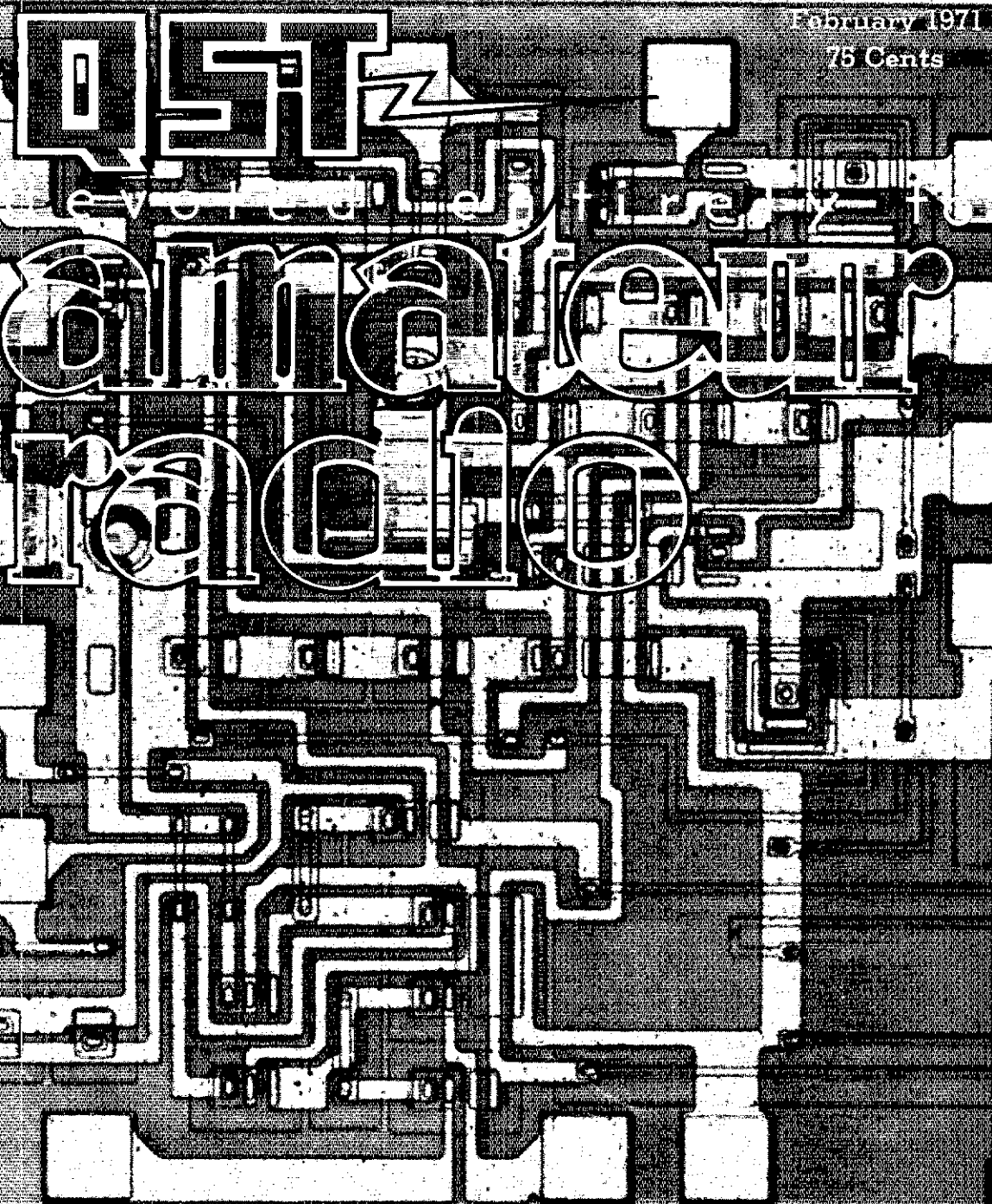


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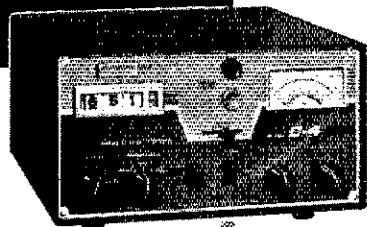
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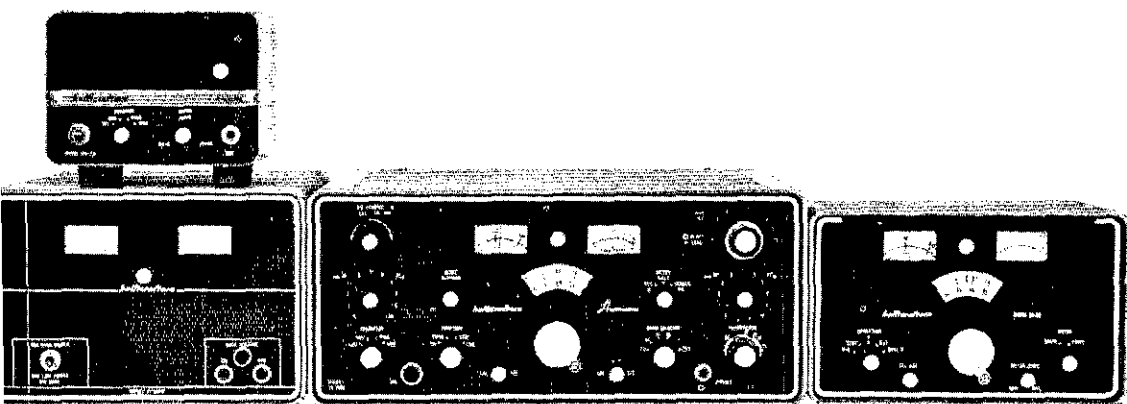
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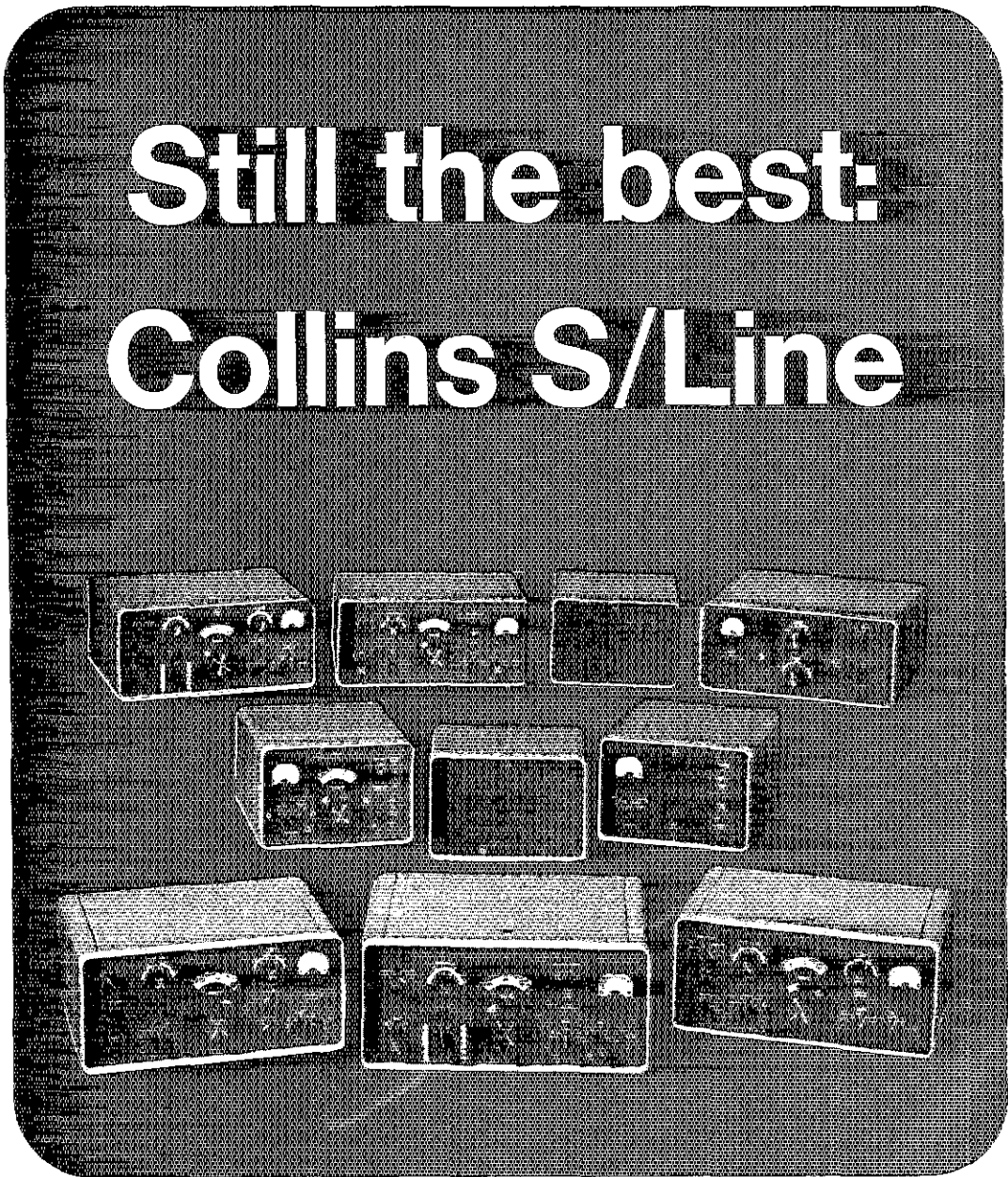
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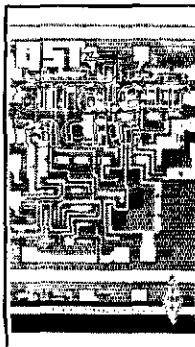
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OUR COVER

It's not really a psychologist's maze, it's a die photo showing the "works" of a monolithic integrated circuit similar to those described by Pos on page 31. Photo courtesy of Motorola Semiconductor Products, Inc.

QST

FEBRUARY 1971
VOLUME LV NUMBER 2

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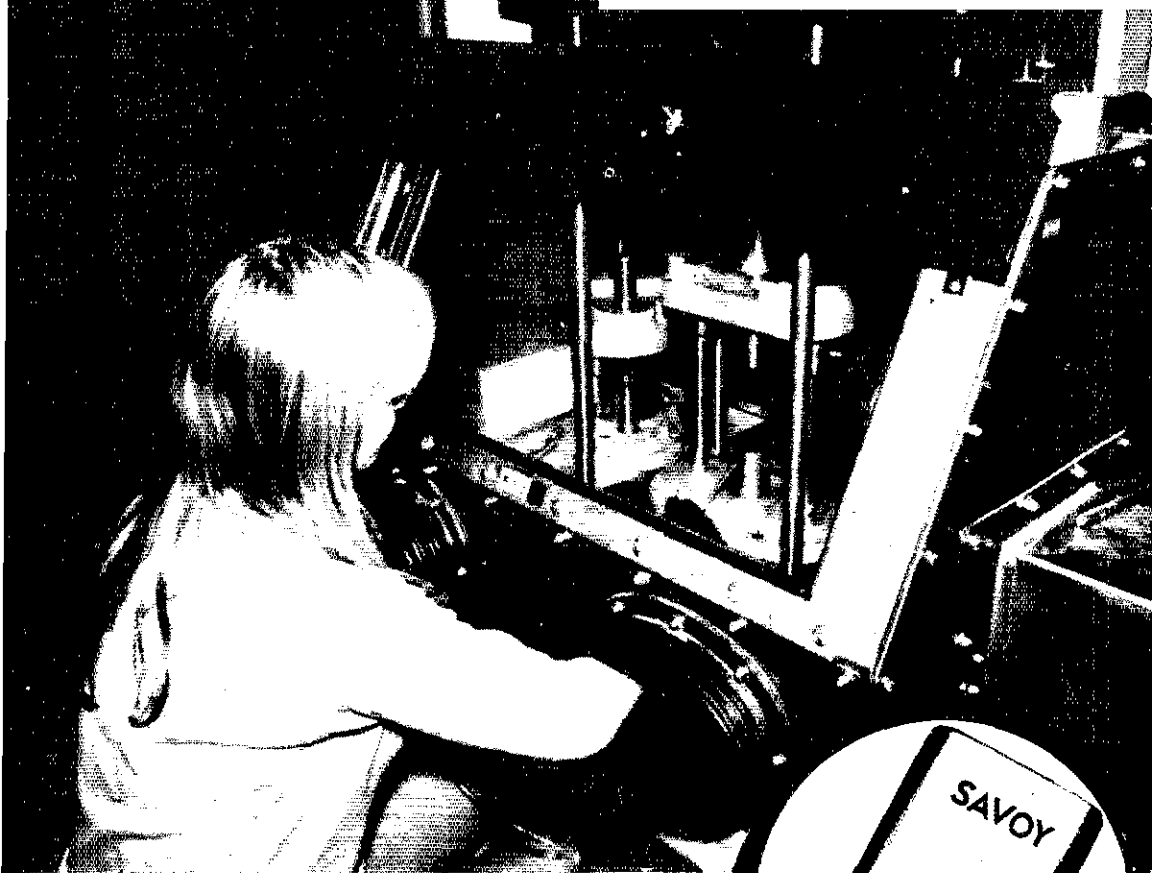
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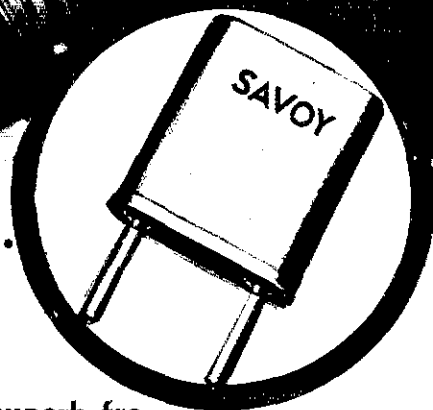
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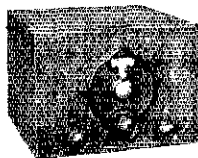


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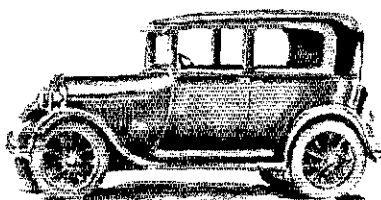
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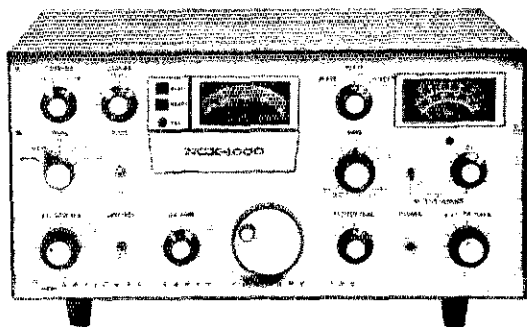
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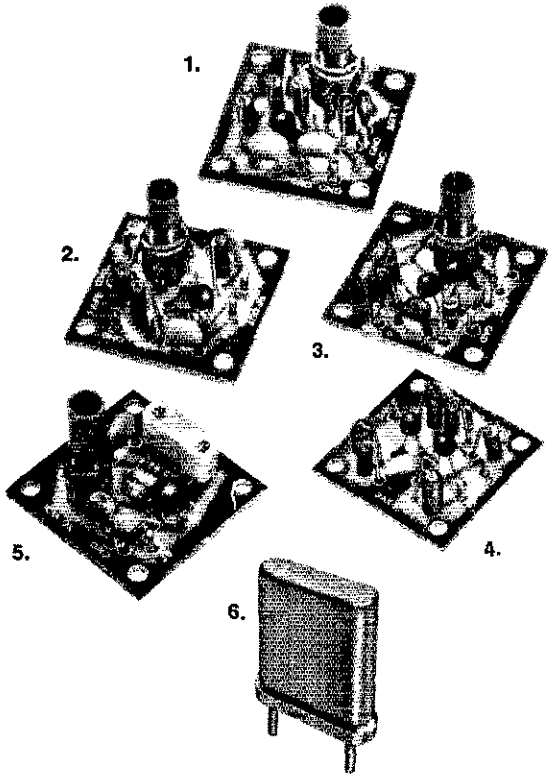
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Vice-Director: Hugh Cassidy W6AUD
77 Coleman Dr., San Rafael, Calif. 94901

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Vice-Director: L. Phil Wicker W4ACY
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Rocky Mountain Division

CHARLES M. COTTRELL W0SIN
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Vice-Director: Allen C. Aulten W0ECN
2575 South Dahlia St., Denver, Colo. 80222

Southeastern Division

H. DALE STRIETER W4DQS
928 Trinidad, Cocoa Beach, Fla. 32931
Vice-Director: Charles J. Bolvin K4KQ
2210 S.W. 27th Lane, Miami, Fla. 33133

Southwestern Division

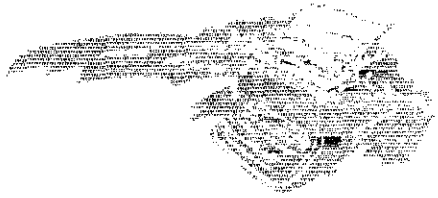
JOHN R. GRIGGS W6KW
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Calif. 93401
Vice-Director: Arnold Dahlman W6UEI
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Vice-Director: Leon Vire W5VCE/W5OBC
330 Rusk Ave., Houston, Texas 77002

* Member Executive Committee

"It Seems to Us..."



THE SERVICE HEADQUARTERS

Was called on to give a luncheon talk to the local Rotary club . . . wonder if you have any information on tap to meet such situations?

You bet — a typical half-hour talk, already prepared.

I think we have enough hams in town now to organize a club. Do you have any dope on how to go about it?

Yes, indeed — an extensive "kit" of suggestions, sample by-laws, how to keep up interest, etc.

Our group would like to set up a small exhibit on amateur radio at the centennial exposition at the county fairgrounds next month. We decided to write ARRL to find if you have any suggestions along this line.

You're darned tootin' we do, OM — not only suggestions but on occasion the loan of certain items which will help make the exhibit a success.

It is part of our job at Hq. to have such things — and many others — available to fill membership needs. The staff at 225 Main Street is set up as a service organization. Every member of the League is familiar with the most important direct service — the supplying of *QST* each month. Most of you know, also, about other major service areas: about representation in international as well as domestic fields; about ARRL general operating activities, contests and awards with their detailed handling and checking; about field organization matters with their associated regular bulletins and newsletters; about the Technical Information Service; about field travel to conventions; about WIAW with its up-to-the-minute news bulletins and code practice schedules; and about the new ARRL film, "The Ham's Wide World," for improved public relations.

But there are numerous individual and specific services, too, to fill membership requests similar to those we quoted at the top of this page. For the asking, we have pamphlets to educate the public on amateur radio, operating desk aids, sample broadcast scripts on amateur radio, suggestions for hamfest and convention planning, training aids films and quizzes for affiliated clubs, extensive dope on how to set up code or theory training for beginners, safety rules, code charts, legal guidance for fellows who have come across a

knotty zoning ordinance problem in connection with the erection of a mast, dope on latest regulatory changes and interpretations of special cases of licensing, essential data on foreign regs in case you're going abroad . . .

Well, shucks — let's put it this way: If you have a problem, or a project, drop us a line; it's dollars to doughnuts we can be of help.

After all, that's what we're here for.

INDUSTRY PESSIMISM?

A League member in Washington recently telephoned a major electronic industry association in that city to enquire as to its viewpoint in a certain amateur regulatory matter. His question was answered — but to his surprise he was also informed that amateurs are a snobby, class-conscious group who only *think* we perform a public service; that our median age is in the 50s; and that the number of amateur licensees is decreasing steadily each year. Somewhat alarmed, the ham contacted us.

Whether we're snobby or class-conscious is pure opinion, to which the industry man is entitled. But he is doing ham radio (and the image of his own association) a special disservice by the other two comments, which on the basis of facts are totally in error.

The Stanford Research Institute a couple of years back undertook a survey which showed the average age of the amateur to be 41. This confirms our own (and other) surveys.

The amateur license total has remained just about the same for six or eight years. These are FCC figures and statements; not opinions. We haven't gained; but neither have we lost.

To some extent we share our informant's alarm, since we have heard another principal in this same association make similar misstatements of a "loss" of 15,000 amateurs the past five years.

The amateur manufacturing and distributing industry is proclaimed by its "leaders" to be not in the healthiest possible condition. Maybe one reason is that these same leaders are harbingers of doom, spreading pessimism through misinformation?

Fortunately, the aggressive members of the industry seem to pay little attention; this issue of *QST* carries the largest number of advertising pages in several years.

QST

League Lines . . .

Some radio club councils in larger cities are in process of buying for loan to member clubs, prints of the new youth-oriented version of the ARRL color film, "The Ham's Wide World." It is titled "This is Ham Radio," and is excellent for indoctrinating school and youth groups. W6BVN at Media Five, 1011 Cole Ave., Hollywood, Calif., can furnish information and prices.

One more note to clubs: Make certain someone in your group is designated to copy WIAW bulletins -- to be read at meetings, inserted in club newsheet, etc. Hq. no longer sends complimentary mail copies -- we hams are, after all, a telecommunications group!

Most Technician Class licenses are arranged by mail under a volunteer examiner; the ticket reads, "Technician (C)" and it carries no credit toward General. However, if you go to an FCC examiner for a higher license, but copy only enough code for five wpm, the examiner will offer you a crack at the standard written exam. If you pass, you'll get a new Technician ticket without the "(C)" -- it does carry credit toward General, leaving only the 13 wpm for your next try. Caution: if you want to continue as a Novice while you build up your speed, don't take the Technician test; you can't hold both licenses at present.

A major experimenter magazine, in its renewal solicitation literature, says FCC is about to consider a code-free license which "would open the doors for CBers to become hams and engage in world-wide radio communications." Maybe they've discovered a new mode of vhf DX propagation; international regulation limits privileges of any such license to above 144 MHz.

Things are getting tough all over. The Radio Society of Great Britain has been obliged to raise its membership dues to 4 £ -- which if our arithmetic is correct means ten bucks in U.S. money. The economics of operating an association will sooner or later catch up with us as well.

In addition to misinformation on the "declining" number of amateurs (see editorial, previous page) some pessimists are still parroting the discredited saw that we aren't getting any youngsters into ham radio these days. Facts: Twenty years ago only one newcomer in five was a teen-ager; today, half the new licensees are in the teen-age (or lower) bracket.

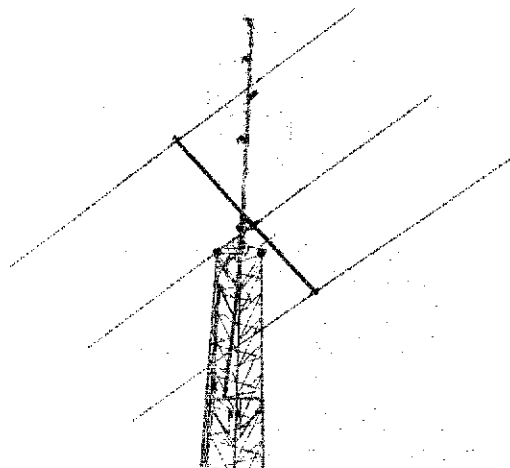
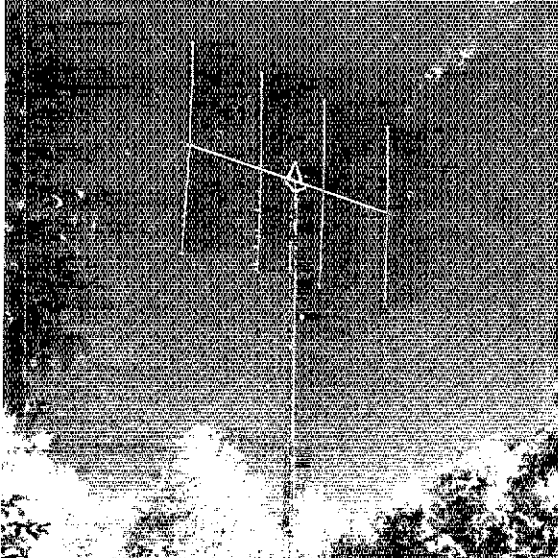
Lost your ticket? Get a duplicate from FCC, 334 York Street, Gettysburg, Pa. 17325. You can apply by letter, but (since August 70) there's a \$6 fee. Simple changes of mail address with no change in station location still are free. Send the letter to the address above, and keep a copy with your license until next renewal.

