance. The uhf characteristics of available coaxial lines are discussed in a *Ham Radio* article by the writer,[2] and will not be reviewed here. A fair idea of the merits of various lines can also be obtained from the information given for 50 through 450 MHz in *The Radio Amateur's VHF Manual*, Chapter 8.

With coaxial line, matching of the feed point to the line at frequencies above 450 MHz becomes a bit more complicated than on lower frequencies, where the flexible-coax balun is practical. For this reason, and in order to achieve better illumination of the parabola, some form of waveguide transition is highly recommended. Instructions for construction of this type of feed given in the 1969 article were somewhat sketchy, as readily available and inexpensive materials were not specified.

The wave-guide-transition feed is precisely what its name implies: nothing more than a transition from coaxial line to wave guide, of suitable cutoff frequency for the band in question. Length of the wave guide section so used, for probe-type transition and proper illumination, has been determined by W2CCY to be at least two wavelengths. Some useful information regarding dish illumination was given by WA9HUV in *QST*.[3] A major advantage of the wave-guide feed, in addition to more effective illumination, is that it is very easy to match perfectly to the transmission line, a factor of extreme importance at these frequencies.

* 14 Oakwood Terrace, Spring Valley, NY 10977

1 Vilardi, "Easily Constructed Antennas for 1296 MHz," June, 1969, *QST*.

2 Vilardi, UHF Transmission Lines, May, 1971, *Ham Radio*.

3 "World Above 50 Mc.," June, 1971, *QST*, p. 101.

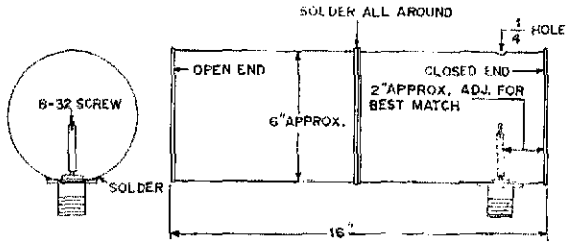


Fig. 1 — Dimensions for the wave-guide-transition feed for 1296-MHz use. The wave guide is made from two antifreeze cans soldered end to end.

Tin-Can Wave Guides

Construction of a wave guide-transition feed is easy, as can be seen from the drawings. Materials are no problem. The guide itself can be made from two anti-freeze cans (Zerex and others) soldered together, end to end. The overall length of the cans when joined should be approximately 16 inches, or about two wavelengths at 1296 MHz. Dimensions for a 2300-MHz feed are also given. Diameter, for the 1215-MHz band, should be about 6 inches, though there is considerable latitude here. It is important only that the wave guide be of sufficient diameter to pass the frequency for which it is being used.

After the cans are soldered together they should be given several coats of paint to make them as weather-resistant as possible. Primer paint for automotive use, plus two coats of epoxy, does a very good job. There are other rust-resisting finishes that work well.

The probe is 1/4-inch brass or copper tubing, approximately 1-7/8 inches long. One end is threaded internally for an 8-32 screw, which will be used as a tuning adjustment. The other end is soldered to the tip of an N-type coaxial fitting, the body of which is soldered to the wall of the can, before painting. Mask the probe and fitting, so that they are kept free of paint during the spraying operations. Silver plating of the probe is desirable, but not absolutely necessary.

Adjustment and Use

Before the can is painted and the N fitting is fastened in place permanently, the position of the probe with respect to the closed end of the can must be adjusted, along with the length of the probe, for optimum impedance match. As shown in Fig. 1, this will be very close to a quarter-wavelength, or about two inches in the 1296-MHz feed. The hole in the can wall can be made oblong, to permit movement of the probe while maintaining contact between the fitting flange and the can wall. The screw in the probe end is reached with a small insulated screwdriver, through a 1/4-inch hole drilled in the can above the probe end. By careful adjustment of the position and length of the probe, it is possible to get a practically perfect match. Openings in the can wall can be covered with plastic tape or epoxy putty when the process is completed, and the fitting has been soldered in place.

The SWR indicator should be one that is adequate for the frequency,[4] and it should be connected through a short length of cable, near to the antenna. The adjustment of the probe should be made with the feed illuminating the parabola, in or near the position in which it will be used. Several types of mountings are usable, and two commonly used mountings are shown in Fig. 2. With either, a wrap-around clamp of sheet metal is used to hold the feed in position, loosely at first and firmly, once the exact position desired has been determined.

[4] Uhf barrels for the Micromatch are on the surplus market occasionally. For other uhf SWR-measuring equipment, usable to 1300 MHz, see Burhans, June, 1960, *QST*, p. 30; Tilton, January, 1969, *QST*, p. 36; or Fisher and Turrin, September, 1970, *QST*, p. 26.

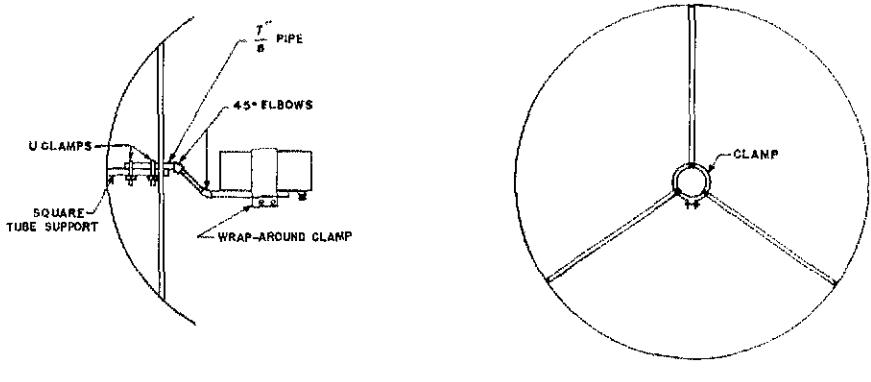
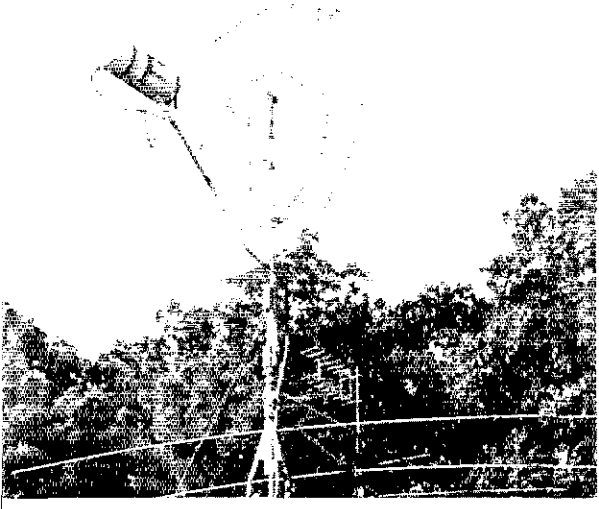


Fig. 2 — Two ways of mounting the wave-guide feed, gooseneck (left) and tripod (right). Open end of the guide assembly is approximately three feet from the cneter of the dish surface, with its position adjustable for focusing.



Homemade 5-foot dish, with wave-guide feed, used by WA2VTR. Mechanical construction was by W2DWJ, to specifications by W2CCY.

The center line of the feed assembly should line up exactly with the center of the parabola. This can be done visually with reasonable accuracy, but the ideal result is obtained by checking the rf level around the periphery of the dish, for uniformity. A loop, diode, and low-range milliammeter used in the manner of a field-strength meter will serve this purpose. Whatever mounting method is used, provision should be made for focusing, to get the feed at the focal point of the dish. The focal point should be somewhere around one inch inside the mouth of the feed. A final check should be made with a field-strength indicator 40 or 50 feet in front of the dish, moving the feed along the dish centerline for maximum indication. Remember that energy at these frequencies is reflected very readily. Do the work in an open area, with no large trees, buildings, cars or other reflecting objects in the field of the antenna.

Use low power (3 to 5 watts) for the tests. Be sure that the antenna is positioned so that people will not be submitted to main-lobe radiation at distances less than 50 feet, when very high power levels are used. *Never look into a wave guide that is carrying rf power.* The eyes and head are particularly sensitive to injury from exposure to uhf radiation.

Mounting

The converted TV dish tends to lean backward slightly, because of its weight distribution. In most other installations the dish tends to lean forward, causing some loss of efficiency. It is recommended that the dish, when finally mounted on the tower, be tilted so that it aims about five degrees above the horizon.

The mount shown at the left of Fig. 2 is adapted to use with the antenna mounting described in the June, 1969, *QST* article. The supporting arm is made of 7/8-inch copper pipe, two 45-degree elbows, and a short connecting piece of such length as to bring the center line of the feed in line with the center of the dish. The clamp around the feed is bolted to the support, with the nuts being tightened firmly once the desired position for the feed is found.

A somewhat similar arrangement is used for the tripod mount, at the right. The ends of the supporting members are bent parallel to the wall of the feed, to clamp under the wrap-around strip, as shown.

2300-MHz Version

Two No. 2-1/2 fruit or vegetable cans soldered together can be used for a 2300-MHz feed. The probe for this frequency is 7/8 inch long, and it should be located about 7/8 inch from the closed end of the can. Most SWR bridges will not work well at 2300 MHz. Be sure that an instrument suited to the frequency is used in adjusting the match, as near-perfect matching is increasingly important as the frequency increases. QST

Strays

Registration for Repeater Directory

We encourage annual registration of all repeaters with ARRL for listing in the *Repeater Directory*. Repeaters and remote base stations should register by May 1, using the special registration card CD85A. Registration cards are available on request from ARRL. To expedite mailing, please enclose an addressed stamped envelope. People who have registered repeaters in the previous edition of the Directory have already received registration cards.

If repeater call has changed since the previous listing, please indicate the former call on the registration card. *This is important so the old call* can be deleted from the new Directory. Please submit the present repeater call. If the call should change before the May 1 deadline because of the new repeater regs., postcard notification of old and new call is all that is necessary. QST

Moonbounce receiving tests with amateurs will be conducted by the Naval Research Laboratory using a 150 foot parabolic dish. See January *QST*, page 58 for background info. Here is the schedule for reception:

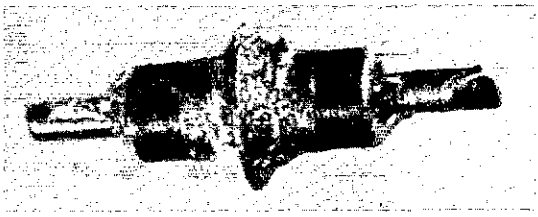
April 1973 — 1296.000 MHz

Date	*Start* GMT	*Stop* GMT	*Area*
March 31	1000	1030	Europe
	1030	1100	E. Coast USA
	1100	1130	Midwest & W. Coast
	1930	2000	Australia

432.000 MHz and 144.050 MHz

April 1	1200	1230	Europe
	1230	1300	East Coast US
	1300	1330	Midwest and W. Coast
	2030	2100	Australia

Technical Correspondence



Close-up view of one of the ceramic feedthrough capacitors used in bypassing the leads of the automatic fuel-injection system.

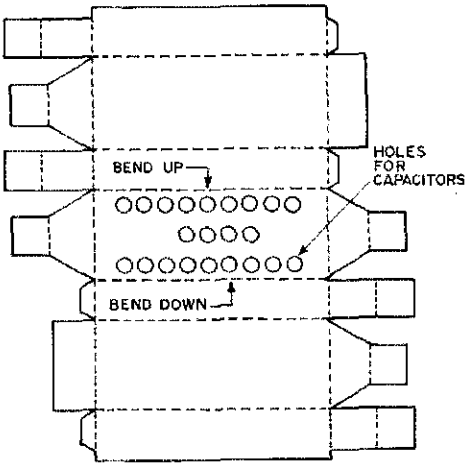


Fig. 1 — Cutting pattern for capacitor box.

SOLUTION FOR FUEL-INJECTION–SYSTEM INTERFERENCE

Technical Editor, *QST*:

It has been reported in *QST* that because of interference to electronic-controlled fuel-injection (ECFI) systems by amateur transmitters, occasionally some hams cannot transmit without killing the engine.[1] I'll introduce a solution for this problem. This method is used at Nissan Motor Company, the manufacturer of Datsun, to eliminate the interference. If you have troubles, I suggest you try this preventive method. I'm sure you will get nice QSOs while cruising along in your ECFI-system vehicles. I think the solution is the effective way not only for ECFI systems, but also for electronic controlled braking systems, transmissions, and so on.

The ECFI system consists of some sensors, a computer, and injectors which are driven by the computer. When rf energy enters the computer, it disrupts the injector drive signals, and then the engine stops. To avoid this, we must put the computer circuit into a shielded metal case, and all the lead wires except a ground one must be brought out through feedthrough ceramic capacitors. Each capacitor is 1000 pF. The signals of the ECFI system can go through the capacitor into the computer, as their frequencies are very low. But the noises from ham transmitters cannot go through the capacitor as their frequencies are very high, and are bypassed to the ground.

The computer has 23 numbered lead wires (numbers are 1 to 24). No. 2 is omitted, and No. 11 is ground. We have to lead the other 22 wires out of the box through feedthrough ceramic capacitors and wire No. 11 is connected to the ground on both sides. It would be best if we could mount the capacitors directly on the computer box, but in practice this is almost impossible. I recommend that you make a capacitor box apart from the computer, and install it in the cable harness. The capacitor box is made of brass or steel sheet, .01 to .02 inch in thickness. Cut the sheet as shown in Fig. 1. Drill 22 holes at the center part of the sheet

[1] Middleton, "AFISI — Automatic Fuel-Injection-System Interference," Technical Correspondence, *QST*, June, 1972, p. 38.

Fig. 2 — Feedthrough capacitors soldered in place before the plate is folded into a box.

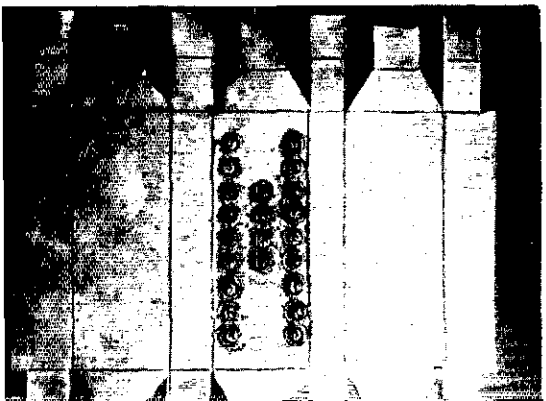


Fig. 3 — Computer leads soldered in place on bypass capacitors. Note the shielding braid over the conductors leading to the connector for the computer.

as shown. The diameter of the holes should match the capacitor outer diameter. Mount the capacitors through the holes with solder (Fig. 2).

From now on the work is done at the vehicle. Cut the cable harness of the computer about 8 inches from the computer side, being sure to identify the wire numbers on both sides of the cut. Cover the computer-side wires with a shielding net, such as an outside conductor of old coaxial cable (RG-8/U, etc.). Connect capacitors between the cut wires so the same numbered wires are connected to each capacitor. The ground wire, No. 11, is connected to the ground of the capacitor box (Fig. 3).

Fold the sheet into a box. The 90-degree bend along one edge of the face where the capacitors are mounted is in a direction opposite that of the corresponding bend along the opposite edge. Thus, the folded box has two compartments, with the capacitors mounted on the center dividing partition. Insert insulator plates to maintain insulation between the capacitor terminals and the outside walls of the box. Affix the seams with solder and connect the box to the shield cover of the wire.

When making connections to the computer, insert a grounded sheet of metal under the plastic lid of the computer. That makes a shielding effect against the noises through the lid. The complete connection of the computer and capacitor box is shown in Fig. 4. When you clamp the wires at the outlet of the computer, take care to assure conductivity between the shielding cover and the computer box, to connect the computer box itself to ground. Then install the computer as it was. That's all the work needed to prevent the interference. I would appreciate receiving reports from those who use this idea. — *Katsumi Akiyama, JA1KKJ, First Engine Experiment Section (k35), Nissan Motor Co., 6-1 Daikokucho, Tsurumi Yokohama, 230 Japan.*

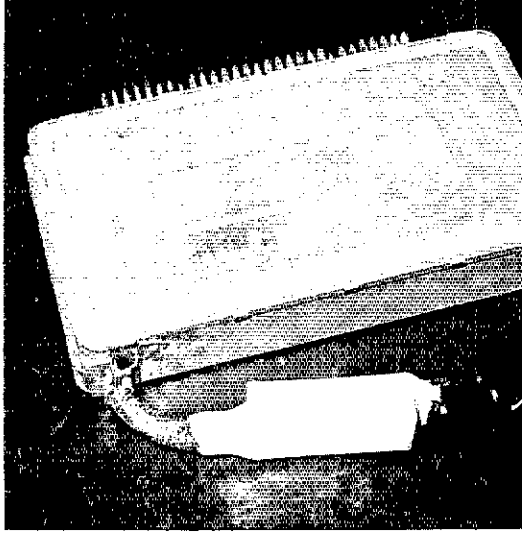


Fig. 4 — The completed installation of shielded and bypassed leads running into the computer.

FILTER TERMINATIONS

Technical Editor, *QST*:

It would appear that the termination for FL1 in the 2-meter fm receiver described in August, 1972, *QST*[2] is not 1000 ohms as indicated. When terminal 4 is directly bypassed to ground, the input impedance of the CA3028 comprises the parallel resistance of the biasing resistors internal to the CA3028 (2800 ohms, terminal 2 to 3, and 5000 ohms, terminal 2 to 7), 1795 ohms, and the dynamic input impedance of the first transistor in the cascode configuration. The input impedance of the transistor (if no positive feedback exists because of the circuit connected to terminal 6 and neglecting collector-to-base capacitance) is

$$Z_{IN} = r_{bb}' + (1 + h_{fe})(r_e + Z_E)$$

where r_{bb}' is the base spreading resistance (typically 50 ohms), h_{fe} is the complex common emitter current gain, r_e is the emitter resistance, equal approximately to $\frac{26}{I_e}$ where I_e is emitter current in mA. Z_E is the total impedance connected between emitter and ground. With terminal 4 of the CA3028 fully bypassed Z_E approaches a very small value, and with typically 4.5 mA flowing in the collector of the transistor, r_e is approximately 5.77 ohms. At 10.7 MHz the h_{fe} has a very small phase angle and we might consider that at 10.7 MHz, h_{fe} is nearly h_{FE} which is the dc beta. Assuming an h_{FE} of 100, the input resistance is about 50 + (100 + 1) (5.77) = 632 ohms. This is paralleled by 1795 ohms, giving 467 ohms.

Now the effective transconductance should be $gm' \alpha \frac{I_e}{26}$, where α is that of the second transistor in the cascode; α is approximately 0.98, so a gm' value of approximately 169.6×10^{-3} mhos would be expected.

An old RCA data sheet on the CA3028, however, indicates R_{IN} at 10.7 MHz is 900 ohms and C_{IN} = 22 pF with gm' = 100×10^{-3} mhos. It appears then that some Z_E existed since Z_E reduces gm'.

$$gm_r' = \frac{gm'}{1 + gm' Z_E}$$

so Z_E of about 4 ohms was involved. A .01-μF bypass capacitor was used in the RCA specifications. With the internal resistor of 500 ohms from pin 4 to pin 3 this gives $Z_E = .004 - j1.48$ ohms. It therefore would be concluded that either an internal resistance of about 4 ohms exists between the emitter and terminal 4, that h_{fe} does not have negligible phase angle, or that there was positive feedback present when RCA measured Z_{IN}.

The important point is that Z_{IN} is about 500 to 1000 ohms, so that at best, termination is 500 ohms in the receiver described. One, of course, wants a wide-band low-impedance source (preferably a short circuit) seen rf-wise by terminal 2. Such condition gives least regeneration because of feedback via Y21, allowing maximum voltage gain. Power gain, of course, approaches zero as the source impedance approaches a short circuit.

If you would like to increase the input resistance of the CA3028 to have better control of the filter termination, this can be done at the expense of gain by connecting an unbypassed resistance in series with the bypass capacitor connected to terminal 4. With 27 ohms in series with terminal 4, the transconductance is reduced to

$$gm' = \frac{169.6 \times 10^{-3}}{1 + 169.6 \times 10^{-3} \times 27} = 0.03039 \text{ mho.}$$

[2] DeMaw, "A Single-Conversion 2-Meter FM Receiver," *QST*, August, 1972, p. 11.

For the same collector-load impedance this means the voltage gain is reduced by 5.58 or 14.9 dB.

However, the large signal-handling capability is improved and input resistance is increased. (You don't care about this in the fm receiver if the filter is not affected by nonlinear input impedance.) With terminal 4 fully bypassed, the transistor current will cut off at $4.5 \times 10^{-3} \times \frac{26}{4.5} = 26$ mV.

With 4 ohms from emitter to ground at rf, the cutoff occurs at

$$4.5 \times 10^{-3} \left(\frac{26}{4.5} + 4\right) = 44 \text{ mV}.$$

With 27 ohms it will be 147.5 mV.

The RCA application note on the CA3028 shows limiting occurring with 40 to 80 mV input so that there appears to be about 4 ohms in the emitter circuit. The input resistance with 27 ohms will be 1078 ohms. – *Dan J. Healey, III, W3PG, Westinghouse Electric Corp., Box 746, Baltimore, MD 21203.*

SSB – FILTERING VS. PHASING METHOD

Technical Editor, *QST*:

If someone hasn't already beaten me to it, I would like to set the record straight. In *QST* for January 1973, "25 Years Ago" tells of the late 1947 ssb activities at W6YX and WØTQK. The impression is given that filter rigs were used at both stations and that the "phasing system" was a later development. The WØTQK rig was filter, as his article shows, but the W6YX transmitter was phasing (possibly high level – I'm not sure on that point). The lack of information in the issue of *QST* was deliberate; the technical staff had been asked to make no mention of the phasing method at that time. It is therefore understandable that the youngster (W1RW) who wrote the copy for "25 Years Ago" jumped to a wrong conclusion.

The phasing system was known mathematically in the 1930s, if not earlier. But no one knew how to build a practical 90-degree *audio* phase-shift network covering several octaves, a requisite part of the system. A paper by R. B. Dome (W2WAM) in *Electronics* in December, 1946, pointed the way (by using *two* networks with constant 90-degree phase difference), and the simple phasing system became possible. (Filters capable of good sideband rejection were very low-frequency *LC* devices, in the 10- to 20-kHz range.) Don Norgaard, W2KUJ, was also working on the phasing system, as will be pointed out in several subsequent issues of *QST* (25 years ago).

The early days of ssb were truly exciting, matched possibly only by the switch from spark to cw and the investigations of the frequencies above 3 MHz. And yet within five years the early sideband pioneers were asking each other, "What will be the next big step?" when most hams were still pondering the switch from a-m to sideband! – *By Goodman, W1DX, 75 Holland Ln., E. Hartford, CT 06118.*

THE HEATH DIGITAL MULTIMETER HANDLE

Technical Editor, *QST*:

In the write-up of the Heathkit IM-102 Digital Multimeter, October, 1972 *QST*,[3] W1KLK stated that the design of the combination tilt and handle for the instrument was in need of modification. An examination of the topside photograph, page 52 of that issue, indicates that the detent spring was installed incorrectly. The photo shows the spring mounted on top of the chassis with only one bolt. The spring should have been installed on the underside of the chassis. When positioned properly, both mounting bolts can be used and positive detent action at normal tilt angles will result.

I have included a top-side photograph showing the detent spring properly installed, Fig. 5. We are reviewing our instruction manual to determine if step by step instructions can be improved to avoid this error by other builders of the IM-102. Many thanks for the otherwise fine product review. – *Joe Shafer, K8DCE, Technical Product Mgr., Heath Company, Benton Harbor, MI 49022.*

DETERMINING SQUARE ROOTS WITH MINI-CALCULATORS

Technical Editor, *QST*:

I recently bought a couple of the little $99 electronic calculators which are now available, for use in my home and business, and also in my electronics hobby. They are absolutely great, except that in many of the problems associated with electronics (such as finding the capacitance needed to resonate with a coil), it is necessary to find square root. The little machines have no square-root key.

An engineer of my acquaintance was kind enough to supply a formula, by means of which square roots can be calculated very quickly and easily on an ordinary electronic desk calculator, without using logarithms. The formula is:

$$\frac{\frac{N}{A} + A}{2} = B$$

Where: N equals the number from which the root is to be extracted
A equals the first estimate of the root
B equals the second estimate of the root (or final answer, as the case may be)

(Continued on page 65)

[3]"The Heath IM-102 Digital Multimeter," Recent Equipment, *QST*, October, 1972, p. 50.

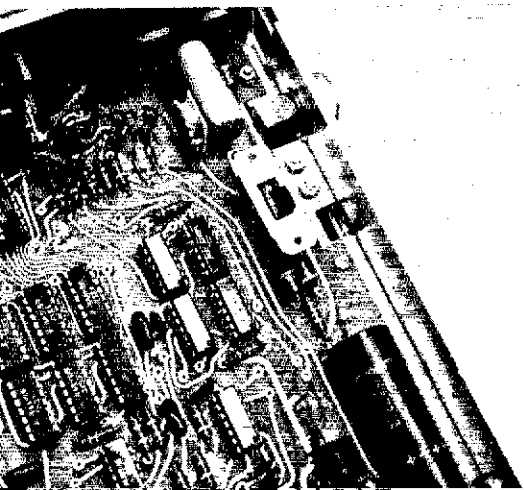


Fig. 5 – Top-side view of the Heath IM-102 Digital Multimeter, showing correct installation of the detent spring for the tilt-handle.

A Universal Voltage-Multiplier Circuit

BY GABRIEL P. RUMBLE,* K4JL

A WELL-KNOWN text describes a full-wave voltage tripler which will not triple (two of its diodes are connected in such a way that they can never conduct). Another book calls a bridge circuit a voltage doubler and confuses half- with full-wave rectification. Much of this confusion arises from the layout of circuit diagrams.

The principle common to all voltage multipliers consists of charging a capacitor through a diode on one ac alternation and adding this charge to the following alternation to give a doubled voltage, and so on, within practical limits, through any desired number of steps or stages. Accordingly, it is possible to draw a master multiplier diagram which is a consolidation of all known multiplier schematics. This could be called a sort of least-common denominator of all published multiplier circuits. In any given multiplier design, one can slice off just enough of this master circuit to give the desired amount of multiplication, either half- or full-wave, and ignore what is left over. The circuit shown in Fig. 1 is symmetrical and straightforward.

Half-wave Multiplication

Only half of this universal diagram is used to design a half-wave multiplier, depending on which end of the dc load is to be grounded. If the negative end of the load is to be grounded, connect the load to the +dc terminal and point C (center); if the positive end of the load is to be at or nearest ground potential, connect the load between −dc and point D. Then select point two, three, or four, depending on whether it is desired to double, triple, or quadruple the available ac source voltage, and put a short circuit across the capacitor connected to that point (substitute a jumper in place of the capacitor).

Example: Place a load between the +dc terminal and point C. Connect the +2 point to the lower ac bus. This will produce a half-wave doubler (Fig. 2A). All of the other diodes and capacitors in Fig. 1 are surplus to this doubler and are therefore disregarded. A half-wave quadrupler would use all of the components either to the right or to the left of center. As an example of a half-wave octupler, discard the left half of the guide, connect the load to −dc and point C. Then jumper out the capacitor at the −8 point (assumed to be off the page to the right).

With half-wave multipliers (sometimes called cascade multipliers) one side of the load always must be connected to point C, the lower ac bus. The capacitor across the load has two functions: it takes part in the multiplier action and it acts like a filter capacitor. This is true also of the capacitors next to the load in a full-wave multiplier.

Full-wave Multiplication

In order to design a full-wave multiplier, connect the load between the + and the −dc terminals, and apply the universal schematic both to the right and left of the load. Example: To derive a full-wave tripler from the circuit shown in Fig. 1, connect the load between terminals + and −dc, and utilize the section between points +1 and −2, Fig. 2B. Note there are two capacitors in series across the load.

As is the case with all full-wave multipliers requiring an *odd* number of diodes, the tripler is unbalanced because the dc load is not connected to equipotential points above C. (Tripling uses diodes in the section between points +1 and −2, so there is more multiplication on one side than on the other.)

For balanced full-wave multipliers, connect the load between the + and −dc terminals, and use an equal number of diodes to the right and left of the load. Example: Discard all components left of the +2 point and right of −2, with the load placed between the + and −dc terminals for a full-wave balanced quadrupler (Fig. 2C). Fig. 2D shows all the components of Fig. 1 connected as a balanced

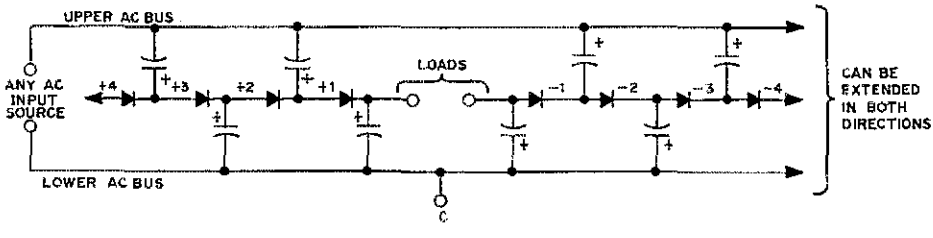


Fig. 1 — Circuit diagram for the universal voltage multiplier. See text for explanation.

* Route 3, Forsyth, GA 31029.

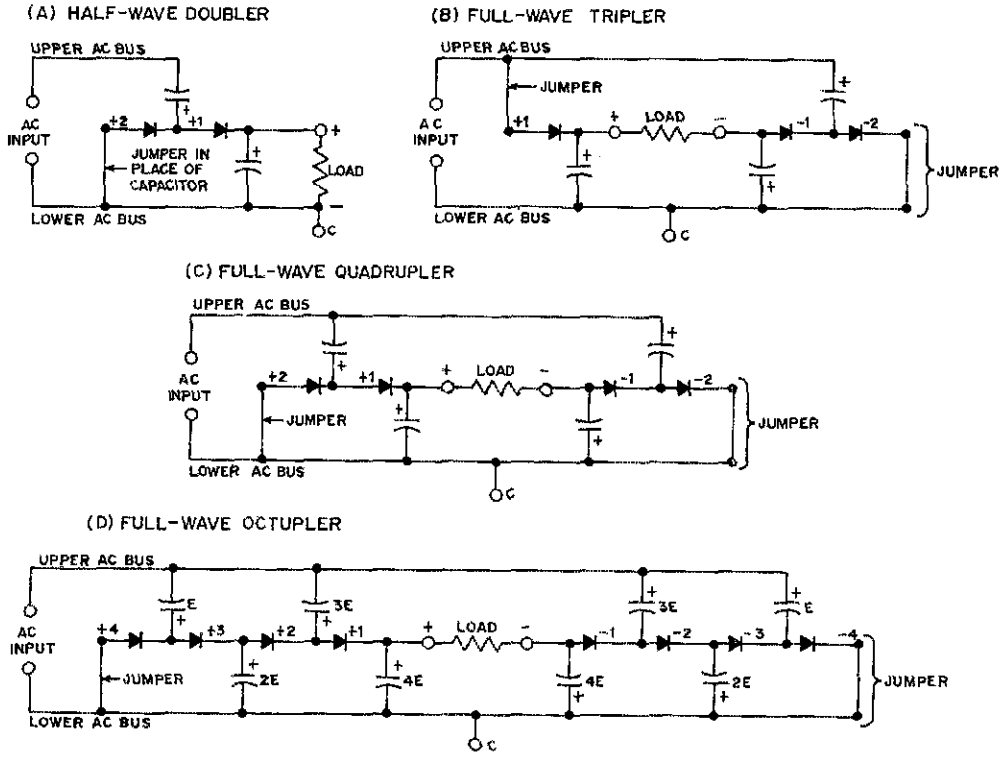


Fig. 2 — Multiplier systems derived from the universal circuit given in Fig. 1 .

full-wave octupler. It can be noted that a full-wave multiplier is two half-wave multipliers fed in parallel, with their outputs in series.

Grounding

Either end of the load may be grounded, provided the grounding is compatible with any existing ground in the ac supply line. If a multiplier is connected to an ac source which already has one side of its line grounded, this grounded side of the source must be connected permanently to the lower ac bus (point C). The two input leads should be swapped if necessary. With half-wave multipliers, one end of the load will be tied to ground. With full-wave multipliers, however, one end of the load will float above ground by a certain voltage, the other end will be below ground (of opposite polarity) by the same amount. The only way around this limitation is to use an isolation transformer in the ac supply line; the transformer will separate the multiplier from any ground on either lead feeding the primary. If a tap or terminal of the transformer secondary is grounded, remove the ground. Then either end of the load on a multiplier fed by this transformer may be grounded as required.

There is no dc component in the ac line supplying a multiplier, whether half- or full-wave, if it employs an *even* number of stages, since one of the ac buses would face nothing except capacitors, which would block any such direct current. On the other hand, there is a dc component in the ac line feeding any multiplier with an *odd* number of stages of multiplication, hence the ac line in such case must provide a dc path and not be blocked at any point by a series capacitor.

Capacitors

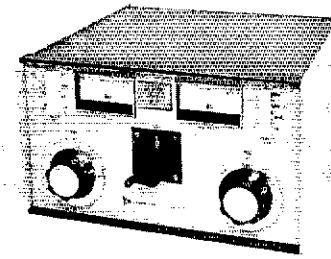
Each capacitor must be polarized as indicated. Voltage multiplication is obtained in steps or stages, each step-up in voltage being accomplished by a diode and a capacitor acting as a pair. At the extreme left and extreme right in Fig. 2D are two pairs, each consisting of a diode and a capacitor in series across the ac line. The capacitor of each pair will charge up to approximately E, the peak value of the applied ac voltage, which suggests its required minimum voltage rating. The second capacitor from each end is in series with its own diode and the first capacitor, which adds its charge to the peak line voltage, thus charging the second capacitor to 2E.The charges on the two capacitors next to the load depend on how many stages there are on either side of the load. Fig. 2D shows there are four pairs on each side; therefore the load is shunted by two 4E capacitors in series, giving 8E across the load. If there were four multiplier pairs on one side and only three on the other, the load would be paralleled by 4E and 3E in series, hence a

(Continued on page 67).

Recent Equipment

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

The ETO Alpha 77 Linear Power Amplifier



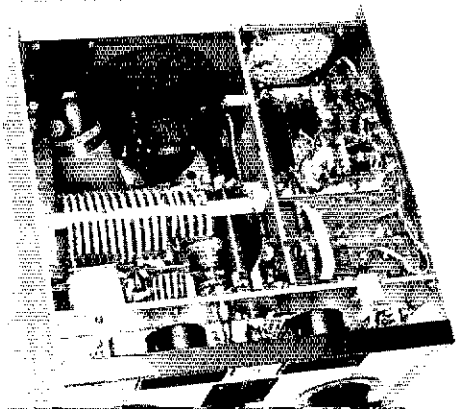
IF ONE IS interested in purchasing a linear amplifier for use in the hf amateur bands (with perhaps some overlap for MARS operation) and peruses the available literature as well as advertisements, the job of making a decision can become perplexing. The purchaser can spend almost any amount of money (relatively) to get the kind of performance he desires. But where does one draw the line? At what point has the amateur spent too much money for his amplifier? And of course, what features are really *needed*? Presented here is what could be considered a top-of-the-line linear amplifier. It not only tops the line in performance and features, (in this reviewer's opinion) it nearly tops the line in price. If the amateur wants to go first class in every sense of the word, the Alpha 77 is one way to do it.

Contrary to what is occasionally heard on the amateur bands, the Alpha 77 is not a "super-power" amplifier. It is *not* capable of running dc-power inputs of five or six kilowatts. It is, however, conservatively rated at a medium power input of 2 kW for ssb service (3 kW maximum) and 1 kW input for cw operation (1.5 kW maximum). When operated at or below these power levels, the Alpha 77 exhibits a very clean signal output on any of the amateur bands 3.5 to 30 MHz. And of course, it will do it all day without getting warm.

Some Basic Features

Perhaps the most important feature of the '77 is the conservative rating of all of the components. For instance, ETO uses a vacuum variable capacitor instead of an air type for tuning the input end of the tank circuit. The plate dissipation capability of the amplifier tube (an Eimac 8877/3CX1500 triode) of 1500 watts assures long life and cool operation even when calling that rare DX station or operating in your favorite contest, hour after hour. The power supply uses components such as a 25-μF oil-filled capacitor, ceramic-frame relays, and a specially wound transformer capable of providing necessary voltages under greatly varying load conditions. The antenna relay is a vacuum type which can be used for conventional VOX switching or TR operation if the station exciter is set up for relay break-in keying. Should relayless keying be desired, an electronic TR switch (also included in the '77) may be used.

The air-flow system uses a large blower which draws air in from the rear of the cabinet. The air is drawn over the power supply and then channeled under the chassis where it is forced up through the socket (and tube) and out an exhaust duct mounted to the rear cabinet panel. The operator can pile log books, scratch paper, pencils, and any other station accessories on top of the amplifier cabinet without restricting the air flow and cooling ability of the system. The only precaution is to allow a foot or two of clearance between the rear of the amplifier and the wall of the "shack." The blower is controlled thermostatically and runs reasonably quietly. If the operator should mistune the amplifier, load into a reactive antenna, or run SSTV/RTTY, the speed of the blower increases when a predetermined temperature is reached at the thermostat. Of course, when the heat diminishes, the blower cuts back to the lower speed again. The main power switch has provisions for allowing the blower to circulate air over the tube after the ac-voltage is shut off, should this be desired. Additionally, if mistuning or some other malfunction causes one of the overload relays to "kick out," the blower remains operative.



Top view of the amplifier. Careful inspection of the photograph will show the blown choke mentioned in the text. The toroidal inductors are part of the pi-*L* output network. The 8877 tube is located under the hood shown at the upper left.

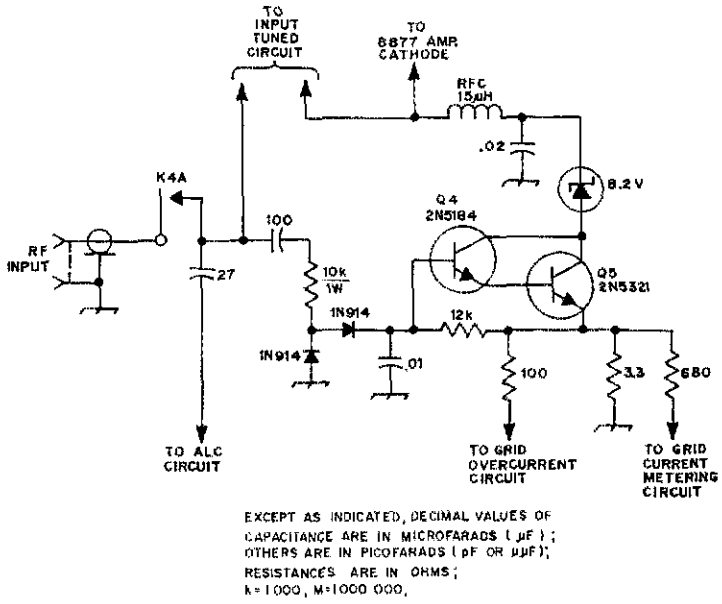


Fig. 1 — Circuit diagram of the Alpha 77 bias switching arrangement. Component designations are those of the manufacturer. A functional description is given in the text.

An obvious feature of the '77 is its compactness. The power supply, amplifier, and all the necessary control components are contained in one very neatly designed package. There is a disadvantage to the all-in-one concept: the amplifier weighs 70 pounds and is somewhat difficult to move around. However, there is a certain satisfaction in knowing that the amplifier is not going to slide around the desk! In fact, the rubber feet installed on our test model made it impossible to slide the '77 at all. Once placed in position, it is necessary to actually lift the box in order to move it.

The Amplifier Circuit

The amplifier is almost conventional. It is the control and overload circuitry that separates this amplifier from some others on the market today. Let's review the rf section first.

An 8877/3CX1500 triode is connected in grounded-grid configuration. Drive is applied to the cathode via a tuned circuit which is factory set to the center of each of the hf amateur bands. ETO has added a feature whereby drive power may be applied directly to the tube cathode (bypassing the tuned input circuit) in the event the amplifier is to be operated outside the amateur bands. The amplifier requires a maximum of approximately 70 watts to drive it to full-power input levels (for the amateur service) with either the tuned cathode circuit or direct feed. While the input circuit offers a nearly perfect match for the exciter on 40, 20, and 15 meters, the match was somewhat removed from 50 ohms on 80 and 10 meters. Adjustments can be made to the circuit and no doubt our test unit could have been improved. No retuning attempt was made since the SWR created no problems with our operation.

The output tank network is a pi-*L* which has been designed correctly for operation at both cw and ssb power levels. Table I gives the efficiency along with the actual power levels measured in the ARRL lab. The loading capacitor is a pair of 500-pF units connected in parallel, mechanically and electrically, as shown in the photograph.

The Electronic Bias Switch

Casual observation of the plate-meter operation on either ssb or cw by someone unfamiliar with the Alpha 77 would give the impression that this amplifier runs Class C on every mode. This is because there is no idling current (the tube is actually cut off) under any conditions of the relays. The cut-off bias is removed only when drive power is actually appearing at the input connector

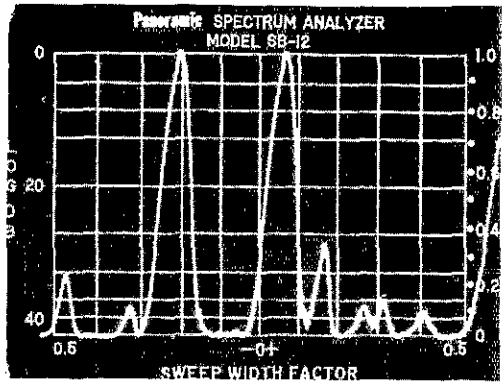


Fig. 2 — Spectral analysis of the Alpha 77 under two-tone test conditions. The third-order distortion products are 32 dB below the output. (The Panoramic scale is calibrated in dB below a single tone. To convert this scale for a two-tone test, subtract 6 dB from the figures indicated at the left side of the scale.)

TABLE I

	SSB MODE*				CW MODE**				
Band	*Output Power (watts)*	*Drive Power (watts)*	*Alpha 77 Wattmeter indication*	*Efficiency (percent)*	*Output Power (watts)*	*Drive Power (watts)*	*Alpha 77 Wattmeter indication*	*Efficiency (percent)*	*Input Circuit SWR*
80	1100	72	900	55	580	55	400	58	3.0
40	1400	65	1100	70	630	41	510	63	1.1
20	1200	50	1000	60	640	38	520	64	1.1
15	1200	70	1100	60	600	38	450	60	1.1
10	1100	78	1000	55	620	60	500	62	2.1

* Low line voltage conditions required tests to be made with 2650 V dc (under full load) for ssb operating conditions at 2 kW. No doubt the efficiency would increase by several percentage points if a "stiff" 220 volt line were used.

** Plate voltage under test conditions indicated 1825 for 1-kW input.

of the '77. This feature alone, separates the '77 from other amplifiers on the market today.

The electronic bias-level circuit is given in Fig. 1. Positive bias is applied to the cathode of the 8877 tube (approximately 50 volts) to cut off plate current during no-drive conditions. The bias is lowered when Q4 and Q5 are changed to a state of conduction which is caused by rectified energy (D17, D18) from the drive power. The value of C16 is selected to hold Q4 and Q5 "on" even though the signal may vary at an audio rate. Thus, when drive is present, operating bias is developed across Zener diode D13, Q5, and R20. The voltage appearing across R20 serves a dual function: it provides a convenient method of giving an indication of grid current as measured between the grid (chassis ground) and the cathode (junction of R20 and Q5). The second purpose for R20 is to provide a reference level to operate a grid-overcurrent relay circuit.

Protective Circuits

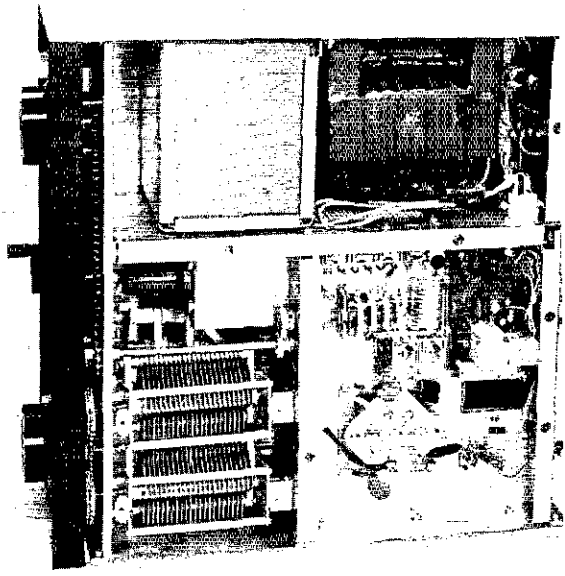
Plate-overcurrent breaker: If the amplifier plate current exceeds the safe operating level, the plate-current protective system will deactivate the entire amplifier, except for the blower. When the source of the problem is determined, such as a load mismatch or too much drive power, the appropriate mode-switch push button may be depressed. After the warm-up time delay cycles, the amplifier is operational again.

Grid-overcurrent breaker: A strong indication of improper amplifier tuning is indicated by the amplifier "dropping" out of the line to the antenna during operation. This happens when the safe level of grid current is exceeded. Recycling of the power switch is necessary (as described above) in order to continue operation. An indication of an over-current situation is given by the meter panel lights when they extinguish.

Warm-up time delay: The 8877 triode tube requires a warm-up time of 90 seconds prior to the application of rf drive power. During this time, the exciter may be operated through the amplifier to the antenna since it is not possible to key the '77 during this period. Provisions must be incorporated, however, to assure that drive power is not applied to the antenna through the amplifier when the warm-up time delay is completed, since the exciter power would be switched to the amplifier input circuit during actual key-down conditions. Resultant arcing could cause damage to the vacuum relay. The '77 has no provisions to allow the exciter to be operated through the amplifier when the main power is switched on. The instruction manual suggests the user provide a spst switch in the line between the RLY jack and the exciter relay control to interrupt the activation of the amplifier antenna relay when high-power operation is not desired.

Operation

Operating on-the-air with the Alpha 77 is a pure pleasure. Sufficient point is made in the instruction manual about the conservative ratings that the operator need not feel rushed while "tweaking"



Bottom view of the Alpha 77 amplifier. The tuned-cathode input circuit is located next to the tube socket. The two large variable capacitors are used for output-tank-circuit loading. The bias switch circuitry is located on the printed-circuit board mounted next to the input circuit.

the knobs under full-output conditions. So long as none of the overcurrent relays "kick," there is nothing to worry about. As a matter of fact, one can tune up to 1.5 kilowatts cw carrier, place a rock on the key, and go out to lunch! Be sure to place your kW dummy load in a bucket of water first, however!

A built-in wattmeter is incorporated to allow the operator to determine the approximate value of forward and reflected power in watts. Actually, the Alpha 77 wattmeter is somewhat inaccurate as indicated in Table I. Checking with ETO we found that the wattmeter is not intended to serve as an accurate indicator of power output. Its purpose is to give the operator a warning if something is amiss with the antenna system.

Amplifier tune-up is a bit different than usually encountered with a grounded-grid amplifier. A careful watch of the grid current is necessary since improper loading can cause excessive grid dissipation. Although it is not possible to overdissipate the grid, recycling the grid-overcurrent relay is annoying. Obtaining a feel for the characteristics of the tuning process is not difficult, however. If you do something wrong, the protective circuits tell you so.

During the early power tests, an arc occurred in the amplifier compartment, which completely destroyed an rf choke in the B+ plate lead. The resultant line transient "killed" the two diodes in the bias switching circuit. While the blown choke was obvious, there were no outward signs of damage to the bias circuit. However, when the amplifier was placed under test for IMD, it was noted that the third-order products were down only 18 dB,* a horrible figure for a well-designed piece of equipment. After careful inspection of the various operating voltages on the tube, it was determined that the bias was remaining at cutoff during ssb operation. Since the meters give an indication that the amplifier is cut off during no-signal input conditions, there was no reason to suspect something was wrong. Testing the bias switch is easy since the bias voltage appears at the plate-meter terminals. The lid of the cabinet must be left open a bit (the protective circuit breaker must be defeated, unfortunately) and a VOM connected between either terminal of the plate meter and ground. During cutoff periods, the bias voltage is about 50. When the bias switch is activated with rf drive from the exciter, the bias should drop to 8.2 volts. If a flashover (or some other unusual occurrence) is experienced, a check of the bias voltage should be made. That was the only one problem we could find worth reporting.

If ratings were applied to amateur equipment by the undersigned, the Alpha 77 would rate an A-plus in every category. - *W1FBY*

*Although there are no industry standards, good engineering design is capable of providing IMD figures of -30 dB or better.

The ETO Alpha 77 Amplifier

Power input (for amateur service): 1000 watts cw, 2 kW ssb.*
Power output: See Table I.*
Output tank-circuit configuration: Pi-*L* network.
Input circuit: Tuned or untuned cathode (selectable by internally mounted switch).
Amplifier tube: 8877/3CX1500.
Plate dissipation: 1500 watts.
Cooling: Forced air (reduced-speed blower).
Drive requirements: Approximately 70 watts on all bands.*
IMD: see Fig. 2.*
Frequency range: 3 to 30 MHz.
Metering: Plate current, grid current, plate voltage, reflected power and forward power (watts).
Power requirements: 117/230 V ac, 20 amperes maximum.*
Rear panel terminations: Rf input (BNC), rf output (UHF), receiver antenna, ALC, antenna relay (phono).
Color: Black cabinet, brown panel.
Dimensions (HWD) and weight: 9.5 × 17 × 18 inches, 70 pounds.*
Price class: $1500.
Manufacturer: Ehrhorn Technological Operations, Inc., Brooksville, Florida.

*Measured in the ARRL lab.

Standard's Model SR-C146 FM Transceiver

WHO NEEDS A 2-meter fm handi-talkie? Well, maybe nobody *really* needs one, but they're sure handy to have as extensions of mobile and base stations. A smooth-operating HT will justify the seemingly outlandish price tag associated with most such units, when used effectively in just one civil emergency of consequence! The mountain climber, the overnight hiker/camper, the ham on a bicycle, or the fisherman in his 8-foot pram can all find practical application in the use of a good HT. So, even if you don't need a handi-talkie, it would probably be lots of fun to have one.

Interested parties may wish to take a closer look at Standard's SR-C146 because it is somewhat less costly than comparable units sold expressly for use in the nonamateur land-mobile services. The "Big Three" in the American HT manufacturing business get from $500 to $1000 for equipment of similar format. Standard has defeated the high cost of HTs by importing the SR-C146 and affixing their trade name to it. Enthusiastic fm/repeater-mode operators may find the $290 price class of the SR-C146 more in keeping with the typical ham budget (if, indeed, such a thing does exist).

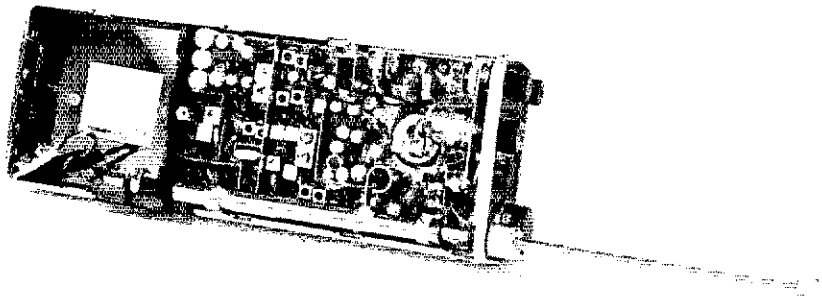
Receiver Rundown

There are 18 transistors, 7 diodes, and one IC directly associated with the receiver circuit. That's quite a few when one considers the compactness of assembly illustrated in the review photos! The sensitivity of the receiver is on a par with that of most expensive American HTs, owing to the matters of low front-end noise and high overall receiver gain. The rf amplifier and first-mixer transistors are dual-gate MOSFETs – the best choice when seeking an equitable balance between low noise, high gain, and minimum cross-modulation and IMD effects.

The major reward to be reaped from having high overall receiver gain is that of good limiting, which is a trait on the plus side for the Standard HT. The writer has yet to observe ignition or similar pulse noise coming through the receiver, despite tests in a variety of severe noise environments. Our tests indicate the sensitivity to be such that a 0.25-μV signal will provide 20 dB of quieting. The manufacturer is somewhat nebulous in his listing of receiver specifications, but the instruction book lists 0.4-μV as a ball-park figure for 20 dB of quieting.

Image and spurious response in the receiver is rated at 50 dB or more below the level of the received (desired) signal. Tests at ARRL show this to be a realistic claim. The receiver is designed to accept signals whose deviation amounts do not exceed 15 kHz.

The single bad feature observed while testing the SR-C146 receiver was the inordinate amount of audio distortion present on the received signals. The condition was common to two units evaluated by the Hq. staff. Though the distortion does not impair the readability of received signals that are "clean" when arriving at the receiver input of the



Interior view of the Standard HT. Shield compartments separate various sections of the circuit to help minimize interaction and spurious responses. The battery compartment is at the lower end of the unit.

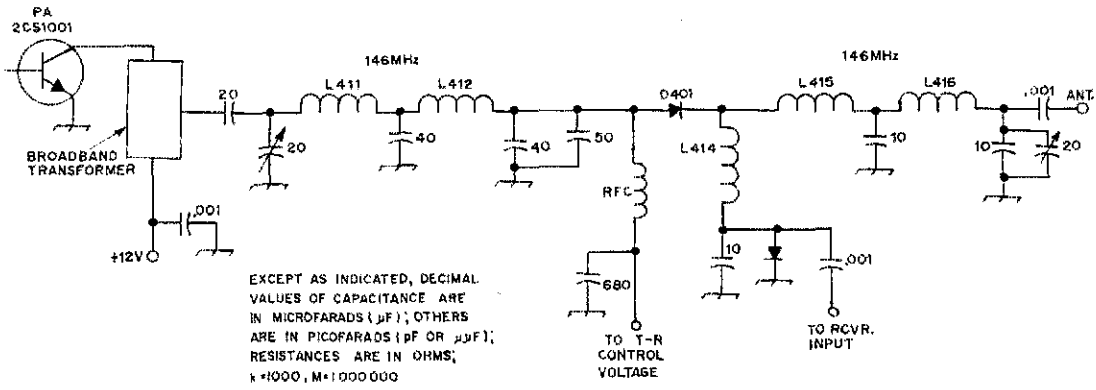


Fig. 1 — Schematic diagram of the PA stage illustrating the relatively complex and effective network design used to minimize radiation of spurious energy.

HT, it will make a "dirty" received signal almost impossible to decipher. Beyond all of this, it is most annoying to this writer when he has to listen to *any* signal that is noticeably degraded by what appears to be crossover distortion. It is likely that the biasing of the audio-output pair of transistors could be changed to help correct the condition, but we did not want to dig into the circuit for the sake of experimentation.

A Look at the Transmitter

There are 9 bipolar transistors, 6 diodes, and one IC in the transmitter portion of the HT. Frequency change during modulation is accomplished in the stage immediately following the oscillator — a bipolar transistor, rather than the more common varactor-diode modulator. All signal reports requested by the writer were given as, "nice and clean, and plenty of audio."

The instruction manual (somewhat sketchy, by the way) tells the owner that the transmitter deviation is set for 7 kHz at the factory. Maybe so, assuming that a specific level of audio at a particular audio frequency is applied to the input terminal of the speech amplifier/clipper circuit. However, the circuit does not contain a clipping-level control (potentiometer *ahead* of the diode clipper), hence a person with a "thin" voice, or one with a soft-speaking manner, may never be able to cause clipping to occur unless he speaks up in the traditional "military manner" when addressing the speaker/microphone. If clipping doesn't occur, it is likely that the deviation amount may be too low, requiring that the deviation control be tweaked for *his* voice level. What may amount to a resultant 7 kHz of deviation for one human voice could provide, say, 3 kHz, or 12 kHz for a person with different voice and speaking characteristics.

Standard rates the transmitter rf output at 1 watt, plus. We measured an output of 1.5 watts with the test model. Experienced fm operators will be aware that this power class is more than ample for most work with local repeaters. When operating from fixed-station locations while using a good gain-type antenna, this power level will enable the operator to "hit" repeaters many miles distant. Simplex operation under the foregoing conditions can be equally effective.

We were happy to observe the use of a half-wave-filter tank circuit in the PA stage (double

(Continued on page 62)

Standard Two-Meter FM Transceiver

Transmitter power output: Typically 1.5 watts (fully charged battery).*
Transmitter deviation: Preset to 7 kHz (see text).*
Transmitter crystal frequency: Operating frequency divided by 18.
Channel capability: Five.
Receiver sensitivity: 0.21 μV for 20 dB of quieting. *
Receiver i-f: 11.7 MHz and 455 kHz.
Receiver crystal requirements: Frequency of operation (MHz) minus 11.7 MHz divided by nine.
Speaker size: Two inches.
Power requirements: Typically 12.5 volts, 15 mA during receive periods and 650 mA under transmitting conditions.*
Accessories: Leather case, external microphone, battery charger and ac supply.**
Case color: Black.
Dimensions (HWD) and Weight: 8 × 3 × 1-1/2 inches, 24 ounces.*
Price class: $290.
Manufacturer: Standard Communications Corp., P.O. Box 325, Wilmington, CA 90744.

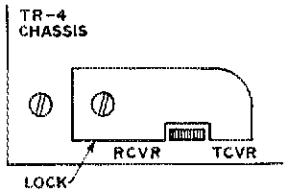
* Measurements made in the ARRL Lab.
** Accessory items available from the manufacturer at additional cost.

Hints and Kinks For the Experimenter

SWITCH LOCK FOR DRAKE TR-4

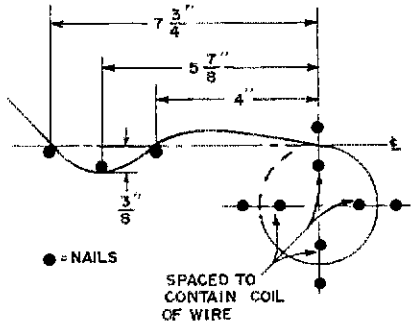
Rare is the owner of the Drake TR-4 who has not wasted a lot of time troubleshooting his sick rig only to find that the TCVR/RCVR switch on the left side has been accidentally moved.

The author solved the problem by making a simple lock which is held in place by some of the chassis screws near the switch. It was made from a discarded ice tray section but any piece of flat stock will do. Cut a notch the exact size of the small protuberance with a nibbling tool or a saw. Secure the lock to the rig with the chassis screw and the job is done. – *Dunas M. Robinson, WA6SBP*



GETTING THE CURL OUT OF STEEL-CORE ANTENNA WIRE

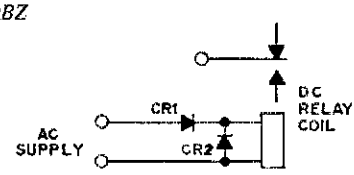
Alumoweld or Copperweld wire is great for antennas, if only it didn't curl so! The straightening die shown worked well with No. 12 wire. Good-sized nails (4-inches long or so) are driven into a 2 × 6-inch plank in the pattern shown in the diagram. Hold one end of the wire *firmly* and steadily pull the wire from the coil through the nail pattern as shown by the solid line. The resulting straight wire is a pleasure to work with. – *Charles H. Gould, W4LZO*



Getting the curl out of steel-core antenna wire.

RECTIFIER FOR DC RELAYS

Some of the best bargains in surplus relays are to be found in the low-voltage dc units. Their use where no battery is available, however, often means the construction of a separate power supply. This writer has used the circuit shown here to operate relays from a filament supply. To provide the normal operating voltage for the relay, the ac voltage should be about 2-1/2 times the rated dc voltage, since a half-wave rectifier is used. CR2 serves to carry the current generated by the decaying magnetic field of the relay coil, thereby protecting CR1 against high-voltage transients. If a high enough ac voltage is not available, a capacitor in parallel with CR2 will raise the dc voltage. This writer used a 50-μF capacitor in parallel with a relay coil rated at 12 volts, 200 mA, and operated it from a 12-volt filament circuit. The combination delivered only 10 volts, but this was enough to close the relay reliably. – *Rev. C. R. Clark, WB4OBZ*



PIV rectifier rating – 2.8 times ac supply voltage.

"SHORT-FORM" BOUND ISSUES OF *QST*

Space for books is minimal at the author's QTH, so in binding back issues of *QST*, a modified procedure of WAØKDQ's excellent article (*QST*, December, 1968) was used. First, the staples were carefully removed so that the pages could be separated, and appropriate selections made.

A typical selection included: covers, index, technical articles, Hints and Kinks, and various other departments and columns that the author was interested in. Care must be taken to include *all* pages which contain a given article. After binding, one or two omissions were found, and the problem was remedied by cutting out, and pasting the missing material in extra locations. The end result was a year's "meat" in one volume approximately the thickness of *The Radio Amateur's Handbook* instead of twice the *Handbook's* size. – *Frank Reeves, VE7CT*

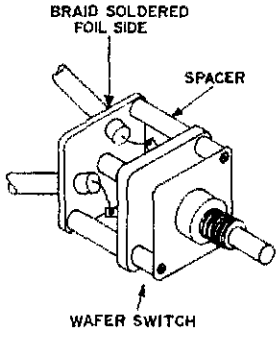
WEATHERPROOFING LOW-VOLTAGE CONNECTORS

Salt finally corroded one of the tail lights on the boat trailer. The price of a new light was more than offset by discovering the trick that the

manufacturer used to prevent the problem. The sockets for the bulbs were liberally smeared with grease, which effectively weatherproofed the metal parts, while not interfering with the pressure-contact electrical connectors. While a more suitable compound is recommended (such as Dow Corning DC-4, which is also good at rf), the author used ordinary marine grease (the kind used for pressure fittings and steering linkages) on the other lights, and with good results. The method could be used to advantage by amateurs where low-voltage connectors may be exposed to moisture. It definitely *should not* be used on ordinary rubber, since reaction between the grease and rubber will ruin the insulation. However, most modern plastics will not be affected. – *W1YNC*

WIRING COAXIAL CABLE TO A WAFER SWITCH

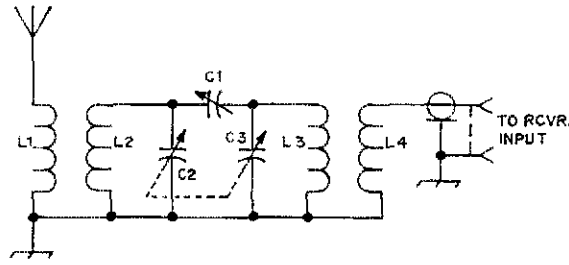
Here is a useful way of getting rid of the horrible mess that occurs when trying to wire up a 3-pole, 3-position, rotary switch with RG-58/U coaxial cable. Cut a small piece of copper-clad, phenolic board more or less in the shape of the switch wafer. Drill a couple of holes in it to match the distance between the screws that hold the switch assembly together. Then with the foil side of the board facing away from the switch, drill 3 holes which will accommodate the shields of the cable (a No. 30 drill is about right). Then solder the center conductors to the appropriate lugs, and the shields to the copper-clad board. This scheme results in a very neat job, and also provides a good ground for the braid through the frame of the switch. – *M. Crosby Bartlett, W9MC/WB4OBF*



FERRITE LOOP FROM BC RADIO MAKES GOOD INDUCTOR FOR MEDIUM-FREQUENCY PRESELECTOR

Having good front-end selectivity is a necessity on the mf and lower hf bands in many parts of the country. Some commercial receivers are lacking in this respect, and an item by W1FTX in the May, 1972 issue of *QST* shows one way to provide some additional selectivity. The preselector shown is another method, and matches the performance of expensive commercially made units.

The circuit consists of two tuned circuits ahead of the receiver, with the coils and capacitors having



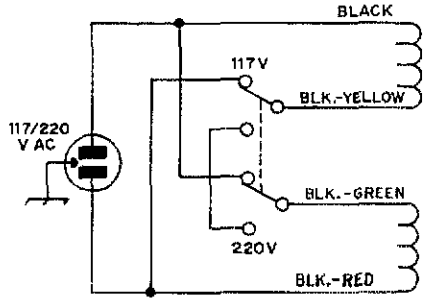
Schematic diagram of an mf preselector using ferrite-loop antenna coils for inductors.
C1 – Trimmer, 3-30 pF.
C2, C3 – Variable capacitor, dual section, 365 pF per section.
L1, L4* – 30 turns of No. 26 wire wound on a close fitting cardboard sleeve placed over the windings of the ferrite coil.
L2, L3 – Ferrite-loop antenna coil from bc radio.

* If a dual-winding coil of the type used with transistor radios is obtained, L1 and L4 may be eliminated.

values that will tune the desired frequency range. For the broadcast band, a ferrite-loop antenna coil, and a 365-pF variable capacitor can be used. Be sure to house the components in an rf shielded enclosure and use coaxial cable between the tuner and receiver input. Separate variable capacitors can be employed to provide better tracking, and C1 can be a variable capacitor to adjust selectivity. The receiver performed satisfactorily on weak signals without additional amplification. – *John W. Dell, K6TB*

117/230-V SELECTOR SWITCH FOR HEATHKIT POWER SUPPLIES

In completing a Heathkit HW-101, the author wanted to do some alignments at the air base in England where he is stationed. Since the HP-23A power supply was wired for 230 V ac, which was the outlet voltage used at home, it had to be rewired for 117 V ac, which was used on the base. Rather than having to rewire the power supply each time, a dpdt switch was installed in the power supply as shown. For those who have to travel overseas, this may be a helpful addition where outlet voltages vary from place to place. – *Samuel E. Stimson, WN5ERL*



Danger!

When You Transmit You Can Turn Off a Pacemaker

BY S. A. SANCHEZ, M.D.,* K5FYF

YOU CAN KILL yourself if your pacemaker is turned off while you transmit.

An amateur radio operator came home from the hospital with a new pacemaker and instructions from his physician to return to "full activity." Naturally, he went to his shack, turned the "old rig" on, and got ready for a nice QSO with his fellow amateurs. He pushed the mike button and began to speak. He awoke a few moments later, slumped over his desk. A second attempt to get on-the-air with a CQ again produced loss of consciousness.

Except for a few lost moments and confusion, this amateur's experience was not fatal. It could have been if his mike had not contained a spring button. By further testing with a borrowed pacemaker, his amateur friends proved that the interference stopped when the antenna was moved 100 feet further away from the transmitter.

Amateurs Should Know About Pacemakers

Pacemakers are electronic devices commonly used to increase the heart rate in persons with slow heart beats. Undoubtedly, many hams with pacemakers will enjoy more years with their hobby. They should be aware that any form of spurious radiation can turn a unit off, with dangerous consequences. Amateur radio operators can expect to be asked for technical advice by other persons with pacemakers. The amateur operator's familiarity with transmitters and his knowledge about other electrical equipment makes him more able to give sound advice on avoiding electrical interference than the average physician who is not trained to deal with interference problems.

Finally, an amateur may find himself in a situation where someone he knows will collapse from pacemaker interference. Quick action in turning off the source of radiation or removing the affected person from the transmitter area may save a life.

Pacemakers are used when the rhythm control center in the heart fails to send a signal regularly or is too slow, usually from hardening of the arteries. The much slower heart rhythm is called heart block. Without a pacemaker, patients with heart block live under the constant threat of dizziness, fainting, seizures, and even death.

Pacemaker Design

An artificial pacemaker is a small, plastic-encased, battery operated pulse-generating transmitter (Fig. 1). Its basic circuit is similar to many designs in amateur radio. An oscillator and an amplifier stage are coupled to produce an impulse of low voltage (1 to 10 volts), low current (2 to 4 mA), and brief duration (1 to 3 ms). The unit itself is not in contact with the heart, but its impulse is delivered directly to the heart by a wire catheter with an electrode tip. Heart rate is usually set at 60 to 70 beats per minute.

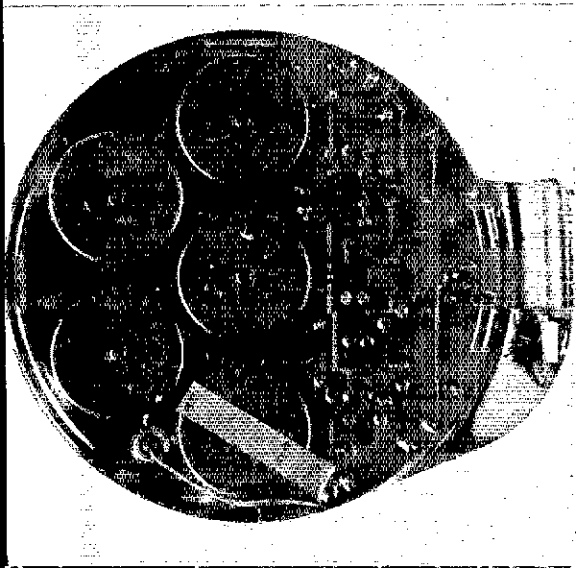
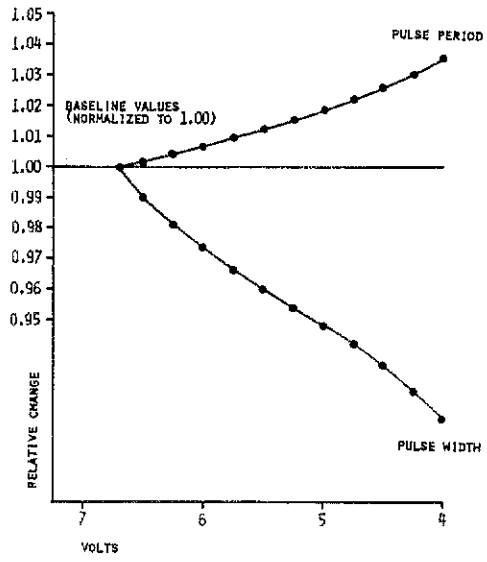


Fig. 1 — Stanicor standby pacemaker unit powered by five battery cells, each 1.35 volts. A transistor oscillator and amplifier stage are miniaturized into an etched circuit board above the battery pack.

* Department of Internal Medicine, Scott and White Clinic, Temple, TX 76501.

Fig. 2 — Pulse period and width variation with change in voltage using a test power supply in a Corids Ventricor pacemaker. Voltage was decreased stepwise from 6.75 to 4.0 volts.



Pacemakers can be classified into two broad types: fixed rate and demand rate. In the fixed rate type, a sensing circuit is absent and the unit fires at a preset rate. The pacemaker pulse sometimes competes with the patient's own heart rhythm, causing annoying irregularity and palpitations. The various type of demand units are designed to generate a pulse only when the heart fails to maintain its normal rate, but always insuring a minimum rate of at least 60-70 beats per minute.

Current manufactured units are reliable more than 90 percent of the time. A unit may fail for mechanical or medical reasons. With early models, the long wire from the unit to the heart occasionally broke, and the heart did not receive the generated pulse. To avoid breakage, electrode wires now are manufactured in the form of a continuous, small diameter spring, quite able to tolerate stress. Medical complications include infection, scar formation over the electrode tip, and the formation of tiny clots.

Pacemakers gradually lose battery power, requiring surgical replacement in about two years. If the wrong catheter is inserted into the pacemaker unit, the connection will be loose and current will leak, causing a short circuit. In older units, decay of battery power produced a very rapid rate appropriately called "runaway pacemaker." Such a development required immediate replacement.

Checking a Pacemaker

Although the battery supply of most pacemakers is designed to operate for two years, there is enough variation in battery life between individual units to require regular measurement. The measurements performed are comparable to routine frequency checks on amateur radio transmitters. The pulse frequency (rate) and pulse width (duration) change with loss of battery voltage and will indicate when the voltage level is low enough for pacemaker replacement, usually about four volts (Fig. 2).

Checking equipment includes a magnetic pickup coil, an amplifier with a step-up gain of 1,000, a digital counter, and a sensitive oscilloscope (Fig. 3). A typical pacemaker pulse is almost a square wave and displays a definite "blip" at the beginning and end of the pulse wave (Fig. 4).

The biggest danger to pacemakers is their susceptibility to an extraneous electromagnetic field. Any signal with a frequency greater than 60-70 pulses per minute and strong enough to penetrate the body can "fool" the sensing circuit of a demand pacemaker, and turn the unit off. Transmitters of any kind are hazardous to persons wearing pacemakers. The amateur operator whose pacemaker failed found that modulating the carrier signal turned the unit off. Because his equipment was ssb with very little carrier except the modulated signal, this would be expected. An a-m signal, on the other hand, would be more likely to interfere when the carrier is turned on.

Causes of Interference

Amateur radio operators may be asked for advice on interference to pacemakers in patients. They should be able to predict the types of equipment and appliances that may produce such interference. Transmitters, radio stations, TV stations, radar sites, microwave ovens, and diathermy machines all radiate signals that are capable of turning a pacemaker unit off. Spurious radiation from any improperly grounded ac motor or industrial equipment such as a dynamo poses the same hazard. Finally, many domestic appliances, i.e., electric razors which are brought near the chest, motors in automobiles, motorcycles, lawnmowers, and edgers can produce interference. A person would have to open the hood of an automobile and lean close to the

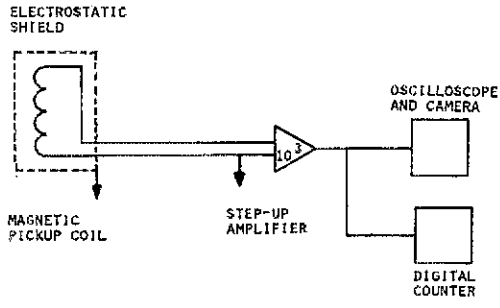


Fig. 3 — Block diagram of pacemaker measurement setup. The oscilloscope used is a Tektronix Model 581A and the counter is a Monsato Digital Counter. Both the magnetic pickup coil and the amplifier unit were constructed in the Scott and White Physics Laboratory.

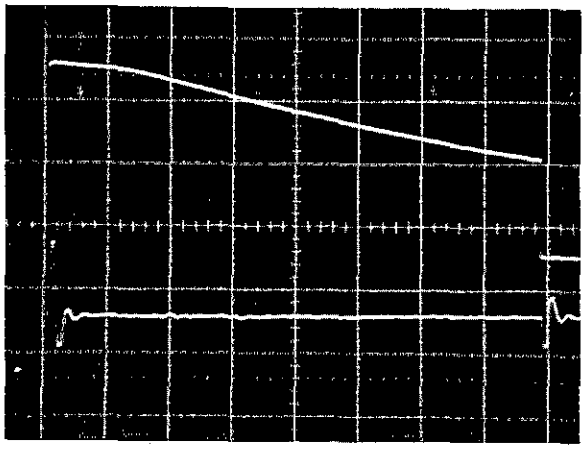


Fig. 4 — Display of pacemaker pulse. Top sweep shows an almost square wave pulse produced by a Cordis Ventricor pacemaker connected to a 470-ohm load. Bottom sweep shows the detected magnetic field pulse output through a stepup 10^3 amplifier. Vertical scale: — 2V/cm. Horizontal scale: 0.2 ms/cm.

running motor and spark plugs for the interference to be strong enough to stop his pacemaker.

Methods for reducing interference radiation to a pacemaker to insignificant levels are the same as those used to reduce unwanted radiation in amateur transmitters. A good earth ground, properly shielded equipment cases, shielded cables, replacement of defective by-pass capacitors and neutralization of final amplifier tubes are important. A "Faraday Cage" (using copper screen) can be used to encase the equipment or the operator.