Man bites dog! Over the past 3 years FCC has received umpteen petitions from amateurs and groups seeking one form or another of expansion of the voice subbands at the expense of cw. W4QVJ has filed one (RM-1723) which proposes expansion of the cw segment on 20 and reduction of phone.

We're already getting first queries on Field Day dates. This year they are June 26-27. Make your plans -- including vacation? -- accordingly. Other events for the year are listed on page 93, January QST.

W9BRD in his "How's" column this month joins us in expressing disdain for the few crepe-hangers among us. His subject is the 1971 DX contest -- upon us almost before the bug cools down from the SS fray. Be there?

Hamfest coming? Register your date with Hq. and avoid possibly-costly conflict with major activities of nearby clubs.



Quad vs Triband Yagi

BY COL. JOHN H. PARROTT, JR.,* W4FRU, EX-KA2JP

CLARENCE MOORE the inventor of the cubical quad, probably little realized when he and his associates were huddled over the reference books back in 1942 that the product of their efforts would receive such widespread acclaim and damnation as has been poured out upon the cubical-quad antenna. The controversy continues with proponents and opponents switching sides as often as contest results are published. The purpose of this article is to contribute yet another bit of data to this controversy and to provide the neophyte and old timer alike an additional basis for applying the principles of cost effectiveness to selection of antenna systems.

While stationed in Japan, a sort of DX crossroads of the world, this writer had the opportunity to observe, first hand, the excellent performance of the cubical quad in competition with the Yagi, dipoles and an assortment of other antenna systems. In pursuing this undertaking certain steps were necessary to insure that any conclusions made would be meaningful, and that they would be derived from sound data. With this in mind a plan emerged.

Objectives

In the many articles written on the cubical quad, it is noteworthy that only on a few occasions have the authors been privileged to compare the quad with other types of antennas on a real-time basis, and from the same operating location. Furthermore, when such comparisons were made, the authors generally compared against some type of monoband antenna system. A casual scanning of the 10-, 15-, and 20-meter phone bands would lead one to conclude that the triband Yagi enjoys a

rather high position of popularity among the antennas in general use. This being the case, it appeared that a worthwhile contribution to the data already available on the Yagi and quad might be made by conducting a series of controlled comparative tests, employing the triband Yagi and the quad. The test objectives were then defined: to compare various configurations of a cubical quad antenna with a representative commercial triband Yagi; such tests to be conducted over short, medium, and long transmission paths, and to arrive at conclusions regarding the relative merits of each antenna.

Test Plan and Procedure

Every effort was made to conduct the tests in a manner which would lessen the possibility of compromising the techniques employed by either the writer or participating stations:

1) The test to be performed by establishing communications with amateur radio stations located throughout the world on a random and scheduled basis.

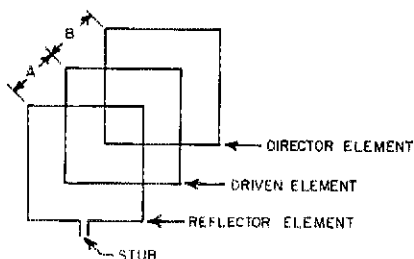


Fig. 1 - Element spacing information for Table I.

*2216 Windward Shore Drive Virginia Beach, VA 23451.

TABLE I

	Mod. I	Mod. II	Mod. III	Mod. IV
Reflector Element	72'3"	70'4"	72'5"	72'5"
Driven Element	69'	70'4"	70'5"	70'5"
Director Element	-	-	-	69'1"
Spacing "A"	7'6½"	8'5"	13'4"	13'
Spacing "B"	-	-	-	13'
Stub	20-30"	34-38"	-	-

2) Amateur radio stations volunteering to assist in this effort to be briefed on conduct of test and data desired.

3) A voice ssb transmission to be made to the participating station, identifying the first antenna used as antenna "A".

4) The voice transmission to be followed immediately by an unmodulated carrier for a period of approximately 5 seconds.

5) The antennas would be switched, and a voice transmission be made identifying the antenna as "B", and the procedures above repeated.

6) Participating stations will note signal strength related to each antenna, and provide a numerical value as observed on his S meter or other indicating device. These values to be logged, and the test reinitiated with another volunteer station.

Equipment Preparation

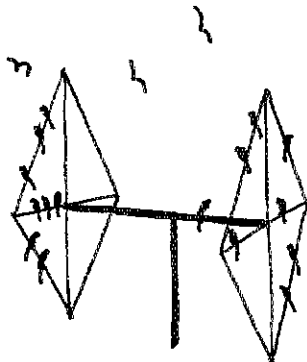
1) Antenna heights to be as nearly identical as possible.

2) Center of antenna horizontal lobe patterns to be as nearly identical as possible when pointing the antennas toward a participating station.

3) Resonant frequency of each antenna to be matched as closely as possible.

4) Transmission lines to be matched to antennas and transmitter loading to be as nearly identical as possible with each antenna.

5) Instantaneous transfer of antennas.



CLOSE SPACING IS FOR THE BIRDS !

6) Relative power and SWR to be monitored continuously.

7) Prior to and after each data gathering session, equipment parameters will be verified. If a significant deviation in any parameter is noted, data collected will be discarded.

Analysis

Antenna performance conclusions to be based upon an analysis of data derived from a minimum of 50 unmodulated-carrier observations with each antenna configuration, and supplemented with data gathered during conventional ssb QSOs.

Antenna Selection

This writer had been using a four-element commercial triband Yagi (boom length 24 feet, and 55 feet above ground) for approximately 1 1/2 years, so the properties of this antenna were fairly well established. Furthermore, in on-the-air comparisons with competitive models of triband Yagis in use by other U.S. amateurs operating from the Tokyo area of Japan, the antenna appeared representative of commercial triband antennas in general use by the amateur community. Therefore, the Yagi in use at the author's station was selected as the reference antenna.

Text material concerning quad antennas, available to the author in Japan, was reviewed. It became evident that there are almost as many variations in quad design as there are writers on the subject. After much deliberation, and many discussions with amateurs throughout the world, the decision was made to test three models of the quad (a fourth model was tested as will be noted later). Since the physical characteristics of the quad are fairly standard, only the dimensions of the elements and the spacing between them was considered. The dimensions for the three models tested were obtained from a Japanese manufacturer of cubical quads, from Orr's book, *All About Cubical Quad Antennas*,¹ and from Dr. J. E. Lindsay, Jr., WØHJ²

Preliminary Testing

Several days were spent "dry running" the test plan to validate the concept, and to smooth out the operating procedures and techniques. Of particular concern was the possible time required to make a valid data-gathering observation. If data were to be reasonably accurate, the transmission path had to be stable, and the signal-strength observations must be taken on each antenna during a short period of time. The dry runs were valuable in this respect.

A problem became evident during the first day of testing. It appears that those of us who speak and understand English do not always convey the same message when using the same words. As a result it was necessary to modify the verbal format, utilizing simple sentences and placing them in a logical sequence.

¹Orr, *All About Cubical-Quad Antennas*, Radio Publications, Wilton, Conn.

²Dimensions later published: Lindsay, "Quads and Yagis" *QST*, May 1968.

TABLE II

	<i>Mod. I</i>	<i>Mod. II</i>	<i>Mod. III</i>	<i>Mod. IV</i>
<i>Total Observations</i>	50	60	60	52
Less than 2100 miles	12	2	3	3
2100 to 4800 miles	33	31	33	32
Greater than 4800 miles	5	27	24	17
<i>Signal Difference</i>				
More than 1 S unit better	—	—	—	—
Less than 1 S unit better	—	—	7	9
No discernible difference	1	5	51	43
Less than 1 S unit poorer	27	46	2	—
More than 1 S unit poorer	22	9	—	—

It also became apparent that the test could not be conducted under all transmission-path conditions; that even under ideal conditions several observations were often necessary before a conclusive report could be compiled. It was decided to conduct the tests only on 20 meters. The operating time available to the writer favored openings on 20 meters to Europe via the long path, and to Australia, the U.S. and various islands in the Pacific. It was also decided to orient the test antennas so that the topography and obstructions seen by each antenna would be essentially the same. (Physical separation between the two antennas was in the order of one wavelength)

Testing

Dimensions of the first quad model selected were furnished by a Japanese manufacturer of cubical-quad antennas, (see Table I). The antenna was assembled, utilizing commercially-manufactured heavy-duty hardware and fiber-glass spreaders. It was tuned to a center frequency of 14,200 kHz. Testing of the first model began in November of 1967 and continued for a period of one month. The results for this period are given in Table II.

In mid-December of 1967, the first quad was replaced by a model constructed according to the formula and dimensions given in Orr's book. The results obtained with model II are contained in Table II.

Construction of the third model (with wider element spacing) was carried out next. Two matching systems (Gamma and Q-section) were experimented with on this antenna. A satisfactory match could be had with either system. However, the Q-section was used for the test because it was the technique used with the previous two quad models (SWR with each antenna was never more than 1.3:1 with a difference between antennas no greater than 0.1). The results conducted with this model were most enlightening, as shown in Table II. The model antenna was also used extensively during the first weekend of the 1968 ARRL DX Contest. Though these contacts were not used in tabulating test samplings, it is interesting to observe that openings to the U.S. (using the Quad) lasted 15 to 30 minutes longer on each end of the period than with the Yagi. It is assumed that this

phenomena would also apply to each of the other quad models.

The fourth quad tested was a 3-element wide-spaced model constructed according to more dimensions furnished by W0HJ. The results of the samplings were somewhat disappointing and are given in Table II. (Frankly, the author felt that the three-element quad would show a substantial improvement over the Yagi in every case.) The 3-element model did appear to have a better front-to-back and front-to-side ratio than either the Yagi or the other quad models. One positive comment: the 3-element model is a monster to assemble and put up! In the author's opinion the difference in performance isn't worth the small improvement. Perhaps, on the other hand, if one accepts the two-element model as the departure point between a simple mechanical structure and a major project, a four-element model might be more worth the effort. However, this is purely conjecture on the part of the author.

Summary

The antenna tests indicate that:

- 1) One can expect to achieve the same or better results with a two-element quad of proper dimensions than with a three- or four-element triband Yagi.
- 2) A wide-spaced quad will perform substantially better than a close-spaced quad.
- 3) Dollar for dollar, the quad appears to be a better investment than a Yagi.

Acknowledgments

The writer wishes to thank all of the amateurs who participated in the series of tests, and particularly the VK gang, who night after night tolerated the request for observations. The support couldn't have been better, and on many occasions, upon completing a check with a particular station, several other stations would call to give their observations (which were taken during the same transmission test). QST

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

Quick-and-Easy Portable/Mobile Reception

BY DOUG DEMAW, WICER

It isn't always necessary to build a complete receiver for portable, emergency, or mobile operation. By using the method described here it is necessary to add but one stage after any detector — a modulated oscillator — then feed the output of the oscillator into a car radio, or loosely couple its tuned circuit to the loop antenna of a small transistor radio.

THE CIRCUIT of Fig. 1 shows a solid-state superregenerative vhf detector at Q1. Its audio output is coupled to the base of Q2, a crystal-controlled oscillator which operates anywhere in the range of 550 to 1600 kHz. Modulated oscillator Q2 operates as a small transmitter, thus providing an amplitude-modulated signal which can be fed into the antenna jack of any car radio. The frequency of Y1 is chosen to fall in a part of the broadcast band where strong local stations are not present. Level control R2 is set for no more than 100-percent modulation of Q2, and any level from 60 to 100 percent will work nicely. Output can be bridged across the input of the car radio by means of a T connector. C1 is adjusted for the proper signal input level to the car radio, being careful to avoid overloading the front end of the auto radio. Alternatively, gimmick coupling can be used as shown in the dashed lines of Fig. 1. Two or three turns of insulated hookup wire can be wrapped around the base of the broadcast whip antenna to

provide sufficient coupling to the car radio input. The second method makes it unnecessary to cut into the car radio, and makes it possible to remove the ham-band adaptor for quick use afield with a portable broadcast receiver.

RFC1, of Fig. 1, and its related bypass capacitors, serve as a quench-frequency filter. RFC2 isolates the base of Q2 from ac ground so that oscillator performance will not be adversely affected when the arm of R2 is near the top of its range. CR1 is a silicon power diode, and is used to prevent damage to the receiver should the battery leads mistakenly be cross connected.

There is no reason why a free-running oscillator cannot be used at Q2. A Colpitts VFO circuit was tried, and it performed well. Frequency modulation is minimal with either type of oscillator.

A direct-conversion receiver, minus its audio amplifier, can be used in the foregoing manner.¹ A typical hookup for this is shown in Fig. 2. The output from Q1 is passed through a passive filter to provide cw selectivity at 900 Hz. If the receiver is to be used for ssb reception, the 0.57- μ F capacitors should be changed to 0.22- μ F units, thus providing

*Technical Editor

1-Hayward and Bingham, "Direct Conversion — A Neglected Technique," *QST*, November 1968.
"The DC 80-10 Receiver," *QST*, May 1969.

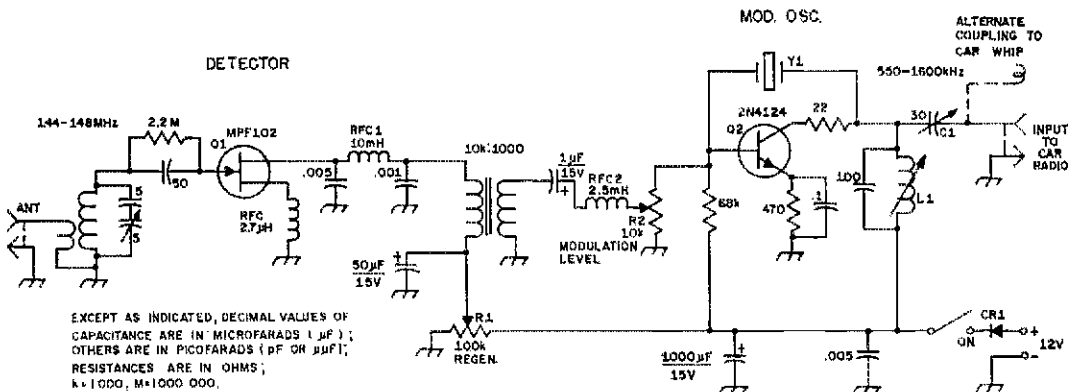


Fig. 1 — Suggested circuit for feeding a superregenerative detector into the input jack of an automobile receiver. R1 controls the oscillation of Q1. R2 sets the modulation level of Q2. Y1 is chosen for operation in a part of the broadcast band where strong local stations are not present. L1 can be a broadcast-band loopstick antenna. C1 is adjusted to provide sufficient signal to the car radio for good reception, but not enough to cause overloading. CR1 is a polarity-guarding diode.

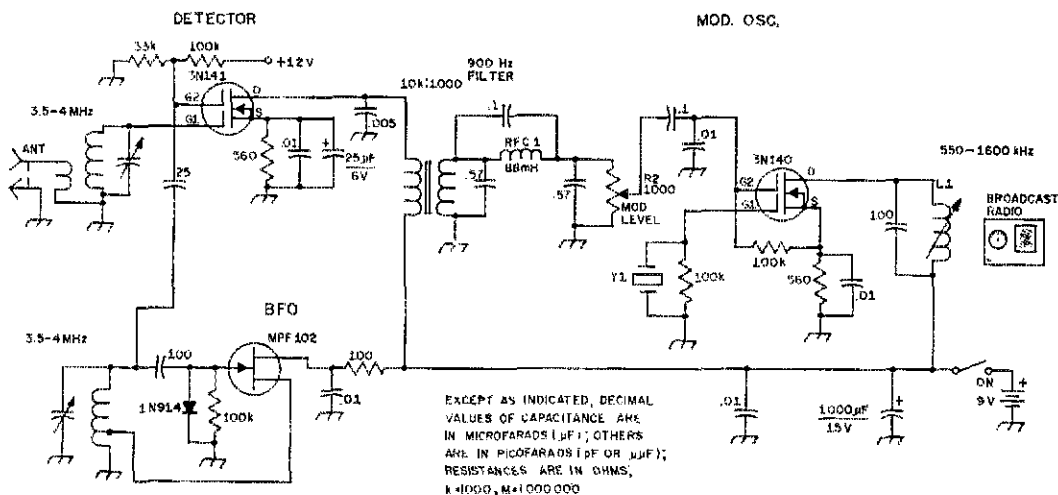


Fig. 2 - A method for feeding a direct-conversion receiver's detector output into a modulated oscillator. In this representative circuit dual-gate MOSFETS are used for the detector and modulated oscillator. Loopstick L1 is loosely-coupled to the built-in antenna of a transistorized broadcast receiver. The receiver-adaptor can also be connected to an auto radio as shown in Fig. 1. Y1 is chosen as outlined in Fig. 1. RFC1 is an 88-mH surplus telephone toroidal inductor.

2-kHz selectivity. Output from the filter section is taken across R2, which is used to set the level of modulation for Q2. Fixed-value resistors can be used in that part of the circuit once the desired ratio is found. Q2 is a dual-gate MOSFET. Modulation is applied to the control element, gate 2. Gate 1, the drain, and the source, function as the crystal-controlled oscillator. Output inductor L1 can be a loopstick antenna which is tuned to the desired input frequency of the car radio. It is shown in close proximity to the built-in loop antenna of a transistor broadcast receiver. The coupling methods shown for the circuit of Fig. 1 can also be used, and the system chosen will depend upon the application.

Fm reception can be effected in the same manner. The af output of the fm set detector can be used to modulate an oscillator which is operating between 550 and 1600 kHz. However, the bandwidth of the fm receiver, and that of any other type of head-end adaptor, must be established ahead of the modulated oscillator. The

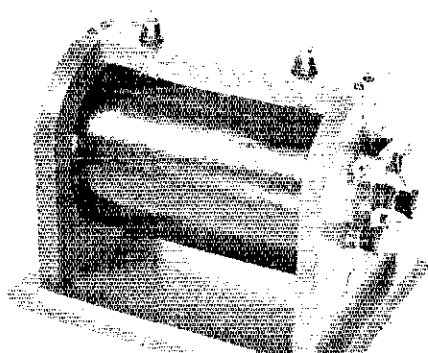
selectivity of the broadcast receiver will have no beneficial effect in the system described here.

If for some reason the detector being used does not have adequate af output to modulate the oscillator stage, a single-stage af amplifier can be used between the detector and the modulated oscillator. The lower the dc input power to the oscillator, the less audio will be needed for full modulation. Some attention can be paid to this, and reduction of the operating voltages at Q2 can be beneficial if this problem arises.

As mentioned earlier, these are merely typical circuits. Many other circuits can be used, and there is no reason why your favorite detector or oscillator cannot be pressed into service. The primary purpose of this article is to show this novel method of using existing broadcast sets for field or mobile use. This technique certainly reduces the number of parts needed for the ham-band adaptor, and simplifies the project markedly. If you've been looking for a short-term construction project, this may be a good one to tackle. QST

From the Museum of Amateur Radio

Here we have the Electro Importing Co. "Bulldog" one-inch spark coil. It superseded the more common box-like structure of earlier coils, and came in various sizes up to "eight inch." The vibrator contacts are of tungsten, and the secondary is wound with enameled wire. The large condenser across the vibrator is inside the fiber casing which is filled with the familiar pink compound. *WIANA*



Receiving FM

Basic Principles and New Circuits

Part 2

BY DOUGLAS A. BLAKESLEE,* W1K1K

FM Receiving Adapters

TO PUT the older tube receivers such as the 75A, HRO and Super Pro models into fm service, the receiving adapter shown in Fig. 10 was designed. Filament and plus B voltages are taken from the companion receiver. Obviously, the better the basic receiver, the better will be the performance of the fm receiving system. For this application sets with high-gain i-f amplifier sections and a broad-band selectivity position (such as the SP-400, SP-600, SX-73, and R-390) are excellent choices. Receivers that have only a 6-kHz or narrower bandwidth may need an extra i-f amplifier stage in the fm adapter in order to tap the receiver i-f at the output of the second mixer. Of course, a converter will also be required with the basic receiver if copy of vhf fm signals is desired.

A sample of the receiver i-f signal is passed to T1, a 455-kHz i-f transformer, which feeds amplifier/limiter V1. A low screen voltage and signal bias enhance the limiting characteristic of the tube. Further "hard" limiting action is provided by the two sections of V2, a 12AT7. A sample of the grid current of V2A is available at TP1, a test point used during alignment. A commercially-made discriminator transformer converts the fm signal to a-m; the a-m is detected by CR1 and CR2. An RC de-emphasis network is included to match the standard pre-emphasis used on fm transmitters.¹⁴ Audio amplification is provided by V3 — in some receivers with high-gain audio systems this stage may not be necessary.

The adapter is constructed on an aluminum channel which is 11 inches long, 2 inches wide, and 1 3/4 inches high. A 1/4-inch lip is included on one side as a mounting foot. A Minibox or a standard chassis is also suitable as a base. The layout of the stages should be kept in a straight line so that rf feedback paths can be avoided. Point-to-point wiring is used throughout.

Alignment

"Lining up" the adapter takes time and test equipment. A VTVM or microammeter plus a signal generator are required. Good alignment cannot be accomplished by ear; if the necessary

* Assistant Technical Editor, QST.

¹⁴To reduce the amount of audio noise in an fm communications system, pre-emphasis is added at the transmitter to proportionally attenuate the lower audio frequencies, giving an even spread to the energy in the audio band. The reverse is done at the receiver, called de-emphasis, to restore the audio to its original relative proportions.

Part II of this article describes several fm receiving adapters for use with communications receivers, and reviews a number of new fm discriminator designs. Part III will appear in a future issue.

test instruments aren't available, they should be borrowed.

To start, check the alignment of the communications receiver, following the manufacturer's instructions, to be sure that the rf and i-f stages are "peaked" before the fm adapter is installed. Two simple internal modifications are required in the receiver, as shown in Fig. 13. If the receiver has a wide i-f bandwidth, a sample of the i-f signal can be taken from the plate of the last i-f stage. Otherwise, the tap should be made at the plate of the first i-f amplifier, and an extra stage, a duplicate of V1, included in the adapter. Short lengths of shielded cable are used to carry the i-f signal to the adapter and to return audio to the receiver — see Fig. 13B. Some units (75A2, HRO-50) which have provision for fm adapters already have a front-panel switch wired for this purpose.

Connect the signal generator to the receiver, and set the generator to produce an S9 reading on the receiver signal-strength meter. The receiver crystal filter should be switched to its most selective position to insure that the incoming signal is being heterodyned to exactly 455 kHz. Then, with a voltmeter or microammeter connected to



Fig. 11 — The fm adapter, wired for connection to a Collins 75A2.

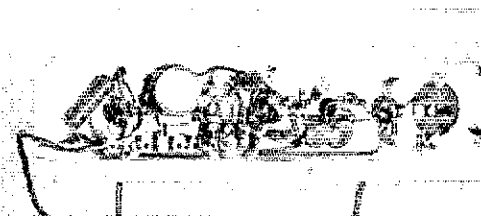
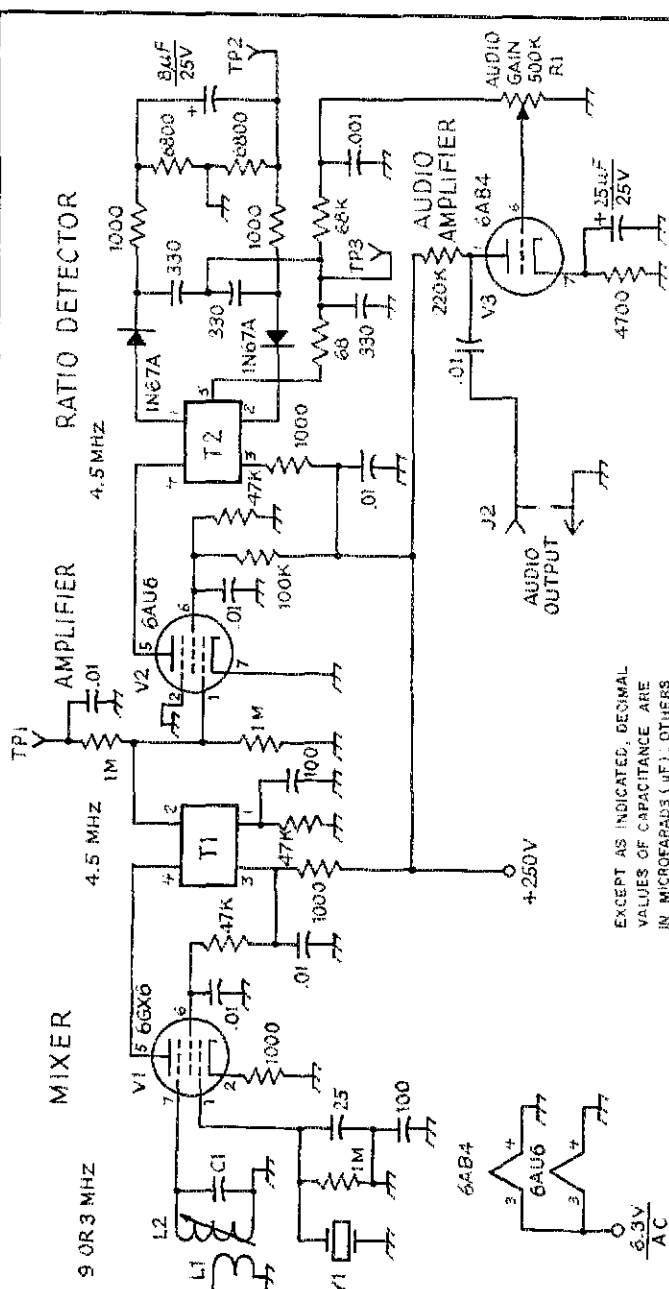


Fig. 12 — In this bottom view, the input transformer is to the left, followed by the i-f amplifier, limiter and detector. On the far right are the audio amplifier stage and gain control.



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



Fig. 14 - This fm adapter is constructed on an etched-circuit board.

Fig. 15 - Schematic diagram of the adapter using a ratio detector. Resistors are 1/2 watt composition; capacitors are disk ceramic, except the one with polarity marked, which is an electrolytic. C1 - For 9 MHz, 18 pF; For 3395 kHz, 47 pF. L1 - For 9 MHz, 3 turns of No. 22 enam. wire over L2; for 3395 kHz, 5 turns of No. 26 enam. wire over L2.

- L2 - For 9 MHz, 9.4-18.7-μH variable inductor (Miller 42A155CBI); For 3395 kHz, 47-58-μH variable inductor (Miller A2A475CBI).
- L1 - Audio-taper composition control (Mallory U-48).
- R1 - TV I-F transformer, 4.5 MHz (Miller 6270-PC).
- T1 - TV ratio-detector transformer, 4.5 MHz (Miller 6271-PC).
- T2 - TP1-TP3, incl. - Tip jack (Johnson 105-XX).
- Y1 - For 9 MHz, 13,500 MHz; for 3395 kHz, 7.895 MHz (International Crystal type EX).

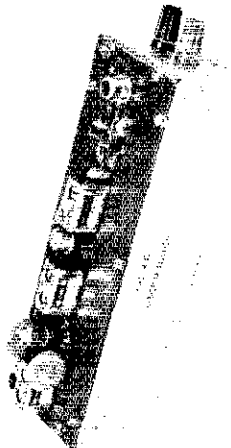


Fig. 16 — The solid-state fm adapter is constructed on a 6 X 2-inch etched-circuit board, mounted on a homemade chassis.

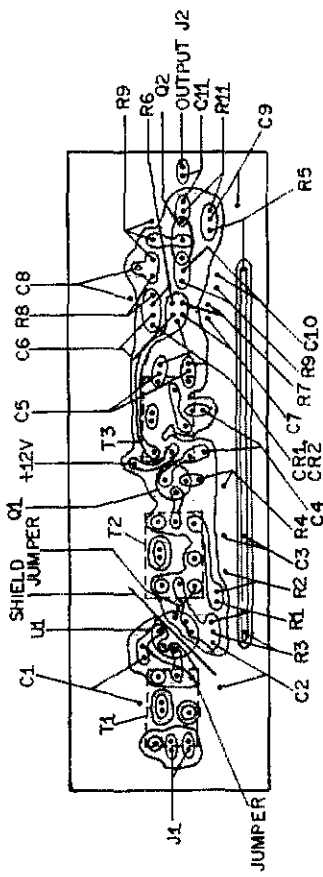


Fig. 18 — Template for the solid-state adapter (not to scale).

DISCRIMINATOR

LIMITER

AMPLIFIER/LIMITER

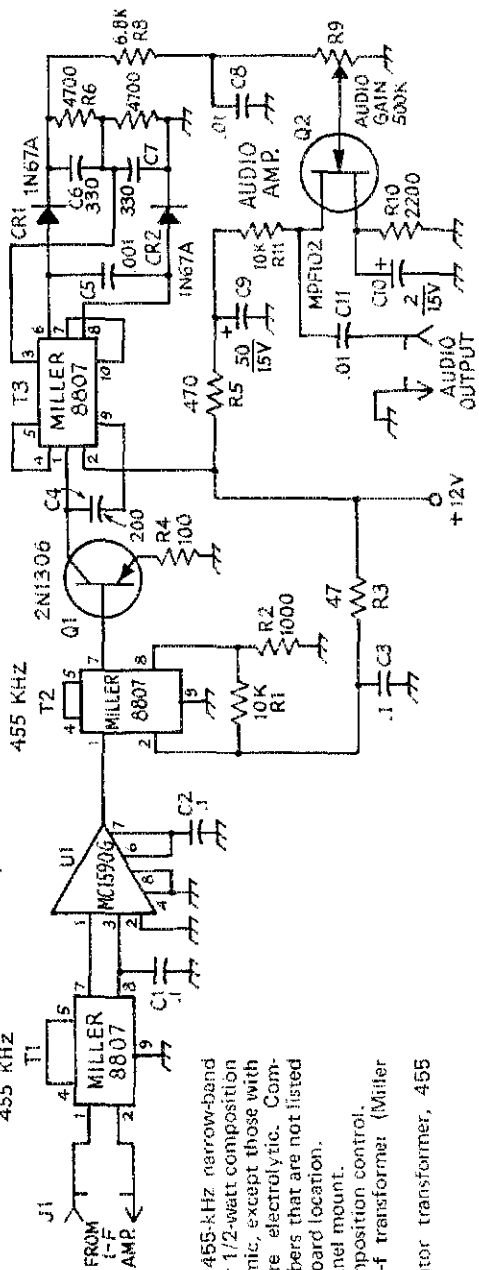


Fig. 17 — Diagram of the 455-kHz narrow-band adapter. Resistors are 1/4- or 1/2-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic. Components with reference numbers that are not listed below are noted for circuit-board location.

- J1, J2 — Phono receptacle, panel mount.
- R1 — Miniature 1/2-watt composition control.
- T1 — Miniature 455-kHz i-f transformer (Miller 8807).
- T2 — Miniature discriminator transformer, 455 kHz (Miller 8806).
- U1 — Motorola MC1590G.

CRYSTAL DISCRIMINATOR

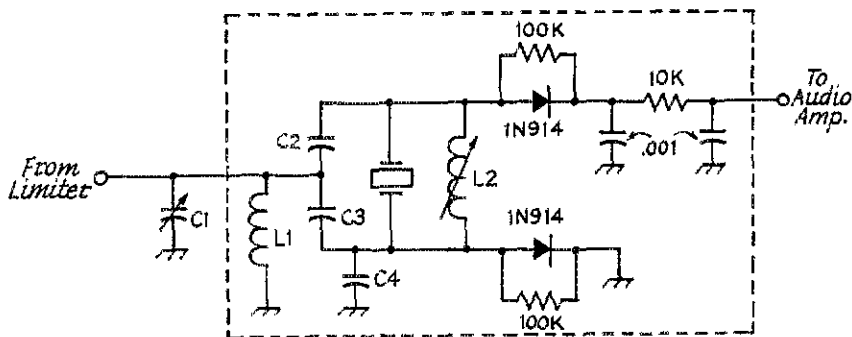


Fig. 19 — Crystal discriminator. C1 and L1 are resonate at the intermediate frequency. C2 is equal in value to C3. C4 corrects any circuit imbalance so that equal amounts of signal are fed to the detector diodes.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR $\mu\mu\text{F}$); RESISTANCES ARE IN OHMS; $k=1000$.

TP1, adjust both sections of T1, and L1, for maximum limiter current. The receiver i-f stage being "tapped" should also be realigned to compensate for the capacitance of the adapter cable.

To align the discriminator, set the receiver selectivity at the broad position, and connect the voltmeter to TP2. Voltage at this test point will swing both plus and minus, so a zero-center meter or VTVM with a lead-reversing switch should be employed. Set the secondary of the discriminator transformer for a zero-voltage indication on the meter. Then vary the signal-generator frequency plus or minus 15 kHz. Going off center frequency in one direction will produce positive voltage at TP2, while going in the other direction generates negative voltage. The primary of the transformer must be set so that, for example, if a shift down in frequency by 5 kHz produces plus 2 volts, then a change of 5 kHz in the other direction should produce minus 2 volts. Unfortunately, the two adjustments on the discriminator transformer are interlocking, so considerable experimentation is required. Also, the tuning of the preceding stages, if not centered on 455 kHz, will affect the discriminator linearity. The first time around, a half hour or more of alignment and realignment is usually required to achieve *equal* swings in output voltage for *equal* swings in frequency — a linear response.

One further check of the discriminator is required. An impulse-generating device, such as an electric shaver, should be switched on, and the receiver, set for a-m detection, tuned to point in the spectrum where the noise is strong. Then, switch to the fm adapter and adjust the discriminator transformer for best suppression of the noise pulses. If the alignment with the signal generator has been completed properly, only a half a turn or so of the slugs will be needed to complete the phase tuning of the discriminator.

A Ratio-Detector Adapter

The circuit shown in Fig. 15 was built to try the ratio detector with a receiver having a high-frequency i-f, and to try etched-circuit-board assembly techniques. This unit was intended to be used with the Heath SB-line receivers, but a crystal and coil change allow the adapter to function with the receivers having a 9-MHz intermediate frequency. The output from the receiver must be taken from the output of the second mixer, just before the crystal filter. Depending on the level at the connection point, one or more (usually two) stages of amplification are required in the adapter.

Layout, assembly, and preliminary alignment of the unit are similar to that outlined above for the 455-kHz adapter. The 4.5-MHz TV i-f transformers used produce the desired wide-bandpass characteristic by overcoupling. To properly set the primary and secondary slugs on these transformers, a loading network consisting of a 680-ohm resistor in series with a .001- μF capacitor should be connected temporarily across the transformer secondary while the primary is adjusted. Then the loading network must be moved to the primary side while the secondary is adjusted. After the loading network is removed, the slugs should not be touched again.

The alignment of the ratio detector varies slightly from that used with the discriminator. Connect a voltmeter to TP2 and adjust the primary core of T3 maximum meter deflection. Next move the meter lead to point TP3 and adjust the T3 secondary for a zero meter reading. Check the linearity of detector response as discussed earlier.

Results with the ratio detector were generally inferior to those obtained with the discriminator adapter. Although the ratio detector does provide some limiting action, alone it doesn't do the job the way the "hard" limiter/discriminator combination can.

TRANSFORMERLESS DISCRIMINATOR

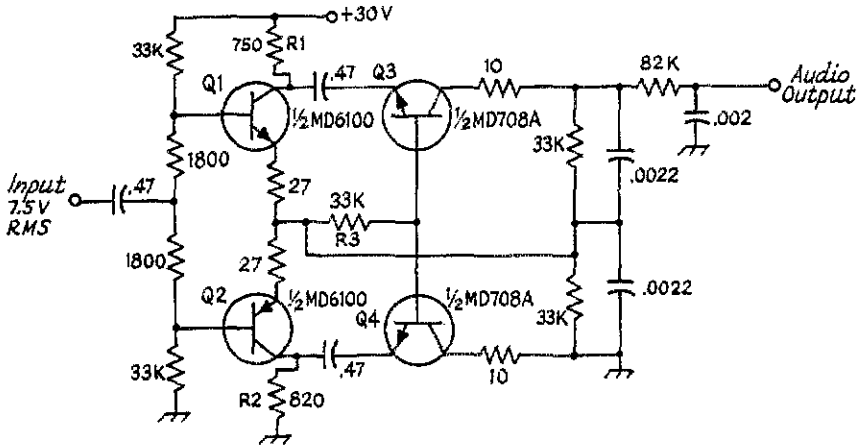


Fig. 20 - Transformerless discriminator.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR $\mu\mu\text{F}$); RESISTANCES ARE IN OHMS; $k = 1000$.

BRIDGE DISCRIMINATOR

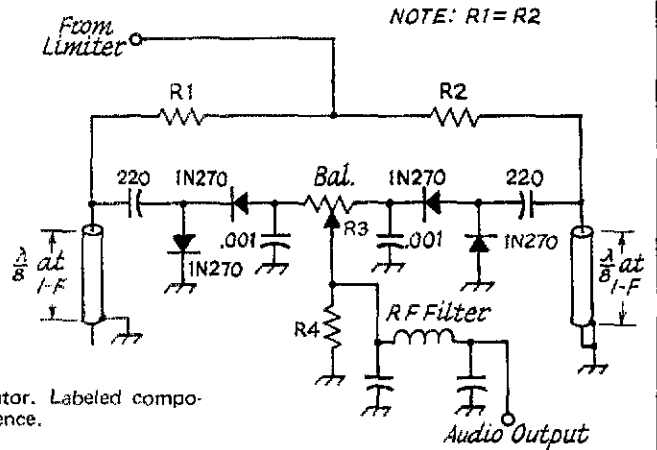


Fig. 21 - Bridge discriminator. Labeled components are noted for text reference.

A Solid-State Adapter

Tubes are seldom used in current designs. For those builders who prefer to be "up with the times," a solid-state version of the 455-kHz adapter was constructed. Using IC limiter/amplifier, and miniature i-f transformers, the unit requires only 25 mA at 12 V for power. See Fig. 17. The Motorola MC1590G provides 70 dB gain, and hard limiting action superior to that obtained with the tube version.

The unit is built on a 2 X 6 1/2-inch circuit board; a template is given in Fig. 18. Because of the high gain of the IC stage, a shield is required across pins 4 and 6 to isolate the input from the output. Alignment and installation are the same as for the tube version. The bandwidth of the

miniature transformers restricts this adapter to narrow-band reception. However, builders wishing a wideband version can use the J. W. Miller 8811 miniature coils which are combined with a 12-pF coupling capacitor to form a wide-band transformer.

New Detector Designs

The difficulties often encountered in building and aligning LC discriminators have inspired research that has resulted in a number of adjustment-free fm detector designs. The crystal discriminator utilizes a quartz resonator, shunted by an inductor, in place of the tuned-circuit secondary used in a discriminator transformer. A typical circuit is shown in Fig. 20. Some

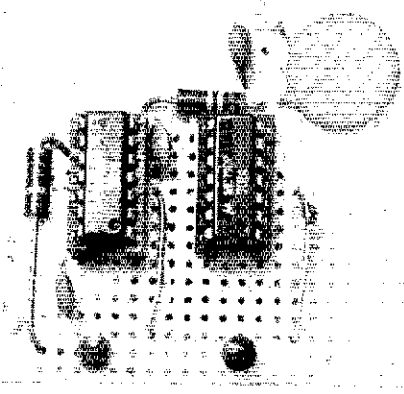


Fig. 22 — Breadboard version of the digital detector. ICs used are Motorola RTL logic.

commercially-made crystal discriminators have the input-circuit inductor, L1, built in (C1 must be added) while in other types both L1 and C1 must be supplied by the builder. Fig. 20 shows typical component values; unmarked parts are chosen to give the desired bandwidth. Sources for crystal discriminators are listed in Fig. 3 (Part I, *QST* for January, 1970).

Little information has been published about crystal-discriminator design, although Schmitzer has reported results of his experiments with the effects of source impedance, load resistance, and parallel capacitance on a KVG discriminator.¹⁵ A practical i-f system using an inexpensive surplus crystal discriminator will be described in Part III of this article.

Transformerless Discriminator

Another interesting fm-detector circuit designed for telemetry use has been described by Kubo.¹⁶ Using active circuits to provide the phase shifts usually accomplished in a discriminator transformer, the circuit (illustrated in Fig. 20) will work up to 1 MHz. Ideally, R1 should equal R2, but Kubo reports that the slight loading of R3 and an inequality of the h_{FE} of the two transistors, Q1A and Q1B, require that R1 be varied to achieve circuit balance. The expensive MD6100 can be replaced by two transistors of closely-matched characteristics; an IC array such as the RCA

¹⁵Schmitzer, "Experiments with a Crystal Discriminator," *VHF Communications*, August, 1970 (Published in West Germany).

¹⁶Kubo, "Inexpensive F.M. Telemetry with Active Circuits," *Electronic Engineering*, July, 1970 (Published in England).

CA3018 would be a good choice. Component values are quite critical, if the best performance is to be obtained. Resistors should be 5-percent tolerance, and capacitors 10 percent.

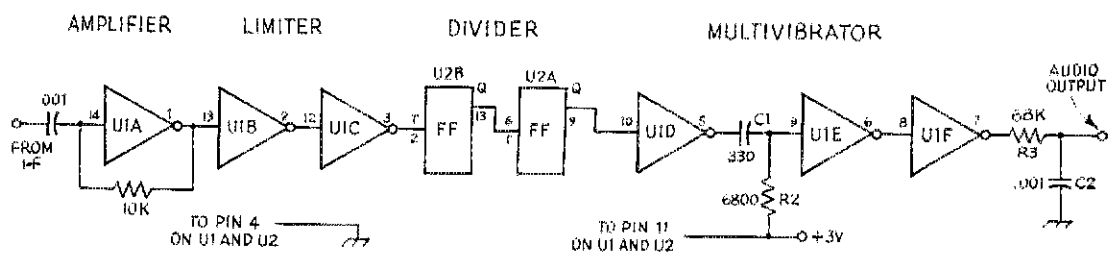
Bridge Discriminator

With the advent of stereo and other subcarrier transmissions, engineers working to develop high-quality entertainment radios have had to reduce the level of phase distortion produced in receiver circuits. Otherwise, mixing of the subcarrier and main-channel signals limits the audio performance. One product of this research is the *bridge discriminator*,¹⁷ a circuit that can produce nearly distortion-free demodulation of fm signals. This detector, shown in Fig. 21, consists of a balanced transmission-line bridge. The physical dimensions of the coaxial lines limit its use to the middle and upper hf region.

The input resistors (R1 and R2), which are chosen to realize a desired input impedance, and the transmission-line sections form a Wheatstone bridge. The voltages developed at points A and B vary with frequency in such a way that the difference between the two is a straight-line function. By using diode a-m detectors attached to points A and B, the difference between the two detector outputs, developed across a common load resistor (R4), is a duplicate of the modulating signal. R3 sets the detector balance. A pi-section output filter removes any trace of the i-f energy, leaving only the recovered audio. To align a bridge discriminator, a cw signal centered in the i-f passband is injected into the limiter, and R3 is adjusted for zero voltage at point C.

¹⁷Panter, *Modulation, Noise, and Spectral Analysis*, McGraw-Hill, New York, 1965; Modafieri, "A New Low-Distortion FM Tuner," *IEEE Transactions on Broadcast and Television Receivers*, November, 1970.

Fig. 23 — Diagram of the integrated-circuit detector. Resistors are 1/2-watt composition and capacitors are disk ceramic. Labeled components not listed below are marked for text reference. U1 — Motorola MC789P hex inverter. U2 — Motorola MC790P dual flip-flop.



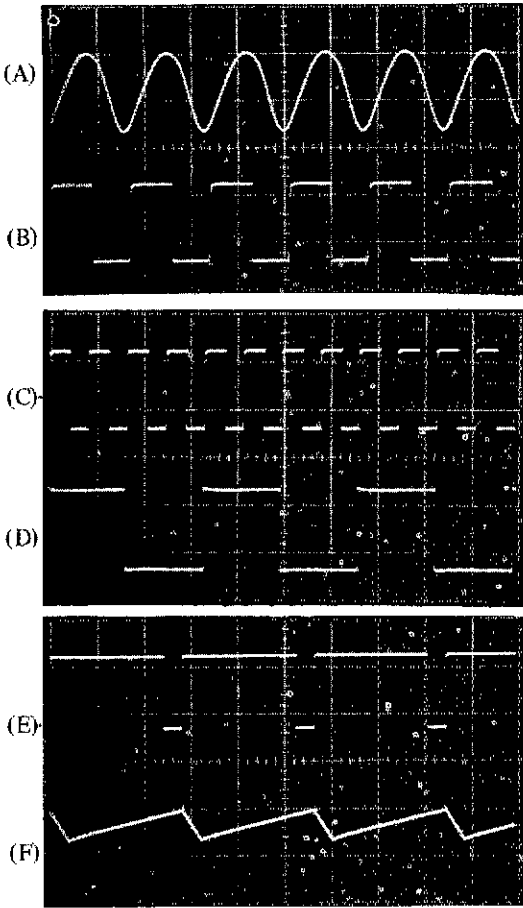


Fig. 24 — Waveforms showing the operation of a digital detector. (A & B) Input and output of the limiter section. (C & D) Input and output of the divide-by-four circuit. (E) Output of the multivibrator. (F) Recovered audio after de-emphasis.

Digital Detector

The integrated circuit allowing complex functions to be performed in a very small package, has caused a revolution in fm receiver design. For sheer simplicity, the *pulse-counting detector*, shown in Figs. 22 and 23, has intrinsic appeal. Using inexpensive RTL logic,¹⁸ the detector requires 200 mV of signal from the receiver i-f system. The oscilloscope photographs of Fig. 24 show this digital detector at work. The first inverter, U1A, is biased to operate as a linear amplifier. The next two stages provide "hard" limiting (Fig. 24B) of the i-f signal (Fig. 24A). The output pulse train from U3A (Fig. 24C) is fed to a divide-by-four circuit consisting of two flip-flops, U2A and U2B. The output of U2B (Fig. 24D) triggers a monostable multivibrator, which consists of R1, C1 and UID.

¹⁸Bisey, "No Tuned Circuits in an IC Wide-Range FM Discriminator," *Electronics*, November, 1969.

The period of the multivibrator is set to be less than half of the period of the i-f signal. For an i-f of 455 kHz, the period is set at 800 nanoseconds. Output from the multivibrator consists of 800-nanosecond pulses whose repetition rate varies in direct proportion to the variation in frequency of the fm signal (Fig. 24E). The output of UID is amplified by U1E and converted to an audio signal by the de-emphasis network (Fig. 24F). Maximum recovered audio occurs at a 50-percent duty cycle.

Advantages of the pulse-counting detector include linear detection over wide frequency ranges and inherent quieting. The self-squelching action results because the digital circuits remain inactive until the input signal reaches a threshold sufficient to trigger U2A. As the ICs are operating in the saturated mode, they provide excellent limiting, and no preceding limiter stage is required. The primary disadvantages are the low-voltage, high-current power requirement (3.6 V at 50 mA for the circuit shown in Fig. 23), and the very low level of recovered audio. Upper frequency limit for the RTL circuits is about 2 MHz, but other faster logic families (TTL or MECL II) can be employed for i-f systems in the 2- to 20-MHz range.

For those who prefer to work with discrete components, Schmitzer has recently described a four-transistor digital discriminator which is suitable for i-fs of 100 to 550 kHz.¹⁹ A kit is available for this circuit.²⁰

¹⁹Schmitzer, "A Digital Discriminator Accessory for FM Demodulation," *VHF Communications*, May, 1970.