If a patient with a pacemaker has to operate electrical equipment, it is advisable to use spring type push button switches, microphone buttons, and foot switches. A master control to turn off all the equipment is desirable. Members of the family should be instructed to turn off the electrical power (with the master control) should the person with the pacemaker suddenly lose consciousness. It is preferable that someone be present with the amateur (if he has a pacemaker) when he operates his radio equipment or uses electrical motors. A battery operated hand drill would be safer than an ordinary ac non-grounded one.

Testing for Interference

A recipient of a pacemaker should give his physician as much information as possible about probable exposure to transmitters and other electrical equipment. The physician may suggest consultation with someone familiar with such equipment, possibly an amateur radio operator. Before allowing the person wearing a pacemaker to operate the equipment, the levels of rf radiation should be measured with a field strength meter, and the effects should be determined on a borrowed pacemaker. By connecting the pacemaker terminals to an oscilloscope, the pulse wave will be displayed during testing. It is easy to identify interference, as the pacemaker signal will disappear. Naturally, the person with the pacemaker should be away from the ham shack or electrical equipment area during the time tests are conducted.

If a ham is transmitting near a person who has a pacemaker and that person suddenly collapses, the radio equipment should be turned off immediately. If the interfering source cannot be turned off, drag the person away from the area. If he fails to awaken within one minute, a hard thump over the left chest area with a fist often will start a heart that has stopped temporarily.

In our highly sophisticated electronics society, patients with pacemakers can expect more interference problems in the future. Manufacturers are trying to reduce the chances of interference by using metal shielding in newer units. Rechargeable Nickel-Cadmium cells and atomic power energy sources are being tested experimentally in pacemakers implanted in laboratory animals. It is hoped their batteries will be active for at least 10 years. Methods of testing pacemakers via telephone are now available.

Artificial pacemakers are rapidly becoming common treatment for certain heart beat problems. Many amateurs will either be wearing one or will be giving technical advice to persons with pacemakers. Methods which reduce spurious radiation in amateur radio equipment can be used on transmitters and electric appliances to prevent interference to pacemakers. QST

Strays

Warren Bruene, W5OLY and formerly WØITK, of the Collins Radio Company, Dallas, politely informs us that the Mac chart ("Simplified Impedance Matching and the Mac Chart," *QST* for December 1972) is quite similar to a chart of his. The Bruene chart was published in *Electronics* for May 1952, and in Henney's *Radio Engineering Handbook*, Fifth Edition, page 18-23, McGraw-Hill, 1959. K6WX points out that another similar chart appears in *EEE* for October 1965. James McAlister, author of the article containing the Mac chart, mentions that his work was done without any knowledge of the earlier articles. Several readers who have written indicated they were glad to see the chart brought back to life — in *QST*.

Producer VE3BQN stands behind the camera ready to film "Fine Business." Stars VE3MJ and VE3GYL (to be) in the car, while the shooting crew gets things in order.

"Fine Business"

VE3BQN, Ted Sparrow, has produced a first-rate motion picture on amateur radio using the above title. VE2MS, VE3SU, and VE6FK have prints for loan to nearby Canadian clubs; Hq. can supply U.S. clubs. Here Ted shares with us some of the trials and tribulations he encountered in production.

The initial draft of the script was written on Easter weekend at my cottage on an island in Parry Sound. Field Day was our first day of shooting. We arrived early but the weather was overcast with possibilities of rain. We filmed for about 2 hours but the camera man called a half due to bad lighting. We tried to rig up lights so we could film in the tents but to no avail, so we quit for the day hoping for better weather the next day. We arrived Sunday to find the park covered with fog so thick visibility was less than 10 feet. It was then necessary to have a simulated Field Day which was scheduled 2 weeks later at the same park. Marty, VE3MR, then decided he did not want the lead part, so then Mort Wolfson, VE3MJ, was recruited. We had set up the antenna and tents the night before, and just as we were preparing to leave a local motorcycle gang rode through the park; since they were suspiciously eyeing our equipment and since we could picture our antenna being pushed over the edge of the cliff, we decided to hire a guard for the night. At Field Day we called a large number of stations and made tape recordings, and these were used at our simulated Field Day. The weather for our second Field Day was perfect.

Filming resumed on September 15 at the Department of Communications. At this time it was necessary to train my receptionist Pat Watts to do the sound recording since my sound man was out of town. At the D.O.C. we had problems with the elevators – we finally had to hide one of the inspectors in the elevator with a walkie talkie to tell us when the elevator would arrive! The scene with Patsy walking from the elevator lasts about 50 seconds in the movie, but it took about 2-1/2 hours to shoot.

The following weekend we did the shooting at Mort's shack, where we ran into an interesting problem with the light dimmer which introduced a great deal of noise into the recorder; it took a while to find the source of the noise, but when we did it was only necessary to turn off the switch to rectify the situation. After 7 hours at Mort's shack the film was sent to the lab for processing; but due to an error at the lab, the film was returned undeveloped! Luckily the film had been opened in a dark room and there was no damage done to it. The prospect of reshooting another eight hours left us cold.

"Ham and His World" was being held at the Ontario Science Center on the 18th of October, and filming finished on the 15th of September. We started madly editing; at one point my editor, Murray Wallace, edited for 26 hours straight – then we had to cut the work print and transfer it to the master print. Murray then spent another 30 hours cutting the negative in order to have the film ready. The film was a great success at the Science Centre where it was shown for 5 days. In November, at the Radio Society of Ontario Convention, the film was shown at least 6 times, but was originally scheduled to be shown only twice. The distributor has requested more prints to keep in his library since there has been a great deal of interest shown in this movie. Marty Rosenthal took a copy to Israel and the gang over there enjoyed it very much.

Patsy took the part seriously enough to study in earnest for her license, and surprised us all by obtaining it in time to have it presented to her at the premiere of the movie – and she is now known as VE3GYL. QST

Standard SR-C146

(Continued from page 55)

pi network), followed by a pi-*L* filter. This approach virtually eliminates the possibility of TVI and interference to land-mobile services from harmonic radiation and the promulgation of certain other kinds of spurious energy. Some low-power fm transceivers previously tested, though FCC type accepted, were found to be real TVI generators. The SR-C146 appears to be free of that unwanted malady! (See Fig. 1 for tank circuit details.)

Switching from transmit to receive is accomplished by applying forward bias to a collection of diodes in the TR logic circuitry. The switching voltage is transferred to the appropriate diodes by means of the transmit/receive switch on the side of the HT case.

Summarization

The equipment can be powered by an external 12-volt supply (handy for mobile operation), or by installing NiCad batteries in the power-supply compartment of the unit. The manufacturer states that alkaline batteries can be used with this equipment. We tried it and found them to be fine for receiving applications. The life span during transmit is very short (the transmitter draws 620 mA during keyed periods)!

The unit comes supplied with crystals for use on 146.34/146.94 MHz, and for 146.94 simplex operation. There are five channel positions, so the owner can add crystals for three more of his favorite frequency pairings.

Accessories for the transceiver are: desk-top charger/ac adaptor; leather carrying case; remote microphone; short, flexible rubber antenna; batteries; crystals; and a mobile adaptor.

An interesting collection of references is given in the instruction booklet, specifying various amateur radio journals and books that contain material of interest to fm-ers. It is incredible that reference to *QST* is obtrusive by its absence! Furthermore, the manufacturer avoids mention of other ARRL publications that treat amateur fm. We recommend that those who wish to learn about all phases of fm/repeater operation read the ARRL publication, *FM and Repeaters for the Radio Amateur* ($3). Back issues of *QST* and the ARRL *Handbook* also contain a wealth of information on the subject. Fm repeater directories are available from ARRL Hq. on request (send a large s.a.s.e.). — *WICER*

SSTV Monitor

(Continued from page 32)

The high-voltage pulse transformer (also called "flyback" transformer) produces a very substantial high-frequency field which can have influence on the low-level signal and sync circuitry. It is necessary, therefore, to supply good shielding for the pulse transformer and high-voltage rectifier system. A rectangular-shaped tin can, such as shown in the top view of the monitor, will serve nicely for this purpose. Soldering lugs may be bent into right-angle shapes, soldered to the bottom of the can, and used to secure the can to the main chassis. All MJE520 and MJE370 power transistors are bolted to the bottom of the chassis using the mica insulating washers supplied with the transistors. The high-voltage oscillator transistor, Q9, is mounted in a TO-3 socket on the top of the chassis. (It is not visible with the high-voltage shield cover in place).

Alignment

Discriminator alignment is accomplished by connecting an accurately calibrated audio oscillator to the input terminals of the monitor and connecting the vertical input leads of an oscilloscope across C1. The value of C2, which tunes L1 to 2300 Hz, is then carefully selected so that a minimum output voltage is indicated on the scope when the audio frequency input is 2300 Hz. The scope vertical terminal is next connected to either side of L2 and the value of C3 selected to produce a maximum voltage when the audio oscillator is set at 1200 Hz.

The adjustment of sync, contrast, brightness, size and centering controls is best accomplished with a tape-recorded SSTV signal that can be played continuously until the desired control settings are found.

The Mark II SSTV Monitor described here should be easy to duplicate and offers good performance with simplicity. I have been diligently field testing the unit with excellent results. Two of the photographs accompanying this article are typical pictures made from the screen of the Mark II Monitor. QST

SSB Receiver

(Continued from page 39)

necessary to readjust the capacitors and slugs several times before optimum tracking is obtained.

The final step is to calibrate the dial. If the 10.7-MHz oscillator is set properly, 7.0 MHz should be on the same spot as 14.4 MHz. Also, 7.4 MHz should be at the same point at 14.0 MHz. Calibration at the intermediate points can be set with a signal generator or other means, for the builder's preference.

When setting up the receiver for ssb reception, tune in an ssb signal with the BFO turned off, and try to find the loudest point (signal will be unintelligible). Turn on the BFO and adjust the control until the speech sounds normal. Once this is accomplished, note the spot where this occurs, and normally the control won't have to be readjusted when tuning in other ssb stations (or cw stations when set for usb).

Performance

The design provided a stable receiver capable of receiving ssb or cw signals quite well. Since a transmitter was unavailable at the time the article was written, not much could be said about on the air tests. However, if one could work the stations that were heard, the receiver project could be considered a success. Novice stations with less than twenty watts input have been solid copy from locations over a thousand miles away on 40 meters. Many DX stations have been heard on 20 meters, using just an end-fed wire for an antenna. QST

Why Mus' We Moider Da King's H'English

BY ROY O. HILL, JR.,* W4PID

HARUMPH. But I guess you aren't quite ready for that. You probably need a little background, so I'll try to fill you in.

You see, back some time ago, English was a good language. It was possible to express yourself precisely with it. I am a technical writer, and have spent many hours, over the years, hunting for words that would say exactly what I wanted them to say; so I guess I notice changes in the language more than most folks do. And there *are* changes – many of them. English is deteriorating.

Let's look at an example. There used to be a perfectly good English verb "to comprise," meaning "to consist of, include." It seems, though, that about as many people used it wrong as used it right. The wrongusers would say "the members comprise the club," when really it was the club that comprised its members. Lots of people made it even worse – they would say things like "The club is comprised of its members." This translates to "The club is consisted of of its members"! Well, they say that dictionaries don't make the language – they only report it. Unfortunately, sometimes they don't do much about protecting it, either. So when *Webster's Third New International* unabridged dictionary was published in 1964, it recognized both meanings; "to comprise" now means either "to consist of, include," or "to make up, constitute." Hurray! We are well on the way to having a universal word that means whatever we want it to!

Likewise, there used to be two perfectly good widely recognized signals – CQ and QRZ. They were intended to be used on cw, of course, but that is another story. CQ used to mean "I seek you," or "I would like to talk to anybody," and QRZ meant "who was that just calling me – I didn't quite get the call." But now we come on the air with a "QRZ" into a repeater that hasn't been triggered in the last 3 hours! I guess we just want to prove we're not lazy. We call CQ with three syllables instead of two.

There were also a couple of cw number signals – 73 and 88. For some reason or other, we insist on pluralizing those two, so they come out "best regardses" and "loves and kisseses." It seems to me that I might as well get into the act here, so I am declaring a new signal – 96. This is to be a modern,

"We are well along the way toward having a language of universal expressions."

multiple-function term; so it can have either of two meanings: (1) thanks for listening to me, or (2) go to H—!

Another word we are making universal is "linear." This was once a useful word for describing a device that amplified, without distortion or change in shape, any signal fed into it. It seems that lots of us are putting linears on our 2-meter fm rigs these days. A fellow told me on the air the other day that he had one, and I asked him why on earth he used a wasteful linear rather than a Class-C amplifier. "Oh," he said, "this one *is* running Class C." (!!!!!) Oh well, I guess we can go on using all the non-linear linears we want to on 2-meter fm, but don't forget to change to a linear linear when you switch to ssb!

So you see, we are well along the way toward having a language of universal expressions that mean whatever we want them to mean. So I will be able to meet you on the street and say "Harumph" and it will mean "What kind of rig was that new one you bought last week?"; and you will say "Harumph" and it will mean "It's a solid-state job with 12 V dc and 117 V ac power supplies built in, frequency synthesizers giving full transmit and receive coverage of the 144-, 220-, and 420-Megahertz bands, 27 watts output, and a preamp with a pair of 40673s giving it a sensitivity of 0.02 microvolt for 87 dB quieting." There is one thing that has me a little concerned, though: I'm not real sure I'm going to be able to tell the difference between my "Harumph" and your "Harumph." Oh well, we don't have to worry about it yet; and maybe if we're a little more careful we never will have to. So while we're waiting to see what develops, I'll be QRZing you; and in the meantime. 96s. QST

* 4051 Skyland Dr., Kingsport, TN 37664

OSCAR NEWS

The special ARRL Oscar 6 "1000" award (December 1972 *QST*, page 58) was only three weeks old when the first application arrived at headquarters on January 5. First in line was LA1K, who needed to collect only 8 QSLs from 8 countries and 3 continents to qualify, followed closely by K2LGJ with 36 cards representing 4 countries and 2 continents. It is worth noting that our initial North American applicant used an omnidirectional "Skew-Planar Big Wheel" antenna from November 1963 *QST* for his two-meter uplink. Bob has since constructed a five-element crossed Yagi and reports improved performance near the horizon, but the "omni" eliminates fussing with the rotator on near-overhead passes.

As of press time, the special certificates have also been issued to K7BBO, W3TMZ, VE3CUA, K4CYU, VE2BYG, WB2VKZ and VE3HD. Randy, VE2BYG needed to send in only five cards to qualify: OK1BMW, SP2DX, LA1K, VE7ANP, and HK5MO. The minimum number of QSLs needed for the award is four, but each would have to be from a different continent – not the easiest way to qualify!

Increased Russian activity with UA1, UB5, UG6 and UR2 prefixes highlights DX news this month. The *Radio Times of India* reports that VU2UV is working through Oscar 6. The appearance of KH6 and KL7 stations whets the WAS appetites of many. (Remember, an Amsat trophy awaits the first to achieve this goal.) A number of stations are nearing a states-worked total of 40. But, it may take some "missionary work" to get a couple of the rarer states on the air. Which ones are you missing? In addition to WAS prospects, we'd like to hear of any other notable "firsts" using Oscar 6. Has anyone been successful in working via Oscar from an automobile? A boat? Or an aircraft? Has anyone used Oscar for message traffic? Any unusual uses or experiments should be reported!

The box on this page lists the achievements of several whose work through Oscar 6 has come to the attention of League headquarters. If you're not listed, it's because you haven't told us how you're doing. Why not drop us a postcard or letter today? If you update it each month, we'll revise your score and continue to list it. Bear in mind that the usual deadline for *QST* copy is around the 20th of the second preceding month, for example, March 20 for the May issue. Don't put it off – write to us today, or mark your calendar to do it around the 15th.

The operating schedule for Oscar continues to be ON for Friday, Saturday, and Sunday GMT. The remainder of the week is used for battery

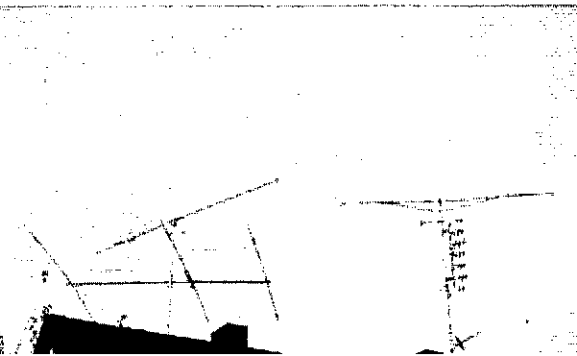
OSCAR 6 TWO-WAYS

	Stations worked	*States*	*Countries*
DJ2RE	168	–	29
DK2ZF	169	–	30
F8XT	150	–	24
G3IOR	100*	6	30
VP2VL	5	4	2
VE2BYG	262	37	26
VE3HD	83	–	8
K1HTV	256	36	25
K1ZND	41	19	6
WB2DNN	26	13	3
K2GUG	300*	–	22
K2LGJ	127	23	16
WB2VKZ	101	28	10
W2WD	–	30	14
W3TMZ	190	34	14
W4CKB	138	26*	14
WA4JID	300**	29	6
K7BBO	1100**	34	11
K9PVW	27	16	3
KØDDA	30*	15*	2

* approximate
** total contacts

Satellite stalwarts (l-r) K1HTV and DK2ZF had a chance to meet in New Haven when Rolf's ship, the *ESSO Muenchen*, docked there in December. At sea Rolf's activity is limited to listening, since German amateurs are not yet permitted maritime mobile operation.

At home, DK2ZF uses this extensive rooftop antenna farm for Oscar work. Note the two-meter crossed Yagi, which has a fixed elevation of about 30° – an effective compromise for anyone without elevation control of his uplink antenna.

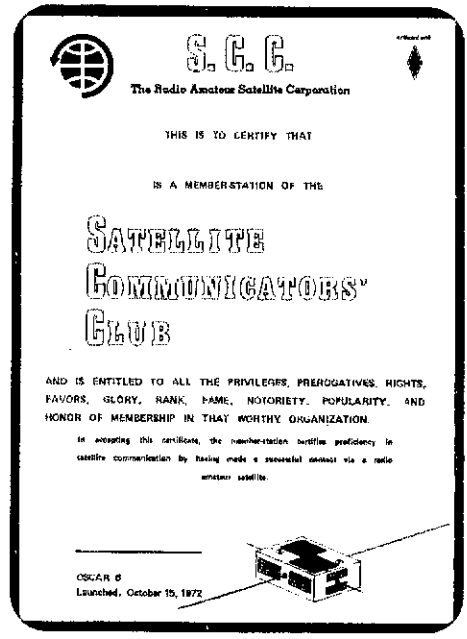


Are you a member of the Satellite Communicators' Club? If you have been successful in making a two-way contact via Oscar 6 you can qualify. Just send (with s.a.s.e) the date and time of contact and call sign of the station worked to Amsat, P.O. Box 27, Washington, DC 20044.

recharge. In early January, the 435.1 MHz beacon began to exhibit extremely reduced performance. The signals are now copied only by stations especially well-equipped on this band. Amsat ground command stations have now begun using the 29.45 MHz beacon in order to continue to receive high-quality telemetry data. Oscar users are urged to avoid transmitting to the satellite in the 145.9 to 146.0 MHz uplink band from Monday through Thursday GMT. This is the battery recharge period and the time when command stations must receive spacecraft telemetry. This important activity is impaired if stations are simultaneously using the repeater. If you find the satellite ON during OFF days, please do *not* use the translator. Friday through Sunday GMT, when the repeater is available for communication, amateurs are requested to avoid having their signals repeated on or near the 29.45 MHz beacon frequency. – *K1ZND and WA2INB*

Oscar 6 Equator Crossings

Orbit	*Date*	*Time (GMT)*	*Longitude (degrees W)*
1720	March 2	0100	62.4
1733	March 3	0155	76.1
1745	March 4	0055	61.1
1808	March 9	0139	72.2
1820	March 10	0039	57.2
1833	March 11	0134	71.0
1895	March 16	0024	53.3
1908	March 17	0119	67.1
1920	March 18	0019	52.1
1983	March 23	0103	63.2
1995	March 24	0003	48.2
2008	March 25	0058	61.9
2071	March 30	0143	73.1
2083	March 31	0043	58.0
2096	April 1	0137	71.8
2158	April 6	0027	54.2
2171	April 7	0122	67.9
2183	April 8	0022	52.9
2246	April 13	0107	64.0
2258	April 14	0007	49.0
2271	April 15	0101	62.7
2334	April 20	0146	73.9
2346	April 21	0046	58.8
2359	April 22	0141	72.6
2421	April 27	0031	55.0
2434	April 28	0125	68.7
2446	April 29	0025	53.7
2509	May 4	0110	64.8
2521	May 5	0010	49.8
2534	May 6	0105	63.5
2597	May 11	0150	74.7
2609	May 12	0049	59.6
2622	May 13	0144	73.4
2684	May 18	0034	55.8
2697	May 19	0129	69.5
2709	May 20	0029	54.5
2772	May 25	0113	65.6
2784	May 26	0013	50.6
2797	May 27	0108	64.3



Technical Correspondence

(Continued from page 47)

To use the formula, one estimates the square root as accurately as possible, and then applies the formula. If the estimate is close to being correct, the answer, *B*, will actually be the true value of the square root (a fact which can be verified quickly by squaring the result on the machine). If you are off in your initial estimate (even by a wide margin), repeated applications of the formula (which take only a few seconds on the electronic calculator) will quickly bring you to the correct answer.

Example: Find the square root of 539. Assume that your first estimate is 20 (which is obviously a very poor estimate). Application of the formula yields a second estimate (*B*) of 23.475. Square the second estimate and you get 551.076, so it is evident that you do not yet have the correct root. Apply the formula again, substituting the value of the second estimate for *A*, and you get a third estimate of 23.2178. Square that and you have 539.066. Thus, you have almost the exact root. Further refinement would not be necessary in most instances, but if desired, the formula could be applied again for a precise result. – *Lauren A. Colby, K4RFC, P. O. Box 19335, 20th St. Station, Washington, DC 20036.*

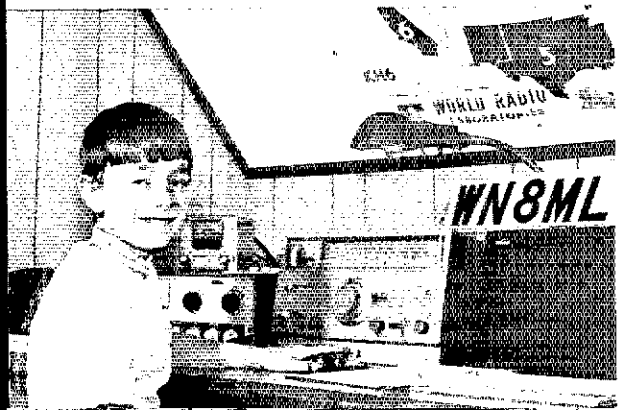
FEEDBACK

On page 52 of January 1973 *QST*, in the drawing for "Using the Heath SB650 with other than Heath Transceivers," the connections for the transistor Q1 are improperly labeled. "D" should be "G," "S" should be "D," and "G" should be "S."

Strays

Akemi Saito, JH3ROF, age 14, holds both code and phone privileges. Because of no reciprocal agreement between the U.S. and Japan, Akemi, who is temporarily in this country, is unable to operate. She will be back on the air from Japan in April. The Saito family includes a sister, Mayumi, JA4RWA, and father "Sam," JA4RGO/JH3PJE. *(JA4RGO photo)*

For some time, *QST* has published an honor roll of affiliated clubs having 100 percent ARRL membership. Not to be outdone (we didn't say topped!) the Associated Mountain Toppers (WA6UMI) now claim to be the first 100 percent ARRL life member club. Shown from left are WA6DSN, WB6ASR, WB6FSE, WB6RIV, (standing) WB6YVP, and WB6RAL.



QST Congtatulates . . .

Barry Kutner, WB2LYB, on receiving a regional award in the 1972 Tomorrow's Scientists and Engineers Program for his project, "The Effect of Tranquilizers on Hamsters."

Dr. Lester W. Burket, W3HQJ, on receiving an honarary doctorate from Georgetown University on the occasion of his delivering the Commencement address.

Max Bice, W7AEA, who has been named Chairman of the NAB TV Code Review Board.

B. Frank Borsody, K4EC/W2AYN, upon receiving the 1972 De Forest Audion Award from the Veteran Wireless Operators Association.

Donald W. Needham, D.V.M., W6JNM, on being named president of the Medical Amateur Radio Council (MARCO).

Walt and Norma Kornacki, W1YOC and W1UBM, who were presented an "Oscar" award for their outstanding volunteer contributions to the Boy Scouts of America.

Kurt R. Schmeisser, W8LZV, on receiving the first DLD-500 award ever issued by the Deutscher Amateur Radio Club to an amateur in the Americas.

Not every eight year-old can pass the Novice exam, but it can be accomplished with adequate instruction. Dale, WN8MLZ studied for his ticket at the DeVilbiss High School Radio Club, WB8EWJ, in Toledo. Dale shares this gear with dad WN8JKH, who may get a chance at the key once in awhile!

March 1923

. . . DX remains the order of the day. Elated with success of the eastbound portion of our Transatlantic tests, ARRL is arranging for trials aiming at two-way contacts with the continent. An All-Canada transcon is in the works. And to the west, the Pacific barrier is being overcome, with dozens of hams being heard in that area; but two-way will have to await licensing, as amateur transmission is prohibited by most nations there (even in New Zealand, in 1973 an outstanding supporter of amateur radio).

. . . Many amateurs still accept the professional view that long waves are best, and so crowd the 200-meter band edge. *QST* urges more exploration of higher frequencies, and schedules a "100-Meter CQ Party." Short-wave experimenters so far seem to find no serious difficulty getting their rigs to oscillate even as low as 70 meters – but there are few contacts because not many hams have equipment to receive that low!

. . . One problem is that station licenses relate to specific apparatus and emission; as most authorizations are for spark, modification is necessary before going to cw. Halfway between is the "icw" set, a tube oscillator with a spark coil supplying plate power, and described as having a "beautifully sharp wave."

. . . An "inverse duplex" receiving circuit is explained, wherein the audio output is fed back into preceding rf stages for additional amplification. Gulp!

March 1948

. . . Rapidly growing phone interest gets a boost in "500 Watts of Audio from AB_1," describing a hefty modulator using the new 4-250A tetrodes. High gain of the tubes permits elimination of the usual driver stage and its power supply.

. . . The trend is to transmitter flexibility and simplicity in controls. W3DD describes a 180-watt bandswitching rig with true single control – antenna tuning is ganged with the other tank circuits. W1CJL's approach, while still requiring switches for low-power stages, involves an "all-band" tank circuit covering 3 to 30 Mc., marketed by the National Co.

. . . Rumblings of an eventual phone-cw donnybrook are apparent in the valiant attempt by Editor Warner to put to rest a lot of misinformation and rumor about the February *QST* return-postcard poll of amateur opinion on mode subdivision. Ordered by the Board of Directors, and based on an extensive Planning Committee report, the poll card seeks amateur opinion on expanding voice segments at both 75 and 20 meters, and keeping 40 meters exclusively cw.

. . . On the cw side, W1DX shows us some better solutions to the problem of attaining full break-in operation with amplifier keying, "even on one's own frequency," without chirps. The oscillator is kept running and the receiver muted except during breaks between words, or whatever variable delay is desired. – *W1RW*

Universal Voltage-Multiplier

(Continued from page 49)

times-seven multiplier; three on one side and two on the other comprises a quintupler.

The required voltage rating of each capacitor depends on its position in the circuit, and increases as the position approaches the load. Example: Assume an ac voltage of 110 V rms; the peak is 110 × 1.4 or 154 volts. A capacitor in position 3E, in this example, will have to be rated at 3 × 154 or 462 volts. A capacitor with a rating of 500 volts or better will do for this position in the circuit. A 500-volt capacitor at position 4E will break down, given 110 volts at the source because under these conditions it would need to handle at least 616 volts.

Diodes

In contrast, the required PIV rating of the diodes does not vary. The PIV rating of all the diodes in the string can be the same (at least twice the peak of the ac source). If the rms of the source is 10 volts, as an example, the PIV rating of each diode would have to be at least 10 × 1.4 × 2 or 28 volts. In this example, a PIV rating of 50 volts for each diode is required.

Ripple and Regulation

What then is the essential difference between half- and full-wave multiplication? If the load gets one "kick" per ac supply cycle, it is a half-wave system. If all the action takes place on one side of center (Fig. 1) then only one impulse per cycle will reach the load, hence half-wave operation. But with full-wave action, one impulse per cycle is contributed by each side of the multiplier. Full-wave rectification provides to the load a ripple frequency twice that of half-wave filter. A larger filter capacitor is required to smooth the output of a rectifier with 60 ripples per second than with a ripple frequency of 120 per second.

Regulation is better with full- than with half-wave multiplication. Regulation depends on losses, and the losses in a diode-capacitor string increases exponentially rather than linearly with an increase in length of the string. The losses in the string of a given half-wave multiplier are greater than the sum of the losses in the two parts of the same string divided as in a full-wave circuit. Therefore the regulation of a full-wave multiplier is better than that of the same diodes and capacitors rearranged into a half-wave circuit. Circuit elements affecting regulation are capacitor sizes and diode resistances; the larger the capacities and the smaller the diode resistances, the better the regulation. QST

Bibliography

Rumble, "Voltage Multiplying Circuits," *QST*, January, 1953.

Blair, "Using the Voltage Doubler," *QST*, November, 1955.

Althouse, "Modern Power-Supply Design," *QST*, October, 1971.

1972 ARL Sweepstakes — High-Claimed Scores

The following high-claimed SS scores are those received at Hq. by December 29. From left to right are shown the call, claimed score, number of contacts, number of multipliers. Full results will appear in a later issue.—*WA IPID.*

CW

W7RM (K7VPF, opr.) 167,325-1117-75
W6MAR 163,425-1097-75
WB6ABK/6 159,600-1064-75
W6HX (WB6OLD, opr.) 156,954-1062-74
K6EBB (W6CUF, opr.) 155,250-1038-75
W3CRE 149,400- 996-75
K1ZND 145,440-1010-72
K1LPL/3 143,420-1010-71
W9YT (WA9TPV, opr.) 136,080- 948-72
K6QYB (K6OVJ, opr.) 135,675- 909-75
K5PFL 135,420- 919-74
VE7WJ (VE7BDJ, opr.) 134,393- 921-73
K4GSU 133,836- 916-73
W5WMU/5 133,444- 920-73
WAØCVS 133,350- 953-70
W1MX (WA8WNU, opr.) 133,128- 925-72
W3IN 132,720- 948-70
W4NQA 131,327- 900-73
W7IR 131,040- 913-72
K1VTM 130,924- 922-71
K4PUZ 129,930- 920-71
KØORK (WAØWEZ, opr.) 128,084- 904-71
W8EDU (WA3BGE, opr.) 126,864- 882-72
W5QJH 126,560- 912-70
K8MFO 126,022- 852-74
WB4YOJ 124,125- 829-75
W1FBY 124,108- 874-71
WA9GMK (K9ZSE, opr.) 123,624- 861-72
W2CXM (WA3HRV, opr.) 123,408- 857-72
W1BPW 123,224- 844-73
W1ICP (WA1PID, opr.) 122,250- 815-75
W7YB (W7LR, opr.) 118,698- 849-73
K1THO 117,292- 837-71
K1KUF 116,920- 771-73
WA2UOO 116,856- 813-72
WA3GBU/5 116,369- 821-71
W1FLM 115,375- 817-71
K1JYN 115,200- 800-72
W3GN 114,984- 801-72
W9YB (WB2RKK, opr.) 114,878- 809-71
W9RQM 114,450- 821-70
W4KFC 114,300- 763-75
KØGXR 113,529- 800-71
W7TML/1 113,223- 784-73
WBØDLE (WBØDJY, opr.) 113,040- 785-72
W4DQS 112,184- 758-74
K4BAI 111,617- 765-73
W6NUT 111,150- 741-75
K9BGL 111,044- 782-71
WA6PGB 110,449- 772-73
W2SZ (WA2EUX, opr.) 108,792- 759-72
W4QZF 107,565- 766-71
W1EFG 107,464- 718-74
WØIYP 106,855- 760-71
WAØVDX 106,855- 754-71
W6DQX 106,632- 741-72
K1DPB 106,610- 763-70
W3GRF 106,216- 748-71
K2AU 105,631- 727-73
W9DOB 104,904- 729-72
W2GXD 104,098- 715-73
WB5AQF 103,824- 721-72
WB6VZI 103,320- 741-70
WA9BWY/9 102,930- 707-73
W7GKF 102,340- 756-68
W7OAD (W7MWR, opr.) 101,814- 717-71
W4ZCY (WA3IAQ, opr.) 101,601- 717-71
WAØVPN 101,500- 725-70
WB2RJJ 101,470- 695-73
WBØCJV 101,456- 746-68
K4DCD 101,388- 714-71
W9RFR 101,290- 730-70
K1OME 101,175- 724-71
K7NHV/7 101,160- 703-72
WØTDR 101,088- 702-72
W2BQF 100,448- 688-73
WB4AEX 100,394- 708-71
K6RU 100,252- 716-71
WAØBWM 100,110- 711-71
W2GGE 100,030- 716-70
K9CUY 100,008- 696-72

Multi-operator

W7SFA 131,619- 907-73
WA4UCE 115,872- 816-71
WA1JUY 111,672- 776-72
K4CG 106,240- 708-75
KØKU 104,682- 725-73
K3WUW 102,900- 688-75
W2FXA 102,346- 701-73

PHONE

W7RM (K7VPF, opr.) 241,050-1609-75
WA9GMK (K9KGA, opr.) 211,875-1418-75
W9YT (K9LBQ, opr.) 199,650-1332-75
WA5JMK 195,750-1305-75
W5WMU/5 195,150-1303-75
WA8ZDT 192,696-1304-74
K1VTM 184,500-1230-75
W7OAD (W7MWR, opr.) 183,150-1221-75
VE7WJ (VE7BDJ, opr.) 178,125-1200-75
WAØQLH (WBØDJY, opr.) 176,100-1174-75
K6JAN 174,750-1165-75
WB6VZI 174,251-1198-73
W8DQL 170,120-1178-74
W1BGD/2 169,375-1124-75
K6BCE (WA6NNJ, opr.) 168,150-1121-75
WA8ZDF (WA8RWU, opr.) 168,150-1121-75
W4ZCY (K3ESI, opr.) 168,000-1120-75
WB4YOJ 168,000-1121-75
K1DQV/1 167,325-1117-75
W3GRF (K1ANV, opr.) 167,325-1117-75
K6SVL (KØGJD, opr.) 166,650-1111-75
WA5RXT 165,300-1103-75
WA1JHQ 165,000-1100-75
K1LPL/3 (WA3IAQ, opr.) 163,800-1094-75
WB6KBK 162,900-1144-75
WA2CLQ 162,225-1085-75
WA4FFW 160,802-1088-74
K1EUF 160,284-1096-74
WAØVKP 160,150-1067-75
W1FLM 159,975-1077-75
W6DSQ 159,450-1071-75
WAØTKJ 158,775-1102-73
WØMYN (WBØDLE, opr.) 158,508-1071-74
W3AZD 158,100-1054-75
WA5RTG 157,650-1058-75
W1FEG 155,400-1050-74
WA5ZKE 153,076-1088-71
K3WUW 152,700-1018-75
K5PFL 152,400-1042-75
W1ICP (WA1PID, opr.) 152,175-1016-75
WA8USP 151,350-1009-75
W6ONV 150,975-1008-75
W7GKF 144,375- 968-75
W3IN 143,400- 956-75
K7LTV 142,820- 965-74
KØKU (WBØEGV, opr.) 141,266- 972-74
WA9BWY/9 140,850- 939-75
W6UA (W6HOH, opr.) 138,450- 952-75
W4NQA 136,725- 915-75
W3EZT 136,200- 912-75
K1DPB 135,823- 959-71
VE4RRC (VE4EA, opr.) 135,000- 901-75
WA5ZWW 134,856- 937-72
VE2UN (WA3HRV, opr.) 133,350- 889-75
WØNUH 133,350- 889-75
W9DOB 133,006- 915-73
WA1RBR 132,830- 898-74
W3ZBW/4 130,275- 884-75
WA8YWX 127,800- 852-75
W4KFC 127,798- 865-74
WA1KZE (WA1NRV, opr.) 126,675- 852-75
W7EXM 126,225- 855-75
W4WSF 124,875- 835-75
WA9AUM 123,876- 837-74
WA7GWL 123,540- 900-71
WBØDSP 122,780- 819-75
WAØCVS 121,764- 834-73
WAØJCE 121,326- 836-73
WA3GJU 121,200- 809-75
W9YB (WA9VVJ, opr.) 120,168- 839-72
WB4GRN 120,150- 801-75
W7YKN 118,800- 825-72
K1THQ 117,072- 824-72
W8OOH 116,850- 780-75
WA7JBM 116,775- 790-75
WA1JZC 116,620- 833-70
KH6IJ 114,600- 764-
WA1MAO 114,034- 771-
WA4UFW 113,960- 771-
W4DM 113,515- 780-
K1OME 112,347- 791-
WA5ZNY 112,200- 815-
K9CUY 111,962- 758-
VE6MP 111,825- 752-
WAØENP 110,814- 764-
W2CXM (WA1LKX, opr.) 110,175- 739-
WBØCJV 109,816- 742-
W3CRE 109,500- 750-
W1FBY 109,296- 759-
K4CEB 107,596- 727-
WAØRBW 106,500- 710-
K4OSL 105,524- 716-
WB4UYD 105,225- 702-
WA7EFU 105,200- 768-
W3DQG 104,488- 706-
K6QPH 104,488- 706-
WA1EQT 103,660- 710-
WA1KID 103,600- 742-
WA8JZY/Ø 103,368- 709-
K1CPF/1 103,304- 698-
WA1MQO 103,222- 711-
W7UBA 102,960- 754-
W2PU (WA3MQJ, opr.) 102,638- 700-
WB6ABK/6 102,600- 684-
WAØPRS 102,273- 701-
WB2YRW/1 102,054- 699-
WA3HGV (WA3KZO, opr.) 101,700- 678-
K4CG (WA8RGJ, opr.) 101,550- 677-
WB4UOX 100,740- 702-
WB4OGW 100,728- 715-
W3GN 100,536- 712-
WB6RKH 100,350- 671-
WB2MZU 100,100- 724-

Multi-operator

WB5DTX 212,400-1419-
W7SFA 184,725-1239-
W1ARR 166,648-1126-
W6NUT 166,050-1107-
WB2OEU 163,800-1092-
W6YRA 157,575-1064-
K8UNG 153,375-1022-
W8EDU 153,180-1036-
WA5QXD 148,208- 991-
KØGXR 146,325- 975-
W6OKK 140,100- 941-
WA6TVC 135,600- 904-
W6HX/7 135,300- 902-
WB9IDS 131,350- 863-
WA4UCE 121,708- 832-
WA1GBA 119,520- 830-
K8RMK/8 118,880- 833-
W6BIP 114,300- 762-
KØVVY 113,955- 740-
KP4USN 113,664- 768-
WB8JBM/8 113,325- 912-
W3KMV 107,596- 728-
K9IU 105,300- 704-
K1CSJ/1 104,784- 708-
W3ADO 103,536- 719-
W3BWZ 102,300- 682-
K2CC 101,104- 712-
K5YHX 101,032- 692-

ARE YOU LICENSED?

● When joining the League or renewing your membership, it is important that you show whether you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

Hamfest Calendar

Delaware – The Kent County Amateur Radio Club's annual auction is March 13, in the basement of Kent County Court House, Dover. For further information write Edward Brown, K3OCE, Rt. 300, Box 356, Clayton, DE 19938.

Florida – The 3rd annual North Florida Swapfest is March 25, from 8 A.M. to 4 P.M., in the Community Center, Hwy. 98, Fort Walton Beach. For tickets and details write the swapfest sponsor, the Playground Amateur Radio Club, P. O. Box 873, Fort Walton Beach, FL 32548.

Georgia – The 15th annual Columbus hamfest is March 25 at the Fine Arts Bldg., behind the Municipal Auditorium at the Fairgrounds. For info write J. T. Laney, K4VGI, 1905 Iris Dr., Columbus, GA 31906.

Illinois – The Rock River Radio Club presents the 7th annual hamfest, Sunday, April 8. The location is at the Lee County 4-H Center, Amboy (1 mile east of the junction of Rt. 52 and Rt. 30 south of Dixon, Illinois.) Free coffee and donuts from 9 A.M. to 10 A.M. Rain or shine with indoor facilities, free camping areas, 2 free tables per party. Talk-in frequency 146.94 MHz. Advance tickets $1.50 at gate $2.00. Write RRCC Hamfest, Carl Karlson, K9ECF, P. O. Box 99, Nachusa, IL 61057.

Maine – The Portland Amateur Wireless Association's hamfest and auction is April 21, starting at noon. The location is the Holiday Inn, Exit 8 off Maine Tpke, Portland. Contact Martin Feeney, K1OYB, 38 Howard St., Portland, ME 04101.

Maryland – The Greater Baltimore Hamboree is Sunday, April 8, 10 A.M. to 4 P.M. at Calvert Hall College, Goucher Blvd. and La Salle Rd., Towson (1 mile south of Exit 28, Beltway I-695). Food service, flea market, no table or percentage charge. Registration $2. For further info write Joe Lochte, 5400 Roland Ave., Baltimore, MD 21210.

New Jersey – The Livingston Amateur Radio Club's annual hamgear auction is Friday, March 16 at 8 P.M. at the Recreational Hall in Memorial Park, across the street from Livingston High School. Building open at 7:30 P.M. All gear must be tagged with the seller's name or call and the minimum opening bid; otherwise the opening bid from the floor will be used. All buyers and sellers welcome.

New Jersey – The Knight Raiders VHF Club's auction and flea market is Sunday, March 25 at the YM-YWHA of North Jersey, 152 Van Houten St., Paterson. Free admission, free parking, refreshments available. Flea market tables $5 for 8 ft. or $2.50 for 1/2 a table. Reserve your tables in advance write to: Knight Raiders VHF Club, Inc., P. O. Box 1054, Passaic, NJ 07055.

New York – The 9th annual amateur radio luncheon meeting sponsored by the Metropolitan New York QCWA Chapter in connection with IEEE International Convention is Tuesday, March 27, at the Engineer's Club, 32 West 40th St., starting at noon. Radio Club of America and IEEE Vehicular Technology Group also are participating. Tickets are $7.50 and reservations must be made in advance thru Nathaniel Pfeffer, W2AIM, 1085 Park Ave., New York, NY 10028.

New York – The New York Radio Club's annual auction is Friday, March 30. Doors open at 6 P.M. and the auction starts promptly at 7 P.M. Donation $1 per person. Location Hall of Science Bldg., World's Fair, Flushing Meadow Park, Corona, Queens, NY.

Puerto Rico – The Radio Club de Puerto Rico's hamfest is Sunday, March 25 in conjunction with the closing celebration of Amateur Radio Week. Registration at 9 A.M.; lunch served at 2 P.M. KP4ID will operate all bands from the hamfest site. For further info write to the Radio Club de Puerto Rico, GPO Box 693, San Juan, PR 00936.

COMING ARRL CONVENTIONS

March 23-24 – Great Lakes Division, Muskegon, Michigan.
April 27-28-29 – West Gulf Division, Euless, Texas.
May 27 – Virginia State, Vinton, Virginia.
June 9-10 – Georgia State, Atlanta, Georgia.
June 30-July 1 – West Virginia State, Jackson's Mill, West Virginia.
September 14-16 – Roanoke Division, Reston, Virginia.
September 29-30 – New England Division, Hyannis, Massachusetts.
October 13-14 – Pacific Division, Santa Cruz, 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.

Strays

STOLEN EQUIPMENT

A Clegg 22er, serial number 1900-578, was stolen from W1NVR's car in the Grace Baptist Church parking lot at a ham radio auction on Nov. 20, 1972. The Clegg belongs to the Town of Wallingford, Conn., Civil Defense Communications Group. Contact: Michael B. Saul, W1DHP, Communications Director, Wallingford Civil Defense, 31 Hanover St., Yalesville, CT 06492.

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A Tempo I and power supply, SN 311094 was stolen from John W. Richardt, Jr., W2WIY, 94 Bald Eagle, Hackettstown, NJ 07840.

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On October 5, 1972, a 1970 Ford F-100 Pickup truck containing a Standard Model SR-C826M transceiver, SN 010194 was stolen in Sterling Heights, Michigan from Richard C. Grege, K8QLM, 4455 Montgomery Dr., Utica, MI 48087.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity HRH

CONDUCTED BY GEORGE HART,* WINJM

REPEATER ACTIVITIES

FROM TIME TO TIME this column has harped on the subject of using vhf-fm repeaters for public service communications purposes. We'll probably continue doing so, too, until the repeater that is used for casual conversation exclusively is the exception rather than the rule.

Club operating statistics recently compiled show that approximately 20% of this cross-section of amateur operators use fm-vhf. Although the data do not necessarily indicate repeater operation, it's probably safe to say that about 99% of this *is* using repeaters. If this is an accurate sampling of amateur operating, it would indicate, as a wild guess, that better than 30,000 amateurs are operating thru repeaters, these days. And the number is growing all the time.

Some will say that this estimate is too low. Maybe so, but let's not be carried away. The point is that you have to be pretty far out in the boondocks, these days, to be out of range of all repeaters on all bands. And, to mention a new and fast-rising concept, you *can't* get out of range of the Oscar satellite. All you need is the equipment - in your car, in your pocket, on your bicycle or at your home station. You're missing out on a new kind of hamming if you don't have it.

But more than that, the potential for public service through emergency communication is tremendous! Granted that you may not be the voluble or garrulous type, just having the gear available and being able to listen to what's going on over one or more of your local repeaters is a revelation. Usually just small talk, occasionally a highway incident, once in a great while a real, widespread emergency situation, and that's when having the little fm rig can be worthwhile, even though you may not keep it active in the transmit mode.

How many of our active ECs and RACES ROs are tied in through local repeaters? How many of you conduct regular or at least occasional drills to keep in practice? Just yakking casually isn't enough. If your AREC group doesn't have a repeater of its own – and most do not – why isn't it possible to make arrangements with a local or nearby repeater sponsor to utilize the repeater for emergency drills or simulated emergencies? Most of them are clubs or groups of amateurs who would be glad of the opportunity to devote their facilities to something really worthwhile, and many, if not all, would probably take active part also.

It is time we get organized at local levels so that each ARC member knows which repeater he will work through in an emergency, and equip himself accordingly; so that a standard procedure by means of which the repeater is commandeered in an emergency can be adopted; so that local served agencies will know who we are, how we operate and what we can do; and so that local amateurs, by and large, know exactly what is expected of them in the event of an emergency situation, which can occur at any time, without notice.

One thing we must all keep in mind about repeaters: their existence alone does not justify them in the public interest, convenience or necessity. So let's get our repeaters more fully into public service *operating*. It's fine to have a repeater on the air for constant use by local amateurs and passers-by, but at regular intervals every repeater should more vividly demonstrate that it complies with the mandate of 97.1 to render a "voluntary non-commercial communication service" to the public.

Traffic Handling

There is some disconcerting talk going the rounds, these days, regarding the general usefulness of amateur traffic handling, especially in light of

*Communications Manager, ARRL.

Twenty members of the Grizzly Peak Radio Club participated in the Four-City Walkathon for the Alameda Co. (CA) Chapter of March of Dimes, Dec. 10, covering all check points from 0630 til dark. Shown here, radio clubbers double check possible trouble areas along the 20-mile route with Army Reservists. Left to right: WA6BBG, K7QJP, WA6DPJ, Reservists Slapar, Beauchamp Satriano, and WA6TRP.

Five of the Eighth Region "brass" were cornered for this picture at the 8th Region ARPSC Conference in Huntington, WV last Oct. 21. Back row (l. to r.): W8MPD, SEC MI; W8IMI, SCM OH; WA8NDY, SEC WV. Front row: W8OUU, SEC OH; and W8ZBT, SCM MI.

the FCC's attitude regarding it as indicated in the new language of sections 97.112 and 97.114. That traffic should decline, in view of these strict interpretations which have now become regulations, is inevitable; but that it should disappear is not the intent, nor would such a result be a beneficial one to the amateur service. Quite the contrary.

The word "traffic," at least as used in this column, refers to written communications in standard ARRL message form. The word is no longer used in FCC regulations, and never was defined. As far as the new regulations are concerned, rules pertaining to "third party communications" apply to all such communications, written or spoken.

The new breed of amateur often asks "Of what value is written traffic?" Nobody writes messages any more, except perhaps on teletype, and even this is giving way to picking up the telephone. The mails get progressively worse. What's the point of handling, or learning to handle, written messages, and of having nets and organizations set up to do so? Why can't we just call the station we want to talk to or talk through and *talk*? With today's technology it isn't necessary to relay written messages. In most cases where it is really necessary you can reach your destination directly and talk the message direct to the recipient.

This overlooks one basic concept – that of training. True, you can get on one of the monitoring services and patch someone to his grandmother in some far-off place to wish her a happy birthday. But in a general emergency situation you won't be communicating with someone's grandmother, you'll be handling an emergency message that can't get through by any other means, and the recipient, especially if an official, will very likely want to know where the message comes from, who sent it or by whose authorization. You *cannot* properly authenticate emergency communications on a casual, word-of-mouth basis, and you cannot handle them on any other basis unless you are trained to do so. Those who feel that they do an effective job of emergency communicating without following standard procedures are whistling in the dark, letting their press notices go to their heads. And, assuming that standard procedures are frequently required, those who feel they can learn them in five minutes without constant practice and association are dreaming.

Whether or not the handling of traffic (see above definition) is necessary to maintain our public service image is a question that can be and frequently is argued. But there can be less argument about whether it is *good* for our image. It not only keeps us in a constant state of training for the purpose, but the organized nets familiarize us with discipline and organization in doing it efficiently. If everybody did it simply for the purpose of keeping himself in training and active in the organizational aspect, the message content itself would be immaterial. But almost nobody likes to handle picayune, valueless, inane messages – not for long, anyway. Every amateur who handles traffic wants and needs to feel that the messages he handles are of some value to someone and that the importance of getting them quickly and efficiently to their destinations is worth something.

So let's not abandon traffic handling. Let's keep it going, and keep organizing nets and systems for the purpose and keep soliciting originations so that when the chips are down and our value as emergency communicators is on the line we won't flounder around erratically but will step up confidently and take charge of whatever communication assignment comes our way. Only by constant activity during normal times can we achieve this state of readiness. – *WINJM.*

Daytime NTS

Not much has been said about the Daytime National Traffic System since the introductory article in the December 1972 issue. We have been busy soliciting candidates for leadership positions, accepting recommendations, making appointments, corresponding with appointed leaders, etc. At this writing, mid-January, approximately half of the fifteen needed managers have been selected. Presently, there are several vacancies in the Central Area and a few in the Eastern Area. Hopefully, by the time you read this, we will have a full slate of managers and most (all?) nets will be in operation. One daytime region net has been running since mid-December.

If you haven't already, why not check with your section net to determine the status of DNTS in your area. Find out how you can assist, either as a liaison station or NCS. If you should find limited or no DNTS activity, drop us a note indicating your findings and suggest someone you think could provide suitable leadership.

One more thing. For the daytime system to be effective, we must have traffic to pass. Please make

a sincere effort to do your share of originating traffic. Without traffic there is little to do.

Are You Represented?

Each month, at the end of the Public Service Diary, we include a mini-analysis of the Section Emergency Coordinator's reports received for the month. Each SEC is expected to report monthly to Headquarters indicating, among other things, the number of Amateur Radio Emergency Corps members in his section. The reports are scanned and the number of AREC members is recorded, added to the number of members in other reported sections and the total compared to the totals of other months.

While reporting (or failure to report) does not necessarily indicate that a section's AREC is active (or inactive), it is a fair assumption that sections with good SEC reporting records (thus, the more conscientious leaders?) are probably the ones best prepared for emergency operations, while the AREC in non-reporting sections is likely to be in sad shape.

During 1972 a total of 476 SEC reports were received from 52 different sections. Twenty-nine sections had perfect reporting records, while 22 sections were void of any reports. Below, are listed the sections in both categories. If your section is not listed, it is because some reports, but not all, were received in 1972. If you live in a section whose SEC did not report, why not drop your SEC a note (address in December 1972 *QST*, page 50) expressing your concern and offer to help out? Maybe you can help get your section "back on the map." Who knows, if the AREC gets back in shape, perhaps a life or two may be saved by amateurs who are prepared for emergency communications, should disaster strike your area.

Kudos to sections with good reporting records (figures in parentheses are the number of consecutive years of perfect reporting): EFla (21), Alta (11), Sask (8), Colo (7), EMass (7), Mar (6), Nebr (6), Nev (5), Utah (5), Ariz (4), Ind (4), Iowa (4), Mich (4), Ohio (4), Conn (3), NNJ (3), Org (3), WPa (3), SDgo (2), Va (2), Wash (2), WVa (2), ENY, NTex, Okla, SDak, Tenn, WFla, WNY.

Non-reporting sections (figures in parentheses indicate the number of years since the last report was received): Alsk, Vt, WInd (no report on record), Man (6), Wyo (5), Ill (4), Me (4), NH (4), SC (3), BC (2), Ga (2), NMex (2), SCV (2), Ala, Ark, Haw, Mo, NDak, Que, SF, SJV, STex. — *WA1FCM.*

Public Service Diary

While mobile in the Jackson Metro area (MS), W5HTV reported three separate incidents requiring assistance to WA5DPO, between Oct. 21 and Nov. 6. The incidents involved a bus seen afire, a three car accident on I-55 and a fire at a public building. Communications were handled on a local repeater and WA5DPO telephoned the proper authorities. — (WA5FII, SEC MS)

— . . . —

At 1309Z, Oct. 26, WB4OXT heard a distress call from a station 50 miles south of La Paz, Bolivia. An 8-year-old child had suffered severe skull damage and required immediate surgery. Only a medical student was available to operate and he needed assistance from Duke Hospital in Durham, NC. WB4OXT called the hospital and acted as intermediary, relaying the step-by-step surgical procedures described by the surgeons. Later contact indicated that the child's life had been saved. — (WB4CES, EC Mecklenburg Co., NC)

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On November 25, WB4UQH assisted in a search for a man lost on the Apalachicola River near Blountstown, FL. He maintained contact with the sheriff and relayed information from his location, in the sheriff's car, to W4KCA who passed the information to county authorities. The man was found during the 5-and-one-half hour search. — (WB4UQH, EC Calhoun Co.)

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On Dec. 10, WB8MAV mentioned on 2 meters that there was a shortage of type "O" negative blood needed to operate on her mother at the University of Virginia (Charlottesville) Hospital the next day. All normal channels had been exhausted in search of the needed blood. Hams in the area volunteered to donate blood and word was passed on 2 meters and the WB4KNX repeater that help was needed. Local broadcast stations were also contacted. The response was excellent and the operation proceeded as originally scheduled. Eight amateurs participated. — (K4RKA)

— . . . —

A fire broke out in a 5-story apartment building in Portland, OR, on Dec. 16. K7WWR proceeded to the site and was later joined by K7JYS. All persons were evacuated and no injuries were sustained. K7WWR and K7JYS aided the homeless in getting family members back together and finding places for them to stay with the assistance of WA7SAC who was in contact with the Red Cross. Five messages were sent to the families of the homeless. — (K7WWR, SCM OR)

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While mobile on Dec. 26, K7SZG lost the clutch in his car in Snoqualmie Pass (WA). He called K7KSZ via the W7PUG (Seattle) repeater. K7NQR and W7IEU were standing by as arrangements were made to get K7SZG towed back to Tacoma. W7IEU contacted a Tacoma station via the Northwest Amateur Monitoring System. K7PKM checked with Seattle auto dealers for a part but could not find one. — (W7IEU, EC Snohomish Co.)

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On Dec. 29, K8YUW/5 phoned EC WB5GOI requesting help in guarding a dangerous situation; chlorine gas from a rusted tank had hospitalized three children and other children were playing in the area. WB5BVP and WB5GOI alerted several amateurs. K8YUW/5, K5QBU, WA5SUE and W5PDG went mobile to the site of danger and kept guard until c.d. trucks arrived to remove the leaking gas bottle. W5GGZ, WA5BNH and W5BW provided relay service while the mobiles were enroute. W5BW alerted c.d. and W5IBO provided information on the noxious gas. — (WB5GOI, EC Harrison Co.)

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About 35 miles north of Cheyenne, WY, W5TZK's car stalled on snowy Dec. 30. After numerous attempts to start the car, it was decided to summon help before dark. The distress call was answered by WBØEEJ who called W7TZK's relatives in Cheyenne. The stranded auto was towed back to Cheyenne. — (W7TZK)

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On Jan. 4, W6ZP/mobile spotted a car containing several people which had just skidded off

Public Service Honor Roll December 1972

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)*	
Max Pts.	*10*	*10*	*12*	*12*	*12*	*20*	*3*	-	*5*	*Totals*
WA2ICU	10	10	12	12	12	16	3			75
VE3AUM		10				15		50		75
VE3GFN	10	10	12		12		3	21	5	73
WA3QOZ	10	10	12	12	12	13	3			72
WB4SVH	10	10	12	12	12	8			5	69
WA8LTX	10	10	12	12	12	4	3		5	68
WA2RYD	10	10	12	12	12	1	3		5	65
WA1MSK	10	10	12	12	12		3		5	64
WA3GSM	10	10	12	12	12		3		5	64
WB4KDI	10	10	12	12	12	3			5	64
W4OGG	10	10		12	12	20				64
KØBAD/4	10	10	12	12	12		3		5	64
KØPIV/4	10	10	12	12	12		3		5	64
WB4VZQ	10	10	12	12	12	6				62
WA2CLB	10	10	12	12	12				5	61
WB4RUA	10	10	12	12	12	1	3			60
WA8UPI	10	10	9	12	12	2			5	60
WB4WCM	10	10	12	12	12		3			59
WBØAXW	10	10	12	12	12		3			59
WB5AMN	10	10		6	12	20				58
WB8KVU	10	10	12	12	12	2				58
WA2AYC	10	10	12	12	12	1				57
W3FCS	1	10	12	12	6	11			5	57
WB8HOP	10	10	9	12	12	1	3			57
WB2AEH	10	10	12	12	12					56
WA2AFL/4	10	10	12	9	12		3			56
WA2EUO	10	10	12	12	12					56
WB2OYV	10	10	12	12	12					56
W5SBM	10	10	12	12	12					56
WA7JQS		10		12	12	17			5	56
WB9AHJ	10	10	12	12	12					56
WØLRW	10	8	12	9	12				5	56
WAØSIG	10	10	12	12	12					56
W7OCX	10	10	3	12	12		3		5	55
WA9EED	10	10	12		12	3	3		5	55
WB2CHY	10	7	12	12	12					53
K3KAJ	10	10	12	9	12					53
W2OT	10	10	12	12			3		5	52
KØBIX	10	10	12	3	12				5	52
WAØMLE	10	10	12		12		3		5	52
WB8JAD	10	5	12	12	12					51
WB5EIN	10	10	12	6	12					50
WA6DEI	10	10	12	6	12					50
WB6KJI	10	10	12	12	6					50
W7BQ	10	5	9	9	12				5	50
WB9FST	10	10	9	9	12					50
VE3GJG	10	10	12	6	12					50
W2ROF	10	10	12	12					5	49
W2TPV/Ø	10	10	12		12				5	49
K8NQW	10	10		9	12			3	5	49
KØMRI	10	10	12		12				5	49
WA3QOR	10	10	9	3	12	1	3			48
WA2LLD	10	10	12		12		3			47
WB4OMG	10	10	12		12		3			47
W4WXZ	10	5	12	6		12		2		47
WB4ZSA	10	10	12		12		3			47
WB8IBMV	5	10	6	12	9				5	47
WA8VKI		10	3	12	12	5			5	47
VE3OOC		10		12	12	13				47
VE3SB	10	10	12		12			3		47
WA3MQP	10	10	12		12	2				46
WB4SQA	10	10	6	12	3				5	46
K9IIDP	10	9	12		12			3		46
WBØLAI	10	10	12		12			2		46
WA5YTA	10	10	12		12	1				45
W6OAW		10		12		18			5	45

WA1NED	44	W2FR	39	W3YA	34	
WB2HLX	44	W3LOS	39	K4KNP	34	
WB2HKL	44	W3NEM	39	W4UQ	34	
K3OIO	44	WB8CSH	39	W6YBV	34	
WB6AKR	44	WB8KXV	39	W7WA8U/5	34	
W6INH	44	WØIIB	39	WA8ETW	34	
W7AXT	44	VE3AWE	39	W9EI	34	
W7GHT	44	VE3DPO	39	W9QLW	34	
K7OHF	44	VE3LWD	39	VE3AIA	34	
W8GLC	44	WB4OAA	38	VE3CYR	34	
WA8NOQ*	44	K8MLO	38	VE3FAS	34	
VE3FRG	44	WBØBIY	38	WN3RCI	33	
VE3GBR	44	WBØIICK	38	WB4IMH	33	
WB4PNG	43	W3TN	37	W6DEE	33	
WA2CNE	42	WB4FKJ	37	WA8BCX	33	
W5ABO	42	WN4YMV	37	WB8HFZ	33	
W5EIJ	42	W4ZJY	37	WA2AOG	32	
K5MAT	42	WB8ALU	37	WB2JWM	32	
KØAEM	42	WB8KKI	37	WB2RXK	32	
VE3GT	42	WA8PIM	37	WA3OLG	32	
WB2NRK	41	WØGBJ	37	WB8CWD	32	
WA2UOO	41	VE3UID	37	WB9KVN	32	
WB4TNC	41	WØBV	36	VE3BPC	32	
K4UNW	41	WA2LCC	35	VE3EGV	32	
K5ROZ	41	WA3QIA	35	VE3FQZ	32	
WBØCCB	41	WB4AJL	35	W6LYY	31	
W2MTA	40	W7PI	35	W2GLB	30	
W6AUC	40	WA1MYK	34	W4CTD	30	
WA6TVA	40	K1SXF	34	WNØGVR	30	
W1UBG	39	W3OKN	34			

*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.

the highway near Fallon, NV and had overturned several times. W6ZP broke into a roundtable and had W6JJ arrange for W6LL to tell highway patrol officers about accident. Officers arrived at the scene within ten minutes and an ambulance was summoned. Had help not arrived when it did, the injured persons probably would not have survived, since the temperature was hovering around zero. – (W6AUC)

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Northern Mississippi was hit by an ice storm on Jan. 7, which resulted in numerous small towns being without electricity because of powerline breaks. The Miss. Sideband Net was activated and W5GZZ and WA5s CAC GYM operated as NCS. K5TFV was on emergency power for 13 hours. W5GZZ and WA5GYM operated WA5WEG, the c.d. station. Information was fed to local radio stations. – (WA5FII, SEC MS)

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At 0815 local time on Jan. 11, WØRUK/mobile issued a distress call concerning an automobile accident near Potterville, MI, on MIDCARS. Service control, W9JLL was unable to copy WØRUK because of conditions. WB2LVW received details of the accident from WØRUK and issued a call for help to the MI area. W8PNW (OH) and W8IIA (MI) responded and called their respective state police departments. Help was promised within 7 minutes of the notification. – (WB2LVW)

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When the Eastern Airlines jumbo jet crashed in the Florida Everglades 17 miles west of Miami, Red Cross officials alerted SEC W4IYT at about 0420 (Dec. 30) requesting a possible communications link be set up between Red Cross Headquarters and the crash site in the event their units could not cover the 22 mile distance. Ass't EC WA4QLZ was called and he contacted W4BLM. By 0500 W4ITE arrived at RC Hq. and was on the Miami Repeater, WB4HAA, with WA4QLZ and K4TFS, Dade Civil

Defense with W4YP and WA4PDM. W4BLM took a walkie-talkie to the crash site but found the distance from the repeater too long for that type of communications. W4GOG offered to take up a small plane to act as relay but officials advised that no additional communications was needed. K4WKY drove to the site but was turned away by police. – (W4IYT, SEC SFla)

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At approximately 1900, Jan. 2, fire broke out in the business district in Pauls Valley, OK. Early predictions indicated that the entire business district would be wiped out. W5OJZ, at the Okla. City EOC placed the Mid-Okla Repeater group on *alert. WA5JGU, in QSO with WA5VIL on 75* meters, intercepted the alert from 2 meters and with WA5VIL acting as NCS, activated a special Okla. Phone Emergency Net session to act as possible back-up to existing communications facilities. W5KOZ and KP4DJT/5 left for the scene. After nearly an hour, WB5CQU relayed further information from the scene. Shortly thereafter it was determined that the fire was under control and the alert was ended. – (WA5FSN, SEC OK)

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During the exhibit "Ham and His World" held at the Ontario Science Center, Oct. 18-22, a message-handling booth accepted 487 messages from the public destined to points all over North America. Eleven amateurs organized to handle the traffic which was routed through the National Traffic System. – (VE3GFN)

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The Southwest Ohio AREC provided communications to coordinate assembly and movement of a parade in Fairfield, OH on Oct. 21. Five mobiles and one portable station participated using 2-meter fm. – (WA8COA, EC SW Ohio)

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On Nov. 12, the SW Ohio AREC was active again, this time assisting in the Muscular Dystrophy Drive in Butler Co. Thirteen amateurs participated. Queen City Emergency Net provided a similar service in Hamilton and Clermont Counties. – (WA8COA, EC)

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The second annual "Operation Santa Claus" was held Dec. 11-15 by members of the Scioto Valley ARC, W8BAP, of Chillicothe, OH. Using 6-meter transceivers, members went portable into kindergarten classrooms of 7 city schools and interviewed 375 children, letting them talk with Santa. – (WB8EEF)

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Amateurs operating from KC4USV (Navy MARS affiliate) set an all-time monthly high record for Antarctic amateur stations by conducting 1186 phone patches and handling 368 radiograms during Dec. – (Operation Deep Freeze news release)

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Los Angeles section AREC members were busy during Dec. Twenty-five amateurs provided communications for the Covina Christmas Parade under the direction of EC WA6JXG. Fifteen members supplied communications for a marathon walking race in the Culver City area with activity coordinated by EC K6VGH. And Dec. 31-Jan. 1, 23 amateurs provided communications support for the American National Red Cross for their activities during the annual Rose Parade. Coordination provided by EC WB6IDO. All above activities took place on 2-meter fm. – (WA6QZY, SEC LA)

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We close 1972 with the receipt of 41 SEC reports which list a total of 12,701 AREC members, which is up slightly over Dec. 1971. In 1972, the total number of SEC reports received wavered between a high of 43 in Apr. to 36 for Aug. (including late reports). The following sections' SECs reported in Dec.: Alta, Ariz, CZ, Colo, Conn, Del, EBay, EFla, ENY, EMass, Ind, Iowa, Ky, LA, Mar, Mich, Miss, Mont, Nebr, Nev, NLI, NC, NNJ, NTex, Ohio, Okla, Org, SV, SDgo, SBar, Sask, SDak, Tenn, Utah, Va, Wash, WVa, WFla, WMass, WNY, WPa.

Traffic Talk

The topic of counting book traffic is tackled in *Operating an Amateur Radio Station*, a League publication which, presumably, all traffic men have (and read?). There seem to be some misunderstandings or misconceptions on the way book messages should be counted for net and individual traffic reports. Let's review a few of the principles.

First, let's define book messages as any messages in which there are identical parts and which ARE SENT without repeating the identical parts. Now a quote from "OARS:" "When transmitting or receiving messages in book form, count one point for every *three* messages in the book, plus another point for any over a multiple of three."

Here's the crunch: With the amount of military arrival, service-organization, QSL bureau, etc., traffic, some nets and individuals are claiming *enviable traffic totals by counting each book* message separately while others, who count book traffic correctly, are left with rather modest totals when handling an EQUIVALENT amount of traffic. Is it fair that some individuals should make BPL when a more accurate traffic total is actually closer to one-third of the total? Or when traffic totals of two nets are compared when one total has been inflated by counting each book message separately?

Let's consider an example. A station reports into our net with 12 "messages" addressed to families back home. In all cases, the preamble (except number and time) and text are the same. A natural for "booking!" The parts which are identical are sent first, followed by the variable parts (number, time, address and signature, in this case). Once the identical parts are sent, transmitting the remaining parts of the 12 "messages" takes much less net time (probably about 1/3 as much net time as sending complete messages); hence, the one for three ratio outlined above.

It is likely that some traffic men believe that book traffic should be counted differently. Changes in the method of counting such traffic are certainly possible. However, unless (or until) changes are made, let's base all counting of book messages on the same criterion: one for three. – *WA1FCM.*

National Traffic System. K2KIR reports EAN's second best Dec.; excellent representation and many helping hands during the Christmas rush. CAN rate down because of lousy conditions but highest traffic since 1968. W1EFW sez 1RN perking along in pretty good shape despite horrible

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Dec. Traffic

Call	Orig	Recd.	Rel.	Del	Total
W3CUL/4	319	1259	1106	67	2751
KØONK	177	715	622	20	1534
WA3IYS	51	624	570	42	1287
WB4WCM	118	485	413	58	1074
WA3QQZ	105	466	358	88	1017
KØYFK		434		434	868
WA8ETX	62	403	390	11	866
W1PEX	106	398	316	30	850
K4SCL	111	404	275	50	840
W3LML	452	373	51	4	880
K8NQW	374	214	123	67	778
K4FAC	76	340	313	38	767
WA2ELD	34	362	343	10	749
W6BGE	22	350	346	10	728
W9CXY	11	358	352	6	727
W6RSY	27	335	311	39	712
WB4YCV	85	347	246	16	694
WB2UVB	512	96	6	77	691
WB2LZN	43	366	175	102	686
WB4OMG	32	329	322	2	685
K7NHL	31	357	269	26	663
W3VR/4	241	229	209	12	661
WB4AIW	37	306	286	20	649
KØAEM	11	370	243	15	639
W8VDA/4	12	302	313	10	637
WA8PIM	35	301	286	6	628
W7LKB	6	302	311	8	627
WØWYX	56	273	144	134	607
WA3OGM	57	279	210	42	588
WA9EED	10	284	264	12	570
KØBAD/4	127	250	189	2	568
WB4RUA	35	265	258	9	567
KØPIV/4	44	259	166	93	562
WA2CNE	32	274	215	33	554
W6LRU	2	276	258	13	549
WB6VTK	498	22	9	15	544
WA2AFL/4	45	241	213	36	535
WA1MSK	45	270	211	5	531
W6IPW	8	261	259	2	530
WA6DEI	100	219	200	9	528
W6JTA	16	251	237	22	526
VE3SB	164	192	146	15	517
K5JEY	1	256	255		512
WBØAXW	36	236	231	5	508
KØZSO	2	253		253	508
WA2ICU	17	246	227	15	505
VE6ADX		252	252		504
WB8JAD	34	234	215	19	502
K3NSN(Nov.)	10	615	615	3	1143
W3FML4Nov.)	51	275	176	2	504

More-Than-One Operator Station

W2ZQ	26	538	504	33	1101

BPL for 100 or more originations-plus-deliveries

WAØAUX	250	VE3ASZ	124	WAØMED	112
WNØFSE	205	WNØGVR	123	W1ZPB	110
K8ONA	200	WB8HUP	121	WA4IQS	110
KH6RZF	178	K9HDP	121	WA1NLD	109
WA6BYZ	170	WAØSUT	121	WB9AEH	109
WN4YMV	159	VE3GFN	120	W1BLY	108
W6INH	140	WB4ZSA	119	W5ABQ	108
W3TN	138	K7NTS	119	W5GHP	107
WA4PDM	137	WNØGQL	119	WB4JNR	106
WA1ECM	133	WB8NRC	118	WA5ZZA	105
W2OE	133	VE3DV	117	K2VGD	104
K8PBJ	133	WA3GSM	116	W4CID	104
WA8MCR	132	WN3RCI	116	WA2RYD	103
WØINH	127	WA4VEK	116	WB4GHD	103
W8QCU	126	WØHOJ	116	W8IBX	103
VE3EHI	126	WB4TNC	115	W7OCX	102
WB2NRK	124	W4BAZ	114	WA3QQR	101

More-Than-One Operator Station

WB4MLI 136, VE2ON 122

BPL Medallions (see July, 1968 *QST*, p. 991 have been awarded to the following amateurs since last month's listings: WB2UFG, WA4IQS, WAØAUX

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.

conditions prevailing during second session. 2RN Dec. traffic was down considerably from last year which is also reflected in the yearly total but W2FR reports that 1972 was a great year for representation. Dec. was 4RN's best month in 1972 except for representation. W4SHJ has issued 4RN certificates to K4SCL, WA4BGW and WA2AFL/4. KØBAD/4 also reports Dec. good to RN5; best month since Jan. '71 which included SET. Poor conditions have forced RN7 to hold their other session at 0130Z instead of 0530Z until conditions improve. Dec. was 9RN's best month in '72 with all statistics up. W9OYL, WA9EED and WB4s WCM ZSA received 9RN certificates from W9HRY. All TWN figures up, too, with an upswing in section activity. WØHI issued 1972 annual certificates to top TEN active stations: WØs BV INH LCX MA MOQ ZHN, KØs AEM AZJ DDA MRI, WAØs ELO MLE NZA QEX TNM, WBØCNM, VE4s EA RO, VE5GL. WBØCXN earned a new TEN certificate.

December Reports

Net	Sessions	Traffic	Rate	Avg.	% Rep.
EAN	31	3280	2.015	105.8	100.0
CAN	31	2151	1.330	69.4	99.4
PAN	31	2122	1.272	68.4	100.0
1RN	62	874	.456	14.1	93.4
2RN	62	978	.849	15.8	100.0
3RN	62	620	.589	10.0	97.8
4RN	50	1063	.597	21.2	77.9
RN5	62	1363	.571	21.9	96.5
RN6	62	1454	.654	23.5	100.0
RN7	61	529	.411	8.7	58.8
9RN	62	766	.512	12.4	98.4
TEN	62	1054	.672	17.0	90.0
TWN	62	721	.324	11.6	79.7
TCC Eastern	176[1]	1435			
TCC Central	119[1]	1262			
TCC Pacific	163[1]	1825			
Sections[2]	1525	9654			6.5
Summary	*2225*	*31151*	*EAN*	*14.0*	
Record	*4045*	*51705*	*2.049*	*28.5*	

[1]TCC functions not counted as net sessions.

[2]Section and local nets reporting (65): AENB, AEND, AENO, AENT (AL); OZK (AR); NCN, SCN (CA); CCN (CO); BEN, CN, CPN, Nutmeg VHF (CT); DEPN, DTN (DE); FAST, FMTN, GN, QFTN, TPTN, VEN, WFPN (FL); GSN (GA); ILN (IL); QKS, QKS-SS (KS); KNTN, KYN (KY); SGN (ME); EMPN, WMN (MA); MNN, WSB (MI); PAW (MN); MSN, WEN (MO); MTN (MT); NHVTN (NH-VT); NJN, PVTEN (NJ); NLI, NYS (NY); BNR, OSSBN, SSEN (OH); OLZ (OK); EPA, PTTN, WPA (PA); TN, TNN (TN); TEX, TTN (TX); BUN (UT); VN, VSBN (VA); NSN, WSN (WA); WVPN (WV); BEN (WI); APSN (AB); MTN (MB); OBN, OPN (ON); WQV/UHF (PQ); SATN (SK).