²⁰Available from Spectrum International, Box 876, Topsfield, MA 01983.

Strays

ARRL's FMT umpire says that, starting with January 1, 1972, all Loran-C, Omega and other vlf transmissions will transmit signals which are not frequency-offset from USFS (United States Frequency Standard). He says that most folks won't detect the shift of three parts in one-hundred million. Recommended reading: *Time Service Announcement*, Series 14 No. 7, dated October 23, 1970, is available from the U.S. Naval Observatory, Washington, DC 20390. He adds that this fine bulletin will give many hours of fun and frustration, getting to know about time and frequency.

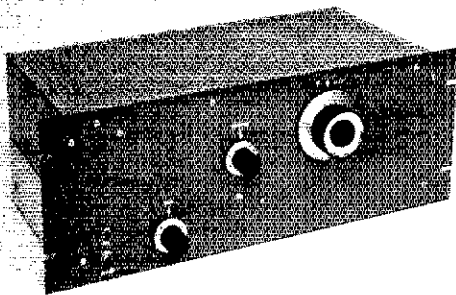
Feedback

The coil information under Fig. 3, Page 34, of the article by DJ4ZC in October, 1970, *QST* is stated incorrectly. The caption should be corrected as follows:

- L1 — 16 turns.
- L2 — 22 turns.
- L3 — 2 turns, wound over grounded end of L2.
- L4 — 22 turns.
- L5 — 4 turns, wound over grounded end of L4.
- L6 — 16 turns.
- L7, L8 — 22 turns.

Oops! That blank space on page 109 of the December issue should have contained the call W6RGG, qualifying at 14 ppm in the September FMT. Sorry about that, Bob!

The 144-MHz amplifier is built in conventional rack and panel style, with the entire top of case metal, to provide free air flow. Controls are grid-circuit tuning, C2, lower left; output loading capacitor, C5, center; and plate-circuit tuning, C4, with vernier dial, right. The slotted end of the Teflon shaft on C1 is visible as a white spot just below the loading control.



New Ideas for the 2-Meter Kilowatt

Easy-to-Make Tank Circuit, with Improved Tuning Device

BY THOMAS F. McMULLEN, JR.,* W1QVF, AND EDWARD P. TILTON,** WIHQD

IN DISCUSSING a 50-MHz amplifier built just before this one, the authors included a rationale for the grounded-grid approach to high power for that band.¹ Conversion to grounded-grid was considered for 144 MHz as well, but a low-drive grounded-cathode amplifier still looks like the best bet for high power on frequencies above the 50-MHz band.

While many transmitting tubes work well at 50 MHz, very few are really good much above that frequency. Those that do go higher are not well adapted to grounded-grid service, except for some medium-power types such as the 2C39. External-anode tetrodes (4X150A, 4X250B, 4CX250B, 4CX250R and 8122 are among the more common types) remain the logical choice for a 2-meter amplifier, and they are at their best in grounded-cathode applications. In Class AB1 service they require no driving power, and in Class C a few watts will drive them to better than 70-percent efficiency.

New tubes of this series and the air-system sockets for them are expensive, but both tubes and sockets can be found at times on the surplus market. Early tubes of the 4X150A and 4X250B type are as efficient as their ceramic-insulated replacements, identified by the C in the type number. Glass-insulated tubes will not take quite as severe punishment, but operated within their slightly-lower ratings they work extremely well on the vhf bands.

Sockets found on the surplus market are generally of good quality, but they probably will not have the raised-screen-ring construction of the latest types. Surplus sockets may require screen-

ring shielding for effective neutralization, but this is readily installed.²

As far as operating efficiency is concerned, our new amplifier has nothing on its *QST* predecessors. Our objectives were mainly greater ease of construction, and a better method of tuning the plate circuit. The disk-type capacitor used in recent 2-meter amplifiers solves some earlier tuning problems, but it tends to cause others. Its effective tuning range is quite limited, and simple lead-screw arrangements may be prone to arcing troubles after appreciable use. Any simple mechanical linkage for driving the screw from the front panel tends to introduce electrical unbalance to ground, which may have to be corrected with another adjustable plate working against the other side of the plate line.

The simple moving-vane arrangement shown here is inherently balanced, in the manner of an ideal split-stator variable. It gets away from the multiple-ground paths and mechanical and electrical unbalance that are unavoidable in conventional capacitors. If it has any weak points, rigorous testing of the amplifier has not turned them up.

Other than in mechanical detail, this amplifier is rather like earlier designs using similar tubes. Its circuit diagram is almost identical, and it was tested on the power supplies and control circuits built for its *VHF Manual* and *Handbook* predecessor.

Construction

The amplifier is built on a 17 by 8 by 3-inch aluminum chassis, fitted with a bottom cover which completes the shielding and directs the flow of cooling air. The top portion of the enclosure is of similar size, except that it is 3 3/4 inches high, and it has a cane-metal top. It was made by bending up the necessary sheet aluminum, but angle stock and flat sheets could be used equally

*RFD Collinsville, CT 06022.

**VHF Editor, *QST*.

¹McMullen, "3-500Z Grounded-Grid Amplifier for 50 MHz," *QST*, December, 1970.

²"Kilowatt Amplifiers for 50 and 144 Mc." February, 1964, *QST*. Also, *Radio Amateur's VHF Manual*, all editions, Chapter 6, and *Handbook* editions 1966 through 1970, Chapter 17. See section on neutralizing the 144-Mc amplifier.

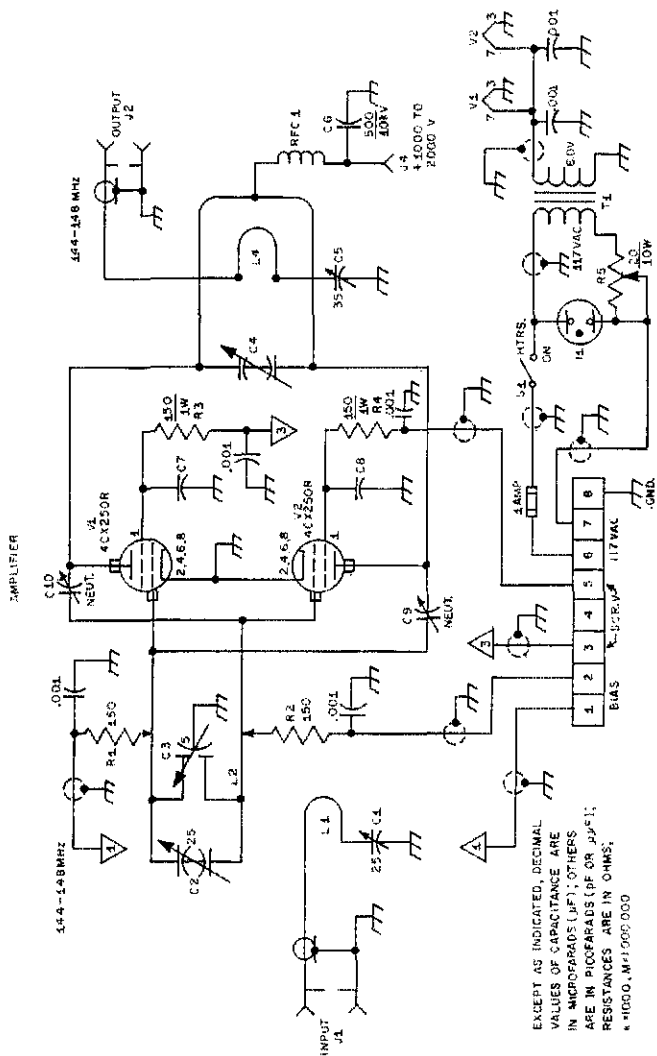
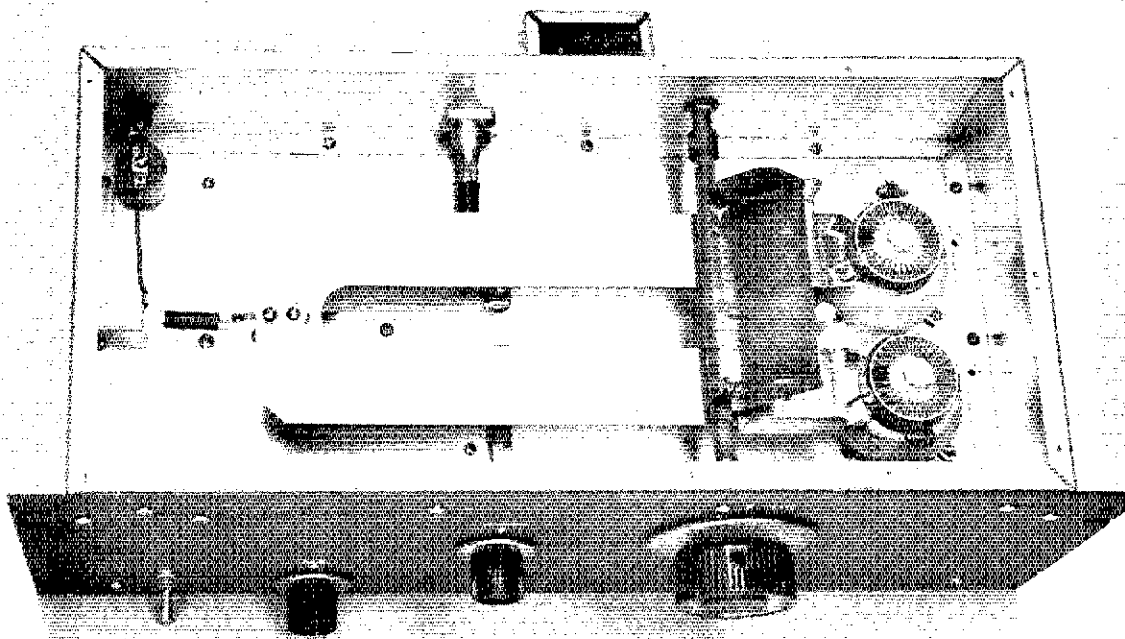


Fig. 1 — Schematic diagram and parts information for the 144-MHz amplifier. Capacitors not described are disk ceramic.

- C1 — 25-pF miniature variable (Hammarlund MAPC-25B).
- C2 — 25-pF per section split-stator (Hammarlund HFD-25).
- C3 — 1.5 to 5-pF differential (Hammarlund MAC-5-5)
- C4 — Vane-type tuning capacitor; see text and photos.
- C5 — 35-pF variable (Hammarlund HF-35).
- C6 — 500-pF 10-kV TV "doorknob."
- C7, C8 — Screen bypass; part of Eimac SK-620A socket.
- C9, C10 — Neutralizing tabs 1/4 by 5/8-inch sheet copper, soldered to top of National FTB bushing.
- I1 — 115-volt neon pilot lamp.
- J1 — BNC coaxial jack.
- J2 — Type N coaxial jack.
- J3 — 8-pin power connector, male.
- J4 — High-voltage power connector (Milien 37501).
- L1 — Copper strip 1/4 by 4 inches. See Fig. 3.
- L2 — 1/4-inch copper tubing 10 1/2 inches long, 15/16 inch center to center. Bend to Y shape 2 inches from tube end.
- L3 — .065-inch sheet brass; see text and Fig. 2.
- L4 — Copper strip 5/16 by 7 1/2 inches, bent to roughly elliptical shape. See text and Fig. 3.
- R1, R2 — 150-ohm composition, 1/2 watt.
- R3, R4 — 150-ohm composition, 1 watt.
- R5 — 20-ohm 10-watt, slider type.
- RFC 1 — 32 turns No. 24 enamel, closewound on 1/4-inch Teflon rod. See mounting position in interior photo.
- S1 — Spst toggle switch.
- T1 — 6.3-V 6-A, filament transformer (Merit P-2947).

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (UF); OTHERS ARE IN PICOFARADS (PF OR P.F.); RESISTANCES ARE IN OHMS; *1000, M=1,000,000



Interior of the 2-meter amplifier, showing the brass plate-inductor and vane tuning system. Note the position of RFC1, at the far left, out of the main rf field. The output coupling loop, L4, just below the plate line and barely visible here, is connected to the output jack, J4, on the rear wall with a short section of coax; and to the loading capacitor, C5, on the front panel by means of copper strip.

well. Angle stock along the rear of the front panel completes the enclosure. The gray-wrinkle aluminum panel is 7 inches high.

The tube sockets are mounted 2 inches in from the right side, as seen in the photographs, and 2 5/8 inches apart, center to center. The Eimac SK620A sockets, with their integral screen-ring shielding, are recommended. Other sockets may require slightly greater spacing, and some modification of the plate-circuit dimensions. The raised screen-ring shield is also a great aid in neutralizing the amplifier. The need for isolating the tubes' screen structure was pointed out in earlier articles, and some form of shield should be added if early flat sockets are used. This need is particularly acute if the amplifier is to be operated in the Class AB1 mode, characterized by very-high power sensitivity.

The half-wave-line grid circuit, L2, is tuned at the end away from the tubes by the split-stator variable, C2, and balanced to ground by means of C3, a differential capacitor. This is supported on its stator tabs, which are soldered directly to L2, immediately adjacent to C2. A strap of 1/4-inch copper connects the rotor of C3 to the chassis, in the shortest practical manner. The slotted shaft of C3 is reached through a hole in the bottom cover of the chassis. This hole is sealed with black plastic tape after the adjustment is completed, in order to avoid air leakage.

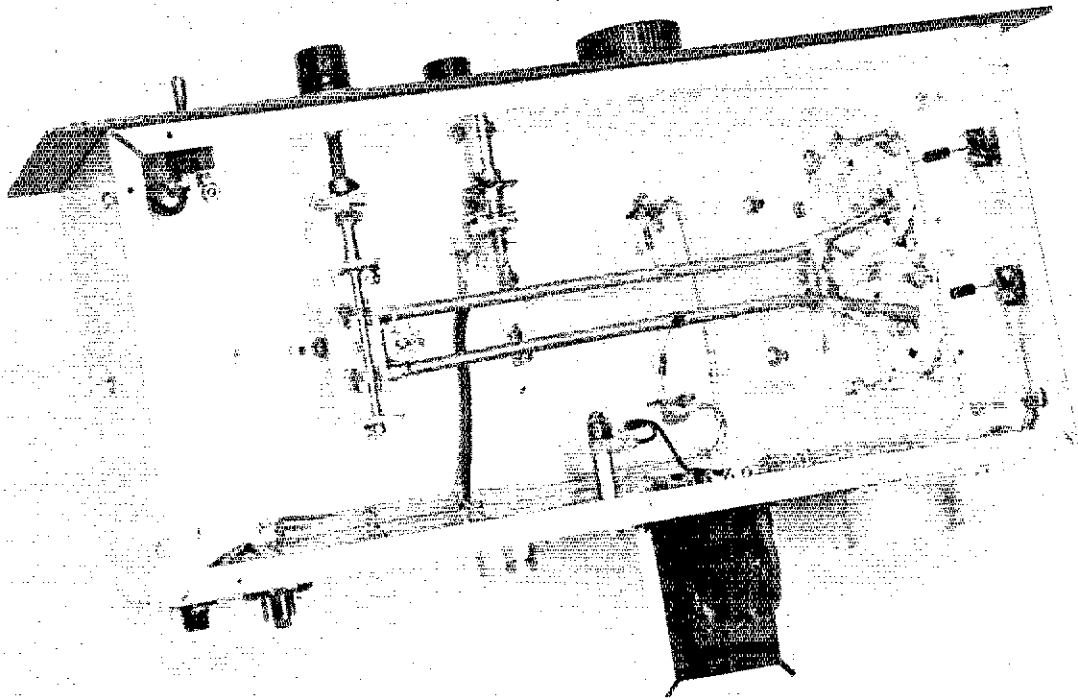
The input coupling loop, L1, is mounted between and just below the grid lines, with its closed end near the midpoint of the lines. The end toward the panel is soldered directly to its tuning

capacitor, C1, and the other to an insulating tiepoint, which also has the center conductor of the RG-58/U coax to J1 connected to it. The position of L1 with respect to L2 can be adjusted by means of an insulating rod, through a hole in the bottom plate near the closed end of the loop. This hole is also taped over to prevent air leakage.

Leads to the neutralizing tabs, C9 and C10, are tapped on the grid lines at a point 1 3/4 inches from the grid end. Feedthrough bushings (not visible in the photographs) are under the lines. The crossover is made by copper strips from the lines to the bushings. Variable capacitance to the plate line is provided by copper tabs 1/4 by 5/8 inch in size, soldered to the top ends of the bushings, just below the plate line, L3. Adjusting their position with respect to L3 provides the required neutralizing capacitance.

Connections to the grid ends of L2 are made with wrap-around copper clips slipped over the tubing ends and fastened to the grid posts of the tube sockets with screws. They are soldered to the line ends, for permanence. The connections to C2 are made in somewhat the same way, except that the tabs are soldered to the stator lugs. Note that the rotor of C2 is not grounded. It is supported on ceramic standoffs 5/8 inch high.

The grid-circuit isolating resistors, R1 and R2, are connected to L2 by means of spring clips which are slid over the line before assembly. These can be tube grid clips, if available. They are moved along the line to the point of minimum rf voltage, using the familiar lead-pencil test.



The principal feature of the bottom view is the half-wave grid circuit. Its split-stator capacitor, C2, is at the left end of the line, L2. The differential balancing capacitor, C3, is also across the line, just to the right of C2. Isolating resistors in the grid circuit, R1 and R2, are near the middle of the picture. The screen isolating resistors, R3 and R4, run to tiepoints on the right wall of the chassis.

The shaft of C2 is rotated through an insulating shaft, fitted with an insulating flexible coupling, to minimize any tendency to unbalance the grid circuit. The shaft from C1 is also insulating material, and it has a flexible coupling. The capacitor is not adjusted often, so the shaft end is slotted, and is allowed to protrude through the front panel. It is just visible in the front view, below the output-loading control.

All power leads are made with shielded wire, bonded together by frequent spot-soldering, and to the chassis by means of grounding lugs. Exposed terminals are bypassed wherever necessary, to prevent rf pickup.

Each cathode pin on the socket is grounded directly through a separate lug, and nothing else uses these lugs for a ground path. Minimum cathode-lead inductance is important, and even the shortest lead shared with another circuit can cause unwanted coupling in a vhf amplifier.

The plate inductor, L3, is made of sheet brass, in the form of a U. Principal dimensions are given in Fig. 2. The stator plates of the tuning capacitor, C4, part A in Fig. 2, are soldered to the plate line with their right edges 5/8 inch from the tube anodes. Connection to the latter is made with two brass tabs, part B in Fig. 2, at the tube ends of the line. These were omitted from the drawing of the assembly in Fig. 2, in the interest of clarity, but their position is clearly visible in the photographs. These tabs are curved slightly after bending, to provide more contact surface to the anode ring. Clamping rings made of flashing copper wrap

around the anode structure and hold the tabs tightly to it. This is a point of low rf current, so a large contact area is not vital.

The plate line was made flat originally, but when the amplifier was tested it was found that this did not allow sufficient room to adjust the output coupling loop, L4, to the optimum position. The half-inch offset shown in Fig. 2 (but not in the photographs, as the change was made after the pictures were taken) netted about a 10-percent improvement in efficiency. It may be of interest here, that the entire plate circuit was silver-plated after the photography. Careful checks on performance indicated not the slightest difference, before and after plating. This is not to discourage the builder from doing a plating job, as it may be desirable on a long-term basis. Silver oxide is a good conductor; other oxides are not. Any of the simple rub-on plating methods will do.³

The "stators" and the tabs for the anode connection were silver-soldered to L3. If you can't do this, ordinary soldering will be adequate, but it might be well to use screws to hold the tabs onto L3, as a precautionary measure. The stator plates have flat-head screws running through them and L3, into the insulating supports for the latter. These are 1-inch ceramic pillars. The closed end of the loop is supported on a 1 1/2-inch pillar.

The holes for mounting these supports can be made slightly oval, to position the assembly so that

³Methods of silver plating at home are given in Chapter 13, *Radio Amateur's VHF Manual*. Immersion electroplating does the best job, but rub-on methods are usable here.

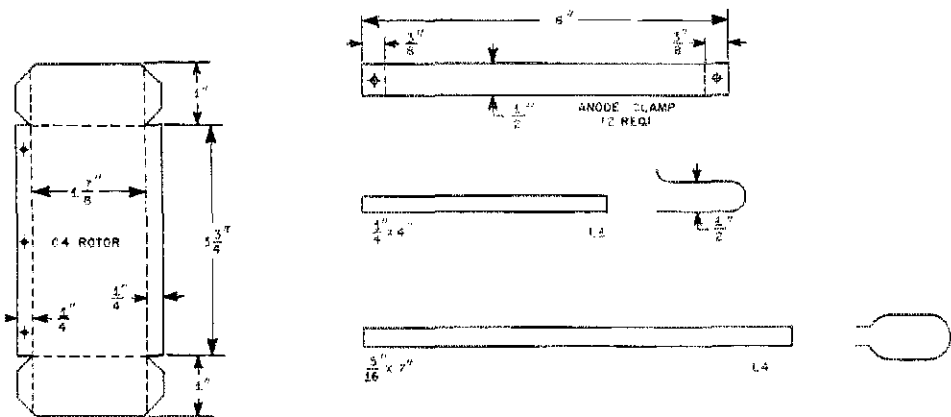


Fig. 2 — Principal dimensions of the brass parts of the amplifier plate circuit. The U-shaped inductor is shown in both top and side views, with the stator plates of C4 in place. These plates (A) are shown before bending, at the upper left. The small brackets (B) make contact with the tube anodes. Slight curvature, to fit tube anode, can be imparted by tapping with a small hammer, against a 1 1/2-inch pipe or rod, used as an anvil.

no strain on tubes or sockets is caused when the anode rings are tightened. Note that the mounting hole in the closed end of L3 is also elongated. The screw that holds the line on its support has Teflon washers above and below L3, to permit the line to move on its support, if expansion and contraction with heating and cooling of the line should be appreciable.

The rotor of C4 is in the form of a shallow box made of flashing copper. It is shown in flat form in Fig. 3, along with other copper parts of the plate circuit. Its ends, 1 inch high, provide the variable capacitance to the stator plates on L3. After the box is bent to the desired form, its adjoining surfaces are soldered for additional strength and rigidity. The edge away from the tube anodes is supported on a fiberglass rod, with 4-40 screws, the rod surface having been filed flat in this area previously. Reducing couplers at each end of the rod permit use of a 1/4-inch shaft bearing at the rear, and a National Velvet Vernier dial mechanism at the front. Do not use heat-sensitive rod such as Lucite or Plexiglas. Nylon and some types of Bakelite are unstable in strong rf fields, and are also unsatisfactory. Teflon is probably good, but the fiberglass rod is stronger and easy to work. It is 6 3/8 inches long, and may be 1/2- or 3/8-inch diameter.

Mechanical stops for the rotor are provided at both ends of its normal travel. A 3/8-inch Teflon rod 1 3/8 inches high, fastened to the chassis between the neutralizing feed-through bushings, stops the rotor in the horizontal position. The rotor is prevented from "going through the roof" by using a 1-inch setscrew in the vernier-drive hub, and a longer-than-normal screw for the lower left mounting screw for the drive assembly. These tricks are visible in the close-up photograph.

In the final assembly, the rotor in its horizontal position is approximately 1/4 inch above L3, and the spacing at the ends of the rotor is also 1/4 inch. The tubes are fitted with Eimac SK626 chimneys.

The under surface of L3 should just clear these. If it does not, it should be raised by putting washers on the screws that run into the 1-inch pillars.

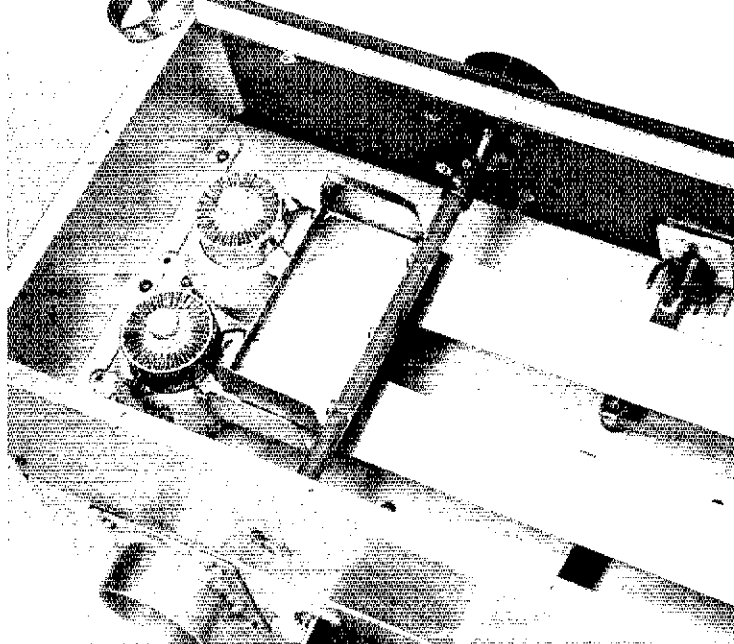
The output loop, L4, is supported under L3 by two 1/2-inch ceramic insulators. Some small pillars have threaded holes that go the whole length. Be sure that the mounting screws do not ground the loop, or come close enough to allow arcing to ground. Connection to the coaxial output jack, J2, is made with a short piece of RG-8/U coax, using a shielding cone at the J2 end. The coax shield is grounded to chassis with a copper strap at the L4 end also, to make the rf path to ground independent of the chassis bonding. The rotor of C5 is also grounded independently. A copper strap connects the stator of C5 to the end of L4. After the final form and size of L4 have been determined, the connection to the strap should be soldered, so as not to leave rf bonding to the mounting screw. These circuits carry high rf currents, and permanent low-resistance connections are important. The performance of many amplifiers falls off with aging, because factors like this were overlooked.

The tube manufacturer states that there should be an air flow of 4.6 cubic feet per minute, minimum, through each tube anode. Much higher blower capacity than this should be provided. The blower used here has a wheel three inches in diameter, turning at 3300 rpm. It is connected to the rear of the chassis by way of a flexible hose 2 1/8 inch in diameter. Automotive defroster hose is fine where one blower may be used for several different amplifiers.

Adjustment

Heater voltage (at the socket) should be 6.0 volts. This is adjusted by means of the slider on R5. Set the sliding clips on L2 at the approximate midpoint. Now apply 1 to 2 watts drive to the grid circuit, adjusting the position of L1 and the tuning of C1 and C2 for minimum reflected power,

Close-up view of the interior, showing details of the tuning device, C4, and connections to the tube anodes. The clamping ring was removed from the upper tube to show the ring and the anode-contact tabs in clearer detail. Note that the output loading capacitor, C5, has its own grounding bracket, so that it does not rely on the panel for ground return.



indicated on an SWR bridge connected between the exciter and J1.

With enough drive so that grid current will be measurable, meter each grid separately, and adjust the balancing capacitor, C3, for as near to the same value for each grid as possible. Readjust C2 for each change. When the currents are approximately equal, the neutralization should be adjusted. With a 50-ohm load connected to J2, and with the screen and plate circuits having some dc path to ground, such as through power supply bleeders, couple a sensitive rf indicator to L3. Still with no plate or screen voltage applied, tune C2 and C4 for maximum indication, then adjust the positions of the neutralizing tabs, C9 and C10, carefully for *minimum* rf feedthrough. Recheck the grid circuit balance and tuning each time a tab setting is changed.

The points of connection of the 150-ohm resistors, R1 and R2, on the lines comprising L2 are not particularly critical, unless the exciter is low on output, but they should be at the points of lowest rf voltage along the line. This is checked readily by running a pencil lead along the line and watching the grid current. The point at which there is no change in the meter indication is where the clip should be. Recheck all adjustments after appreciable change in the connection points.

For initial testing with plate power applied, the plate voltage should be on the order of 800 to 1000, and the screen supply should be no more than 250 volts, preferably regulated. There will be almost no difference in tuning or output, with the cover on or off, so, with due regard to safety, leave it off at first. Never, under any circumstances, reach inside the plate compartment when the power is on. Be *sure* that it is off. Using an insulated screwdriver or other safe shorting device,

short L3 to the chassis *every time* before making any adjustment inside the compartment. Quite a bit of reaching in will be necessary, but don't let temptation get the better of you. Play it safe. Better a big bang with the screwdriver than a dead or injured operator!

The approximate tuning range of the plate circuit can be checked readily with a grid-dip meter, with no power on the amplifier. It should be considerably wider than the 2-meter band. Now, with an output indicator and a good 50-ohm load connected to J2, the amplifier is ready for power. Apply plate and screen voltage, in that order. Adjust the bias so that the plate current, with no driving power applied, is around 150 mA. Apply drive, and tune C4 and C5 for maximum power output. With enough drive to show about 5 mA grid current per tube, the plate efficiency should approach 70 percent. The position of L4 with respect to L3 has to be adjusted with some care to do this well. The optimum position of the loop and both tuning adjustments, will change with plate voltage and drive level, so adjustment should be made with the operating conditions for which you will want the highest efficiency and best amplifier linearity.

Adjustment of the shape and position of L4 is likely to be the most critical operation. For high-efficiency Class-C operation, we got best results with the loop roughly elliptical in shape, and about 3/8 inch below L3. Efficiency seems to be highest at plate voltages between 1200 and 1800, a condition we've found with other amplifiers using these tubes. The manufacturer's typical operating conditions are your best guide in setting up the amplifier for your circumstances. Bear in mind that these are only *typical*; so long as you do not exceed the various maxima for grid,

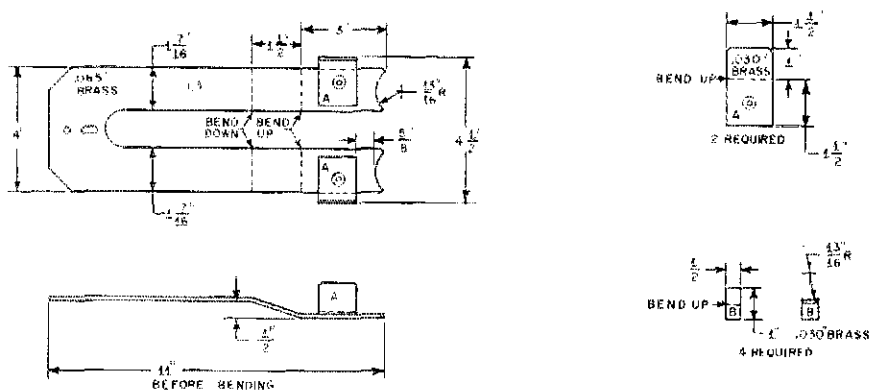


Fig. 3 - Flashing-copper parts used in the 2-meter amplifier. Broken lines indicate 90-degree bending required. The surfaces of the C4 rotor are soldered together after bending, for rigidity. The anode clamps, upper right, wrap around the tube cooling ring, and hold the brass tabs (Fig. 2) firmly in place. L1 and L4 are shown in the approximate shape, after bending, at the right.

screen and plate dissipation, you can have an interesting and profitable time of it experimenting with an amplifier of this kind.

Depending on your interests, many variations are possible. The writers, for example, like an amplifier to work best on high-power cw, with ssb running a close second, and a-m linear a conservative third. With the amplifier set up for the first two conditions, only a slight change in grid drive is needed to go from one to the other. For top performance it is desirable to switch screen voltage, too, and this is done readily enough if something like the previous method of providing regulated 250 and 350 for the screens is used.⁴ With Class AB1 linear operation (a-m or ssb) the screen voltage should be 350, if the drive is kept low in going to cw, the screens can be left at 350

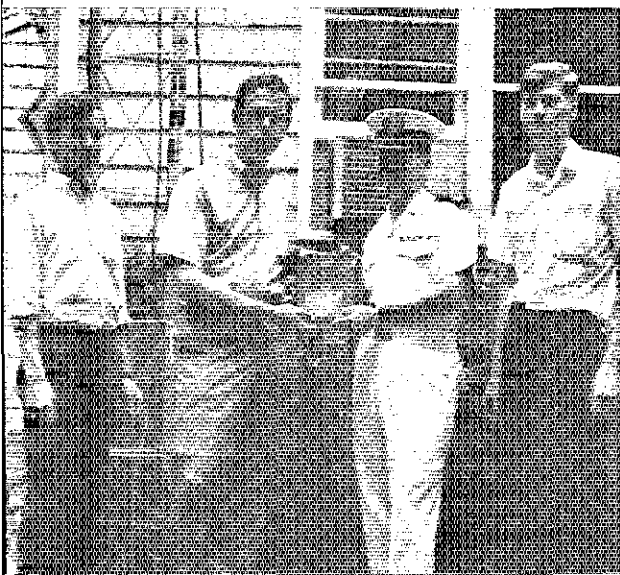
⁴See section on controls and metering, Reference 2. A recommended addition is a bleeder from screen to ground. If this is connected to the positive side of the screen meter to ground in the circuit shown in this reference, the current it draws will not be added to the screen current indicated on the meter. About 25,000 ohms, 10 watts, will do.

volts, but for increased drive and higher efficiency the voltage should be dropped to 250, to avoid excessive screen current.

In vhf work it is often desirable to operate at moderate power levels, and this amplifier will drop down nicely. By varying the plate voltage between 300 and 2000, and the grid drive up or down as you wish, a choice of output levels from less than 50 watts to more than 700 is readily available. Linear operation is the critical mode, of course. For more on the fine points of linear adjustment, see any edition of the *Handbook* or the *Radio Amateur's VHF Manual*.

Our amplifier combines a few new ideas with many old and well-proven ones. In addition to the references footnoted in the text, the following *QST* articles are worth reviewing, if you are embarking on a vhf amplifier project:

- Maer, "Perseids Powehouse," October, 1959.
- (Two-band amplifier, 50 and 144 MHz.) "High-Efficiency 2-Meter Kilowatt," February, 1960. (Uses 4CX-300As.)
- Breyfogle, "Top Efficiency at 144 Mc. with 4X250Bs," December, 1961. QST



Strays

Dave Porter, K2BPP, is shown receiving from Lt. Douglas Zaugot a plaque commemorating the 50,000th phone patch handled by Dave for men in the Antarctic during the past 15 years. From left are Rich Hill, Dave, K2BPP, Lt. Zaugot, and Rick Hagen. As an additional expression of appreciation, the men at "Operation Deep Freeze" will play host to Dave for a one-week visit during December (that's summertime on the ice!).

Integrated-Circuit Flip-Flops

BY NORMAN D. POS,* WA6KGP

MANY ARTICLES about various digital devices have appeared in *QST*. Since a variety of flip-flops (hereinafter referred to as FF) were employed in these articles, perhaps the time is right for a more detailed description of FFs than was provided in my earlier article.¹ At the end of this article is a list of *QST* articles to which the reader can refer for examples of FF uses.

For a brief recapitulation, recall that "ones" and "zeros" are the states of a digital device of interest. These refer to voltage levels, the values of which depend on the particular device to hand. (Operational data may be obtained from the particular manufacturer.)

An FF is a device which has two outputs that can have states of 1 or 0. One output is called the Q output, or "set" output, while the other is the \bar{Q} (NOT Q), or "reset" output. If $Q = 1$ and $\bar{Q} = 0$, the FF is said to be "set" or in the "one state," while for the reverse, the FF is "reset," or "cleared," or in the "zero state." A variety of inputs exist, from which the FFs derive their names.

The R-S Flip-Flop

The symbol for this primitive FF is shown in Fig. 1, together with its truth table. Simply, the outputs follow the inputs. Fig. 2 shows how one might construct an R - S FF from two NAND or NOR gates.² It is also clear in Fig. 2 that an FF has inherent regeneration (outputs tied back to inputs). Thus, this simple FF might be used as an "edge-sharpener," useful for converting incoming pulses with sloppy rise and fall times into clean sharp pulses. There will be some threshold voltage at the R and S inputs at which the FF will decide to change state. Once the change of state is underway, it proceeds rapidly due to the feedback paths.

*5691 Mt. Acara Dr., San Diego, CA 92111.

¹See Pos, "Digital Logic Devices," *QST*, July, 1968.

²Ibid.

The Type T Flip-Flop

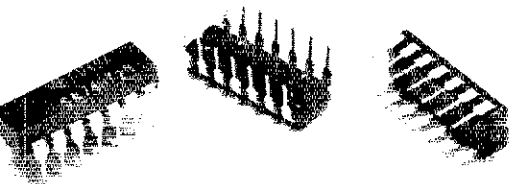
Symbols for the T FF are given in Fig. 3, with timing diagrams illustrating the action. As you can see, the T FF "toggles," or "counts," or "divides by two" (the terms are synonymous). Whether the FF toggles on the "one-going" or "zero-going" edge of the T pulse (called the "clock" pulse) depends on the presence or absence of the little "negating" circle. Whenever you see such a little circle at an input or output connection, swap ones for zeros, and swap one-going edges for zero-going edges. The T FF can be considered as a special case of the J - K FF to be described later.

The Type D, or "Single-Rail" Flip-Flop

This FF is shown in Fig. 4. It acts as a storage element in the following way. At the one-going edge of the clock pulse (C), the status of the D input is transferred to the Q output (the Q output assuming the opposite state, of course). The FF is called "single rail" because when a number of them are built up into a shift register, only one "rail" is needed to connect each FF in the register. This is shown in Fig. 5. Every time a clock pulse hits the register, the pattern of ones and zeros marches to the right by one stage. The D FFs shown in Fig. 5 also have R and S inputs. This is commonly done. These allow a number to be "jam set" into the register by inhibiting the clock-pulse line while gating the desired number all at once (called "parallel in") into the R - S inputs. Then, as the clock is allowed to run, the number comes scooting out the right-hand end (called "serial out"). Note that, if the Q is tied back to the D of the same FF, the FF then will act just like the type T .

The Type J-K Flip-Flop

Refer to Fig. 6. This FF might be called a "double-rail" FF because when used in a register, both J and K inputs must be wired to the preceding outputs. There is some confusion in the literature on nomenclature. Properly speaking, an R - S FF is not clocked, while a J - K is. However, the J input is frequently called the "set," or S input; the K is called the "clear" or C input (to be confused with C for "clock"), while the clock



Pictured at the left is a Texas Instruments SN74H72N integrated circuit, called a J - K master-slave flip-flop. In single-unit quantities at electronic mail-order houses, this device costs approximately \$4.50. Shown in the center is a Motorola MC1027P IC, which is a 120-MHz ac-coupled J - K flip-flop, available for about \$9.75 each. Both of these ICs might be considered "universal" flip-flops, for they may be used in a variety of ways. Shown at the right is a Motorola MC726P, a simple J - K flip-flop. It is available for slightly more than \$2.00.



R	S	Q	Q̄
0	0	1	1
0	1	1	0
1	0	0	1
1	1	X	X

X=NOT DEFINED

Fig. 1 — The R-S flip-flop.

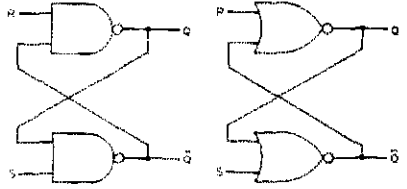


Fig. 2 — An R-S flip-flop constructed from two NAND or two NOR gates.

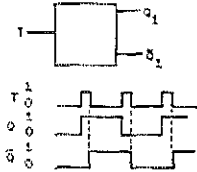


Fig. 3 — Type T flip-flops with timing diagrams.

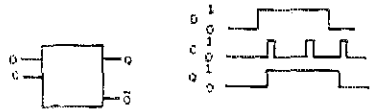
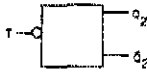


Fig. 4 — The type D flip-flop with timing diagrams. Note that the output becomes synchronous with the clock.

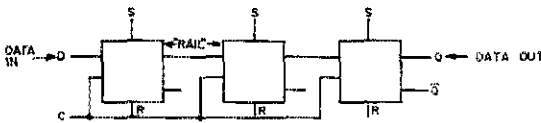


Fig. 5 — Type D flip-flops connected as shift register.

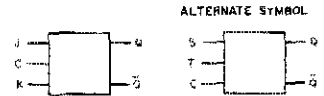


Fig. 6 — The type J-K flip-flop with frequently-used alternative symbols.



Fig. 7 — The J-K flip-flop wired as a "counter," or type T.

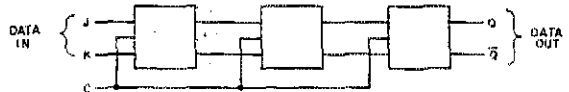


Fig. 8 — A shift register built from J-K flip-flops.

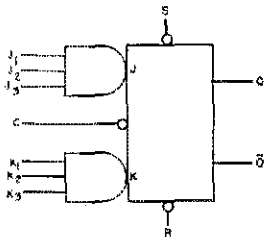


Fig. 9 — The universal flip-flop — exemplified by the Texas Instruments type SN74H72N.

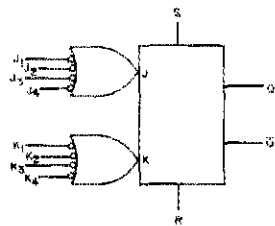


Fig. 10 — Another universal flip-flop — the Motorola type MC1027.

input is called *T* as in the type *T* FF. This alternate symbology is also given in Fig. 6.

This FF operates as follows. When a clock pulse hits the FF, the status of the inputs is transferred to the outputs where it remains until the next clock pulse. Fig. 7 shows the *J-K* FF wired as a type *T*, and Fig. 8 shows a shift register built from *J-K* FFs.

The Universal Flip-Flop

R and *S* inputs, as mentioned earlier, may be, and usually are, added to any FF. Also, inputs may be duplicated at an input-gating structure built into the integrated circuit. When all is done, an FF of great versatility is created. As an example, the Texas Instruments type SN74H72N is shown in Fig. 9. The *R* and *S* inputs override the other inputs, and unconditionally operate the FF as a type *R-S*. With this particular FF however, the zero at *S* produces a one at *Q*. (Note the little circles.) The logic diagram of the FF shows that $J = J_1 \cdot J_2 \cdot J_3$ and that $K = K_1 \cdot K_2 \cdot K_3$. (The dots here symbolize the logic AND function.³ Then, if both *R* and *S* are ones (NOT ZEROS, because of the circles), *J*, *K*, and *C* (again, note the circle) operate the FF as a simple *J-K* FF. Many sorts of fancy stunts may be contrived with an FF as versatile as this one.

This last example, and one which will perhaps pique the interest of the rf-minded folks, describes the Motorola MECL II type MC1027, which can be toggled at frequencies as high as 120 MHz!! (MECL stands for "Motorola Emitter-Coupled Logic" - which refers to the internal construction of the devices.) Not impressed? MECL III types can go as high as 300 MHz, and I am told that more is on the horizon! At any rate, this FF is shown in Fig. 10. I chose this example to show another possible arrangement of input gating. Here,

$J = J_1 \vee J_2 \vee J_3 \vee J_4$ or, by DeMorgan's law, $\bar{J} = J_1 \cdot J_2 \cdot J_3 \cdot J_4$ with similar equations for *K*.⁴ (Little

³See footnote 1.

⁴See footnote 1.

"*v*" stands for the logic OR function.) One can form a clock input by tying one *J* and one *K* input together. At my place of employment, I have used these units in the construction of phase-locked loops for some fancy signal-processing equipment. It is of interest to find that life comes full circle at times. Having moved away from conventional linear circuit techniques, I now find that one must pay attention once again to matters such as proper shielding, unwanted stray lead resonances, careful grounding, and the like, when using logic circuits at these frequencies.

Conclusion

Progress marches on. We have seen the advent of transistorized amateur radio equipment ranging from receivers to keyers. The wave of the future encompasses more and broader technology. Old devices will remain where they do best (vacuum tubes in kW linear amplifiers) but new devices will become more prominent where they do the best job.

Bibliography

The following articles from *QST* are selected as illustrative examples of how FFs are used.

R-S FFs are nicely employed in:

Van Cleef, "HKEY - An Integrated-Circuit Electronic Keyer With Dot and Dash Memories," *QST*, November, 1968.

T-type action is primarily used in the following: Grillo, "A Frequency Counter With Binary-Coded Decimal Readout," *QST*, August, 1969.

Jahn, "Microcircuit Electronic Keyer," *QST*, September, 1969.

Staples, "Integrated-Circuit Frequency Dividers," *QST*, July, 1968.

By far the most frequent FF used is the type *J-K*. *QST* has had many articles which used this FF. A few recent ones are:

Hall, "A Digital Morse-Code Message Generator," *QST*, June, 1970.

Bryant, "Touchcoder II," *QST*, July, 1969.

Pattison, "A Tiny Frequency Standard with Big Ideas," *QST*, March, 1969. 

NEW BOOKS

Better Shortwave Reception, 2nd Edition, 1970, published by Radio Publications, Inc., Box 149, Wilton, CT 06897, 5 1/2 x 8 1/4 inches, 156 pages, soft cover. Price: \$3.95 (\$4.95 Canada). From amateur dealers, or publisher.

The new edition of this handbook has been revised, and a new chapter covers the types of transmissions from 10 kHz through uhf, including facts about the frequencies used by the Apollo 8 spacecraft, space satellites, digital transmission and outer-space signals. Interesting, indeed, as amateurs tend to forget that a tremendous amount of communication takes place outside the edges of the bandspread dial of their receiver! Amateur radio and CB are covered in this handbook and the comments on each should be of interest to those seeking information on both services. Both authors of this book, by the way, are radio amateurs: William I. Orr W6SAI and Stuart D. Cowan, W2LX.

While this book provides an introduction to the field of radio communications in general, it also contains considerable information of value to the new and intermediate amateur. For example: what to look for in buying a new or used receiver, discussion of sensitivity, selectivity and stability, and receiver alignment procedures. Also: how to build a crystal calibrator, a preselector, and a *Q*-multiplier. The text is clearly written and easily understood.

Other subjects include nine types of receiving antennas, transmission lines, antenna placement, single-sideband reception techniques; international broadcasting and jamming; shortwave signal paths; the 24-hour time system and listening tips.

The book is aimed at potential amateurs, newer hams, CB operators and science students. The cover features evaluations on the usefulness of the book by Senator Barry Goldwater, K7UGA, Bill Leonard, W2SKE, and George Jacobs, W3ASK.

A lot of fun to read, even for the jaded DXer who knows all (well, almost all) the listening tricks. He may know a few more after reading this clever little book. - *W1CER*.

The ATR-166 -

A Homemade Transceiver for the 160- to 6-Meter Bands — Part I

With Provision for Vhf Transverters, Too.

BY WILLIAM J. HALL,*K1RPB

CERTAINLY, THE most satisfying aspect of any hobby is the ability to produce tangible results from a creative effort. This holds true whether the participant is a gardener, photographer, or a weekend pilot. Individuals in each of these groups busy themselves with experimentation directed toward improving the performance of their product. Many find that such efforts lead to new insights and a broader self-development. Imagine the thrilling experience of first flying a home-designed and home-built airplane!

With amateur radio, the rare-DX snag, the high score in a contest, and just plain ragchewing provide the bulk of the fun. The amateur who is able to claim that at least part of his station or antenna system is a creation of his own mind and hands is a proud fellow, indeed! This is especially true if his homemade gear provides him with some operating advantage that puts him on top of the heap in a contest.

Approximately five years ago, the author designed and built a two-meter transverter.¹ This unit allowed vhf operation with the Heath SB-300/SB400. The project was a relatively simple one, but the finished product worked very well. Being, at that point, an enthusiastic builder, the author immediately began to consider a complex project. The obvious choice was to design and build a complete station that was ideally suited to this writer's personal operating needs and habits. The ATR 166 transceiver is the result of this effort, and it is hoped that seeing what can be accomplished using simple hand tools will inspire the reader to try his hand at an advanced project.