Transcontinental Corps.

All directors scheduled extra TCC stations to help handle the Christmas traffic. On KØAEM's first report, he indicates that with all the activity, it was a great month for breaking in a new director. K5MAT welcomes W7DZX back to the Pacific TCC roster and expresses thanks to the gang for their excellent cooperation during the Christmas rush. TCC certificates issued: Eastern - K4FAC, WB4OMG; Central - W5TNT.

(Continued on page 102)

Correspondence From Members-

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

FREAK OR NO FREAK

● The use of orbiting repeaters or reflectors such as Oscar 6 and the moon should not be isolated as freakish things not worthy of contest recognition. The exception granted in the case of Oscar 6 for the VHF SS is a step in the right direction, but the fact that it is an exception rather than the rule implies a lack of acceptance of space communication techniques as part of the everyday vhf scene. *Satellite communication in particular is a great* equalizer in which an operator in Utah now has access to many more stations than would otherwise be possible. Fixed terrestrial repeaters which are not available to all contesters on an equal basis should continue to be excluded, however. (Also, contesting through terrestrial repeaters would be contrary to FCC-stated intra-community service goals.) It can be shown that the ionosphere "retransmits" hf signals through interaction between the incident radio wave and free electrons in the ionospheric plasma; 'nuff said? – *Art Goddard, W0MOQ, Vernon, IA*

● Oscar 6 use for contacts and sections in the January VHF Sweepstakes was met with much confusion and disbelief by many members and friends of our club. This seemingly arbitrary decision violates several contest rules which we have all come to believe necessary for a meaningful contest.

The use of repeaters has been traditionally banned from ARRL contests. Obviously Oscar 6 is a repeater. Why then should there be dispensation for this repeater when all other repeaters remain illegal? Does this not establish an argument for the use of all repeaters in contests? There is little difference between a satellite repeater, a repeater in a high-flying aircraft, or merely a mountain top installation. Oscar 6 is not just a vhf repeater, but has its output in the hf spectrum on ten meters. Further, a study of the orbital paths of Oscar 6 across the United States shows that varying access times are available for different locations. Is this not an inequity in a contest situation?

It is not fair to the serious vhfer who has developed his station and equipment and operating prowess to where it is possible to work Illinois on six-meter scatter or Michigan on two meters to be now outclassed by the use of fifty watts output and a ground plane antenna. – *Walter Bohlman, K3BPP, President, Mt. Airy VHF RC Inc., Philadelphia, PA*

[EDITOR'S NOTE: How do you feel about this?]

"BLACK BOX" NEEDED

● This is a challenge to other amateurs which I hope will be accepted. The FCC has "suggested" that full carrier a-m not be used on the lower four hf bands.

This has caused some concern to those of us who cannot spend much money on our hobby. From strictly financial viewpoints, the old phasing system seems to have the advantage in getting on ssb.

But we are also supposed to advance the state of the art. . . . accurate phase shifts must be maintained over wide frequency ranges. I believe that we have overlooked a characteristic of chip operational amps that will solve this problem of the phasing system. Sometime last year I got a chance to look thru a catalog of ICs and mentally was able to build a phasing generator for under 25 dollars.

The big problem was that I did not have the math background to calculate the feedback loops to replace the 2Q4 – but the chip specs listed "stable phase shift from dc to 20 MHz" – imagine, the same circuit for balanced modulator, mixer, and receiver converter!

I realize that anyone with the expertise to do the math required would probably want a patent, but I believe that it would be a great service to "us poor folks" if someone could either publish a circuit in *QST* or come out with a "Black Box" for under 25 dollars. Thanks in advance. – *Patrick E. Hamel, W5THT, Long Beach, MS*

NO SPOOFING

● Upon reading *Operating News* in the November issue of *QST*, I noticed a reference made to *I Tappa Key* as a "common spoof of Greek letter honorary fraternities." The reference brought back memories to this OT. Perhaps some amateurs, because they had not yet been born in the late twenties and early thirties, may have taken the editor's remark referring to it as a "spoof" at face value. For the sake of historical accuracy, *I Tappa Key* was a *bona fide* organization of radio amateurs and broadcast operators who were also hams in that era. Its membership extended from its "birthplace" in Cape Girardeau, Missouri to the West coast. Its originator and "High Kilowatt" was Joseph R. Meloan, 9BPX (No W, K, WA, WB, etc.), who later, when he moved to California, was assigned the call W6CGM. This writer, who was a member of *ITK* in those years, would appreciate it greatly if some *QST* reader who may know the present whereabouts of ex-W6CGM, would drop me a card giving me the present address of this real OT. – *Russell C. Bennett, W6DTJ, Sacramento, CA*

SWL SUPPORT

● Enclosed find my membership. Although I won't be able to vote on any of the League affairs, since I'm not an amateur, I feel it's an honor to help support the ARRL in any way I can. There are too many licensed amateurs who find it easy not to belong, but yet they reap the many benefits. Through the many fine articles in *QST* and your "Gateway" series, I hope soon to be licensed and with my membership, help make a great League even better. – *Bill Kingsbury, St. Paul, MN*

FM/REPEATER MANUAL

● The new *FM and Repeaters for the Radio Amateur* is a very good job, and I am enjoying reading it very much. – *John F. Longley, W2ANB Slingerlands, NY*

● Congratulations for a job well done on the "FM and Repeaters" handbook. The tremendous effort that went into the publication is quite obvious. Once it becomes publicized, I am sure that the amateurs will buy them by the carload. – *Larry Shima, W@PAN, Bloomington, MN*

● Thanks to the staff of ARRL for the excellent fm-repeater handbook recently published. I purchased my copy this past week and found it very informative and well written. – *Andy Drautz, WB2DEW, Kings Park, NY*

● My copy of *FM and Repeaters for the Radio Amateur* arrived the other day, and I have only found the time to just leaf through the whole book. Nevertheless, it takes only one glance to see that you have done a thorough job and have made an important contribution to amateur radio. It fills a definite need, it was timely, and it is up to date. I'm delighted with it. My thanks to all who worked on this project. – *Paul L. Rinaldo, K4YKB, McLean, VA*

ROTTEN REGULATION?

● I wonder what "T.O.M." would have said about the action taken by FCC in their Report and Order on Docket 19162 adopted September 27, 1972, concerning phone band expansion? After overcoming his first fit of apoplexy I expect he would have rumbled "Rotten Regulation – Rotten Administration" and gone on from there to set things straight.

Frankly, I think the FCC "sold out" the U.S. amateur in the hope of placating the ITU, RSGB and Canada. This, I think is not only "Rotten Regulation" but wishful thinking on FCC's part.

The fact that a Commission representing over 60% of the world's amateurs retreated in the face of a pressure group representing at most less than 20% of the world, will not be considered "cooperation" at the next world radio conference. It will be interpreted for what it really was – weakness on the part of the U.S. to stand up for its international rights – and the way will be paved for additional cutbacks of U.S. amateur privileges. . . .

The FCC is supposed to be responsive to the Congress of the U.S., not the ITU, RSGB or other foreign groups. Unless our elected representatives know where we stand, the FCC will continue to ride roughshod over us as they did in this instance. Let's get with it. – *Chas. E. Dewey, Jr., W8LBM/W@CD, Battle Creek, MI*

● In this instance, FCC showed better judgment than ARRL, and the thousands of cw operators can only be thankful that the FCC did not yield to pressure to expand phone privileges in more than the 10 kHz which was approved. Any extension of phone privileges is in effect, a restriction of cw privileges.

Your comments on incentive licensing are probably irrelevant. The FCC decision was undoubtedly based upon the principle of the maximum benefit to the largest number of operators within our limited allotment of frequencies. – *Howard E. Winters, W8HX, Dearborn, MI*

CP QRM

● I would really like to hand it (the B+ of my rig) to the lid who, on Dec. 12, 1972, at 0230 GMT, fired up his RTTY right on top of W1AW's Code Proficiency Run. I had been studying every night for three weeks in order to get a 15 wpm endorsement sticker. It would have meant a lot to me to get this award, something I would be proud to display as the fruit of my labors. It seems to me that no matter what a ham feels about ARRL, he can still keep a respectable distance away from W1AW's frequency. The lid that does jam the frequency is not ruining it for anyone but the hundreds of hams and near-hams who are striving to better their code speed. Perhaps T.O.M. needs some help in administering the Wouff Hong; the amount of lids that deserve it seem to be multiplying rapidly. I can think of one RTTY operator who has earned the privilege of having it applied to him. – *Barry Hamilton, WN1QWA, Nantucket, MA*

● I am a 13 year old Novice trying to improve my code speed. I listen to W1AW's broadcasts of 10, 13, and 15 wpm at 1930 EST. Sometimes, however, it is very difficult to receive you, not because reception is poor due to QRN or anything else of that sort, but rather because higher classed hams are transmitting on the same frequency, in my case, 3580 kHz. I, probably along with many other Novices or others trying to improve their code, would greatly appreciate it if you could ask hams to please not transmit on the same frequency as W1AW's code practice broadcasts. – *Deani Kaufmann, WN2FHO, Jamaica Estates, NY*

● It is very disgusting to me, as well as other Novices I'm sure, to have a hundred stupid, liddy, Generals and what-have-you, that seem to just *love* to QRM W1AW during code practice sessions. . . . – *Jim Gaskins, WN8MKL, Burnsville, WV*

LAST CALL

● I still have several large boxes of QSL cards from prior to my retirement on August 1, 1969, as QSL Bureau Manager. I am sure some of these fellows would be very glad to know that their cards are still being held at the bureau. Notices were sent to them when I was manager, but no reply. I am wondering if one last notice in *QST* would bring replies from some of them before destroying cards. If any of the fellows think they might still have cards here, I would be glad to have them send one sase. If they do not have cards, I will forward their envelopes to the present Zero QSL Bureau. – *Alva A. Smith, W@DMA, Caledonia, MN*

PHONE PATCHES

● Section 97.103 (station log requirements) of the FCC regulations have been revised to show that "A notation of third party messages sent or received, including *names of all participants* and *a brief description of the message content* " must be retained.

I am sure many hams have handled phone patches from South American countries where the language used was either Spanish or Portuguese; and probably they do not understand either of these languages. Therefore, they are not aware of the nature of the traffic being handled. It seems to me that it should be pointed out that this is in violation of the new regulations as amended. – *John P. Weber, Jr., K1PVB, West Hartford, CT*

Happenings of the Month

Board Meeting Report

Army-ARRL-BSA Project

New Rules for Model Control

Emergency Comms Advisory Committee

Phone, Repeater Rules Stay "As Is"

BOARD MEETING HIGHLIGHTS

To a greater degree than most national organizations, the American Radio Relay League is a functioning democracy – or perhaps more accurately, a micro-republic, since its governing body is representative, like Congress, rather than direct, like a Town Meeting. (It's perhaps worth emphasizing once again that the officers, the directors and vice directors are all unpaid volunteers elected to their posts.) The governing body, the Board of Directors, held its Annual Meeting January 18-19, 1973. (Another meeting is scheduled for July 19, called the "second" meeting.)

Actually, the meeting unofficially began on Sunday, January 14, when the first few directors and officers arrived from their home cities. Through Wednesday, there were informal exchanges of ideas and information among directors and staff; "caucusing" by directors on behalf of motions to be offered (or indeed, ideas in search of motions); inspections of League records; observation of work rituals; and committee meetings. Thursday morning the meeting began officially at 9:04 (the notice of the meeting had indicated 9:30 – but the directors agreed informally to start early!), and the formal record of its actions appears later on in this department. Here is a summary of high points.

A major action was the unanimous adoption of a resolution expressing deep concern over the apparent trend toward restrictive regulations characteristic of recent FCC actions. Directors reported strongly adverse membership reaction to changes in amateur rules, especially in the areas of repeater operation, message traffic handling, and phone band suballocations. Incidentally, the directors wanted this resolution to reflect its true grass-roots origin; accordingly the basic draft was settled upon in Committee-of-the-Whole, after excluding the officers, General Counsel and staff from the discussions. Nevertheless, the resolution is fully supported by the whole official League family. It directs the President and General Manager to undertake a vigorous program leading to "reasonable and technically viable philosophies of regulation and interpretation, conferring at all necessary levels with the appropriate Government departments and officials . . ." (See Minute 20 and this month's editorial.)

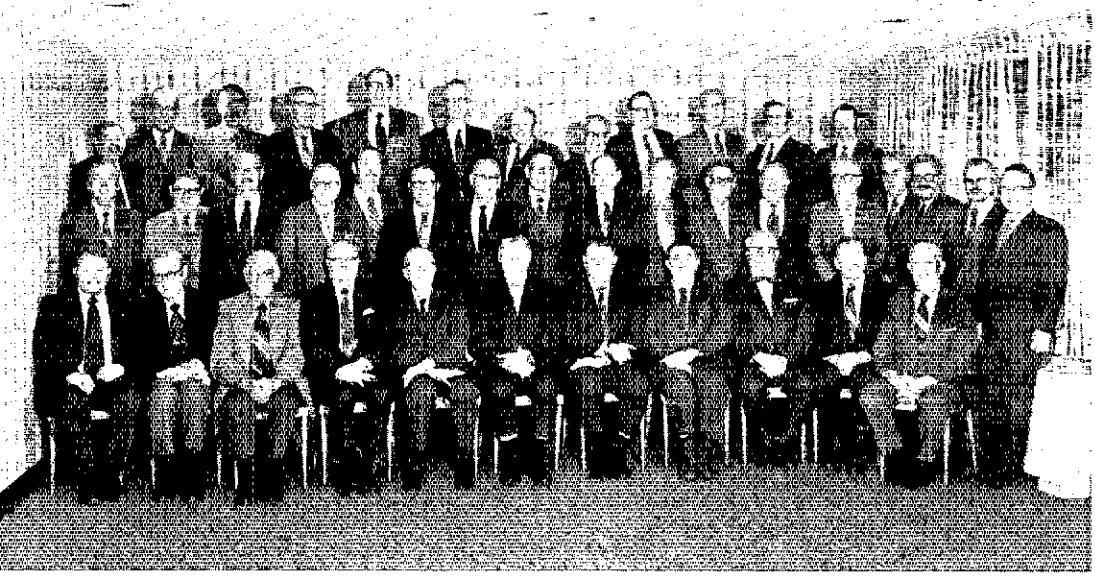
In a similar vein, the Board directed the General Counsel to file comments in opposition to the recently-proposed license fee increases (Minute 38).

Five new standing committees were structured at the second (July) 1972 meeting, becoming effective at the close of this January, 1973, session:

International Affairs Committee
Plans and Programs Committee
Membership Affairs Committee
Management and Finance Committee
Legal and Regulator Committee

replacing the Finance, Planning, Membership & Publications, Public Relations and Merit & Awards Committees, and encompassing some previously special areas such as the Foundation study. The composition of these committees was announced by the President at Minute 18; his list was formulated with the aid of a questionnaire turned

Three-time *QST* Cover Plaque winner, Wes Hayward (center), visited ARRL Hq. in December of 1972. Wes is shown here with Technical Editor DeMaw, W1CER (left) and former *Handbook* Editor Goodman, W1DX (right) following an evening of brisk discussion about the design of receivers and solid-state QRP equipment. *QST* has published eleven technical articles under Hayward's byline since 1964, at which time he held WA6UVR. Wes is presently employed by Tektronix, Inc., Beaverton, Oregon, as a physicist. He has been a proponent of QRP operation for many years, and has made many outstanding contributions to the solid-state amateur design art. More W7ZOI articles are coming. Standby!



The gang's all here: Front row, left to right: WØPAN, W3SW, W5QKF, W7PGY, Treasurer Houghton, President W2TUK, W4DQD, W6ZRJ, W1QV, K2SJO, W8WC. Second row: WØDX, W2IHA, W5NW, WØBUO, W1CER, W1RW, W4ACY, WAØLLC, KØNL, W6KW, WØSIN, W5EYB, W9PRN, W4WHN, PR Consultant Waters, VE2MS, W1RU. Top row: W3KT, WØBWJ, W6NJU, W1BDI, W4KFC, VE3CJ, W1HHR, W4WBK, W1NJM, W9HPG, W1UED, K7WWR.

in by each director indicating preferences, experience and talents which could be brought to the work of a particular committee.

Looking some years ahead, the Board assigned to the International Affairs Committee (Minute 27) the task of updating and formulating more detailed plans for representation of amateur radio at an eventual high frequency World Administrative Radio Conference. ("Updating" here has reference in part to an extensive working paper presented at the 1972 Annual Meeting, to summarize projects and plans in progress at that date.)

The Board chose the Radio Amateur Satellite Corporation (Amsat), producers of the ham satellite Oscar 6, as recipients of the 1972 ARRL Technical Merit Award; See Minute 10. (Project Oscar, Inc. had received the parallel honor in 1965.) The Board also voted to continue administrative support for Amsat (Minute 53). There will also be a study of a space tracking station installation at League Headquarters and to assess the need for a full time satellite coordinator at Headquarters (Minute 52).

The year just finished made us all quite conscious of the need for amateur readiness for emergency communications. The Board has called for creation of an Emergency Communications Advisory Committee (No. 8; also see the call for nominations elsewhere in this department) to furnish it with expertise on this important subject. A couple of study tasks await the ECAC when it gets going, possibly right after the July Board meeting: see Nos. 37 and 39).

SCMs have long been the League's volunteer man-on-the-spot for communications activities: often they've been the principal contact between an individual member and the League in a whole state, or at least a sizable portion of one. The Board has accordingly chosen to recognize areas of concern, in addition to communications activities, in which an SCM can voluntarily get active: public relations, club affairs, recruitment into amateur radio and into the League, and training (No. 7). The Board approved specific "goals and objectives" for the President and General Manager (Nos. 51 and 59). Present members of the Executive Committee were reelected – Directors Clark, Thurston, Griggs and Eaton. The remainder of the committee, as specified in the By-Laws, comprises the president, the first vice president and the general manager. Elections of officers are called out in the Articles of Association for the Annual Meeting in even-numbered years. Thus, the next election of officers takes place in January, 1974.

These are highlights – on to the minutes themselves, further on. For convenience this year, we've set key words of many of the minutes in bold face type. Please let us know if you find this helpful – or distracting.

LICENSE SUSPENSION REPORTS

One of the actions of the Board in January was to request the publication in *QST* of brief reports on license suspensions or revocations brought by FCC against amateurs. Such reports have, of course, appeared in these pages sporadically in the past; an effort will be made to put them on a regular continuing basis, subject to continued receipt of the necessary raw materials from the Commission and taking into account the right of each individual to request a hearing. As a result, most of the actions to be reported here will be a few months old when you read them. The reports should still be useful, however, in reminding us all of our obligations as licensees. Note particularly that one of the suspensions reported below is for

Ed Anderson, W8DUW and his wife Kay, W8DUV together won the MARS First Army Trophy, presented by Lt. Gen. C. E. Hutchin, Jr., Commander, First Army. Ed maintains the West Virginia MARS repeater equipment; Kay is chairman of the "Operator of the Month" committee.

failure to furnish a current mail address to FCC! Is *your* license overdue for modification?

The General Class operator license of Richard L. Jackson, W8UDE, of Dayton, Ohio, was suspended for the remainder of its term (that is, until April 30, 1973) effective September 12, 1972 by FCC. The licensee was found to have willfully violated Sections 97.61(a) and 97.87(a) of the amateur rules on June 24 and 25, 1971 by transmitting on 27.165 MHz, a frequency not assigned to the Amateur Radio Service, and while doing so, failed to properly identify his station. He was also found to have communicated on the same dates with a Citizens radio station in violation of Section 97.89 of the rules. Additionally, he was found to have violated Section 97.95 of the rules on June 24, 25 and 26, 1971 by operating W8UDE away from the fixed transmitter location specified on the license without notification to the Commission. The licensee was also found in violation of Section 308(b) of the Communications Act of 1934, as amended, for being unresponsive to specific inquiries made in two notifications of the above-mentioned violations. It was further found that the licensee, authorized General Class privileges only, did willfully violate Section 97.7(b) of the rules by operating W8UDE on June 26, 1971 on a frequency authorized only to Extra/Advanced Class licensees.

The Conditional Class operator license of Robert L. Lannen, W3BIN, of Washington, D.C., was suspended (until expiration July 16, 1973) effective October 5, 1972, for having operated his station on 7022.97 kHz, which is reserved for use by Amateur Extra Class operators, in violation of Section 97.7(b) of the Commission's rules, and for failure to respond to official communications, in repeated violation of Section 1.89 of the rules.

The General Class operator license of Roy F. Hill, W6QCM, of Concord, California, was suspended (until expiration on August 8, 1973) effective December 12, 1972, for failing to furnish his correct mail address and failure to reply to official communications.

The General Class operator license of Michael Pecsek, Jr., WA9PKO, of Highland, Indiana, was suspended (until expiration November 5, 1976) effective December 29, 1972, for violation of Section 97.7(b) of the amateur rules by operating on 7023.34 kHz, a frequency reserved for use by Extra Class operators. The licensee was also found in violation of Section 1.89 of the rules for repeated failure to respond to official communications.

ARMY RESERVISTS NEEDED

Are you a member of the U. S. Army Reserve, either in a unit or Individual Ready Reserve, who is looking for an interesting active-duty assignment for this summer? USAR launched an imaginative program last summer under which Explorer members of BSA and Civil Air Patrol Cadets got two-week intensive courses in private flying leading to the FAA written test, and taught by Army Reservists in pay status, fulfilling their annual active-duty commitment in especially-useful fashion.

This year, the Army wants to add amateur radio and survey-engineering to its offerings. The ham radio course is planned to cover General Class theory; code instruction up to 13 wpm will also be available. The courses are offered to girls and boys in the Exploring program of BSA who are 15-18 years of age. (If BSA doesn't fill all the student vacancies, members of ARRL affiliated clubs in the same age bracket will be accepted, too.) Courses are presently planned for the following places and dates: Camp McCoy, Wisconsin, 15-30 June, 1973; Camp Roberts, California, 1-15 July, 1973; Camp Pickett, Virginia, 16-31 July, 1973; Fort Chaffee, Arkansas, 10-25 August 1973.

Participants pay their own transportation costs and $40 for room, board and instruction (flight time is an optional extra at $11 per hour for those in the aviation program). Explorers interested in signing up should contact the local Scout office; ARRL club members drop a line to K1ZND here at Hq.

Reservists qualified to teach in any of the three courses whether available just for two weeks or the whole summer, should send name, rank, address and phone number to Lt. Col. Robert T. S. Colby, Commander Project CASE, 118 South Royal Street, Alexandria, VA 22314. Col. Colby can be reached by phone between 6 and 7 p.m. EST at area 703-836-0437. Deadline is 15 April, but the earlier the better.

ROUX NEW VICE DIRECTOR

Charles James Roux, K4THA, of Largo, Florida, has been appointed by President Dannals as vice director from the Southeastern Division for the term ending January 1, 1974. The action fills the vacancy left when Larry E. Price, W4DQD, became director after the resignation of Dale Strieter, W4DQS. Jim, 36, is Florida marketing representative for Genesis One Computer Corporation. He's been an assistant director of the division since 1970; is president of the Golden Triangle DX Club and past vice president of the Florida DX Club. First licensed in 1951 as W3ROU, Jim is a member of the A-1 Operator Club and of the First-Class CW Operators Club (FOC).

QSL BUREAU MOVES TO TEXAS

Kenneth F. Isbell, W5QMJ, who has been in charge of the W5 QSL Bureau for the past three years, has to give it up because of the press of business. Morris Guzick, W5IO (who has been handling C, H and I suffixes) and Robert H. Johnson, K5LIW (who's been doing D, G, R and U) are taking over the central sorting operation. The new bureau address, effective immediately, is:

ARRL W5 QSL Bureau
Box 1690
Sherman, Texas 75090

Ken's gang of helpers are continuing to help Morris and Bob, so the transition should be smooth.

EMERGENCY COMMS ADVISORY COMMITTEE

One of the many ways in which members help guide the course of the League is through advisory committees in specialized fields. In addition to those already operational in the areas of VHF Repeaters, Contests and DX, the Board has now proposed a new Emergency Communications Advisory Committee. There will be a maximum of eleven members on the committee, and initial appointments of terms up to three years are authorized. The full rules for advisory committees in general may be found in the Articles of Association and By Laws pamphlet, 1973 edition, free to members (faster response with a self-addressed stamped envelope of standard business size to Hq.). Nominating forms can be requested at the same time.

Candidates for committee membership may be nominated at any time by three sponsors, each of whom is a Full Member of ARRL. Each candidate must have been a League member for a minimum of two years, licensed as a Technician or higher for three or more; and currently and consistently active and qualified in the specialty area of the committee, in this case, emergency communications.

Though the committee will probably not begin to function for several months yet, nominations to this committee are now in order. Current information on the other advisory committees appeared on page 77, *QST* for January 1973.

REPEATER RECONSIDERATION DENIED

On January 2, FCC released a Memorandum Opinion and Order denying several petitions for reconsideration and/or stay of effective date in Docket 18803, commonly called the Repeater Docket. (Some of these petitions were summarized on page 78, December *QST*. The League petition for partial stay until February 19, 1973 was granted in effect by the Policy Statement issued early in October; see page 10, November *QST*. Briefly, it said already-licensed repeaters should comply with the October 17 effective date of the 18803 changes insofar as possible, but in any event by June 30, 1973.)

The text follows:

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

In the Matter of

Amendment of Part 97 of the Commission's Rules concerning the licensing and operation of Repeater stations in the Amateur Radio Service	Docket No. 18803 RM-388, RM-1087 RM-1209, RM-1542, RM-1725

MEMORANDUM OPINION AND ORDER

Adopted: Dec. 20, 1972 Released: Jan. 2, 1973

1. The Commission has under consideration its Report and Order (FCC 72-757) released September 8, 1972, in the above-entitled proceeding, the petitions for reconsideration, and/or stay, and other petitions requesting changes to the rules adopted in the Report and Order, filed by The Northern Berkshire Amateur Radio Club, Inc.: Wayne Green (2 petitions)[1]; 73 Magazine for Radio Amateurs (4 petitions)[1]; The Texas VHF-FM Society; the Fort Worth Chapter of the Texas VHF-FM Society; Fort Worth-Tarrant County Office of Civil Defense; Fort Worth-Tarrant County RACES; North Central Texas Six-Meter Repeater Association; Repeater Committee of the Arlington (Texas) Radio Club; VHF Advisory Committee of Montana; The Engineers Repeater Group; American Radio Relay League (ARRL); Naval Communications Command; Ben F. Meyers, Jr.; Michael F. Troy, et al; James L. Hudson; Roy L. Albright; Robert S. Levy; P. Meir; H. L. Watkins; and the Northeast Repeater Association. In addition to these petitions, which were timely filed, there were a number of informal letters and petitions received by the Commission after the time for filing

[1] One of the Wayne Green petitions, and the four 73 Magazine petitions were not petitions for reconsideration and/or stay. Since they do request amendments to the rules adopted in the Report and Order, they are included in this proceeding.

petitions for reconsideration had expired,[2] both in support and in opposition to the amendments to Part 97 as adopted in the Report and Order.

2. Briefly summarized, the petitioners request reconsideration of the Report and Order, and seek either additions, deletions, modifications or a combination of these to the amendments adopted therein, or a stay in the date the amendments become effective. The petition of the Northeast Repeater Association, requests neither a petition for reconsideration nor a petition for review, but merely requests an extension of 30 days in which to file a petition for reconsideration.[2]

3. The majority of the petitions address the matter of supervisory control of a repeater station, and the nature of the responsibility of a repeater station control operator. Indeed, from the remarks of the petitioners, it appears some misunderstanding existed about the need for a control operator under the rules in force prior to the adoption of Report and Order 18803. Then, as now, when in operation every amateur radio station must have a control operator at an authorized control point. Unattended operation of an amateur radio station is not provided for in the rules. The petition of the Fort Worth-Tarrant County Office of Civil Defense, requests amended rules to permit repeater stations to operate without a control operator on duty. Petitioner Albright requests additional rules for special unattended repeater stations equipped for tone-coded access on the input frequency. Petitioner Hudson requests another class of repeater station be established in order to accomplish the same purpose. The Engineers Repeater Group petition requests tone-coded access be a requirement for all repeater stations, and the user-operator transmitting the access signal be made responsible for the proper use of the repeater station. The Texas VHF-FM Society petition requests tone-coded access be permitted as an alternative to continuous monitoring.

4. Seven petitioners request that the rules place the burden for proper use of repeater station only upon the user station operator transmitting on the input frequency of the repeater station. They further request that the rules limit the responsibility of a repeater station control operator to properly maintaining the technical operation of the station. Of these petitions, several would require the control operator to have the means to remove the repeater station from service upon notification that the station was being used improperly. Although not specified, the notification would presumably come from user operators. Petitioners would allow 15 minutes or more after the notification for the control operator to terminate the repeater station transmissions.

5. Seven petitioners request rules for repeater stations having wide regional coverage. The petitions request deletions of the provisions of 97.89 (c) and 97.69 (c) which effectively limit the service area of repeater stations to intra-community coverage. Some of these also request an increase in the maximum authorized power limits for repeater stations, in one or more amateur frequency bands.

6. The Fort Worth-Tarrant County Office of Civil Defense petition requests, in effect, that repeater stations in RACES be permitted to operate in the entire 220-225 MHz frequency band. Petitioner Harris requests the same provisions and would also allow RACES repeater stations operating on frequency bands 50.35-50.75 MHz and 145.17-145.71 MHz to also be used for non-RACES purposes. A 73 Magazine for Radio Amateurs petition requests the entire frequency band 220-225 MHz, and an additional 2 MHz from 440 to 442 MHz, also be made available for repeater station operation. Additionally, petitioner 73 Magazine, requests rules permitting crossbanding of repeater stations.

7. The Northern Berkshire Amateur Radio Club petition requests the deletion of the requirement for certain of the showings specified in 97.41 for repeater stations. The Repeater Committee of the Arlington Radio Club petition requests additional rules providing for temporary, experimental repeater stations.

8. The information submitted in the petitions adds nothing new to that available and considered by the Commission in adopting the Report and Order. While the Texas VHF-FM Society petition puts forth the argument that amateurs have demonstrated the means to generate stable, distortion-free, audio tones required for accurately coding and decoding control signals, through the use of a recently available, inexpensive, hybrid integrated circuit, tone stability alone was not a major consideration in the decision to confine the use of such signals on a repeater station input frequency to secondary control purposes only.

9. Operation of a repeater station in the Amateur Radio Service can present unique problems not comparable to other radio services such as Land Mobile or Citizens Class A, where control operators are not required at repeater stations. For instance, specific frequencies are not assigned to amateur radio stations, as they are in other radio services. An amateur radio station operating frequency must be selected by the control operator. Good amateur practice requires that he monitor his selected frequency prior to transmitting, in order to insure that the transmission will not interfere with radio communication already in progress on that frequency. Repeater stations are no more exempt from this requirement than are any other type of amateur radio station. Indeed, with over 90% of the licensed amateurs in the Country alone having access to all of the frequencies where repeater stations are permitted to operate, supervisory control is very necessary. Moreover, these frequencies are not limited to voice operation. All of the types of emissions authorized for amateurs may be used on most of the frequencies where repeater stations are also permitted to operate.

10. Good amateur practice also requires the control operator of a repeater station to monitor the input receiving frequency prior to activating the repeater transmitter. A repeater station, as with any amateur station, may not retransmit signals not intended for retransmission. Again supervisory control is necessary since there could be radiocommunication already in progress on the input frequency not intended for retransmission. Also, if a repeater station retransmitted a simplex radiocommunication between stations on the input

[2] Section 405 of the Communications Act of 1934, as amended, requires petitions for reconsideration to be filed within 30 days from the date which public notice is given of the order, decision, report, or action complained of. Among the late filed petitions were those filed on behalf of the Interstate Repeater Society, the Amateur Radio Caravan Club of New Mexico, and the Trenton Radio Club. The Commission has no authority to extend the time during which petitions for reconsideration may be filed.

frequency, it would be violating the rules prohibiting one-way transmissions.

11. Several petitioners recognize these problems and propose to overcome them through a tone-access system. Users would activate the repeater station by transmitting a certain combination of tones on the repeater station input communication frequency channel. Such a technique is inadequate to provide supervisory control over a remote station. It will not prevent the activation of the station by unauthorized persons, nor will it assure that the control operator can de-activate the station when there are interfering stations on the same input frequency channel. Controlling an amateur radio station by radio remote control with a control link that uses a widely-known frequency, such as the input communication channel of a repeater station, is not good amateur practice. The use of widely-known audio tones, such as those used in public telephone dialing systems, for remotely controlling an amateur radio station, is also not good amateur practice. A basic principle of radio control is that there be a reasonable probability the remote station will not be activated by unauthorized persons, and the control operator can indeed effect supervisory control of the station from the remote control point just as well as if the control point was located at the station.

12. We believe the ingenuity of amateurs can eventually develop the techniques, technical and operational, that will permit the adoption of rules for automatically controlled repeater stations. It is conceivable that automatic and reliable means can be developed that will perform all of the supervisory functions of a repeater station control operator under certain specific conditions. The Commission urged knowledgeable persons to submit information on this approach. Several amateurs have already responded and although their ideas show promise, it is clear that provisions for automatic control are not warranted at his time.

13. The ARRL petition requests the effective date of the new and amended rules relating primarily to repeater stations be stayed until February 19, 1973. The Levy petition requests the rules be implemented after a minimum of ninety days. One of the Green petitions requests a delay of one year in the effective date of the amendments. The Troy petition would stay and put aside selected portions of the new rules, inasmuch as the policy established for transition to the new rules announced in a Public Notice (90785) dated October 6, 1972, does provide a reasonable time for existing stations affected by the new rules to make the appropriate modification necessary for compliance, for the most part the objectives of the petitioners are already achieved. For instance, a station operating as a repeater station, and/or one authorized for remote control, whose license was granted as a result of an application filed prior to October 17, 1972, the effective date of the new rules, should comply with the new rules to the extent possible after that date, but must fully comply by no later than June 30, 1973. In view of the time and effort already expended in studies, evaluations and discussions in this matter, there should not be any further delay, with consequent postponement of the substantial public benefits the new rules promise.

14. The petition by the Naval Communications Command would delete military recreation stations from the types of amateur radio stations prohibited from portable or mobile operation by 97.95 (a) (1). Petitioner cites three examples of portable operation by military recreation stations; K4NAA at the Armed Forces Communications and Electronics Association Annual Convention; Navy or Marine Corps sponsored military recreation /MARS station exhibit at the Southern Nevada Amateur Radio Club, Inc. Annual Convention; and the field day and emergency communications provided by K3USN. Since non-amateurs may be the license trustee of a military recreation station, they are not required to be familiar with our rules. These stations are principally intended for the recreational use of amateur radio operators serving in the Armed Forces, and the few instances where portable or mobile operation of a military recreation station is warranted can be best handled on a case-by-case basis.

15. After reconsideration of all factors raised in the several petitions, we conclude that the amendments to the Amateur Radio Service Rules as adopted by the Report and Order, FCC 72-757, on August 29, 1972, in Docket 18803 are reasonable and in the public interest. Therefore, in view of the foregoing, IT IS ORDERED, that the petitions for reconsideration and/or stay listed in paragraph 1 ARE DENIED and that the amendments to the Amateur Radio Service Rules, Part 97 adopted on August 29, 1972, ARE AFFIRMED.

FEDERAL COMMUNICATIONS COMMISSION

Ben F. Waple
Secretary

PHONE RECONSIDERATION DENIED

In a Memorandum Opinion and Order, released January 10, 1973, FCC denied the ARRL request for reconsideration in Docket 19162, phone band expansion. Another petition, filed by Gerald N. Seligman, W7BUN, relating to the Novice changes effected in the same docket, was also turned down. The denial was one of several matters considered by the ARRL Board of Directors at Minute 20 of the January 18-19 meeting; see separate story for more information.

The text follows:

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

In the Matter of

Amendment of Part 97 of the Commission's Rules to provide for expansion of the telephony segments of the High frequency amateur bands.	Docket No. 19162 RM-1306, RM-1349, RM-1477, RM-1479, RM-1544, RM-1550, RM-1593, RM-1603, RM-1614, RM-1616, RM-1644, RM-1665, RM-1695, RM-1723, RM-1729, RM-1748, RM-1873, RM-1880

MEMORANDUM OPINION AND ORDER

Adopted: Jan. 4, 1973 Released: Jan. 10, 1973

1. The Commission has under consideration its Report and Order (FCC 72-849) released October 2, 1972, in the above-entitled proceeding, and the Petition For Partial Reconsideration filed by the American Radio Relay League (ARRL), and the Petition for Reconsideration filed by Gerald N. Seligman, et al.

BOARD THANKS VOLUNTEER A.R.R.L. OFFICIALS

The Board expressed by resolution its sincere thanks for the untiring work and devotion to the League and to amateur radio by the vice directors, assistant directors, SCMs, SECs, QSL Managers, and all members of the League. It also thanked the FCC and DOC for their cooperation on regulatory matters; and commended the Intruder Watch for their dedicated efforts toward the preservation of amateur radio.

2. The ARRL Petition requests the Commission to reconsider its Report and Order, and amend its rules to make frequencies 3,825-4,000 kHz available for radiotelephony operation to all but Technician and Novice Class amateur radio operators. ARRL repeats the request made in its Comments in Response to Notice of Proposed Rule Making filed on June 1, 1971, for relief from overcrowding in the 3,900-4,000 kHz telephony segment then available to all amateur radio licensees except Technician and Novice Class. ARRL states that in the seventeen months subsequent to filing comments, overloading in that frequency segment has become even more severe.

3. The Seligman Petition requests the words, "the transmitter shall be crystal controlled," be allowed to remain in Section 97.7(d)(1) of the rules. Petitioner would return the requirement for the frequency of a transmitter operated by a Novice Class control operator to be derived from an oscillator circuit utilizing a piezoelectric crystal. Petitioner states the belief the deletion of this requirement is deleterious to the Amateur Radio Service, and will prove to be detrimental to Novice Class type of operation.

4. The frequency allocation under the reconsideration requested by ARRL is popularly known as "75 meters," and is that frequency segment authorized for A3 and F3 radiotelephony in the 3,900-4,000 kHz amateur frequency band. Until our Report and Order, 75 meters occupied 200 kHz of the high frequency spectrum from 3.8-4.0 MHz. In our Report and Order, an additional 25 kHz was authorized for A3 and F3 radiotelephony, expanding it to the 225 kHz between 3,775-4,000 kHz. Four amateur radio operator classes, other than Novice and Technician Class, are permitted to operate stations in this frequency segment, subject to a system of expanding frequency privileges according to the level of difficulty in the examination requirements for each class. The objective is to offer an incentive for encouraging individual amateur radio operators to improve their technical and operating skills. Our Report and Order provides 110 kHz in the 75 meter frequency band for all four classes, an additional 90 kHz for the higher Advanced and Amateur Extra Classes, and another 25 kHz for the highest operator class, Amateur Extra. Petitioner in effect requests the 75 meter frequency allocations for incentive purposes be amended to provide 175 kHz for all four classes and only 25 kHz exclusively for the combined Advanced and Amateur Extra classes. The petition does not request changes to the 25 kHz specified for Amateur Extra Class only.

5. In support of the request, ARRL submits a *Net Directory* listing almost 300 amateur radio networks registered with their organization. Typical examples are the *Eastern Pennsylvania Emergency Phone & Traffic Net*, which the Net Directory indicates operates on the frequency of 3.917 MHz every day starting at 2300 GMT, and the *Delaware Emergency Phone Net* which operates on 3.904 MHz on Saturdays at 2300 GMT. Petitioner notes that all but two of the 154 registered networks with radiotelephony operations in the 75 meter frequency band have selected the frequency segment where all four license classes have operating privileges, and this activity accounts for 606 regularly scheduled network sessions each week. The other two networks have selected frequencies restricted to stations operated by Advanced and Amateur Extra Class operators, which represent but 7 regularly scheduled network sessions. ARRL claims there are many other non-registered, casual conversational networks, almost all of which choose to also operate in the same 75 meter frequency segment as the 154 registered networks and subsequently contribute to the overcrowding. ARRL claims that amateur radiotelephony networks operating between 3,900-4,000 kHz were the primary communication circuits for many days following the 1972 disasters in South Dakota, Pennsylvania, and New York.

6. ARRL gives as the reason for the frequency selection pattern by these network participants, that the incentive of less interference in the exclusive frequency segments available only to Advanced and Amateur Extra Class licensees has been insufficient for some key members of these networks to upgrade their licenses to these two higher classes and obtain the additional privileges, even though, as ARRL reports:

> " . . . overloading has become so severe, both because of general communications as well as net operations, that everyone has suffered intolerable interference at times, and nets often have been unable to fulfill their role even in times of emergency . . . "

7. The Seligman Petition presents the following argument in favor of returning Section 97.7(d)(1) to the previous wording:

> " . . . the newly licensed Novice will be tempted to buy the SSB transmitter or transceiver that will eventually be used after he has upgraded his license, since this type of equipment is controlled by a variable frequency generating device. This type of equipment usually has a much greater power rating than the Novice is permitted to utilize, and normally cannot be detuned or lightly loaded enough to the extent required to operate at a 75 watt input level." and "due to the relative complexity of variable frequency generating devices, the beginning Novice Class licensee will be discouraged from home-constructing his own transmitter, thus leading to a reduction in technical skills and experience in the Amateur Radio Service, and contrary to the Commission's Basis and Purpose for the Amateur Radio Service as brought forth in Part 97.1."

8. In considering the over-crowding existent on many of the amateur bands, including 75 meters, the Commission fully realizes the difficulties of communicating under the conditions prevailing. We are mindful that our actions must be in the overall interests of the Amateur Radio Service. In this we are guided by the basis and purpose of the Service contained in Section 97.1 of the Rules. However, we do not consider that 97.1(a) precludes or normally should be accorded higher priority in respect to our decisions than 97.1(c) which relates

to " . . . rules which provide for advancing skills in both the communication and technical phases of the art."

9. It might appear from the comments of the ARRL that they would espouse a common-denominator level of achievement in the Amateur Radio Service rather than actively support the upgrading incentive plan for which they indicate approval. Insofar as is known, the ARRL has not initiated any recent major program to upgrade the status of the lower classes of licensees. In this country there are approximately 23,000 Novice Class, 52,000 Technician Class, 30,000 Conditional Class, 87,000 General Class (both currently having the same privileges), 59,000 Advanced Class and 12,000 Extra Class operator licensees. Recent information, obtained from reexamination of certain Conditional Class licensees, indicates that probably a large percentage of that category of licensee does not meet the Commission's qualifications to occupy the high frequency bands which, as ARRL points out, are already over-crowded. It is well known that in many countries, the highest grade of license is required for radiotelephone operation on certain high frequency bands. In Canada, for example, that situation prevails and as a result, approximately 70 percent of their amateur population holds the highest class amateur license. It is considered that this is the most appropriate direction in which to pursue further measures to relieve the interference situation, rather than further expanding a phone sub-allocation for use of the lower classes of licensees which would only further compound the problem. Further attention will be given this matter in appropriate actions. In so doing, the Commission will continue to be guided by what is believed to be the overall best interests of the Amateur Radio Service.

10. Further, the petitioner ARRL does not provide a rationale for the specific frequency sub-band allocation requested. In reviewing the many frequency allocation plans proposed in comments filed in response to our Notice of Proposed Rule Making in this Docket, including the petitioner's plan, we find most of them to be subjective in their approach, and fail to account for the results of the upgrading incentive system. Overall, offering additional frequency privileges as an incentive to upgrading has proven to be workable. The number of Advanced and Amateur Extra Class licensees continues to increase while the number of General and Conditional Class licensees decreases. It is important to the further success of this system that as upgrading progresses, the frequency sub-bands must be systematically and periodically revised. When the number of licensees authorized to operate in each sub-band changes significantly, there must be corresponding modifications to the frequency privileges for the affected license classes. The method selected and outlined in the Report and Order was designed to provide an objective formula approach to the amendments adopted, and for future adjustments to frequency privileges. Sub-band apportionments are determined by considering the number of individual licensees in each group having privileges to each sub-band, *weighted in favor of the higher classes*. Therefore, assuming the present upgrading pattern continues as we anticipate, there will be further expansion of the exclusive-frequency privileges for the Advanced and Amateur Extra Classes, and a corresponding reduction in the frequency privileges for General and Conditional Classes.

11. Petitioner ARRL does not support its claim that between June 1, 1971, and November 1, 1972, overloading in the 75 meter frequency segment available for radiotelephony has become more severe. Commission records show that during this same period, the number of General/Conditional Class licensees decreased about 5 percent, and the number of Advanced and Amateur Extra Class licensees increased about 6 percent. Therefore, the number of amateur radio operators having access to the exclusive-frequency segments increased, and it does not seem likely they would choose not to exercise their new privileges.

12. We agree with the ARRL that it is unfortunate that key members of the amateur radio networks do not choose to upgrade their operating skills and privileges. However, we cannot agree that the solution is to compromise the upgrading system by authorizing additional privileges for the General/Conditional Class licensees at the expense of the Advanced/Amateur Extra Class. Rewarding those who have not upgraded at the expense of those who have, would be an unwise and illogical approach. If, as petitioner claims, key members of the radiotelephony nets do not find the incentives offered under the present system sufficient to increase their desire to upgrade their licenses, then incentives should be increased, rather than decreased as proposed by ARRL. Also, there is the possibility that participation in network communications does not fully provide the experience and training necessary for upgrading. We shall keep these aspects in mind in future proceedings.

13. For the individual General Class or Conditional Class operator finding the overcrowding on 75 meters intolerable, he may select another frequency band or emission for his amateur radiocommunications. He may also improve his skills, upgrade to a higher class operator license, and earn additional frequency privileges. The new frequency allocations adopted in our Report and Order present new opportunities in the way of upgrading incentives. We believe every amateur radio operator should be encouraged to develop the skills necessary to meet the requirements of the next higher license class.

14. While it is correct that amateur radio nets undoubtedly do have value to the public, it is also true that the Amateur Radio Service can be more effective when the individual operators have advanced their communication and technical skills. Indeed, it appears from the information supplied with the Petition, that a significant percentage of the frequencies allocated to the Amateur Radio Service are heavily occupied by net type operation. Yet, ARRL did not include either quantative or qualitative data on that type of amateur radiocommunication being accomplished in the name of public service.

15. Although we have not been provided a comprehensive report of the complete activities of amateur radio operators in providing radiocommunications for the public during the 1972 disasters, we are aware it was extensive and excellent. Reports received to date indicate other amateur radiocommunication systems were used in addition to 75 meter radiotelephone, including VHF-FM repeater stations, and radiotelegraphy. Also, the Citizens Radio Service provided some of the needed communications. As noted by the petitioner, during the disasters of 1972, the Commission did declare certain frequencies for use only

Get the point? W4DQD, W4KFC.

by amateur operators participating in emergency communications, when necessary. It is clear there are provisions to make the necessary frequencies available to amateur operators in an emergency.

16. The Seligman Petition does not submit any evidence supporting the claim that amateur single sideband transmitters and transceivers normally cannot be operated at the maximum power level authorized for the Novice Class. We are aware of several manufactured units having this capability. In fact, we are not aware of any that do not. Should there be such units available to amateurs, they would be unsuitable for Novice Class operation, but this is not sufficient reason to require crystal control.

17. Additionally, we are not overly concerned if the Novice Class operator initially does not construct his own transmitter. While it would be valuable experience for him, his main concern should be to develop the skills necessary to obtain the General Class license. Our experience in conducting many thousands of these examinations each year has proven the primary problem for applicants to be difficulty with the telegraphy examination. For this reason, we recommend Novice Class operators concentrate their amateur radio activities in this area. The amended rules should result in increased operating flexibility which should assist every Novice Class operator in acquiring the necessary telegraphy skills.

The Canadian contingent: VE3CJ, VE2MS.

18. After consideration of all factors raised in the two petitions, we conclude that the amendments to the Amateur Radio Service Rules as adopted by the Report and Order, FCC 72-849, on September 27, 1972, in Docket 19162 are reasonable and in the public interest. Therefore, in view of the foregoing, IT IS ORDERED, that the two petitions for reconsideration are DENIED, and the amendments to the Amateur Radio Service Rules and Regulations, Part 97, adopted on September 27, 1972, ARE AFFIRMED.

FEDERAL COMMUNICATIONS COMMISSION

Ben F. Waple
Secretary

MINUTES OF THE 1973 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC.

January 18-19, 1973

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Shoreham Motor Hotel, Hartford, Connecticut, on January 18, 1973. The meeting was called to order at 9:04 A.M., with President Harry J. Dannals, W2TUK, in the Chair, and the following directors present:

Roy L. Albright, W5EYB, West Gulf Division
Ralph V. Anderson, KØNL, Midwest Division
Max Arnold, W4WHN, Delta Division
Robert York Chapman, W1QV, N. England Div.
Victor C. Clark, W4KFC, Roanoke Division
Charles M. Cotterell, WØSIN, Rocky Mt. Div.
Noel B. Eaton, VE3CJ, Canadian Division
J. A. Gmelin, W6ZRJ, Pacific Division
John R. Griggs, W6KW, Southwestern Division
Philip E. Haller, W9HPG, Central Division
Harry A. McConaghy, W3SW, Atlantic Division
Alban A. Michel, W8WC, Great Lakes Division
Larry F. Price, W4DQD, Southeastern Division
Larry J. Shima, WØPAN, 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, WØBUO, First Vice President; Robert W. Denniston, WØDX, 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; Edmond A.

[EDITOR'S NOTE: Because of the large number of photographs of the Board meeting, and because the names and titles of all the participants are listed in the minutes, we are identifying individuals only by call sign to save space. Unless otherwise noted, all are listed from left to right. The formal portrait is by *QST*'s official photographer, Frank Beaudin; the candids are by W1CER.]

Vice-presidential chat: WØBUO, W5QKF.

Metzger, W9PRN, Central; Franklin Cassen, W4WBK, Delta; George Diehl, W2IHA, Hudson; Paul Grauer, WAØLLC, Midwest; John C. Sullivan, W1HHR, New England; Dale T. Justice, K7WWR, Northwestern; L. Phil Wicker, W4ACY, Roanoke; Gary Stilwell, W6NJU, Southwestern. There were also present Honorary Vice Presidents Wayland M. Groves, W5NW, F. E. Handy, W1BDI, and Carl L. Smith, WØBWJ; Treasurer David H. Houghton; General Counsel Robert M. Booth, Jr., W3PS; Assistant General Manager Richard L. Baldwin, W1RU; Communications Manager George Hart, W1NJM; Senior Assistant Secretary Perry F. Williams, W1UED; *QST* Technical Editor Doug DeMaw, W1CER, and Public Relations Consultant Don Waters.

2) On motion of Mr. Gmelin, seconded by Mr. Shima, unanimously VOTED that Item 11 of the agenda, Appointment of Committees, be moved up to follow Item 6, Consideration of Recommendations of Committees.

3) On motion of Mr. Thurston, seconded by Mr. Chapman, unanimously VOTED that the minutes of the 1972 Second Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

4) At this point, extensive oral reports were offered by the officers of the League, during which Canadian Division Vice Director George Spencer, VE2MS, entered the meeting at 10:10 A.M., and the Board was in recess from 10:35 to 10:55 A.M.

5) Mr. Eaton, as Chairman, read the report of the Finance Committee; Mr. Gmelin, as Chairman, read the report of the Planning Committee; Mr. Arnold, as Chairman, read the report of the Membership & Publications Committee; Mr. Haller, as Chairman, read the report of the Public Relations Committee; Mr. Groves, as Chairman, presented the report of the Merit & Awards Committee; Mr. Chapman, as Chairman, read the report of the Committee on an ARRL Foundation; Mr. Griggs, as Chairman, read the report of the Committee on a Hoover Memorial Station; Mr. Dannals, as Chairman, reported for the Committee on Goals & Objectives; Mr. Chapman, as Chairman, reported for the Committee on Technical Symposia; Mr. Chapman, as Chairman, read the report of the Committee on Headquarters Building Facilities; Mr. Dannals, as Chairman, reported for the Ad Hoc Committee on Space Communications.

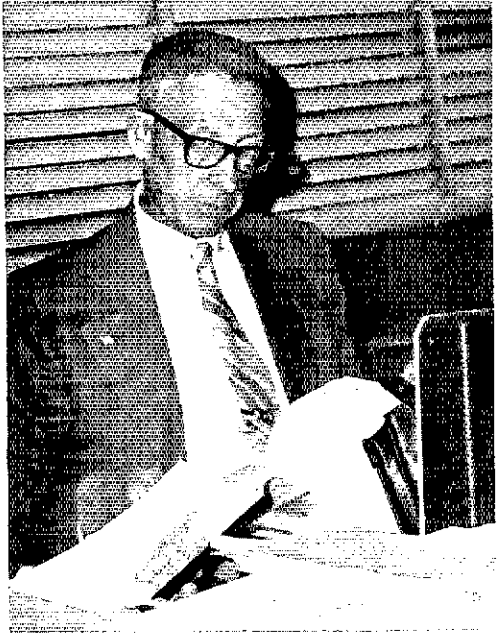
6) As liaison directors, Mr. Albright presented a report for the VHF Repeater Advisory Committee; Mr. Clark for the Contest Advisory Committee; and Mr. Chapman for the DX Advisory Committee; Mr. Clark for Amsat; Mr. Chapman for the Talcott Mountain Science Center; and Mr. Gmelin for Project Oscar. During the course of these reports, The Board was in recess for luncheon from 12:30 to 1:30 P.M.

7) On motion of Mr. Clark, seconded by Mr. McConaghy, unanimously VOTED that the rules and regulations of the Communications Department be amended in accordance with the January 6, 1973, recommendations of the Planning Committee so as to broaden the areas of official activity for Section Communications Managers and thus enable them to engage in matters pertaining to public relations, public information, club endeavors, recruitment and training, and the dissemination of information to the membership.

8) On motion of Mr. Clark, seconded by Mr. Cotterell, unanimously VOTED that the Board of Directors (1) authorizes the establishment of a new advisory committee to be known as the "Emergency Communications Advisory Committee," to function under the rules and regulations concerning advisory committees; (2) instruct the Membership Affairs Committee, in cooperation with the staff, to prepare the documentation required by Rule 2; and (3) requests that an invitation for nominations for membership on the new committee appear in the next available issue of *QST*.

9) On motion of Mr. Arnold, seconded by Mr. Shima, unanimously VOTED that the General Manager take the necessary steps to revise and update the *License Manual* by insuring that the

"The report is about this thick." WØPAN, K2SJO.



Studying a report: WØSIN.

following is accomplished: (1) all questions, answers and examples shall reflect current FCC rules and regulations as soon as possible; (2) the questions, answers and examples shall be grouped according to topic, i.e., rules and regulations, Ohms law, antennas, etc.; (3) all questions shall be keyed to at least one other League publication as determined and implemented by the appropriate headquarters staff. The above to be accomplished for the 70th Edition of the *License Manual*.

10) On motion of Mr. McConaghy, seconded by Mr. Clark, unanimously VOTED that in recognition for its contribution to space communication, under the leadership of Perry Klein, K3JTE, President, and Jan King, W3GEY, Project Manager of Oscar 6, the League presents the 1972 ARRL **Technical Merit Award to Amsat.**

11) Moved, by Mr. McConaghy, seconded by Mr. Price, that in addition to the present membership pin for 25 years, the League issue an additional similar **pin for 40 years.** After discussion, moved, by Mr. Zak, seconded by Mr. Shima, to amend the motion to provide issuance of a pin instead at 35 years. But, after discussion, the motion to amend was rejected. Moved, by Mr. Gmelin, seconded by Mr. Shima, that the matter be laid on the table; but the motion to table was rejected, 7 votes in favor to 9 opposed. Moved, by Mr. Gmelin, seconded by Mr. Shima, that the matter be referred to the Membership Affairs Committee for further study of the desirability of issuing pins covering multiple years of League membership; but, after discussion, the motion was rejected. The question therefore being on Mr. McConaghy's original motion, the same was unanimously ADOPTED.

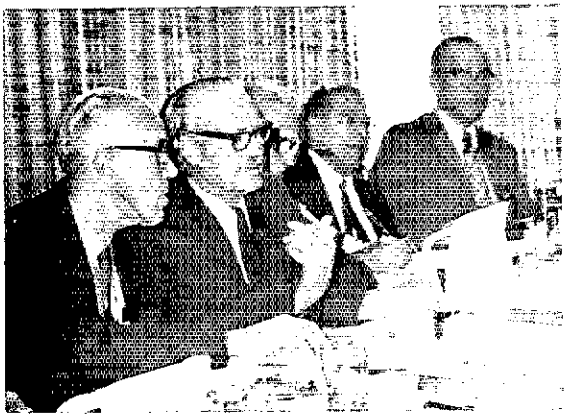
12) Moved, by Mr. Chapman, seconded by Mr. McConaghy, that the League issue suitable pins for those who have reached the 200 and 300 mark in the DXCC listing; but, after discussion, the motion was rejected, 6 votes in favor to 8 opposed, Mr. Clark abstaining. Mr. Chapman requested to be recorded as voting in favor.

13) Moved, by Mr. Chapman, seconded by Mr. McConaghy, that the League, in addition to the **50-year** membership pin, issue a **matching plaque,** similar in style and size to the "Life Membership" plaque. This plaque to be engraved "Fifty Year Membership" and that the award be made retroactive for all 50-year members. After discussion, moved, by Mr. Cotterell, to amend the motion so that the cost of the plaque would be charged to the individual division accounts; but there was no second, so the motion to amend was lost. After further discussion, the question being on Mr. Chapman's original motion, the same was unanimously ADOPTED.

14) On motion of Mr. Price, seconded by Mr. Thurston, after extensive discussion, unanimously VOTED that the special Committee for the ARRL Foundation is thanked for its work in researching the background necessary to proceed with the formation of the Foundation. Further, that the Management and Finance Committee is directed to proceed with further preparations leading to the establishment of an **ARRL Foundation,** proposed articles of incorporation, by-laws, and proposed board to be submitted to the Board of Directors not later than July 1, 1973, it being understood that the Management and Finance Committee is empowered to employ the services of counsel as appropriate.

15) On motion of Mr. Chapman, seconded by Mr. Zak, after discussion, VOTED that the Board be placed on record as approving the need for the construction of a new **addition to the present headquarters** building and this be pursued by the Plans and Programs standing committee.

16) On motion of Mr. Albright, seconded by Mr. Griggs, unanimously VOTED that the Board hereby expresses its appreciation to the VHF Repeater Advisory Committee, the Headquarters liaison personnel, and to the many repeater organizations involved, for the cooperation and progress achieved during 1972 in the establishment and functioning of Repeater Frequency Coordinating Committees.



Three honorary "Veeps": W1BDI, W5NW and WØBWJ (far right), with W4WBK (partially hidden) and W3KT.

"According to my notes . . .": W7PGY, W4WHN.

17) The Board was in recess from 3:00 P.M. to 3:25 P.M.

18) At this point the following committee appointments were announced:

International Affairs	Mr. Eaton, Chairman Mr. Albright Mr. Clark
Plans and Programs	Mr. Griggs, Chairman Mr. Cotterell Mr. Zak
Membership Affairs	Mr. Arnold, Chairman Mr. Haller Mr. Thurston
Management & Finance	Mr. Shima, Chairman Mr. Chapman Mr. Price
Legal and Regulatory	Mr. Gmelin, Chairman Mr. Anderson Mr. McConaghy (Mr. Michel, alternate)

19) On motion of Mr. Thurston, seconded by Mr. Gmelin, unanimously VOTED that the reports of the directors to the Board of Directors are accepted and the same placed on file.

20) On motion of Mr. McConaghy, seconded by Mr. Chapman, unanimously VOTED at 3:35 P.M. that the Board does now resolve itself into a Committee of the Whole, to consider recent actions by the FCC on dockets and rule making. Mr. Haller was elected Chairman of the Committee. During the course of its discussions, the Committee requested that officers, General Counsel and staff depart from its meeting. The Committee was in recess from 4:05 to 5:15 P.M. The Committee rose at 6:10 P.M. and presented its report. Whereupon, on motion of Mr. Haller, seconded by Mr. Thurston, the following resolution was unanimously ADOPTED by roll-call vote, 15 in favor to none opposed (Canadian Director Eaton abstaining):

WHEREAS, the highly developed radio communications technology existing in the world today is the direct outgrowth of contributions made by radio amateur enthusiasts over a period of more than 70 years; and

WHEREAS, the Government of the United States, including various administrative agencies, has traditionally followed the policy of permitting and encouraging the development and growth of the amateur radio service by adoption of only minimal regulations and broad general policies; and

WHEREAS, under the policy of minimal regulation the amateur radio service has developed to an extremely high level of proficiency and service to the nation in times of disaster and national emergency as well as in normal periods; and

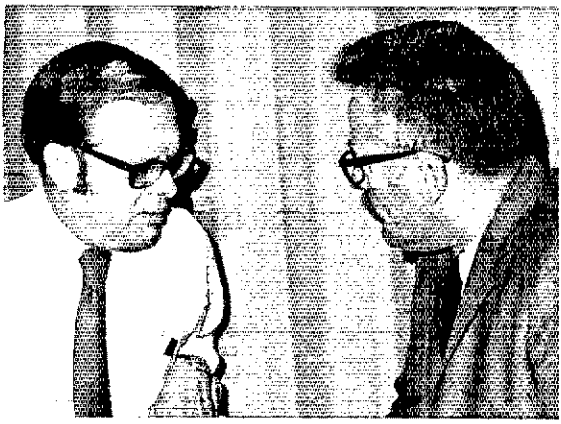
WHEREAS, the Federal Communications Commission in recent months has adopted a number of amendments to its regulations and issued a number of interpretations of these and other regulations which evidence an abandonment of the policy of minimal and self regulation followed so successfully over the years, and has other proposed restrictive amendments under consideration which, if adopted, will further increase the level of government regulation; and

WHEREAS, these developments and trends are a matter of the greatest concern to amateurs throughout the nation and to the American Radio Relay League, the only nationwide membership organization representing active amateur radio licensees of all ages and interests; and

WHEREAS, a great number of amateurs, individually as well as through their local clubs affiliated with the League, have expressed deep concern over the apparent trend toward progressively restrictive and unilaterally-imposed regulations governing the Amateur Radio Service, and the potential inhibiting effect of this upon the orderly development of the Service as a public resource, as well as in carrying out the charter in Section 97.1 of the rules,

Now, therefore, BE IT RESOLVED that the President and the General Manager are directed to undertake a vigorous program to seek reasonable and technically viable philosophies of regulation and interpretations, conferring at all necessary levels with appropriate Government departments and officials, and recommending to the Board of Directors courses of action which may be required to assure the continued availability of traditional

"But back then . . .": W4ACY listens to Treasurer Houghton.



Huddle: W1RW, PR-man Waters.

latitudes and freedoms, and the full public service capabilities essential to the growth, improvement and usefulness of the amateur radio service.

21) The Board was in recess for dinner from 6:15 to 8:15 P.M.

22) On motion of Mr. Haller, seconded by Mr. Zak, after discussion, VOTED that all future petitions to the FCC on matters concerning the amateur radio service be printed in *QST* in summary form if possible, and at the earliest practical date.

23) On motion of Mr. Arnold, seconded by Mr. Eaton, unanimously VOTED that the Board, taking cognizance of the increasing number of late deliveries of *QST*, supports and encourages the ARRL staff in its efforts to locate and reduce areas of delay within the U.S. Postal Service and the Canadian Post Office Department and to take any steps possible to improve delivery.

24) On motion of Mr. Zak, seconded by Mr. Griggs, after discussion, unanimously VOTED that

the Membership Affairs Committee, in conjunction with the General Manager, study the feasibility of the League offering a correspondence course to its members and non-members for the purpose of upgrading amateur radio licenses and providing courses for the Novice newcomer.

25) On motion of Mr. Chapman, seconded by Mr. Gmelin, after discussion, unanimously VOTED that the General Manager procure and install two flag poles on the median in front of the Administration Building and that the flags of Canada and the United States be flown and illuminated on the pole in accordance with the Federal Governments and Connecticut State directives.

26) On motion of Mr. Gmelin, seconded by Mr. Clark, unanimously VOTED that the ARRL Contest Advisory Committee be commended for its work in improving contest rules regarding logging and disqualification criteria.

27) On motion of Mr. Clark, seconded by Mr. Shima, unanimously VOTED that the International Affairs Committee, in cooperation with the President and the General Manager, be instructed to complete, as a priority order of business, the basic plan of action for use in connection with the next world administrative radio conference for the high frequencies, and to submit this for Board approval at the July 1973 meeting.

28) On motion of Mr. Price, seconded by Mr. Arnold, unanimously VOTED that the Board of Directors expresses its appreciation to H. Dale Strieter, W4DQS, for his service to this Board as Director.

29) Moved by Mr. Griggs, seconded by Mr. Chapman, that the American Radio Relay League, by action of its Board of Directors, does hereby recommend to the International Amateur Radio Union the establishment of a five band Worked All Continents Award in the interests of stimulating operation on the principal high-frequency amateur bands throughout the world. After discussion, on motion of Mr. Denniston, seconded by Mr. McConaghy, unanimously VOTED to amend the motion by providing for the issuance of a six-band WAC award as well. The question then being on the motion as amended, the same was unanimously ADOPTED.

30) On motion of Mr. Albright, seconded by Mr. Thurston, after discussion, unanimously VOTED (Canadian Director Eaton abstaining) that the League petition FCC to permit a free, one-time re-examination on code test for amateur applicants who fail the first test, provided the applicant appears for re-examination within six months.

31) On motion of Mr. Shima, seconded by Mr. Chapman, unanimously VOTED that the General Manager be authorized to reimburse expenses of all standing committees and special Board appointed committees up to $1,500 annually unless otherwise directed by the Board for specific committees.

Listening: WAØLLC, W2IHA.

Three "freshman" vice directors: K7WWR, W1HHR, W6NJU.

32) Moved by Mr. Zak, seconded by Mr. Shima, that the General Counsel petition the FCC requesting a **license expiration notice** be sent to all amateurs prior to their license expiration date, as now provided for marine and aircraft licenses. But, on motion of Mr. Gmelin, seconded by Mr. McConaghy, unanimously VOTED (Canadian Director Eaton abstaining) that the matter is referred to the Legal and Regulatory Committee for further study.

33) Moved, by Mr. Gmelin, seconded by Mr. Price, that the **organizational structure of the League** be revised to place the office of ARRL President in the most responsible position with all offices and positions reporting to him. But, after discussion, on motion of Mr. Griggs, seconded by Mr. Shima, unanimously VOTED that the matter is referred to the Management and Finance Committee for further study.

34) On motion of Mr. Clark, seconded by Mr. McConaghy, after discussion, unanimously VOTED that the Management and Finance Committee be instructed to study ways and means of strengthening **on-scene liaison with U. S. Government** departments and other national organizations in Washington, D. C., and to make appropriate recommendations to the Board of Directors at its July 1973 meeting.

35) On motion of Mr. Price, seconded by Mr. Zak, after discussion, unanimously VOTED (Canadian Director Eaton abstaining) that the Editor of *QST* is directed to publish the names, call signs and brief facts surrounding the **suspension or revocation** of amateur license privileges with a view toward bringing this information to the attention of amateurs in general.

36) Moved, by Mr. Albright, seconded by Mr. Thurston, that publication date of *The Radio Amateur's Handbook* be such that delivery will reach dealers on target date of one November each year. But, after discussion, on motion of Mr. Chapman, seconded by Mr. Clark, VOTED, 8 in favor to 7 opposed, that the matter is referred to the Membership Affairs Committee for further study.

37) Moved, by Mr. McConaghy, seconded by Mr. Zak, that the headquarters appoint someone trained in **emergency communications**; ways of helping coordinate amateurs and public officials; somewhat knowledgeable in the publicity field, and readily available to proceed to disaster areas as soon as it would be humanly possible for him to get there, and make contact with the necessary officials — both public and amateurs. Such a person could be the National Emergency Coordinator, his assistant, or someone equally cognizant of the problems at hand. The appointee should not be a non-amateur publicity agent. After discussion, on motion of Mr. Price, seconded by Mr. Albright, VOTED to amend the motion to provide that the new Emergency Communications Advisory Committee shall study the question. Moved, by Mr. Gmelin, that the entire matter be laid on the table; but there was no second, so the motion to table was lost. The question then being on the original motion as amended, the same was unanimously ADOPTED.

38) On motion of Mr. Shima, seconded by Mr. Clark, after discussion, unanimously VOTED (Canadian Director Eaton abstaining) that the General Counsel shall file comments in **opposition to license fee** increases proposed in Docket 19658.

39) On motion of Mr. Zak, seconded by Mr. Gmelin, after discussion, unanimously VOTED that the **Emergency Communications Advisory Committee** when formed, study and make recommendations on the desirability of establishing a group or groups of frequencies to be used in time of national or international emergencies, these frequencies to be published for use only by stations directly involved at the scene of any disaster.

40) On motion of Mr. Thurston, seconded by Mr. Gmelin, after discussion, unanimously VOTED that the Communications Department be instructed, in cooperation with the staff, to review the need for revision of the rules and **regulations for affiliating clubs.**

41) Moved, by Mr. Gmelin, that the Contest Advisory Committee be directed to study the feasibility of giving additional Field Day cw contact credit in order to provide incentive for cw

Technical talk: KØNL, W1CER and Andy's frequency counter.

"When I was in Managua . . .": WØDX, W5EYB.

operation. But there was no second, so the motion was lost.

42) On motion of Mr. Clark, seconded by Mr. Zak, after discussion, VOTED that the Membership Affairs Committee, in cooperation with the International Affairs Committee, investigate the feasibility of preparing a film having as its central theme "Amateur Radio Worldwide," for use in publicizing amateur radio throughout the world.

43) On motion of Mr. Price, seconded by Mr. Shima, after discussion, VOTED, 12 votes in favor to 4 opposed, that the Management and Finance Committee is directed to undertake a study of Life Membership fees and the actuarial adequacy of reserves.

44) On motion of Mr. Michel, seconded by Mr. Haller, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1973 in the proper administration of ARRL affairs in their respective divisions, up to amounts as follows:

Canadian Division	$1750
Atlantic Division	3600
Central Division	2400
Dakota Division	1600
Delta Division	2900
Great Lakes Division	2500
Hudson Division	2500
Midwest Division	2200
New England Division	2700
Northwestern Division	2500
Pacific Division	4000
Roanoke Division	2400
Rocky Mountain Division	1800
Southeastern Division	2700
Southwestern Division	4000
West Gulf Division	3000

45) On motion of Mr. Gmelin, seconded by Mr. Chapman, 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 1973 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.

46) On motion of Mr. McConaghy, seconded by Mr. Griggs, 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 1973 a total amount not to exceed $8,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

47) On motion of Mr. Thurston, seconded by Mr. Cotterell, 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 1973 a total amount not to exceed $6,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

48) The Board recessed at 9:58 P.M., reconvening at 9:30 A.M. on January 19, with all directors and other persons hereinbefore mentioned in attendance.

49) The Chair announced that the Board would now proceed with the election of four directors to the Executive Committee for the ensuing year, and appointed Messrs. Metzger and Diehl as Tellers. Mr. Clark nominated Mr. Thurston. Mr. Eaton nominated Mr. Griggs. Mr. Zak nominated Mr. Eaton. Mr. Arnold nominated Mr. Clark. Mr. Cotterell nominated Mr. Arnold; but he declined the nomination because of his new responsibilities as Chairman of the Membership Affairs Committee. Mr. Shima nominated Mr. McConaghy; but he declined the nomination as not appropriate at this time. Mr. Anderson nominated Mr. Albright. On motion of Mr. Chapman, seconded by Mr. Cotterell, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows:

Mr. Thurston	14	Mr. Clark	16
Mr. Griggs	13	Mr. Albright	10
Mr. Eaton	11		

Whereupon Victor C. Clark, W4KFC, Robert B. Thurston, W7PGY, John R. Griggs, W6KW and Noel B. Eaton, VE3CJ, were declared elected as members of the Executive Committee for the ensuing term. (Applause.)

50) Moved, by Mr. McConaghy, seconded by Mr. Anderson, that effective January 1, 1974, By-Law 20 be amended providing for the annual meeting date of the Board of Directors be changed to read, "second Thursday of March of each year," and the second meeting date of the Board of Directors be changed to read, "second Thursday in September of each year." No other changes to By-Law 20 are required. But, after discussion, on a roll-call vote, the motion to amend the By-Laws was rejected, 6 in favor to 10 opposed. Messrs. Albright, Anderson, Eaton, Griggs, Haller and

McConaghy voted in favor; all other directors voted opposed.

51) On motion of Mr. Shima, seconded by Mr. Albright, after discussion, unanimously VOTED that the Board of Directors hereby approves the President's Goals as follows:

Promote amateur radio nationally
Promote amateur radio internationally
Foster growth of the amateur radio satellite program
Increase number of radio amateurs
Increase number of ARRL members
Raise funds necessary to support League programs
Prepare for World Administrative Radio Conferences
Promote effective and efficient use of our frequencies
Provide amateur radio technology leadership
Promote Public Service aspect of amateur radio
Develop emergency communications technology

The President shall periodically report progress toward these goals to the Board.

52) On motion of Mr. Gmelin, seconded by Mr. Clark, after discussion, unanimously VOTED that the Ad Hoc Committee on space communications is requested to make a study of the possibility of establishing a **national tracking station** at ARRL Headquarters and assess the need for a full time satellite coordinator at headquarters. Further, that the Ad Hoc Committee solicit the cooperation and advice of the Amateur Satellite Service Committee in this study.

53) On motion of Mr. Clark, seconded by Mr. Gmelin, after extensive discussion, unanimously VOTED that the General Manager is authorized to reimburse **Amsat**, the Radio Amateur Satellite Corporation, for various administrative expenditures during 1973 in an amount not to exceed $6,000.

54) The Board was in recess from 10:35 A.M. until 11:00 A.M.

55) On motion of Mr. Cotterell, seconded by Mr. Gmelin, after discussion, unanimously VOTED that the Plans and Programs Committee initiate a program to attract interest and **support from foundations**, both scientific and educational, for the advancement of the amateur space communication program.

56) On motion of Mr. Gmelin, seconded by Mr. Clark, unanimously VOTED that the Contest Advisory Committee study ways of encouraging continued use of a wide variety of modes in the **ARRL Field Day**.

57) On motion of Mr. Griggs, seconded by Mr. Eaton, unanimously VOTED that additional reimbursement for the year 1972 in the amount of $256.55 for the Southwestern Division, and $71.05 for the Dakota Division be authorized.

58) On motion of Mr. Albright, seconded by Mr. Clark, unanimously VOTED that funding not to exceed $250 per committee for the calendar year 1973 be authorized for each of the advisory committees created by the Board of Directors.

59) On motion of Mr. Shima, seconded by Mr. Cotterell, unanimously VOTED that the Board of Directors hereby approves the Goals and Objectives **of the General Manager** submitted to the Board on January 2, 1973. The General Manager shall periodically report progress toward these goals to the Board.