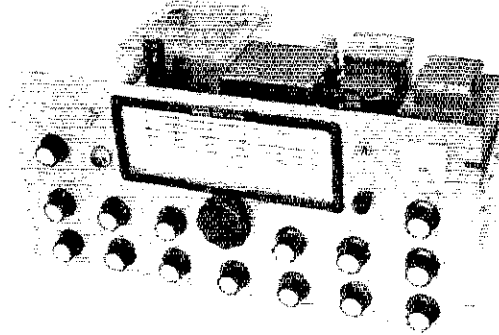
Features

The versatility of the ATR-166 transceiver makes it an ideal station for the single-band operator, the MARS man, the technician, or anyone with an experimental bent. The rig is designed to operate on any chosen frequency

*Prospect Hill Road, Brimfield, MA 01010.

¹Hall, "A 100-Watt, 2-Meter Transmit-Receive Converter," *QST* Jan., 1966.

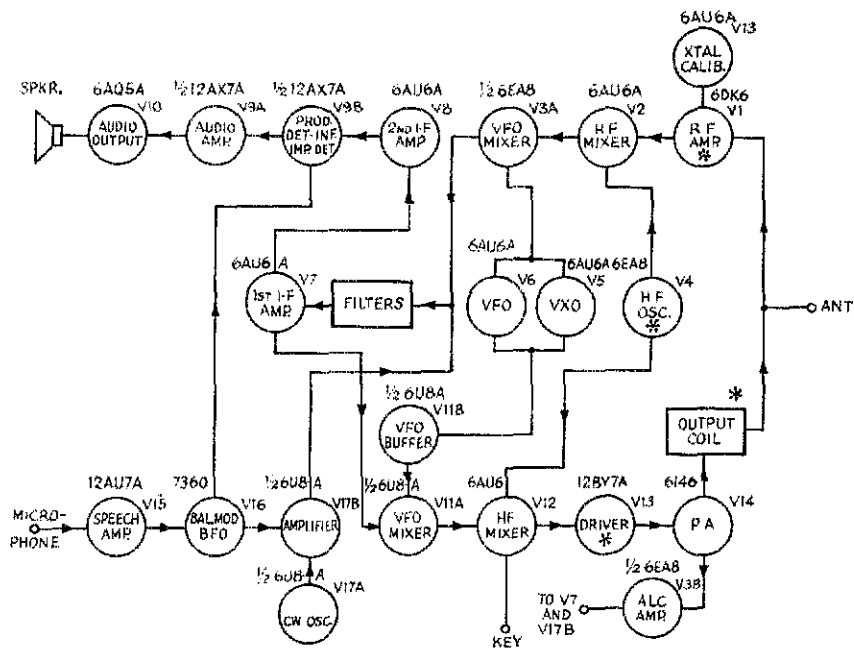
This is the first of a two-part series describing K1RPB's transceiver. Complete mechanical details, assembly hints, and alignment instructions will be given in Part II, which will appear in a subsequent issue.



The transceiver, including power supply, is built on a standard 13 X 17 X 2-inch chassis (Bud AC419). A 8 3/4 X 19-inch rack panel is used as the front of the unit. The main tuning dial is an Eddystone 898 (available from British Radio Electronics, Ltd., 1542 Wisconsin Ave., NW, Washington DC 20007).

between 160 and 6 meters directly and with external transverters for higher frequencies. Tuning is in 500-kHz segments. Band changing is accomplished with plug-in rf amplifier, oscillator, driver and pi-network output circuits. The plug-in units can be designed specifically for the frequency in use, giving optimum efficiency on each band. A panel switch determines whether the transceiver is used as a "barefoot" self-contained exciter, or alternatively, as a driver for a linear amplifier on the two-meter transverter. The panel switch simply reroutes the power and signal inputs and outputs of the transceiver to the proper auxiliary units. Receiver bandwidths, ranging from 200 Hz to 100 kHz can be selected independently of the operating mode. Frequency control can be switched-selected for VFO on transceive, VXO transceive, or VXO transmit, VFO receive. The panel meter can be switched to read alc, plate current, or grid current during transmit, and it reads signal strength only while receiving. The MODE switch selects a-m, cw or ssb transmission.

From a design viewpoint, the rig utilizes circuits copied from commercially-made equipment and from the *Radio Amateur's Handbook*. Standard components were used throughout, and no fancy tools are required for the mechanical construction phase. The builder does not need to be an electronics engineer or shop mechanic! (The author certainly has no claim on being either.)



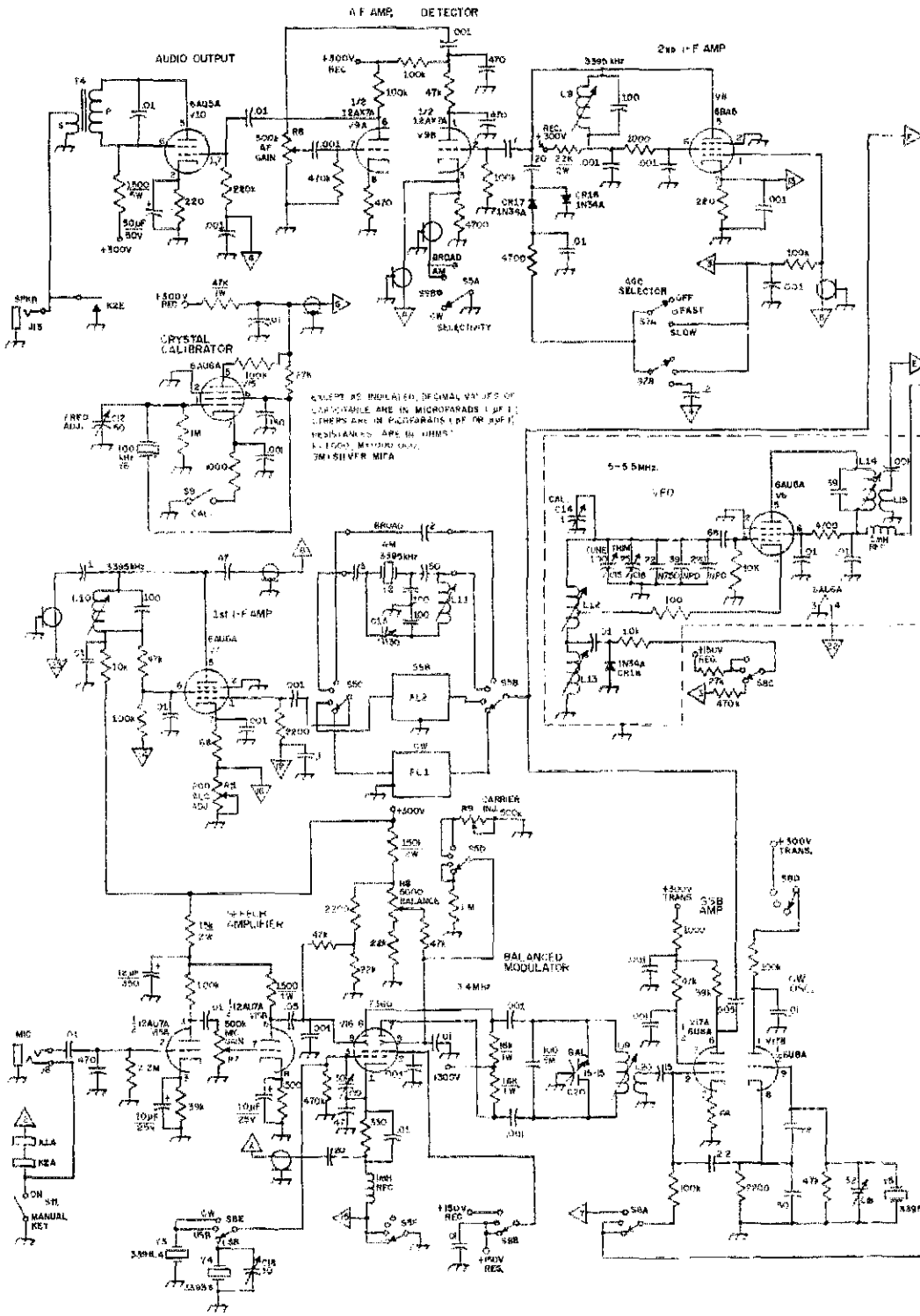
* - Plug-in circuits

Fig. 1 - Block diagram of the transceiver.

TABLE I

Band	6	10	15	20	40	80	160
C1,C2	20	39	47	68	68	68	68
C3	15	20	39	47	100	250	470
C4	20	22	22	39	47	68	68
C5	120	150	150	330	390	560	560
C6,C7	-	-	22	47	100	200	390
C8	-	-	-	-	-	100	300
C9	-	-	-	-	-	680	2200
L1	1 turn	1 turn	1 1/2 turns	2 turns	4 turns	8 turns	16 turns
L2-L6, incl.	5 turns	8 turns	12 turns	16 turns	32 turns	64 turns	130 turns
L7	8 turns tap at 3 turns	12 turns tap at 4 turns	15 turns tap at 6 turns	20 turns tap at 8 turns	40 turns tap at 16 turns	80 turns tap at 32 turns	160 turns tap at 64 turns
L8	2 1/2 turns 1/16-inch copper tubing space wound	4 1/2 turns No. 18 8 tpi (3014)	7 turns No. 18 8 tpi (3014)	8 3/4 turns No. 20 16 tpi (3015)	20 turns No. 20 16 tpi (3015)	31 1/2 turns No. 20 16 tpi (3015)	35 1/2 turns No. 24 32 tpi (3016)
Y1	58.8954 MHz	36.8954 MHz	29.8954 MHz	22.8954 MHz	15.8954 MHz	12.3954 MHz	10.6954 MHz

Table 1 - Component values for the plug-in modules. Coils L1 through L7 are wound with No. 30 enam. wire (except on 6- and 10-meter units where No. 22 enam. is used) on 1/4-inch slug-tuned forms, Miller 20A000RBI. The numbers in parentheses are for B&W Miniductor stock suitable for L8. Crystals may be purchased from International Crystal Co., Oklahoma City, OK 73102.



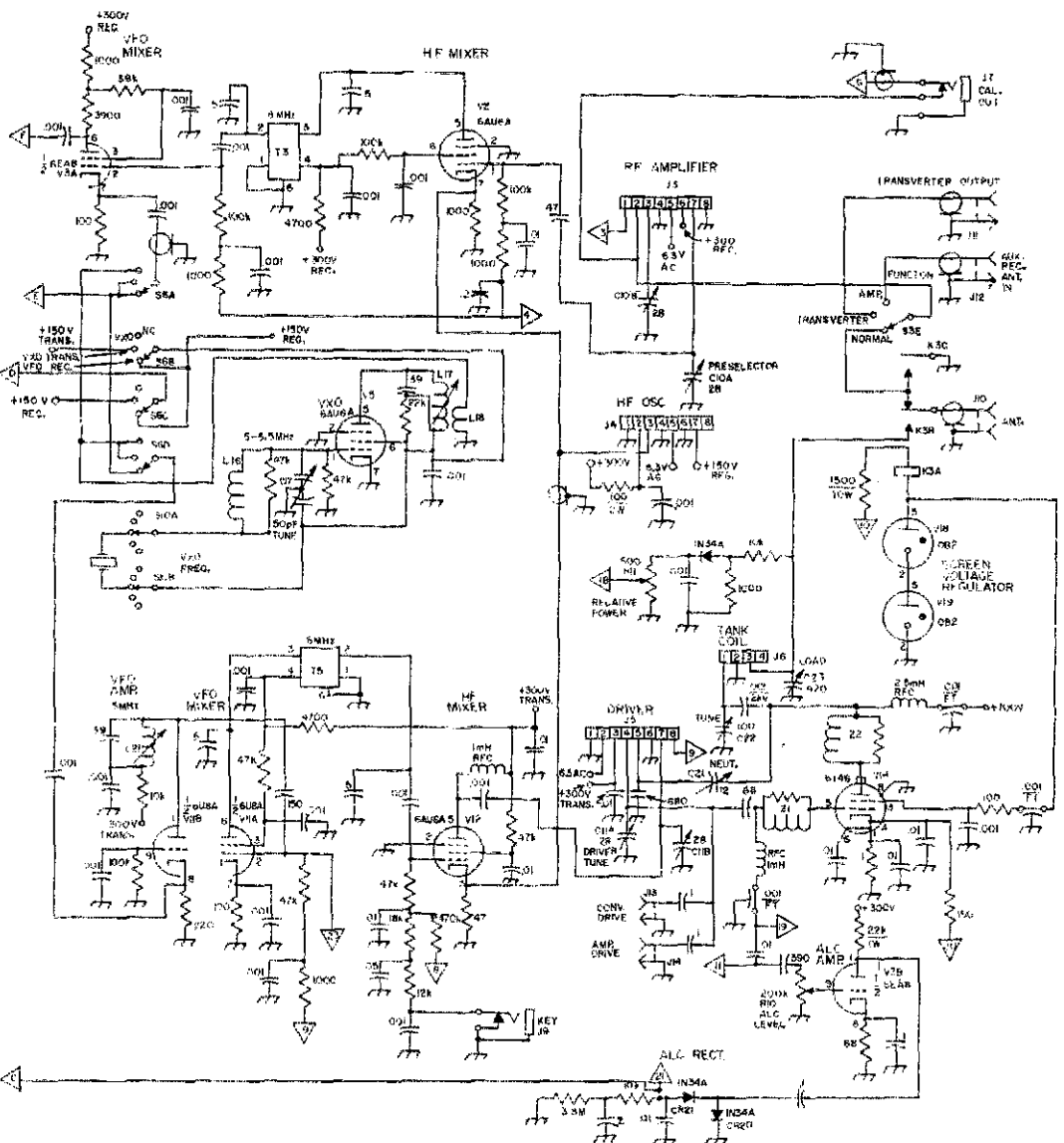


Fig. 2 - Schematic diagram of the transmitter and receiver sections. Unless otherwise noted, resistors are 1/2 watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic.

- C10, C11 - Dual-section variable, 28 pF per section (Hammarlund HFD-30X).
- C12 - NPO ceramic trimmer, 8-50 pF (Centralab 822AN).
- C13, C18, C19 - NPO ceramic trimmer (Centralab 827C).
- C14 - Air variable, modified with all but one stator and one rotator plate removed (Johnson 160-104).
- C15 - Air variable (Millen 23-100).
- C16 - Air trimmer (Johnson 160-130).
- C17 - Butterflly variable, 40 pF per section (Hammarlund BFC-38).
- C20 - Differential variable, 15 pF per section (Johnson 160-308).

- C21 - Air variable (Johnson 160-107).
- C22 - Air variable, 1750-volt spacing (Hammarlund MC-100SX).
- C23 - Two-section variable, 365 pF per section (Miller 2112).
- FL1 - Crystal filter, 400-Hz bandwidth (Heath SB-301-2).
- FL2 - Crystal filter, 2.1-kHz bandwidth (Heath 404-283).
- J3-J5, incl. - Octal socket (Amphenol 168-015).
- J6 - 4-pin socket (Amphenol 49RSS4).
- J7, J9 - Phone type, shorting (Switchcraft 12A).
- J8 - Microphone receptacle (Amphenol 80PC2F).
- J10 - Coaxial receptacle (Amphenol 83-1R).
- J11-J14, incl. - Phone type (Switchcraft 3501FP).
- K3 - Dpdt contacts, 115-V ac coil, antenna-switching type (Potter-Brumfield KT11A).
- L9, L10, L14, L17, L21 - 80 turns, No. 30 enam. wire on 1/4-inch, slug-tuned form (Miller 20A000RB1).

(Continued on page 38)

- L11 - 140 turns, No. 30 enam. wire on 1/4-inch, slug-tuned form (Miller 20A000RBI).
- L12 - 22 turns of No. 22 enam. wire on 3/4-inch slug-tuned ceramic form.
- L13 - 3 turns No. 22 enam. wire on Miller 20A000RBI form.
- L15 - 8 turns No. 30 enam. wire on the bottom end of L14.
- L16 - 50- μ H rf choke (National R-33).
- L18 - 8 turns No. 30 enam. wire wound on the bottom end of L17.
- L19 - 80 turns No. 30 enam. wire on 1/4-inch slug-tuned form.
- L20 - 5 turns No. 30 enam. wire wound on the center of the L19 winding.
- P1 - Vector plug-in assembly, octal base, for 7-pin miniature tube (C10N).
- P2, P3 - Vector plug-in assembly, octal base, for 9-pin miniature tube (C10M).
- R6, R7 - Audio-taper, composition.
- R8, R10-R12, incl. - Linear-taper, composition.
- R9 - See R3, Fig. 3.
- S5 - Rotary ceramic switch, 2 sections, 4 poles, 2-6 positions, 4 used (assembled from a Centralab PA-300 switch master and 2 PA-3 switch sections).
- S6, S8 - Rotary ceramic switch, 5 poles, 3 positions, 1 section (Centralab PA2015).
- S7 - Phenolic rotary switch, 1 pole, 11 positions (3 used) 1 section (Centralab PA-1003).
- S9, S11 - Spst toggle.
- S10 - Ceramic rotary switch, 2 poles, 6 positions (5 used), one section (Centralab PA2003).
- T3, T5 - 8-MHz broadband transformer (Heath 52-65).
- T4 - Audio output type, 5000-ohm primary, 3.2-ohm secondary (Knight 54D2064).
- Y2 - 3395 kHz (International type EX1).
- Y3 - 3396.4 kHz (Heath 404-206).
- Y4 - 3393.6 kHz (Heath 404-205).
- Y5 - 3395.4 kHz (Heath 404-215).
- Y6 - 100-kHz standard crystal (International Crystal type GP).
- Z1 - 4 turns No. 22 wire on a 47-ohm, 1/2-watt composition resistor.
- Z2 - 4 turns No. 16 wire on a 47-ohm, 2-watt composition resistor.

The top view shows the positions of the plug-in circuit modules, which have been painted black for easy identification. At the lower right, the PA-tank coils plug in through a hole in the shielding that surrounds the amplifier section. A chassis layout sketch is included in Part 2 of this article.

Circuit Description

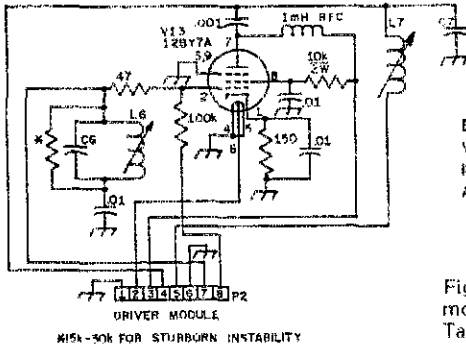
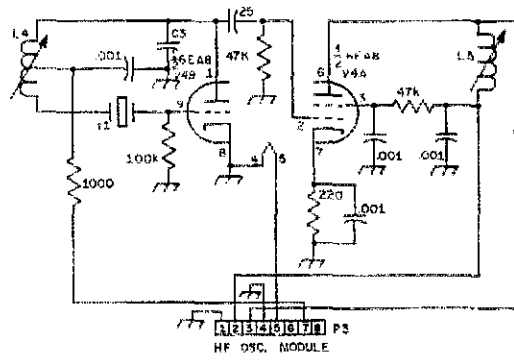
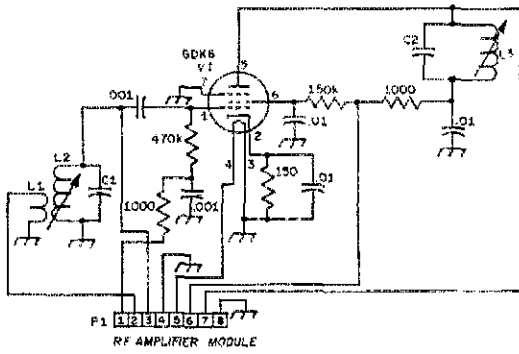
Fig. 1 is a block diagram, and Fig. 2 the schematic diagram of the transceiver. The plug-in rf amplifier is at the top left. The two mixers following the rf amplifier are designed for good conversion gain with minimum noise. The resultant i-f signal, after passing through the common i-f filter is amplified in two stages and ready for detection. A triode product detector also doubles as an infinite-impedance detector for a-m signals with a simple cathode bias change. The second half of the 12AX7 detector tube functions as an audio preamplifier, driving the 6AQ5 output stage. A fast-attack age system can be run either with slow or fast decay, or turned off entirely. The 100-kHz calibrator has an output jack for calibration of an auxiliary receiver, as well as the ATR-166 itself.

The transmitter section is straight-forward. A two-stage speech amplifier modulates a 7360 combination balanced modulator and carrier oscillator. The 7360 also serves as a crystal-controlled BFO for the product detector described above. The precise frequency of the 7360 dsb signal can be adjusted with small trimmer capacitors to place the oscillator in the proper position with respect to the bandpass of the crystal filter. A separate cw oscillator is provided for switching simplicity. The filtered ssb signal is amplified by the same circuit which serves as a first i-f stage for the receiver section. The signal is heterodyned twice to obtain the desired output frequency. The second mixer stage is grid-block keyed for cw operation. The plug-in driver stage excites the 6146 power amplifier, with drive to spare. The final "loafs along" at about 50 watts input. Intermodulation distortion products are down 30 dB or more. The second harmonic is well suppressed, measuring 35-40 dB down. Suppression of the unwanted sideband is more than 40 dB. Any grid current in the 6146 is sampled, amplified and rectified to produce an a/c voltage. A/c amplification was found to be necessary because the grid-sampling technique tried didn't produce enough dc control voltage to prevent flat topping.

Some circuits are common to both the transmitter and receiver sections. These include the power supply, panel meter, relays, VFO, hf oscillator, crystal filters, first i-f amplifier and carrier-frequency oscillator. The use of common circuits has obvious benefits in cost and simplicity, but more important the use of the same three master oscillators guarantees that the transmitted-signal frequency is precisely the same as the receiving frequency.

Fig. 3 - Transceiver power supply. Unless otherwise marked, resistors are 1/2-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic.

- CR1-CR9, incl. - Silicon, 600 PIV, 750 mA.
- CR10-CR15, incl. - Silicon, 100 PIV, 1 A.
- J1, J2 - Octal socket (Amphenol 168-015).
- K1, K2 - 4pdt contacts, 12-volt dc coil, (Potter-Brumfield KHP17DU).
- L21 - 2-H, 200-mA filter choke (Knight 54D1418).



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICO FARADS (pF OR μpF);

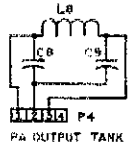


Fig. 4 - Schematic diagrams of the plug-in modules. Values for the labelled parts are given in Table I.

Before going into construction aspects, it should be noted that the ATR-166 has, over the past four years, provided excellent service. It has performed reliably in routine home operation and survived four Field Days and five vhf contests. A burned-out pilot lamp has been the only component failure to date.

Planning

Perhaps the most critical stage in any project is the planning. Serious and often expensive errors can be avoided, and a good deal of confidence in the project can be developed, with proper planning. In publishing any construction article, an author rarely mentions the planning and experimental stages of his work. He describes the project in its final and, presumably, best-developed form.

Starting from scratch, several steps should be followed. The first order of business in a construction project is to draw a simplified block diagram of the circuit. In this way, one can study the interactions of the various functions. Once this is done, a very rough sketch of the chassis and the front panel can be made. Third, each individual circuit is drawn in detail. Without an engineering degree, it is best to use circuits that are well established, whether they come out of the *Handbook*, *QST* articles, or the schematic diagrams of *commercially-built units*. Fourth, the circuits must be tied together on paper with appropriate switching, power and signal wiring, and provisions made for any accessories to be added later. At this juncture the rough planning is completed, and the tough job really begins.

Refined planning starts with a thorough search for components in the industrial catalogs supplied by Newark, Allied and other distributors. A complete parts list is drawn up at this point. Circuit revisions may be needed as certain desired components may prove to be unavailable. With the design firm, a precise scale drawing of the front panel and chassis layout is needed. The author has found it best to draw these to scale. Cardboard cutouts were used to represent transformers, tubes, knobs, switches and tuning capacitors. Then, the writer was able to dope out a practical mechanical design for the rig. The physical layout is very important and a good design pays rich dividends later, as the builder can avoid the difficulty of putting tuning shafts through vacuum tubes in this manner! Of equal importance, however, is a physical layout which optimizes the electronic design. Circuits should be positioned to reduce undesirable coupling and feedback problems, and to keep signal leads short. For example, it is poor design to place the carrier oscillator near an amplifier which follows the sideband filtering system. This effort, coupled with the technique of testing each circuit during construction, pays off handsomely. This rig worked satisfactorily the first time it was plugged in. That certainly is a happier tale than the author can tell about some earlier projects, which either failed to work at all or were such poor performers that a decent burial was the only recourse.