60) Moved, by Mr. Chapman, seconded by Mr. Eaton, that the Plans and Programs Committee study the feasibility of moving the 80-meter Novice frequencies to 3675-3725 in order to provide phone free frequencies to Novices and additional cw free phone frequencies to our Canadian neighbors and members. After discussion, moved, by Mr. Price, to amend the motion by striking all text after the words "Novice frequencies;" but there was no second, so the motion to amend was lost. After extensive discussion, on motion of Mr. Clark, seconded by Mr. Cotterell, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: that the Plans and Programs Committee is requested to perform a continuing **study of sub-band allocations**, with particular attention to the feasibility of moving the 80-meter Novice frequencies in order to minimize interference problems in this amateur band, and to make appropriate recommendations to the Board of Directors. The question then being on the motion as amended, the same was unanimously ADOPTED.

61) Moved, by Mr. Gmelin, that the Plans and Programs Committee is directed to study the desirability of petitioning FCC to permit narrow band **facsimile** transmissions on the sub-bands now permitting SSTV. After discussion, moved, by Mr. Griggs, seconded by Mr. Gmelin, to amend the motion to request study additionally of alternate sub-band locations of these modes to permit use by General class licensees; but there was a tie vote, 7 in favor to 7 opposed (Messrs. Eaton & Clark abstaining); the Chair voted in favor, so the amendment was ADOPTED; Mr. Albright requested to be recorded as voting opposed. The question then being on the original motion, the same was rejected, 5 votes in favor to 9 opposed; Messrs. Gmelin and Griggs requested to be recorded as voting in favor.

East and West shall meet: W1QV, W6KW.

62) On motion of Mr. Clark, seconded by Mr. Cotterell, after discussion, unanimously VOTED that the Management and Finance Committee, in cooperation with the General Manager, develop and supervise preparation and promulgation of basic indexed guideline procedural and historical information, for permanent retention and reference by directors and vice directors, this to take the form of a loose leaf binder or other suitable device, including means for its routine updating.

63) On motion of Mr. Cotterell, seconded by Mr. Price, and on a unanimous vote, the Board proceeded to an informal discussion of the "*Recent Equipment*" column in *QST*.

64) The Board was in recess for luncheon from 12:35 to 1:25 P.M.

65) At this point President Dannals presented the first copy of the 1973 *Radio Amateur's Handbook* to Honorary Vice President E. E. Handy, W1BDI, and read the preface dedicating this 50th edition to Mr. Handy. (Applause)

66) On motion of Mr. Best, seconded by Mr. Thurston, unanimously VOTED that the Board expresses its sincere thanks for the untiring work and devotion to the League and to amateur radio by the vice directors, assistant directors, SCMs, SECs, NTS, QSL Managers and all members of the League; it is the sense of the Board that their contributions to amateur radio have done much to enhance amateur radio, particularly in the fields of technical development and public service.

67) On motion of Mr. Best, seconded by Mr. Albright, the following resolution was unanimously ADOPTED by a standing vote of applause:

WHEREAS, to quote Wayland Martel "Soupbone" Groves from January 1930 *QST*, "Hams are born, not made;" and

WHEREAS, one of these "born hams" has been pounding brass since 5NW was issued in 1923; and

WHEREAS, said W. M. Groves promptly joined the League on June 1, 1923 and has been continuously a member since, now as Charter Life; and

WHEREAS, he was first elected a director of the League on December 20, 1934 serving until January 1, 1938 and again on April 13, 1942, serving until he was elected Vice President of the League on May 6, 1950; and

WHEREAS, he then served as First Vice President until elected as an Honorary Vice President on May 2, 1970; and

WHEREAS, throughout all this time he has added keen insight, an awareness of grass-roots thinking and a large measure of common sense (spiced with wit and humor as appropriate) to the proceedings of the American Radio Relay League; now therefore, BE IT RESOLVED, by the Board of Directors of the American Radio Relay League in Annual Meeting assembled, that it deeply appreciates the contributions of WAYLAND M. GROVES, W5NW through a half-century of service.

68) On motion of Mr. Denniston, seconded by Mr. Eaton, unanimously VOTED that the American Radio Relay League does hereby extend to the Radio Society of Great Britain hearty congratulations on the occasion of the sixtieth anniversary of the founding of the Society, and the Board of Directors here assembled does additionally express its deep appreciation to the Radio Society of Great Britain for its long and valued service to amateur radio.

69) On motion of Mr. Denniston, seconded by Mr. Compton, unanimously VOTED that the American Radio Relay League does hereby extend to the Philippine Amateur Radio Association hearty congratulations on the occasion of the 40th anniversary of its founding as well as its 25th anniversary of joining IARU and the 50th anniversary of the Amateur Radio Club of the Philippines, the forerunner of the Philippine Amateur Radio Association.

70) At this point the Chair complimented the several *vice directors* present for their interest in and dedication to League affairs, and each responded briefly.

71) There being no further business, on motion of Mr. Compton, seconded by Mr. McConaghy, unanimously VOTED that the Board now adjourn, *sine die*, at 3:00 P.M.

72) (Total time in session, as a Board 10 hours, 49 minutes; as a Committee of the Whole, 1 hour, 25 minutes; total direct appropriations, $87,877.60.)

Respectfully submitted:

JOHN HUNTOON, W1RW
Secretary

Buttonholed: W9HPG by W3SW.

EXECUTIVE COMMITTEE MINUTES

Minutes of
EXECUTIVE COMMITTEE MEETING
No. 334 January 17, 1973

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc.,

W2TUK, center; W5QKF, left; W6ZRJ. In front of W2TUK is the "solid state amplifier" for the President's gavel!

met at the headquarters office of the League in Newington, Connecticut, at 2:05 p.m. January 17, 1973. Present: President Harry J. Dannals, W2TUK, in the Chair; First Vice President Charles G. Compton, WØBUO; Directors Victor C. Clark, W4KFC, Noel B. Eaton, VE3CJ, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Also present were a number of other directors and vice directors.

On motion of Mr. Griggs, approval was unanimously GRANTED for the holding of a Georgia State Convention in Atlanta on June 9-10, 1973; a West Virginia State Convention in Jackson's Mill on June 30-July 1, 1973; a Roanoke Division Convention in Reston, Virginia, on September 14-16, 1973; and a Pacific Division Convention in Santa Cruz, California, on October 13-14, 1973.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies: Amateur Radio Society of Central Union High School, El Centro, Calif.; APL Amateur Radio Club, Silver Spring, Md.; Calvary Baptist Amateur Radio Club, Los Gatos, Calif.; Chesapeake Bay Repeater Association, Perryville, Md.; Christian Brothers Academy Radio Club, Lincroft, N.J.; Collier County Amateur Radio Club, Naples, Florida; Fremd Amateur Radio Club (H.S.), Palatine,Glastonbury Amateur Radio Club, Glastonbury, Conn.; Greater Norwalk Amateur Radio Club, Norwalk, Conn.; Hall of Science Radio Club, Flushing, N.Y.; Henderson State College Radio Club, Arkadelphia, Ark.; Hub City Radio Club, Aberdeen, .D.; Irvington High School Radio Amateur Club, Irvington, N.J.; ITT/EPL Amateur Radio Association, Columbia, Md.; Jared Eliot School Amateur Radio Club, Clinton, Conn.; John I. Sabin Pioneer Radio Club, Sacramento, Calif.; Newington High School Radio Club, Newington, Conn.; O'Brien County Amateur Radio Association, Primghar,Iowa; Oologah High School Amateur Radio Club, Oologah, Okla.; Patuxent Amateur Radio Communications Society, Upper Marlboro, Md.; Riverside County Amateur Radio Association, Riverside, Calif.; San Bernardino Microwave Society, Corona, Calif.; Slide Mountain Amateur Radio Society (of Onteora H.S.), Boiceville, N.Y.; South Peninsula Amateur Radio Klub (SPARK), Palo Alto, Calif.; South Shore Vo-Tech Amateur Radio Club, Hanover, Mass.; University of New Mexico Amateur Radio Club, Albuquerque, N.Mex.; Warrensburg Amateur Radio Club, Warrensburg, Mo.

On motion of Mr. Thurston, Life Membership was unanimously GRANTED to the following applicants:
Max Arnold, W4WHN; Jim Avery, KØHUA; Charles G. Bailey, WA3CIA/WA4NSE; Dale W. Bargmann, WB9ELZ; John R. Beaston, WB9GWO; James D. Bertschi, K6ONP; Alden N. Bice, K7JZT; David C. Bland, KØLCB; Philip S. Borisevich, K6PKH; Anthony J. Butterhof, K2JOX; Charles R. Carr, W3FPP; Addison K. F. Ching, WB6WPP/KH6CYT; Percy A. Crosthwaite, VE5RP; George W. Dowd, Sr., W4CYL; Donald Elliott, W4TMP; Daniel P. Fetcie, WA2TSR; Elmer S. Forwood, K3KNT; Donald C. Friedmann, W3QYL Julius L. Galin, W1EA; Gilman M. Gates, WB4ATY; Kenneth M. Gleszer, W1KAY; William C. Grundhoefer, W8NDJ; Francis L. Hajdu, K1BIM; Albert S. Hammond, KØHWE; Stephen J. Hay, Jr., K5RZU; Alfred S. Hayes, W3CO; Roy C. Hejhall, K7QWR; Durfee B. Hill, WA1EMN; Robert Houck, Jr., K2JOL; Ray C. H. Johnson, K4DXO; William G. Kaiser, KØRQA; John M. Konopacki, WA7BXH; Glenn R. Kurzenknabe, K3SWZ; Ben Lane, W7FNE; Lloyd J. Larson, W9HQP;Frank E. Lind, WA2OFG; Charles L. Lowe, K4SSW Patrick D. Lynch, K7NFB; Roman G. Martin, Jr., W9AES; Milton R. McCoy, KØVPM; Billie J. McPherson, VE3CMM; Herbert W. Merrill, K4CSY; Samuel W. Milligan, W7GTM; C. Eugene Mills, WB6SUP; Wayne P. Myers, Jr., K8RGM; Creston Patterson, W6OKK; Robert D. Peterson, K4HLJ; Donald R. Poole, Jr., W4DXF; Frank R. Portune, WA6BCO; Ralph E. Quinn, K4EDS; (Mrs.) Mary Jane Robine, WN2GVP Gregory E. Rogers, WAØUWS; Michael F. Schmidtendorff, WB8JXF; Milton Schwartz, W2SF; George D. Snell, W6AKM; Bruce Sogoloff, K1FJR; Richard H. Stevens, WA2EVG; Joseph L. Stroud, K9MRI; Ronald J. Taylor, W3GWE; William A. Theeringer, W8PEY; Charles E. Thomas, WA3MWM; Paul C. Thompson, W6SRS; Sara Anne Thompson, WA5WYD; Michael J. Toia, W3TQM; Paul Vitols, WA1NES; John R. Waltner, WBØCRE; James E. Weaver, WA8COA/WA9FEW; Robert C. Wenger, W3DYT; Guy H. Whitley, Jr., W4C2S; Donald C. Williams, K4HAK; Robert P. Woltz, Jr., WA5JIK;Stan Zak, K2SJO.

There being no further business, the Committee adjourned, at 2:25 p.m.

Respectfully submitted,
JOHN HUNTOON, W1RW
Secretary

QST

FM REPEATER NEWS

Word from the FCC is that they will accept telephone remote control providing it is a private line with an unlisted number. Also, provisions must be incorporated to prevent activation of the station by callers other than the control operator. All this is well and good but the next question is how to be practical and what kind of device do we need at the end of the phone line to control the repeater. Fortunately, we have the answer. Or rather, the North Carolina FM Repeater Association has the answer and has graciously passed it along. We have checked with FCC and this device *is acceptable* as a means of control. However, FCC also wants it made clear that *any* control device is only as dependable as the control operator manning the system.

At this point in time, we are not exactly sure what is acceptable to FCC as far as radio control is concerned. As soon as any system is licensed we hope to pass the details along. – *W1ICP*

This device will disable the repeater if the telephone line between the telephone exchange and the repeater is opened or shorted. The repeater will remain off until dialed back on or reset. It is designed to turn the repeater on or off through pulse integration and latching relay set or clear.

Background

George Brannock, WA4CQK, Mt. Airy, NC, designed this remote control device utilizing a commercial telephone line for WA4ZAS repeater. It has been in service with no problems encountered since October, 1972. Similar devices, based on this same design, are operational on W4EXU repeater in Salisbury and WB4QGE repeater in Winston-Salem. This design was recommended by the Board of Directors of the North Carolina FM Repeater Association as the remote telephone system for use by member repeaters.

Operation Description

In the diagram shown, Fig. 1, K1 is energized, and is being held closed by the constant 40 volts dc on the telephone line. K3 is energized through the upper contacts of K2 (normally closed) by the 24 volts dc furnished by the repeater power supply. The repeater power supply also furnishes a positive 12 to 14 volts dc for use as PTT voltage.

In the diagram shown, the repeater is *not* on the air; note the PTT voltage line is open (lower contacts on K3). To place the repeater into the "ready-to-operate" mode, it must be dialed up.

As the telephone rings the specified number of times, voltage builds up through the rectifying circuit, through R2, and the lower set of contacts on K2, to the unijunction transistor circuit which triggers at approximately 16 volts. The resistance across R2 establishes the number of rings required for operation. R1 will need to be adjusted to allow for the various frequencies which the telephone companies use (20 to 60 cycles typically). Set R1 to achieve 32 to 42 volts at point A when the telephone is ringing.

This sequence results:

a) Triggering voltage energizes K2.

b) The upper contacts on K2 now close, thereby opening the 24-volt line feeding the coil of K3.

c) This causes K3 to release (open).

d) This transfers the 24 volts from the upper set of closed contacts of K2 through the normally closed set of upper contacts on K3 back to the coil of K2. This holds K2 closed.

Repeater Remote Control Device

When K3 releases, the lower set of contacts on K3 now close and provide a continuous path for the PTT voltage, thus the repeater may now be "keyed" by a user station. To shut the repeater down, a similar sequence happens in reverse, starting by triggering K3.

Failure of the Control Link

If the telephone line from the telephone exchange to the repeater is opened, shorted, or is not available for use for any reason, K1 will open. This

(Continued on page 102)

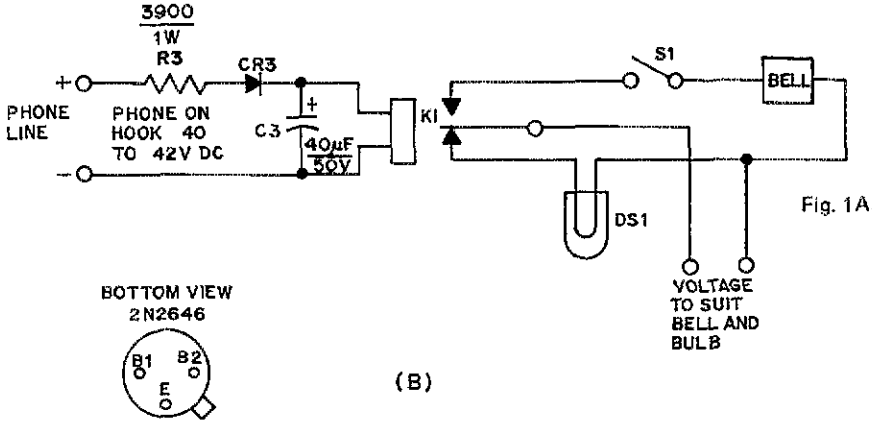


Fig. 1A.

Fig. 1 — Circuit diagram of the remote control device.
C1, C2 — 1 μF paper or Mylar.
C3 — 40 μF, 50 V electrolytic.
C4 — 16 μF, 50 V electrolytic.
C5, C6 — 200 μF, 25 V electrolytic.
CR1, CR2, CR3 — 1N4004.
CR4 — 1N4002.
K1 — Relay, RBM controls, MS64-903, 24 V, 6500 ohms, spdt miniature dc sensitive relay.
K2, K3 — Relay, RBM controls, MS50P-902, 12 v, dpdt enclosed plug-in type.
Q1, Q2 — Unijunction transistor, 2N2646.
R12 — If higher PTT voltage is used, insert .025-mA current limiting resistor in series.
T1 — 115 V primary, 360 V, 20 mA secondary (Essex-Stancor P-6425). Note connections in Fig. 1, the secondary is connected to the phone side of the line.

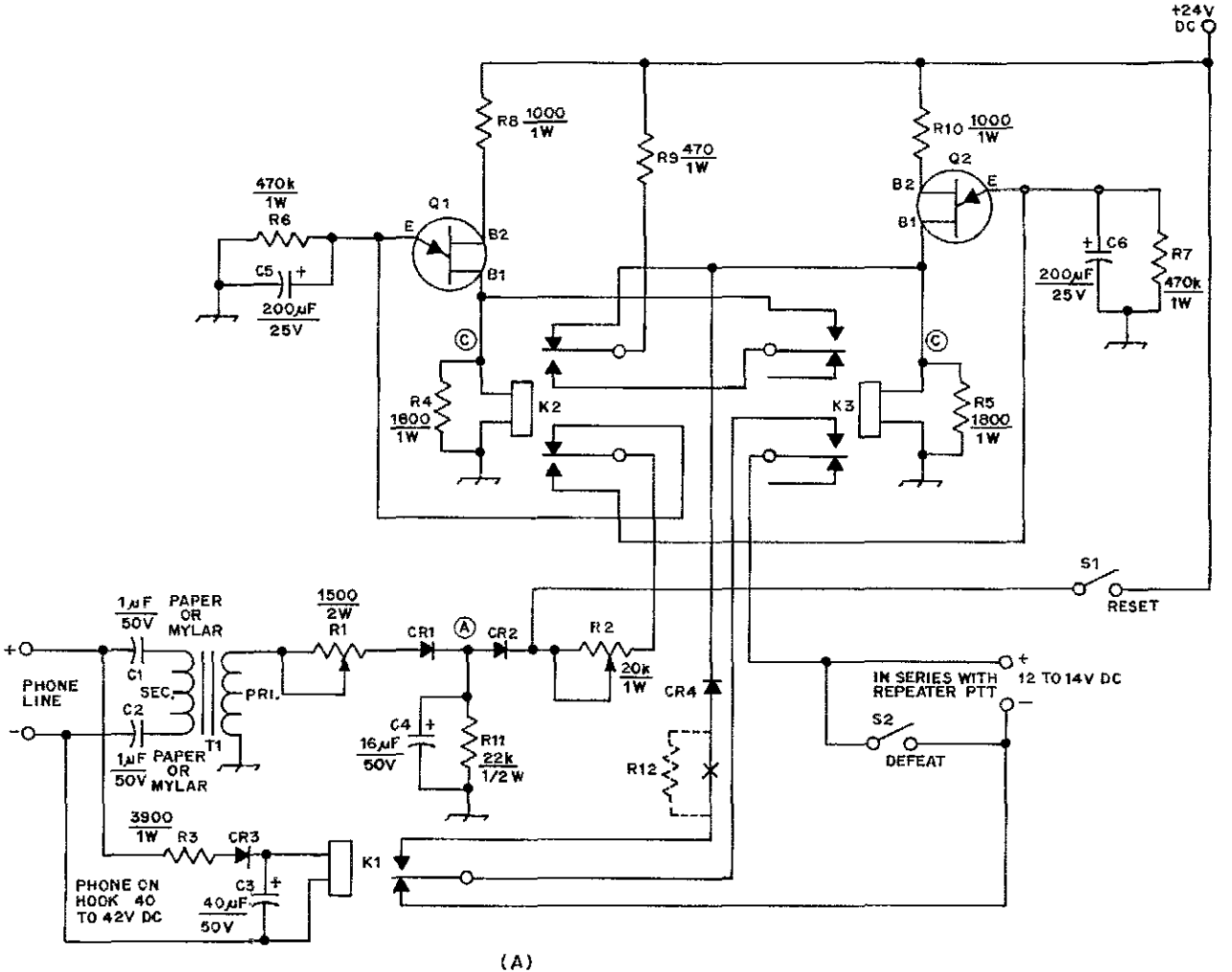
The relays are listed in the 1973 Burstein-Applebee catalog. T1 is listed in the 1973 Allied Radio Industrial Catalog.

Test points:

Point A — 32 to 42 volts at this point when ringing.

Point C — 450 to 500 ohms dc resistance to ground.

If relays other than those specified are used they must function at approximately 12 volts dc and the resistance of the relay coil plus its companion parallel resistor to ground must be 450 to 500 ohms.



(A)

Silent Keys

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

W1AMK, Otis Vaughn, Medway, MA
W1BBR, Charles E. Kachele, Jamaica Plain, MA
K1BHI, J. Leo MacCarthy, Sr., Beverly, MA
W1EAR, Arthur E. Jacques, Northboro, MA
WA1FTD, John D. Russell, New Haven, CT
W1GRC, William E. McConnell, Chatham, MA
W1HTS, Lewis G. House, Wethersfield, CT
W1IZ, James F. Waldron, Bristol, NH
W1JRD, Alfred S. Bishop, Fitchburg, MA
Ex-W1NFX, Alfred W. Pratt, Anderson, SC
Ex-1UG, Lucian F. Ackerman, New Bedford, MA
Ex-1UR, Henry J. Ackerman, New Bedford, MA
W2FNM, Jacob A. Day, Bloomfield, NJ
W2OF, Henry H. Sampson, Westfield, NJ
W2SSK, Carl Ornehaug, Randolph, NY
W2UQZ, William Metcalf, Sound Beach, NY
W3OYG, William P. Mueller, Emporium, PA
W3VNF/W4BUX, Kenneth D. Cox, Annapolis, MD
K4AGY, John G. O'Brien, Sr., Chattanooga, TN
WB4CLE, Ernest L. Melson, Shelbyville, TN
W4CVV, Mildred F. Hufham, Clarkton, NC
K4KMX, W. Glen Ward, Warner Robins, GA
WB4MYS, Lester C. Angell, Dunnellon, FL
WA4WKM, Herman A. Tabor, South Daytona, FL
W4ZIR, Henry Clark, Homestead, FL
WA5HTQ, Steven C. Nephew, Arlington, TX
Ex-W5JG, Joe C. Goulden, Marshall, TX
W5JZV, Earl B. Isbell, Broken Bow, OK
W5OZA, Charles E. Griffin, Sr., Inola, OK
WA5SYB, Matthew S. Flippen, Metairie, LA
W5UXO, Robert B. Prince, Village Mills, TX
W5YBI, Robert E. Wright, Carlsbad, NM
W6AO, Charles V. Litton, Grass Val, CA
W6DLI, Raymond J. Ogborn, Lake Isabella, CA
W6EFI, Peter A. Wiebens, Pleasant Hill, CA
W6FXO, Henry W. Davison, Red Bluff, CA
Ex-W6HD, Homer G. Hunt, Walnut Creek, CA
WB6IFK, John I. Whitaker, Santa Barbara, CA
W6IO, Donald E. Gillum, Goleta, CA
K6IZL, George E. Canaan, Santa Clara, CA
K6JJF, Delbert A. Moore, Modesto, CA
Ex-W6JUW, Irving L. Pate, Concord, CA
WB6LAV, Inez I. Plemmons, Oakland, CA
WB6MHR, Otto C. Schultz, Long Beach, CA
W6MML, James Alexander, San Francisco, CA
W6MX, Walter H. Harrington, Sr., Yountville, CA
WA6NGL, Russell C. Colburn, Bellflower, CA
W6RUZ, Lyle Gardenhire, Martinez, CA
W6SNW, Theodore C. Kercher, San Diego, CA
W6VIS, Norman L. Smith, LaCanada, CA
W6ZP, Lloyd E. West, Glendora, CA
W7DLO, Bernard M. Wills, Oroville, WA
K7DPQ, Reginald A. Gross, Gig Harbor, WA
W7LOF, Richard D. Harbour, Pullman, WA
K7SCL, Ernest E. Stender, Alderwood Manor, WA
K7SHD, Robert N. Foster, Portland, OR
K8AQI, Gerald D. Smith, Midland, MI
W8MPY, Wayne L. Burlew, Midland, MI
K8UYZ, David T. Evans, Three Rivers, MI
W8YLV, Eugene L. Dersnah, Midland, MI
W9AAI, John W. Piether, Fort Wayne, IN
W9BRC, Elizabeth T. Lugg, Madison, WI
K9DOL, Harvey A. Mattes, Green Bay, WI
K9EEP, Myrle H. Spicer, Pardeeville, WI
W9EPZ, Dee M. Pell, Indianapolis, IN
W9ETZ, Elmer J. "Doc" Emanuel, Milwaukee, WI
WB9JDJ, Peter J. Kirisuk, Friendship, WI
WØBGX, James A. Sheldon, Leavenworth, KS
WØDNJ, Philip F. Evans, N. Fargo, ND
WAØHPX, Wayne Hutchins, Carthage, MO
WØZB/W4ZB, Lester A. Benson, St. Louis, MO
WØZDT, Kenneth W. Kirchner, Spirit Lake, IA
KH6DN, Wildred M. Y. Ho, Kailua, HI
VE3BRC, Bill O. Farris, Peterborough, ON
F8KJ, Raoul Soulie, Aiguillon, France
PAØDD, W.J.L. Dalmijn, Arnhem, Netherlands

ARRL QSL Bureau

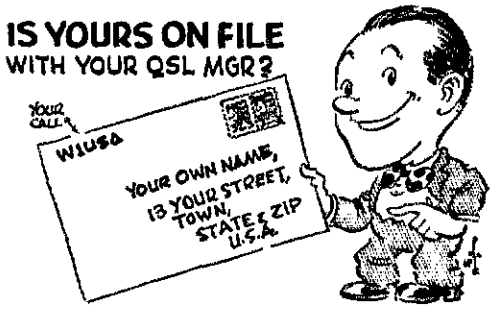
The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 5 by 8 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in **bold face.**

W1,K1,WA1,WN1 – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
W2,K2,WA2,WB2,WN2[1] – North Jersey DX Assn. P.O. Box 505, Ridgewood, NJ 07451.
W3,K3,WA3,WN3 – Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
W4,K4 – North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.
WA4,WB4,WN4 – J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
W5,K5,WA5,WB5,WN5[1] – **ARRL W5 QSL Bureau, Box 1690, Sherman TX 75090.**
W6,K6,WA6,WB6,WN6 – No. California DX Club, Box 11, Los Altos, CA 94022.
W7,K7,WA7,WN7 – Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.
W8,K8,WA8,WB8,WN8 – Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
W9,K9,WA9,WB9,WN9 – Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
WØ – Reggie Hoare, WØOYP, P.O. Box 115, Mitchellville, IA 50169.
KØ,WAØ,WBØ,WNØ – Dr. Philip D. Rowley, KØZFL, Route 1, Box 455, Alamosa, CO 81101.
KP4,WP4[1] – Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.
KV4 – Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.
KZ5 – Lee DuPre, KZ5OD, Box 407, Balboa, CZ. Box 407, Balboa, CZ.
KH6,WH6[1] – John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.
KL7,WL7 – Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.
VE1 – L. J. Fader, VE1FQ, P.O. Box 663, Halifax, NS.
VE2 – A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal 301, PQ.
VE3 – R. H. Buckley, VE3UW, 20 Almont Road, Downsview, ON.
VE4 – D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N OE8, MB.
VE5 – A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK. S4S 5ES.
VE6 – D. C. Davidson, VE6TK, 1108 Trafford Dr. NW, Calgary 47, AB.
VE7 – H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC.
VE8 – Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.
VO1 – Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.
VO2[1] – Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.
SWL – Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

[1] These bureaus prefer 4 1/4 by 9 1/2 inch or No. 10 business envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the "IARU NEWS" section of the June and December issues of *QST*.



The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

THE WINTER MONTHS are usually a period of limited vhf activity to report, but the thirty days preceeding this writing in late January were as productive as any similar period I can recall, so we go directly to . . .

OVS and Operating News

50 MHz winter *E* turned out to be more interesting than I had predicted based on early reports. In New England, WA1DFL, Revere, Mass., says "December turned out to be quite a month." Despite power supply problems, Steve worked several openings. On December 18, 50 MHz was open most of the day, 3s, 4s, 5s, 8s, 9s and Øs. Also in Massachusetts, WA1PFA, in nearby Salem, found six meters lively enough to send three reports, covering December 29 through January 8. Sporadic *E* provided 4s, 5s, 9s and Øs December 29, 30 and 31, and Quadrantid meteor shower enhanced scatter signals over similar distances. Between January 6 and 8, Chuck worked 4s, 8s, 9s and Øs, with the best opening on the 6th.

Although we don't have any reports in hand yet, Super Bowl Sunday, January 12, must have been exciting in New England and throughout the midwest and southeast, based on reports read in Phoenix newspapers of a Mississippi television station interfering with TV reception in the New York area, during the Dolphin's win over the Redskins. Newspaper reports credited "freak cloud-bank formations" with the interference. Sure beats amateur TVI complaints! And maybe we should use those "cloud banks!" WB2WTJ, Brooklyn, reports working 3s, 4s, 5s, 8s, 9s and Øs December 17-19. No third call area reports were received.

Although the report is late, it's worth mentioning that WB4ASA, Cleveland, Tenn., is proudly displaying a QSL from LU2DEK for an October 16 contact. Herb also worked LU3DCA the same evening. *TE* is still producing night-time DX on 6 and 10.

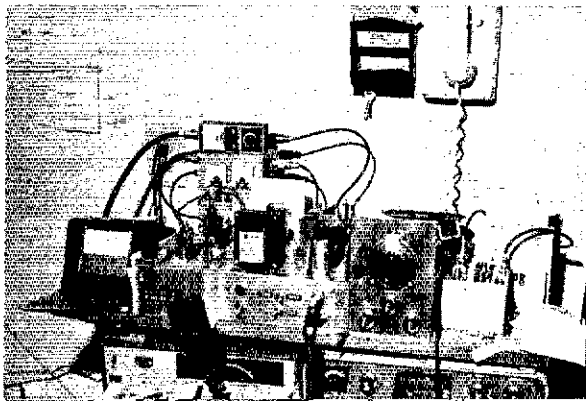
WB4WRF, Va., worked a nice selection of 8s, 9s and Øs December 17 and 18, with VE3ACL tossed in for good measure. From Pensacola, WB4ZPG says WB4BMU worked 1s, 2s, 3s, 4s, 5s, 8s, 9s and Øs during December with the 13th being the most productive day.

At Dallas, K5UGM reports December *E* to 6s and 7s. K5ZMS/5, San Antonio, sent two reports supporting claim to *E* openings December 4-6, 9, 11-13, 15-16, 20-21, 30-31, January 1-4, 6-7, 9, 13, 15 and 16. Ray said, "Six is in pretty good shape – still!" One highlight at K5ZMS/5 was a Dec. 6 contact with TG9SO, who also worked into the midwest. K5ZMS worked XE1PY December 13 and XE2AB January 15. Ray's stateside contacts included all call areas except WI.

An *eighteen-page* report confirms that 50 MHz was active from San Antonio between Dec. 14 and Jan. 15. WA5IYX/5 reports hearing or working all call areas, including WA1NNW, in Mass., Dec. 19, when the *E* muf climbed at least to 106 MHz. Pat says this day produced the highest *E* muf since August 21, with the peak coming shortly after 6 P.M. local time. Pat reports the opening similar to one Dec. 18, 1967. December 20 was nearly as good. Summarizing the month, Pat noted 50-MHz *E* on nine days, the second-best December since he began keeping records several years ago. Only December, 1969, was better. Looking back at 1972, Pat recorded 227 *E* openings covering 47 states, VEs, XEs, KP4, VP5 and 8P6. WA5IYX/5 began the new year by working 6s and 7s on New Year's Day. He says the Quadrantids apparently peaked early the afternoon of the 3rd, with the meteor count lower than the previous two years. On Jan. 8 Pat found the *E* muf passing 50 MHz shortly after 6 P.M., and rising to at least *115 MHz* at 10 P.M. Several other good openings were noted on ten of the first fifteen days in January. "So far a very interesting year," Pat concluded.

From El Paso, WA5ZLS reports Dec. 2, 5, 7, 9, 15-16 and 19 openings to 4s, 5s, 6s, 8s, 9s and Øs, with the 19th the best day. WB5HBM, Austin, says conditions were excellent Dec. 2, 3 and 5, as he worked throughout the country, except New England. He says W5QDB worked TG9SO the evening of Dec. 3. WB5HBM is collecting parts for a kilowatt final. This will feed stacked Yagis, for a summer assault on the *E* layer.

*Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington CT 06111.



In Des Moines, WBØDPB enjoys low-power 50-MHz a-m DXing with homebrewed equipment. The equipment on the shelf somehow looks familiar, is this correct W1HDQ?

In California, W6DPD at Fresno heard Texas and Colorado stations Dec. 3, and K6QHC caught a Jan. 1 opening. WB6NKO worked the New Year's opening across the continent to WB4BBA in Florida, and a number of stations in between, including 5s, 7s and ϕs during a six-hour period beginning in mid-afternoon. Mark worked VE7AEZ December 20, and openings on the 14th and 30th.

WB6NMT/6 is preparing to make his own "openings" having completed another large rhombic array for moonbounce. Louis says the gain of the antenna should make possible contacts with stations using "small arrays" of stacked 6-element Yagis, or better, and 500 watts or more at the antenna. WB6NMT's rhombic is 300 feet per leg and will have moon-window time April 3, 12, 30, May 9 and 28, and June 6 and 24. The array will be dismantled just prior to Louis's departure from the Navy, June 30. Stations interested in this EME experiment should contact WB6NMT: Lt. Louis Anciaux; Officer in Charge; NAVRADRECFAC; Skaggs Island; Sonoma, CA 95476.

Al, K7ICW, Las Vegas, says December was disappointing, providing only one *E* opening, on the 30 to southern Texas. Again this seems to prove that is makes a difference where one lives, comparing Al's observations with excellent openings reported from other areas of the country.

W6ANN, Twentynine Palms, Calif., an area probably more like Las Vegas in climate and terrain than like Los Angeles, concurs that the winter E_S season seemed below average. Bill, a vhf DX enthusiast since the 1930s, heard almost nothing beyond the normal range, through late January. This comment was picked up by W1HDQ, when these two long-time vhf enthusiasts got together on 10 meters. See what retirement does to some people! Ed finds 10 good during the midday hours for keeping in touch with old friends from the 6-meter DX days of the '40s and '50s. Look for Ed around 28.6, ssb, when 10 is open to the Northeast.

In Phoenix, WA7KJC is attempting to revitalize the once-active Phoenix VHF Radio Club. Also in Phoenix, WA7FPO tape recorded a sideband station signing JA1DQL, at 0130 GMT November 20. The Japanese station was working a W6, but faded shortly after completion of that contact. In December, Glen worked several minor *E* openings, mostly to 5s and 6s. The evening of New Year's day was excellent from WA7FPO, and Glen worked 5s, 6s, 7s, 9s and ϕs during a six-hour opening. The January contest was disappointing, with little worked, but there was *E* to Texas on the 13th and 15th.

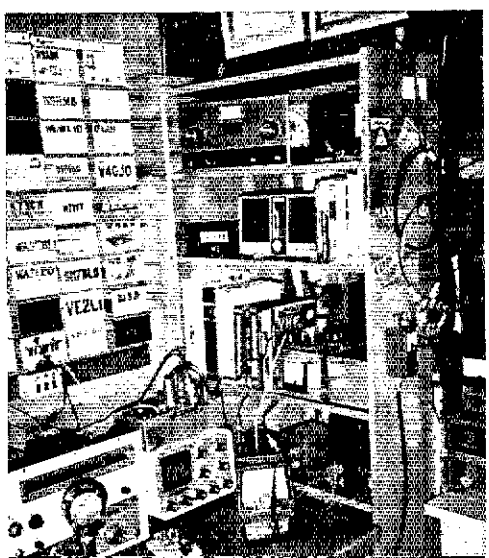
In Ohio, W8UCI reported several December *E* sessions, including an excellent one on the 17th, from Wyoming to South Carolina. Gerry logged 20 states that day; the best he's ever heard during winter months. K8TUT worked this one, adding New England stations. Bill found 6 open five December days. K8UNV did well, working seven December openings but missing XE1PY, heard on the *13th*. Phil did work both Dakotas, Maine and VE1KO, however. At Jackson, Michigan, K8WKZ was fortunate to work TG9SO at 0043 GMT, December 6. WB8BOK says six was open the first 14 days of December, and again January 1.

WBϕDPB, Des Moines, says his SB-110A gathers dust as he homebrews gear pictured elsewhere in this column. Mark says ex-WϕBFB of Iowa 2-meter fame is now K4SM in Florida. WϕMOQ, Lisbon, Iowa is very active on 6 and 2 meters reporting 50 MHz *E* December 6, 9, 14, 17-18, 20, 24 and 31. He heard TG9SO on the 6th for one hour.

VE3ECJ says TVI has apparently dampened six-meter enthusiasm in the Ottawa area, but he is active with 50 watts, looking for U.S. contacts.

Jerry Edgley, KG6JCG says there were five openings between Guam and Japan during November. Nov. 3rd was the best, lasting over two hours, during which he also heard the Korean beacon of HL9WI. Jerry lists KG6APP, WB6QCC, WA6OYU, WB6OYP and himself as active on six meters from Guam with WA6OYU/KG6 having a 50.110 beacon. Two meters is also catching on, with 8 stations active and a repeater installation underway. Jerry may be contacted by writing Gerald L. Edgley, Collins Radio Representative, VQ-3 P.O. Box 65, FPO, San Francisco 96637.

144 MHz offers a variety of DX, satellite to meteors. W1JSM, N.H., worked his state number 29 December 13, W4ISS in Georgia, during the Geminid meteor shower. Don has also had success working through Oscar 6. W2FWM, N.J., worked WAϕCKH, Mo., January 5th at the end of the Quadrantid shower, following a near miss with WA5UNL, Arkansas, on the 3rd. The Ursid shower December 22 produced complete calls from WB5BKY, Tulsa, above 145 MHz, but no contact. W2UK, N.J., continues weekend random meteor schedules with KϕMQS, getting plenty of signal both ways. WA2UDT, also N.J., reports negative results on several December Geminids schedules. Bill says WA2PKY worked WϕMJS, Minn., December 13, apparently the peak day of the shower. WB2WIK, Springfield, N.J., found mid-winter antenna work necessary after a December 15 windstorm toppled his tower. But before the storm, Steve made several Geminid meteor contacts and numerous two-ways through Oscar 6 including one with LA1NRK, Norway.



This is the shack of WB2WIK in Springfield, N.J., active on 50 and 144 MHz and Oscar 6. Steve is replacing a December-storm damaged 28-foot 144-MHz Yagi with stacked 14-element Yagis.

W3TMZ, Md., spends each weekend working through the satellite, nearing enough credits for the "1000 Award." WA3GPL, Pa., home on Christmas vacation from college, found time to schedule W5SXD, Texas, but not enough Ursid meteors to make a go of it. W4ISS, Ga., has qualified for a box listing with 29 states, the most recent being W1JSM, N.H., on Geminid meteors. WB5BKY, Tulsa, requests meteor scatter schedules. Will is a Tech running a kilowatt and 20-element collinear. Write to him at 10114 East 4th Street, Tulsa, OK 74128.

W6PO, in the Bay Area, continues his moonbounce success, reporting the following contacts: VE7BQH on Nov. 18, SM7BAE Nov. 20 and 21 and VK3ATN also Nov. 21, for a new country on 144. Bob worked the Australian again the next day. W6PO is running EME schedules with W1FZA, K6MYC, W8KPY, K9HMB, WØLER, KØMQS, KD1KO, KH6NS, PY2CSS, SM7BAE, VE2DFO, VE7BQH, VK3ATN and VK5MC – just to give an idea of who is active. WA6EIR does his DXing now on meteors, after his first contact, made December 13 with K7BBO on ssb, with no schedule. Joe listened on the 11th "to get the feel of meteor signals."

K7BBO, Tacoma, says the Geminids shower was good; four contacts made by calling CQ and two others on schedules. All were made between Dec. 12 and 14; five 6s and K7ICW. Dave says the shower peaked between 0430 and 0630 GMT, December 13. But of more interest to Dave is Oscar 6. At this writing K7BBO has completed over *1000* contacts in 33 states and eight countries. Included are several European contacts and one with a JA8 for the first U.S.-to-Japan contact and the first across the Pacific via Oscar. His is by far the largest number of Oscar contacts reported to this column. Congratulations, Dave! K7ICW, Las Vegas, says the Geminid shower was poor. WA7FPO, Phoenix, is preparing for an assault on 2 meters. Glen's first night on with 40 watts, cw, netted a 450-mile contact with K6QEH. WA7FPO now has 200 watts, ssb and cw, and an array of four 8-element Yagis. He is particularly interested in 144 *E*.

K9KQR, near Chicago, schedules WØWYZ, Colorado, weekend mornings on random meteors. WA9NKT, after 15 years on 144, 432 and 1296, under four calls, has vacated vhf for 160 meters. Lon says his present location in Illinois is not good enough for vhf, but he has worked 46 states and 12 countries on 160. We hope you come back to vhf soon. WB9ECM, 319 East Marion Street, Protage, WI 53901 seeks schedules. Mike is also on 432.

WØMJS, Minneapolis, is eligible for a box listing with 25 states worked, WØEYE in Colorado, Dec. 14 Geminids being the latest. Ron is still investigating the Oscar 6 inverted Doppler shift reported in this column last month. Checking with other stations around the country using the satellite, the effect appears peculiar to stations located approximately 45 degrees north latitude. Two VE2s tell Ron they have noticed the up-Doppler also.

It's not often we hear from Germany, but DK5CU writes that during six months of activity on 144 with 500 watts, a 10-element Yagi or 20-element collinear, he has worked 22 countries on tropo and meteors. Some of the meteor scatter DX worked by Bernhard include Russians UT5DL, UK5EAK and UA1WW, EA4AO, G3CCH, YO7VS, SM5LE and SMØDRV/5. Thanks for the letter and I'd appreciate hearing from more European DXers.

VE7ANP, Vancouver, completed his first two meteor contacts on the Geminids, WA6SFS December 11 and W6PO the following day. Steve runs a 5894 and 13-element Yagi.

Vhf DX is always news, but maintaining local activity is important, too. WA1OZI, Needham, Mass., would like to spread the word that there is 2-meter activity regularly in the Boston area, above 145 MHz, with a-m, cw and ssb. He lists WA1s OAM, OWQ, GEP, MJD, W1s QXX, AEQ, GVM, K1s SFZ and TOZ as among the regulars. A calling-and-meeting frequency of 145.1 MHz is suggested.

220 MHz meteor scatter is receiving attention from W6PO. Bob worked K7BBO, Washington, Nov. 16, on the Leonids during a 50-second burst. WB6NMT will have his large rhombic on the moon April 2 and May 10 and 27. Louis says calculations indicate some 35 dB gain on 222 MHz, sufficient for contacts with stations running small antennas such as a pair of stacked Yagis. Write Louis at the address given in the 50-MHz section of this column for schedule details. His home telephone is 707-644-5935 and his work and ham shack phone is 707-644-5671, extension 534. K7ICW, Nev., worked K6IBY December 12 on tropo. WA8ZCO, Michigan, is active nightly around 9 P.M. local on 220.05 looking for contacts.

432 MHz is getting more moonbounce attention. ZE5JJ writes W3KE from Rhodesia that he is active on EME, with a kilowatt and a backfire crossed-Yagi array having a gain in excess of 20 dB. W6FZJ gave ZE5JJ some devices for a low-noise preamp. ZE5JJ was apparently heard in California on December 22. I have not heard from W6FZJ to confirm the reception, which may be the first between Africa and the U.S. on EME. W3BLC says VK5MC hears his own echoes on 1296 and has heard W6PO. VK3ATN is also reported ready for 1296 EME.

K5UGM, Dallas, is gathering parts for a 20-foot dish for 432 EME, and is building a kilowatt final. Other projects at K5UGM include building converters for 1296 and 2304 – and changing a new baby daughter! Congratulations to the K5UGM household although Bill's wife has not confirmed the "changing."

W6FZJ, near San Francisco, is scheduling K2UYH, VE7BBG, VK2AMW ans ZE5JJ on EME and reports a 400-mile tropo contact in December with K6HX, San Diego, an apparent land tropo record in California. W6FZJ, writing in his 432 newsletter, says WB6NMT is spearheading an attempt to install 220 and 432 gear in Hawaii for some long-haul tropo DXing. Joe says mark your calendars for the West Coast VHF conference scheduled May 5-6 in Los Angeles.

W9AAG, Woodhull, Ill., active since 1928, continues to be interested in 432, building converters, and adding a new state to his totals. In the Chicago area, K9KQR is building towards 432 activity.

Moving higher in frequency, W5AJG (also W5HN) and WA5UVM report a 8-1/2-mile contact on 2304 in the Dallas area. W5AJG ran about 10 watts to a 5-foot dish up 70 feet while WA5UVM was running 140 milliwatts output for a 30-inch dish. Higher power, larger dishes and improved receiving systems are in the works.

WA6QYR reports receiving signals from Apollo 17 December 11 on 2287.5 MHz. Bill is also running schedules on 3365 MHz over a 60-mile path with WA6DPE. The path is obstructed by

5000-foot mountains. W6DSL is scheduled to soon participate in the tests, 40 miles distance from WA6QYR. A 10,500-MHz project is also underway at WA6QYR.

K4QIF, Hobson, Va., passes along some excellent advice for anyone interested in doing well on the higher frequencies. Rusty feels that there is a marked parallel between current experience on 1296 and that on 432 some ten years or more ago. When we learned how to build effective antennas, low-noise receiver front ends and efficient transmitters for 432, the disparity between uht and vhf performance was reduced almost to negligible proportions. We need the same progress to make the bands above 1000 MHz practical for interesting coverage.

Rusty stresses the importance of measuring everything, in uhf work. Most fellows think they can't do well in this department, so they assume that things are working well; but too often, it just doesn't work out that way. If you don't have the equipment to measure uhf performance, someone near you probably has it, and he may be willing to help, if you're really serious about improving your results. There are some rental agencies handling expensive test equipment. You don't need it all the time, and renting could be a solution.

Many problems can be traced to the antenna system. The power actually put into the antenna on 1296 is almost always less than the average uhf newcomer thinks he's getting. Things like transmitter efficiency, antenna performance, and receiver noise figure should never be taken for granted in amateur uhf communication. K4QIF and others have proven that 1296 will work consistently over paths up to 250 miles, and during favorable tropospheric conditions anything can happen. But if you haven't checked out your gear with the best techniques and equipment, you may still be thinking that 50 miles is DX, above 1000 MHz.

New Record on 21 GHz

Did we say "higher frequencies?" The January issue of *Radio Communication* (RSGB) reports a new DX record of 45 miles on 21 GHz, set Nov. 12, 1972, by G3BNL and G3EEZ. The two stations used crystal-controlled gear. The exciters deliver 6 watts on 1152 MHz, and are used to generate signals in the 2300-, 3300-, 5650-, and 10,000-MHz bands, in addition to 21 GHz. The gear is stable enough for narrow-band fm all the way up! QST

ARPS

(Continued from page 75)

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	176	90.0	4096	1435
Central	119	92.4	2636	1262
Pacific	163	93.3	3618	1825
Summary	*456*	*91.9*	*10550*	*4522*

The TCC roster (Dec.): Eastern Area (W3EML, Dir.) – W1s BJG EFW EJI NJM QYY YNF, K1GNW, W2s FR GKZ, WA2s ELD ICU UWA, WB2RKK, W3s CB EML, K3MVO, WA3OGM, W4s SQO UQ, K4s EAC KNP, WB4s OMG SGV, W8s IBX PMJ RTN VDA/4, K8KMQ, WA8PIM, WB8ALU. Central Area (KØAEM, Dir.) – W4s OGG ZJY, WB4s KPE YCV, W5s MI QU S8M TNT, WB5CIC/5, W9s CXY DND YB WØs HI INH LCX ZHN, KØDDA, WAØs ELO IAW. Pacific Area (K5MAT, Dir.) – W5RE, K5MAT, W6s BGF EOT IPW MLF VNQ VZT, WA6DEI, WB6VKV, W7s BQ DZX EKB EM GHT KZ PI, K7NHL, WØLQ, KØOTH, WBØAXW.

Independent Net Reports (December)

Net	*Sessions*	*Traffic*	*Check-ins*
Clearing House	25	264	374
North American Traffic	26	822	606
20 Meter Interstate Ttc.	25	1175	448
Mike Farad	28	330	359
7290 Traffic Net	40	542	1943
75 Meter ISSB	31	515	1640
Ohio Valley Teenage	31	213	248
IMRA	42	1281	1725
New York Region RTTY	31	106	229
Hit & Bounce / MW	31	1011	400

QST

FM News

(Continued from page 97)

in turn applies the positive 12 to 24-volt PTT voltage through the blocking diode CR4 to the coil of K3, thereby energizing the relay. That removes the applied voltage to K2 and places the repeater control in the "off" position. The repeater will remain down – even after the telephone line becomes operative – until someone rings it up, or manually resets it.

Bypass And Reset

A manual reset button S1 (momentary push button, normally open), provides a local means to bring the repeater up. It must be held down for a time period equal in length to the time it takes to ring the telephone the number of times established by R2.

In the event someone needs to use the telephone for some other reason, or if work needs to be done on the control device itself, a manual defeat switch, S2, may be closed thereby removing the entire control circuit from its "on line" condition.

Alerting Circuit For Control Operators

To provide the control operator with a means to determine if his personal telephone line is operational, a variation of part of the original circuit is used (Fig. 1A). When S1 is closed, and the telephone is on the hook, the light will glow, indicating the telephone line is operational. If, however, the line becomes inoperative, the bell will let you know. S1 is provided to deactivate the system when the control operator is not on duty.

QST

Strays

An entry bearing the ARRL diamond captured third place in the Third Annual West Carrollton (Ohio) High School Paper Airplane Competition, endurance class, with a flight time of 6.3 seconds. The contest was organized by Dick Fowler, K8PXE, a physics teacher at the high school. Design engineer, owner, and operator of the craft is WB8IOE.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

H o w :

GO PLACIDLY amid the noise and haste, and remember what peace there may be in later silence. . . . So far as possible without surrender be on good terms with all big-gun locals. . . . Transmit quietly but clearly; and listen carefully to all others, even the dull and ignorant, for they too may be new multipliers. . . . Try to avoid loud and agressive QRM; it is a vexation to the spirit. . . . If you compare your reports to those of others you may become vain and bitter. For always there will be greater and lesser signals than your own. . . . Keep interested in your countries total. However humble, it is a real possession in the changing fortunes of DX. . . . Exercise caution in QSLing for the world is full of trickery. But let this not blind you to what virtuous QSLers there are. Many persons strive for high ideals and everywhere life is full of heroism. . . . Be yourself. Neither become cynical about DX, for in the face of all aridity and disenchantment it is perennial as the grass. . . . Take kindly the counsel of OTs and gracefully surrender the foibles of young squirts. Nurture strength of ham spirit to shield you in sudden QSB. . . . Do not distress yourself with vague imaginings. Many operating errors are born of fatigue. . . . You are a child of the ionosphere no less than those with higher power and bigger beams. You have a right to be here. And whether or not it is clear to you, no doubt the solar cycle is unfolding as it should. . . . With all its sham, drudgery and broken dreams, it is still a beautiful DX world. Be careful. Strive to be happy. Switch to Safety. . . .

Which you may recognize as an ineptly perpetrated paraphrasing of Ehrmann's famed "Desiderata" to go with your final frantic ARRL DX Test weekends this month. We apologize humbly to Max. His original wording already deals adequately with our radio world and all others.

† † †

W h o :

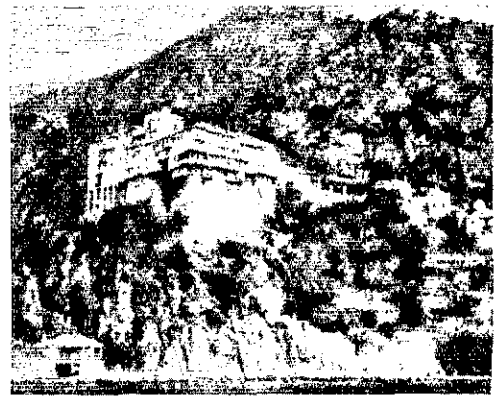
Low-power DX enthusiasts continue to proliferate despite unfavorable sunspot readings. K8EEG/Ø, an organizer of QRP doings and editor of the *Milliwatt*, favors us with a timely dispatch from the peanut-whistle front:

The appearance of such fine manufactured QRP gear as now on the market has added quite a number of amateurs to the QRP ranks. Still a lot of us old homebrew types around, though. Reading about the big linears and massive antenna arrays used by some DX chasers might give one the feeling that attempting to work DX with less than five watts is nonsense. But there is an amazing amount of DX being worked with very low power and minimally adequate antennas. Your readers should be reminded that persistence, patience and a good bit of savvy can make up for much in this game. To give an idea how some real low-power buffs are making out here are some countries totals and power inputs recorded here at year's end: K4FS, 102 countries (5 watts); W4VNE, 76 on 1 watt; W5TVW, 66, 5; WB4WRF, 65, 10; WØQZR, 54, 2-8; WA8DDI, 50, 1; K2BG, 45, 5; W1JUB, 42, 6; WA6ABP, 36, 0.8; W3HGX, 36, 5; W9SCH, 25, 4; K8EEG/Ø, 25, 0.7-4; W8ELL, 25, 2; W3AVM, 25, 2; W4WHK, 23, 4; K6EIL/2, 21, 0.3-1; W4UM, 16, 3; K2VIV, 15, 5; WA7PCZ, 15, 4; W6JVA, 11, 2; W4ZRP, 11, 2; and KZ5OD, 10, 5. K4FS has five countries worked with 40 milliwatts mobile. K4OCE, previously a contributor of QRP info to "How's," is now somewhere up around 150 countries on 4.8 watts. If any of the boys are at the point of wearily waiting for the next DXpedition to add another country I suggest they start all over again — this time with less than five watts. They'll swear there is nothing more competitive, challenging and rewarding in all of amateur radio. Many of the preceding totals were worked in the last few months. Lots of thrills are involved. Like my first DX out here in the Dakotas a couple of weeks ago. I had just put up a new homebrew bamboo two-element beam for 20. UA1PAA was the first station I called. A solid QSO with my 700 milliwatts!

† † †

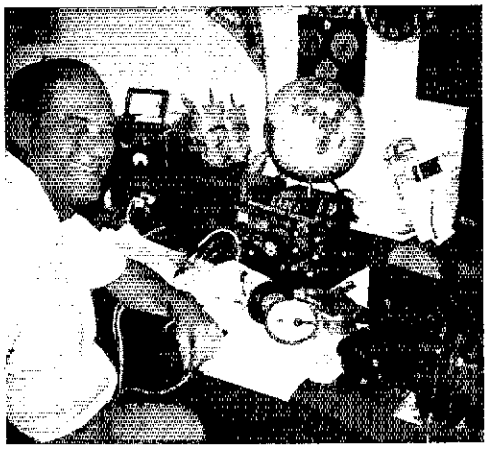
W h e r e :

NORTH AMERICA — As a kind of Society for the Prevention of Cruelty to QSLs and QSLers I suggest including a blank stamped envelope or two with your next batch of s.a.s.e. (self-addressed stamped envelopes) to your local ARRL QSL Bureau Manager. He may be able to stir up needed



SY1MA, thanks to SVØs WII WJJ and others, radioactivated the remote autonomy of Mount Athos last fall. The mountain republic makes a striking QTH of the Month. *(Photo via DL1CU)*

*c/o ARRL, 225 Main St., Newington, CT 06111.

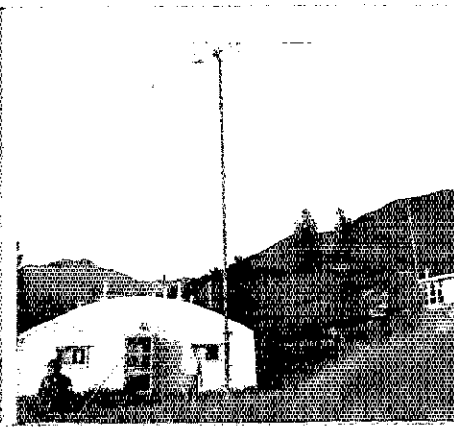


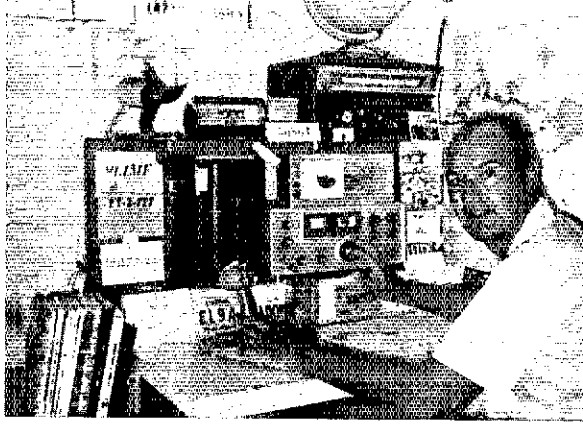
EA9EJ, lately available around 21,325 kHz at 1300 GMT, soon will close down for Canaries reassignment. Without Justo's enthusastic activity Spanish Sahara may become DXceedingly rare. *(Photo via W5LZW)*

future cooperation at the same time he unloads a little backlog. Each such volunteered envelope could be marked on the back "QSLs courtesy (your call or club)" if you like. (K6ARE) . . . KL7ELB Fletcher Ice Island QSOs may be confirmed (operator Bob only) via R. Ferguson, 5504 105th NE, Kirkland, Washington. (DXNS) . . . VA2UN is closed down but cards keep pouring in to keep our DXpedition of the Month staff busy with QSLs. W3GHD and WB4UKA recently joined our team, and DotM celebrates its tenth anniversary in May. Stations currently active for whom we handle QSLs include CN8HD, CR5SP, CX2CO, C21s DC DR, FM7WF, HKØAI, HM1AJ, HP1IE, HS2AGP, IP1s MOL RB RBJ, KV4FZ, LA1G, LU1AZO, OY7ML, PJ7VL, PY2s PA PE, VE8RCS, VK9s JK XI XK XW XX, VPs 7NY 8JV 9GR, VS6s DO DR, XE1IIJ (6G1AA), ZS6IW and 9Y4VT. We still await logs from PJ7VL, additional logs from FM7WF. (W2GHK) . . . The late WA2AAJ apparently had no KS4 QSL connections despite indicates to the contrary. (W7JAC) . . . "QSLers of the Month" lauded and applauded for QSL responses quicker than the usual are CP1EU, CR7EY, EA9s EJ EO, CT2AZ, FG0AFC/FS, FL8s DS HM, FM7AN, FO8BV, FP8FU, GM5AXO, HBØs XJL XKW, JTØAE, K4FPQ/VP7, KC4USN, KG4s AN FO, KH6s CA HQL IH RS, KL7s GDO GQD, KP4s DLC DLW, KX6s BB EB, KZ5BB, LU6DGW, M1B, OA4s AHA QZ, OZ6MI, PYs 1ZAL 2WW ØDVG, SM2AGD/CEØ, SP9VU, SU1IM, UI8FAS, UW3BI, VE8RO, VK9AJ, VPs 2DH 2LAW 9HD, VQ9R/d, VS6AW, VU2SBX, WAØOTH/TF, WB8BQG/4X, XT2AF, YNs 1ZBH 4EHJ, YV1AD, YX5AJ, ZD7BB, ZE4JH, ZS5PG, 3B8CV, 3X1P, 4S7EA, 9G1HE and 9K2BQ, plus QSL agents W3HNK, K6AQV, WAs 3HUP 7OMZ 9PZU ØWKW, VEs 2DCY 2JH 3FCL and SMØKV, all commended in "How's" mail from Ws 1RML 1SWX 3CTE 7YF ØKUM, Ks 2HYM 8PYD 9VLQ, WA3DMH, WBs 4WHE 9DRE and VE7BAF. Any particularly prompt pasteboard inputs out your way? . . . Halp! These parenthesized brethren seek hints toward capturing tardy QSLs from holdouts mentioned: (W4NJF) CVs 8CZ 9BT, IW4LN, YN7JKW, 5N5ABH; (W8MBB) 5A4TE of August '69; (WA2TRK) VK3MO; (K2HYM) ZD3Z; (K4SD) EA9EJ, OY9LV, TJ1BF, VR1PA, ZC4TR, 3B8CR, 3V8AH; (WB4WHE) CO6AW, HA3GA and SVØWOO. Any 'alp? . . . W6NLG, K9VLQ and H. Smith of 218 Normandy Dr., Silver Spring, MD 20901, offer QSL managerial assistance to needful ops at the DX end. Need 'alp?

AFRICA — DJ6QT's logs for CT3/DJ6QT, DJ6QT/5T5/5U7, HBØXSV, TYs 9ABC ØABD, TZ2s AB AC, XT2s AB AC, ZD3N and SV8WS operation in 1970-'71 have just reached our DotM desk. S.a.s.e. on hand for this activity will be filled and mailed immediately, other QSLs via bureaus. (W2GHK) . . . 5X5NA has been QRT since last June despite spurious evidence to the contrary. (DXNS) . . . I understand 9G1 calls are popular among pirates. For the record we worked practically no telegraphy in Ghana, only a few Novice QSOs. We continue to receive QSLs via W5EGH. (ex-9G1s WW YA) . . . I believe I have answered all QSLs received for my many years of QSOs from Southwest Africa but further inquires to my new Israel QTH are welcomed. (ex-ZS3S) . . . High hamming activity helped bring five sudden sacks of mail to VQ9HCS. WA1HAA now assists Harry's QSLing. (WCDXB) . . . Effective December 12, 1972, I manage QSLs for WA1RDH/VQ9. Bob should continue active until April. Self-addressed stamped envelopes are required from W/K applicants, s.a.e. plus Inter-

HL9TV prefers 20 phone and 15 cw from Tongduchon. Andy, a signal Corps officer, expects to return home to Virginia and WA4MTP this summer. *(Photo via K5HWO)*





OD5GT, an American far from home, is grateful to native OD5s EP and FB for helping him join the ranks of hamdom in January of '72. Despite a restrictive Beirut apartment location Bill nears DXCC on a simple multiband dipole.

national Reply Coupons from others. (W4WFL) . . . K8LUH, not K7LUH, manages EL4B's QSLing. (Ks 7LUH 8LUH) . . . TU2DD gives many a teleprinter hound a brand new RTTY country. I handle his QSLs and strongly urge that the mode, of contact be very clearly indicated, such as "2xRTTY", on all cards. (K2QHT) . . . I'm closing the files for my EL2Z operation in 1964-'69. Anyone still needing contact confirmation should write me at once. (PAØHU) . . . My QSL output for ET3USA, 9E3USA and 9F3USA is delayed by slow log receipts. The latter station poses a special problem because I find that several operators used the call at various locations; complete logs may never be forthcoming. Moreover, VE3IG has 9F3USA logs for QSOs between April 7, 1971 and January 19, 1972. (W4NJF)

EUROPE — 4K1C is said to radiate from Antarctica's Russian Vostok base, further implementing the U.S.S.R. 4J-4K-4L prefix blocks. (WCDXB) . . . UK3ØSB was a recent Stalingrad commemorative special, and HA5s may be using HA25 and/or HA1ØØ commemorative prefixes through '73. (DXNS) . . . I intend to QSL my FØACS contest contacts 100 per cent. (DJ5JH) . . . Scant results while using IRCs (International Reply Coupons) here. Moscow's Box 88 still owes me QSLs from eight countries. (K4SD) . . . We still need logs for LAØAD activity and hope be hearing soon from Bob who is now LU5EVM. (W2GHK) . . . Since my QTH was changed to Florida I've enlisted WB2GVE's help in handling CT1SH QSLs. (WB2ZER/4) . . . I1BNZ unfortunately confirms that MI1 was not active September 1, 1972, pile-ups notwithstanding. (W1JUB)

SOUTH AMERICA — SM2AGD/CEØ's impressive Easter Island QSL was well worth a 45-day wait. (W7YF) . . . After working OAs for six years, OA4s, AHA and QZ finally confirmed Peru for me. (WA3DMH) . . . Finally shattered my Uruguay QSL jinx with a card from CX7BBB. Still working on overdue CP and YS pasteboards. (W3CTE) . . . Here comes our monthly mailers' smorgasbord, and keep in mind that each offered item is necessarily neither "official," complete nor accurate. Reach:

A4FA, Box 602, Muscat
C21DR, D. Reed, Box 249, Nauru (or via W2GHK)
CM3HG, P. O. Box 15, Santa Cruz del Norte, Cuba
CO2PZ, F. Prado, P. O. Box 1, Havana, Cuba
CR6RJ, P. O. Box 484, Luanda, Angola
CT1SH, via M. Wein, WB2ZER/4, P. O. Box 151, No. Miami, FL 33161 (or via WB2GVE)
CX8BE-CX8ZBE, J. de Castro, Juan Benito Blanco 1047, Montevideo, Uruguay
DJ6QT/CT3/5T5/5U7 (see text)
DJs 7ZG/CEØ 9FB/CEØ (to DJ7ZG)
F6s AJY/5U7 AYK/5U7 (to 5U7AZ)
FL8OR, B. P. 1279, Djibouti, T.F.A.I.
HL9VJ, L. Hurzon, 6171 CSS, P. O. Box 295, APO San Francisco, CA 96324
HP1XTW, E. Chism, P. O. Box 139, Balboa, Canal Zone
HS3AII, D. Denton, P. O. Box 6721, 1998th Comm., APO, San Francisco, CA 96288
KB6CV, B. Zater (WB4LDK), Box F-82, APO, San Francisco, CA 96401
KC6SK, S. Kohn, Box 55, Colonia, Yap, W. Carolines, 96943
KX6KE, J. Teele (W1WXC), P. O. Box 2346, APO, San Francisco, CA 96555 (or via KX6BU)
KX6MD, 30412 San Trap Dr., Agoura, CA 91301
LU8WN, P. O. Box 6, Comodoro Rivadavia City, Argentina
PY7ZAH, J. Standish, Recife, Brazil, APO, New York, NY 09676
PZ2AB, P. O. Box 71, Nickerie, Surinam (or via W2KF)
PZ9AC, P. O. Box 1021, Albina, Surinam
TJ1BB, P. O. Box 4, Yokadouma, Cameroon (or via WB2WOU)
TYs 9ABC ØABD (see text)
TZ2s AB AC (see text)
UA1KAE/1 (via CRC, attn. UAØBA)
UA3YH/m (via CRC, Attn. UK3KAI)
VA6NQ/6, Box 592, Calgary, Alberta, Canada
VK2BQQ, K. Nad, Box 3209, Sydney, NSW, 2001, Australia
VP2KH, Box 184, Basseterre, St. Kitts, W.I.
VP2ST, Box 93, St. Vincent, W.I.
VS6AW, D. Woolley, Box 30, FPO, San Francisco, CA 96659
WA1RDH/VQ9 (via W4WFL)
WA5MUV/KC4 (via WB4TUP)
WA8KMJ/KL7, J. Wright, NCS Box 185, FPO, Seattle, WA 98777
WB4VKH/8R1, P. O. Box 596, Georgetown, Guyana
XT2s AB AC (see text)
YN1AZ, Aptdo. 5013, Managua, Nicaragua
YN1ZBH, L. Howard, P. O. Box 4531, Managua, Nicaragua
YS2FM, Box 125, Santa Ana, El Salvador
ex-ZS3s, B. Bloch, Rehov Yehuda, Halevi 2, Herzliya, Israel
5R8AG, Box 60, Ivato Airport, Malagasy

AF4FD (via G3XE)
C31FV (to DK4TP)
CT7SH (to CT1VE)
DU1WTG (via WB4QOA)
EIØYSE (via EI5A)
EL2Z (see text)
FØACS (to DJ5JH)
FØADO/FC (to VE8RA)
FK8CE (via WA2HSU)
FPØCZ (to W2IEG)
FPØMB (to F6BFH)
HBØXSV (see text)
HKØAB (via HK4BNC)
JY9DB (via K4AVD)
JY9VO (via W7JHO)
KL7FLB (see text)
LA8YB/4W (via LA3BI)
M1s C D (via I4FTU)
OD5GU (via WA2LQZ)
ON8WX (to W8FXP)
TJ1BG (via K4WQS)
TU2AA (via WA8EJI)
W2NTJ/HH (to W2NTJ)
WA9VYR/TF (to WA9VYR)
YA1DX (to PAØGMM)
YA1TCA (to OAØTCA)
YN1JU (via W1GNC)
ZD3N (see text)

ZD8DLG (via G3LXQ)
ZD9GC (via SARL)
3AØON (to ON4UN)
5B4AA (via G3XMQ)
5V7YH (via VE3GHL)
5V8WS (see text)
ex-5X5FS (to EI9G)
6W8DY (via VE4SK)
9X5NA (via W7LFA)

The preceding QTH collection comes courtesy Ws 1CW 1JUB 1RML 1SWX 3CTE 4WFL/1 6AM 6GSV 7YF 9LNQ ØOYP, Ks 2HYM 2QHT 4SD 4WVT 8PYD 9VLQ, WA3RPL, WBs 2ZER 9DRE, VE7BAF, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, N.72T, England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (K4KQ), 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), Nigeria Amateur Radio Society *News* (5N2ABG), North Texas *DX News* (W5SZ), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PAØs INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB). Your turn?

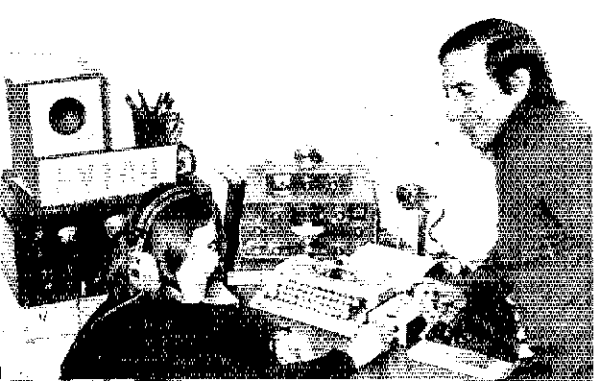
† † †

W h e n c e :

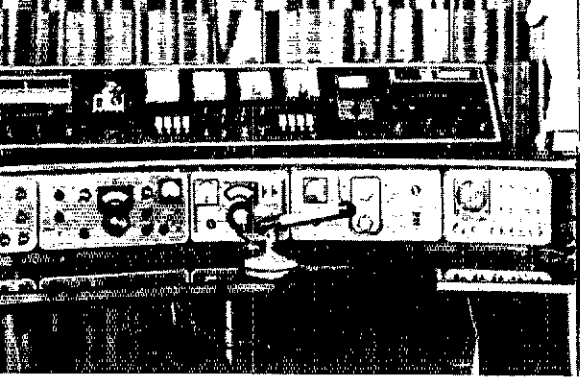
SOUTH AMERICA – I'd be glad to schedule anyone wanting an OA6 contact on 10 through 40, cw or ssb. I won't be back home at KØWTM for months: Arequipa has such a fine climate we hope to prolong our stay. I'm scrounging about for stuff to make a cubical quad to go with my SB-102. Made DXCC during a seven-year tour as ET3GB. Incidentally, getting a ticket down here isn't exactly quick and simple. Took me three months, also two months to get my gear through customs. (OA6CV) . . . WØYVA/4 tells me he will be signing 4M4AGP in Venezuela during the phone portion of the current ARRL Test. Watch for Bob on 160 at 0600-0700 GMT. (W1CW) . . . Last October's operation as YX5AJ in Caracas was the first use of that prefix by Venezuelan amateurs. YV5s ANF BBU BPJ BPU DFI, F2QQ and I staffed the station (YV5BPG) . . . PT2AAA has a new station on the air at Brasilia LABRE headquarters. (K2YFF) . . . Fine November visit to Aruba where I ran into PJ3s MA MV and other hams. W/Ks may obtain PJ operating authorization by initiating a forms request to Lands Radiodienst, Curacao. After completing the considerable required paperwork it is wise to forward copies of everything to PJ3MV to assure proper follow-up. (WB2LEI) . . . LU5HFI is former VU5KV-XV5AC, and ex-LAØAD is also a new LU5. (SCDXC) . . . LU1ZC signs WA4CDM when home in the Miami area. Albert was also active in the South Shetlands about a year ago. (WCDXB)

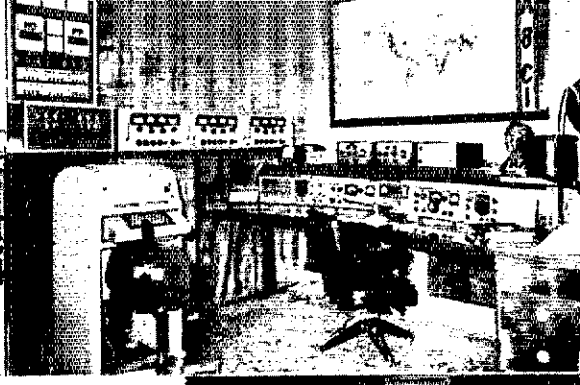
OCEANIA – ARRL's Five-Band WAS still frustrates me. Seek a handful of cards for 80, only Nebraska and North Dakota on 40. Neighbor KS6DH just made his 5BWAS, probably one of the first in Oceania. My countries total is 200/170 worked/confirmed. Hf short paths are becoming more erratic but long paths are paying off well. After a visit to New Zealand in February I'll be hitting those ARRL DX Test week ends. With two more Samoa years ahead I hope to be visiting rarer DX spots out this way. Very 73 to all from paradise! (KS6DY) . . . My friend WB6CZB used delta loops, dipoles and long-wires on 160 through 10 meters while DXpeditioning as A35JH, ZK2DX and 5W1AL last year. Jim is trying to put together enough QSLs for DXCC at each stop. (WB5BHN) . . . DU9FB's second op, daughter Mariecel, recently pictured in *QST*, studies commerce in Manila. Fernando himself is a lawyer who is very active in civic, religious and radio circles. Davao is my old home town. (WB6RJP) . . . A new multiband vertical, left on Kure Island by our recent DXpeditionary group headed by KH6HGP, should make KH6EDY more available to 5BDXCC-hunters. (KH6BZF) . . . Uncle has seen fit to send me to the Philippines for the next two years. Hope to get a DU1 license while there. Must be pretty good DX as I've never heard a DU in this Texas QTH. (WB5DRU) . . . I'm quite active on 10, 15 and 20 sideband from Kwajalein with a GT-550A and TH3-MK3. (KX6KE-W1WXC) . . . ZL2BT's 90-foot-high collinear array really punches a signal through on 3805 kHz around noon GMT. (W9LNQ) . . . DU1WTG is WB4YLM stationed in Manila with our embassy. I'll be happy to help set up skeds with John. (WB4QOA) . . . VK6EB copied my 75-meter sideband at good strength in Perth last fall. (VE3BBN) . . . W6GQU, K6GUY and KH6HET accumulated nearly four VR3AC kiloQSOs with 117 countries using FT-101s with outboard VFOs. KZ5JF-K4CEF hints of an early Fanning encore plus possible KP6 radiations. (WCDXB)

NORTH AMERICA – Concluding March 2nd, I conducted a series of eastern Caribbean sunset 160-meter propagation tests which consisted of automated beacon transmissions on 1803 kHz at 2130-2300 GMT Mondays through Fridays. The main purpose was to explore sunset path propagation to Europe. Reception reports will be appreciated. (8P6DR) . . . I restricted my October ZF1GS efforts to 160 meters, working 203 stations in 17 countries with Drake gear and a full-sized dipole about fifty feet above the beach. At the same time friends W4ZMQ, K4SHB and WB4TAF pushed ZF1VD to 1800 contacts while WB4SHB (formerly W4ISF, J2ISF and KL7AAY) was making 400 QRP contacts on 10 and 15 with a two-watt Argonaut. Lovely trip! (W4BRB) . . . Met a lot of W9 "snowbirds" while wintering in Florida. Surprising DX results with 150 watts and a 4BTV atop our mobile home. (W9NN, DXAC) . . . St. Vincent Amateur Radio Club's headquarters, scene of DX activity by VP2SG, is located in the old gunpowder storage area of Fort Charlotte, a monolith with three-foot-thick walls built about 1790. The island soon should be heard more often since five or six VP2S-stations are readying new equipment. I operated there a year ago from VP2SR's location. (K8ESX) . . . VP2ST is very popular on 20 cw with his 60 watts and dipole on St. Vincent. (WA3RPL) . . . Here's a handy way to employ ARRL Op-

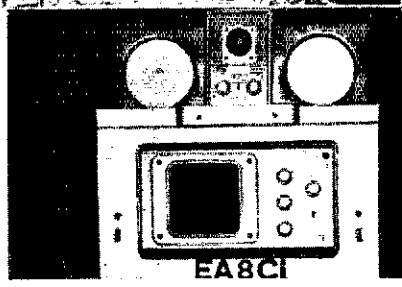


SV1CH is especially interested in working W/K/VEs on 40 meters these sunspotless days. Pano, right, here entertains visiting friend Vivi, a soon-to-be YL SV1. *(Photo via WA3KSQ)*



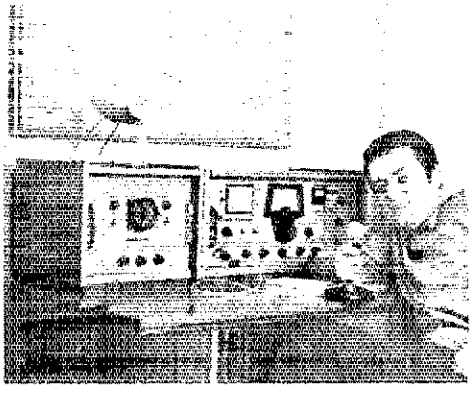


EA8CI's sumptuous Las Palmas installation is widely worked on code, voice, radioteletypy and slow-scan television. This photography is contributed by VE3AGC who enjoyed a recent visit with Manuel and other EA8 friends.



erating Aid No. 7 (DXCC Countries List): To the left of each country place a small dash when worked, change it to a plus-sign when confirmed, and circle the plus-sign after accrediting for DXCC. (W2CNQ) . . . Sure hate present band conditions. Used to give Utah to 25 or 50 DX stations daily on the higher frequencies. Not lately. My nearest ham neighbor, W7YAI, is 21 miles away. Despite the remote QTH I have QRN from near-by power transmission lines. Much of the time all bands sound something like 80 in Florida. Nevertheless I've managed 47 states and 17 DX contacts on 160 meters. (W7ZC) . . . W1CT requested that I present his 5BDXCC plaque (No. 200) to him at Quanapowitt Radio Club's first meeting at Boston last September 15th. George earned it on less than 500 watts and a vertical. (W1QV) . . . I'm a 75-meter DX nut and our newly expanded subband is really hopping! (K9RGM) . . . Twenty's been going to sleep at dark with the chickens in Washington state. Not much left for us night-owl DX men. (W7YF) . . . VP2DH claims he's the only DX hound regularly active on Dominica. (W1RML) . . . Eighty cw started the year quietly but picked up fast. (W1SWX) . . . European paths have been somewhat disappointing in B.C. on higher frequencies this winter. Four good days a month is about average. Africans pop out of the woodwork at the most unexpected moments! (VE7BAF) . . . Last Christmas eve I worked 27 states and three countries while aeronautical-mobile in an L-1011 en route San Juan from New York, mostly 7-MHz ssb with our flight-deck Collins job. We tallied 63 QSOs from "Santa's Sleigh." (K2LY1) . . . The jurisdictional friction over Roncador and Serrana Bank involving Colombia, Nicaragua and our country goes back to circumstances surrounding a treaty signed by the three nations in 1928. (WB9BUV) . . . KZ5s JF PW and K6JAN missed Serrana on their first pass aboard yacht *Vamonos* in October. A second try one week later was plagued by fuel water-polution. (WB4QFH) . . . A more complete list of 160-meter WACs issued by ARRL-JARU since W1BB's No. 1 in 1953 goes, in order: Gs 6GM 3PO, W8GDQ, G3OQT, DL1EF, W1PPN, G3PQA, Ws 2KQT 6KIP, G3RBP, W2IU, G3s FPQ LIQ, K6DZC, W0VXO, DL9KRA, W0NWX, GI6TK, Ws 9PNE 1HGT, KV4FZ, OK2PDN, GM3YCB, HB9s HL CM, OK1ATP, Ws 2EQS 6RW, WA4PXP and GM3WDF. This info comes from combined research by W1BB and ARRL. Correspondence concerning corrections or omissions is welcomed. (W1BB) . . . ON6DX, YU2HH, ZS6KO, PY2FQK, WL7HHX, JA1CIO and VE3EHM completed an unconfirmed WAC for me after one year on the air. The way east coast Novices pile up makes me wonder if Colorado is super-rare DX on 21 MHz. (WN0GFL) . . . DL1JS broke in his new reciprocal operating privileges on 75 meters with my 350. Johannes prefers 15 and 20 back home. (WA1HXJ) . . . Being portable-VP7 for two years was great DX sport but I'm glad to be an ordinary U.S. Six once more. I'll soon be after DX again from a Bartow desert location. (K6LZQ) . . . With everybody else working interesting Asians I'm almost convinced that propagation between that continent (except for JAs) and my

(Continued on page 115)



LZ2ZK's homebuilt station gives a good DX account of itself on several bands. Kiril radiates from scenic Trnovo, Bulgaria's capital in ancient times. *(Photo via W2MLO)*

Operating Events ..... de WIYL

MARCH

1 ***W6OWP Qualifying Run*** (W6ZRJ, alternate) 10-35 wpm at 0500 GMT on 3590/7090 kHz. This is 2100 PST the night of February 28. (Please note dates are always shown at least two months in advance.) Underline one minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

3-4 ***DX Competition*** phone, p. 55 Dec.