Construction and alignment details for the ATR-166 will appear in an early issue of *QST*.

Use your Zip code when writing ARRL.

• Beginner and Novice

A

15-Meter

Beam

"On A Budget"

BY CHUCK DAILY,* WN7PDT

THERE ARE many plans available for constructing beam antennas which use aluminum tubing for the elements. However, in many areas of the country aluminum tubing is difficult to find. Also, aluminum stock can be quite expensive. For the Novice who has just tied up his life savings in a transmitter and receiver, the cost of a commercial beam can be prohibitive. Necessity breeds strange inventions, and in my case it enabled me to put together a high-performance, three-element beam at a fraction of the cost of a commercial unit.

Beating the High Prices

The key to keeping the cost down is the use of electrician's thin-wall tubing and pressure connectors. Thin-wall tubing comes in 10-foot lengths, which of course are too short for use as elements. In order to join the tubing sections, to obtain the required lengths, pressure connectors are used. A pressure connector is a coupling unit that fits over the tubing ends and can be tightened to make a solid connection between the two lengths of pipe. Thin-wall tubing and pressure connectors can be purchased from Sears, either at their stores or through the mail-order catalog.¹

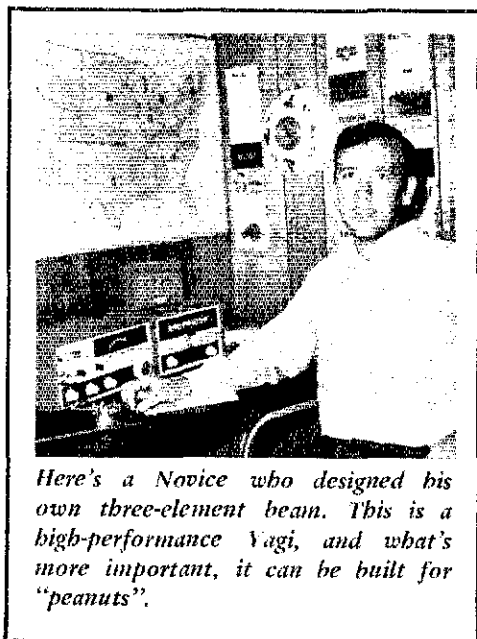
Constructional Details

Information is given here for the assembly of either a two- or three-element beam. I originally built a two-element version using 1 1/4-inch thin-wall tubing for the boom (Fig. 2). Then I found that Sears stocks 21-foot lengths of tubing that are used as the top rail in their chain-link fence. I couldn't pass up the chance to try a three-element beam, which is now what's in use at WN7PDT.

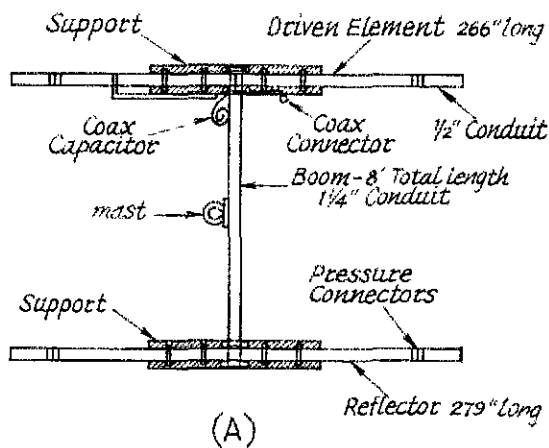
The supports for the elements are made from 3/4-inch plywood which is treated with an outdoor preservative to protect it from the weather. Details for the supports are given in Fig. 2. The

*1187 Ash St., Provo, UT 84601.

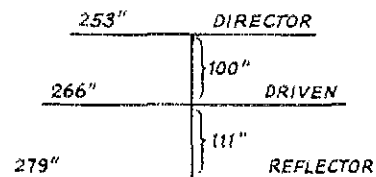
¹Also, nearly all cities or towns have nearby electrical parts distributors. — Editor



Here's a Novice who designed his own three-element beam. This is a high-performance Yagi, and what's more important, it can be built for "peanuts".



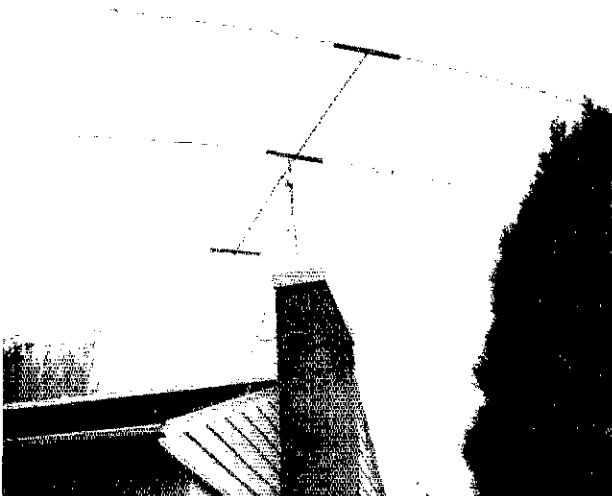
(A)



THREE-ELEMENT VERSION

(B)

Fig. 1 -- At A are the details for the original two-element beam. At B, the information for three elements.



The completed antenna has been mounted on the chimney, using TV hardware. While not clearly visible, guys are used to secure the rotor and mast.

center of the support should be chiseled out, 1 X 2 inches, and to a depth of 1/4 inch, so that the center pressure connector can be recessed. Without this step the U-bolts pull the elements down, causing too much stress at the center connection. Four small U-bolts and two large ones are used to connect the element to the support, and the support to the boom.²

The elements are made by connecting 10-foot sections of the thin-wall tubing together. It was found that support was needed in addition to the pressure connectors. I decided to turn down 5/8-inch wooden dowel rod with my electrical sander (disk type) and place the rod inside the conduit at each of the connections. This dowel rod fits inside the tubing at each of the joints and provides the additional support required. The same system of connectors and dowel rods is used to make up the supplemental length at both ends of the 20-foot section.

A gamma system is used for matching the antenna to 50-ohm coax. For the gamma rod I used a 5-foot length of the 1/2-inch thin-wall conduit and made clamps out of aluminum strips. I used a length of coax for the gamma capacitor. The capacitor is formed by the outer braid and inner conductor (Fig. 3 shows the details). The length of the coax section can be determined from Table 1. Make the capacitor at least six inches longer than the value listed because the coax must be pruned to obtain an exact match.

²If the antenna is to be used in an area where moisture is a problem, it would be a good idea to insulate the elements from the U-bolts. This could be accomplished by using pieces of plastic garden hose over the elements where the U-bolts hold the elements. Also, all elements can be grounded directly to the boom, at the center of the elements. This is known as "Plumber's Delight" construction. The performance of beams using grounded or ungrounded elements is identical. — Editor

The capacitor is constructed by removing three or four inches of the outer insulation to expose the braid. The shield should then be cut in the middle of the area from which the cover was removed. Make sure not to cut the dielectric between the shield and the inner conductor. The two lengths of exposed braid should then be unraveled and twisted together to form the two leads. The coax shield should be connected to the center coupling of the driven element by means of a self-tapping metal screw. The shield lead from the gamma capacitor should be connected to the end of the gamma rod. No connection is made to the center conductor at the capacitor end. A coax fitting, for connection to the feed line running to the station, should be installed at the other end of the piece of coax. It is a simple matter to install an SWR indicator at this point for observation during matching adjustments.

Adjusting the Gamma

When assembled, the antenna should be mounted at least 10 feet above the ground for making the matching adjustments. If the antenna can be reached in its permanent location, all the better for making the adjustments.

Feed enough power into the antenna to get a reading on the SWR indicator and then slide the

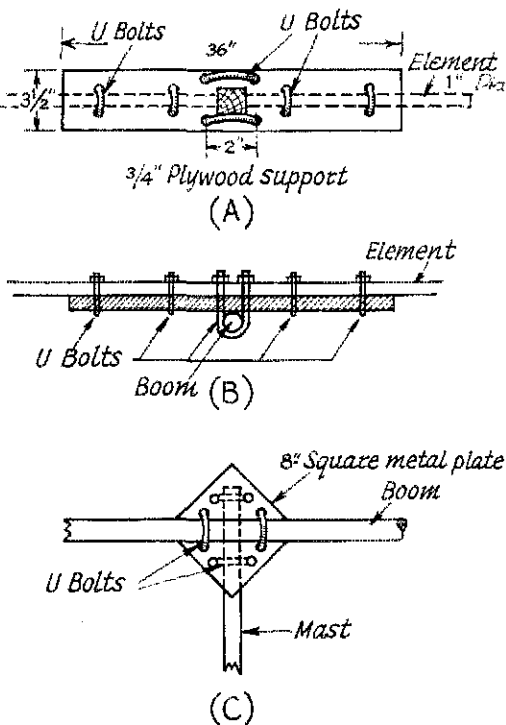


Fig. 2 — Constructional details for the element supports are shown at A and B. Illustration C shows the mount used for the boom-to-mast bracket.

TABLE I

Band (Meters)	Capacitance required (pF)
20	100
15	75
10	50
6	30

Given below are figures for capacitance-per-foot of various coaxial cables.

RG-8/U	29.5 pF/ft.
RG-11/U	20.5 pF/ft.
RG-58/U	28.5 pF/ft.
RG-59/U	21.5 pF/ft.

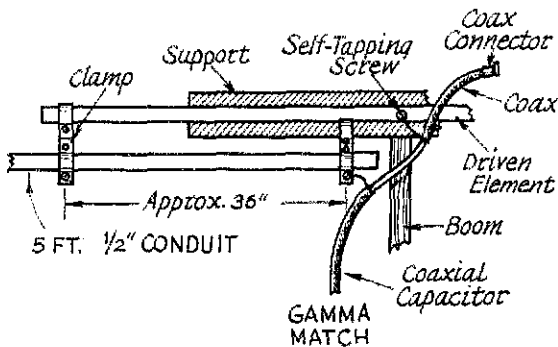


Fig. 3 — Details of the gamma-matching system. The portion of the gamma rod extending past the shorting clamp can be cut off after the matching point is found.

gamma shorting clamp back and forth, looking for the lowest SWR reading. Be sure the transmitter is tuned to the design frequency of the antenna for these tests. Prune the gamma capacitor about an inch at a time and adjust the shorting bar for the best match (minimum reflected power). It should be possible to get a perfect match if care is taken in the adjustments.

The dimensions given in Fig. 1 are for the Novice portion of the 21-MHz band. Figuring the element length is quite simple. The formula for the driven element is 468 divided by the frequency in MHz. The answer will be in feet. The

reflector should be made five percent longer than the driven element, and the director five percent shorter than the driven element. These figures apply to the other bands as well.

The front-to-back ratio on my beam is excellent. The entire beam cost about \$15. One thing for sure — with a beam 15 meters becomes a whole new world for the Novice. QST



February 1921

... L. M. Clausing, of the Bureau of Standards, describes how to get a high-pitched musical note out of a 60-cycle supply. He has a "current reverser" in the high voltage output from a transformer. Might be a little difficult to make, I'm thinking.

... "Rotten S.O.L." is the title of a yarn by The Old Man and this recounts his experiences at the Midwest Convention. He meets all the "greats" and has a ball. Well illustrated by Clyde Darr, 8ZZ, with realistic cartoons. Think miniskirts are new? Read this.

... Well, we have instructions for making an electrolytic rectifier. P. J. Furlong, 1FF, of Boston gives the horrible details. He uses it as plate supply for a W. E. VT2. (Maxim had one with one hundred twenty test tubes. Allowing five minutes for cleaning each cell every-so-often, that comes out ten hours of messy work. I dunnit once!)

... Allen H. Wood shows how to make a simple wavemeter. It is intended for use in locating the long wavelengths, primarily. Just a coil and condenser. A note by the editor says this is a form of sensitizing circuit which will increase signal strength several X.

... The famous 2RK, station of J. Kenneth Hewitt, Brighton Beach, N.Y. is well described. This was a powerhouse all right, using a United Wireless 30,000-volt transformer, 2kW, 4-wire flat-top, 70-ft. high.



February 1946

... K. B. Warner talks about our various ham bands. He gives them a sort of personality, thinking of the 3500-4000-Kc band as a sort of "mother band." (I think of this band as an old foggy's haven, at least part of it!). The 7 and 14 Mc bands to him are populated by hardened warriors (with their mike gains wide open). Ten meter is "just slightly potty and very inventive."

... John Huntoon discusses war surplus gear at length and describes the process by which such material becomes available to hams.

... Byron Goodman, W1JPE, has a nifty little combination 28-Mc converter/receiver. For cw it works as a simple superhet. For phone, the output is piped into a broadcast receiver.

... "Dixie Jones Owl Juice" makes it appearance and he wonders how come all his dumb bunny ham friends came out of the war as Majors and higher while he was a lowly Captain. (Huh, I was just a Pfc. when I got out of WWI!)

... Paul Robbiano, W6PKM has Part II of his story of the enemy radar jameters developed during the war, at Harvard. Lots of trick antennas.

... What's this? W. W. Smith, W6BCX, one-time editor of the old *Radio*, spells out the glories and benefits of "Premodulation Speech Clipping and Filtering." Says it is possible to realise a gain of nearly 100 fold, as far as working DX is concerned. Of course there is a "slight" sacrifice in quality. Yecchh! *WIANA*

Technical Correspondence

TV COLOR-BURST SIGNAL FOR PRIMARY FREQUENCY REFERENCE

Technical Editor, *QST*:

I have an idea that someone might like to implement. The idea is to use the color pulse from a local TV station as a primary frequency reference for calibration of frequency meters and other amateur equipment.

By FCC regulations the transmitted color-burst frequency of 3.579545 MHz must be maintained to an absolute accuracy of ± 10 Hz with a rate of change of no more than 1/10 Hz per second.¹ However the networks maintain the frequency by means of a rubidium frequency standard which has an accuracy of 1×10^{-11} Hz. The National Bureau of Standards at Boulder, Colorado made measurements on the color burst pulse originating from New York City, and demonstrated that precision of a few parts in 10^{11} may be obtained for 15 minutes averaging time.

It appears to me that the color-burst reference frequency is readily available in any part of the country to an accuracy of several times that which can be obtained from WWV directly, and might be used for calibration of frequency meters and for other amateur applications. I believe that a simple direct-reading digital frequency meter could be developed using a multiple-turn iron-core-adjusted master oscillator, using the color burst signal as a reference for extreme accuracy on the ham bands.

— Kenneth L. Huntley, W4CXP, 334 Elliott Road S. E., Ft. Walton Beach, FL 32548.

MESSAGE-REPEAT AT INTERVALS FOR THE MORSE-CODE GENERATOR

Technical Editor, *QST*:

I just finished a version of the Morse-code generator² and it works beautifully! My machine calls CQ three times and signs my call twice, using 287 diodes in the matrix.

I incorporated a circuit to make it repeat the message at a variable time interval. This circuit is shown in Fig. 1, and is a simple relaxation oscillator. When S1 is closed, C1 charges through R1 and R2 until the voltage across it exceeds the threshold of Q1. The unijunction transistor (UJT) fires, rapidly discharging C1 through R4. The resulting sharp voltage spike is fed from base 1 to

pin 6 of U7, the control flip-flop, causing it to change state and initiate the cw message.

The color-burst frequency, known technically as the chrominance subcarrier frequency, consists of at least eight cycles, transmitted immediately after each horizontal sync pulse, but omitted following the equalizing pulse during the broad vertical pulses. Chrominance components are transmitted as amplitude-modulation sidebands of a pair of suppressed subcarriers in quadrature. The chrominance subcarrier frequency forms the basis of all other frequencies used in a color-TV transmission: the horizontal scan frequency is 2/455 times the burst frequency, or 15,734.264 \pm 0.044 Hz; the vertical scan rate, 55.734 Hz, is a submultiple of the burst frequency. Color bursts are omitted during monochrome transmissions.

Editor.
²Hall, "A Digital Morse-Code Message Generator," *QST*, June, 1970.

When S1 is in the position shown, the message will repeat indefinitely after a time interval selected by adjusting the delay control, R1. Components R1, R2 and C1 determine the time constant of the circuit, which can be from 25 seconds to about 2 minutes with the values shown in the diagram. R2 and C1 can be smaller values if the builder wishes the delay range to be shorter, but keep in mind that C1 is charging up while the message is being sent. The message is not disrupted if Q1 fires during the message sequence, but the various positions of R1 may seem to give inconsistent results. When S1 is placed in the other position, the code generator will function as originally designed and the message is started by pressing the message-initiate push button, S2.

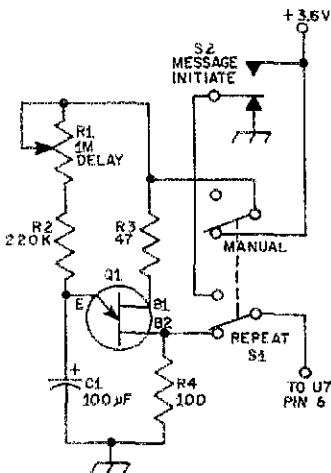


Fig. 1 — The WB4EGA circuit for repeating code messages at adjustable intervals. Resistances are in ohms, k = 1000, M = 1,000,000. Parts not listed below are for text reference.

Q1 — See text. Types 2N4851, 2N4871, or Motorola HEP 310 are also suitable.

S1 — Dpdt. A spst switch may be used by eliminating top section and permanently wiring junction of R1 and R3 to +3.6 V.

S2 — S2 of original circuit.

This repeat feature, when used with the selectable-message-stop feature of the generator, can give even wider use. A 10- μ F value for C1, a 10,000-ohm resistor in place of R1 and R2, and shunting C1 with 10 megohms for added timing stability will produce initiate pulses about three or four times a second. If one selected a message-stop pulse from the matrix ahead of a K normally used at the end of the message, the generator would repeatedly send CQ followed by the call. Then by switching S1 to manual and the stop-selector switch to the second position, the CQ call would be concluded with the call followed by a K. A three-position switch at S1 would let the builder select rapid repeats, delayed repeats, or manual initiation.

For Q1, almost any UJT will do. I used one of the 4-for-\$1 variety. I guess you could say I have become a lazy cw operator. Now all I do is tune up my transmitter, turn on the digital code generator,

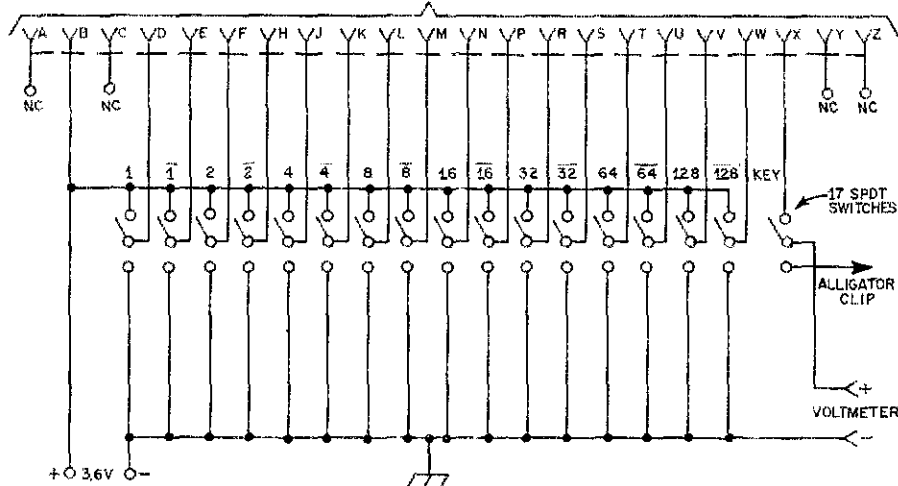


Fig. 2 — Schematic diagram of the test fixture for diode matrix boards. Spdt switches are indicated for the lines; if miniature dpdt switches are used, connecting both poles in parallel will assure lower contact resistance. Stop-signal AND gates may be tested by connecting the alligator clip to pin Y or Z on the connector and placing the KEY switch in the down position.

and sit back and relax until it snags a contact for me! — Phillip D. Deem, WB4EGA, 1900 Holly Ridge Dr., Apt. 204, McLean, VA 22101.

FIXTURE TO TEST DIODE-MATRIX BOARDS

Technical Editor, *QST*

I have built a neat little gadget to fully check out a matrix wired for the digital Morse-code message generator.³ My scheme uses 17 miniature dpdt switches (only one pole is used), which permit the application of voltage to selected diodes that comprise a given AND gate, and checking the output voltage at the keying line of the matrix board (actually the output of the associated OR gate). A schematic diagram of the device is shown in Fig. 2.

For an example to explain its use, suppose we are checking a gate which has diodes in the 1, 4, 8, 16, 64 and 128. We simply plug the board under test into the Amphenol 22-contact socket and connect a voltmeter to the binding posts, and turn "up" the six switches marked with the same flip-flop output markings. If the AND gate is functioning as it should, the meter will read upscale to about 3.2 volts or higher. If it fails to do so, the chance is that the OR gate diode is bad; here a check can be made on the OR gate by connecting the alligator clip to the input side of the OR-gate diode.

To check each diode of the AND gate, one by one, momentarily throw the switches into the grounding position. The voltage indicated on the meter should drop to a very low value, about 0.3 V. Should any switch be thrown to the ground position and no voltage change noted, the diode may have been "cooked" and rendered useless. One other possibility also exists: there may be a hair-line crack in the copper foil on the matrix board. If this is the case, the break will be between the finger contact and the diode under test. I have found that where redundant combinations of diodes are used, the meter has a tendency to lie. This can be cured by not connecting any of the 47,000-ohm resistors until all of the gates are wired, and by temporarily connecting the resistor to each AND gate for the test.

³Ibid.

The beauty of this little gadget is that it permits one to test the etched board for open circuits or even shorts, without having to unsolder either end of any of the diodes; that is to say, all testing can be done "in the circuit." Using this test fixture, I have found seven cold-solder joints, 18 diodes that had been "cooked," four cases of hair-line breaks in the foil lines, two cases of dead shorts between longitudinal foil lines, one bad resistor, and two diodes that had inadvertently been mounted with the polarity wrong. By using the device on every single AND and OR gate, I have been able to make the whole matrix function beautifully. M. Crosby Bartlett, W9MC, 5201 Knollton Road, Indianapolis, IN 46208.

NARROW-BAND SSB EMISSIONS

Technical Editor, *QST*:

In the October, 1970, issue of *QST*, the article by Karl Meizer, DJ4ZC, appears to be the answer to one of the most trying problems faced by hams today. It appears to me that the output of his processor is an ssb signal that is 1 kHz wide. If this is so, what is there to prevent the transmission of the signal in this state?⁴ By moving the tripling down the processing path a few linear and heterodyning stages from the microphone to the speaker, and tripling in the receiver's i-f just before the product detector, it would seem that the signal would lose no essential modulation. My point is this: The transmission of the 1-kHz-wide signal would double, maybe even triple our effective usable bandwidth in the hf phone bands, where we need it. — Joseph E. Price, WA5UNK, Box 543, Olton, TX 79064.

⁴Special Temporary Authorization would be required from the FCC. See *QST* for February, 1969, page 63, "Experimental Reservation Denied," — Editor.



Hints and Kinks

For the Experimenter



HAM-M ROTATOR MODIFICATION

Ham-M rotors sometimes develop an intermittent connection at the rotor which causes meter fluctuation at the control box. The arm of the potentiometer is driven by a leaf spring which presses against the bell housing. Eventually the teeth in the leaf spring cut a groove in the housing and two things can happen: The drive mechanism can slip, causing incorrect readings, and the ground contact can cause erratic meter indications.