10-11 ***VHF/OM Contest*** cw, p. 99 Dec. ***Worldwide VHF Activity, Virginia QSO Party, 4X4 Contest***, p. 97 Feb.

16 ***W1AW Qualifying Run*** (10-35 wpm at 0230 GMT) on 1.805 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 EST the night of March 15. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.

17-18 ***DX Competition*** cw, p. 55 Dec.

19 ***Conn. Wireless Assn. High-Speed Code Test***, p. 97 Feb.

24-26 ***BARTG Spring RTTY Contest***, p. 97 Feb.

24-April 1 ***IARC phone contest***, p. 97 Feb.

31-April 1 ***Society of Wireless Pioneers QSO Party*** the full GMT period, all bands, any mode. Members call CQ SWP on frequencies plus-or-minus 55 kHz inside any band or subband edge. Shift 3 kHz for working frequency during QSOs. Score 1 point for contacts on the same continent, 2 points for other contacts, 3 points for mobile marine. Multiplier each time the QSO exceeds another 10 minutes of contact. For a contact to county, you must receive RS(T), QTH and SWP membership no. Report promptly following the contest to SOWP Chief Operator Bob Shrader, W6BNB, 11911 Barnett Valley Rd., Sebastopol, CA 95472.

26 ***W1AW Morning Qualifying Run***, 1400 GMT (this is 9 am EST). Same frequencies and details as under the March 16 listing.

APRIL

4 ***W6OWP Qualifying Run.***

7-8 ***CD Party***, cw. This is a quarterly event for League appointees and officials, notified separately by bulletin. Check with your SCM (p. 6) to see if you can qualify for an appointment. ***SP Contest***, 1500Z April 7 to 2400Z April 8, 80-10 meter cw only. Single op, single band and multiband and multiop, multiband entries permitted. Non-SP stations send RST plus QSO no, starting with 001. SP stations will send their Powiat designation instead of QSO no. (for example, 579WA). Each SP or 3Z station counts 3 points, you may work the same station on different bands. A multiplier of one for each Powiat contacted (to count only once during the contest). Single ops, single band multiply QSO points by the no. of different Powiats; single ops, multiband add Powiats on each band (same scoring for multiops.), multi-multi not permitted. Appropriate certificates. Log in GMT, separate logs per band. Your entry must be accompanied by a summary sheet with all scoring info., competition category, your name/address in block letters, and the usual declaration. Attach a separate list of Powiats contacted. Entries must be postmarked by May 1. Send to PZK Contest Mgr., Box 320, Warsaw 1, Poland. ***Florida QSO Party***, Sat. 1500-2000, Sun. 0000-0500 and 1400-2359 (all times GMT). All amateurs are invited to participate. Fla. amateurs may work each other. There are no time or power restrictions. Fla. stations send RS(T) and county, outside-Fla. stations send RS(T) plus state, province, or country. Do not exchange QSO no. A station may be contacted once on each phone and each cw band (the modes are separate entries and may be summed for Fla. club aggregate entries only). Fla. stations count 1 point per QSO times the no. of states, provinces and countries (DC counts as MD). Other Fla. stations may be worked but only for contact points, not for mult. Max. mult is 73 (49 states, 12 provinces and 12 DX countries maximum). Non-Fla. stations count a point a QSO times the no. of Fla. counties (67 max.). Fla. clubs may total their members single op. cw and/or phone scores and enter this total in a club aggregate category. Each single op. so claimed may appear in only 1 Fla. club aggregate entry. A variety of trophies and certificates will be awarded. All logs must be postmarked no later than April 30 and mailed to Florida Skip Contest Chairman, Box 501, Miami Springs, FL 33166. A summary sheet with your name, call, address, claimed score, category and the customary declaration must accompany your entry or it will be disqualified. Messy entries (!) will not even be considered. Scores will be published in the June issue of Florida Skip. For a copy, include an 8 cents stamp with your logs. Note only Fla. c aggregate entries may combine phone and cw scores. Decisions the Contest Committee are final.

10 ***W1AW Qualifying Run.***

13-16 ***County Hunters SSB Contest***, sponsored by the Mob Amateur Radio Awards Club, Inc., from 2200Z April 13 to 0500 April 16. Use the low end of the general class phone sections of ea band. No credits for contacts made on the 14.336 or 3.943 nets fixed station may be worked only once. Portables changing count may be worked again for point and mult. credit from each n county or county line, ditto mobiles. Stations worked on a coun line count for 1 contact but 2 or more mults. Portables considered fixed for scoring purposes. Exchange report, consecut QSO no., county and state (country for DX). DX to DX conta will not count. Mixed mode permitted but one station must be SS Score 1 point for contact with a fixed U.S. station, 3 points fo contact with a fixed North or South American DXstation, 5 poir for other DX (including KH6), 5 points for any mobile 14 MHz a up, 3 points for any mobile on 160 and 10 points for mobiles on 4 For fixed stations, the mult. is the no. of counties worked plus n of DX countries; for mobiles the no. of counties worked plus no. counties given out plus the no. of DX countries = mult. Log m show stations, reports, county/country), state, bands, claim points; with a notation for each new mult. Use MARAC logs possible. Special plaques and certificates. Summary and l available for a no. 10 s.a.s.e. or s.a.e. and appropriate IRCs, availa from WA1ZCQ. Entries must be received by June 1 to be eligi (DX entries should use airmail). Send to Olin Munger, WAØZC 6004 N.W. 68th Terr., Kansas City, MO 64151

14-15 ***CD Party***, phone.

22-24 ***QRP QSO Party*** from 2000Z April 22 to 0200Z April 2 Members send report, state/province/country, QRP no. N members use power instead of QRP no. Scoring: 3 points per QS 4 points if non-W/VE; non-member 2 points per QSO, 3 points non-W/VE. The same station may be worked only once per ba Multipliers equal total of states, provinces, countries worked each band. Power mults.: 25-100 watts X 1.5, 5-25 watts X 2, watts X 3 and under 1 watt X 4. Final score equals QSO points mult. X power mult. Suggested freqs.: cw, 3540 7040 14065 210 28040; ssb, 3980 7280 14330 21430 28600; novice, 3720 71 21120. Appropriate awards. In reporting, indicate all usual log da equipment used, declaration that rules observed. Deadline for log May 15, send to Jim Hadlock, K7JRE, 210 Herric Rd., Newt Center, MA 02159.

28-29 ***5th RTTY WAEDC***, sponsored by the DARC, the t GMT period, 80-10 meters. Single op, single transmitter a multiop, single transmitter. Only 36 hours operation permitted single ops. The 12 hours of nonoperation may be taken in one b not more than 3 periods anytime during the contest. The peri need not be of equal duration but must total a minimum of hours and be clearly indicated in the log. Exchange QSO no. a RST. Two-way RTTY contacts with one's own continent count point, with stations outside your continent 3 points. Contacts non-EU with EU will count 5 points for the non-EU and 3 poi for the EU. Work a station once per band. Each QTC given received counts a point; each QTC must contain the time, call a QSO no. of the station being reported. A QTC may be reported o once and not back to the originator. A maximum of 5 QTCs t station is permitted per band. Keep a list of QTCs sent. Multiplier the no. of countries worked on each band plus call areas in JA VO VE VK W/K ZL ZS plus UA9 and UAØ. Three classifications, to 200 watts dc input, over 200 watts, SWL. A reasonable score required for one of the several awards. Excessive dupes unsportsmanlike conduct are grounds for disqualification. Lo must contain all the usual info. plus QTCs send/received. Separa logs per band. Enclose a summary showing scoring, rest perio classification, plus your name and address in block letters. Deadli June 10. Contest Committee decisions are final. Send to WAE Committee, D-8950 Kaufeuren, Postbox 262, West Germany. ***PA Contest***, sponsored by the VERON, from 1200Z April 28 to 180 April 29, 160-10 meters. Crossband and crossmode not permitte (Note, PA stations on 160 operate cw 1825-1835.) Exchange repo and QSO no., starting with 001. PA/PI/PE stations will send th province indicator (as follows: GR Groningen, OV Overijessel, N Noord-Holland, ZL Zeeland, FR Friesland, GD Gelderland, Z Zuid-Holland, NB Noord-Brabant, DR Drente, UT Utrecht,

(Continued on page 168)

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

Wallpaper

WE COLLECT souvenirs and mementos of special events to show our friends. We hoard programs of plays, or sports we've attended. Some of us spend hours with the camera collecting slides, moving pictures, or snapshots to record commencements, anniversaries, club activities or vacation trips, and spend more time going over and over them to share the pleasures with friends and family. Of all the souvenirs of our activity, the wall full of certificates in the shack is the most personal, for no layman who has not experienced the thrill of the hunt can quite understand the glow of accomplishment that they represent.

Among the long list of awards that are available to amateur radio operators, many are offered for contacts with YLs only. The most familiar are offered by YLRL: YLCC, WAC-YL, the rather difficult WAS-YL, and DX-YL that is limited to YLs alone. Members of the club who maintain an unbroken membership over five years, automatically are eligible for the club's Continuous Membership certificate.

The international organization's awards are not the only evidence of working women amateur radio operators; most of the clubs offer certificates as proof of contact with a specified number of club members. For those who are interested in this feminine touch in wallpaper that represents the YLs in amateur radio, there are a variety in that category.

On the east coast there are YL clubs from Maine to Florida. WRONE, and the RI-YLs in New England; NYC-YLRL, in New York; PJ-YL for Pennsylvania and New Jersey; and WAYLARC in the Maryland-DC area. Farther south the Georgia Peaches, SPARCYLs, and a certificate from the Floridoras will add glamor to any collection.

In the midwestern United States, certificates are available from Buckeye Belles, Chix-on-Six in Ohio; HAWK, in Indiana; LARC, in Illinois; TASYL of Michigan; and TYLRUN, and GAYLARC represent the southwest. There are two awards offered by the Colorado YLs, and the MINOW net certificate indicates that the proud owner has worked gals in all five of the states that the net represents.

The west coast is represented by the Portland Roses; "Lads 'n' Lassies," from YLRC-LA; the Mermaid certificate is evidence of operating YLs from the San Francisco gals of BAYLARC; while far to the north are the Alaska Lassies. Those who have acquired the Camelia Chirps certificate have a real collector's item now that that California club is inactive.

Canada's YLs offer TOT, and CLARA certificates for contact with members of these clubs. In South Africa, the gals of SAWRC offer their "Worked All YL" award, and one for cw contacts only – the "Key Keen Klub."

There are other awards and trophies offered by the gals for contest operation as those of YLRL, TOT, and SWARC. The Red Wagon Widows, for example have one for contact with members of the club that is made up of wives of firemen.

Each club and net has its own requirements. A contact with a member of any of these organizations is a way to start a collection of QSLs for a particular certificate. It might be interesting to know if anyone holds all the certificates that are YL club sponsored.

Olga, WN8MVV, wife of WB8EUN may be found on both 40, and 80 meters. Olga was born in Munich, Germany, and because the OMs interest in the hobby was so high decided to get her own license.

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

33rd YL Anniversary Party Results

CW Winners

4M5CKR	2928.0	Gold Cup, First Place
I1MQ	1292.5*	Certificate, Second
W7QYA	1288.0	Certificate, Third

Phone Winners

HC2YL	8923	Gold Club, First Place
K6KCI	7751*	Certificate, Second
W2GLB	7198	Certificate, Third

Combined Scores

HC2YL[1]	9422.00	VE1AMB[3]	2009.00
K4RHU[2]	6197.00	WA2DMK	1350.00*
W7QYA	5750.00	VK3KS	833.75*
WA9TVM	4367.00	G8LY	827.00
WAØYNC	3945.00	SMØCXC	679.50
K8NGR	3668.00	F6BHM	170.00

Cw Scores

WA1KMP	805.00	WB4NXR	3010.00
WA2DMK	700.00*	WB4NKO	2870.00
WB2PYI	660.00	WB4TIV	1938.75*
W2PVS	37.25	W4EHN	726.00
K4RHU	1215.00*	K4LMB	580.00
WA4EPM	609.00	K5OPT	5300.00
W7QYA	1288.00	K6KCI	7751.00*
WA7BBD	337.50*	K6DLL	5117.50*
WA8USU	125.00*	W7QYA	4462.00
K8ONV	1092.00	W7WLX	960.00
K8NGR	280.00	WA7FLC	630.00
WA9TVM	1271.00	W7HHH	330.00
WAØYNC	270.00	K8ITF	4950.00*
WNØGQL	37.50*	K8NGR	3388.00
VE1AMB	609.00	WA8AHU	2812.00
4M5CKR	2928.00	W4HWR/8	1885.00*
I1MQ	1292.50*	K8TFR	1152.00
VK3KS	783.75*	WA8VXE	770.00*
HC2YL	490.00	WA8EBS	646.00
G8LY	300.00*	WA9TVM	3096.00
SMØCXC	242.00	WA9FSR	1800.00*
F6BHM	110.00*	WA9EYL	390.00*
OH5RZ	6.00	WAØYNC	3675.00*
		WAØYPB	3200.00*
Phone Scores		WØJUV	2252.25*
		VE1AMB	1400.00
WA1NXR	3230.00*	VE3GTI	1837.50*
W1ZEN	2062.50*	KL7FQQ	1323.00
WA1JYO	1800.00*	KL7FJW	665.00*
W2GLB	7198.00	KL7GFU	190.00
WA2RDV	3266.25*	HC2YL	8932.00
K2OYG	2600.00	DL3LS	2840.00*
WA2RRI	2440.00*	HB9ACO	871.25*
WB2DSM	2210.00	G8LY	527.00
WA2DDD	1536.00	SMØCXC	437.50*
WA2DMK	650.00*	DJ1TE	140.00
W2EEO/2	247.00	F6BHM	60.00*
WA2FGS	260.00*	VK3KS	50.00*
K4RHU	4982.00	JA1YL	33.75*
WA7OII/4	4802.00	JA1AEQ	1.25*

Confirmation logs W3CDQ, VE5DZ cw. W6CEE, 4M5CKR, phone.

*indicates low power multiplier
[1]World DX Hagar Award
[2]Corcoran Award
[3]North American Hagar Award

Beth Taylor, W7NJS, is the YLRL western Membership Chairman.

CLARA Activity

CLARA, Canada's national YL club with members across that country, originated a special activity in December, 1972, for hospitalized children. Called "Operation Santa Claus," the club initiated a series of "phone-patch" style contacts between shut-in, and hospitalized children with "Santa" located at VE8RCS. OMs at VE8RCS assisted by acting as Santa and his assistants and speaking with the children in these contacts.

Both the national organization, CLARA, and the Ontario Trilliums, TOT, are particularly active in service activity for handicapped and hospitalized people.

More on First YLs

Originally from New Zealand, Elaine Scott became the first YL to obtain a license in Jamaica when she received the call 6Y5ES. Elaine is now operating in Canada as 6Y5ES/VE7.

Mac, 9Y4T, sends information that the first YL from Tobago is Hermine, 9Y4HP who may be found working all bands, 10 through 80 meters.

1927 is the date of Indo-China's first YL, with the call AF1B. Also that year the prefix SB7AB was used by Odette Chavez before the IARU intermediate BZ was assigned to that country.

1930 is the first evidence we can find of YL activity in Belgium when the call ON4OU was assigned to Mrs. Ulrix.

On "The Only YL in her Country" list, add Suren, JT1AH, in Mongolia, and Ann VP9GP, in Bermuda.

Meet the Net – Chix-on-Six

A casual QSO on 6 meters gave Shirley the idea of a YL net on 6 Meters. The original group began with ten members in 1959 beginning with two frequencies, one for the gals in the Cleveland area, and another for the Akron women. Later both

VE3DGG, Jean, and OM, Dave, VE3BAR. Jean is active in both CLARA and TOT, YL clubs in Canada. *(Photo courtesy VE3BBO.)*

merged and now meet on 51.3 MHz, at 2100 EST each Wednesday.

While the net operates on 6 meters, membership is made up of every class of amateur license, even people who are preparing for their first license are members for these gals have their own form of incentive licensing based on mutual encouragement.

The gals have provided communications during tornados, floods, and other disasters as well as participation in weather nets, and the Eyebank Net. The net certificate was designed by K8QJH. The present custodian is Marge Blose, K8ZEV.

VE3DGG – Jean Evans

When OM VE3BAR got his license in order to keep contacts with their son VE3CZL, Jean couldn't stand the pressure of waiting for Dave to get on the air so, in 1961 she got her license, and the past twelve years have been busy ones with her particular interest in radio, helping the handicapped and hospitalized persons.

Jean was awarded the Clifford Marsh Memorial Trophy in 1972 as Amateur of the Year, for her work with the handicapped, and most recently with a group of World War 2 veterans in Toronto. She is the first YL to be so honored by the Radio Society of Ontario.

Jean has taped a complete code course for the blind using a straight hand key for the purpose, and this course is being used all across Canada. She has worked with her OM, and friends, teaching theory to disabled veterans who have now established a station at the hospital.

In 1969 both VE3DGG and VE3BAH were presented a plaque for their outstanding service in Amateur Radio at the Midwest YL Convention in Toronto.

Strays

A note from W8EFW asks the question we have received from an even dozen amateurs: "Maybe a future column of yours could tell us what ever happened to Jean Hudson, W3BAK, over the years. Where is she now?" Maybe someone knows. QST

Strays

Hq. was honored by a visit from three engineers of the Heath Company who came to Newington late in 1972 to discuss some performance problems that troubled the ARRL technical staff. Standing, left to right, are Larry Houghton, K8ZVF; Joe Shafer, K8DCE; Bob Myers, W1FBY (ARRL); and Doug DeMaw, W1CER (ARRL). Seated is Bob Fernau, W8NDG, designer of the Heath HW-7 QRP transceiver. Such substantial concern on the part of the manufacturer for the performance of his amateur product is indeed an encouraging sign!

March 1973

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
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.

The Frequency Measuring Test. At one time, the FMT had only one purpose – to permit Official Observer appointees to test their frequency-measuring equipment and qualify or requalify for their appointment. Even today, OOs of Classes I and II must meet certain requirements and must prove they can do so by submitting FMT measurements every so often – requirements, incidentally, which at one time were somewhat difficult but which are quite easy to meet with any good communications receiver today.

But as time went on, more and more amateurs took part in the quarterly W1AW FMT transmissions, just to compare their measuring skill and gear with that of the "umpire," a commercial frequency-measuring service the League pays to measure W1AW's frequencies during the test. Down through the years we have changed "umpires" several times, but the same one has been doing the job now for several years, and doing it well and conscientiously. For obvious reasons, he prefers to remain anonymous. Suffice it to say that he is an old-time ham who has been in the business a long time and knows what he is doing – and makes no profit on the FMTs.

This hasn't prevented many amateurs with exotic frequency-measuring gear and a lot of enthusiasm from measuring right along with him, cycle for cycle (oops, hertz for hertz) and vehemently arguing about decimals thereof. Some are satisfied that they compare favorably with the measurements of the umpire; a few feel that the umpire might be wrong and they might be right – and at least one or two are sure that they can measure closer than the umpire and feel *they* should be the umpire, or at least that we should get a new umpire who can measure down to .001 hertz or so.

Well, there are always perfectionists who are the rare exception rather than the general rule, and we have no doubt that some amateurs are capable of equalling or outdoing the umpire, just as the "instant replay" can often catch errors in sport officiating, while decisions nevertheless remain final. Our umpire's FMT results are also final, in so far as the standings in the FMT Contest are concerned. As for OO qualifications, the most that is required is to measure to the nearest kilohertz on 20 meters.

Some say that W1AW's transmissions for the FMT should be more sophisticated, and that they should be supplemented by west coast transmissions as are the code proficiency Qualifying Runs. Perhaps one day, should participation reach that point of demand, this (these) will be done. Meanwhile, the transmissions are from W1AW only, using ordinary open-air (i.e., no temperature-control ovens) crystals for the most part on kilowatt transmitters used solely for the purpose,

TO QSL OR NOT TO QSL? THAT Is the Question

"I've got your QSL from Slobovia all made out, Old Man. A couple of IRCs should cover it." That does it! What a great feeling to know you just knocked off your 100th country for that coveted DXCC. Happiness is that 100th card! So you quickly send out your card with the requested IRCs and, where called for, you send SASEs direct or to QSL Managers. You impatiently await the returns. But don't hold your breath, because in many cases you won't receive the promised QSL cards. Sadness is....

Now don't get me wrong, there is no law that states that any ham operator must send out QSL cards. If you don't believe in QSLing, or you don't want to lay out the dough for cards, that's strictly your business. Just tell me so at the time I request your QSL card; tell me so right then and there. Don't suggest SASEs and then ignore them. Don't request IRCs (at 20 cents each) and then forget the guy who sent you this "money."

During a local round-robin, the other night, I brought up this subject. It was generally agreed that among the "locals," usually maritime and aviation mobiles were very lax in QSLing. Among the countries overseas it was the "iron curtain" countries that were so very slow and frustrating in their QSLing. The IRC and SASE "rackets" were sort of universal and always a personal matter.

Half the fun of amateur radio to some hams is sending and receiving QSL cards from all over the world. Therefore, if you are asked for your QSL card and you know you are not going to honor the request, BE A MAN and *say* so. It's the considerate thing to do. – *K3FDL*.

W1AW FALL-WINTER SCHEDULE
(Oct. 29, 1972-April 29, 1973)

The Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. 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 on Nov. 23, Dec. 25, 1972; Jan. 1, Feb. 19, Apr. 20, 1973. Please note that all times-days are in GMT. Specific operating frequencies are approximate and indicate general operating periods.

GMT	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY Bulletin[3]	.....	.....
0030	← CODE PRACTICE DAILY[1] 10-13-15 wpm →						
0100	.....	← CW BULLETIN[1] →					
0120-0200[4]	.....	.....	3.7 Novice[5]	14.080	7.080	7.15 Novice[5]	3.580
0200	.....	← PHONE BULLETIN[2] →					
0205-0230[4]	.....	.....	3.990	50.120	145.588	1.820	21.390
0230	← CODE PRACTICE DAILY[1] (35-15 wpm TThSat, 5-25 wpm MWFSn) →						
0330-0400[4]	.....	.....	3.580	.....	1.805	.....	3.580
0400	RTTY Bulletin[3]	.....	← RTTY BULLETIN[3] →				
0430	Phone Bulletin[2]	.....	← PHONE BULLETIN[2] →				
0435-0500[4]	.....	.....	7.290	3.990	7.290	3.990	7.290
0500	CW Bulletin[1]	.....	← CW BULLETIN[1] →				
0520-0600[4]	.....	.....	3.7 Novice[5]	7.080	3.990	7.15 Novice[5]	3.580
1400	.....	← CODE PRACTICE[1] (5-25 wpm MWF, 35-15 TTh) →					.....
1800-1900	.....	21/28 CW[7]	21/28 SSB[8]	21/28 CW[7]	21/28 SSB[8]	21/28 CW[7]	.....
1900-2000	.....	14.290	14.080	14.290	14.080	14.290	.....
2000-2100	.....	7.080	7.290	14.095 RTTY	7.290	7.080	.....
2100-2130	.....	21/28 SSB[8]	21/28 CW[7]	21/28 SSB[8]	21/28 CW[7]	21/28 SSB[8]	.....
2130	.....	.....	CW Bulletin[1]	.....	CW Bulletin[1]	.....	.....
2200-2230	.....	7.150 Novice	21.125 Novice[4]	7.150 Novice	21.125 Novice[4]	7.150 Novice	.....
2230	.....	.....	RTTY Bulletin[3]	.....	RTTY Bulletin[3]	.....	.....
2300	.....	CPN[6]	7.095 RTTY[4]	3.625 RTTY	14.095 RTTY[4]	CPN[6]	.....
2345	.....	.....	CN[6]	.....	CN[6]	.....	.....

[1] 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.
[2] Phone Bulletins on 1.82, 3.990, 7.290, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.
[3] RTTY Bulletins sent at 850-Hertz shift, repeated with 170-Hertz shift; frequencies 3.625 7.095 14.095 21.095 and 28.095 MHz.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] W1AW will tune the indicated bands for novice calls, returning the call on the frequency on which called.
[6] Participation in section traffic nets.
[7] Operation will be on one of the following frequencies: 21.02, 21.08, 28.02, 28.08 MHz.
[8] Operation will be on one of the following frequencies: 21.270, 21.390, 28.590 MHz.

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 EST dy 4:30 PM PST	0030 dy
5-7½-10-13-20-25	9:30 PM EST SnTThS 6:30 PM PST	0230 MWFSn
5-7½-10-13-20-25	9:00 AM EST MWF 6:00 AM PST	1400 MWF
35-30-25-20-15	9:30 PM EST MWF 6:30 PM PST	0230 TThS
35-30-25-20-15	9:00 AM EST TTh 6:00 AM PST	1400 TTh

The 0230 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 0230 GMT practice on the following dates.

Mar. 9:	It Seems to Us	Mar. 27:	ARPS
Mar. 13:	Correspondence	Mar. 30:	World Above
Mar. 19:	League Lines	Apr. 2:	YL News

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and what with QRM, QSB, drift and Doppler-shift problems the umpire has on occasions been climbing the walls trying to get an accurate measurement – and on rare occasions has failed to do so. One observer said "My receiver is more stable than the W1AW transmissions."

What this all boils down to is that a long, hard look is being taken at this program to determine what changes need to be made, if any, to make it a useful activity in modern-day amateur radio. As long as drift was kept under a kiloHertz on 20 meters, in the old days, this was good enough, but it's not good enough to challenge measuring equipment most FMT participants are using today. Ordinary crystals on 80 and 40 in controlled room temperatures do surprisingly well, but on 20 it starts getting to be a different story; so we now do use an oven-controlled VFO for the 20-meter transmissions and most of the measuring problems are Doppler problems, and we can't control that. All in all, we feel that the biggest problem lies not at W1AW but in the field. When a single umpire

In the center is Dick Shaw WB4TWL receiving the Delta Radio Club (Memphis) "Ham of the Year" award from (right) Delta Division Vice Director W4WBK and W4SCF, President of the MidSouth Amateur Radio Assn. *(Photo by WB4ECK)*

cannot, for reasons not necessarily his fault, measure accurately enough to meet the demand, perhaps the solution is more measurements from more different points, from measurers known for a high percentage of accuracy – say those who have been on the Honor Roll (.4 ppm or better) consistently over a certain period – their average then taken as the "umpire" measurement for all other measurements to be compared against. Any member of the "umpire" group who is more than a certain percentage (or ppm) off from the average of the rest can be disqualified as part of that group. In this way, it might be possible to do without a qualified single umpire altogether – although it would probably still be useful to have one for reference purposes.

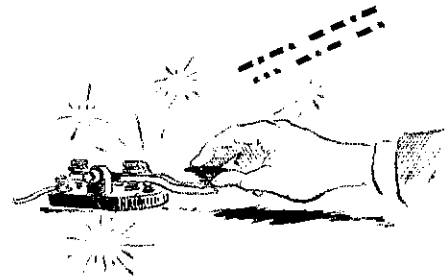
The manner of W1AW transmissions is also under study. Most FMTers use frequency counters that do not require the traditional long dashes – and in fact, these long "dashes" can be more confusing than helpful for some. On the other hand, those FMTers still using heterodyne-type devices such as the LM or BC-221 need somewhat longer time. Would measurement accuracy be improved or impaired by requiring a spot measurement rather than one averaging measurements made over a certain period of time? Of course it would be improved, since stability of the transmitted signal would be much less a factor. But it could result in those using older methods not being able to get a measurement at all.

Well, enough discussion to bring some comment, we hope. The last FMT results were published in January *QST*, page 102. Are all these participants amateurs who have sophisticated frequency-measuring gear? Not at all. Many do their measuring using ordinary communications receiver calibration, plus a modicum of ingenuity. *You* can do it too. Try it.

Worked All Hq. At the present time there is no such award, although at one time a staffer got up his own and offered it to other staffers who succeeded in working all his colleagues. W5EIJ now proposes a WAHQ QSO Party or contest.

With all the varied interests of the hams at headquarters, this should be a real challenge. If each member of the Hq staff followed his personal interests, to run up a good score in any such contest would require a maximum of versatility. You'd have to be on hf and vhf, on RTTY, voice and cw, maybe even ATV, to get 'em all. The list of hams at Hq is on page 63, Dec. 1972 *QST*. It changes almost monthly. How many of them have you worked? How much interest in a low-key activity (similar, perhaps, to "Straight Key Night") to "Work All Headquarters"?

Youngest Old Timer? Mike McIntyre, K2AZB/WB4TFM, would like to lay claim to this title. Mike was born in Jan. 1939, and licensed in July, 1952. Anybody born later than this who is in ARRL's OTC? – *W1NJM*.



STRAIGHT-KEY NITE W1YL

It's now three in a row for SKN, a modest little fun-type activity held New Years' Eve. Reported participation was down, activity indicating 646 took part, 113 sending in reports. About 1 in 6 picked up at least one vote for "best fist of the night." The special award, however, goes to W4KFC once again for most votes for best fist. Next in line was W8QXQ with the following in third place; W2LYH, W3ABC, K4CAX and W4YZC (a brother act!), K6QPH and W7DI. Special thanks to the following novices who supported SKN: WN1PWZ, WN2s KJF BAK CGW BTG, WN3SEA, WN4s OFA AZL BTS YKN BLS YTL, WN5s ESX EYL FQG/5 SEF HUP, WN7TXE, WN8s NOE NDQ, WN9s IZW ARW, WN0HTK. Some discussion is going on about holding SKN on a night of the year more available to more ops. Any concensus? As is usual in any operating event, the full flavor appears in the Soapbox section of the report - read on!

SOAPBOX

A fb activity. Worked my dad and brother (W5KL and K4CAX). It's a thrill to hear the ole

pump keys again. - W4YZC. Not a bad or poor fist in the bunch. - W2ESX. With all the bowl games and things like that who has time for SKN? - K4JK. Got a kick out of W5KL who was passing out reports in the old "QSA R PDC" format. Talk about nostalgia! - W4KFC. Used a marble-based Clapp-Eastham antique key part of the time, then MAC "Stream Key." An enjoyable, pleasant, relaxed party. - K4QF. (Thanks to you, Wells, for the Ode to SKN!) A lot of fun, especially meeting my call letter "cousin" K6ON. - K4ON. Just finished building a keyer the day before the contest. Before that EVERY night was Straight-Key Night. - WB2EKK. Remind some of the guys that SKN isn't a contest. - WBØFMR. There was another kind of party pressing me for time that evening, but it was possible to make two contacts, each quite pleasant. The vertical wrist joints are not quite so rusty now, hi! - W4NG. Those SKN boys were thicker than fleas on a dog's back. I was so QRL on 3530 I didn't get to 7030 till 12:10 am! - W8BKM. The quality of sending was very high this year. - W3WI. As New Year's Day is a holiday why not plan SKN then? - K4IX. I'm in favor of minimum QSO time, not the hasty identification, report and CUL. - W8IRG. Why not utilize 160 for SKN? - WB4RUA. Use GMT, not 8:00 pm local, as we California hams can hear the east coast when they start. A good starting time would be 2300 GMT. - K6ARE. Next year I'm going to work portable from the party location! - WA3TMR. SKN was the first event I've participated in as an amateur. I only worked 4 stations with 17 watts and a dipole, but every minute of it was enjoyable. - WN7TXE (age 13). I had a good time, apparently laying down a good signal in the east on 7 MHz. - W7DI. Many stations heard and called, but QRM and local high-voltage power line buzz prevented more contacts. - W6AW (since 1924, first call 6AVH in 1921). Without my electronic fist, I felt like a lady without her "transformation" on. The real me showed, ugh! - Marty, WA5SKI. I tell you I CQd SKN till my arm nearly fell off, but no takers. What to do? I pulled the big switch and went upstairs. Luckily, the old arm wasn't so badly wounded as to prevent me from raising a few "snifters" to my lips. My SKN frustrations magically melted away. I wonder if the rest of the boys on 40 had as much fun as I did on SKN? - VE3CUI. A good way to have a safe and sane New Yerar'. - W3ABC. Straight Key operation is still the best for reading weak signals through heavy QRM. - W5EZY. Many excellent straight key ops, on and nominating only one is difficult. - K4CAX. For the smart remarks section: please replace the following ARRL contests with Straight-Kay Nights; DX Test, SS, FD, CD Parties, NR. Oh yes, change the Intruder Watch to a 24-hour SKN! - WA7BSG. My key is my old navy aircraft key from my Douglas Dauntless dive bomber, vintage 1944, and still going strong. - W4ORT. I thought equipment trouble happened only on FD. - WB4SYC. My third SKN; it has become a tradition now. Screwy, but fun. - W4ZSH. For the occasion I borrowed from K4ROH an antique (1915) straight key manufactured by (I think) the Central Scientific company. I polished it for the event. I think I had more fun than if I had gone to a party. - WB4FDT. I think much more interest would be generated if the event occurred on some night other than New Year's Eve. - W5SBX. My key (get this) was a phono plug, tapping it with salivated fingers to produce dots and dashes. - WA3IYS. Will somebody please pass the Ben-Gay. - WB8KZD. This is too much work. Without my keyer I'd soon become a phone man. - WA2CPO. My first QSO was the prize contact for it bridged the time/generation gap. The lad at WB8MLW was only 16 and got his general license just mid-December. Yet, he was right in there like an old timer. We ragchewed for quite a while. It took me back to my early days when I got my first ticket at the age of 15 back in 1920. - W1BDV. WB9DWP suggested it be called Keyer Appreciation Night. - WB2OYV (age 14). This is one operating event that is all pure enjoyment. Better sore arms than big heads on New Year's Day! - *W2LYH.*

DXCC Notes

Announcement is hereby made of a change concerning the ARRL DXCC Award.

Upon recommendation of the ARRL DX Advisory Committee, effective September 1, 1973, the DXCC Phone Award will be discontinued and no further phone credits, as such, will be made to DXCC records as of that date. All DXCC Awards issued on or after that date will be for the CW/F type only.

Those DXCC participants who have been issued only the DXCC Phone Award will continue to receive DXCC credits when making endorsement submissions. However, these credits and those previously given, will be considered as CW/F only.

Those participants holding both types of DXCC will be given credits only towards their CW/F DXCC and no further credits will be made toward their DXCC Phone Award.

November, 1973, *QST* will be the last issue to show any listing for the DXCC Phone Award. It will, however, carry the New Members and Endorsements made for the DXCC Phone Award for the month of August, 1973.

How's DX

(Continued from page 107)

Texas QTH does not exist. Anyway, as a Barefoot General I've managed 137/113 worked/confirmed. (WB5AHX) . . . I particularly enjoy QRQ radiotelegraphy from shipboard around the world. (WØTUT/mm) . . . Scheduled more VP2VAN and PJ8AE DXcitment for the '73 ARRL Test weekends. (K2FJ) . . . VP5LD, Navy civilian engineer, expects to be radiating from Grand Turks with his T4X/R4B until 1974. Neighbors VP5s GR and RF show up on 40 and 80, the latter also game for 160. (WCDXB) . . . President WB6UDC passed the 5BDXCC 100-mark on 75/80 with K6SSN in hot pursuit. (SCDXC) . . . Over a thirty-month period International DX Association DXpeditions to Palmyra, East Pakistan, Dominica, Norfolk, Willis, Bajo Nuevo, etc., have produced almost 35,000 QSOs, fifteen operators participating. Signal strength, operator skill, split-frequency facility, cw availability, simultaneous multiband status and choice of optimum band(s) are affirmed to be factors of DXpeditionary success in that order.

† † †

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 credits given including deleted countries. All totals shown represent submissions received through Dec. 31, 1972.

Honor Roll

DL3RK	320/342	K7GCM	319/332	W2MJ	318/335	W6REH	317/328	VE5RU	315/332	W6OME	313/331
G3FKM	320/342	K8IKB	319/335	W2QHH	318/344	W6RKP	317/336	W2AYJ	315/339	W8BVF	313/320
G4MJ	320/342	PA0FX	319/344	W2SAW	318/340	W6TA	317/335	W2NQ	315/324	W9AMU	313/333
G5VT	320/345	W1AZY	319/338	W2WMG	318/334	WA6GLD	317/323	W2PV	315/322	W9HJ	313/328
G8KS	320/343	W1BAN	319/337	W2YY	318/331	W7ADS	317/340	WA2HOK	315/322	W9MQK	313/330
GW3AHN	320/344	W1CKA	319/334	W2ZX	318/341	W7JG	317/330	W4IC	315/325	W9QLD	313/321
HB9J	320/349	W1HZ	319/342	WA2RAU	318/324	W7OF	317/339	W4MR	315/339	W9YFV	313/342
HB9MQ	320/343	W1MV	319/341	W3AFM	318/333	W8CUT	317/329	W5EGK	315/338	W0BMQ	313/331
K2BK	320/339	W1NU	319/339	W3EVW	318/344	W8DMD	317/343	W5KBU	315/337	XE1AE	313/327
K2BZT	320/342	W2BOK	319/341	W3GRS	318/335	W8KBT	317/335	W5MMD	315/339	YV5AIP	313/327
K4LNM	320/339	W2CP	319/330	W3MWC	318/337	W8MB	317/333	W5PM	315/333	YV5BPJ	313/320
LU6DJX	320/349	W2CR	319/341	W4BJ	318/335	W8ONA	317/338	W5TIZ	315/333	DJ0PN	312/318
OE1ER	320/347	W2GLF	319/337	W4DJR	318/338	W9JUV	317/341	W5UKK	315/334	F9RM	312/327
VE2NV	320/343	W2JVU	319/345	W4LYV	318/343	W9QQN	317/323	W5WZQ	315/334	G3HDA	312/329
W1AX	320/348	W2QM	319/339	W4NJF	318/326	W0BFB	317/340	W6DZ	315/332	JA1AG	312/330
W1BIH	320/348	W2SUC	319/341	W4QCW	318/339	W0GKL	317/335	W6EUF	315/320	JA3UI	312/326
W1CLX	320/348	WA2IZS	319/340	W5KTW	318/326	W0KF	317/339	W6KZS	315/322	K1YZW	312/316
W1DK	320/342	W3CGS	319/343	W5OLG	318/344	ZL3IS	317/335	W6WX	315/327	K4ICK	312/329
W1GKK	320/350	W3LMA	319/346	W6CHV	318/341	ZS6LW	317/335	W7BA	315/330	K4ID	312/320
W1HX	320/345	W3NKM	319/341	W6FZJ	318/328	DL1HH	316/330	W8KIA	315/344	K4IKR	312/317
W2AGW	320/349	W3RNQ	319/342	W6ISQ	318/330	G2BVN	316/339	W0BN	315/326	K4MZU	312/318
W2BXA	320/347	W3WGH	319/339	W6KTE	318/324	G3HCT	316/332	YV5BOA	315/321	K6EIV	312/327
W2CTO	320/345	W4BYU	319/342	W6ZM	318/333	K2UVU	316/333	G3DO	314/341	K6VVA	312/326
W2DXX	320/331	W4DQS	319/331	WB6OOP	318/328	K2YLM	316/321	G6XL	314/334	K8EHD	312/318
W2HTT	320/341	W4LRN	319/336	W7CMO	318/333	K2YXY	316/328	I8KDB	314/333	SM7ANB	312/326
W2NUT	320/341	W4OM	319/346	W8CT	318/327	K4PDV	316/334	IT1ZGY	314/332	UA1CK	312/322
W2OKM	320/343	W5PQA	319/342	W8EVZ	318/326	K4TJL	316/330	JA2IW	314/330	VE1VR	312/317
W2RGV	320/341	W5QK	319/335	W8JIN	318/348	K6OW	316/328	K4YYL	314/320	VE3CFG	312/331
W2SSC	320/341	W6ANN	319/343	W8KIT	318/329	K6OH	316/321	K4TWF	314/325	VE3MJ	312/317
W2TP	320/334	W6BZE	319/344	W8UAS	318/343	K6WR	316/327	K8DYZ	314/320	VK3KB	312/340
W3KT	320/348	W6EPZ	319/345	W9GIL	318/340	K8OHG	316/326	K9WTS	314/321	W1BPW	312/326
W3LMO	320/338	W6HX	319/347	W9RKP	318/340	PY2CQ	316/322	PY2BKO	314/320	W1RLQ	312/325
W3MP	320/347	W6OSU	319/336	W9SFR	318/338	PY2SO	316/322	W2BHM	314/333	W2EXH	312/323
W4AFF	320/348	W6TZD	319/344	W0CJZ	318/327	SM3BIZ	316/338	W2BQM	314/332	W2LAX	312/334
W4EX	320/349	W6WWQ	319/341	W0LWG	318/333	W1DGJ	316/325	W2JT	314/338	W2PN	312/319
W4GXB	320/346	W8OK	319/335	ZL1HY	318/347	W2CYS	316/343	W2MS	314/337	W2ZGB	312/332
W4OPM	320/340	W8QJR	319/341	4X4JU	318/337	W2GT	316/339	W4CKB	314/328	WA2ELS	312/321
W4PLL	320/340	W8WZ	319/346	CR6BX	317/338	W2RDD	316/335	W4EEE	314/336	WB2FMK	312/319
W4VPD	320/342	W8ZCO	319/338	DL7EN	317/337	W2WZ	316/344	W4TM	314/341	W3HTF	312/323
W5ABY	320/342	W9DWO	319/337	G3AAE	317/341	W2ZTV	316/321	W5GR	314/339	W4AVY	312/329
W5AO	320/343	W9GFF	319/336	G6TA	317/337	WB2HXD	316/322	W5HDS	314/335	W4BFR	312/326
W5KC	320/348	W9HB	319/338	K1SHN	317/326	W4IF	316/333	W6AFI	314/327	W4VMS	312/319
W5MMK	320/346	W9HUZ	319/343	K4EZ	317/329	W5FFW	316/338	W6CUF	314/321	W5FT	312/335
W5UX	320/340	W9ILW	319/330	K4JC	317/325	WA5EFL	316/322	W6DZZ	314/341	W5IO	312/337
W6AM	320/350	W0AIH	319/339	K6CH	317/341	W6KG	316/333	W6HVN	314/321	W5NUT	312/330
W6CUO	320/349	W0ELA	319/347	K6GJ	317/343	W6RGG	316/322	W6KUT	314/339	W6BSY	312/333
W6CYV	320/343	W0MLY	319/340	K6YRA	317/323	W6SQP	316/336	WA6EPQ	314/324	W6KNH	312/314
W6KZL	320/341	W0NK	319/346	K8ONV	317/331	W6UOV	316/335	WA6MWG	314/320	W6YMV	312/323
W6NJU	320/339	W0PGI	319/340	K8RTW	317/331	W7AC	316/345	W7QK	314/333	W7ENW	312/341
W6PT	320/342	W0QGI	319/340	K9ECE	317/331	W7QPK	316/326	W8LY	314/333	W0NLY	312/332
W6ZO	320/346	W0SYK	319/342	PY2CK	317/345	W8ARH	316/324	W9TKD	314/329	YV5AHR	312/320
W7AQB	320/337	CE3AG	318/346	PY2PA	317/323	W8EV	316/339	W9TKV	314/335	ZS6YQ	312/326
W7KH	320/348	DJ7ZG	316/322	VK4QM	317/345	W8KPL	316/338	W0AUB	314/327	F3YR	311/332
W7MB	320/349	DL1IN	318/339	W1CBZ	317/337	W9FKC	316/341	W0BK	314/328	HB9TL	311/332
W7PHO	320/343	DL1JW	318/335	W1FZ	317/341	W9WYB	316/335	YV5BNW	314/316	JA1MIN	311/314
W8BF	320/346	DL1KB	318/342	W1GL	317/325	W0NVZ	316/333	YS1O	314/335	JA8ADQ	311/316
W8BT	320/341	G3FXB	318/340	W1JNV	317/339	YV5AB	316/339	DJ5DA	313/319	K2KER	311/316
W8DAW	320/349	G3IVJ	318/338	W2GQN	317/323	YV5ANF	316/319	DL7BA	313/335	PY7YS	311/328
W8EWS	320/349	I1AMU	318/341	W2HO	317/338	DJ0KQ	315/321	F3AT	313/330	SM6AEK	311/316
W8GZ	320/348	IT1TAI	318/339	W2PCJ	317/339	DL3BK	315/333	JA1ADN	313/325	VE3WT	311/317
W8JBI	320/344	JA1BK	318/331	W2PDB	317/333	DL7HU	315/329	JA4BJO	313/319	VE4OX	311/320
W8MPW	320/343	K1JXG	318/330	WA2RLQ	317/323	GI3JIM	315/332	K2OEA	313/334	W1OJR	311/327
W8NGO	320/342	K4KQ	318/343	W3DJZ	317/329	HB9KB	315/334	K6AHV	313/322	W1WQC	311/322
W8PHZ	320/340	K6DC	318/339	W3GAU	317/345	I1KMG	315/320	K7ADL	313/323	W2FXN	311/330
W9BG	320/350	K6RQ	318/333	W4MCM	317/333	JA1DM	315/335	K0EZH	313/320	W2QK	311/319
W9LNM	320/348	K8LSG	318/333	W4ML	317/342	K2DCA	315/337	K0UKN	313/319	W2YCW	311/318
W9NDA	320/349	K9KYF	318/331	W4SSU	317/330	K2PXX	315/325	OH5UQ	313/320	W3BWZ	311/311
W0BW	320/346	K9LUI	318/330	W5GC	317/331	K2TQC	315/327	PY1HX	313/335	W3GJY	311/328
W0DU	320/347	LA7Y	318/345	W5GJ	317/329	K4MQG	315/322	W2IOT	313/318	W4HOS	311/311
4X4DK	320/343	LU4DMG	318/339	W5GO	317/335	K5AAD	315/323	W2UVE	313/336	W4RLS	311/320
DJ2BW	319/341	OH2NB	318/344	W5HE	317/323	K6EV	315/322	WA2DIG	313/327	W4ZXI	311/314
DL6EN	319/339	ON4NC	318/344	W5PWW	317/333	K6NA	315/341	WB2CKS	313/319	W5MBB	311/320
DL7AA	319/346	W1GYE	318/338	W5QKZ	317/330	K9BGM	315/320	W3ECR	313/334	W5OB	311/322
DL9OH	319/335	W1HH	318/334	W6ABA	317/325	KP4RK	315/330	WA4WIP	313/318	W6DOD	311/311
G2BOZ	319/342	W2BMK	318/335	W6EL	317/325	LU5AQ	315/335	W5EJT	313/325	W6UQQ	311/322
I1ZL	319/335	W2DOD	318/341	W6GPB	317/343	OH2BH	315/322	W5HJA	313/328	W6ZJY	311/320
K2LWR	319/337	W2FXA	318/336	W6HOC	317/335	OH2QV	315/325	W5OGS	313/334	W8BRA	311/33
K6AN	319/345	W2FZY	318/336	W6ID	317/341	OK1ADM	315/325	W6CAE	313/338	W8JQ	311/31
K6EC	319/338	W2GKZ	318/325	W6LN	317/342	ON4DM	315/339	W6ERS	313/324	W9GB	311/32
K6LGF	319/336	W2LV	318/342			VE2WA	315/331	W6FOZ	313/336	W9ZTD	311/32

Radiotelephone

W2BXA	320/347	K9KYF	318/331	W4PDL	317/332	W3KT	315/338	K2IRK	313/320	W6TA	312/323
W2HTI	320/340	K9LUI	318/330	W5GC	317/331	WA5EFL	315/321	K4YYL	313/317	W7ADS	312/332
W2RGV	320/339	LU4DMG	318/339	W6REH	317/324	W6BAF	315/330	PY2CYK	313/316	W8JIN	312/332
W2TP	320/331	PY2CK	318/345	WØGAA	317/325	W6EUF	315/319	PY2PC	313/317	W9HB	312/329
W2YY	320/326	W1BAN	318/335	ZS6LW	317/334	W6RKP	315/329	SM3BIZ	313/334	WØMX	312/325
W6AM	320/348	W1ONK	318/339	HB9J	316/341	W9RNX	315/337	SM5BCO	313/328	YV5AHR	312/320
W6GVM	320/346	W2ZX	318/341	K2YLM	316/321	WØGKL	315/332	W2GKZ	313/319	YV5BBU	312/317
W8BF	320/346	WA2RAU	318/324	K4TJL	316/330	DJ7ZG	314/320	W2GQN	313/319	YV5BPJ	312/319
W8BT	320/341	W3WGH	318/332	K9ECE	316/329	I8KDB	314/333	W2LV	313/330	ZS6YQ	312/324
W8GZ	320/348	W4QCW	318/335	ON4DH	316/337	K4HEF	314/328	WA2EOQ	313/319	DL7HU	311/324
4X4DK	320/343	W5JWM	318/334	VE3QA	316/336	K5JEA	314/330	W4UWC	313/321	F2MO	311/321
5Z4ERR	320/346	W5LZW	318/330	VK5MS	316/340	LU9DAH	314/331	W5HE	313/316	I1AA	311/315
DL9OH	319/335	W6ZM	318/328	W4NJF	316/323	OE1ME	314/332	W5PQA	313/332	I1ZV	311/324
G8KS	319/338	W8MPW	318/332	W4SKO	316/335	VE5RU	314/330	W7CMO	313/321	K4JC	311/316
TI2HP	319/346	W9LNM	318/334	W6EL	316/323	W1CLX	314/333	W8UAS	313/335	KØUKN	311/317
W1JFG	319/339	W9NZM	318/327	W6NIU	316/329	W2PV	314/321	W9JT	313/318	VE3MJ	311/316
W2GLF	319/337	WØCM	318/340	W7QPK	316/325	W2WMG	314/323	XE1AE	313/327	W1WQC	311/322
W3NKM	319/340	ZP5CF	318/338	WA8AJI	316/322	W3RIS	314/344	YV5AIP	313/327	W2BQM	311/329
W4EX	319/346	DL1IN	317/336	W9DWQ	316/324	W4EEE	314/336	I9RM	312/327	W2IOT	311/316
W7PHO	319/342	G6TA	317/336	W9WHM	316/338	WA4WIP	314/318	I1KMG	312/317	W2NUT	311/320
W8QJR	319/341	K6LGF	317/331	YV5AB	316/339	W5SZ	314/318	IT9JT	312/314	WB2HXD	311/317
W9ILW	319/330	K8RTW	317/331	YV5ANF	316/319	W6KTE	314/320	OK1ADM	312/318	W3GRS	311/320
W9NDA	319/344	ON4DM	317/341	4X4JU	316/332	W8EVZ	314/321	OZ7FG	312/331	W4ANE	311/331
WØBW	319/339	PAØHBO	317/338	K2BZT	315/330	W9SFR	314/326	PY4TK	312/333	W5IO	311/335
DJ2YI	318/338	PY2PA	317/323	K6WR	315/326	YV5BNW	314/316	VE3MR	312/321	W6CHV	311/329
DL6EN	318/335	W2OKM	317/338	K6YRA	315/321	ZL1HY	314/342	W2EXH	312/321	W6WX	311/317
G3FKM	318/337	W2ZTV	317/321	KP4CL	315/323	CR6BX	313/330	W2JT	312/331	W6YMV	311/321
G5VT	318/343	WA2IZS	317/329	SM5CZY	315/323	DJ2BW	313/328	WA2HOK	312/319	W6YY	311/335
GI3IVJ	318/336	W3DJZ	317/326	W1DGJ	315/324	G3DO	313/339	W3AZD	312/320	W6ZJY	311/320
I1AMU	318/341	W4OM	317/338	W2FGD	315/321	JA1BK	313/324	W5KBU	312/333	WØMLY	311/328
K1IXG	318/330									ZL3NS	311/315

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings – *December 1-31, 1972*

New Members

WB6DXU	288	F3IJ	161	JH1MMT	120	KX6HC	107	UC2WG	104	F6KDE	101	DM3VGO	100
JA6LLO	235	JA6MJV	159	W5RKT	118	VP9AD	107	WA2EKW	104	K1ALP	101	DK4SY	100
VU2BEO	229	VE6BU/W5	147	W6AFH	118	DL7MX	106	W8ERD	104	K2GLS	101	K3FNB/1	100
DJØMW	208	W8GIO	145	K4BEO	116	OH6UW	106	K6OZL/1	102	K9BAU	101	K4NLH	100
WA2FYA	199	KL7GRF	131	W6ZS	115	UK3YAB	106	KH6CU	102	SP9ECH	101	W4WFL/1	100
WB2VKO	200	DJ9QG	122	JH3HPX	111	UV9DO	105	VE6AVO	102	WA1NSJ	101	WA1GSS	100
ET3GK	168	W3KLR	122	K5CSK	111	K6OZL/4	104	WAØQLH	102	W7YKN	101	WA2MBP	100
PJ2RB	164			UI8LL	108			DK1IT	101			WA5JVO	100

JA6LLO	229	JA6MJV	146	DK5EK	124	JH3HPX	110	HC2RW	101	LA7RB	101	WA2GYB	100
WA2FYA	198	CP1DN	136	HS4AGZ	118	OE1NV	110	K2GLS	101	K1ALP	100	WA5RIV	100
DL3FC	170	KL7GRF	129	VE6BU/W5	116	WA2RQH	108	K7NOS	101	K1ATL	100	W7YKN	100
						ZL1AJL	105						

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.

KH6CD	335	DK2BI	290	W5LUJ	270	W4GIW	220	K1ASJ	180	DK9WB	160	WA1NCK	140
K4SCT	320	W1HGA	290	WA6GFY	270	WB4SIJ	220	K4FJC	180	HB9PQ	160	WA1OIO	140
W6JKJ	320	WA3KSQ	290	WA9VOL	270	W6RXW	220	KP4DLW	180	K6ELX	160	W2NUS	140
W1FTX	315	W4ORT	290	WA9VGY	260	W7CE	220	W1RYB	180	UA3GO	160	WA2RQH	140
W7MI	310	W7GRH	290	W6YUS	250	I5FOS	200	WB2AQC	180	WA1JMP	160	WB2QQX	140
WØOAQ	310	W9OW	290	K4BHG	240	K9BWQ	200	WB2NLM	180	W6OJW	160	WA5EEM	140
K3AFO	305	WØTDR	290	K6TWT	240	SM6EOC	200	W3ZBW/4	180	WA8PRR	160	WA5PPZ	140
K5LIW	305	DJ5IQ	280	SP3DOI	240	UW3IN	200	WA5SUE	180	WA9VCK	160	WA5ZRB	140
WA2HSX	305	EP2TW	280	W5LPO	240	W1STW	200	W6HJ	180	YU1NTO	160	K5TYT	120
W7MI	305	VE4XJ	280	K2OLG	220	W2GOF	200	WA7BPS	180	K2YFE	140	K8RXD	120
DL3ZI	300	K4CYU	280	OH8SR	220	WB2NDI	200	WA9TVM	180	K3ZOL	140	W1FW	120
W1FIJ	300	DJ6RX	270	UC2BF	220	W4TK	200	WØHBH	180	KØYVU	140	WA5TYB	120
WA2HSU	300	I1BUP	270	VE3BS	220	W6PTF	200	WØKH	180	KL7JDO	140	W8DSO	120
WB4KZG	300	W4PLM	270	W1AB	220	W6SO	200	YU1SF	180	OK3BH	140	WA9ZWL	120
WØMYN	300	W4WSF	270	W3SDV	220	W7SFF	200	CT1SH	160	W1YZL	140	WØMHK	120
						WØDIA	200						

W5NMA	325	VE1VR	300	F6AOI	250	W4PLM	240	W3QND	200	VP9GE	180	YV3CN	160
PY7YS	320	WØMYN	300	K4LSP	250	12RC	220	WA4NRE	200	WB2VKO	180	CT1IC	140
W1HX	320	DK2BI	290	K6RXZ	250	K2OLG	220	WA4YJJ	200	WØKH	180	F3IJ	140
I5TDJ	315	W1HGA	290	KZ5JF	250	W2UBJ	220	W8DX	200	WAØHZP	180	I1LXA	120
W5KGX	315	WB6PNB	290	W1KID	250	WB4SIJ	220	W8POD	200	DK9WB	160	K6KT	120
JA1ADN	310	I1BUP	270	W4WSF	250	CT1UD	200	ZL1AMN	200	W2GOF	160	W3KLR	120
W4QBK	310	K2KGB	270	W6TTS	250	K9BWQ	200	I1CMA	180	W3IWF	160	W3YG	120
I1WT	305	WB4KZG	270	WA9VGY	250	UC2BF	200	HK4CJB	180	W5LUJ	160	W9OFO	120
K9WTS	300	W7GRH	270	K4KQ	240	UW3IN	200	K4BHG	180	W5MIG	160	WA9ZET	120
SMØATN	300	VE6WJ	260	W9MIJ/4	240	W2FCR	200	WB4PXW	180	W8MBB	160	WB9ETQ	120

Station Activities

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, W3DKX – SEC: WA3DUM. RM: W3EEB. PAM: WA3GSM. WA3GSM made BPL this month as well as PSHR with 64 points. W3DQ will be looking for Del. contacts /4 from Fla. and from KP4DQ through Mar. WA3HIX and other Dover area hams hope to have Delaware's 3rd amateur fm repeater in operation soon. The 1973 Delmarva Hamfest will be held at the State Fairgrounds at Harrington Aug. 19. Out-of-state Del. QSO Party winners 180 or more points were: WB2APO, N.J. 255; W2FVS, N.Y. 225; WA9BLY/9, Ind., WA3QWP, Pa. and K4YEH, N.C. each 180. Del. winners were WA3HIX 4235, WA3SKP 4134, W3BHG 3570 and WA3RYH 3243. Operation Holiday Greetings showed K3QBD with a QTC of 143 and W3SL with 62. DTN QNI 144, QTC 49/46. DEPN QNI 53, QTC 7. Traffic: WA3GSM 434, K3KAJ 126, W3DKX 46, W3EEB 42, WA3DUM 26, WA3HD 16.

EASTERN PENNSYLVANIA – SCM, George S. Van Dyke, Jr., W3HK — SEC: W3EBF. RMs: W3EML, K3BR, K3MVO, K3PIE, W3CDB, WA3AFI. PAMs: K3BHU, WA3PLP. OBS reports from WA3EEC, WA3OOZ, WA3AII, W3ZMN, K3NSN, WA3EUG, WA3LWR, W3CBH. OO reports from WA3EEC, K3NSN, K3OIO, K3RDT, W3FTG, W3BFF, W3NNC, K3LWQ. OVS reports from W3CL, WA3PCS, WA3FEC, K3VAX. BPLs: K3NSN, W3EML, WA3OOZ. PSHR: WA3MQP, WA3QOZ, K3OIO. I'm home from Jamaica back in line.

Net	*kHz*	*Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610	7:00 P.M. Dy	361	271	K3BR
EPA Nov	3610	7:00 P.M. Dy	261	199	K3BR
PTTN	3610	6:30 P.M. Dy	167	79	WA3AFI
PTTN Nov	3610	6:30 P.M. Dy	138	60	WA3AFI
PFN	3960	5:30 P.M. M-F			K3BHU
EPALP&TN	3917	6:00 P.M. Dy			WA3PLP

The Lancaster Radio Amateurs voted for a new title "The Lancaster Public Service Communications Service Assn. of Lancaster Co." They also adopted a new constitution and elected the following officers: W3FEY, pres.; K3VAX, vice-pres.&treas.; K4AVQ, secy.; K3HQC, trustee; W3DNV and WA3JMJ, dir. Delaware Valley Chapter QCWA elected the following new officers: W2AXU, chmn.; W3KD, vice-chmn.; W2YPZ, treas.; W2HX, secy. Delmont Radio Club elected the following new slate of officers: W3HKZ, pres.; W3ZXV, vice-pres.; K3JJO, 2nd vice-pres.; WA3DTA, treas. Secy. of Delmont tells me their club took first place in 5 transmitter class. WA3OOZ appointed to the DNTS; congrats. W3EML reports a case of the flu didn't stop TCC! W3BNR reports he is going 2-meter fm. WA3PLC got his big A. Santa gave K3MNT a 2-meter fm rig so look for him too. WA3FEC reports a new Scranton 2-meter fm repeater 34/94. W3EU reports lots of senior citizens on 40 cw. After 15 years W3FTG made DXCC! Temple ARC is now active, they all have hf band capability, working on 2-meter fm and Oscar capability. Equipment is of members but funding is expected to relieve that soon. Several members have the uhf bug and working on 3.4 GHz rigs. The Jan. VHF contest is over, and being a Pack Rat I think we won again! Traffic: (Dec.) WA3OOZ 1017, W3EML 800, WA3OGM 588, K3BHU 401, K3PIE 301, K3DCB 244, WA3MQP 232, K3BR 205, K3OIO 148, K3MVO 133, W3BNR 89, WA3ATQ 83, WA3KWU 70, WA3PHQ 57, W3ADE 35, WA3LWR 26, WA3QLG 23, W3OY 20, WA3AFI 19, WA3PLC 18, K3KTH 17, W3BUR 11, W3CBU 10, K3KML 8, WA3BSV 6, W3WRE 5, W3LC 4, K3MNT 4, WA3EEC 3, WA3RKH 2, WA3BJQ 1, WA3CKA 1, W3EU 1, W3FTG 1, W3GMK 1, W3HK 1, K3VAX 1. (Nov.) K3NSN 1243, W3EML 804, K3PIE 236, K3BR 105, WA3BSV 28, WA3AFI 25, WA3EUG 18, W3ZMN 18, K3MNT 10, K3VAX 1.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl R. Medrow, W3EA – SPC: K3LED. MDD RM: W3EZT. MDCTN PAM: W3ECS. MEPN NCM: W3LDD. BPLs: WA3IYS, W3TN and WN3RCI. K3TNM now PAM for MDCTN. W3QU takes on the record keeping for MDD and is RM elect for MDD. K3RUQ spends week days in Del. on his farm and week ends at home in Md. W3EOV became a Goldcoaster. WN3RCI needs more supplies to keep MHFN going on 3733 at 2245Z. Nov. sessions 21, QTC 215 and QNI 10.2 average. W3OKN is busy on HCN, LAN and GBN. W3CSZ now chief op W4USN and ORL MARS. WA3IYS reports for WA3OAO working 15-meter DX and WA3KOQ being activated by WN3QGT and WA8EAE/3. WA3IYS doing well at school and making points on the net during the winter recess. W3QU goes automatic with his IC CQ machine homebrew. W3IPT putting a new keyer together. W3ZNW keeps Calvert Co. on the cw map. W3ABC is a popular speaker at the area clubs. WA3QIA is a new splash from Silver Spring. WA3PJG thinking about going to Rensselaer Polytech next season. W3LDD handled some Managua traffic. WA3NYU and K3RUQ were the first in this area to alert the authorities about the quake. W3ADQ says the balmy summer has been replaced by the cold cruel winter in Bushwood. WA3FHK keeps busy with MEPN, RACES and the U. of Md. WA3MSW keeping code speed up and his hand in traffic while pursuing that higher education. K3GZK is now the master of his keyer. W3ECS takes on expanded work responsibilities. WA3IIV takes that Airstream to Ariz. during bad months. WA3AFQ has a long trip to make radio club meetings these days. W3FZV visited Dad W4IA in Fla. over the holidays. WA3QDH snagged Utah with his new 80-meter dipole for a new one, with Alaska left. WA3QPM shares his new HW-100 with kid brother WN3SEQ. WA3DJQ is the High Point High School call in Beltsville. W3LBC publishes the Termite Log. MDCTN 21 sessions, QTC 125 and QNI 14.3 average. MDD 62 sessions, QTC 469 and QNI 7.0 average. MEPN 21 sessions, QTC 76 and QNI 21.2 average. WA3MJF spent some time in the hospital. Traffic: WA3IYS 1287, W3TN 306, WN3RCI 252, W3OKN 205, WA3QIA 182, W3QU 133, WA3EHK 80, WA3PJG 80, W3EA 69, W3FZV 62, WA3AFQ 57, WA3IIV 45, W3ABC 41, W3ECS 40, K3GZK 32, K3RUQ 27, W3LDD 25, WA3MSW 22, WA3SWS 18, W3EOV 14, WA3MJF 11, W3ADQ 10, W3ZNW 5, WA3QDH 3.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ Acting SEC: W2YPZ. PAM: WB2FJE. RM: W2JJ.

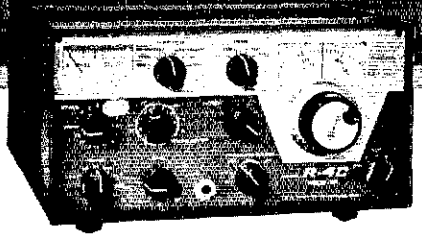
Net	*Freq.*	*Time(PM)*	*Sess*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3930	6:00	5	109	66	WB2FJE
NJSN	3730	8:00	18	21	77	WA2RYE

An outstanding program of activity was carried out by the DVRA for the month of Dec. Operators are K3CPF, WA2BIX and WB2GMH. The club operated on an eighteen hour schedule Dec. 15 thru Dec. 24th and from Dec. 25 thru Jan. 2. Phone patches and traffic were handled for maritime mobiles and deployed U.S. personnel as well as traffic to and from Managua, Nicaragua. As a result of this activity, the club qualified for BPL and PSHR status with a total score of 236 points. The DVRA elected K3CPF, pres.; K2SNK, vice-pres.; K2AAR, treas.; W2VU, secy. W.F. Middleton, Jr. reports the election of officers for the Rancocas Valley ARA as WB2POG, pres.; K2BG, vice-pres., K2YBN, secy.; WA2KCE, treas. The Gloucester County ARC reports officers for 1973: WA2SUA, pres.; WA2DNI., vice-pres.; WA2SEA, rec. secy.; W2AFZ, corr. secy.; WB2DFR, treas. Congratulations to WA2NPD for top honors in the ARRL Nov. SS for Southern NJ. Commendations go also to Southern NJ participants in the VHF QSO Party – W2EIF, K3MBO/2 and K2BWR (plus K2ZRJ). PSHR honors go to WB2UVB with 53 points. W2ORS and WA2NKV, newly appointed OOs submitted excellent reports. Harry McCormick EC for Gloucester Co. appointed as asst. ECs WA2OLS for 10-meter activity and WA2MEM for 15-meter Novice activity. WA2KWB received DXCC in the 160-meter contest. Traffic: W2ZQ 1101, WB2UVB 691, WB2VEJ 330, WA2CZA 109, WB2GBR 37, WB2FJE 33, W2YPZ 16, W2ORS 2.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KTK – Asst. SCM: Rudy Ehrhardt, W2PVI. SEC: W2CFP. Section net listings appear in Apr. Station Activities. Appointment renewals: W2EZK, WA2DHS, WB2FPG, ORSs; K2RTQ OPS; K2DUB,

(Continued on page 122)

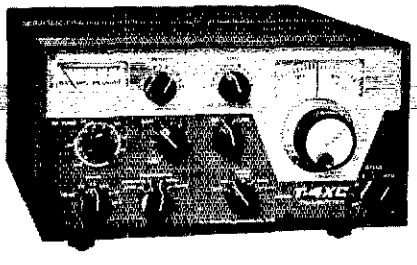
Drake C-Line



R-4C Receiver

NEW R-4C FEATURES:

- 8-pole crystal filter combined with passband tuning, SSB filter supplied
- Provision for 15 additional accessory 500 kHz ranges
- Transistorized audio
- Optional high-performance noise blanker
- AVC with 3 selectable time constants
- Optional 8 pole filters available for CW, AM, RTTY
- $499.95



T-4XC Transmitter

NEW T-4XC FEATURES:

- Plug-in relay
- More flexible VOC operation; including separate delay controls for phone and CW
- Crystal control from front panel for amateur, Mars, commercial uses
- Provision for AFSK RTTY operation
- $529.95

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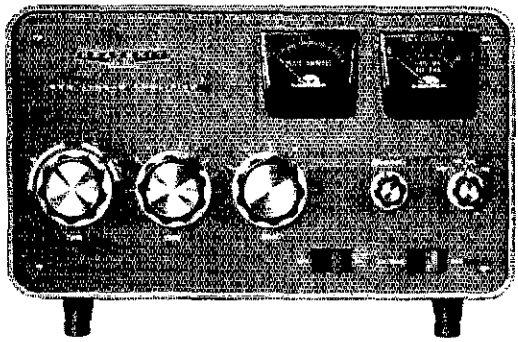
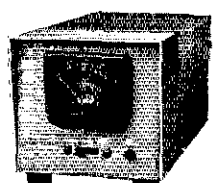


Power to get you to the pole — Heathkit SB-220 2 kW Linear... 369.95*

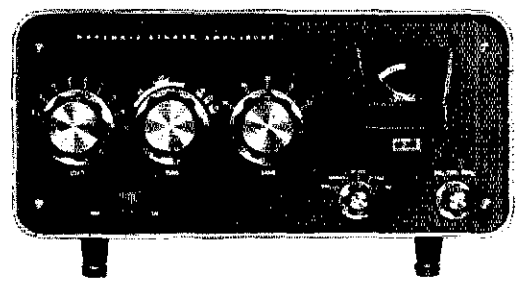
The SB-220 uses a pair of conservatively rated Eimac 3-500Z's in grounded grid circuitry to provide up to 2000 watts PEP SSB input. And it can be loaded to a full 1 kW input on both CW and RTTY. A broadband pre-tuned pi-input delivers *maximum efficiency with low distortion over 80* thru 10 meters. Requires only 100 watts drive. Built-in solid-state power supply can be wired for either 120 or 240 VAC. Built-in circuit-breaker protection. Zener diode regulated operating bias reduces idling current for cooler running, extended tube life. A large quiet fan is another plus feature. Other features include ALC to the driving unit to prevent overdriving; front panel switch-selected monitoring of grid current, relative power and high voltage; easy, enjoyable 20 hour assembly. **Kit SB-220,** 69 lbs.

SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meters. **Driving power:** 100 W. **Max. power input:** SSB, 2000 W. PEP; CW, 1000 W.; RTTY, 1000 W. **Duty cycle:** SSB, Continuous voice modulation. CW, Continuous (maximum key-down 10 minutes). *RTTY, 50% (maximum transit time 10 minutes).* **Third order distortion:** —30 dB or better. **Input impedance:** 52 ohm unbalanced. **Output impedance:** 50 ohm unbalanced; SWR 2:1 or less. **Front panel controls:** Tune, Load, Band, Sensitivity Meter Switch, Power, CW/Tune — SSB, Plate meter, Multi-meter (Grid mA, Relative Power and High Voltage). **Rear panel:** Line cord, circuit breakers (two 10 A). Antenna Relay (phono). ALC (phono). RF Input (SO-239). Ground post. RF Output (SO-239). **Tubes:** Two Eimac 3-500Z. **Power required:** 120 VAC, 50/60 Hz at 20 amp. max. 240 VAC, 50/60 cycles, at 10 amp. max. **Cabinet size:** 8¼" H x 14⅞" W x 14½" D.

NEW Heathkit RF Absorption *Wattmeter...* 59.95*



Great for tuning up off the air. Features 50-ohm non-inductive, air cooled load with less than 1.2:1 SWR for frequencies of 1.8 to 30 MHz; 0-200 & 0-1000 wattmeter range ±10% full-scale accuracy; power rating, 175 watts cont., 1000 watts max; overload indicator lamp with built-in test circuit; 6" H x 5⅜" W x 13¾" D. **Kit HM-2103,** 6 lbs.



Power up with 1200 watts SSB, 1 kW CW — Heathkit SB-200... 229.95*

Provides 1200 W PEP SSB input, 1000 W CW. Built-in solid-state power supply with circuit breaker protection. Metering for SWR grid current, plate current, relative power, plate voltage. ALC output. Shielded, fan-cooled amplifier compartment. *Pre-tuned cathode input circuit for maximum* efficiency and low distortion.

The sturdy, yet lightweight construction of the *SB-200 is achieved through the use of a heavy-*gauge one-piece aluminum chassis that is partitioned for extra strength and isolation of components and circuitry. This clean, open layout makes assembly extra easy, too. **Kit SB-200,** 50 lbs.

SB-200 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meters. **Maximum power input:** 1200 W P.E.P. SSB, 1000 W CW. **Driving power required:** 100 W. **Duty cycle:** SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 dB or better at 1000 W P.E.P. **Output impedance:** 50-75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; *broad-band pretuned input circuit requires no tuning.* **Meter functions:** 0-100 mA grid current, 0-1000 mA plate current, 0-1000 relative power, 1:1-3:1 SWR, 1500-3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572B/T-160-L (in parallel). **Power requirements:** 120 VAC @ 16 A (max.), 240 VAC @ 8 A (max.). **Cabinet size:** 6⅝" H x 14⅞" W x 13⅜" D.

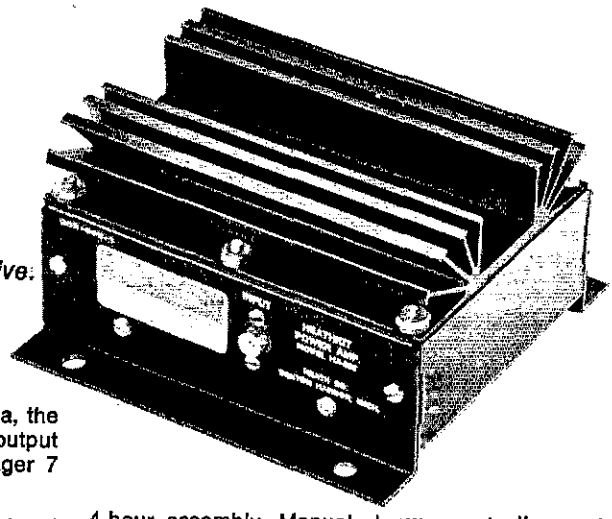
Heathkit Wattmeter/ SWR Bridge... 29.95*

Two switch-selected ranges measure RF output from 10-200 and 100-2000 W... built-in SWR capabil*ity for proper tune-up,* transmission line to antenna Z matching. Negligible loss for permanent insertion into 50 ohm line. Remote detector permits placement of meter in any convenient location. (6 ft. of cable supplied.) **Kit HM-102,** 4 lbs.

HM-102 SPECIFICATIONS — Frequency range: 1.8 to 30 MHz. **Wattmeter accuracy:** ±10% of full-scale reading. **Power capability:** *10 to 2000 watts.* **Impedance:** *50 ohm nominal.* **Connectors:** UHF type SO-239. **Dimensions:** 5¼" H x 5¼" W x 6½" D.

Heathkit® SSB, CW & NEW FM amps

NEW Heathkit 2-Meter Amplifier for cleaner FM copy on the fringe... 69.95*



40 watts nominal out for 10 watts in — *requires only 12 VDC supply.*

Fully automatic operation — *with any 2-meter exciter delivering 5-15 watts drive.*

Solid-state design — *all components mount on single board for fast, easy assembly.*

If you're regularly working from a fringe area, the new Heathkit HA-202 can boost your mobile output to 40 watts (nominal), while pulling a meager 7 amps from your car's 12-volt battery.

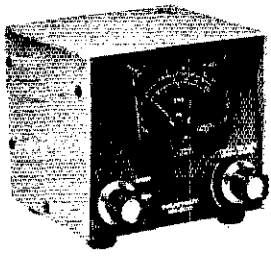
Install it anywhere...in the trunk, under the hood or dashboard. Use it with any 2-meter exciter delivering 5-15 watts drive. Features fully automatic operation. An internal relay automatically switches the antenna from transmit to receiver mode when you release the mike button.

All solid-state design features rugged, emitter-ballasted transistors, combined with a highly efficient heat sink, permitting high VSWR loads. Tuned input-output circuits offer low spurious output to cover the 1.5 MHz segment of the 2-meter band without periodic readjustment. All components mount on a single printed circuit board for easy, 4-hour assembly. Manual shows exact alignment procedures using either a VOM or VTVM. And installation is just as simple.

Kit includes transceiver connecting cable, antenna connector. Operates from any 12 VDC system — additional power supplies are not required. Add HA-202 power to your mobile 2-meter rig, and boom out of the fringe. **Kit HA-202,** 3 lbs.

HA-202 SPECIFICATIONS — Frequency range: 143-149 MHz. **Power output:** 20W @ 5 W in, 30W @ 7.5W in, 40W @ 10 W in, 50W @ 15 W in. **Power input (rf drive):** 5 to 15W. **Input/output impedance:** 50 ohms, nominal. **Input VSWR:** 1.5:1 max. **Load VSWR:** 3:1 max. **Power supply requirements:** 12 to 16 VDC, 7 amps max. **Operating temperature range:** −30° F. to +140° F. **Dimensions:** 3" H x 4¼" W x 5½" D.

New Heathkit VHF Wattmeter/SWR Bridge... 29.95*



Perfect tune-up tool for your 2-meter gear. Tests transmitter output in power ranges of 1 to 25 watts and 10 to 250 watts ±10% of full scale. 50 ohm nominal impedance permits placement in transmission line permanently with little or no loss. Built-in SWR bridge for tuning 2-meter antenna for proper match, has less than 10-watt sensitivity. **Kit HM-2102,** 4 lbs.

HM-2102 SPECIFICATIONS — Frequency range: 50 MHz to 160 MHz. **Wattmeter accuracy:** ±10% of full-scale reading.* **Power capability:** To 250 W. **SWR sensitivity:** less than 10 W. **Impedance:** 50 ohms nominal. **SWR bridge:** Continuous to 250 W. **Connectors:** UHF type SO-239. **Dimensions:** 5¼" W, 5¼" H and 6½" D, assembled as one unit.
*Using a 50 Ω noninductive load.

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WA2JDG EC's. New appointees are WA2DBQ and WA2AOG as ORSs, BPLs: WA2ELD (in spades!), WA2ICU, W2OL and WB2NRK. Antique ham gear is on display at the shack built by K2RXG of Baldwinsville. K2ILL of Hamburg had Santa talking with the junior ops on 3915 Christmas day. ARATS elected officers WB2UYI, WA2LYF, WB2UXY *and directors* WA2KAT, WA2DHG, WA2ARA, K2FQB, WB2YEM and WB2MBG. EC for Erie and Niagara Counties WA2EYF has appointed WB2YEM as asst. WA2CCI of Rochester nneed not go barefoot any longer. W2VRS has a new Yaesu-570 heating up 20 meters. WA2MPC, K2HYQ and WA2ALB are new officers of the WNY Emergency Net. Sorry to report the passing of W2SSk to Silent Keys. The BARF 2-meter repeater is W2OY on Grand Island. ARATS and their bulletin the Coherer are organizing a woman's auxiliary. WB2LVW assisted by relaying emergency traffic for some midwest mobiles aiding an accident victim. Long skip prevented the direct communications. Have you noticed the super long skip on 80" – like VU2SBX in India on 3687 kHz while EAN reps struggled to relay traffic between W1- and W2-Land 2 kHz below. NYS reports 62 sessions for Dec., 943 check-ins and 517 messages handled. Now that W2MPK is over the 200 mark in DXCC he finds the pickings so slim that WA2EJS and fiancee bought him a busy box to occupy his time. Traffic with *indicating PSHR. WA2FLD* 749, WA2ICU* 505, W2OE 406, W2UR* 386, WA2AYC* 267, WB2ADW 188, WB2NRK* 165, WA2HSB 137, WA2PLH 123, WB2VND 113, W2MTA* 107, WB2EUX* 98, W2HYM 82, WA2AOG* 81, W2ROL* 78, K2JBX 76, W2MSM 73, W2RUF 69, W2FZK 68, W2EEB 67, WA2LUF 61, WA6TLB 37, WA2AEY 37, WN2SMM 31, WN2CTB 30, WA2MPC 29, W2PVL 28, K2OFV 28, WB2EDT 27, WA2AIV 24, W2EAF 23, W2GLR* 18, K2DNN 14, WA2SMQ 14, WA2LUC* 10, W2PZL 10, W2DBU 7, WA2JEQ 7, K2IMI 6, WA2EHX 2.

WESTERN PENNSYLVANIA – *SCM, Robert P. Gawryla,* W3NEM – SEC: W3KPL. PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. It is with deep regret that we record the Silent Key of W3SG/W3MRZ. Congrats go to W3TV on being granted membership in "First Class Op Club." He is only 1 of 2 Pennsylvanians on the list. The University of Pittsburgh at Bradford ARC has a new club house and a new call WA3IWR. WA3RVJ has upgraded his license from General to Advanced. RVJ also held a four hour and seven minute QSO with WA3QCD – some eagchewing! Novice nets are springing up – PNN, Foothills Novice Net, meets Wed. at 8 P.M. on 7138/39 kHz. PENN State ARC has the Early 80 Free Net on 3733 kHz daily. Marnet meets at 2130 GMT on 3715 kHz daily. Novices join in the fun. W3AHO has again started his theory classes for the Foothills ARC. The Radio Assn. of Erie has the following new officers for 1973: K3OAY, pres.; K3NAU, vice-pres.; WA3HSR, secy.; WA3EAY, treas.; W3SN, W3NEM, K3VLP, WA3HSR, WA3KAI and WA3MAU, dir. Don't forget to renew your license. Upgrade at the same time. Public Service Honor Roll for Dec.: WA3QQR 48, W3LOS 39, W3NEM 39, W3YA 34. WPA CW Net had 31 sessions, 425 stations check-in and handled 351 messages. Traffic: W3YA 245, WA3QQR 244, W3KUN 197, W3NEM 190, W3LOS 102, WA3PXA 76, K3HCT 72, WA3IYA 32, K3CR 27, *WA3RIZ 23, W3AFQ 21, K3SJN 20, W3SN 16, WA3FJO 14,* W3IDO 7, W3LLZ 4, K3INH 4, WA3PMI 2.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYU. PAMs: WA9CCP and W9PDI (vhf). RM: W9MUC. Cook County EC: W9HPG.

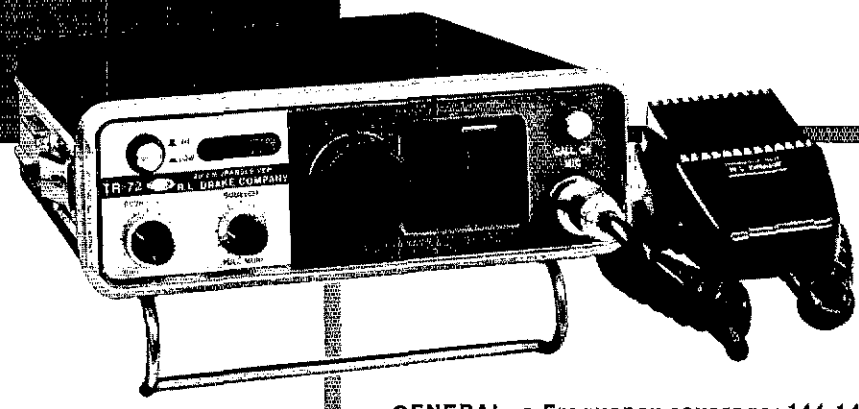
Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	54
ILN	3940	0300 Dy 2330	369
NCPN	3915	1300 M-S 1800	253
Ill PON	3915	1430	610
Ill PON	145.5	*0200 MWF*	16
Ill PON	50.28	0200 M	none
ILNN	3720	0100 Dy	40

New appointments include: W9KRR as ORS, K9AJP and W9KO as OOs, WB9HAD as OPS and WA9LRI as OVS. Reports to this column are numerous with regards to the terrific damage to antennas during the Dec. ice and sleet storms. Many reported that they have restored them and are now back in operation. The Ill. section amateurs were doing an FB job in handling welfare messages following the Nicaragua disastrous earthquake. New Tech. licensee is WB9KYM. A new Novice heard was WN9LHA. K9UCM received the

(Continued on page 126)

NEW

2-Meter FM Transceiver



- **23 Channels**
- **Superior Selectivity**
- **Completely Solid State**

$299.95

Including dynamic microphone, DC power cord, mobile mount and desk mount brackets, microphone hanger, auxiliary connector, and external speaker plug

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 1/16"W x 2 3/8"H x 9 7/16"D (18 x 6 x 24 cm) • **Weight:** 5½ 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 ±15 kHz max., factory set to ±6.5 kHz • **Automatic VSWR protection**

RECEIVER: • **Crystal-controlled, double conversion superhet** • **Sensitivity:** Less than .35μV for 20 dB quieting • **Selectivity:** 20 kHz at -6 dB (±30 kHz and adjacent channel rejection at least 80 dB down) • **Audio output:** 1 W • **Audio output impedance:** 8 ohms • **Modulation acceptance:** ±7 kHz • **Image rejection:** -65 dB • **Intermodulation and other spurious responses:** at least 70 dB down.

AC-10 POWER SUPPLY
for 115 VAC operation
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A-2515 Receiver 59

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CN-50 (23 MHz t.f.) 29
CN-50 (28–32) 29
CN-50 (14–18) 29
PT Preamp (6-160m) 39
TX-62 VHF Xmtr 79

B&W
5100 SSB Xmtr $119

BTI
LK-2000HD Linear $595

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QT-1 Anti-trip 6
100V Transmitter 325

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22'er 2m AM Xcvr $149
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99'er 6m AM Xcvr 59
22'er FM series 25 239
Thor 6 (RF only) 85
417 AC sup./mod. 65
418 DC sup./mod. 39
22'er Mk II 2m AM 239
Zeus VHF Xmtr 289
Interceptor Receiver 229
Interceptor B 289
Allbander HF Tuner 79
Apollo Linear 175
FM-27B 2m FM 329

COLLINS
75A-1 Receiver $139
75A-4 (ser.#7651) 325
75A-4 (ser #2343) 375
75A-4 (ser #7354) 375
Speaker (A1, A2, A3) 9
75S-1 Receiver 225
R-390A Receiver 995
32S-3 Transmitter 695
KWM-2 Transceiver 595
PM-2 AC supply 109
SM-3 Mike 39

DIGITEC
Z-200A Voltmeter $ 69
ZD-210A Voltmeter (rack) 59

R. L. DRAKE
2A Receiver $159
2C Receiver 179
2-NT Transmitter 109
R-4A Receiver 299
R-4B Receiver 349
MS-4 Speaker 15
TR-3 Transceiver 359
RV-3 Remote VFO 69
TR-4 Transceiver 439
RV-4 Remote VFO 69
DC-4 DC supply 95
MN-2000 Matching Network 149
TR-4 with 34PNB (Demo) 579
L-4B Linear 595
T-4XB Transmitter 375

DYNAMIC COMM.
10-0 2m FM amp $125
500C 2m FM amp 49
500ES 2m FM amp 65
500D 2m FM amp 65

EICO
720 Transmitter $ 49
723 Transmitter 34
730 Modulator 39
753 SSB Xcvr 119
751 AC supply 49
752 DC supply 49

ESPEY
R-366 Receiver $149

GLOBE/GALAXY/WRL
Scout 680A Xmtr $ 39
LA-1 Linear Xmtr 49
Hi-Bander 62 79
DSB-100 SSB Xmtr 49
755 VFO 39
6-2 VFO 34
VX-1 VOX unit 15
Galaxy III Xcvr 169
Galaxy V Xcvr 239
Galaxy V Mk II 259
Galaxy V Mk III 279
AC-35 AC supply 65
G-35 DC supply 69
RV-1 Remote VFO 49
VX-3 VOX 9
SC-35 Speaker 15
DAC-35 Dlx. console 75
G-500 DC supply 75
AC-400 AC supply 75
F-3 300cy. filter 24
2000 Linear/supply 259
Duo-power 300 AC DC supply 75
GT-550 Xcvr 329
GT-550A Xcvr 389
SC-530 spkr. console 19
AC-210 AC, DC supply-booster 25
FM-210 2m FM Xcvr 99
PR-550 ph. patch 39
AC supply for rejector 4
G-1000 DC supply 95

GONSET
Comm II 6m $ 69
Comm IIB 6m 79
Comm IV 2m 149
Comm IV 6m 125
Comm IV 220Mc 249
GC-105 2m Xcvr 119
G-28 Transceiver 149
G-50 Transceiver 139
900A 2m Xcvr 199
900B 2m Xcvr 199
901A AC supply 39
910A 6m Xcvr 199
911A AC supply 39
G-76 DC supply 49
972-A Centron 2m mobile amp. 149

HALLICRAFTERS
S-38A Receiver $ 39
SX-62 Receiver 129
SX-62A Receiver 159
SX-100 Receiver 139
SX-101A Receiver 189
SX-110 Receiver 99
SX-111 Receiver 129
S-120 Receiver 29
S-125 Recidemo) 49
SX-130 Receiver 139
SX-133 Receiver 195
WR-600 Receiver 39
R-46B Speaker 9
HT-32A Xmtr 225
HT-44 Transmitter 189
HT-46 Transmitter 219
SR-150 Xcvr 275
SR-160 Xcvr 169
PS-150-120 AC sup. 75
PS-150-12 DC sup. 75
P-500DC DC sup. 95
SR-34 (AC) Xcvr 174
SR-34 (AC/DC) 199
SR-42A 2m Xcvr 99
SR-46 6m Xcvr 79
SR-46A 6m Xcvr 89
HA-17 calib(SX-122) 15
HA-19 calib(SX-130) 19

HAMMARLUND
HQ-100 Receiver $ 99
HQ-100C Receiver 109
HQ-100AC Receiver 149
HQ-110 Receiver 109
HQ-110C Receiver 119
HQ-110A Receiver 149
HQ-110AC Rec. 159
HQ-129X Receiver 75
HQ-140X Receiver 119
HQ-170 Receiver 149
HQ-170C Receiver 159
HQ-170A Receiver 199
HQ-170AC Rec. 209
HQ-170A-VHF 259
HQ-215 Receiver 225
S-100 Speaker 9

HEATHKIT
GR-64 Receiver $ 39
GR-78 Receiver 99
HR-10 Receiver 49
HR-10B Receiver 69
RX-1 Receiver 139
SB-300 Receiver 209
SB-301 Receiver 229
XC-2 2m converter 25
XC-6 6m converter 25
SB-600 Speaker 15
HS-24 Speaker 9
HD-11 Q-multiplier 12
GD-125 Q-multiplier 15
HW-7 QRP Xcvr 59
DX-60 Transmitter 59
DX-60B Transmitter 69
TX-1 Transmitter 99
HX-20 Transmitter 125
HX-30 6m Xmtr 149
HA-20 6m Linear 75
HW-12 75m Xcvr 75
HW-22A 40m Xcvr 85
HW-32 20m Xcvr 75
HW-32A 20m Xcvr 85
HW-18 (for 80m CAP) 99
HW-16 Transceiver 99
HW-101 Transceiver 269
SB-101 Transceiver 349
HW-10 6m Xcvr 119
SB-110A 6m Xcvr 295
SB-310 Gen. Conv. 329
HW-30 (Two'er) 139
VHF-1 (Seneca) 119
HP-13 DC supply 49
HP-23 AC supply 49
HP-23A AC supply 54
HRA-10-1 calibrator 8
HO-10 Monitor 59
HO-13 Hamscan 69
HW-17A 2m Xcvr 119
HW-17-1 DC supply 19

JOHNSON
Adventurer $ 29
Challenger 54
Valiant I 139
Valiant II 189
Pacemaker 129
Invader 200 225
Courier Linear 139
6N2 VHF Xmtr 89
TR switch 19

K-W ELECTRONICS
KW-2000B Xcvr w/AC supply $495

KNIGHT
R-100 Receiver $ 59
T-50 Transmitter 24
T-60 Transmitter 34
TR-106 6m Xmtr 69
V-107 VHF VFO 19
TR-108 2m Xcvr 89
G-30 GDO 12

LAFAYETTE
HA-750 6m Xcvr $ 49
HB-502 AC supply 19
HA-225 Receiver 79
HA-600 Receiver 89

LAKESHORE
Signal Splitter(as-is) $15

MOSLEY
CM-1 Receiver $ 99

NATIONAL
NC-98 Receiver $ 89
NC-125 Receiver 75
NC-155 Receiver 119
NC-270 Receiver 125
NC-300 Receiver 175
NC-303 Receiver 199
HRO-50T1 Receiver 125
HRO-60 Receiver 199
NCX-3 Transceiver 169
NCX-5 Transceiver 329
NCX-5 Mk II Xcvr 369
NCXA AC supply 75
200 Transceiver 239
NCX-500 Xcvr 269
NCL-2000 Linear 375
AC-500 AC supply 75

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4350A Receiver 109

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DX-2000-L Linear $395

REALISTIC
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ROBYN
500 Transceiver $595

SBE
SB-33 Transceiver $189
SBI-LA Linear 175
SB-34 Transceiver 279
SB2-VOX 19
SB2-MIC Mike 9

SWAN
SW-140 Xcvr $ 75
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TCU Control unit 59
117AC AC supply 59
117B AC supply 59
508 VFO 95
260 Transceiver 299
270 Transceiver 329
250C 6m Xcvr 329
350 Xcvr (late) 289
SW-117C AC supply 65
350C Transceiver 325
500 Transceiver 349
500C Transceiver 369
117XC AC supply 85
14-A DC supply 29
TV-2B 2m Xverter 225
22 VFO adaptor 22
22B VFO adaptor 25
250 6m Xcvr 229
210 6m VFO 89
500kc Calibrator 15
NS-1 noise silencer 24
TV-2 2m Xverter 189

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FMA 25w 2m FM $249
ACA AC supply 25
Tempo One AC sup. 75

TEN-TEC
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PM-2A Transceiver 59
PM-3A Transceiver 54
PM-2C Xcvr 49
TX-100 Transmitter 79
AC-4 SWR bridge 9

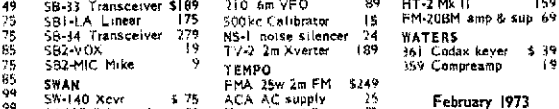
TOP BAND SYSTEMS
TBS-2000 Linear $175

UTICA
650 6m Xcvr-VFO $ 59
650A 6m Xcvr/VFO 79

VARITRONICS
FDFM-2A 2m FM $ 89
FDFM-2SA 2m FM 99
IC-2F 2m FM Xcvr 169
PA-50A 2m FM Amp. 69
FM-208M amp & sup 69

WATERS
361 Codax keyer $ 39
359 Compreamp 19

February 1973



NEW EQUIPMENT SPECIALS & CLOSEOUTS

Due to the low prices and limited quantities of the merchandise listed below all prices are for "Payment in Full With Order—No Trade".

	reg.	NOW
BTI		
2000 Wattmeter	$ 49	$ 39
CLEGG		
22'er FM series 25	$384	$269
22'er FM series 24	384	269
FM-27A 2m FM Xcvr	479	329
Thor DC supply/modulator	159	80
22'er Mk II AM	389	289
COLLINS	reg.	NOW
75S-3B Rec. - New Display	$110	$880
32S-3 Xmtr - New Display	1330	1064
351D-2 mob. mt. - New Disp.	337	187
CUSH CRAFT	reg.	NOW
AM-22 2m stacked halo/mast	$17	$12
AM-26 2 & 6m Halo/mast	19	14
R. L. DRAKE	reg.	NOW
TR-4 Transceiver	$599	$499
L-4B Linear - New Display	825	660
TC-6 6m xmt. converter	278	248
ML-2 2m FM - New Display	299	239
R-4B Receiver	475	395
T-4XB Transmitter	495	395
TC-2 2m xmt. converter	378	378
SC-6 6m Rec. converter	71	71
CC-1 Converter console	49	49
CPS-1 Power supply	20	19
SCC-1 VHF calibrator	27	26
RV-4 VFO for TR-4	110	95
RV-4 VFO for TR-4	110	95
ETO	reg.	NOW
PA-70V Linear w/160m	$1675	$1475
EICO	reg.	NOW
751 AC supply - kit	$ 79	$ 49
751 AC supply - wired	109	79
752 DC supply - kit	79	49
752 DC supply - wired	109	69
GALAXY	reg.	NOW
AC-210 AC supply/booster	$ 49	$ 29
GT-550 80-10m Transceiver	550	350
GT-550A New Display	595	450
GAVIN	reg.	NOW
Maverick II 6m Filter	$ 34	$ 15
GONSET	reg.	NOW
902A DC supply	$ 79	$ 39
GSB-701 Mk IV Linear	660	389
HY-GAIN	reg.	NOW
203BA 3 el, 20m Beam (shipped in error to a customer)	$139	$ 79
HB2S2 stacked 2m Halos	26	12
SD-150B 159-174Mc J-pole	125	49
HB2S4 4 stacked 2m Halos	54	27
400 Rotor - New Display	229	199
KENWOOD	reg.	NOW
TS-511S 80-10m Xcvr and AC supply - New Display	$620	$450

	reg.	NOW
LINEAR SYSTEMS (ADCOM)	reg.	NOW
350-6 6v DC supply	$125	$ 20
12-150 12-110v 150w inverter	60	20
PEARCE SIMPSON	reg.	NOW
CLADDING 25 2m FM Xcvr WITH matching AC supply	299	$229
RAYTRACK	reg.	NOW
CB Autolevel	$ 69	$ 19
SBE	reg.	NOW
SB-36 Xcvr. - New Display	$969	$769
SB-5V Scanvision Monitor and Camera - New Display	999	280
SB-144 2m FM - New Display	259	229
SB-2MIC Mike (dynamic)	16	12
SONAR	reg.	NOW
FM-3601 2m FM 8 ch, 10w	$299	$175
PS-2923 AC supply for above	39	25
FR-2514 Low-band Scanner	189	99
2902 Porta-Pak for FR-104	59	25
STANDARD	reg.	NOW
SR-C146 Hand-held 2m FM	$279	$199
SR-C826M 10w, 12 ch, 2m FM	359	259
SR-C14U Base - New Disp.	595	476
SWAN	reg.	NOW
410C VFO for 500C	$120	$ 85
500CX/SS16B - New Disp.	589	549
600R Custom - Demo	545	495
600T Xmtr - New Display	589	535
1200w Linear (110v)		225
1200w Linear (230v)		225
TEMPO	reg.	NOW
FMV 10w, 2m FM	$249	$149
2000 Linear	395	350
VARITRONICS	reg.	NOW
FDFM-2 and BP-1	$262	$149*
FM-20M Mobile Amp	150	50*
FM-208M Base Amp/supply	235	75*
PA-50A 2m FM Amp, 12v	129	85*
FDFM-2S (mod. for MARS)	210	160*

* with 90-day A.E.S. warranty

	reg.	NOW
WATERS		
346 Neuverter, 6–2 conv.	$175	$ 75
REGENCY CB	reg.	NOW
Imperial 23 ch, 110 & 12v	$299	$199
KAAR CB		
Skyhawk II, 23 ch, 12v	$229	$129
SQUIRES-SANDERS		
Skipper 23 ch, 12v	$159	$ 79

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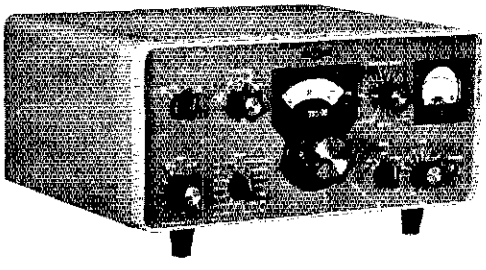

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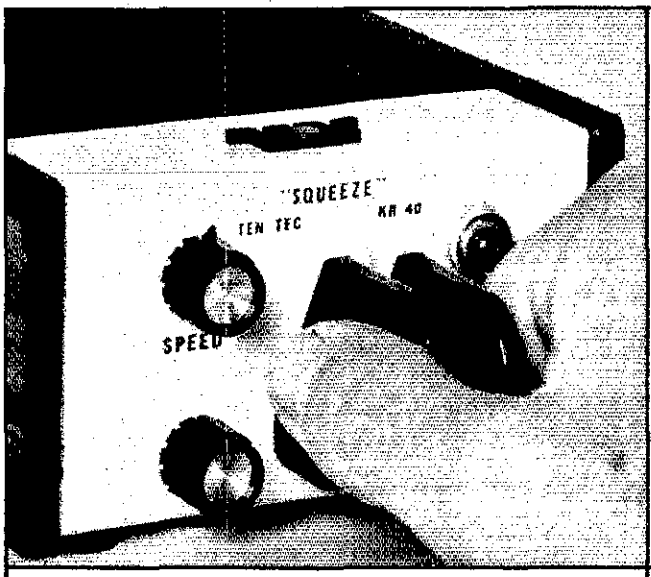
RARA Ham of the Year award and received a plaque from his Rockford Amateur Radio Assn. Club for his outstanding work as a member. New officers of the Southeastern Ill. Ham Society are WB9HPG, WB9BXB, K9RZP and K9CVL. WA9IIU is a new amateur in Omaha, (Ill.). WB9ACN spoke on "Safety Around the Ham Shack" at the regular meeting of the Tri-Town Radio Amateurs Club. WB9DWG and XYL WB9DWF formerly of Fort Atkinson, Wisc., now claim Grayslake, Ill. as their new QTH. K9HGG is recovering from a very serious auto accident. Mark your calendars for Expo '73 on Sat. and Sun. July 7 and 8. WA9RMS now is a General Class licensee and WN9IOH has passed his Advanced Class exam. K9OVM is out of the hospital and recuperating at home. K9PZR, a member of the Salvation Army advisory board presented a certificate to the Cenois Amateur Radio Club for their participation in collecting $900.00 during their Radiothon. New officers of their club are WA9IQK, K9MGE, K9DAG and Meredith Burgess. Traffic: (Dec.) W9NXG 275, W9AES 260, W9MUC 251, W9JXV 110, WB9EHI 98, WB9JPS 98, WB9JTK 96, W9LNQ 68, WA9LDC 54, WB9HEG 35, W9KR 15, K9WMP 11, W9PRN 10, W9TAL 7, WA9LHU 6, WA9ELP 3. (Nov.) WB9EHI 76, K9WMP 4.

INDIANA – SCM, William C. Johnson, W9BUQ – Acting SEC: W9BUQ. RMs: WA9EED, WB9FAY, W9HRY. PAMs: K9KTB, (vhf) W9HWR, W9PMT.

Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
ITfcN	3910	1330-2300 Dy 2130 M-S	688	K9KTB
QIN	3656	0100-0400 Dy	352	WA9EED
IPON	3910	1300-2130 Su 2000 S	32	WB9AHJ
IPON VHF	50.7	0100 M-W-Th	48	WA9UEH
IPON CW	3740	0000 Dy	88	WB9KVN
IPON SSB	50.2	0200 Dy	24	W9MHZ
Hoosier VHF			14	W9PMT

With deep regret I report the passing of W9ATE, W9EPZ, W9AAI and W9JYU. New officers for Gibson County ARC are W9HWR, pres.; K9GHN, vice-pres.; WA9NOA, secy.-treas. After three years as SEC of Ind. W9FC resigned Jan. 1, 1973. IPON SSB net on 50.2 has been able to cover the state during the long skip this winter. Stations able to work both cw and phone liaison duty are WB9EAY, WA9EED, WA8FKQ/9, WB9FST, K9HPD. From QIN to ITfcN. The Indianapolis Radio Club is getting a directory for Marion County. WA9EED wants more phone traffic handlers to check in with QIN. W9NYW is back on the air. WB9AHJ copies ARRL bulletin, and puts it out before you get the bulletin by mail. QIN Honor Roll: WA9EED, W9EI, K9HDP, WB9LHI, W9QLW, WB9KVN. BPLs: WA9EED, K9HPD, WB9AHJ. Amateur radio exists because of the service it renders. Traffic: (Dec.) WA9FED 570, K9HDP 322, W9QLW 267, WB9AHJ 247, K9KTB 221, WB9KVN 151, WB9LHI 145, K9FZX 141, W9EI 127, W9IBQ 120, WB9FOT 108, K9YBM 62, WA9TOD 57, K9CBY 52, K9RWQ 45, WA9OHX 41, WN9IHH 40, WB9FST 39, W9HRY 37, W9BUQ 36, W9DZC 30, WA9TJS 29, WB9BAP 27, W9FWH 26, K9JOY 26, WA9ULH 26, WA9KWB 23, WB9EAY 22, K9RPZ 22, WA9OAD 20, W9COU 18, K9DIY 17, W9HWR 17, WA9AXF 16, WA9OKK 15, W9PMT 14, W9BDP 13, K9ILK 12, WA9WME 10, W9AUM 7, W9ENU 7, W9LWI 7, W9IC 6, WB9EJO 4, K9PNP 3, W9CMT 2, K9UZA 1. (Nov.) W9EI 24, W9IC 6.

WISCONSIN – SCM, Joseph A. Taylor, W9OMT – SEC: W9NGT. PAMs: K9FHI, WA9OAY, WA9QKP. RMs: W9UCR, K9KSA. Nets: WSBN QNI 1263, QTC 245; BEN QNI 727, QTC 129; WIN (early) QNI 311, QTC 184; BWN QNI 424, QTC 287; WSSN QNI 22, QTC 4; WIPON QNI 525, QTC 63. WB9DWG and XYL WB9DWF recently moved to Grayslake, Ill. They are active on all bands with a Drake TR-4. WA9SWX now has an HT-200 for 2 meters. W9RQM, K9JPS and K9KSA spoke on proper operating procedures at the Jan. meeting of WVRA. Our WIN net mgr. W9UCR gave a nice talk at the Dec. meeting of the West Allis ARC. W9KCR is back on the air after long siege at the V.A. Hospital in Madison. W9MMP operating portable at Bloomer, with an SR-150 and Swan antenna. WA9MCC, WB9ECO and W9EWC had good luck working through Oscar. WB9ECO, newly appointed asst. secy. for YTARC, built up a digital clock and was able to count down New Year's Eve. W9PIT has a new SB-line. K9DAF back chasing DX on 20- and 15-meter cw. WB9FWK has a new Regency on two. WA9LYY looking for more La Crosse members for AREC; also sent in a clipping from La Crosse Tribune on how amateur radio helped local people to communicate with family in Nicaragua. OVS W9FBC has a computer program to update Oscar satellite predictions. If you have access to a computer you might be interested in dropping W9FBC a line. Traffic: W9CXY 727, K9CPM 433, W9DND 294, K9FHI 147, W9ESJ 140, WB9ABF 83, W9MFG 72, WB9HLM 71, W9CTI 58, W9UCR 58, K9KSA 56, W9IHW 42, W9DXV 36, W9KRO 36, K9LGU 32, WA9OAY 28, K9JPS 26, WA9LRW 21, W9MMP 18, WA9BZW 17, WB9ECO 15, WB9GGL 15, K9UTQ 14,



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KR20

Dual paddle straight keyer. Self-completing characters. Two position weight switch and monitor oscillator. AC operation.

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DAKOTA DIVISON

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: KØPVG. RM: WAØMLE. OO: WØBF. Our sympathies to the families of WØONJ and WBØDAE who quite suddenly passed away in Dec. WAØGWD, KØABC and WAØIAS recently blossomed out with new Tempos. The Elks in a Leadership award selected WAØRWL as outstanding in Richland Co. Congrats. KØPVG was in St. Lukes Hospital for some time. Going has been rather tough for the YL WX Net because of skip conditions at 0730 in the morning. The Theodore Roosevelt ARC of Dickinson report WØKXP, pres.; WBØETR, secy.-treas.; WBØAUM, pub. chmn.; WØZCM, vice-pres.; WØBHF, act. mgr. WØKXP has a new Hallicrafters FPM-300. WBØETR is building an HW-101. WBØGFZ has a power supply coming up. The Forx ARC had a farewell party for WØLIR who was transferred back to Kans. Because of new band allocations and QRM, the ND CW Net has been moved to 3642 kHz, same time and days. WAØMLE and WAØSUF made BPL. Congrats. WAØELO and WAØMLE continue to keep N. Dak. in the TEN Tfc. Net, 7th place in Nov. with 35 and 32 QNI respectively. Nice work. WAØMLE made PSHR.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
Goose River	1990	0900 S	4	91	2	WØCDO
ND PON	3996.5	1830 S-S 0900 S	15	413	56	WAØSJB
YL WX	3994.0	0730 M-F	21	341	320	WAØGRX WAØMND
ND RACES	3996.5	1730 M-F 1830 M-F	42	854	175	WBØATJ WAØSUF
ND CW	3642.0	2150 M-S	17	63	29	WAØMLE

Traffic: WAØMLE 421, WAØELO 385, WAØSUF 156, WBØRWM 181, WBØFDT 50, WAØJPT 25, WØDM 24, WØCDO 20, WAØSJB 19, WBØFFH 7, WØMXF 3.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – RM WAØTNM and the rest of the cw gang on the South Dak. CW net are to be congratulated for being very active and handling a lot of traffic. The SDN CW net meets on 3650 kHz at 0100Z. Your checking in with them whenever possible would be greatly appreciated. They are always willing to take out-of-state traffic. In Nov. SDN CW Net had 26 sessions with 283 QNI and 285 formals. In Dec. 29 sessions were held with 261 QNI and 130 formals. New calls are WBØGTY, WBØEPY and WBØGCY. WØSDG has recently gotten a rig and become active. Net reports: WX Net – 595 QNI and 407 formals; NJQ – 569 QNI and 11 formals; Early Evening – 778 QNI and 25 formals; Late Evening – 1754 QNI and 75 QTC. Traffic: WØZWL 407, WØHOJ 205, WAØUEN 154, WAØROK 58, WØIG 46, WØDVB 27, WAØYAK 26, KØGSY 20, WØCLS 12, WAØNZA 6, WAØTNM 36, WAØZXV 9.

DELTA DIVISION

LOUISIANA – SCM, John R. Rivoire, K5AGI – Asst. SCM: Louis Muhleisen, Jr., WB5AEH. RM: W5GHP. MTA school director WB5APJ announced the recent graduation of 8 Generals and 4 Techs. Congrats to newly elected OARC WA5YJW, pres.; WA5VCS, vice-pres.; W5PYJ, secy.-treas.; WA5CKI, WA5CKJ, WA5EDD and WA5QCX, board. Congrats to recent upgrades K5MKW and K5UAR to Advanced and WB5ADU and WA5UES to General. WA5VUC reports MTA will award a wattmeter to the member with the best attendance record in 1973. WA5TRX reports completing a 27 month tour with the Navy in Spain and now serving aboard the USS Coronado out of Norfolk. WB5CXK provided the refreshments for the MTA Christmas party. LARC is making plans to host a Delta Division Convention in Lafayette for 1974. Get your reservations in for the Lafayette Banquet on Mar. 10. K5DPG, K5ARH or any member of LARC can help you with reservations. W5EXI has a shiny new Drake setup and crank-up tower. Congrats to W5GHP and WA5ZZA for BPL certificates this month. New Iberia welcomes WB5HXJ. WA5ZVB is on RTTY with new Drake gear and two-element 20-meter quad. WA5ZDZ and WN5ESH played hostess and host for LARC's Christmas party. W5EVS is active on 40 meters using a 14-AVQ. WA5HVZ is active on 2-meter fm. WA5AWF is back from Vietnam and working on degree number 2 at LSU. Indications are that La. amateurs have contributed greatly in handling traffic for the Managua disaster. In order to compile a complete report of La. participation I need your help. Thanks for the cards, letters and remembrances during my recent hospital stay. Traffic: W5GHP 424, W5MI 296, WA5ZZA 179, WA5WBZ 54, WA5QVN 28, W5EA 14, WA5NYY 10, W5YN 8.

MISSISSIPPI – SCM, Walker Coffey, W5NCB – Asst. SCM: Gene McGahey, WA5JWD. SEC: WA5HII. PAMs: W5JHS

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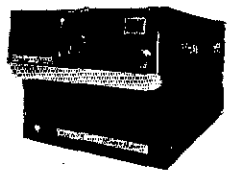

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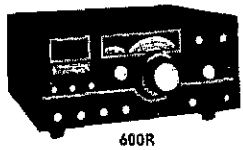

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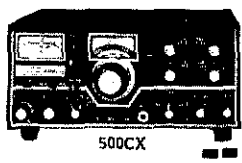

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WA5KEY, K5MDX. RMs: WA5YZW, WB5DEK. Thanks to WB5FML, W5PDG, W5AO, WA5WUX, WA5FII, WB5GOI, etc, who helped us with news. New officers for Old Natchez ARC are WB5AHZ, pres.; WA5NCM, vice-pres.; WA5CAM, secy.-treas. Congrats to W5AO recently appointed to DX Adv. Comm. WA5WUX, pres. Miss. State ARC is running a Novice Class. Club plans Exhibits and a station on High School Day at State. WB5ALB has new tower. W5AO working stateside and DX via Oscar 6 satellite. W5WMQ has an eleven-element beam on 2. There were 182 activity reports with over 11,000 pieces of traffic in 1972 this section. More than 200 Novices in Miss. want to upgrade. Please help them. See you in the DX contest.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
MTN	3665	0045 Dy	117	128	WA5YZW
MNN	3733	0100 TTS	–	–	WB5DEK
GCSBN	3925	0030 Dy	–	–	W5JHS
GGCHN	3935	0100 Dy	1350	100	W5VVV
MSPON	3970	2345 Dy	347	219	WAØGVO/5
MSBN	3987.5	0015 Dy	981	118	WA5UIH

Traffic: (Dec.)W5SBM 288, W5EDT 132, WA5YZW 112, W5AMZ 84, WB5DEK 71, W5NCB 65, WB5FML 56, K5YTA 52, W5WZ 48, WAØGVO/5 44, WB5BUE 31, WB5EIN 11, W5BW 8, K5YUW/5 1. (Nov.) WB5FML 28.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4ANX. PAMs: W4PFP, K4MQI, WA4EWW, WA4NEC. RM: W4ZJY.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TPN	3980	1245 M-F 1400 SSuH	31	1495	45	W4PFP
TSSBN	3980	0030 T-Su	26	1275	52	K4MQI
FTPN	3980	1140 M-F	22	576	27	WA4EWW
TN	3635	0000 Dy	31	208	132	WB4YCV
TNN	3720	0000 Dy	25	127	26	WB4USG
ETVHFN	50.4	0000 TThS	13	128	0	WB4IOB
ETVHFN	145.2	0000 WF	9	34	0	WB4DZG
FTTMN	28.2	0200 WF	9	53	0	WB4NFJ
KVHFN	50.7	0100 T	4	27	0	WB4MPJ
MTTMN	28.8	0200 TF	9	89	0	W4PSN
ACARECN	146.28 146.88	0100 M	4	80	0	WB4DYJ
TUN	3980	0200 Th	4	45	0	W4CYL
TPON	3980	0030 M				WB4BHZ

We wish WA4UAZ a very pleasant tour in the USN for the next two years, he will be operating GM5AXO. New officers for NARC are W4CYL, pres.; WB4KNF, vice-pres.; WA4WJD, secy.-treas. Officers of MARA are W4SCF, pres.; WB4HPO, vice-pres.; WN4VDJ, treas. Officers of KARC and BMRC are WB4FVM, pres.; WB4MPJ, *vice-pres.; WA4EWW, secy.-treas. KARC and WB4MKS, secy.-treas.*; BMRC, W4DMS, act. mgr.; WB4MPJ, editor Zero Beat, K4VOS asso. editor. Officers of Mid-South VHF Assn. are WB4CPI, pres.; WB4GIJ, vice-pres.; WA4PRR, treas.; WA4IAX, secy. W4BS repeater frequency changed to 146.22 in; 146.82 out. W4PFP, WA4LAX and K4EP have been awarded Certificate of Merit for their assistance in accident at Saltillo, TN which claimed one life. Traffic: WB4YCV 694, W4OGG 252, K4CNY 177, W4ZJY 95, WB4DJU 89, W4RUW 77, WB4VZO 68, WB4USG 65, WB4NIR 62, K4VVE 49, WB4ANX 43, W4WBK 38, WB4MPJ 36, W4PFP 35, WB4FEC 32, WA4GLS 30, WA4UAZ 20, WB4BZC 14, WB4DYJ 12, W4SGI 10, W4CYL 6, K4SXD 6, K4SJV 5, K4UMW 3, K4ON 2, W4TYV 2.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – SEC: WA4GHQ. Appointed: K4UNW as EC District 1. Endorsement: WB4EOR as OBS. BPLs: WB4WCM, WB4ZSA, W4CID, W4BAZ and WA4JQS.

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
ERN	368	44	KYN	292	310
MKPN	711	60	KYN(Dec)	319	315
KTN	1408	225	KPON	108	78

A whole raft of BPLs this month! Keep it up fellas! WB4WCM has a new 9RN certificate. K4TXJ handled quite a lot of emergency traffic during the Nicaraguan earthquake. WB4IDW is now on SSTV. WN4WND is working 15-meter Novice DX while WN4ZMK is working Novice mobile. WB4CTV has just completed his new shack with a house attached. W4BVT is a Silent Key. The Great Lakes Division (that's us!) Convention is Mar. 23-24 in Muskegon, Mich. It's a real blowout. We should get a group together and go up. Traffic: WB4WCM 1074, WA4JQS 389, WB4ZSA 309, W4BAZ 266, W4CID 260, K4TXJ 135, K4MAN 103, WB4EOR 92, WB4AUN 60, WA4GHQ 51, WA4VZZ 51, WB4YAF 47, WB4NHO 45, WN4ZMK 38, WA4AVV 26, WA4FAF 17, W4CDA 16, WB4GCV 14, K4OZQ 14, K4AVX 13, WA4ENH 11, K4FXN 11, K4QHZ 11, WB4REN 11, K4LOL 10, W4OYI 7, K4VAI 7, W4OXM 6, K4QCQ 6, K4HOE 1.

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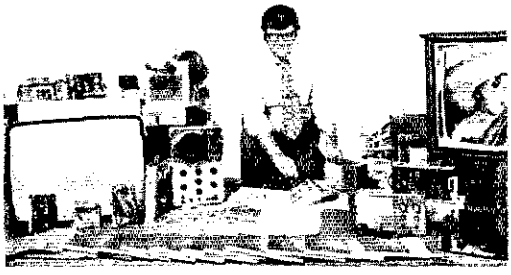

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MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – SEC: W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC. PAMs: K8PVC, WA8KHB, WB8HQS. VHF PAMs: K8AEM, WA8WVV.

Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
Mi.6M	50.7	0000 M-S	292	34	22	WA8VXE
BR/MEN	3930	2230 S/F	726	79	25	WA8KHB
GLFTN	3932	0230 Dy	401	53	27	WB8HPZ
UPEN	3920	2230 Dy	590	75	32	WB8HQS
PON	3955	1600 Dy	1074	349	31	K8LNE
WSSB	3935	0000 Dy	994	318	31	K8PVC
PON/CW	3645	2400 M-S	161	51	26	VE3DPO
QMN	3663	2300 Dy	1156	587	93	W8JYA

SW Mi. 2-meter Net had 45 QNI, 1 QTC and 4 sessions, W8CVO as mgr. SW Mi. 6-meter weather net held 2 drills, QNI 23, K8ZWR, mgr. I regret to report as Silent Keys – WA4AXC ex-W8JDZ, W8RFK, K8WSK. SVHN elected the following officers. K8BWC, pres.; WB8GUC, vice-pres.; WN8MNC, secy.; K8LNR, treas.; WN8KFU, trustee. MAARC Licensing Classes started Jan. 8 at Community College for the 18th season. A very good record for the club. ARRL Great Lakes Div. Convention Mar. 23-24. A new amateur radio club has been formed in the Mt. Clemens area, The L'anse Creuse Amateur Radio Cleb. QRM Code and Theory Class began Jan. 19 at the Grand Rapids Naval Reserve Center. Traffic: WA8PIM 628, WB8IAD 502, WA8WZF 330, W8IBX 319, W8JYA 161, K8LNE 131, WB8KWI 119, K8DYI 115, W8MO 75, W8RTN 73, WB8BJP 68, W8HLO 68, K8PVC 67, WB8BYB 65, W8OW 65, W8JZZ 61, K8WRJ 52, WA8LXY 46, WB8FBG 45, WB8HQS 42, W8IUC 42, K8GOU 38, WA8KHB 38, WB8DKQ 37, WA8FXR 36, WB8FEU 35, K8IFD 34, WB8HPZ 33, W8WVL 32, WA8OJI 29, K8ZVO 28, WB8IDTI 27, WB8BJY 26, WB8DJS 25, W8DCN 23, W8EUI 22, K8TIY 19, W8EOI 17, W8HKL 17, W8JBP 17, K8MXC 17, WB8BJJ 15, K8TVC 15, W8VFS 15, K8ACO 12, WB8ICU 11, K8GXV 10, K8JHA 10, K8KCF 10, K8AEM 9, WA8ONZ 8, WA8RXI 8, W8VIZ 8, W8VXM 8, WB8EUN 5, W8FZL 5, WA8WVV 5, WA3IYS/8 4, WA8MDK 4, W8QBE 4.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Kenneth L. Simpson, WA8ETX. SEC: W8OUU. RM: WA8WAK. PAM: K8UBK. VHF PAM: WA8ADU.

Net	QNI	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBTN	3112	1561	82	3972.5	1530/2100 2315	K8UBK
BN	739	593	62	3577	0000/0300	WA8WAK
O6MtrN	513	68	31	50.16	0200	WA8ADU
OSN	228	111	31	3577	2325	WA8WAK
BN RTTY	149	62	26	3605	2300	W8SZU

BPLs: WA8ETX, K8NQW, WA8MCR, K8ONA, WB8HUP, W8QCU, WB8NRC and K8PBJ. New appointees are WA8MAZ ORS and WB8MXU OVS. New officers of Clinton Co. ARA are W8WMQ, pres.; WB8NRC, vice-pres.; WA8JBG, secy.-treas. W8RYP is in Greece. The Scioto Valley ARC's Operation Santa Claus enabled 375 kindergarten children to speak to Santa by ham radio. WA8COA reports WB8DLJ and K8RXM are new asst. ECs for Warren Co. and for Clermont-Brown Counties, respectively. WA8EBS reports the Buckeye Belles have "adopted" LA8YL and that a new 2-meter fm radio unit has been formed within Al Koran Shrine in Cleveland. Public Service Forums will be held at Muskegon (Mich.) on Mar. 24 and at Dayton on Apr. 28. K8ONA and WA8QFK were interviewed on a Cleveland radio station and promoted the Apricot Net and ham radio public service. K8MYN spoke to the Fulton Co. ARC on Oscar 6. DXer W3JZJ/8 reports his XYL is a new Novice. WB8FVI, WN8LER and WB8HUP operated club station W8GYH at the St. Xavier H.S. open house. Evendale ARS has new 2-meter fm gear for AREC support. Massillon ARC sponsoring electronics/ham radio classes and workshop at Massillon Boy's Club. New officers of Van Wert ARC are W8DHG, pres.; WA8IBE, vice-pres.; WA8CPS, treas.; K8PBE, secy.; WB8FNB, act. mgr.; WB8CJU, asst. act. mgr.; WA8CPA, pub. mgr. Central Ohio AREC contacted 1000 area hams by mail soliciting SET participation. Ham radio classes Akron U. start on Mar. 21 – contact WA8FTX. Contact W8DSR if your group would like to visit the Gray Museum in Mason. WREPP, W8ARW, WA8STW and W8AKP were among the many Ohioans active in handling Nicaraguan earthquake traffic. Officers of Evendale ARS are WB8ESB, pres.; WA8SSI, vice-pres.; WA8STX, secy.; K8BAX, treas.; WA8TYF, trustee. Ham Shack Gossip reports W8GRT called out 10 mobiles and station 3 hams at Red Cross Hq. as AREC responded to flooding in northwest Ohio in Nov. The Canton ARC now meets the 3rd Wed. of each month at Brunnerdale Seminary at 8 P.M. Apr. 8 is the date of the annual Buckeye Belle meeting, K8CKI is pres. Don't forget the spring meeting of the Ohio Council of ARCs on Mar. 10 at the Columbus YMCA. Contact W8OUU for details. Traffic:

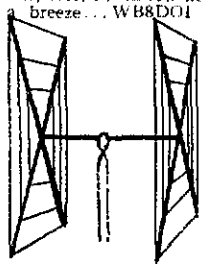
WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15-meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices — rely on the results op open, competitive contest. Ask yourself: Why do Gotham antennas win?

In QST since '53 without missing an issue!

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1AB, DM4SEE, FL8SK, F6AUM, HK7YB in few hours. Instructions a breeze... WB8DOI



CUBICAL QUAD ANTENNAS— these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

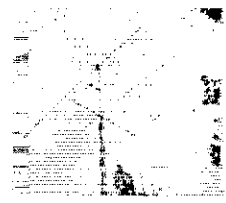
Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$41.00
10-15 CUBICAL QUAD	36.00
15-20 CUBICAL QUAD	38.00
TWENTY METER CUBICAL QUAD	31.00
FIFTEEN METER CUBICAL QUAD	30.00
TEN METER CUBICAL QUAD	29.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-El. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$25	4 El 10	$24
3 El 20	31*	7 El 10	38*
4 El 20	38*	4 El 6	24
2 El 15	21	8 El 6	34*
3 El 15	25	12 El 2	31*
4 El 15	31*	*20-ft. boom	
5 El 15	34*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

***FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN,FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!**

V40 vertical for 40, 20, 15, 10, 6 meters $18.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $20.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters .. $22.95

How to order: Send money order only (bank, store, or United States) in full. We ship immediately by REA Express, charges collect. DEALERS WRITE!

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

WA8ETX 866, K8NQW 778, W8PMJ 478, WA8MCR 465, WA8HGH 363, WA2ASM/8 311, W8SUS 289, K8ONA 273, WB8HUP 271, WB8ALU 261, W8QCU 259, K8MLO 239, WB8KKJ 231, WB8NRC 215, WA8YLW 209, W8CUT 207, WB8MKZ 196, WA8WAK 183, W8MOK 182, WB8JEL 181, WA8UPI 180, K8PBJ 167, W8VIT 129, W8DDG 119, WA8ITW 118, WB8KXV 118, *W8JD 114, W8MGA 114, WA8FSX 105,* WA8DWL 102, WA8ETW 100, K8BPX 99, W8ENI 95, W8CHT 94, WB8AYC 89, W8GVX 87, WA8YIB 86, W8QZK 77, WA8SED 70, WB8IBZ 68, W8FGD 67, WA8VWH 63, WB8FCT 60, K8CMO 55, WB8OAM 53, K8JDI 51, K8ZYX 50, WB8BLH 48, WB8JGW 46, WA8BCX 45, K8LTG 45, WA8QFK 43, WA8VKF 43, WB8DNZ 41, WA8NOQ 41, WB8EEZ 36, WB8KZD 36, WB8KVU 34, WB8CWD 33, WB8CSH 32, *WB8FNB 32, WA8HQO 29, WB8AJC 28, WA8ICQ* 27, W8BHL 26, W8LZE 25, WB8FXD 24, WA8ADU 23, W8OE 20, W8WEG 19, K8BYR 18, WB8HWE 18, W8PBS 18, WA8YVM 18, WA8RUO 17, WA8STX 17, W8GOE 16, WA8KPN 16, WA3BGE/8 14, WB8FWF 13, WB8GGR 12, WB8CLF 10, K8DHJ 10, W8ETU 10, K8CKY 9, W8CXM 9, W8KOI 9, W8ARW 8, WA8JSW 8, WA8MIH 8, WA8SSL 8, WA8YXB 8, K8RXD 7, W8NAL 6, K8PBE 6, WA8LAM 3, W8AQ 2, W8LAG 2, W8VND 2, W8VYU 2, W8OUU 1.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – Asst. SCM/PAM: Kenneth Kroth, WB2VJB. SEC: W2URP. RMs: WA2VYS, WA2FBI and K2DN (RTTY). VHF PAM: WA2YQU. Nets: NYS daily at 0001Z and 0300Z on 3.675 MHz; Empire Slow Speed (ESS) daily at 2300Z on 3.590 MHz (10 wpm); Novice Traffic Training Net Mon. on 3.677 MHz at 7:45 P.M. local time (Tue. 0045Z); NYRTTY daily at 2330Z on 3.613 MHz; NYSPT&EN daily at 2300Z on 3.925 MHz. All nets may have to *shift up or down a hair for long skip winter conditions.* WA2WGS still accepting reservations for the Dinner get together in early Mar. for Leadership appointees and XYLs to be held in Kingston. Hope to see you all there! On the club loop: Annual elections at Harmonic Hills: K2CIJ, pres.; K2BQO, vice-pres.; WB2ISL, treas.; WB2UYD, secy.; W2WRI, trustee; W2FWU, WA2VYS, WA2TJP, dir. with alternates WA2HIO, WA2ROJ, W2KGV. Dec. meeting heard WA2ROJ on Test Equipment. Westchester County ARA held annual dinner Dec. 14, day after the Yonkers ARA held theirs. Schenectady ARA held Ladies Night, speaker William Baird of US Olympic Committee. Communications Club of New Rochelle reelected W2YLE, pres.; WB2IXW, vice-pres.; WB2MOG, secy.; WB2VOB, treas.; K2JQB, sgt.-at-arms; W2DPV, trustee; WA2VEG, WB2NOY, WA2RAU and K2SJN, dir. Speaker was WB2BHM of NNJDXA. WA1OFP/WB2ZEC having a ball with new 3 watts in QRP rig. K2DN back from Switzerland, reports WB2EEX Mon. NCS for RTTY net. WA2WGS now QCWA member. WB2VUK, asst. EC for Net Operations and Training in Westchester County. K2BK back *after rig problems. WB2BXL at new QTH with 60-ft. beam and* kw rig. K2BK won W-2 section in HV-22 Contest and ENY Multi-op in ARRL DX phone with WB2BXL, W2DXL and WA2SUH pitching in. W2URP has all bands and modes set up at alternate station WB2IWE. PSHR listing should have been WA2CNE recently – and he made it again in Dec. along with BPL. WA2FBI now sporting call letter plates. New Drake line at W2SZ; WA2PJL had snow caused delay in new antenna project, but now OK. *Traffic: (Dec.)* WA2CNE 554, W2URP 129, W2GPH 83, W2UYK 50, WA2PJL 31, WB2VJB 26, WA2WGS 26, WA2FBI 24, WA2LIK 21, W2SZ 14, WA2EAH 13, WB2CUH 12, K2SJN 9, WA2HGB 6, K2HNW 5, *WB2IXW 4, WA2JWL 4.* (Nov.) WA2PJL 45, WA2WGS 26, W2SZ 24, K2SJN 17, WA2FBI 9, WB2AEQ 7, WB2IXW 7.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – SEC: K2HTX. RM/PAM: WA2UWA. RM: *WB2LZN. VHF PAM: WB2RQF. The following are major AREC* nets; join one!

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Kings	28.64 MHz	50.35 MHz	146.76 MHz
Richmond			146.88 fm
New York	29.5 MHz	50.48 MHz	145.62 MHz
Queens	29.50 MHz	50.20 MHz	145.62 MHz
Nassau	28.72 MHz		146.10 MHz
Suffolk (West)	28.73 MHz	50.46 MHz	145.59 MHz
			147.21 fm
Suffolk (East)			146.88 fm

Note: Net times between 2000 and 2100 local, Mon. It is with deep regret that I report the listing of W2VL as a Silent Key. Maury had been very active in various section activities and a deep personal friend to many of us. He will be sorely missed, but remembered by *us all. WA4CEN (WB2HIR) reports he now is living in Fla. W2BQF* is back in action on the "DC" bands after a whirl at the "line of sight" spectrum (vhf). W2FVS now has a TH3 atop his apartment bldg. He did it without a "Sky Hook". K2CFG's bi-lingual talents

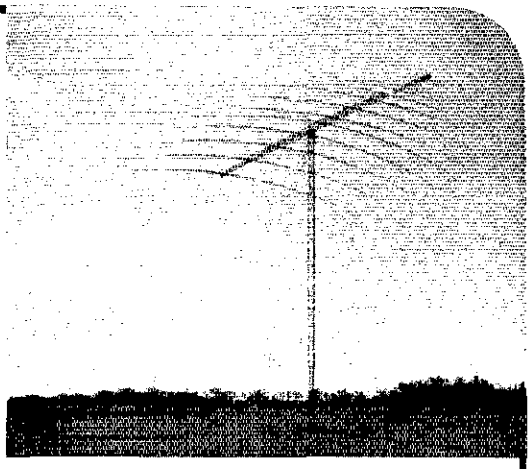
hy-gain

LP-1112MR

Flexibility and Dependability in the field

The Hy-Gain Model LP-1112MR is a lightweight transportable and rotatable log periodic antenna system covering the frequency range of 4 through 30 MHz. It is designed for temporary or permanent installation with minimum deployment time. This unique antenna is of extremely small size considering the wide frequency coverage.

Erection is performed via use of a mechanical hand winch, whereas rotation is accomplished through the use of a mechanical stop and halyard device, eliminating the need for electric power of any kind during system erection and operation. Installation and erection can be performed by a crew of 6 men in less than 4 hours. All installation tools and fixtures are included in the antenna kit.



Specifications for Hy-Gain LP-1112MR

VSWR	2.5 to 1 maximum		
Power Rating	2.5 KW Average 10 KW PEP	Overall Height	60 feet
Forward Gain	9 db min. from 4 to 6 MHz	Boom Length	72 feet
	11.5 db min. from 6 to 30 MHz	Erection Area	125 x 125 feet
Azimuth Beamwidth	70 degrees average	Net Weight, uncrated	2,000 lbs.
Front to Back Ratio	4 db min. from 4 to 6 MHz	Wind Rating	80 MPH
	12 db min. from 6 to 30 MHz		

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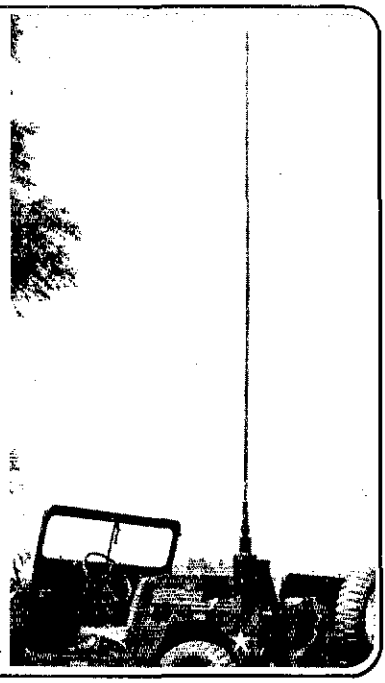
hy-gain **AS-1729/VRC**

(Model Number V-4231)

Designed to meet the new B-specification

The AS-1729/VRC (Model V-4231) is an omnidirectional, vertically polarized, center-fed antenna assembly built to MIL-A-55288B (EL) specifications. It is fully compatible with military radios in a 10 band spectrum from 30 to 76 MHz and with previously manufactured AS-1729 equipment. It is designed for installation on military vehicles ranging from jeeps to shipboard applications. Band-switching is manual and/or automatic, when operated with a compatible transceiver with automatic band-switching.

The AS-1729/VRC consists of three units: MX-6707/VRC Base Matching unit with spring cable assembly; AS-1730/VRC Lower Antenna element; and AT-1095/VRC Upper Antenna element.



Specifications for the AS-1729/VRC (Hy-Gain Model V-4231)

Frequency Range:	30-76 MHz
Power Input:	70 watts maximum
Input Impedance:	50 ohms

For further information, contact:

Hy-Gain Electronics Corporation

8601 N.E. Highway #6 Lincoln, Nebraska 68507 402/434-9151 Telex 48-6424

helped with traffic relief out of Nicaragua after that disaster. WA2LJS is sporting 2-meter fm gear in the mobile these days. W2PF reports that the 9th Annual Amateur Radio Luncheon will be held on Mar. 27, 1973 at the Engineers Club, 32W. 40th St., N.Y. Contact W2PF for details. W2EW and W2FZ have been given honorary vice-pres. designations by the Hudson Amateur Radio Council for the over 50 years of service to amateur radio and their service to the Council since its inception in 1959. Congratulations! Congratulations also to the following members who have been granted field appointments: WA2ZHA as EC Queens County; K2HK for ORS; WB2JSJ, WB2EKK, WA2ZHA as OBSs; WA2QQR as OVS. K2VGD has upgraded to Advanced Class; WN2FHN now is WB2FHN General Class. The Massapequa Radio Club is now conducting amateur radio classes; contact WB2CHY for details. With a fine turnout, the annual inaugural dinner of the Suffolk County Radio Club was deemed a success at Lands End, Sayville. The Electchester Amateur Radio Club is planning an excursion to ARRL, Newington in Mar. or Apr. Contact WA2NDV for details. WN9GEM/2 not only has changed his call area, but has also upgraded to General Class as WB2JWM! K2DGI reports taking in the Southeastern Division Convention while in the area on business? Where are all of our VHF Public Service minded enthusiasts? The VHF traffic Net (145.8) has been on frequency for some time now, but hasn't logged you in as yet! They need help, particularly in the NYC area. With the largest ham population of the section located in the 5 borough area, there is a strange lack of public service in these areas. With the Eastern Counties sporting the smallest ham population, and the largest public service record, there is a strange imbalance somewhere, n'est-ce pas? How about getting a better balance, and help get this section going as it should be? Congratulations to WB2LZN and K2VGD who earned BPL for Dec. 1972. Traffic: (Dec.)WB2LZN 686, WB2WFJ 311, WA2CLB 193, W2EC 154, WB2CHY 133, K2VGD 131, WB2LGA 125, WB2STQ 111, WB2OYV 90, K2HK 40, WN2CGW 37, K2JFF 37, W2FVS 18, W2DBQ 17, WA2LJS 15, WB2BYY 11, W2PF 10, W2EW 5. WA2PLI 19. (Nov.) WB2WFJ 413. (Oct.) WB2WFJ 278.

NORTHERN NEW JERSEY – SCM, John M. Crovelli, WA2UOO – SEC: K2KDQ. RM: W2ZEP. PAMs: K2KDQ and WA2FVH.

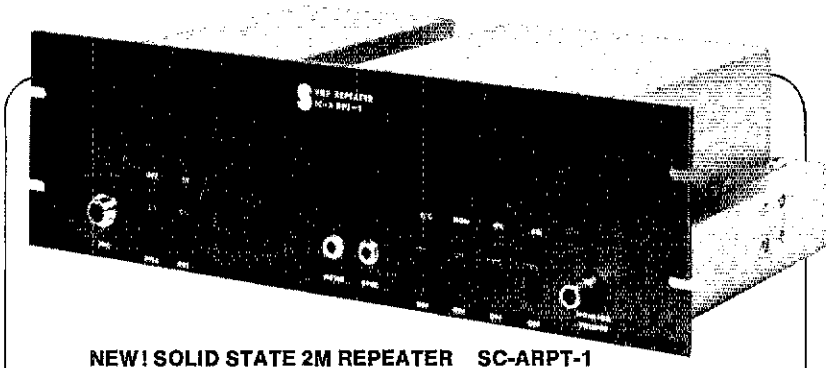
Net	kHz	Time(EM)/Days	Sess.	QNI	Tfc.	Mgr.
NJN	3695	7:00 Dy	31	549	374	W2ZEP
NJN	3695	10:00 Dy	31	240	84	W2ZEP
NJSN	3730	8:15 Dy	18	21	77	WA2RYD
NJPN	3950	6:00 Dy	31	559	259	WA2FVH
NJPON	3930	6:00 Su	5	109	66	WB2FJE
PVTEN	145710	7:00 Dy				K2KDQ

New appointments: W2ZEP as RM for NJN. WA2APG as OO. Endorsements: WA2FUI as EC for Bayonne and vicinity. WA2SRQ as ORS. WA2APG and WA2DFC would like to hear from anyone interested in starting a new radio club in the Pequannock area. WB2CST has returned from SNJ. WA2FNF reports a new home brew 3-500Z linear working well. WA2QJU and WA2SRQ both passed their Extra Class exams. WA2QNT passed the Advanced. Congratulations. WB2IEC operated DJØPXX on 20 and 15 meters while vacationing in Europe. W2CVW reports making contacts via Oscar and that he is investigating the uses of loop antennas. WA2QNT active at K3CR, Penn State University. WA2UDT is attempting two meter QSOs via meteor scatter. WA2UOO has acquired an HQ-170A receiver. WN2CWS is an active traffic handler using a DX-40, HR-70B and an HW-7. WA2SRQ is busy with construction projects including two antenna couplers and a contest machine of his own design. WB2AEH operated 40-meter mobile on a recent trip to Maryland. WB2FEH is mobile on 80 cw while traveling back and forth from Cal Tech. W2ZZ soon hopes to have his 80-meter dipole back in operation. W2VJZ, W2ZKE, W2WVR, WB2GTV and many others are active fixed and mobile on 28.705 kHz am. Many are using converted CB transceivers. OO reports received from WB2TFH and WA2APG. WA2RYD invites everyone to NJSN. The net is in need of a few more NCS stations. K2KDQ reports handling Navy MARS traffic via RTTY. WB2NTP was recently engaged. WA2RYD made BPL in Dec. Traffic: (Dec.) WA2RYD 437, WB2DDQ 364, WA2EUO 307, WB2CST 187, WB2IKL 151, W2ZEP 151, WB2AEH 133, WB2RKK 133, WB2JWM 82, WA2EPI 79, W2CU 63, WA2UOO 59, WB2RIJ 54, WA2QNT 48, WA2FVH 44, WA2CCF 43, WA2WNZ 43, W2ZZ 26, K2EFI 23, WA2CAK 22, W2ODV 21, W2CVW 20, WB2COV 19, WN2CWS 13, WB2AKU 11, WB2CFT 11, WB2KNS 8, W2WOJ 8, WA2FUI 7, W2ABL 5. (Nov.) W2CVW 15. (Oct.) WB2BCS 6.

MIDWEST DIVISION

IOWA – SCM, Al Gilbert, KØYVU – SEC: KØLVB. I wish to announce that I have appointed KØLKH as PAM of Iowa and have

REPEATERBILITY
by Standard Communications



NEW! SOLID STATE 2M REPEATER SC-ARPT-1

Complete packaged repeater designed for today's popular 2M FM band. 12 vdc. Ideal for new system or emergency portable operation.

FEATURES:

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- ☐ Maximum 3 amp current drain.
- ☐ 19" Rack Panel Mounting.
- ☐ Size: 19"w x 5"h x 9"d.

$640.00 Suggested Amateur Net Price

220 MHz & 450 MHz versions available

2M FM TRANSCEIVER SRC-146A

Solid state, 2 watt, 5 channel, hand held transceiver.

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Write for complete specifications.

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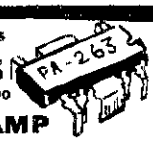
GENERAL ELECTRIC $2.95 3 FOR $6.00



3-WATT AUDIO AMP

Delivers 3 watts continuous, 10 watts peak. With heat sinks; micro-mini size: 3/4x1/2x1 1/2". 9 to 30V supply. High sensitivity, 8 to 16 ohms. For mono and stereo phonos, tape, FM, AM, TV, servo.

DIGITAL CLOCK KIT

By Scientific Devices

$44.00 WITH CASE

- ★ Smaller & more compact
- ★ 8" x 5½" x 3" case

The lowest price digital clock kit (with cabinet) as far as we can see in U.S.A. Scientific Devices' engineering dept. took extra patience in designing to give you the finest digital clock kit using the latest techniques in an easy-to-understand booklet. The cabinet-making section gives it the "interior decorating" touch so that it may fit into any room at home, shop or office. Walnut laminated tapered front cabinet, with gold-line front. Tapered legs for easy viewing. Large V.F.E. 7-segment fluorescent "blue-green" polaroid glow for the latest easy-viewing. FEATURES: 6 display tubes, completely etched and thru plated circuit board, all IC's. Includes BCD outputs for use with timer options, may be wired for 12 or 24 hour display. Indicates HOURS, MINUTES, SECONDS. 115 VAC 60 cy. Gift packed. Wt. 3 lbs.

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☐	1101	256 Bit RAM MOS	$3.95
☐	1103	1024 Bit RAM MOS	7.95
☐	2513	Character Gen. ROM	12.50
☐	7489	64 Bit RAM TTL	3.50
☐	8223	Programmable ROM	7.95
☐	MM5260	1024 Bit RAM	8.88

11 TRANSISTOR PHILCO AM RADIO CHASSIS

BUY 2 FOR STEREO

Use as:

- Mike amplifier
- Phone amplifier
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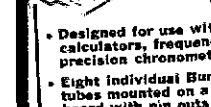
- Covers 555 Kcs to 1500 Kcs Broadcast band
- AC or DC

☐ Only $5.95

Originally design for portable phono systems, and tape cassettes!

One of the most versatile AM Radio and multi-purpose amplifiers we have seen at Poly Paks famous "Economy" price. Measures only 4½" x 3" x 2" high. With tuning capacitor, IF circuitry, loopstick, ant., volume control with switch, AC and phono-mike jacks. Separate switch for changing from AM radio to amplifier. Uses either 110V plug-in adapter (not with unit) and a 9-volt battery power. Exceptional sensitivity and power. Feeds into 16 ohm speaker. Complete with spec sheets, diagrams, and hookup ideas. ● Mike, Tape, Phone Inputs ● With Built-in Preamp

NEW! 8-Digit MUX (Multiplex) BURROUGHS 8-DIGIT "UNIVERSAL" NEON READOUTS



PC Board Included!

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- Eight individual Burroughs B5750's Nixie tubes mounted on a universal 4½x1½" MUX board with pin outs for digit drivers & segment.

Use all 8 readouts or any number of readouts from 1 to 8 SIMPLY, EASILY. Electrical characteristics: 170 VDC, 8 decimal points, 2 anode pins. We include schematics & instructions. • Characters 9/16" high!

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Terms: add postage, cod's 25%. **Rated:** net 30. **Phone** Orders: Wakefield, Mass. (617) 245-3829. **Retail:** 18-18 Del Carmine St., Wakefield, Mass. (off Water Street). C.O.D.'S MAY BE PHONED

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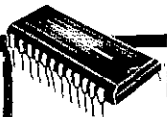

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SD-5314 direct substitute to famous U.S. maker. 24-Pin DIP — IMAGINE! ONE CHIP ELIMINATING 15 and other parts. Space Saver! Money saver! Latest in clock design. Features 12 or 24-hr. operation, 4 or 6 digits, 50 or 60 Hz operation. Internal digit multiplex oscillator, leading zero blanking, high output current for simple readout interface. Single power supply operation. Digit blanking for reduced current drain. 11 thru 19 volt range. Full MOS LSI. Spec sheets included.

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12-DIGIT "CALCULATOR ON A CHIP"

Similar to Mostek 5001. Outperforms Texas 8-digit TMS1802. A 40-pin DIP. Adds, multiplies, subtracts, and divides. Use with 7-segment readouts, Nixies, and LED's. We include schematics, instructions from factory to build calculator.

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$12.95

3 for $35

1 WATT "FLANGELESS" TOP HAT ZENERS ☐ 5 for $1

Type TK, Metal Case!

Volts	Volts	Volts
4.7	10.	15.
6.2	11.	30.
8.2	12.	33.
9.1	13.	

NIXIE

COUNTING SYSTEM

Includes SN7490, decade counter, SN7475 latch, SN7441 BCD decoder driver, 0-to-9 Nixie tube, instructions.

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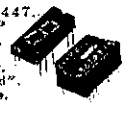
Lowest prices on

LED READOUTS ☐ 4.50 3 for $12.

0-9 plus letters, for SN7446 or SN7447. Snaps in 14-pin DIP socket. 3/4"x3/8"x3/8", characters: 1/4"x9/16". 5V, 20-mils per seg. characters: 1/4"x3/16". Famous MAN-1 type.

☐ Sockets .50 ea.



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This display is excellent for small portable electronics, such as DVM's, calculators, etc. Equivalent to Monsanto MAN 3A. Operates from 5V, 20 milliamperes, with 47 ohm dropping resistor.

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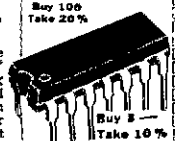

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☐	DM8845	Same as SN7446	1.45
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Use as power pak for mobile rigs & many "Ham" components, other electronic projects. Size: 5½" tall x 4½" wide overall x 2¼". Shipped dry, must be filled before use.

- Compact
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- ☐ 914 Quad 2 Input Gate
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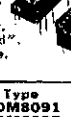
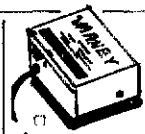


12VDC POWER PAC



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$3.33 5 x 2½ x 3¼"

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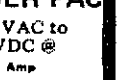

Unique Scientific Device, "hand claps", sensitizes crystal mike amplifier, triggers SCR. Needs only 3 to 6vdc. Use as burglar alarm, intrusion device. Use with photo cell, triggers SCR's, relays, LED's. Even fiber optic light pipe may be used. With hand booklet.

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PIV	2Amp *	2Amp	3Amp
50	$.05	$.05	$.08
100	.06	.06	.12
200	.07	.07	.15
400	.09	.09	.22
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800	.15	.15	.39
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☐ 1 AMP 1000 PIV

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(A) TO-5 or DIP dual in line pak

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☐ SN7402	.25
☐ SN7403	.25
☐ SN7404	.28
☐ SN7405	.27
☐ SN7406	.45
☐ SN7407	.45
☐ SN7408	.29
☐ SN7409	.29
☐ SN7410	.25
☐ SN7411	.25
☐ SN7413	.75
☐ SN7416	.48
☐ SN7417	.48
☐ SN7420	.25
☐ SN7421	.25
☐ SN7426	.32
☐ SN7430	.25
☐ SN7432	.25
☐ SN7437	.50
☐ SN7438	.51
☐ SN7440	.25
☐ SN7441	1.30
☐ SN7442	1.12
☐ SN7443	1.21
☐ SN7444	1.21
☐ SN7445	1.50
☐ SN7446	1.50
☐ SN7447	1.50
☐ SN7448	1.25
☐ SN7450	.25
☐ SN7451	.25
☐ SN7453	.25
☐ SN7454	.25
☐ SN7455	.25
☐ SN7460	.21
☐ SN7470	.39
☐ SN7472	.38
☐ SN7473	.44
☐ SN7474	.39
☐ SN7475	1.00
☐ SN7476	.44
☐ SN7480	.65
☐ SN7481	1.10
☐ SN7482	.88
☐ SN7483	1.25
☐ SN7486	.49
☐ SN7489	3.50
☐ SN7490	1.00
☐ SN7491	1.25
☐ SN7492	.75
☐ SN7493	.75
☐ SN7494	1.10
☐ SN7495	.95
☐ SN7496	1.10
☐ SN74100	1.41
☐ SN74107	.49
☐ SN74121	.49
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☐ SN74123	.99
☐ SN74141	1.45
☐ SN74145	1.25
☐ SN74150	1.25
☐ SN74151	1.13
☐ SN74153	1.49
☐ SN74154	2.10
☐ SN74155	1.39
☐ SN74156	1.39
☐ SN74157	1.25
☐ SN74158	1.48
☐ SN74160	1.79
☐ SN74161	1.79
☐ SN74162	1.79
☐ SN74163	1.79
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☐ SN74180	1.10
☐ SN74181	4.50
☐ SN74182	1.10
☐ SN74184	2.50
☐ SN74185	2.50
☐ SN74192	1.75
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☐ SN74195	1.19
☐ SN74198	2.65
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NIXIE TUBE SALE $2.50 ☐

Burroughs B7971, 0-to-9, A-to-Z, 2½" high characters, 170V.

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Type G, 1/2" dia. x 1-2/3" high. Mounts 1/4" hole, with shaft, linear, compression-proof high freq.

2 for $1

Ohms			
☐ 75	☐ 2.5K		
☐ 100	☐ 5.0K	☐ 25.K	
☐ 500	☐ 7.K	☐ 75.K	
☐ 2.0K	☐ 10.K	☐ 100.K	
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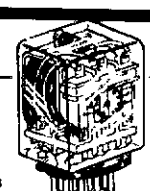

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☐ 75	☐ 250	☐ 1.0K	☐ 7.5K	☐ 25.K	☐ 100K	Any 4 for $1
☐ 100	☐ 500	☐ 2.5K	☐ 10.0K	☐ 50.K	☐ 250K	
☐ 200	☐ 750	☐ 5.0K	☐ 20.0K	☐ 75.K	☐ 2 Meg	
					☐ 5 Meg	

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☐ $3.33

For Class AB use. Basic includes: Signetic 540 80 transistor high power driver TO-5 "IC", with a pair of complimentary 35-watt plastic transistors, i.e. 2N6296 npn and 2N6109 pnp. With schematics, printed circuit and parts board layouts.

BURROUGHS $755R

☐ $2.95 ☐ Socket — 50c

0-9, with right and left decimals. Neon red. Requires 175 volts 17 mils. 1½" x .8", character size: .51".

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☐ 2000	1.00	☐ 5000	2.25	1 AMP	
☐ 3000	1.35	☐ 6000	2.96		
☐ 4000	1.65	☐ 8000	3.50		
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STUD TRIACS

PRV	15 amp	25 amp
50	☐ $.85	☐ $.85
100	.85	1.05
200	1.25	1.45
300	1.45	1.65
400	1.85	1.95
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600	—	2.65

☐ 3 "LEDS", visible, micro-miniature, axial leads	$1
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0-9 plus letters, for SN-7448. Snaps in 14-pin DIP socket. .7" x 1/2" x 3/8". 5V 10ma, with decimal point. Like MAN-1

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Fluorescent Blue-Green ☐ Socket — 50c

H x W. Characters Filament V.
1.75 x 1.7 .360 x .870" 1.5V AC/DC 42 mils

Compatible to 7-segment driver IC's.

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☐ 2- MOS FETS, N channel 10k umos 3N128, TO-18, RCA $1
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Type	Description		
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☐ LM-370	AGC squelch aop amp TO5	3.75	
☐ LM-373	AM-FM SSB if strip TO5	1.98	
☐ LM-380	2 Watt amplifier	1.98	

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Hermetically sealed 6 to 12 VDC. SPDT. Good for 1,000,000's of switching cycles. 350 DC ohms, 1.0A 250V contacts, 15 watts, 2¾" x 1" x 3". Wt. 4 oz.

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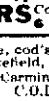

PIV	2 Amp	6 Amp
50	☐ $.69	☐ $.85
100	.79	.99
200	.95	1.25
400	1.19	1.50
600	1.35	1.75
800	1.59	1.95
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Case: 2 amp TO-5 case
6 Amp 1½ x ½ x 3/16 sq

Terms: add postage, cod's 25%. **Rated:** net 30
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POLY PAKS

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asked that he concentrate his efforts in establishing contact with the numerous vhf repeater sponsors within the section and further, to establish liaison with the repeater coordinators of the bordering sections. I urge all groups presently sponsoring or contemplating sponsoring a vhf repeater to contact KØLKH at his Ames address. I was quite surprised and saddened at the sudden passing of KØOKD. WAØEFN reports that KØJAZ has also joined Silent Keys. Dec. was a busy month for all and no exception for your SCM with trips to Ames and Cedar Rapids for meetings with these two fine ARRL affiliated clubs. Congratulations to WAØHIK on passing the Advanced Class exam. New officers of the North Iowa ARC are KØIDN, pres.; WAØNYU, vice-pres.; WAØAMH, secy.-treas.; KØJZM, act. mgr.

Net	*GMT*	*QNI*	*QTC*
Iowa 75 tone	1830	1832	115
Iowa 75 tone	0000	1000	58
TLCN (cw)	0030	131	103

Traffic: WAØAUX 299, KØAZJ 271, KØDDA 240, WØLCX 118, WØMOQ 98, WAØZVF 43, WBØDBG 32, WBØFHD 19, KØYVU 18, WØWSV 17, WAØTAQ 14, WØBW 8, KØCNM 8, WAØIHK 8, WBØAVW 5, KØLKH 2.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØJMF. PAMMs: WØGCJ, WBØBCL. RM: KØMRI. VHF PAM: WAØTRO. WAØZTW now operating on 449.1 MHz fm simplex. The Johnson County RAC elected WBØEBY, pres.; WAØUMH, vice-pres.; WNØFSL secy.; WØZJY, secy.; Wichita ARC – WBØBVC, pres.; WNØDNP, vice-pres.; WBØIRY, secy.; WNØDKX, treas. WAØUTT will continue as pub. dir. and editor. The Jayhawk ARS, Inc. – WNØGVR, pres.; WAØYOM, vice-pres.; WNØGQL, secy.; KØBXF, treas.; WAØHZS and WBØGNC, dir. Douglas County ARC – WBØBIY, pres.; WAØSEV, vice-pres.; WAØZTW, secy.; WAØUJT, treas.; KØTLQ, WAØFEF, WAØSVO, dir. South Kansas DX Assn. – WAØVTQ, pres.; WØAKT, vice-pres.; WØLUB, secy.-treas. Editor of Bulletin is WNØDPR; KSENV/Ø contest mgr. Central Kansas ARC – KØHPC, pres.; WAØYXK, vice-pres.; KØYEM, secy.-treas.; WBØDOX, act. chmn.; WNØDEQ, hamfest chmn. Make sure your SCM receives a listing of your club officers as soon as they are elected. Net reports for Dec.: KSBN QNI 888, QTC 104. KPN QNI 260, QTC 31. The Mid States Mobile Monitor Service QNI 2136 including 96 mobiles, QTC 107 and 77 patches or phone calls in 93 hours of operation. This service ended the year with 26,330 QNI in 1241 hours of operation with 14 service control operators. QKS QNI 516 with QTC 322 and the Kans. WX Net QNI 512 and QTC 156. All ECs make note to send your next months report to KØJMF. Traffic: WØHI 353, KØMRI 345, WNØFSL 338, WØINH 288, WNØGVR 191, WNØGQL 172, WBØEAF 171, WØMA 134, WAØLLC 125, KØBXF 123, WBØHBM 109, WØNEE 102. KØJMF 77, WØBCI 72, WØCHJ 59, WNØHTR 45, WØPB 41, WAØSXR 37. WØGCJ 31, WNØHTH 30, KØKU 23, WBØBIY 22, WAØSWC 21, WAØUXI 20, WØBIJ 19, WBØCZR 18, WAØSRR 18, WØRBO 17, KØJDD 16, WA2HSP 14, WAØYXK 11, KØZHO 11, WAØZTW 11, WAØSRQ 10, WØFDJ 8, WØNYG 8, WBØEEJ 4, WBØEGV 4, WAØOWH 4, WAØWJX 3, WAØYMK 3.

MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW. Appointment renewed: KØONK as EC. With deep regret I report WØFHV, KØLIQ and WØZR as Silent Keys.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MNN	7040	1900 Dy	31	80	38	WØGBJ
HBN	7280	1805 M-F	21	824	41	WAØUPA
MON	3585	0100 Dy	29	154	157	KØAEM
MON 2	3585	0345 Dy	28	103	67	KØAEM
MSN	3703	0130 TFS 1600 Su 2315 TFS	27	106	29	KØBIX
MoPON	3963	2300 M-S	26	684	68	WAØTAA
MoSSB	3963	2400 M-S	26	1313	80	KØHNE
WEN	28.6	0130 M	4	23	0	KØBIX
PHD	50.45	0130 T	3	67	11	WAØKUH

KØBIX reports totals of 49 sessions, 28 QTC and 124 QNI for WEN during 1972. The Johnson County AREC net meets at 0330Z Tue. on 146.94 MHz with WAØRVT as net mgr. WAØVBG announces the chartering of the Trenton H.S. Amateur Radio Club with WAØVBG as sponsor and 5 charter members working toward Novice licenses; those wishing to contribute equipment or books for the club should communicate with WAØVBG at Trenton, Mo. Congratulations to: WBØBTT, who passed Extra Class; to WBØDQW, who passed Advanced; to WAØHHB, who passed General after 12 years as a Tech.; to WNØEPH, who passed General; and to new Novice WNØIZE. Ex-WAØVMP is home after travels of three years as DL4VA, EØUG, 3AØFN, WA4WME/LX, HBØXMA, et al., and asks QSO acquaintances to drop in for visit at 4350 Heidelberg in St. Louis. WØJHY (also CT2AZ) now has Advanced Class license. Traffic: (Dec.) KØONK 1534, KØAEM 639, WØBV 178, KØBIX

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130, WØOUD 112, WØGBJ 73, WBØFQM 56, WAØWOC 29, WNØLOI 20, KØSGJ 15, WAØKUH 14, WØNUB 6. (Nov.) WBØCXN 130.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. Endorsements: WØAGK, WAØDXY and KØFJT as ECs.

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	1367	34	WAØLOY
NSN II	3982	0130 Dy	947	22	WAØLOY
Neb. 160	1995	0130 Dy	552	305	WAØCBJ
NEB	3590	0315 Dy	66	8	WØTQD
NMN	3982	1330 Dy	1396	44	WAØJUF
WNN	3950	1400 M-S	493	69	WØNIK
AREC	3982	1430 Su	233	4	WØIRZ
CHN	3980	1830 Dy	1240	56	WAØGHZ
SHN	3950	1930 Dy	202	17	WØDJO
DEN	3980	2100 M-F	323	8	WAØAUX
NEB(Nov.)	3590	0315 Dy	103	14	WØTQD

Lincoln RC provided communications for "Operation Merry Christmas". Ak-Sar-Ben RC conducting tree code and theory classes. KØCZO is a Silent Key. Congrats to WBØIAH on receiving Advanced; WBØDIU Conditional and WNØIUX Novice licenses. WØGGP moved to Colo. WØEWO again active. North Platte RC had good attendance at annual Christmas party. WØLOD spending winter in Fla. WØHOP spent holiday traveling. WØRJA on trip to Okla. and Tex. Box Butte Co. 2-meter AREC net ONI 14, QTC 2. Sandhills Net progressing nicely. Traffic: WAØSCP 86, WAØCBJ 61, WAØIXD 56, WBØCAU 49, WØFQB 36, WØHTA 32, WBØGWT 30, WØIAY 30, KØODF 28, WØMW 24, WØVEA 22, WAØQEX 20, WAØGHZ 19, WBØGAK 18, WØDJO 17, WØSGA 17, WØVYX 17, WAØBOK 16, WØDMY 16, WØGEO 11, WAØYGZ 11, WØHOP 10, WØNIK 10, WAØOOX 10, WAØPCC 10, WØRJA 10, KØHNT 8, KØOAL 8, WAØJUF 7, WAØHQO 6, KØDGW 5, WAØEFI 5, WØFOW 5, WAØJKN 5, WAØLOY 4, KØMUF 4, KØSFA 4, WØWZR 4, WØZNI 3, KØJFN 2, WAØVIT 2, WØYFR 2, KØBDF 1, WBØEHU 1, KØPTK 1, KØWPF 1.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John McNassor, W1GVT – SEC: W1HHR. RM: K1EJR. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1900 Dy 2200	62	661	507
CPN	3965	1800 M-S 1000 Su	31	649	314
VHF 2	145.98	2200 M-S	20	61	35
VHF 6	50.6	2100 M-S	20	74	17

High QNI: CN – WA1GFH, W1KV, W1MPW and W1CTI. CPN – W1DQI, W1GVT, W1MPW, WA1NLD, W1NQO and WA1OPB. SEC W1HHR appreciates the cooperation of all AREC members – please get your reports to him each month via mail, CN, CPN or 2-meter fm. Director W1QV would appreciate more information on club activity and member comments. This is very helpful in expressing your thoughts to ARRL. Tri-City ARC held very successful Christmas Party, theory class now under way. Murphy's Marauders are kept well up to date via the "Message" – their Christmas Party included the very Best in Contest/DX Operators! Candlewood ARA Newsletter points out the lack of communications between club members. A club paper represents a lot of work and the cooperation of ALL members is required to make it a success. Congratulations to: WA1FCM and WA1NLD for Dec. BPL and to W1MPW for High QNI on CN and CPN! Traffic operators who are interested in the new Daytime NTS are needed, please send me your call and QTH if you would like to help. This is a wonderful opportunity for traffic men who have free time during the Daylight hours. Happy Saint Patricks Day to all and to the RTTY operators, best of luck on the Green Keys! Traffic: W1EFW 473, WA1FCM 287, WA1GFH 247, W1MPW 207, WA1NLD 202, W1BFY 165, W1CTI 158, WA1OPG 150, W1RMI 99, WA1NES 82, K1SXF 82, W1EJI 81, K1EPW 64, K1YGS 57, W1GVT 53, WA1GGN 52, WA1NYU 38, W1KV 35, WA1HYN 31, WA1KID 29, W1QV 29, W1AW 27, W1DQI 27, WA1PHJ 26, W1DGL 13, W1FUF 9, W1BDI 7, WA1OPB 6, W1HHR 4, K1BOP 3, W1CUH 3, WA1LNQ 3.

EASTERN MASSACHUSETTS – SCM, Frank L. Baker, W1ALP – SEC W1AOG received reports from ECs W1s BAB, LE, UJF; K1s NFW, ZUP; WA1s DXI, OWQ, MYK. WA1HCK is new EC for Carlisle. K1WKS now in Medway. W1GNO in Norton. W1BVL worked Ireland on 160. W1ZSX sold his equipment. W1MD, WA1NRV, WA1KZE did nice work after the earthquake in Nicaragua relaying traffic. W1CRO is in the Coast Guard. New officers of Waltham ARC: K1MON, pres.; K1VVC, vice-pres.;

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WA1PJJ, secy.; W1DDN, treas.; W1JCI, dir.; K1IOE, trustee. W1AUQ retired and looking for DX on 10. W1NF worked W1CER on 14 MHz in Barbados, 8P6EU. WA1MPP has DXCC and looking for countries on 15 and 20, he is on African Net 1800 daily. W1DFS, W1MBB in the hospital, W1BIO home from the hospital. W1PEX, WA1MSK made BPL. WA1MXV finished keyer. WA1OMM on 15, mobile cw and ssb. WN1s RFD, RFE, RFF all working DX. T9 Club had sociable with XYLs at W1TYP's QTH. "SARA Monthly" Sharon ARA's newsletter going good. WA1PFA new OVS, looking for more ssb for ragchews on 6. WA1IFE worked WA5SJM in Ark. on 6 and many other districts, also WA1DFL before his power supply blew. WA1LAK attending Carleton College in Northfield, Minn. Framingham RC holding code and theory classes at the Southboro Police Station, each Tue., at 7:30 P.M. WA1MZC is new treas. Massasoit ARA held MARA Night. WN1RBF has tower and antenna up thanks to the Plymouth fellows. W1CUY new rig on 20 cw. WA1KXP has a TR-6 and beam for 6. Quannapowitt RA had a Christmas Party-Family Program; radio courses still going on, with higher class licenses coming up. W1FJ in the hospital. K4IDI is ex-K1NKP in Fla. W1VDV has new 50-ft. tower. Capeway RC met at K1LOE's QTH, new officers: W1ZXG, group mgr.; W1YTB, asst. group mgr.; W1UOH, treas.; W1ANB, secy.; K1HGT, cert. chmn. W1ZXG has an inverted "V" for 75. W1HGT in Sturbridge. WA1GEP on a trip to E. Africa; Robbie, 5Z4ERR over there is on all bands. Waltham ARRA, WA1KGS Advisory Comm.: W1s HGT, PVF; K1s ETT, MON, MUC, NUN. New officers of So. Eastern MASS. ARA: WA1FNM, pres.; W1AIT, vice-pres.; WA1NJP, treas.; WA1GXV, secy.; W1LE, W1KHV, K1VJP, dir. K1JNQ is on the air. WA1MYK, WA1MSK made PSHR. W1OH, WA1HOO are Silent Keys.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Mgr.*
EM2MN	145.8	2000 M-F	180	120	WA1OWQ
NEEPN	3945	0830 Su	140	12	K1EPK
6MCBN	50.85	1930 M-F	Nov.105	3	K1OKE
EMPN	3985	1800 M-F	131	86	WA1MYA
EMN	3660	1900/2200 Dy	390	319	WA1MSK
6MCBN	50.85	1930 M-F	Dec.12		K1OKE

WA1FTK is on Two Jima on 20 ssb signing KG6IJ, his dad is W1JAJ. Endorsements: W1BB, W1MNK as ECs; WA1OWQ, PAM for 2; W1BB as OO; W1PEX, K1OJO as ORSs; WA1IAK, K1CLM as OPSs; K1OJO as OVS. Traffic: (Dec.) W1PEX 850, WA1MSK 531, WA1NNL 351, W1EMG 192, WA1OWQ 188, W1CE 186, K1PRB 119, WA1MYK 86, WA1IFE 72, WA1OML 63, WA1MXV 52, WA1OMM 49, W1AQG 39, K1LCQ 26, W1DOM 17, W1ABC 15, WA1NRT 13, W1MNK 12, W1ATX 8, K1EPL 7, WA1FNM 7, WA1HGG 5, K1JNQ 2. (Nov.) WA1OMM 17, WA1MYK 15, K1OKE 6, WA1NRT 3. (May) WA1OMM 82.

MAINE – SCM, Peter E. Sterling, K1TEV – SEC: K1CLF. PAM: WA1PEN. RM: W1BJG. The Carleton Univ. Ham Radio Club, VE3OCU Ottawa, Canada, are now active on 6 meters ssb and cw and are looking for skeds. W1AE had the cast removed and is using a walker and making good progress. K1RTV recovered his voice and is back on air. W1NIC and son WA1KPR both passed commercial fone exams at the same time. WA1QHU expects to be portable 8 in Mar. for 2 years graduate study at Ohio State Univ. New hams are WN1RDQ and WN1RGR, wife and brother respectively of WA1QHU; also WN1RFR. Congratulations! New officers for the PAWA are K1OYB, pres.; WA1KVY, vice-pres.; K1GAX, chief op.; W1BTR, treas.; WA1MXO, secy. The Maine Slow Speed Net meets at 1815 local time on 3596. W1JKR, friend of many Maine hams, has been transferred to the Bedford, Mass. V.A. hospital. The North East Area Barnyard Net reports 26 sessions, 784 check-ins, 1 traffic for Nov. and 26 sessions, 777 check-ins, 0 traffic for Dec. Pine Tree Net meets at 2300 GMT on 3596 Mon. through Sun. Traffic: (Dec.) WA1QHU 141, WA1RDX 44, WA1JHT 33, K1TEV 31, W1OTQ 12, WA1REM 12, WA1NMW 11, WA1PEN 8. (Nov.) K1GUP 40, W1OTQ 4.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: W1UBG. Endorsements: W1UBG as RM and W1EVN as ORS. Welcome back gentlemen. W1DXB is becoming a phone man by the looks of CD party scores. WB2EYM/1 now is WA1RGO and is in Fla. W1EVN also should be in the southland by now on 21400. W1AIJ remains active with broken 80-meter antenna. Can any of you fellows in Concord help him? W1UBG worked FP8CW on 80 meters. WN1QNK is on 15 and 80 and will sked anyone who needs N.H. WA1JSD received QSL from HH9DL for country No. 128. More new hams – welcome to WN1RGT, WN1RGU, WA1RGP, WA1RGF, WA1RHF, WA1RJB. , WN1RIX and WA1RIZ. W1UGB's NHVT Net report shows 144 check-ins and 112 traffic. W1SWX had the honor of being the first one to work India on 80 meters. The station was VU2SBX, in New Delhi. Traffic: WA1MXT 159, W1UBG 159. K1YMH 114, K1PQV 50, W1BYS 5, W1EVN 5, W1MHX 4, WA1JSD 2, W1SWX 2.

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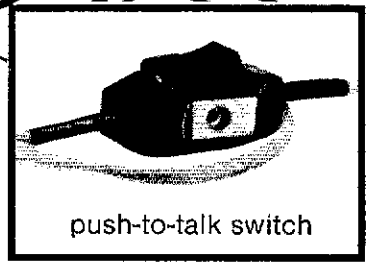

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RHODE ISLAND – SCM, John E. Johnson, K1AAV – The W1AQ Club Rumford recently held its election with the following elected to office: WA1CVF, pres.; WA1MUQ, vice-pres.; W1DK, treas.; W1WAC, secy. The club issued WRI Certificate No. 107 to OK1APV. The club issues this certificate for working two stations in each of the five counties in R.I. The RIFM Repeater Group meets quarterly during the year and elected the following: K1PNI, pres.; WA1MQO, vice-pres.; K1VOB, secy.-treas; K1ABR, W1HQV, K1RFH and W1EYH, board. The club is presently operating under the call K1ABR until FCC issues a new call on an application submitted. The membership issued a sincere vote of thanks to K1ABR for devoting many long hours from his busy schedule to the detailed preparation of application forms and commend him for the high degree of technical competence he displayed in accomplishing the research necessary for their completion. The Providence Radio Assn., W1OP, elected WA1LAD, pres.; K1HZN, vice-pres.; W1KKE, treas.; WN1RFT, secy.; WN1POJ, WN1PJC and Antonio Muto, board. Working in the club classes are recent Novices WN1RFT and WN1RKL who are well on their way to the next class.

VERMONT – SCM, James H. Viele, W1BRG – SEC: W1VSA.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
VTSB	3909	2300 M-S 1230 Su	634	177	W1ZCJ
VTPO	3909	2200 Su	112	38	K1BQB

Welcome new amateur WN1RGS, Woodstock. K1POT has gone to Fla. until spring. Central Vermont Amateur Radio Club again sponsors Vermont QSO Party. Time: 28 hour period 2300 GMT Feb. 24 to 0300 GMT Feb. 26. Frequencies: 3685 7060 14060 21060 28100 50260 3909 7265 14290 21375 28600 50360 3932 7290 14325, also 144-144.5, 145.8, certificates will be issued. Send logs by Mar. 31 to Peter Kragh W1AYK (K2UPD) 170 Summit Ave., Ramsey, NJ 07446. Traffic: K1BQB 304.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. CW RM: W1DVW. PAM: WA1ITL. UHF VHF PAM: W1KZS. The SEC reports the Sun. morning WMEN held 5 sessions with total QNI of 59 (counties: Hampshire 20, Berkshire 11, Hampden 10, Franklin 6, Worcester 0, out-of-section 12). Could there be a message in that? NCSs were WA1DNB, WA1ITL, W1KZS. The RM reports for WMN: 31 sessions, QNI 174, traffic 167. Top 5 in attendance: W1BVR, W1DVW, W1TM, WA1LNF, W1ZPB. The PAM reports the new 4:30 P.M. WM Phone Net (near 3935) held 18 *sessions with a QNI of 127. Top 5 in attendance: K1RGO, W1OBA,* W1PF, K1SKX, WA1GXN. This net is going wonderfully well for a new net. Congrats. W1ZPB is very active on cw, ssb and RTTY. WA1LNF handled Red Cross traffic to Managua. WA1FBE has again re-qualified for OO Class 1. OO K1VHO started his duties well. From CMARA: by the time you read this, the Novice class students will have had their exams. From HCRA: guest speakers were W1KK and Dr. Scott. The club is assisting the Springfield Boys' Club in ham radio instruction. From NOBARC: "If you put all the people K1DEU got started on 2 fm in one room at the same time you would have one mighty crowded room." (Nice tribute!). From Voice of Lincoln: monthly meeting was held at U. of Mass. Traffic: W1ZPB 172, W1BVR 129, WA1LNF 97, W1TM 86, W1DVW 79, WA1LPJ 21, W1STR 19, WA1FBE 1.

NORTHWESTERN DIVISION

IDAHO – SCM, Donald A. Crisp, W7ZNN – SEC: WA7EWV. The FARM Net meets at 0200 GMT each day on 3935 kHz. Idaho RACES Net meets week days on 3990.5 kHz at 2015 MST. Idaho P.O. Net meets Mon., Wed. and Fri. on 3930 kHz at 1830 MST. Evening RACES Net meets Mon. at 1830 MST on 3990.5 kHz. Plans are being firmed up for the Idaho-Mont. CW Net. Contact W7GHT for net time, frequency, etc. FARM Net mgr. W7JFA is QRT for a battery change (Pacemaker). W7NHV/7 was appointed to the Contest Advisory Committee. WN7RWL (ex-WH6CWC) is a new ham in Sandpoint. W7AXL reports that South Idaho hams again provided communications for a snowmobile race from St. Anthony to West Yellowstone, a distance of 101 miles. Two meters was used mostly from 6 check points and 75 meters was used for long haul contacts. W7WVD recovering from a broken leg. W7HZL put up a new 160-meter full wave wire. P.O. Net reports 13 sessions, 118 QNI, 16 traffic. FARM Net 28 sessions, 882 QNI, 88 traffic. Traffic: W7GHT 284, WA7BDD 162, W7ZNN 36, W7IY 15.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. New officers of the Butte Amateur Radio Club are WA7PZO, pres.; WA7GFN, vice-pres.; WA7OBH, secy.; WA7MUU, treas. New officers for the Anaconda Radio Club are WA7KST, pres.;

WA7MKY, vice-pres.; W7TUO, secy.; K7YNZ, treas.; W7TYN, act. mgr. W7DB and W7TYN are engaged in Oscar 6 activities. WA7KKP has a new Renault to house his 2-meter rig in. K7LTV has a 40-meter beam up. WA7JRI is on with his new Cygnet 270-B. K7NDV was in the hospital for a brief stay. W7LBK is in the hospital. Hope you are out by the time you read this Earl. Mont. traffic net had 1032 check-ins, 83 traffic and 20 sessions. A good time was had by all at the Butte installation party. W7EKB made BPL this month. W7FSP has retired from the FAA. K7EGG is back in ham radio after being inactive for some time. Traffic: W7EKB 627, WA7JQS 177, WA7OBH 41, WA7IZR 29, WA7KMP 19, WA7PZO 19.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. Section net report: WA7NWV reports for the BSN for Dec.: sessions 62, traffic 148, contacts 213, check-ins 1094. New appointments: W7WW as OO and WA7MHP as OBS. K7IFG has a new 64-ft. tower ready to go up when the weather cooperates. W7ALG and W7FVF have a new TR4C in mobile use. W7NGW retired from the Post Office. K7BLG is on two meters fm. K7MMK built an SSTV monitor and is looking in on twenty meters. The first BPL issued in a long time goes to K7NTS. Traffic: (Dec.) K7NTS 350, K7QFG 289, K7OUF 195, WA7NWV 57, W7ZB 38, W7DAN 23, WA7TXV 21, W7LT 12, K7WWR 11, WA7KRH 10. (Nov.) K7RQZ 80, WA7TXV 3.

WASHINGTON – SCM, Arthur Henning, W7PI – SEC: W7UWT. RM: K7OZA. PAMs: W7GVC, W7MCW. VHF PAMs: K7BBO, K7LRD. New appointment: W7GLC as OO.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Sess.*	*Mgr.*
WSN	3590	0245	386	195	49	K7OZA
NTN	3970	1930	1572	138	31	W7PWP
NWSSB	3945	0230	725	28	31	W7SVV
NSN	3700	0300	337	82	31	WA7OCV

W7VJP logged 50 hours monitoring and handling traffic in the Nicaraguan disaster. Old China hand XU8MT after 35 years absence from the air is back at Blaine as WN7TSH. OO K7GGD received his WAS award. WA7LQQ is hopeful that someone wants into Kalama now that he has phone patch. VHF PAM K7BBO has had outstanding success with Oscar 6, to date (Dec.) 960 QSOs, 33 states; and also first QSO across Pacific via Oscar between Japan and U.S.A. Dave is swamped with mail, requests for information, pictures, QSLs and he also took on job raising funds for AMSAT. WA7SKX in Pasco reports working hard developing his rig. W7NUN is able new editor of Random Radiation, organ of PARGUILD, 100-Watt maximum net. Contact him for details. Mark your calendars for the Skagit Hamfest at Bryant Apr. 28. NW Director W7PGY very QRL traveling the circuit and attending ARRL meetings in the east. Our best to K7LRD now recovering at home from his hospital stay. AREC has 298 members and 8 active emergency nets. WA7ELI very QRL working AREC 2- and 6-meter nets. Boeing Bears Club beat out Radio Club of Tacoma in Sweepstakes both cw and ssb and score is now two each – winner next year gets the trophy permanently. Traffic: W7PI 409, W7KZ 357, W7GYF 200, W7BQ 178, W7JEY 143, WA7OCV 117, K7OZA 108, W7DZX 95, W7AXT 83, W7APS 80, WA7EDQ 77, WA7HKR 53, WA7KNW 49, W7MCW 46, K7VNI 46, K7OXL 45, W7PWP 35, W7IEU 29, W7QCV 12, W7BUN 10, K7VAS 10, W7AIB 7, WA7OXQ 4, WA7LQQ 2, K7BBO 1.

PACIFIC DIVISION

EAST BAY – SCM, Paul J. Parker, WB6DHH – Congrats to W6IPW on BPL again this month. Much traffic to Central America. WA6IYB participated in local disaster drill in Livermore. Most local clubs have elected officers for this year; why not send the list to me and let others know. WA6QEW is new Advanced from Pleasanton. Congratulations to all who participated in this year's SET. Please advise me of your operations. All who have handled traffic to Central America after earthquake are urged to report activities to WB6DHH. Want frequency expansion rather than contraction? Make your feelings known before the next ITU meeting. How about a ham band every 4 or 5 MHz? Sound good, or too good? Let me know your feelings. Traffic: (Dec.) W6IPW 530, WB6VEW 12, WA6BOB 5, WA6IYB 1. (Nov.) WB6VEW 4.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: KH6BZF. RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. SRC: KH6FOX. QSL Mgr.: KH6DQ. ECs: KH6s GPQ, BAS, HHG and BZF.

Net	*MHz*	*Time(Z)/Days*
Confusion (patches)	21.400	0030 All

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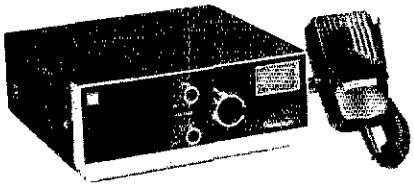
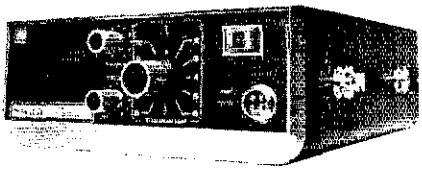


FM-2X



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I regret to report FCC employee KH6DN; also KH6EK as Silent Keys. KH6CU writes he made DXCC with 116 countries and 35 zones. KH6HRG is on with a new Drake T-4XB to a 14AVQ and 15-meter monobeam and a Drake TR-22 shortly. WBØEIZ/KH6 is on locally. WNØVCK was a visitor to Kaneohe. W6RSY reports that National Traffic System RN6 stations ran into trouble getting this statement from MARS stations (Gateway Stations) "No QSP for Hawaii 3rd party traffic." W6RSY has sought for years without success to contact cw stations in Hawaii to handle traffic at any time any frequency. Any takers? Contact W6RSY or me. KH6GDR recently returned from the West Coast. Also back from the Coast is W6HXT/KH6. KH6AD and XYL returned after visiting grandchildren in Calif. KH6BZF's folks were here recently for the holidays. Also W7BVP/KH6 mother visited from Salt Lake City. Traffic: KH6BZF 204.

NEVADA – SCM, Leonard M. Norman, W7PBV – Notice to all amateurs: It is reported that approximately thirty Conditional and/or Technician Class licensees have been called in for reexamination in the Las Vegas area. Governor Mike O'Callahan proclaimed the first week of Jan. as Amateur Radio Week in Nev. The SNARS continued Amateur Radio Week until the end of the month with a fine display of radio equipment and publications at the Washoe County Library through the efforts of K7VYT and W7YKN. Code and theory course registration at the Reno High School conducted by W7DNX and W7IAD. SAROC convention committee report a very large advance registration of delegates and exhibitors. W7ILX sponsoring the PON National meeting at SAROC and reports an increase in net activity. K7UGE FM repeater Las Vegas area off the air, trustee failed to renew license. Thanks to all of you who have supported me as SCM in Nev. and may all of you support the ARRL for the benefit of amateur radio.

SACRAMENTO VALLEY – SCM, John F. Minke, III, W6KYA – New OVS appointee WB6NKO reports openings on 50 MHz and is busy with the construction of a 432 MHz kw amplifier. Other active 50 MHz stations in the section include WB6CNX, WA6QBA/6. WA6ECE has become a Silent Key. Sam was a member of the North Hills Radio Club and will be missed by many. Now is the time to prepare for Field Day. June isn't that far away. The Sacramento ARC have formed two nets on Mon. evenings, one on 28.6 MHz and the other on 145.35 MHz. WB6POQ and W6SI are NCS respectively. Time is 7:30 P.M. local time. The only other clubs I know of in the section that include nets in their activites are the RAMS and the GEARS. Any other clubs run nets? WB6GCE now has his General ticket. The John I. Sabin Pioneer Radio Club membership is still growing, the latest being K7NKF and K7NOM, both of Reno. K6TWE has gone QRP with a new Heathkit HW-7. Sure nice to see some amateurs still support the flea power in amateur radio. Traffic: K6YZU 41, WA6JVD 31.

SAN FRANCISCO – SCM, Thomas A. Gallagher, W6NUT – Your SCM had a pleasant visit with the Marin ARC on Jan. 5. The club's 1973 officers are WB6OVH, pres.; W6ON, vice-pres.; WB6CIE, secy.; WB6KEM, treas. Meetings are held on the 1st Fri. at 8 P.M. at the First Presbyterian Church, 5th and E, San Rafael. Plans are already underway for FD. The Marin Club is active in a wide spectrum of activities including DXing, emergency planning and support of the VHF Expeditionary Society which operates the K6GWE repeater. Marin Co. is funding an amateur station to be located in the Civic Center. The Humboldt ARC elected its 1973 officers: WB6AAR, pres.; WB6FAJ, vice-pres.; W6GGR, secy.; WA6BTF, treas.; WA6ICB, act. mgr. W6GGR reports that Eureka now has 146.34/146.94 and 146.22/146.82 repeaters. W6RO reports W6ENA and he were active in the New Year's Eve Straight Key Night. Many of the Bay Area amateurs were busy handling inquiry traffic to Nicaragua collected by the Nicaraguan Communications Center in SF. W6BIP established the initial contacts between the center and local amateurs. Sudden emergencies of this sort point up the critical need for each of us to have working knowledge of proper phone and cw net procedures. K3OAF and his lovely YF visited W6NUT during the holidays. Traffic: (Dec.) WA6BYZ 374, W6RNL 81, W6BIP 47, W6WLV 33, W6NUT 16, W6BWV 10. (Nov.) WB6JQP 15, W6BWV 11.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – WB6WKR is stationed in Okinawa and operating with the call KA6RR. The Kern Co. Radio Club officers are WA6TVC, pres.;

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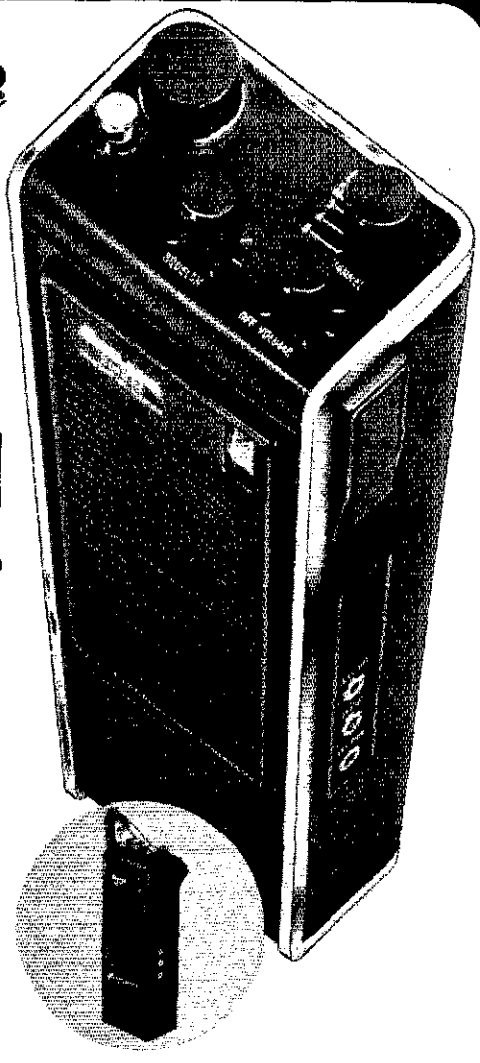

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K6GHT, vice-pres.; WN6RCN, 2nd vice-pres.; WA6DLA, secy.; WN6LMX, treas. WB6RAG has a Yaesu 2-meter rig. WB6BUV has a Standard 826A. The Bakersfield Repeater Society's call is WA6ZSR with input 146.07 and out 146.67 MHz. The TARC Christmas party was held on Dec. 15, 27 in attendance, with W6JUK and W6JPU also attending. The Madera Radio Christmas party was held Dec. 29 with 35 in attendance. New officers of the Delta ARC are WA6UAA, pres.; K6OZI, vice-pres.; WN6SKD, secy.; WB6ZOQ, treas. K6OZL is back in Calif. and is in San Diego NTS. K6QPE is on Slo-Scan TV. WA6WXP has 292 countries confirmed. W6PSQ is DXCC. WA6EXV active on 432 MHz. WB6VSV received the boner award. WB6UCQ is the new TVI chmn. for Fresno. K6RPH has a TS-900 transceiver. W6WME is new editor of SKIP, FARC. WA6UMU and WB6HWE active in MARS. WB6TUR received a plaque as past pres. of FARC. WB6BBS and WA6BUH worked over the FARC 2-meter repeater. K6RI was a guest of FARC at their Christmas party. Traffic: WA6SCE 188, WA6JDB 55, W6DPD 4, WA6CPP 2.

SANTA CLARA VALLEY - SCM, James A. Hauser, WA6LFA – SEC: WA6RXB. RMs: W6BVB, W6RFF, W6AUC, W6DEF and W6YBV made PSHR again this month. Congrats! W6RSY is again back in business and reports handling Managua earthquake traffic. W6BVB reports NCN had 60 sessions in Nov. with 714 check-ins and 355 pieces of traffic handled. Nice going! W6AUC reports running phone patch traffic for Nicaragua during the earthquake emergency. W6RFF is recovering from an operation. Says he is getting in lots of operating time. W6PAA is the new call of ex-WA6DKF. Ken reports handling Managua relief traffic. WB6GFJ finally has his new beam up to 35 feet with the help of W6NLG and has just moved the W6WX repeater to Black Mountain and the new receive frequency is now 147.36 MHz. W6NLG reports he now has 10 full AREC members in Sunnyvale and wants to thank WB6UOM for his Managua traffic work. W6OAT returned from Trinidad where he spent time with 9Y4AA, and Venezuela where he operated in the CW DX contest as 4M4AGP. Bulletin Schedules: W6ZRJ each Thur. eve. as follows; CW 15-20 wpm, 7:30 P.M. local 3590 and 7129 kHz; SSB, 8:30 P.M. local 3815 kHz; RTTY, 850 Hz shift 9:00 P.M. local 3615 kHz.

Net	*Affil.*	*Freq.*	*Local Times/Days*
NCN	NTS	3630	7:00 P.M./8:30 P.M. Dy
SPECS	AREC	146	7:45 P.M. M
SCV	AREC	146	8:00 P.M. T
GORILLA	AREC	146.25 In 145.49 Out	5:45 P.M. Su (Soon 146.85 out)

Traffic:W6RSY 712, W6YBV 444, W6KZJ 148, W6BVB 125, W6AUC 109, W6RFF 73, W6DEF 71, WA6HAD 46, W6IQU 31, W6PAA 10, W6NLG 4.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – SEC: W4EVN. PAM: WB4JMG. RMs: WB4ETF, WB4VBM. Many assisted during the Nicaraguan earthquake including Charlotte ARC, W4CQ, which received UPI coverage. Good newspaper publicity from efforts by W4DCW and W4PW. WA4VJW, W4BLK, WB4NDB and WB4OYN also assisted. The lighting of Exchange Club Christmas Trees was very successful. BPLs: WB4MLI, WB4TNC, WN4YMV, WN4TNB. Congrats! WAØYDJ/4 at Ft. Bragg likes traffic on cw. K4ZKO had nice write up in Greensboro for passing Governor's traffic during Christmas to "Gov.'s Century Club" (over age 100) members. K4MC oscillating again after short hospital stay. WB4TNB fell out of tree putting up 80-meter antenna. K4BAI is new member of Contest Advisory Committee. WN4VAK now WA4CIY. The Western NC 2-meter Net meets Tue. 8 P.M. local through Mt. Pisgah repeater WA4BVW, 16 in, 76 out. Had 12 QNI on first session from NC/SC/TN/GA. Net mgr. for WNCTN at start is WA4KWC who reported new information. WA4WZQ working DX on 6 and WA4WZP bagged state number 45 on 6. K4MSG building new final PP-6146Bs for vhf work. WB4OXT acted as relay between La Paz, Bolivia and Duke Medical Center on surgery play-by-play for doctor here and intern there. The Cary ARC sent 200 Christmas messages from an 8-day exhibit in Raleigh. They also assisted with traffic to local band attending Rose Bowl. Congrats to K4SKI on receiving from the Liberian Government, the Knight Official in the Humane Order of African Redemption, for his assistance in stopping a Lassa Fever epidemic by relaying information. Traffic: (Dec.) WB4MLI 333, WB4TNC 280, WAØYDJ/4 274, WB4OZL 211, WN4YMV 206, W4PCN 180, K4MC 178, W4EVN 136, WB4TNB 111, W4WXZ 104, WA4VNV 82, WB4JMG 68, K4EZH 59, W4OFO 42, K4VBG 42, KØMSP/4 35, W4TYE 34, WAØUKD/4 34, WB4VSA 31, WB4HGS 19, WA4KWC 19, W4ACY 18, WB4MKI 18, WB4UOU 18, K4ZKQ

8, K4FBG 4, K4KH 2. (Nov.) WB4OZL 78, WA2NMT/4 73, WB4QQM 47, K4KH 2. (Oct.) WB4QQM 44.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A. E. Martin, Jr., W4THV. SEC: WA4PBG. Asst. SEC: WA4JJF. PAM: WB4ZRW. RMs: W4HIR, W4SQQ, W4SHJ. KØPIV/4. VN 439 QNI, 445 QTC. WB4DRB's father passed Novice. KØPIV/4 double BPI this month; W8VDA made it for the first time in seventeen years – and look at the close one for K4KNP! Don't forget the Va. QSO Party 1800 GMT Mar. 10 through 0200 GMT Mar. 12 sponsored this year by Sterling Park ARC. County hunters: WA4WQG 3039, W4JUJ 2776, WA4UNS 1500, WA4EPH 600. WB4WLK finally on 80 phone. W4LQO has 2 fm base. W4DM complains of cold shack. K4LMB kept almost daily schedule regarding condition of local man who suffered a heart attack while driving through Houston. W5VZO/4 completed repairs on vertical and has new dipoles for 80/40/20. WB4GMC appointed Radiological Defense Officer in Norfolk Civil Defense. Director W4KFC active in Nicaraguan disaster, worked VS6AW (K4EZL) in Hong Kong who sends 73 to Va. gang. W4KX visited W6- and KH6-Lands. PVRC celebrates quarter century mark. W4YZC visited W4NQA and W4HBA. WA4HQW busy with new homebrew (radio?) projects. Santa brought SB-220 to KØPIV/4. PSHR reports is filed by SCM.

VSMN	3947 kHz	0715/1630 Local M-F
VSBN	3935 kHz	1800/2200 Local Dy
VSN	3680 kHz	1830 Local Dy
VN	3680 kHz	1900 Local Dy
VPN	3947 kHz	1930 Local Dy
VRN	3625 kHz	2000 Local Dy
VPON	3905 kHz	2315 GMT T

Traffic: (Dec.) W8VDA/4 637, KØPIV/4 562, K4KNP 473, W4UQ 321, WB4SGV 275, W4SQQ 263, WB4KSG 204, W4HIR 197, W4YZC 197, W4TJN 128, WB4KIT 106, WB4RZW 102, WB4PNY 96, K4GR 88, K4IAF 63, WB4RDV 59, WB4RDB 54, W4KFC 54, WA4JJF 50, K4KA 47, K4FGV 32, WA4PBG 31, WA4HOW 28, WB4KBJ 28, WB4FDT 22, W4FQV 21, WA4UNS 17, K4VIG 17, K4JM 16, WA4OLN 16, K4KDJ 13, WA4FGC 11, W4LQO 10, WA4WQG 10, W4MK 9, W4TE 9, W4DM 7, WB4WLK/4 5, WB4GMC 4, W4JUJ 3, WA4EPH 2. (Nov.) KØPIV/4 153, W4ZAU 4, W4DM 3.

WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8IYD, K8CHW. CW Net Mgr.: WB8CYB. Phone Net Mgr.: WB8BMV. New officers for the Kanawha Radio Club are K8WMX, pres.; K8HGM, vice-pres.; WB8MAV, secy.; WA8HJC, treas. WB8IJW, WB8EKG, WA8NPY upgraded their licenses to Advanced. WB8FRZ moved to Charleston and is working on SSTV. WA8WCK and WA8NDY worked emergency tests in Upshur County, using converted CB rigs. W8HAX new OVS, working 15, 6 and 2 meters. WVN CW Net with 63 stations, passed 118 messages. WVN Phone Net with 425 stations, handled 108 messages. MARA Radio Club officers are WB8BMW, pres.; WN8LGF, vice-pres.; WB8BMV, secy.; WA8EQI, treas. WN8MKL reports Novice Net again active on 3730 at 2100. WB8IJW has new 2-meter mobile rig and 5/8 wave antenna. WB8NMP active from Alderson-Broaddus College with a 2000 MN and trap dipole. WB8NQB built a six-element 2-meter beam. WB8BMV consistent in making PSHR. Mountain State FC Net held 3 sessions with 33 stations and 6 messages. State Radio Council held Spring meeting in Buckhannon with Buckhannon ARC as hosts. State ARRL Convention, Jackson's Mill, June 30, July 1. Traffic: W8JWX 85, WB8CYB 69, WA8NDY 65, W8AEC 39, WB8RMV 34, WB8NQB 20, WA8WCK 20, WB8IJW 19, K8QEW 15, WA8UIH 15, W8JM 14, WB8EKG 8, WA8YCD 5, WB8BMW 4, WB8DQX 4, WB8DXF 4, W8ETF 4, W8GWR 4, WN8MKL 4, WA8OKG 4, WA8AYB 2, K8BCF 2, WA8UNP 2, K8ZDY 2, WB8AKR 1, W8CKX 1, WB8DMS 1, WB8EOR 1, WB8FYR 1, W8GDP 1, WB8GWP 1.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC: KØFLQ. RM: WØLRN. PAMs: KØCNV, WØLRW, WAØWYP. WØWYX is currently serving as NCS on 10-meter portion of Denver Area AREC Net. KØTIV is enjoying his new Heath IB-101 frequency counter. WBØBSS is now active on SSTV. We are sorry to lose WBØDRG who was transferred to San Antonio, Tex. in Feb. Newly elected officers of the Pueblo Ham Club are WBØDMQ, pres.; WAØVTO, vice-pres.; WAØWAD, secy.; WØKSA, treas. Incoming officers for the Boulder Amateur Radio Club are WAØZON, pres.; WRØCJH, vice-pres.; WBØBEM, secy.; KØKJN, treas. A hearty welcome and best wishes for a long life are extended to the new club paper of the Rocky Mountain VHF Society, titled "Boulder

QSP", editor WA4HAA/Ø. With deep regret, we add the calls of WØUPS and KØGOT to the list of Silent Keys. Net traffic for Dec.: SSN QNI 430, QTC 209, informals 24, 31 sessions, 959 minutes. CCN QNI 313, QTC 161, 31 sessions. Columbine QNI 1075, QTC 68, informals 182, 26 sessions. Traffic: (Dec.) KØYFK 868, WØWYX 607, WBØAXW 508, KØZSQ 508, WØLQ 378, KØOTH 188, W2TPV/Ø 176, KØJSP 146, WØNGA 128, WBØHCK 122, WBØCUB 100, WØLRN 100, WØIW 91, WØLRW 87, WAØSIG 57, WØLAE 54, WØGV 38, WBØHBT 34, WAØTMA 34, WØNZL 33, WAØZPP 32, WBØBSS 21, WAØYED 21, WØSIN 18, WØLLA 16, WØGAQ 13, WØBY 12, WBØHSZ 12, WAØNFO 12, WØONK 11, WAØHLQ 3. (Nov.) WØONK 15, WØLAE 7.

NEW MEXICO – SCM, James R. Prine, W5NUI – The use of endorsement stickers for ARRL appointments has been implemented. A formal message or letter is requested to help keep the SCM records up to date when your certificate expires. W5MYM, W5DAD and K5DAB handled traffic out of the Nicarugua earthquake area. An ice storm the week end of Jan. 6 '73 disrupted telephone service in Clayton and Roy, N.M. WB5DAT and W5MOX provided communications for these communities during the emergency. W5TLK received a substantial award from USAF for suggestion. Be sure to attend the La Mesa "Bean Feed" hamfest the last Sun. in Mar. Traffic: WB5BHN 332, K5MAT 279, W5UH 171, W5RU 101, W5TLK 99, W5MYM 52, W5YQ 26, W5DAD 24, WA5OHI 12, WA5BLI 8, WA5MIY 5.

UTAH – SCM, John H. Sampson, Jr., W7OCX – SEC: W7GPN. RM: K7HLR. The new Utah Code Net off to a good start with K7HLR as mgr. The net meets daily at 0230Z on 3575 kHz. The Beehive Utah Net meets daily at 1930Z on 7272 kHz. W7WKF was awarded a certificate of merit for his work as the long-time SEC. WA7BSG filed a total of 115 Intruder Watch reports during Nov. and Dec. K7HLR says that this year it takes more time to make fewer points in handling traffic than previously. W7UTM still bothered with line noise. K7CLO has 18 states to go for 5BWAS. A new Tech. is WA7OXZ daughter of WA7MEL. K7ZVT back on the air from Layton. A new FC is K7ZOF, Weber Co. W7GPN busy ironing out the wrinkles in the proposed Ogden repeater. Assisting with the logic circuits is W7LIH. Also doing much work with the repater is K7RGY and K7DOT. A recent visitor was K7DOU who says he is going back to school to complete requirements for his MBA degree. A former Maine RM, a student at BYU, is busy in the ham bands with the call K1TMK/7. An avid traffic handler he now is an ORS in Utah. W7GPN received ham gear for Christmas. He now sports the complete Collins control equipment to compliment his already extensive Collins station. The XYL of W7DHJ is hospitalized in Calif. and he has made many air trips back and forth to see her. The Pack Rat Net is still active at 0200Z Fri. and Sat. on 3962.5 kHz. It is saddening to report that W7FLJ has joined the ranks of Silent Keys. Traffic: K7HLR 353, W7OCX 170, W7EM 160, K1TMK/7 57, W7FYR 20, W7LLH 17, WA7MEL 17, K7CLO 16, K7BNZ 10, W7UTM 10, WA7HCQ 6, W7IQU 4, WA7QAR 4, K7ZVT 3, WA7BSG 2.

WYOMING – SCM, Wayne M. Moore, W7CQL – SEC: K7NOX. W7RJR is again back on the air. A new one in Casper is WN7UYD. W7HNI has been vacationing out around Las Vegas. W7TZK was stalled in his car near Cheyenne but, thanks to his mobile rig, he got the assistance needed. Don't forget Field Day this year. Time to plan for it now. We have a new traveling trophy for the winner and a certificate to attest that they won. WA7RNI is now W7JLI. New officers of the Casper club are W7TVK, pres.; WA7LUY, vice-pres.; K7TAQ, secy.; WA7NHP, treas.; W7VTB, trustee; WA7QLV, act. chmn. W7GSQ is out of the hospital and recovering nicely. W7PVN vacationed in Mex. during Dec. enjoying the sun and fishing. Traffic: K7VWA 185, W7SDA 171, W7TZK 153, W7HNI 67, W7BHH 49, WA7NHP 22, K7ITH 14, K7SLM 6, WA7OEC 4.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4EKJ – SEC: W4DGH. RM: W4HFU. PAM: WB4WAI. K4IKR is a member of the ARRL DX Committee. New NM of AENM is WB4WAI who succeeds K4ROR. WB4THU reports school and vacation doesn't leave him much time to QNI the nets. K4KM reports he lost his antennas and support to a big wind. AEND net certificate presented to WN4ZQF. WB4KDI and W4HFU report a lack of new net members is hurting AENT and AENB. K4HJM was a special guest of WHMA (Anniston) on a one hour program "You're on the Air." He also spent time during the holidays running phone patches for KC4USX, PY7ZAJ, VE3FMB, YN5ASV and many others. K4JK off to sunny Fla. Don't forget to mail in your SET reports. The Mobile Civil Defense hosted the Jan. 5 meeting of the Mobile ARC. The

Ala. Training Net AENO had 247 check-ins in Dec. Please encourage all your Novice friends (especially) to join our training net which meets daily at 2330Z on 3.725. NM WB4SVH will be happy to answer any questions. The AENB (daily at 0100Z on 3.575) also needs participants and traffic. WA4ZWD now is heard regularly on these nets and we are happy to have him. Congratulations to WN4ZOG who passed the General Class exam. It is not too early to make your plans for the upcoming section hamfests – Birmingham-fest and Mobile. Appointed WB4WAI as PAM. Endorsed K4JK and K4AEB as OOs. Traffic: WB4SVH 486, WB4EKJ 245, WB4JMH 136, WA4VEK 127, WB4KDI 112, K4AOZ 90, WB4SVX 38, WN4ZQF 18, K4HJM 9, WB4THU 8, WB4KSL 7, WB4WUS 5.

GEORGIA – SCM, A.J. Garrison, WA4WOU – Asst. SCM: John T. Laney, III, K4BAI. SEC: WA4VWV. RMs: WB4RUA, WB4SPB. PAMs: K4HQI, W4LRR.

Net	*Freq.*	*Times(z)*	*QNI*	*QTC*	*Mgr.*
GSN	3595	0000/0300/1150	844	344	WB4RUA
Ga. SSB	3975	0100	910	190	K4VNV

WN4TVU passed his General during Dec. Will soon be checking into GSN and SSB net. Sorry to lose K4BAI as RM and GSN net mgr. but due to appointment on the ARRL Contest Advisory Committee, he felt it necessary to tender his resignation. The job of RM and GSN net mgr. is in the able hands of WB4RUA. New officers for Northeast Georgia ARC are W4RNL, pres.; WA4AON, vice-pres.; WN4COY, secy.; K4TQU, treas.; WA4BCL, act. mgr. Plans are nearing completion for the Columbus, Ga. hamfest scheduled for Mar. 25. Many of the Atlanta area hams were hard hit by the recent ice storm. Traffic: WB4RUA 567, W4EEP 139, WA4RAV 103, W4PIM 98, WA4NMU 93, W4RNL 87, WA4WQU 63, W4AMB 58, W4CZN 56, K4BAI 54, WB4WXX 38, WN4TVU 31, K4VGI 20, K4NM 15, W4JM 13, WA4LLI 11, K4KZP 3.

EASTERN FLORIDA – SCM, Regis K. Kramer, W4ILE – SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4FAC CW, WA4WIW RTTY. PAMs: W4SDR 40, W4OGX 75. This will be the last column appearing in "Station Activities" under an Eastern Fla. heading. Look for us next month under Southern Fla. Forty station appointments were issued and renewed during Jan. New OBS appointment goes to K4EVY. We ended the year with 85 stations reporting for Dec. which included 8 BPLs and 6 PSHRs. Total traffic count was over 12,000. Nice going gang. Keep up the good work regardless of section changes. Net certificates were issued to WA4EYU, K4YSN, K4LPS and WB4QPW. WA9QVT/4 is back in Fla. Also welcome back to W3CUL and OM W3VR. K4QG trying to figure out a way of getting better QSL returns. K4NE reports Fla. OOTC Charter NR 1 is off and running with 44 members. WN4ZYZ has new SB-401 on the air. WB4AJL starting off on the nets with a bang. K4KO doing FB job on the Fla. DX Club Bulletin. Sorry to see W4DOS leave us as SE Division Dir. We have W4DQD assuming Director duties in a very business-like fashion. Congrats Larry! We sure are going to miss all those gung ho fellas from the ORT, DAB and JAX areas and all points between. All good things must come to an end. 73 from Eastern Florida. Traffic: (Dec.) W3CUL/4 2751, K4SCL 840, K4FAC 767, WB4OMG 685, W3VR/4 661, WB4AIW 649, WA2AFL/4 535, WA4SCK 448, WB4GHD 435, W4IJK 258, WB4ISK 203, WA4IJH 200, WA4NBT 184, W4SDR 176, WA4PDM 163, WB4GMB 152, WB4AID 149, WB4NCH/4 119, W4DVO 118, K4WKY 107, WB4PNG 100, WB4HJW 91, WB4WTL 86, WB4AIK 85, W4YSO 81, WB4WYX 78, WB4SQA 76, WA4BGW 73, W4BM 70, K4NE 68, WB4NJI 58, W4DQS 52, WB4WHK 52, WB4HKP 48, K4BLM 47, W4TJM 47, WB4AJL 46, K4GFW 46, W4IAD 46, WB4OAA 44, WA4HDH 42, W4NGR 42, W4LSR 41, W4DFP 40, W4EH 40, WA4RUE 40, WA4YRU 38, WA4EYU 36, W8BJW/4 36, K4HGG 34, WB4SKJ 34, W4SMK 34, WB4UNV 34, W4IYT 33, W4LDM 32, WA4FJA 30, WB4ADL 29, W4GUJ 29, WB4BBH 28, WA4SXB 27, WB4CHB 23, K4QG 21, W4KGJ 19, W4NTE 19, K4JZI 17, K4EZE 16, K4EBE 15, W4KRC 15, W4LK 12, WB4NSQ 10, W4OGX 10, K4SJH 10, WB4SMA 10, W4DDW 9, W4ILE 8, WN4ZZB 8, WA4EYY 7, W4DTV 5, WA4VZF 5, W4IA 4, WB4QID 4, WB4FIY 3, WA4ALF 2. (Nov.) K4WKY 93, W8BZY/4 42.

WESTERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. RMs: K4[illegible]N, W4WEB. PAMs: WA4IZM, W4SDR. VHF: WB4KGW.

Net	*kHz*	*Time(Z)/Days*	*Sess*	*QNI*	*QTC*
NFPN	3957	2330 Dy	31	668	110
QFN	3651	0000/0300 Dy	62	–	–

Jan. marks the start of the new Northern Fla. section. ECs send your Form 5s to W4IKB. Appointments: W4IA and W4ILW renewed ORSs; WB4OAA is a new OPS. WB4JNI now EC for Volusia Co. WA4VCK new Net Mgr. of FPTN. Pensacola: WN4CGA,

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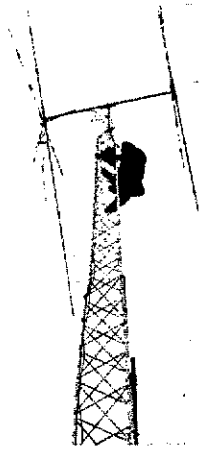

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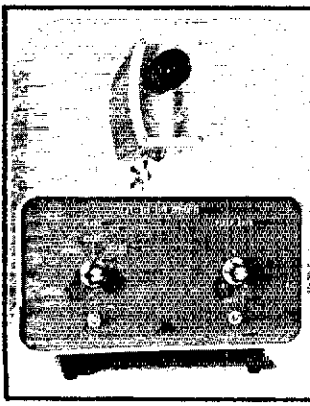

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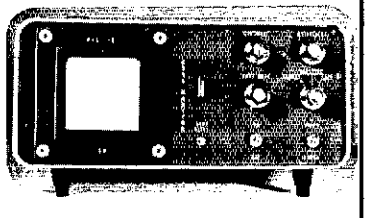

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WN4CJH and WN4CJO are new Novices. WB4ZPC prepared a 10-minute TV program on local hams for Ch. 23. WA4BMW made a number of 6-meter skip contacts during Dec., also working on a 220 MHz converter. The FFARA Christmas party was great fun. The WB4QEQ repeater moved its receiver to Montclair water tank. KØBAD/4 won medallion for third BPL this month. Crestview: WA9QVT/4 active on both phone and cw nets. Chipley: W4IKB and WA4BFT operated mobile on 3-day boat trip down the Apalachicola River. W2QWC/4 now is WA4CLY. Panama City: The WB4QER repeater is being converted to all solid-state. Newest ham is WN4CJK. Blountstown: WB4CKA. XYL of WB4UOH, just received her ticket. Traffic: KØBAD/4 568, WB9FUZ/4 111, W4YSO 81, K4BSS/4 66, WN4UPJ 60, WB4NJI 58, WB4RCI 56, WN4BSP 31, WA4NAP 27, W4RKH 23, WB4RGO 21, WB4NHH 12, W4IKB 4, W4JLW 2.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – PAM: WA7JCK. RM: K7NHL. The annual pot luck lunch and softball game between the Old Pueblo ARC and the Ariz. ARC will be in Casa Grande on Mar. 25. New officers for the Kachina ARC (Snowflake) are K7CUY, pres.; WA7KSU, vice-pres.; WA7NHQ, secy.; K7BDY, tech. dir. For the Ariz. ARC officers are WA7OVN, pres.; W7JKD, vice-pres.; W8KIH/7, secy.; K7JWB, treas.; WA7KEV, act. mgr. A new net has been formed with WN7TWI as mgr., the Ariz. Novice Net, meeting on 7140 kHz at 1930 MST daily. The Old Pueblo ARC is planning a hamfest in Tucson on a Sun. in Oct. It's time to start planning for Field Day which is June 23 and 24. New appointments are WA7JCK as PAM and mgr. of the Ariz. Traffic and Emergency Net and WA7TZO as OPS. K7NHL has resigned as TWN mgr. but remains active in TWN and other traffic schedules and has earned BPL awards for Nov. and Dec. Section net awards were earned by K7GLA, WA7KQE, K7MTZ, WA7NHQ, K7NTG, WA7QVN and K7RLT. ATEN: 31 sessions, 637 check-ins, 102 QTC. Traffic: K7NHL 663, K7MTZ 308, K7NTG 228, K7RLT 114, WA7QVN 84, W7PG 50, W7DQS 43, W7IO 37, WA7JCK 29, W7CAF 18, WA7KQE 13, WN7TWI 9, K7GLA 3, WA7IXC 1.

LOS ANGELES – SCM, Eugene H. Violino, W6INH – SEC: WA6QZY. RM: W6LYY. The Christmas traffic is over and things are beginning to settle down. SET will be over by the time you read this. Thanks to the Mission Trail Net boys for such good done with the Christmas messages. WA6ULA has been very active in RACES and in the St. Clarita club along with new pres. WB6DTT, vice-pres. W6JNH and club trustee K6OU. The PARC are planning to put membership on data processing cards to keep up with members. Several clubs are having trouble getting delivery of their Bulletins on time, this seems to be common all over. W6MEO made arrangements with the USC Radio Club for the Cary, N.C. Rose Parade band to keep in touch with their homes while in Calif. Heard were WA6EPS, WA6KDK and WB6TCR on the local Swapcars Net. WB6ITD active on 7 MHz handling traffic will soon be on SCN. WA6BCO has new Wilson four-element 20-meter and three-element 15-meter beams on new 54-ft. Trlex tower. WA6OWM has been very active on the phone nets since receiving Asst. Dir. appointment. Every year the league has a VHF contest; one of the outstanding clubs is the So. Calif. VHF club who plan to go it again this year. VHF stations should get in touch with WB6YVP if you are an experimenter. WA6CTB and WB6GGO playing chess on the 2-meter band and will take on all challengers. WA6CTB also has a sixteen-element broadside collinear up and working. Bill Welch of the Lockheed Radio Club has taped lessons for those who wish to upgrade their licenses. Beginners tapes are also available. The TRW club members now have available a new "Apollo" style QSL card which is outstanding. WB6OYN has completed WAS and DXC and now ready to return to SCN. W6OEO has been handling Nicaraguan earthquake traffic. W6QAW reports difficulty with checking on WPSS net because of long skip and the southern states coming in on frequency. W6WHK lost his 70-ft. tower in recent heavy winds. The QCWA group had a good time at SAROC this year with many attending breakfast arranged for them by W6MLZ. Traffic: W6INH 452, W6LYY 252, W6OEO 145, WB6KJI 109, WA6ZKI 91, W6QAE 83, W6USY 62, WB6KGK 48, WB6OYN 46, WA6BCO 40, W6JPH 36, WB6YIZ 25, W6IVC 23, WA6IDN 20, W6FD 16, W6OAW 8, W6DGH 7, WB6IPO 5, WB6GGL 4, WA6OWM 4, W6AM 2.

ORANGE – SCM, William L. Weise, W6CPB – Asst. SCM: Richard W. Birbeck, K6CID. SEC: WA6TVA. The 1973 officers for Victor Valley ARC are WA6HWR, pres.; W6QUU, vice-pres.; WB6NXL, secy.-treas. WIHJT/6 left for DL4-Land in Jan. WB6VTK

had great time handling traffic via new RTTY gear during Christmas rush. W6ISC is proud owner of the Swan 600T and R. Bob should put out a big signal on SCN. Congrats to WA6OIT on passing his General in spite of his blindness. W6FHM/DU1 and VQ9N was a recent visitor at Desert RATS club meeting and gave highlights of his tour. Regret to announce the passing of WA6OVM and W6RPH first part of Dec. Our condolences to the families. K6GKN is convalescing from recent heart attack. Hope to see you on the air soon Gene. The 1973 officers for the Riverside County ARA are K5BBM/6, pres.; WB6JJP, vice-pres.; K6GMF, treas.; WB5AYK/6, secy.; K6SJA, act. chmn. and WA6THY hospitalities chmn. SCN still needs more permanent check-ins. Try 3600 kHz daily at 0230Z. Hope many of you phone men will be joining the daily phone traffic net which is being established. Check QST for frequencies. All you league officials in Orange section are urged to check-in on LO net the first Sun. of each month at 1000 local time on 7250 kHz. Here is your chance to hear the latest information and to put in your suggestions for improvement of local communications. PSHR: WB6AKR 44, WA6TVA 40. Traffic: WB6VTK 544, W6ISC 219, WB6AKR 156, W6WRJ 51, K6GGS 44, WA6TVA 33, WA6YWS 13, W6CPB 7, WB6ZOK 4, W6BUK 2.

SAN DIEGO – SCM, Paul C. Thompson, W6SRS – Asst. SCM: Art Smith, W6INI. SEC: W6GBF. RMs: W6BGF, W6LRU. New club officers: El Cajon – WB6LBM, WB6VKV, WA6HLA, WB6VWW. SOBARS – WB6TTW, WA6ENU, WA6HLA, K6QM. Palomar – W6HZJ, WA6EYX, W6ARN, K6SLA. North Shores – WB6GYB, W6KVB, W6HME, WA6QVH. Imperial Valley ARA – WB6PUM, WB6PUO, WA6MIW, WA6EQX. Thanks to all the outgoing officers. K6LE and WB6HSZ helped with BAJA 1000. New tower for K6JP. New stations on PRC repeater are WA6EYX, K6SLA and W6NLO. WA6HUG now working RATT. WB6LJO busy with SCN schedules. WA6BJM conducting license class at the EOC. New Novice is WN6URI. Another new traffic man in the section is WB6PVH. IVARA conducted a workshop at their monthly meeting for the construction of "emergency antennas." WA6COE is getting set up on ATV. W6VNQ continuing with TCC schedules. W6DEY and W6PJU now have his and hers mobiles. K6PM has rebuilt his Quad after 12 years. K6SDR and W6MAR continue with OO activities along with DX. W6FMZ now handling traffic on NTF (7070 kHz) for the section. W6LRU made BPL. Lots of activity for VHF-SS this time. PSHR: W6LRU 52, W6BGF 46, WB6VKV 34. Traffic: W6BGF 728, W6LRU 549, WB6VKV 421, W6VNQ 400, WB6HMY 267, K6HAV 237, W6DEY 49, W6SRS 27, W6FMZ 13, K6QM 4, WA6COE 2, K6CXR 2, WA6HLA 2, W6MAR 2, WA6DMB 1.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DEI – SEC: W6JTA. PAM: K6EVQ. RM: W6UJ. W6KW was guest speaker at the SBARC installation dinner. Vice Director W6UEI and SCM were also present. W6DKQ new program coordinator for the Radio Council. Contact him if you need a speaker. EC K6VBX signed up AREC members at the Poinsetta ARC. ORS WA6MBZ is back on SCN. MTN, PON after school in Ariz. OBS WA6IDQ changed jobs and moved to Fla. WA6GEN has Globe Champion on from Santa Maria and WA6SSN has new vertical in Camarillo. K6CFJ installed an HW-22 mobile for vacation in Tex. K6QPH participated in SKN. MAKRAC members W6MUL, K6VIE, WA6SSN, K6QPH, WB6EDG and WA6DEI took field trip to VOA station in Delano. W6KW elected pres. of the South Bay Civic Assn., Baywood. W6JTA received the A1-Op award. W6CJS has new Swan 500CX and earned a section AREC Net certificate. Code and theory classes taught in Ventura by W6MHK, WB6DHW and K6VFF and in Camarillo by MAKRAC members. W6OAL chasing the new Satellite Award. W6AM spoke on DXing at the Poinsetta ARC. WB6OKF received Advanced ticket. W6JEO made 32 contacts in 16 sections for 1024 points in 160-meter contest. W6CDN new EC for SLO Coastal District. WA6DEI ran Christmas rush traffic on RTTY. W6JTA and WA6DEI made BPL for Dec. WB6PGK continues to liaison between SCN and MTN. More of you qualify for PSHR than report. K6YLQ, WA6NTP, WA6OBB were among section attendees at SAROC where WA6LLI won life membership to 73 magazine. PSHR; WA6DEI 50. Traffic: (Dec.) WA6DEI 528, W6JTA 526, WB6PGK 251, WA6WYD 153, WA6MBZ 42, WA6PFF 21, K6QPH 2, W6MQF 1. (Nov.) WA6PFF 9.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Harrison, W5LR – Asst. SCM: Frank A. Sewell, W5IZU. SEC: K5QKM. Asst. SEC: WA5KHE. RM: W5QU. Many items came to our attention this month – OBS No. 404 re: Satellite "DX" achievement award via Oscar 6; OBS No. 405 on advisory committees K5STR, W5AO and

W5VPQ. Then OBS No. 406 shows up stating FCC denied petitions for reconsideration of decisions in repeater docket No. 18803. W5JAX Arlington ARC read bulletin No. 401 re: details league elections. Caprock ARC WA5WZO says deadline Ignition last day each month. WN5IDZ has DX-35/SX-38. WN5ICB has Tempo I. Crossing SCM's desk this month is recent Affiliated Club Bulletin. Ten new training films now available first come basis, 16 mm sound B and W. WB5FOY received his 15 wpm certificate. Affiliated Clubs should now apply for annual league '72 report, W5ABQ RM SoTx writing newsletter to all QRSs, plans to contact all ORS stations attaching two regular Form 1 reporting cards to encourage stations reporting in. It is RM's responsibility to keep ORSs active and on the air. Garland ARC recently honored Old Timers of the area. Jim Hester back from VK-Land. Steve Hay, Jr., DARC new member CRW. FB Steve. Pres. RWK completed 24 years hamming. FB Stu. The Kilocycle Club Ft. Worth reported Christmas party and dinner Oak Grove airport Dec. 15 with excellent attendance. No news from Abilene or Midland and I assume St. Pats day continues to be "firm." Congrats on upgrade to WB5FLQ. WB5VHW, WA5VXW and many others. K5BIQ and Karen in Big Ben? K5IBI and XYL says list new hams his area helpful. Irving ARC active with new officers and 30 members. Traffic: (Dec.) W5QU 203, W5SHN 17, W5LR 13, WWB5FOY 7, W5YK 7. (Nov.) K5ABV 71. (Oct.) K5ABV 61.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM/SEC: Leonard R. Hollar, WA5FSN. RM: W5RB. PAMs: W5MFX, WB5CWX and K5DLE. W5LHY traded his Collins gear in on an SB-600. There must be something about an SB-600 that I do not know about. K5LUJ is sporting a new Galaxy. If you are looking for WA5PQX, you'll have to look on 20-meter cw. Welcome to W@LYC/5. W5SUG back in good shape after two major operations, is NCS couple times a week on STN. Let's all load up our swapping gear and head for the high plains area to the Woodward Hamfest Mar. 31 and Apr. 1. FM is taking hold here in Lawton area (now if we could just get our repeater going).

Net	*kHz*	*Local Time/Day*	*Sess.*	*QNI*	*QTC*	*WX*
OPEN	3900	0800 Su	5	245	23	
OPON	3900	1700 M-F	20	533	208	
STN	3850	1730 M-S	25	475	48	
OTWXN	3900	1745 M-S	26	467	42	262
OLZ	3682.5	1900 Dy	31	176	39	

LOs or not please let me hear from you at the end of the month. Traffic: K5TEY 512, W5RB 197, WB5DXP 96, K5OTM 45, W5MFX 41, W5PML 38, WB5BFX/5 34, WA5ZOO 39, WA5IMO 28, WB5AZS 25, W5FKL 19, WA5OUV 18, K5ZDB 17, WA5FSN 16, WA5CUJ 12, W5SUG 12, K5LUJ 6, WB5FIK 4.

SOUTHERN TEXAS – SCM, E. Lee Ulrey, K5HZR – PAM: W5KLV. RM: W5ABQ. Congratulations to new OPS/ORS WB5AMN. Renewed ORS for W7WAH/5. Congratulations to W5KR our new SCM for So. Tex. Austin ARC has big plans for the VHF SS. W7WAH/5 reports working hard for WAS. OPS WA5VBM active with IMRA for Managua earthquake traffic. WB5BWV, WB5AMN, WB5DBK, WB5DQE, K5EJL, W5JVR, W5NNK, W5LBG, WA5ZEM, WA5ZBJ and WB5FMA received Section Net Certificates for work on TEX and RNS. RM/ORS W5ABQ now has OPS. WB5AMN, W5ABQ, K5ROZ, W7WAH/5 and WA5YEA are on PSHR. Received OO reports from K5MEN, WA5MIN and W5RBB. WB5AMN is the new net mgr. for TTN with W5IRQ as asst.

Net	*kHz*	*Sess.*	*QNI*	*QTC*
TEX*	3770	62	586	521
7290 Tfc	7290	40	1943	542

*NTS. Traffic: W5ABQ 222, W7WAH/5 213, WA5VBM 144, WA5YEA 137, WB5BWV 132, WB5CUR 93, W5YAX 92, WB5DQE 77, WA5ZBK 76, K5EJL 66, WA5FJN 57, W5KLV 56, WB5AMN 48, WB5DBK 44, WA5YXS 38, W5JVR 37, K5ROZ 35, WB5EDS 33, WA5JFZ 32, W5BGE 29, W5TFW 28, K5RVF 22, W5BHO 19, W5HWY 19, W5EZY 17, WA5TJI 17, K5HUA 11, W5UKN 9, WA5CBT 4.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – Asst. SCM: Mrs. Donez Booth, VE6YL. SEC: VE6XC. ECs: VE6FM, VE6WI, VE6ATY, VE6AXH. ORSs: VE6YL, VE6LZ, VE6BAT. OPSs: VE6YL, VE6ASL, VE6HN, VE6VS, VE6AXH. OOs: VE6HM. VE6MI, VE6TY. OVS: VE6MX. PAM: VE6ALQ. VHF PAM: VE6AMC. Congratulations to VE6AOZ on receiving his Advanced ticket. VE6ADX did excellent work relaying between YN and KZ5 during the recent Managua disaster. VE6AMU did a nice job of activating VA6NQ on 28 MHz. VE6HQ is a fine cw operator.

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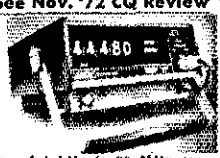

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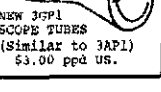

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VE6ALQ keeping fine records of the APSN. A number of VE6s have worked through Oscar 6. VE6AC and VE6ALL seem to have joined the Canadian colony in Mesa, Ariz. VE6EO finds time to operate his square dance business and be pres. of SARC. Traffic: VE6ADX 504, VE6IK 114, VE6XC 60, VE6BAT 44, VE6YW 18, VE6SA 14, VE6AVV 12, VE6FV 10, VE6VE 10, VE6AM 9, VE6ARI 8, VE6KS 6, VE6ALQ 5, VE6AEA 4, VE6ARU 4, VE6ATY 4, VE6QY 2, VE6WN 2.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – British Columbia Amateur Radio Association's 1973 officers are VE7AFJ, pres.; VE7WS, vice-pres.; VE7SM, secy.-treas. Also the Association moves to the Island. BCARA annual cup award goes to VE7AGX for his efforts in code and theory classes over many years and organizing many events in which amateur radio communication was needed. East Kootenay ARC reports their code classes are proceeding and several CB operators will have amateur tickets this spring. Beaver Valley ARC paper which is an FB paper report their Certificate is still available by working members of "The Lil' Beavers." Nice letter from W1BDI wishing us all the best for '73. Traffic: VE7RLO 149, VE7LL 122, VE7AMW 16, VE7SE 16, VE7CDF 11.

MANITOBA – SCM, Steve Fink, VE4FQ – WARC saw the new Canadian film "Fine Business" at its Jan. meeting, it is certainly worth seeing. We welcome new appointees VE4LG as ORS, and VE4HF as OBS for two meters in Winnipeg. VE4QJ retires as MEPN mgr. and PAM after seven years; thanks Jim for a real FB performance. A new net mgr. to be announced next month's column. Flin Flon EC VE4NW reports all is well up North; his asst. ECs are VE4HH and VE4NC. Best of luck to VE4PI who has gone to VE7-Land. Don't forget the Swap and Shop Net after MEPN Sun. MTN: 28 sessions, 110 QNI, 72 QTC. MEPN: 30 sessions, 1081 QNI, 49 QTC. Let's start planning for Field Day, fellas. Traffic: VE4RO 87, VE4LG 53, VE4KE 46, VE4PG 34, VE4JA 22, VE4FQ 21, VE4EF 17, VE4NF 16, VE4YC 14, VE4RQ 10, VE4WT 10, VE4FK 8, VE4CR 6, VE4QJ 5, VE4FO 4, VE4OP 4, VE4PA 4, VE4SW 4.

MARITIME – SCM, W.D. Jones, VE1AMR – I regret to report VE1BH and VE1CW as Silent Keys. The APN (Atlantic Provinces Net) on 3654 kHz at 8 P.M. local time is seeing increased activity. VE1RO, net mgr. would welcome your participation. The film "Fine Business" has been viewed by many section clubs during Dec. and Jan. If you have not seen this film, do so at the next opportunity. The big story for Dec. was the efforts of Andy and company during the Managua disaster. Led by VE1ASJ the operation lasted pretty well around the clock for more than 2 weeks. Some of the people involved include VE1s IN, IZ, ABX, AIO, ANH, AOG, SI, AVN, ATG, AAO and VE1AKZ. The new executive for the Halifax club include VE1AI, pres.; VE1AMC, 1st vice-pres.; VE1ASN, 2nd vice-pres.; VE1ALS, treas.; VE1AEN, secy. The new Dartmouth executive is VE1WZ, pres.; VE1AM, vice-pres.; VE1AIG, treas.; VE1YW, secy. The SONRA Christmas party was a huge success, thanks to VO1ER as Santa's helper. VO1BT is exercising a new tower-rotor-beam on 10-15-20. VO1DI chasing Oscar. APN reports QNI 156, QTC 90 in 31 sessions. Traffic: VE1AMR 165, VE1ARB 139, VE1DB 68, VE1AFM 12, VE1AMB 4, VE1AWS 3.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – The following Ont. ECs did a fine job in SET '73 under SEC VE3EWD: VE3GOG, VE3AYR, VE3DOC, VE3GFN, VE3EBY newly appointed to cover Windsor and VE3BPC also newly appointed to cover that area under repeater VE3STP. As usual the NTS section nets of OPN, OON, NWON and GBN gave full support to the Ont. AREC. The Thunder Bay Museum now has an exhibit of a typical amateur layout of the 1925-30 era. Arranging of the equipment was the work of a couple of experts of this particular period VE3AYZ EC of Thunder Bay for many years, and VE3AJ. VE3GX reports the call of one Ottawa's most illustrious sons, VE3JW, has been obtained for the amateur station being assembled for the Museum of Science and Technology located on the outskirts of the Nation's Capital. VE3JW was the call of the late Jim Cotter who became a Silent Key in Dec 1969. The Quinte ARC reports a new RTTY repeater is in the works which may also be used for voice! It will input on 146.10 and output on 146.70. Also reported by the QARC is a recent change of the Belleville repeater frequencies to 146.37 and 146.97 in accord with a frequency proposal by the Tex. and Southern Calif. FM Societies. VE3HC reported 3001 check-ins for ONTARS the RSO sponsored service net for week ending Dec. 29. Belated New Years wishes to all. Congrats to VE3ASZ, VE3LHF, VE3SB, VE3GFN and VE3DV on BPLs in Dec. Traffic: (Dec.)

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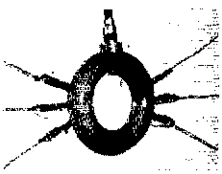

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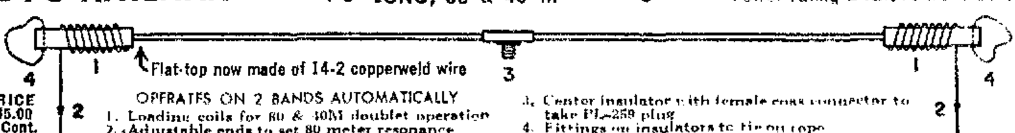

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QUEBEC – SCM, Joe Unsworth, VE2ALE – SEC: VE2BDM. The 1973 directors for VE2RM, Inc.: VE2AWO, pres.; VE2DEA, vice-pres.; VE2APT, secy.; VE2FX, treas.; VE2ALE, sale; VE2BEN, tech.; VE2JO and VE2BU, to appoint. VE2ABF doing FB job as NCS on VHF net. VE2DGD has a turn me on-and-off ring along with 1296 MHz hair cutlers as per VE2APT. VE2BRW, VE2UN and VE3AUM were shown on TV news. River de Loop repeater is VE2ES on .46-.94. VE2WM back at QTH after 7 months in VE3-Land; he also lost his beam in a recent wind storm. VE2BYI had help of VE2BEN and VE2YU to put up an 80-meter dipole in below zero weather. VE2AGI leader emergency service net and VE2s AJD, OV, OY, MN and BKT have up-to-date new gear at their stations. Conditions on 75 meters up and down in Dec. in the evenings. VE2DU will move to VE3-Land and small party was held for him at VE2GA QTH. VE2APT made PSHR with 27 points. VE2BHH had a knee operation and doing FB. VE2ZA does not feel too well these days. VE2s BPF and BU operate Skidoo vhf mobile on week ends. VE2s ADZ and BPF put on excellent Santa Clause net for the QR Net again this year. VE2AKM once again very active on 20 meters. Amateurs in other areas note that QSL mgr. for VE2-Land is VE2IJ, see listing in QST. VE2BIT looking for other NCSs for the QR net. Also need more VE2s to check in to help with traffic. VE2UN again made BPL. Traffic: VE2DR 204, VE2UN 130, VE2LV 63, VE2OJ 62, VE2BP 36, VE2EC 31, VE2ALE 18, VE2APT 12, VE2DLG 9, VE2WM 8.

SASKATCHEWAN – SCM, William H. Parker, VE5CU – Never has AREC training been more noticeable than this past week. The earthquake disaster in Managua brought out some skilled operators to handle emergency messages. VE5BO acted as a net control station. Look for full report later. A few problems have arisen as a result of the American move down to 3775 as Sask. net frequency is 3785. NTS is going great and could use some more operators so if you are interested in cw get in touch with VE5GL. Hamfest now is the big talk. Two meters is becoming more and more a big thing in Sask. Saskatoon, Moose Jaw and Regina are very active with repeaters. Field Day will be the latter part of June, watch May QST for particulars. VE5HE is now going to 20 meters. Regina Club bought themselves a club house. Traffic: VE5GL 133, VE5QS 52, VE5CU 16, VE5SC 15, VE5RJ 6, VE5TT 4. QST

Operating Events

(Continued from page 108)

Limburg, YP Ysselmeerpolders). These are multipliers for non-Holland stations. Three points per complete QSO. PA/PI/PE stations use the DXCC list for multipliers plus call areas W/K 1-0, VE 1-8, VO1, VO2, PY1-9, VK1-8, ZL1-4, ZS1-6, CE1-9, JA1-0. Final score is the 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. L. v. d. Nadort, PA0LOU, Bospolderstraat 15, Nieuwerkerk a/d IJssel, Netherlands. Include usual contest statement.

30 W1AW Special Evening Qualifying Run.

MAY

3 W6OWP Qualifying Run.
5-6 H-22 Contest.
12 Frequency Measuring Contest.
12-13 Connecticut QSO Party.
13 YL ISSB Contest, cw.
16 W1AW Qualifying Run.
19-20 Tennessee QSO Party, 5 Flags ARC VHF Contest, YL ISSB Contest phone.

June 9-10, VHF QSO Party.
June 23-24, Field Day.
Sept. 8-9, VHF QSO Party.
Nov. 10-11, SS phone. QST

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(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For information contact Rose Ellen Bills, WA2FGS, Secretary, 17 Craig Pl., Pennsville NJ 08070

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to WB2MBF, Box 532, West Hempstead NY 11552

ROCHESTER NY is the place to go for the largest Hamfest, VHF meet and flea market in the northeast, May 12th. Write WNY Hamfest, Box 1388, Rochester NY 14603

22ND ANNUAL Dayton Hamvention will be held on April 28, 1973, at Wampler's Dayton Hara Arena. Technical sessions, exhibits, hidden transmitter hunt, flea market, and special program for the XYL. For info write Dayton Hamvention, Dept. Q, Box 44, Dayton OH 45401.

GREATER Baltimore Hamboree will be held at Calvert Hall College, Putty Hill and Goucher Boulevard, Towson MD (one mile south of Exit 28 of Beltway Interstate 695) on Sunday April 8 1973 at 10 AM. Food service, flea market, and more. Registration $2. No table or percentage charges. Info: Joe Lochte, 5400 Roland Ave., Baltimore MD 21210.

MIX pleasure with pleasure, 1973 Hamburg International Hamfest on Sept. 15 only 45 minutes from fabulous Niagara Falls, RV parking for weekend only $2.50 with hookup. Details: Valerie Orgera K2KQC, 187 Main, Hamburg NY 14075.

BROWARD auctionfest March 10, 1973, at the Broward Community College, 3501 S.W. Davie Road, Ft. Lauderdale FL. Hours 9 AM to 5 PM. Refreshments and unlimited parking. Donation $1.50. Free coffee. XYLs admitted free. No sales commissions. Convert your used equipment into cash. Public welcome.

EVANSVILLE Indiana TARS hamfest Sunday May 6, 1973. 4H grounds, highway 41 north 3 miles. Auction, overnight camping, ladies' bingo, reserved flea market booths, air conditioned. Advanced registration. For flyer contact Robby W9MKZ, 502 S. Lincoln Park Drive, Evansville IN 47714.

HAMFEST Wabash County ARC fifth annual hamfest Sunday, May 20, rain or shine. Admission still only $1. Flea market, food, tech talks, and much more. For information write Bob Mitting, 663 Spring, Wabash IN 46992.

QSLs?? America's Finest!! Samples 35c. DeLuxe 50c. Religious 35c. (Refunded). Sakkers, W8DED, Box 218-A, Holland MI 49423.

TRAVEL-PAK QSL Kit — Send call and 10c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 30c Half pound of samples 60c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av, Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

SAMPLES 20c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs 300 for $4.65, samples dime, W9SKR, Ingleside IL 60041

RUBBER stamps $1.50 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

QSLs "Brownie," W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

COMPLETE QSL catalog, 300 cuts, 10 report forms, ink and stock samples, plus ten sample QSLs. 25c. Corneilson's Quality QSLs, 321 Warren St., N. Babylon, NY 11704

3-D QSLs - Hallmark of discriminating operators. Samples 25c (refundable). 3-D QSL Co. Monson 2 Mass. 01057.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375, Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 2 for $1, 7 for $3, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

Excellent QSLs, reasonable, Samples 25c, W9CL Press, R.R. 1 Box 811, Carmel IN 46032

QSLs, 3 color glossy, globe, eagle, straight key, ham with earphones on front, report form on back. 100 - $4.75 postpaid, Rusprint, Box 7575, Kansas City MO 64116

QSLs, Second to none. Same day service. Samples 25c. Ray, K7HUR, Box 331, Clearfield UT 84015.

QSL's 300 for $4.95! Samples 15c, Colourcard Box 326 Topanga CA 90290

QSLs — Dime or your present card brings samples. Alkanprint, Box 3494, Scottsdale AZ 85257.

QSLs. Gorgeous rainbows, etc. Photostamps, address labels. Top quality! Low prices! Samples 10c refundable. Joe Harms, W4BLQ. Box 158, Edgewater FL 32032.

200 two color QSLs $5.20, stamp for samples. Mark, WB6NKO, 2534 El Tonas Way, Carmichael CA 95608.

CANADIAN QSL cards. Write for free samples. Bon Rae Specialty, Dept. A, P.O.Box 601, Saint John NB.

CANADIANS free surplus parts catalog. ETco, Box 741, Montreal.

CANADIANS. Sell, electronic keyer, EKI, FB condx. $30. VE3CJB, 654 Framosa Rd, Guelph.

COLLINS Mechanical filters 455 kHz, 2.4 kHz bandwidth, $11 postpaid. V. Mozarowski, VE3AIA, 1 Belgrove Dr., Islington Ontario, Canada

HEY LOOK! The Charleston Hamfest II is going to be held again this year on the third Sunday in March. March 18, 1973 in Charleston SC.

ANTIQUE radio equipment sale and swap session, dinner and program, AWA Spring meet, April 7, Canandaigua, NY. Write for details: Lincoln Cundall, W2QY, 69 Boulevard Parkway, Rochester NY 14612.

ANTIQUE Wireless Association annual historical radio conference with programming for old time operators, historians and collectors. Sept. 8, Canandaigua NY. Write K2WW.

AUCTION. The New York Radio Club will have its annual auction Friday, March 30, 1973. Doors open at 6 PM. Auction starts promptly at 7 PM. Location: Hall of Science Bldg., World's Fair, Flushing Meadow Park, Corona, Queens, NY. Donation of $1 for each person attending required.

STERLING - Rockfalls Hamfest March 11th. Info, Box 11 Sterling IL 61081

APRIL 15, is the date for the first annual Raleigh Hamfest sponsored by the Raleigh Amateur Radio Society. Flea market, net and association meetings, YL activities — all indoors in the arena at the N.C. State Fairgrounds. Overnight camper parking on the grounds. Talk-in on 80 ssb at 3923 kHz and 2 mtr. In on 146.94 Simplex, 146.28/146.88 and 146.04/146.64. Flea market space reserved and more info available by writing: RARS Hamfest, P. O. Box 17124, Raleigh NC 27619.

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

WANTED: An opportunity to quote your ham needs. 33 years a ham gear dealer. Collins, Drake, Galaxy, Tempo, Kenwood, Ten-Tec, Hy-Gain, and all others. Also $25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc. 1960 Peck St., Muskegon MI 49441. Tel: 616-726-3198

WANTED: Teletype machines, parts models No. 28, 32, 33, 35, 37. Cash or trade for Drake equipment. Alltronics-Howard Co., Box 19, Boston MA 02101. Tel: day or night 617-742-0048

VERY in-ter-est-ing! Next 6 big issues $1. "The Ham Trader," Sycamore IL 60178

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806

WANT wireless (early) magazines and equipment for W4AA historical library. Wayne Nelson, Concord NC 28025

KLEINSCHMIDT Manuals, Mite KSR, Teletypewriter supplies, gears, parts, toroids. SASE list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Teleprintronics, manuals bought.

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York NY 10013

TOWER climbing safety belt/lanyard $21.50. Prop pitch rotor $65. T/S 175 frequency meters $45. 2M handitalki $50. Coax rf switches multiposition $16-$48. Free list. Link, 1000 Monroe Tpk. Monroe CT 06468.

PREPARE for ham exams! Use Posi-Check. Original, expertly devised, multiple-choice questions and diagrams covering all areas tested in FCC exams. Keyed answers, explanations, IBM sheets for self-testing. All newly revised and up-dated, General Class $4.25, Advanced Class $4.50, Extra Class $4.75. Each applies to its own class only. First class mailing included. Add 25c per copy for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale, Des Moines IA 50322

SELLING out. Send address for list. Cline WA7TMR Box 216, Logan UT 84321.

FIBREGLASS mast tubing for high frequency antennas. Outside diameters 1.0", 1.4", 1.5", 1.6", 1.4" telescopes inside 1.6". 1' to 10', $2 per foot, each additional foot $1.50, plus shipping. Lengths to 16'. Thermo-Flex, Inc., Box 1184, Salina KS 67401.

WILL trade Swan 350; power pack model 117XC; 3-Band directional antenna model TA33-Jr; P2SWR meter; model CDR rotor — All for a Parker Shot Gun. J. B. Williams, WA4BJZ, 615 Glendale Dr., Rock Hill SC 29730. Tel.(803)-327-7728.

SELL Collins 312B4 Console $150, NC200 transceiver with NCXA pwr supply $225. W9IY, 2285 Holly Court, Northbrook IL 60062. Fone (312) 272-2443.

ANTENNA King mail order sales — King-size antenna/radio packages, major brands, Save to 20%. Prompt service — P.O.Box A, Lomita, CA 90717.

BUYING QST magazines. Interested in 1924 down to 1916. Willing to pay fair price. WAØLIB, 10417 Spring Garden, St.Louis MO 63137.

COLLINS R390A receiver $525. Want Model 32, 33, 28 teletype, Tom Howard, W1AFN, 46 Mt. Vernon St., Boston MA 02108. (617) 742-0916.

FOR SALE: HQ170 $125, RTTY model 26 printer/keybd $75. Model 14 perforator $70. Model 12 paper tape reader $45. RTTY converter $35. RC348R ac supply $35. Plus assorted parts pwr xmtrs etc. List. W2UGM, 66 Columbus Ave., Closter NJ 07624. (201) 768-1884.

WANTED: Galaxy III, Swan 260. WB6MNS.

HAVE antenna problems? May 1973 I will go on a ninety day automobile trip through Texas, Oklahoma, Missouri, Iowa, Minnesota and South Dakota. Will operate SSB and two meter FM during trip and will carry a full set of tools and antenna supplies. Handicapped amateurs in these states who need dipole or inverted V antennas and are unable to put them up should contact Philip Rosenstein, WA5YRL, at 5426 Union St., Corpus Christi TX 78408. My services are free to handicapped people and it will be my pleasure to accomodate.

TRIEX H.D. 71' crank up tower with elevation motor and mounting hardware, 4-element quad, 3 prop pitch motors, 115'V Sincros $500. Two 4 X 150 A, factory-sealed $15 pr., 813' unused, base $5. W6MDH, 14638 Sylvan, Van Nuys CA 91401.

COLLINS 75A4 with 2.1, 5.1, and 3.1 filters. Excellent condition, $300, National NCX5 transceiver, excellent condition, all ten meter crystals included $250. Barry Forrest, WA2BIT, 347 Bch. 43 Street, Far Rockaway NY 11691. (212) 327-4952.

FOR SALE: Johnson Viking kW Match Box with instructions, like new condition. Firm $125. Buyer pays for postage and insurance. Henry L. Lehmann, 49 Leonard Avenue, Tenafly NJ 07670.

SAVE $60, new electro-voice Columnar speaker Model LR4A. Your cost $60, plus freight. J. Fahrner, 6094 Lake Ave., Orchard Park NY 14127.

HEATH SB303 with cw, s-m filters. $295. W2EYD, 816 Donegal, Toms River NJ 08753.

FOR SALE: Mosley tri-bander, two-element quad, with fiberglass arms, and feed tube stabilizer $75. W3HZ.

HW-16 transceiver, all band vertical both new $85. WN2FSF, 39 Dorian Road, Boonton NJ 07005. (201) 334-4696.

FOR SALE. QST 1926 to date, $100. You pay shipping. Sencore TF151 in circuit transistor checker $75. K2RCO, Ed Schneider, PO Box C, Brooklyn NY 11204.

EQUIPMENT needed, for new club station WBØDQI, 590 Fieldstone, Ballwin MO 63011.

SWAN 500CX, Vox, ac pwr; Galaxy V Mark II, Vox ac pwr; pwr supply for Swan Mark II linear; Mosley CM1 receiver; other gear and parts. W6ME, 4178 Chasin St., Oceanside CA 92054.

WANTED CE200E, HQ180AX, state condition and your lowest price. John Waskowitz, 35-30 73 St. Jackson Hts NY 11372

DAH-DITTER Electronic keyer. Self completing ac supply, sidetone oscillator, speaker, 5 to 40 wpm, many other features. Wired $44.95. M & M Electronics, 6835 Sunnybrook, NE, Atlanta GA 30328.

PCs. I can supply boards for any construction article that includes the full size artwork. Many in stock. Write, D. L. McClaren, W8URX, 19721 Maplewood Ave., Cleveland OH 44135.

SELL Collins KWM2, mint, with 516F2, 516E1, noise blanker, mobile mount, cables. $890. Package only. C. W. Tinsley, 75-561 Donwood Drive, Naperville IL 60540.

WILL buy your unfinished or inoperative amateur related Heathkits. Must be complete. WØWAM, 7928 Hedges, Raytown MO 64138. 816-358-1148.

WANT 5th edition ARRL Handbook. Extras to trade. K6WM, 850 Groff, Pomona CA 91768.

75S3B receiver, a dream. $495. 75A4, 3.1 kc filter, vernier knob, $295. 60 ft. tower $50. Wont last long. Ron Richardson, 525 Chalet West, Millersville MD 21108.

FOR SALE, Teletype 28ASR, dual tape readers, tape winder, storage bin, diagrams, manuals, new cabinet; FRXD reperf/TD unit w/cabinet; DXD strobescopic test set and message generator; IBM selectric I/O computer terminal new; Tektronix 511AD scope; Hallicrafters SX100 rdceiver; Heath sine/square wave generator; Heath FET VOM; 7000 vct power transformer for kw; Cardwell kw load condenser. This equipment plus many parts at NY location, but contact Gerald Block, WA2YJD, at 436 W. Washington Ave., Madison WI 53703 for details. (608)-257-2612.

CLEANING house. GT550 $295, VOX35C $15, CAL25, $15, AC400, $65, RF550, $50, RV550, $60, SC550, $15. The package $475. Swan 350, $200. 117XC, $85. Swan 500C, $300. SBE34, $229, mike $9. W9HF, 5005 Indiana, Ft. Wayne, IN 46807.

HT37, new xformer and relay, perfect, with carton, bought new $175. Will ship. Dave Goggio, 1419 Favell, Memphis TN 38116.

FOR SALE: Drake TR22 fm transceivers. Used less than 6 hours. Two units complete with all accessories and instruction books. $150 each or $250 for the pair. Postpaid from W4ZAE/7, PO Box 112, Ely NV 89301.

SIGNAL/One, Alpha Seventy, new and used. Also Collins, Tempo, Kenwood, Hallicrafters, Drake, Regency, Hygain, Mosley, etc. A real ham store with complete service department, one of the few left. Write or call Douglas Electronics, W5GEI, 1118 South Staples St., Corpus Christi TX 78404.

WANTED: Lionel 2330, 2332, 2340, 2360, 793 locomotives. Have ham gear or cash to trade. W3SYT. Bob Rockwell, 8672 Lincoln Blvd., Pittsburgh PA 15237.

IBM Electric typewriter, Model B, good condition. $135. Jim Talens, K3MNJ, 8361 Langdon St., Phila. PA 19152.

QST magazines for sale, 1915 — date. Write Paul Kluwe, Box 28, Cedar Lake MI 48812.

TECHNICAL Material Corporation Model TRC-500 antenna couplers. Will match 70 ohms to 150, 300 or 600 ohms over 2 to 30-MHz region. No power or tuning required and comes in weatherproof case, MIL rated at 500 watts (hi!). Unused in original packing with data sheet and mounting hardware. $27.50 FOB Lexington. Richard Solomon, Five Cherry Street, Lexington MA 02173. Include sase for five page list of other goodies.

SX-101 Mark III $125, Heath 1M-38 $30, Simpson 260 $30, HP 212A pulse generator, free — you pick up. H. L. Shoemaker, 329 W. Derby Ct., Sterling VA 22170.

SALE: Got the winter blues. Try repairing an Ameco R5 80-6 receiver. Best bid before April 15. WA2GRD, 152 Grant, Brooklyn NY 11208.

MATCHBOX Sell: Mint Johnson W6SWR $69. Wanted: Murch Ultimate Transmatch. WB4PNE, 1840 Hoopes, Alcoa TN 37701.

DRAKE 2C'2CQ and xtal calibrator excellent condition $205 FOB. Alfonso Vazquez, 311 Harpertown Road, Elkins WV 26241.

HAM Scan SB620 professionally wired and factory calibrated $80 or trade for mini-calculator counter or what have you. WB2CMZ, 116 Bay Avenue, Greenport NY 11944.

WANTED, L-4B Excellent condition, low price, cash Fred Swisher, WB6FTH, 385 Carlyn Ave. Campbell CA 95008.

NEED power supply (parts) 3000 + volts, 300 + Ma. Sell power swupply 1500V, 350 Ma. $65, NCX3 — 12V supply $165, NCX5-AC supply $275, Heath 5" scope OM-1 $40. W2AEV, 111 Hillside Rd., Farmingdale NY 11735.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI. Barry Electronics, 512 Broadway, NY NY 10012.

WANTED: All types of tubes. Top prices paid for Varian & Eimac. Jaro Electronics Corp. P.O. Box 414, Orlando, Fla. 32802. For fast action call Toll Free: 800-327-7799. Ask for Bob Hoffman.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick WA 99336

CASH for ssb gear, working or in need of repair. Elvin Miller, 5005 Indiana, Ft. Wayne IN 46807.

ATTENTION: single Camden County NJ area hams. A young adult mixer and radio club is now forming. For info phone James, ESPO, Esposito Jr., WA2LYZ, 547-3772.

WANTED: Drake TR6 — please state serial number, age, condition, accessories, asking price, preferred shipping method, phone number, etc. in a letter to WA1PGI, 52 Hanes Street, Albany NY 12203.

WANTED: Antenna insulators for my collection. Hopewell, Electrose, Ohio Brass, others. Walt Lehnert, 6209 Minnehaha Blvd., Minneapolis MN 55424.

SELL: Low-frequency converter. Original QST September 1968 unit. $55, plus shipping. W. H. Fishback, W1JE (ex-W1IKU), Old Comers Road, Chatham MA 02633.

TO sell your ham gear or to purchase new or used or to receive our monthly mailer of reconditioned equipment, contact, Associated Radio, 9012 Conser, Overland Park KS 66204 (913) 381-5900.

INSULATED standoff terminals: Teflon, 15 @ $1; Ceramic, 20 @ $1; Phenolic, 25 @ $1. Teflon pressfit terminals — standoffs, feedthrus, testjacks, your choice, 50 @ $1. 1-10 pF glass piston trimmers, 4 @ 1. Postpaid. Sase brings component list. CPO Surplus, Box 189, Braintree MA 02184.

TECH manuals — $6.50 each: R-389/URR, R-390/URR, URM-25D, R-274/FRR, TT-63A/FGC, R-220/URR. Hundreds more. List 50c (coin). W2IHD, 4905 Roanne Drive, Washington DC 20021.

GREATER Washington DC area Foundation For Amateur Radio offers an Information/Hospitality service. Special consideration is given to visiting foreign amateurs and a volunteer staff of linguists is available. Contact Hospitality Chairman Bill Parrott, W4URL, 8548 Georgetown Pike, McLean VA 22101. Phone (703) 893-8383 between 8 a.m. and 8 p.m.

UNIVERSITY forces sellout. HW-101 factory checked, mike, ac supply — $250; Twoer, mike, crystals $25; Lafayette SWR meter — $8. All in good condition and all prices firm. WB4IUX 130 Mountain View Lane, Clemson SC 29631.

SSTVers — New unused Hal camera sampler — $45, or make offer. WA6WGH, 4002 Anna Circle, Temple TX 76501.

HEATHKIT Warrior Linear, excellent, inside and out — $125. WA2RSP, Richard Fountain, Broadalbin NY 12025.

SELL speech processor Magnum Six for Collins equipment, never used — $100. W2FDK.

BUY surplus radios, electronics, vehicles, etc., from U.S. Government. Typical! Collins 51J3 receivers — $98. Send $1 for application and helpful bidding hints. D. Henderson, 1898 Kathleen Drive, West St. Paul MN 55118.

COLLINS 32S-3 with 516F-2 — $550; with 75S-3 — $925. New 80-40 Cliff Dweller — $100. 73 mags 10-60-4/72 — $35. CQ mags 5/67-5/71 — $10. Paul Schrader, W4BCV, 7906 Tip Top Lane, Louisville KY 40219. Phone (502) 969-7697.

WANTED; 51-S Collins receiver. State condition and price. SSB Glen J. Staples CO C, 97th Qm. BN. APO New York 09028.

SELL Collins 200 cycle xtal filter for 75S3-B $70. W1HNN, Smith, 131 Clarendon, Boston MA 02116.

HY-GAIN 18AVQ vertical antenna — excellent condition — $30. WB2ONZ, Wayne (212) 251-7580.

CV-89 teletype converter and CM-22A comparator, both for $150, manual included. W9FYM, 1538 S. Post Road, Indianapolis IN 46239. Phone: (317) 898-3459.

WANTED: Old C.I.E. Electronics Technology course. J. Cretsinger, Artesian SD 57314.

WANTED: Crank-up tower, heavy-duty rotor, 2kW antenna tuner and linear. K6HER, 575 Grand Avenue, Colton CA 92324.

DICTAPHONE Travelmaster with case. Cost — $295, used seldom. Needs batteries, perhaps minor work. Asking $75, or trade for compressor-clipper, 2-meter amplifier, etc. W8RWC, 2651 Manchester, Ann Arbor MI 48104. 971-5910 evenings.

HW32A — $45; HP23, two — $30 each; HW12 — $45; Unique wire tuner — $30; Heath phone patch — $30; Astatic mikes — $15 each, desk type; complete set mobile Hustler 10-80 — $30. (212) 595-6096, after 6 p.m. WB2HHR. Good condition.

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio, Butler MO 64730.

SELL: Collins 75A-4, excellent, with filters — $350. L. Martin, 10 Buzzards Bay Ave., Woods Hole MA 02543.

SWAN 500DX, SS16, 117XC, 508, extras — $550; Millen 92200 2kW Matchbox — $70. Steve Stewart, 26 Boulevard, Greenlawn NY 11740.

WANTED: HG10B and ac power supply for Gonset G-76. WA2OPA, 624 Willis Ave., Williston Park NY 11596.

JOHNSON Avenger 250W ssb/cw, 5 bands — $400; ac, mobile power supplies — $100 each.; TenTec PM3A — $50. K2BW (516) 294-0689, evenings.

HRO-60, ABCD and AC coils, speaker and xtal calibrator. G. Levy, W2LAP, 2845 University Avenue, Bronx NY 10468.

GT-550A with VOX, 25 kHz calibrator, and ac supply, perfect condition, used very little, have original shipping cartons — $350. James Powell, 200 Andrews, Cleveland MS 38732.

SWAN 240. Super clean, latest model produced with 270/500 colors, never mobile — $179; Adcom ac power supply in matching speaker cabinet drives to 150 watts output — $79. Will make package deal. Will schedule on 75/40 meters. Also Swan 120, very rare. Manufactured in Benson, Arizona — $79. W5EBC, Roger T. Scaggs, 4342 SE 25th Terr., Topeka KS 66605. (913) 235-2202.

JACKSONVILLE Florida, Arlington & Regency section, looking to set up sked with N.Y.C. ham. Write — WB2DEX, 67-38 152 St., Flushing NY 11367.

COLLINS 75S3, 312B1, 32S1, 516F2 manuals, excellent — $750; FT101 fan mount, mint — $425. F.O.B. W6LA/7, 3550 Riverbanks Rd., Grants Pass OR 97526.

HEATH IB-101 counter, never used, assembled, working perfectly — $175. W. W. Powell, 8914 Valley View, Houston TX 77036.

WANTED: Drake R4-A, T4-X, MS-4, AC-3 in very good electrical and mechanical condx. Can pay $550. Al Shrago, WB4KQV/4, Box 4814, D.S., Durham NC 27706.

SELL: Warrior linear — $135; Gonset Six Sidewinder 910A — $175; HD-10 Keyer — $25; KR-40 Keyer — $60; new 4-400A — $20. KOCZO, 35 Bloomfield Ave., Caldwell NJ 07006.

SELLING as a unit complete Drake station: R-4B, T-4XB, AC-4, MS-4, MN-4, patch cords, and manuals. Excellent condition. Cashiers check or money order for $700 and I will ship. Wade Johnston (K2EEF), 301 Highland Avenue, Moorestown NJ 08057. (609) 234-0184.

HEATH HX-20, 90 watts cw/ssb/ac supply — $100. Will ship, you pay. Capacitors 10 mfd., 2500 volt oil-filled — $8, plus 8 lbs. shipping. Switches 5 position for linears, heavy-duty — $5. P.P. 48. Bill Collier, K4VCP, 2537 Cannaday Rd. N.E., Roanoke VA 24012.

WANTED to buy: HW 100 (in the price class of $150); and SB200 ($150 price class). Offers to: OH2BFI, Martti Hatonen, telephone (90) 801-8916, Soukanahde 7 F 116, 02360 Soukka Finland.

"Don and Bob" guaranteed buys. SBE450 MHz fm (399L) $339; Standard 826MA- Write: Midland 2MFM-Write: Hy-Gain TH6DXX $139; HyQuad $109; TH3MK3 $114; 2048A $129; 400 Rotor $179; Mosley CL33 $124; CL36 $149; TA33 $114; Ham-M $99; TR44 $59.95; Belden 8448 Rotor Cable 10c/ft; cde parts; 8214 RG8/U foam coax 16c/ft; Cetron 572B/T160L $13.95; Mallory 2.5A/1000PIV Epoxy Diode 29c; Mot MC1709CG (709) TO5 39c; Triex MW50 $250.75; MW65 $331.50; WB1 $386. Write quote Drake, Triex, Eimac, Leader, Clegg FM27B; shipping collect. Warranty guaranteed. Mastercharge, Bac. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668.

SELL: Hammarlund "HQ-110A-VHF" receiver, 160-2 meters, with manual, mint condition — $250; Knight "Star-Roamer" receiver, excellent — $40; Knight "T-60" transmitter, excellent — $40; Heath "DX-20" transmitter, working condition — $15. Steve Torma, 26 Sloop Lane, Mystic CT 06355.

SELL Heath HD-10 — $22.50 pp., Alpine Enterprises, 415 Demarest Ave., Closter NJ 07624.

WANTED: Equipment, receivers, transmitters, anything associated with amateur radio. Amateur radio club in school district with no funds available. K3ARZ, Central Columbia School District, Bloomsburg PA 17815.

HALLICRAFTERS, SX-101-A, fine ham band rcvr, good condition — $145. Also Heath Twoer, xtals and mike — $25. WA1MSB, Greg Stoen, 1346 Drift Road, Westport MA 02790.

NEW FPM300 xceiver with warranty card — $525, mint.; Kenwood R599 Rec. — $280; HR212 — $210. W9HLA, 713 Oak, Lake Bluff IL 60044.

NATIONAL NCX-500 (needs a little work) with power supply/speaker — $150. Steve Smith, WB9BVJ/1, Box 458, Wesleyan Station, Middletown CT 06457.

RTTY pic swap? Write or send 60 wpm 170-850 shift cassette. Will re-record and return. WA9UGE.

NOVICES! Hallicrafters HT-40/xtals. WB9JLH, RR 1, Box 937, LaPorte IN 46350.

HOOSIER Electronics has the best deal around on the ham gear you want. Write us for a quote and try our fast, friendly Hoosier service. Factory-authorized dealers for Drake, Standard, Regency, Ten-Tec, Galaxy, Hy-Gain, Cush-Craft, Hustler, Mosley, Ham-M, plus many more. Orders for in-stock merchandise shipped the same day. Write or call us today for our quote and become one of the many happy satisfied customers of Hoosier Electronics, R.R. 25, Box 403, Terre Haute IN 47802. (812) 894-2397.

For SALE: Heath HW-12A — $65; Hammarlund HQ-110AC-VHF 160 thru 2 meters — $125; Eico 723 xmtr — $25; Ten-Tec PM-1 — $25. (615) 647-2891. Fred, WA4URA, RFD 4, Box 104, Clarksville TN 37040.

SENECA transmitter with manual — $100, or best offer, plus shipping. Allan Ruppar, 2824 Airport Rd., No. 218, Colorado Springs CO 80910.

NOVICES: Heathkit Chevenne xmtr, 80-10m. Built-in VFO. $6146 final, cw-am, $40. WA6MFR, 4034 South F Street, Oxnard CA 93030.

FOR SALE: Mint Swan 500CX, 117XC — $450, or trade for YAESU FTDX 560 or FT-101. Dick Konrad (K9DXO), 1020 Main St., LaCrosse WI 54601.

68 Mooney air coupe, 3 passenger, spring steel gear, wheel pants, full IFR, beacon, bucket seats, KX150, 870 TT. Will take S line and/or late model car. Dick Daniels, Webster WS 54893.

TV camera for ATV CCTV. New in carton. All silicon transistorized plug-in boards, high resolution vidicon, automatic light level control, 75 ohm and channel 5-6 outputs. With 12.5 mm wide angle fl. 9 lens, coax, TV switcher. Professionally prealigned ready to use — $175. R. Feingold, WA2JCS, 142-44 Bayside Avenue, Flushing NY 11354.

HAMMARLUND HX-50, HXL-1, Drake 2B with 2BQ and 2AC — $600. WA1OID, 1616 Baldwin Blvd, Bay Shore NY 11706.

VALIANT II Johnson ssb adapter — $350; HQ-145AC cal spkr, mint — $175. WA2RBO, 118 Florence, Rochester NY 14616.

WANTED: HW32 transceiver, SB610 Scope or HO10 Gotham 4EL20 Beam. W5GY, Naples TX 75568.

FOR SALE: Yaesu FT-101 five-band transceiver, newly realigned by Spectronics, mint condition, see ads in past QSTs for complete description. Also, Yaesu FL-2100 linear amplifier, won in raffle, never used, 10 thru 80 meters, uses pair 572B/T160 (not included), built-in SWR bridge, 1200 watts PEP, 1000 watts cw, 600 watts a-m, compliments FT-101, both for $795 FOB postal or UPS (your choice). Vandegrift, 4350 Heidelberg Avenue, St. Louis MI 63123.

TRADE over 30 years QST plus CQ bonus for ham gear, or $100. W0BNF.

REWARD $1,000, Reward $1,000, Reward $1,000 — to anyone having or locating information of my 1942 licensing that will be accepted by FCC examination taken at Nashville, Tennessee, November 20th 1942 at age 12. Received only operators license due to war. Federal Records Center has charge card indicating 1942 license, but FCC claims error. Possibly someone understanding files could locate license. If you know anything that could help, it would be appreciated. Herbert Louis Rippe, W8BQH/W8DE, 3785 Susanna Drive, Cincinnati OH 45239. Phone (513) 385-8027. Acceptable information gained from more than one source, reward divided equally. Reward $1,000, Reward $1,000, Reward $1,000.

CHRISTIAN Ham Fellowship now organized for Christian hams who wish fellowship with other Christian hams. Request free information on how to witness to other hams. Christian Ham Callbook, $1 donation. For free details write — Christian Ham Fellowship, 5857 Lakeshore Dr., Holland MI 49423.

SELL: Heath SB-102 with cw filter, spkr, pwr supply & mic., excellent cond. — $400, 1B-101 & 1B-102, excellent cond. — $200, 1M-102 with probe, excellent cond. — $220. W9LHN, 208 N. Colorado, Streator IL 61364.

DRAKE R-4 with MS-4 speaker, excellent condition — $250; Elmac AF-67 with homebrew ac supply, excellent Novice xmtr — $50. Will consider trade for all-band transceiver. W9MRA, David Lippman, Rt. 3, New Richmond WI 54017. (715) 246-2358.

COMPLETE Station — factory HW-16; 10-17 oscilloscope (both need alignment) VTVM; HD-10 Keyer (needs rewiring) crystals; clock, manuals, all physically good — first $150. Steve, WN2TAW (212) 831-3578, 1710 Second Avenue, NYC 10028.

FOR SALE: Heath SB-300, including 2 xtal filters, HT-37, price all — $425, no shipping. W2VP, Milton NY 12547.

WANT SB-620 Scanalyzer or similar gear, trade my GC1A receiver, 8mm (sound) projector, tape recorder or ? WA2DDU, 1122 Victory Ave., Plainfield NJ 07060.

NC-303, excellent condx., manual — $180, or best offer. Ameco 2m conv, with pwr supply — $22. WA9ZLI, 3061 E. Avalon, Spfld. MO 65804.

WANTED FTdx 560. Avner Barzely, 34 Hillside Ave., New York NY 10040. (212) 942-1787.

HEATHKITS professionally wired, tested. Send for quote. Parrish, 306 W. Amherst, Melvourne FL 32901.

SELL: FTDX560 — $400; Lafayette HA410 — $75. WA2PVN 642 Self master, Union NJ 07083.

HEATH factory alligned HW16 and VFO HG10B — $150, or best offer. C. Robertson, 1147 Harbor Hills Dr., Santa Barbara CA 93109.

75A4 for sale, 2 filters, manual. Like new condition, serial 5153 — $350. Bayard Rowan, W2GKF, 55 Runnymeade Road, Berkeley Heights NJ 07922.

SELL: SB200 — $180; Viking Navigator with FSK mod. — $65; Hammarlund HQ140X with xtal calib — $100. W4CQI, Rt. 1, Warrenton VA 22186.

OLD microphones 1920 to 1940. Also old microphone catalogs. Write — Bob Paquette, 443 N. 31 St., Milw, WI 53208.

APOLLO 6m linear — $165; Hammarlund HQ215 receiver — $265; Hallicrafter HA6 — $79; SR160 W6117-120 ac — $185; power supply for Thunderbolt — $85; Johnson Pacemaker — $89; Heath 2er — $35; Knight TR108 W6V107 — $95; Tektronix 511AD scope — $135. List available. W2FNT, 18 Hillcrest Tlr., Linden NJ 07036. (201) 486-6917.

HEATH HW-16, speaker, crystals, excellent — $90. Frank Downs, 17 Hargrove Dr., Stony Brook NY 11790.

WANTED: Crystal switch unit drawer for Collins KWM-1. 522-0879-00. Frank McJannet, 11557 Evanston No., Seattle WA 98133.

BIG Kilowatt. Mounted in 4-foot rack on casters. IPA drawer from Navy GPT-10K plus homebrew power supply. Complete with manual and schematics. Will ship via REA. $300 or best offer. Tom Fitzpatrick, 20 Uhl Rd., Cold Spring KY 41076.

SELL: Ranger II, mint — $120; Finco 6 & 2 antenna — $15; Fairchild test oscillator TS-47/APR — $45. Phone 899-8718 or write — W2KUL, 1321 Comanche Ave., Pt. Pleasant NJ 08742.

SELL: Swan 400, 420, 406, VOX, and power supply — $425; Heath Twoer — $30. All excellent, pick up preferred. K9BQL, 206 Sweetbriar, Plano IL 60545. (312) 552-8668.

SELL or swap ssb receiving converters CV-591A/URR with manual & unchecked. Used with R-388, R-390, SP-600, 75A-1-3 etc. Clem, K8HWW, 33727 Brownlea, Sterling Heights MI 48077. (313) 268-2467.

WILL Trade: Collins 72S-1 and 32S-1 for KWM-2. WA3TLU, 15607 Bounds Avenue, Laurel MD 20810. Tel. (301) 725-3539.

WANTED: 1916, 1917, 1919 and January 1922 QST. W3QII, 5899 Barnes Avenue, Bethel Park PA 15102.

EXPERIMENTERS, Builders — At last preetched, predrilled, glass epoxy, solder-plated, printed circuit board 1-inch X 5.4 inches. Mounts six 14 pin or five 16 pin ICs, transistors, has extra pads for components. Power and ground bus mounting and stacking holes. A few jumpers completes your circuit. Save time and money with G boards — $3.20. California Residents, add 5%. Chronometric Products, Dept. Q, 16530 Ardita Drive, Whittier CA 90603.

GREAT Circle Bearing charts. Computer generated for your exact QTH. Each chart gives bearings, distances, and return bearings for 660 locations throughout the world, and consists of six handy-sized 8-1/2 by 11-inch pages. Price $1, postpaid worldwide. This non-profit project described in detail in Ham Radio Magazine (New Products) March 1973, and Radio Communication (article) November 1972. Send name and address; name of town for which you want the chart (if rural area, or under 10,000 population, include latitude and longitude or carefully describe location); $1. To: Great Circle, 1808 Pomona Drive, Las Cruces NM 88001.

1000-V 1A diodes 1N4007 10/$2.50 or 50/$10, postpaid USA. W2EKB, 348 Bortons Mill, Cherry Hill NJ 08034.

LIBERIAN Mission urgently needs Drake or other suitable gear. Also beams, 2 mtr & cb and test gear. State lowest price. All donations tax deductible. Ambassadors For Christ, Box 366, Concordia Seminary, Springfield IL 61105.

COMPLETE budget ssb station: Galaxy VMk2, 400 watts with VOX; matching ac supply & speaker; Heath SWR bridge; Turner 454C base mike; 1971 Foreign & USA callbooks. All $300. FOB. Steven Falk 97-07 63 Road, Rego Park NY 11374.

FOR SALE: Brand new Heathkit, all assembled SB301 receiver and SB401 transmitter — $500, or best offer. Selling due to demise of W1MC. E. Corby, 70 Crown St., Trumbull CT 06611.

FOR SALE: Hallicrafters PS-150-12 dc supply, excellent condition — $60. Will trade for EICO 751 ac supply. WA0RLL, 123 Jones Court, Midland MI 48640. Phone (517) 631-9676.

DRAKE TR-6 with blanker, low serial number, good condition — $450. Curt Schuster, 5726 Balsam Rd., Madison WI 53711.

SWAN 350, AC power supply, mint condition — $275. H. Fullam, 3 Cliff Place, Armonk NY 10504. (914) 273-8529.

RECEIVERS for sale: SB-303, SX-101A. Both mint with manuals. State your offer in first letter. WA8YVR, 519 Oakbrook, Flushing MI 48433.

BRAND new Kenwood (Trio) R-599 receiver, built-in 2m converter, ssb-fm-cw-a-m and matching T-599 transmitter w/orig. boxes, cost — $775, take first $500; Heath GR-295 Color TV Console, partially finished remote control, cost over $600, best offer or trade; 1296 Mc klilowatt linear; HP Sig. Gen. W4API, Box 4095, Arlington VA 22204.

SALE: Yaesu FTdx570, SP401P speaker and phone patch, YD844 matching mike, absolutely mint condition, will not split. $500 firm. EIO, 720 transmitter, 730 modulator, 722 VFO, also mint condition, will not split. $100. W3BPZ, 1039 N. 21st St., Allentown PA 18104. (215) 437-1608.

30 pieces of excellent-used commercial ham equipment — priced to sell, Send self-addressed stamped envelope for list. S. Bernard Kamp, 329 Edwards Dr., Fayetteville NY 13066. (315) 446-6332.

DRAKE 2N-T — $110, Hy-Gain 248BOQ 20-40-80 Trap ant. — $19. Both new, never used. Wm. Campanelli, 136 Derfuss La., Blauvelt NY 10913.

DRAKE 2-NT xmtr, mint cond. — $110, plus 9 xtals. M. Grodner, 2977 Mariposa Dr., Durlingame CA 94010.

SAVE $100 — Brand new Hallicrafters FPM300, solid-state transceiver in original packaging. James T. Thompson, W5KRD, New Hebron MS 39140.

HAMMARLUND 180-C, matching speaker, practically brand new — $250. V. R. Parker, 463 Chase Rd., Lunenburg MA 01462.

SELL Hammarlund HQ170, excellent condition — $150. Stewart Crisler, WB4WMA, 505 Cherry Road South, Memphis TN 38117.

FOR SALE: Drake T4X-R4A & L4 linear — $875. Package deal only, will accept offers. Swan 240, 80-40-20 m. cw & ssb 250 watts. Mobile rig including ac & separate dc supplies — $150. Hy-Gain 6 & 2 meter beam — $10. Electrovoice 664 mike — $25. Viking navigator — $40. Ham-M rotator — $60. Collins 312A1 speaker & clock console for KWS1 — $50. All above in excellent condition. Paul Neveu, W1CKA, 60 Northwestern Dr., Bristol CT 06010. Telephone (203) 582-4885.

EXCELLENT sixteen-month old Drake R-4B — $375; MS-4 — $10; MN-4 — $75; Ten-Tec keyer — $50; Brown Brothers BTL paddle — $16; Homebrew linear w6new 3-500Z — $120; 12HR Tymeter — $6; Heath HW-12 w/homebrew ac supply — $75. TR-44 rotator — $40; Viking Ranger Two — $150; Rohn Ten-foot roof tower w/rotor plate — $25; new 2m 8/8 beam — $20; Mosley MP-33 Ten-bander — $45. Manuals. Will ship. First checks take. Chris Daly, 2 Timberhill Drive, Livingston NJ 07039.

MUST Sell: Realistic DX-150A 4-band receiver. Like new, w/speaker and items helpful for Novice — $95. H. Sansoucy, Edwards St., Southbridge MA 01550.

DXers — Dig them out of the mud. New low-noise dual-gate MOSFET preamplifier. Nominal 20 dB gain. 10-30 MHz. Complete in cabinet — $29.95. Dynacomm, 1183 Wall Rd., Webster NY 14590.

HEATH SB-102, SB-300, SB-600, plus other small items, best offers, together or separate, call around 5:00 EST. WB8GSY, Gregg, (614) 774-2542.

FOR SALE: SB303 with cw filter, SB401, SB600, microphone — one year old, factory aligned, excellent condx. — best offer. WB9GUG, 2619 Henry St., Sheboygan WI 53081. Phone (414) 452-7590.

DISCOUNTS on all Shure and Electro-Voice microphones. Shure 444 list price — $49, only $23.87. E-V 619 list price — $57, only $26.78. All units postpaid, guaranteed. Check or COD. Other models available. Advance Sound Company 188 Warner Rd., Huntington NY 11743. (516) 368-7620.

RARE QST. All 1920, 1921; all 1922 except January. All covers. $140 or Remington M-1 Carbine, Singer 1911A1, or tour Mauser M98. H. E. Sanders, K4HGF, Rt. 5, Fayetteville TN 37334.

WANTED: Griddip osc. WB5CRX,Box 643, Norman OK 73069

YOUR one-stop source for the finest in amateur equipment. Featuring Clegg, Regency, SBE, CushCraft, Gladding, Newtronics, Ten-Tec, Standard, Genave, plus others. Phone or write today for fast personalized service. Johnson Electronics Sales, Box 332, Griffin GA 30223 (404) 228-3831.

COMPLETE Station —FTDX-560, separate VFO & speaker, all matching. Factory recond. & updated to latest specs. Henry 2K-D w/new finals. Drake W-4, Shure 444, G.M.T. clock, B-W low-pass CDR. TR-44 rotator, Cubex fiberglass wide-spaced two-element quad, 300 ft., coax, plus misc. All above in A-2 mint cond. Complete package only — $1,100 — firm. Includes 40 ft. Tristo crank-up self-supporting tower. Shel M. Kurtzman, 5363 Geyser Avenue, Tarzana CA 91356.

ESTATE of WA@JZS: KWM2/136B2/Waters 340A — $800; MP1 — $90; 351Ds new — $70; 30L1 — $325; 136B1, new — $50; SR2000%HA20/P2000 used only 7 hours — $950; other ham, test equipment; new UTC S48 transformer, S37, S38 chokes; other parts. Everything guaranteed to meet original specifications. Sase for list. Brian Harris, W9GUO, 617 Madison St., Oak Park IL 60302.

FOR SALE: SB-401, with xtal pack, good condition; 75A-1 by Collins, 1-MHz coverage each band 80-10, good condition — $150 each, both for $300. Virgil L, Jiles Jr., 4606 Tumbleweed, El Paso TX 79924.

LAMPKIN 105B frequency meter; with over 1300 factory calibration dial readings, manuals, original carton. Superb condition — $105. M.O. only. Robert Goodwin, 351 Sicomac Ave., Wyckoff NJ 07481. Phone (201) 891-4458.

TEN-TEC PM3 transceiver, 5 watts 40/20 meters — $33. WA6MOW, Tel. (714) 830-9821.

VALIANT/I, many spare tubes — $110; .125 watt/potted Varamatch modulation transformer, new UTC-CUM3 — $15. Donald R. Gardner, W8HET, 3800 H. Riber Rl., Port Huron MI 48060.

DRAKE TR22, mint — $165. WB6RPU, Box 824, Escondido CA 92025.

GLADDING 25 2m fm transceiver. HC power supply and 34/94, 28/88, 19/79 crystals included. Mint condition — $205. K1MRM, 44 Briarwood Rd., West Hartford CT 06107.

YAESU FTDX 560, excellent condition. Purchased 1971. Little used. Best offer. TA33 JR. — $50, will not ship latter. W5BWA, Alexandria La 71301. (318) 443-6565.

HAMMARLUND SP-600, no case, good condition — $165; HT-32 with new 6146s — $130; SB1-LA linear — $75. WA6WWI, 1602 San Antonio, Garland TX 75042. (214) 276-0769.

SWAN AF-800 cw filter for 300, 350 c, 500, and 500 c, in original factory carton, never used — $25. WA5AAQ, 5833 Normont, El Paso, TX 79912.

FLORIDA: Retirement DX QTH, 50 foot Windmill, 16 Acres w/creek, house 4 br, 1 bath plus mobile home. $22,000. K4TIG, Rt. 2, Box 57, Hawthorne FL 32640.

WANTED — Dowkey Relay handkey Vibroplex or keyer and paddle SWR bridge power meter low band VFO. Joanne Kakstys, WA2VHW, 18 Hillcrest Ter., Linden NJ 07036.

ANTIQUE Television — 7-inch Hallicrafter with channel 1-thru-13. Working condition. Swap for Bird Thru-line or Meas. Corp Model 59 Megacycle Meter. Dessert, 224 Hillcrest, Newington CT 06111.

SELL, extra nice Collins KWM-2 with Waters rejection tuning, plus-in relays, matching F-2 ac power supply, and Collins SM-3 mike. $750 complete or I might take a less expensive transceiver in on trade. Richard Schark, 417 N. Ferry, Ottumwa IA 52501. Tel. (515) 682-5741.

MOBILE Ops — Completely shielded ignition system is answer to ignition noise problem. Write for info on shielding kits and components. Summit Enterprises, 36 Winchip Road, Summit NJ 07901.

SB-400 Heathkit transmitter. Needs some work on 10-meter coils. Otherwise excellent — $210. Call or write — Ed Troy, Pi Lambda Phi, Lehigh University, Bethlehem PA 18015. (215) 691-9388.

SELL: NC300 Rec., Excellent conditon — $135. Will deliver in S.E. New England. K1ZZY, M. L. Young, 14 Meadowbrook Lane, Harwich Port, MA 02646.

SELL Galaxy R530, recently factory overhauled and aligned. Prefer no ship but will discuss — $580. Art Hale, Box 1003, Largo FL 33540. (813) 584-2968.

SELL: Viking II — $35; Gladding 25 — $150; S40-B — $20; BC-221 — $35; RTTY TU — $35. W8KV, Box 4, Chillicothe OH 45601.

WANT: Impedance bridge GR 916A, 1601, 1602, 1603, or equal. Nagle, 12330 Lawyers, Herndon VA 22070.

WANTED: Collins KWS-1 and SC-101. Preferably in good to mint condition. Will pick up within 600 mi. radius. Pay shipping & ins. if farther. Call collect, or write — Dean Pollock, WB3SSV, RD3, Box 402, Greensburg PA 15601. Tel (412) 834-1532, eves.

NC303 with calibrator and manual — $180. You pay shipping, but may deliver if New York state. Larry S. Kaufman, WA2MOR, Box 760 CCT, Potsdam NY 13676. Phone (315) 268-7827.

SELL Heath DX60B xmtr; HG10B VFO; HR10B rcvr with calibrator, manuals, mike, phones, key — $145. Excellent condition. John Shea, 1221 E 59 St., Brooklyn NY 11234.

ENGINEERS, Radio Men — Tired of humdrum city life? For Sale — a successful radio business, 5 acres, home, towers, three buildings, antennas, income property. Be the highest ham in New Jersey — $70,000. Principals only. B. J. Simon Call (201) 697-4246.

HEATH HW-16, HG-10B — $125. SW-717 — $35. You ship. WB4URW, 8802 Bellefonte Road, Richmond VA 23229. (703) 282.6735

HEATH HR-20, HX-20, HP-23A, SB-600. Complete working Novice or General station with all manuals — $165. WB4ZDD, Dave, 5 Lakeshore Drive, Newport News VA 23602.

SWAN 500 and 117XC. Super sanitary, used less than 20 hours. Pick up only — $400. W6WRU, 3920 Seneca Avenue, Los Angeles CA 90039. (213) 662-4029.

RME-602, 20 watt 6 & 2 meter transmitter — $35, cash & carry. W9WTG, Jay Smith, 1S162 Holyoke Ln., Villa Park IL 60181. (312) 627-3941.

DRAKE TR4C & AC4, new, unopened carton — $625 FOB. Collins 516E1 12-V dc supply for KWM2, etc. — $70 postpaid. WA6YTR, Box 241, Calimesa CA 92320. (714) 795-2144.

NCX3 w/NCXA speaker 80-40-20 33D Turner Mic. — $200. K8HZM, Albert Allen 3352 Claydor Dr., Dayton OH 45431. 426-7348.

LATE model robot monitor and camera and accessories. M. Marsley, 2242 Stevens Avenue, Kalamazoo MI 49008. Phone (616) 342-8838.

SBE144 and KWM-1 for sale, best offer. KZMMT, Peter Brandenberg, 43 Canterbury Road, White Plains NY 10607 (914) 946-8253.

SIGNAL/ONE-Alpha-77: CX7 modified to CS7A — $1295. CS7A demonstrator — $1695. Alpha-70 vapor and air — $995. 160 meters add — $75, 90-day factory warranty on used Alphas. NCX-1000, new — $595. 30L-1 — $320. Top trades. Payne Radio, Box 525, Springfield TN 37172, days (615) 384-5573. Nites (615) 384-5643.

QST from 1922. CQ from 1945. Make offer. Sase for list. W8EYU, 1455 Rochingham, Rochester MI 48063.

WANTED — Low-prices T4, T4B, or T4X w/PS only. Elec & Mech gud. Looks fair. Write — Chesler L. Pattee, 20 Marie Ave., Sharon MA 02067.

KWM-1 with 516F-1 ac supply. Excellent condition. $295. K7VNO, 8751 Shenandoah Place, Tucson AZ 85710.

WANTED, cw filter for 75A1. WA6FKI, 11388 Campus, Loma Linda CA 92354.

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 Regency HR-212 two-meter fm transceiver, 20 watts, amateur net — $259; new factory sealed, factory warranty, Gonset GSB 201 MKIV 2kW linear, reg. — $660, cash $399. New Rohn 50 ft. foldover tower, prepaid — $239; New Mosley CL-33 and demo Ham-M rotor — $215. Used equipment: Ham-M — $89; SB-220 — $339; T4-XB — $369; R4-B — $349; HT-37 — $165; TR-4 w/34NB — $489; HX-10 — $159. Moory Electronics Co., P.O. Box 506, DeWitt Ar 72042. Tel (501) 946-2820.

CRYSTALS airmailed — Novice, nets, MARS — Novice. All new and old frequencies, rock-solid crystal signals. Economical. Active, FT-243, five/order, 40M-15M-10M — 99c each. 80M — $1.59 Mix OK. Under five — $1.50, 80M — $1.75 each. Novice band calibrators: Two/band for QSO and edge markers, 40M,-15M-10M — $2.70, 80M — $3.50. General purpose: FT-243 .01% 32pF, 3500-8600 — $1.90 each, (five — $1.75), (nets ten same — $1.45) 75c for HC-6/u above 2000. Free order listings. Bob Woods, W9LPS. Since 1933. C-W Crystals, Marshfield MO 65706.

CW time identifier — a drilled fiberglass 4-5/8 X 8-1/2 printed circuit board now available for W8BEB cw time identifier in the Nov. 72 issue of QST. $12.50 ppd. WA6JYJ, "RTTY Speed Converter," a 4-1/2 X 5-7/8 drilled fiberglass board for $5 ppd. Also many others. C. R. Sempirek, K8WDC, Rt. 3, Box 1, Bellaire OH 43906.

HAVE 570 QSTs, good condition, from May 1917 through December 1967 and 89 CQ's, January 1952 through December 1967. Send for list and make offer. Mrs. Albert Swan, 1515 Washburn, Topeka KS 66604.

TEKTRONIX 511AD Scope D.C.-10 MHz, w/probe — $150; TV-7B/U Mutual Conductance Tube Checker w/adapters and charts — $35; Amphenol 855 Color CRT Cehcker — $75; Heath Frequency Counter, 1Hz-18 MHz, factory checked — $175; Dycom VHF Scaler 4-275 MHz, New — $75; NTS Color TV Course — $35. W4ERZ 2866 N.W. 34th Tr., Ft. Lauderdale FL 33311. (305) 731-7013.

DRAKE: R4B, MS-4 — $380; T4XB, AC-4, TV-1000-LP, 729SRD — $495; MN-2000 — $175; Heath: SB-220 — $375; Keyer — $35; Standard: SRC-826M, SR-C12/120-1BH, Larson, Ringo — $350, Tempo (Sankyo)! fmv, ac — $150; Vibroplex: Presentation — $15; Mini-Products: Two-element, rotor — $50; Hustler: Vertical, 75-2000 coil — $60. W7IBJ, Box 2454, Casper WY 82601.

1973 Hobby Electronics Directory. Hundreds of companies, products, and services. Parts, surplus, test equipment, plans, kits and more — $1.50. Newcal Enterprises, Box 323-H, El Segundo CA 90245.

NOVICES: Eico 720 transmitter, surplus 80-meter receiver. WB2KRC, Gordon Piper, local only. (201) 891-4255.

DRAKE matchbox MN-2000, new with guarantee card — $140. K1PNL. Tel. (203) 583-5433.

FOR SALE: SB102 & power supply — $350, one-year old. Need Swan ac supply, will trade. D. C. Hubbard. 4811 W. Grace St., Richmond VA 23230.

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, 589 Central Avenue, East Orange NJ 07018. Phone (201) 678-7070.

FOR SALE: Telfex 4-element wide spaced 20-meter Monobander — $250. Irving Glassman, M.D., K1SEO, 186 Sherman Avenue, New Haven CT 06511.

WANTED: 6 Kc and 1 Kc filters for Collins model 51J-4 (500 kc IF) cont coverage receiver. Bill, 7914 Leonora, Houston TX 77017.

KWM1, 516F1, best offer over $200. WB2CYU (210) 335-7409.

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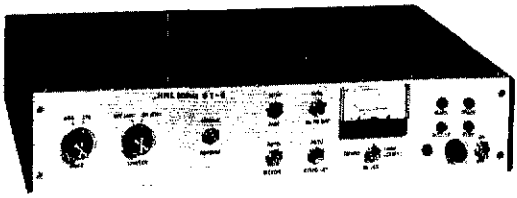

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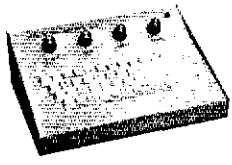

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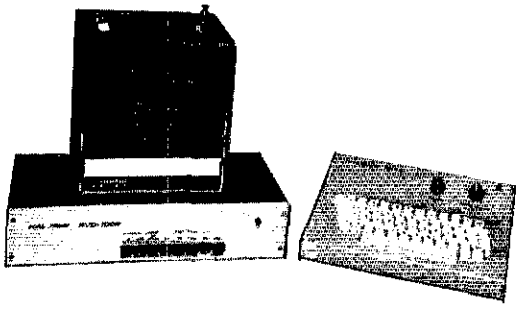

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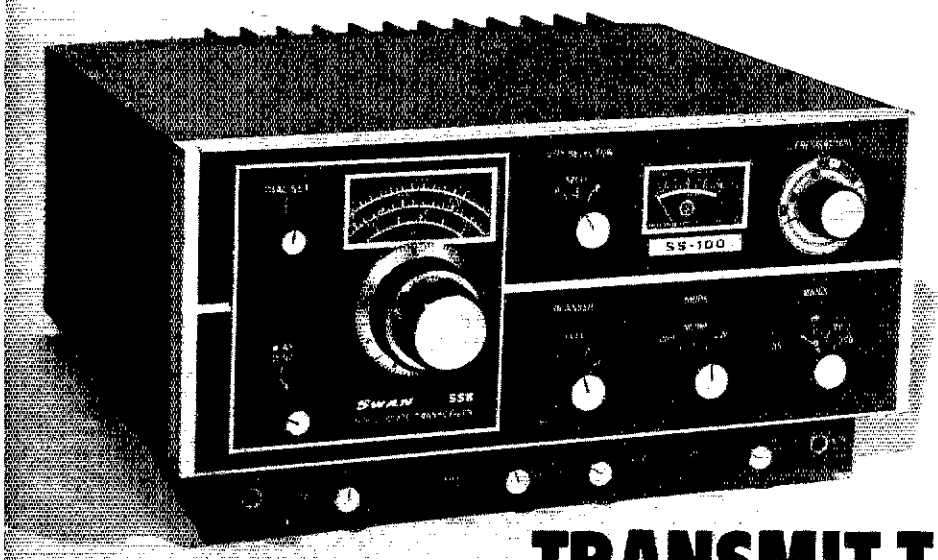

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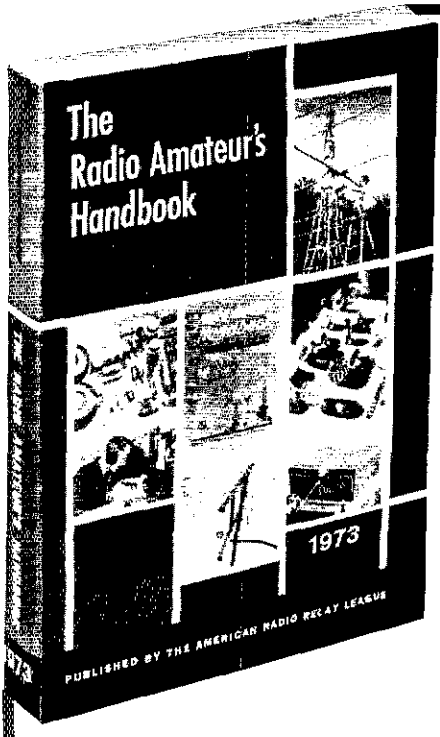

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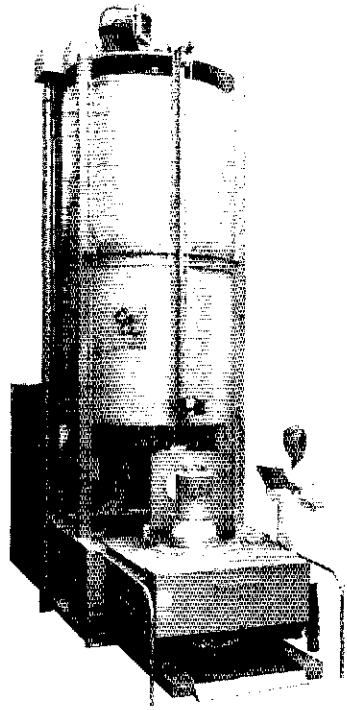

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