Both problems can be cured by taking the following steps.

1) Remove the bell housing and mark a point about 3/16 inch away from the center point where the leaf spring has been bearing.

2) Drill and tap a hole at this point (No. 3 drill).

3) Cut a section of a machine screw about 1 1/8 inches long. This screw will be used as a threaded stud.

4) Drill a 3/32-inch diameter hole through the center of the stud (longitudinally).

5) Using an "O" ring washer or a grommet, a brass washer, and a hex nut, tighten the stud into the tapped hole as shown in the diagram.

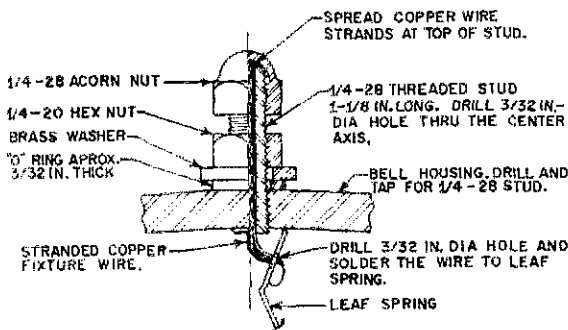
6) Drill a 3/32-inch diameter hole through the center of the leaf spring. Then attach a flexible wire (lamp cord without insulation) to the spring and solder it in place.

7) Pass the flexible wire through the hole in the stud while lowering the bell housing back into place.

8) Cut off the flexible wire approximately 1/8 inch above the stud. Bend the wire over and spread it out on top of the stud.

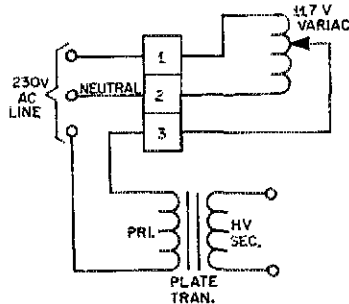
9) Drop a small flat brass washer into an acorn nut, then tighten it on the stud over the copper strands.

10) Paint the stud and nuts if they are not brass. If it is necessary to disassemble the rotator again, the flexible wire must be replaced. The screws and acorn nut were purchased at a local hardware store. Taps and drills of the proper size cost less than 50 cents each. — *George Spencer, VE2MS*



117-VOLT VARIAC WITH 230-VOLT TRANSFORMERS

Here is a way to use a 117-volt Variac on a 230-volt plate supply. This system allows the plate voltage to be varied from half to full voltage and permits energizing the plate primary at the lower value. — *Mark Mendelker, W5RSZ*



CENTER INSULATOR FOR ROTATABLE DIPOLE

The plastic "T" connectors made for joining sections of heavy-duty plastic water pipe are readily available at plumbing suppliers and are easily modified to make a strong and versatile center insulator. Fast-drying epoxy cement should be used to join the elements to the connector. — *Alan Wise, W1NTV*

BAMBOO POLES

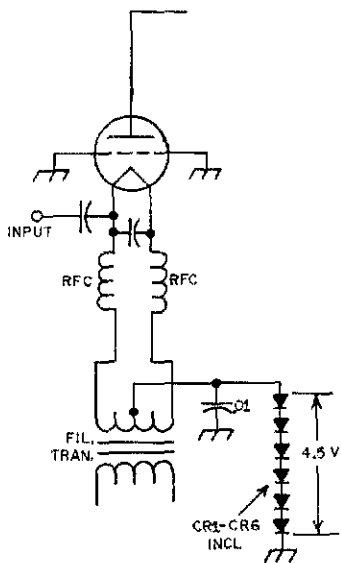
Bamboo, suitable for quad arms, can be purchased from Western Auto in bundles of 10 pieces. They come in 12, 14, and 16 foot lengths and are listed in the fishing-supplies section of the catalog. One bundle of the 12-foot lengths lists for \$4.60. — *Russ Pitts, W1EFZ*

RIVETS IN PLACE OF SCREWS

While building an antenna tuning unit, I had trouble locating suitable hardware to install the two SO-239 coax connectors. To my surprise, a pop rivet tool and some 1/8-inch diameter rivets worked very nicely. The tool has many household uses and is inexpensive. The rivets are easily removed by drilling through their center holes. — *Eric C. Ellison, WB2CHT*

REDUCING AMPLIFIER DISSIPATION

After building a kilowatt grounded-grid linear amplifier, which used a voltage doubler in the power supply, I found that the voltage regulation was poor. During idling periods (no speech), the higher plate voltage increased the tube dissipation substantially. Even between words, the idle current went up, running the tubes red hot. I decided that



Six silicon diodes are wired in series to provide 4.5 volts of regulated bias. The voltage rating of the diodes is unimportant but the current rating must be greater than the tube plate current at full power input.

adding a small amount of bias should cool things off a bit. High-current Zener diodes can provide bias, but they are expensive. In checking some garden-variety silicon power rectifiers I learned that the barrier voltage across their junctions remained fairly constant with changing current. Although they are not intended to be regulators, they actually do a fair job of regulating.

Six of these ordinary diodes, connected in series with the cathode of the amplifier tube, decreased the idling current from 120 mA to 80 mA. More bias can be obtained by using additional diodes. The six diodes in my system provided 4.5 volts.¹ — *B. H. Brunemeier, W6FHM/DU1*

SIGNAL GENERATOR FOR I-F ALIGNMENT

Most commercially-made grid-dip oscillators have a low-frequency limit of 1.5 MHz. Most of these instruments can be persuaded to oscillate in the vicinity of 455 kHz by adding a fixed-value capacitor across the pins of the largest inductance. No internal modifications to the unit are required. If difficulty is encountered in obtaining oscillation at the lower frequency, two capacitors of equal value can be used from each end of the coil to ground.

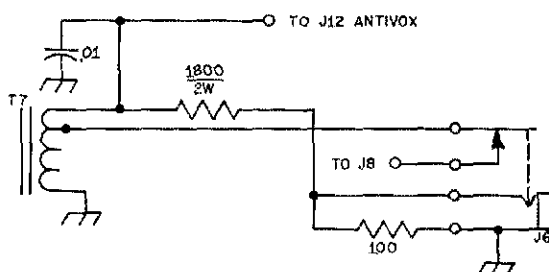
The use of a large fixed-value capacitor across the variable tuning capacitor results in a large amount of bandwidth. Typically, a value of about 500 pF results in a tuning range of only 14 kHz at 455 kHz. This is an ideal spread for exploring the shape of the i-f response curve of a receiver.

¹A short discussion of bias for grounded-grid amplifiers, and its effects on distortion products can be found in *QST* for December, 1970, page 28.

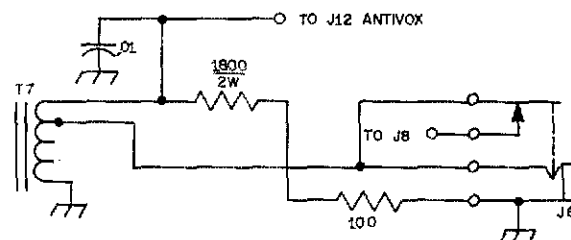
A simple way to see if the added capacitance has brought the frequency down to 455 kHz is to look for the second and third harmonics on a broadcast radio. — *D. P. Taylor, G80D*

75S3 AUDIO MODIFICATION

Many amateurs use low-impedance headphones, and these headsets will not operate satisfactorily with the Collins 75-S series of receivers. A simple wiring change at the phone jack will correct the problem. Remove the orange wire going to J6, tape the end and tuck it out of the way. Connect a wire to the terminal where the orange wire was fastened and connect the other end to the terminal on the jack having a white wire (with brown and blue tracer). Simplified versions of both circuits are shown in the drawing. — *H. Dale Strieter, W4DQS*



ORIGINAL 75S-3 AUDIO CIRCUIT



MODIFIED AUDIO CIRCUIT

PANEL MATERIAL

Discarded washing machines, dryers, and other appliances are good sources for panel and chassis material. Scrap dealers are usually willing to let customers cut panels from these machines for a very reasonable price. The steel bends easily without breaking and can be cut with a sabre saw. An added feature is that one side is painted and this can serve as either the final finish or as a primer for another color. — *W. H. Moody, WA2RKL*

SPAGHETTI

Your local hospital is an excellent source of spaghetti tubing. For medical applications, the tubing can only be used once. A request to a doctor or nurse will usually bring you enough plastic tubing of various sizes to provide a lifetime supply for ham purposes. — *WIKLK*



Recent Equipment



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

The Heath SB-102 Transceiver

BUILDING A five-band ssb transceiver from a kit could be the most difficult project that some hams will ever attempt. In their SB series, Heath Company has developed the business of constructing a "station in a box" to the point where any amateur with patience and a little kit-building experience can produce a first-class rig. The SB-102, a revised version of the SB-100 and SB-101, was recently introduced. Although the basic design remains unchanged, the new model features improvements in receiver sensitivity and VFO stability, as well as having provisions for attaching outboard vhf transverters. Readers may refer to an earlier QST review for a stage-by-stage description of the "works."¹

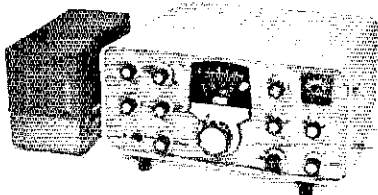
Changes

To upgrade the sensitivity of the receiver section, especially on 21 and 28 MHz, a 6HS6 has been substituted for the 6AU6 used in the front end of the earlier versions. The revised circuit is shown in Fig. 1.² Input and plate tuned circuits of the rf stage also serve as the plate and grid tanks, respectively, for the driver stage. Adjustment of the PRESELECTOR control, therefore, tunes both the receiver input and the exciter section.

The tube VFO used in the earlier models has been replaced by a solid-state version with improved electrical and mechanical stability. Drift

¹Recent Equipment, "The Heath SB-100," QST, September, 1966.

²An enterprising chap has been advertising a front-end modification kit to allow SB-100 owners to install the SB-102 exciter. See Ham Ads.

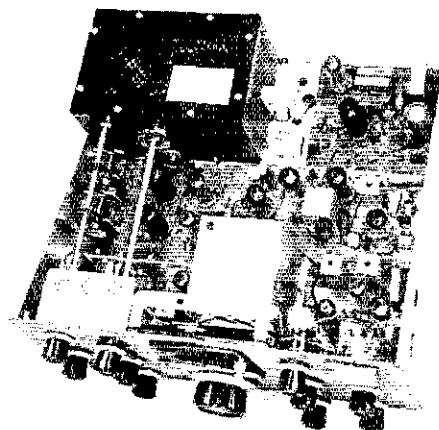


tests revealed an average of 14-Hz change in frequency over a fifteen-minute period, after a thirty-minute warm-up. No details of the new circuit have been released by Heath (not even a schematic diagram). The manufacturer states that the VFO assembly is being made by several subcontractors and that circuit details vary from supplier to supplier. Heath's requirement is compliance with their specifications, apparently giving suppliers some leeway in component selection and circuit design. The VFO housing is completely sealed, and the instruction book carries a stern warning against tampering.

For those who might be thinking of adding the new VFO to a SB-100 or SB-101, mechanical differences will prevent direct substitution. The VFO is sold as a replacement part, so it might be a good choice for a homemade rig if linear-frequency readout is desired.

The VFO power supply provides a 10-volt regulated output, using 12.6 volts ac from the filament line and 150 volts dc regulated with a VR tube. The details of this circuit are shown in Fig. 2. Filament voltage is rectified by D906 and filtered in an RC pi section. A No. 1815 pilot lamp functions as a variable resistance, supplying a 10-volt Zener diode. Further regulation is accomplished by a 2N3567 pass transistor which uses a sample of the regulated B plus (through an appropriate dropping resistor) as a reference element.

Another modification incorporated in the SB-102 is the provision for operation with a vhf



The SB-102 consists of five etched-circuit board subassemblies, the VFO (lower center), and the final amplifier section (which is contained in the cage at the upper left). Above the control relay, a transverter power jack has been added on the right side of the amplifier cage. The power supply for the VFO is contained under the cover on the VFO housing. Crystal control of the transmitter frequency can be selected with a front-panel switch. However, only one crystal socket is provided, which is visible at the center left.

RF AMPLIFIER

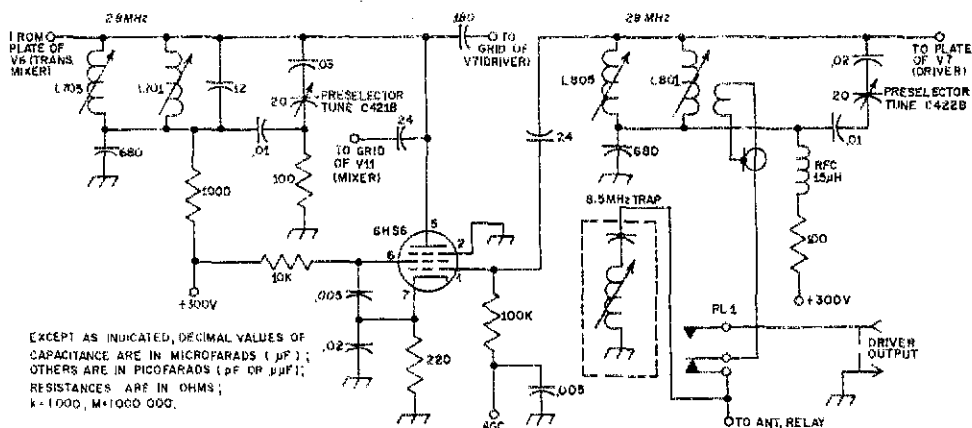


Fig. 1 — Modified receiver front end.

transverter such as the Heath SB-500.³ No modifications are required, other than punching out the knockout section in the rear cabinet wall to allow access to a power jack. However, the otherwise lucid and complete instruction manual contains no directions for transverter connection. The schematic diagram shows that a sample of the driver signal is available at a rear-panel connector marked, appropriately enough, DRIVER OUTPUT. The final-tube plate and screen voltages are routed by way of the nylon jack mounted on the rear of the amplifier cage (behind the knockout section of the cabinet). Removing the shorting plug from this jack will disable the final amplifier — and the B voltages to run the transverter may be obtained at this point.

Accessories

One extra-cost item, the cw filter, was tried in the SB-102. If cw operation is planned, this accessory is a big help in sorting out stations in the crowded hf bands. The ssb-bandwidth filter is far too wide for QRM-free copy during the popular operating hours. External audio selectivity is often employed to improve cw reception with an ssb transceiver, but it is doubtful that an onboard adapter could provide an equivalent of the steep-sided bandpass of the crystal filter.

Another accessory that most hams will need is a power supply, as none is built into the SB-102.

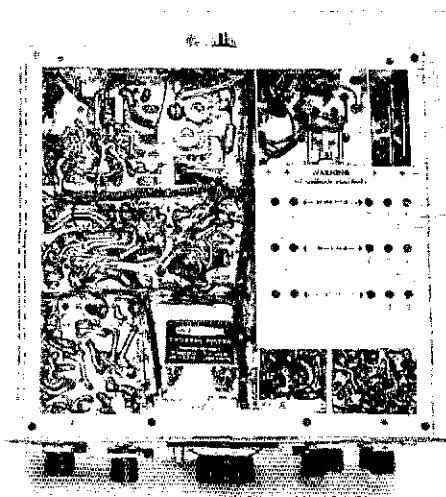
³Recent Equipment, "The Heath SB-500 2-Meter Transverter," *QST*, September, 1970.

In the bottom view of the SB-102, the cw 400-Hz crystal filter is located just behind the main tuning dial, with the ssb filter positioned under the cw unit. Most of the exciter alignment adjustments can be made through the plate at the center left; two coils have extra slugs which must be peaked from the top side of the chassis through holes in the circuit board.

Heath markets the HP-23A for home use and the HP-13 for 12-volt mobile operation. Two improvements were noted in the 23A: a circuit breaker replaces the fuse in the old HP-23, and a front-panel switch allows selection of 250- or 300-V B-plus output. The lower voltage can be used during initial testing and the higher for operation. One item missing from the new design is a three-wire ac cord fitted with a grounding plug. Heath supplies a standard two-wire cord. This type of cord is required by the electrical code in some areas and is a desirable safety feature on all amateur equipment.

Assembly

By any measure, the construction of an SB-102 is a long task. Fifty to one hundred man-hours are required. One amateur reported to ARRL that he built his unit in one nonstop, weekend-long binge. For most builders a few hours at a time is the best



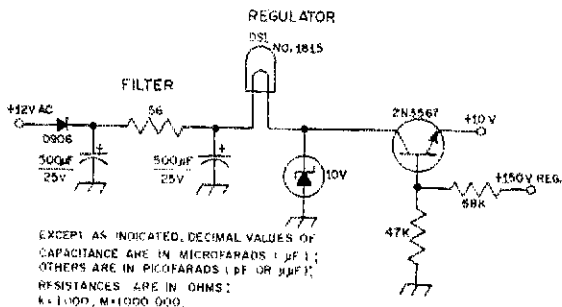


Fig. 2 — Power supply for the solid-state VFO in the SB-102.

approach, as the chance for errors climbs with increasing fatigue.

The box of parts destined to be an SB-102 is Heath's most expensive amateur kit. To insure that these components produce the desired result when assembled — a high-performance transceiver — the manufacturer's instruction book must be followed to the letter. Also, it is a good idea to go back and check over your work after every ten steps, or so. Persons who do not have previous experience with Heathkits would do well to put the HP-23A together first, to become familiar with the way that Heath's instructions are presented before starting the transceiver itself.

The SB-102 instruction book contains three pages of resistance checks that are used to spot wiring errors which could produce smoke if not corrected before the power is applied. The alignment steps are rather simple, requiring only about 30 minutes to complete. Only the assembly of the dial mechanism proved to be difficult. A few minute metal chips became lodged between the dial shaft and the panel bushing, causing the shaft

to bind. Disassembly of the dial, cleaning the parts involved, and reassembly was needed to achieve smooth rotation.

Test Results

The new front end of the receiver section provides excellent sensitivity. CW signals of 0.1µV or greater are clearly audible, as are 0.3-µV or stronger ssb signals. The dynamic range of the receiver is much better than a number of other transceivers in the same price class, giving freedom from overload and cross-modulation effects. Rejection of out-of-band signals is also excellent. Heath specifies an eight-ohm speaker for use with the receiver; audio output will be down if a 3.2-ohm speaker is employed.

A spectral display of the rf output, using a two-tone test signal, is shown in Fig. 3. Third-order distortion products are 30 dB below the level of two-tone output, just the figure quoted by Heath. In the cw position, power output is in excess of 100 watts on the 80- to 15-meter bands and measures 90 watts on 28 MHz. When checked into a 50-ohm dummy load, second-harmonic energy was 37 dB down — less than the 45 dB specified by the manufacturer, but more in line with what can be expected from a single pi-section tank circuit. Afc action is excellent, as two pentodes in the exciter section are fed control voltage.

The keyed cw waveform is well shaped, soft enough to eliminate clicks on both make and break, but not so soft that the note sounds mushy. An internal RC phase-shift oscillator provides a keyed monitor tone which is fed to the audio power amplifier in the receiver section and to the VOX circuit to turn the transmitter on when the first cw element is sent. The output of this oscillator has some distortion, but not enough to be objectionable.

As a package, the SB-102 is an excellent choice for a mobile, portable or fixed station. The complete line of SB accessories allows an amateur to add extra features as his budget permits. No doubt Heath's less expensive transceiver, the HW-101, will appeal to many, but the SB-102 offers precision dial calibration, an optional cw filter, crystal control of the transmitter, plus provision for an external VFO (Heath's SB-640) and station console (the SB-630) — features which the amateur who takes his hobby seriously may desire. — WJKL

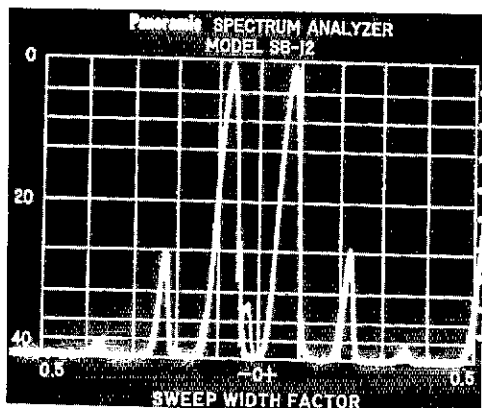


Fig. 3 — Spectral analysis of the transceiver output signal under two-tone test conditions. The third- and fifth-order distortion products are down 30 dB below the PEP output. (The Panoramic scale is calibrated in dB below a single-tone test, which may be converted to Heath's rating system by subtracting 6 dB.)

HEATH SB-102 TRANSCEIVER

- Height: 6 5/8 inches.
- Width: 14 7/8 inches.
- Depth: 13 3/8 inches.
- Weight: 17 1/2 pounds.
- Power Requirements: +700 volts dc at 250 mA; +300 volts dc at 150 mA; -115 volts dc at 10 mA; and 12 volts ac or dc at 4.76 A.
- Price Class: \$380 plus accessories.
- Manufacturer: Heath Company, Benton Harbor, MI 49022.

Eldorado Electrodata Model 225 Frequency Meter

AN ELECTRONIC frequency counter as a piece of equipment for the ham shack? Not too many years ago it was either a rather wealthy or else a very fortunate amateur who could make such a claim. But electronics technology has improved by leaps and bounds within the past few years, so that medium- and low-cost counters, some manufactured and some homemade,¹ are finding their way into more and more ham shacks. These instruments are proving themselves invaluable for participating in ARRL Frequency Measuring Tests, for checking drift of VFOs or other oscillators, for "tweaking" crystal oscillators onto the proper frequency, for checking transmitted frequencies, for measuring resonant frequencies of tuned circuits and frequency responses of filter networks . . . need we go on?

Specifications

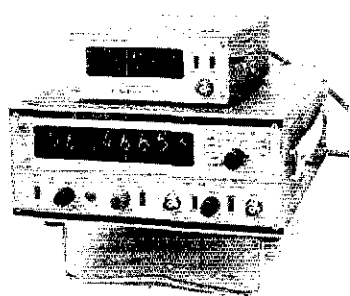
The Eldorado Electrodata model 225 frequency counter is small in size, but not small in performance. Containing 25 integrated circuits and 6 transistors, this little counter will measure frequencies which are greater than 10 MHz, typically to 15 MHz and higher. The counter contains only two operating controls, a power ON-OFF switch and a HZ-KHZ switch to select a counting interval of either one second or one millisecond. The counter's time-base section uses a 1-MHz crystal oscillator, a rather deluxe feature for commercially available instruments in this price class. (Many economical frequency counters use the 60-Hz power-line frequency as the "standard" for the time-base section.)

Decimal readout is afforded by five 5750S Nixie tubes, which stand only 1 1/4 inches tall (numeral height is 1/2 inch). A decimal point is positioned by the setting of the HZ-KHZ switch. During operation, a display-storage section provides a continuous reading of the frequency which was measured at the last count interval. This "memory" is updated to provide a new indication after each counting interval has elapsed. The result is that indicated "frequency run-up" during the counting period is avoided, in contrast to older-style counters not containing this feature. Instead, a constant reading is displayed on the indicators, with perhaps a bit of "hobble" in the last few digits, depending on the stability of the signal being measured.

Operation

This type of frequency meter or counter has often been called an EPUT meter — events per unit time. See the block diagram of Fig. 1. The signal being measured is fed through a front-panel-mounted BNC jack to the input wave-shaping circuits. The input circuits will accommodate any

¹Macleish, "A Frequency Counter for the Amateur Station," *QST*, October, 1970. Also Grillo, "A Frequency Counter with Binary-Coded Decimal Readout," *QST*, August, 1969.



signal between 100 mV and 50 V rms amplitude. The shaped output signal from this block is a continuous train of pulses, one pulse for each cycle of the input signal. These pulses are fed to a gated input of the totalizer section — the section which totals the number of pulses per unit of time for which the gate is open. This gating time is derived from the 1-MHz crystal oscillator signal, through a chain of integrated-circuit frequency dividers. With the gate opened for exactly one second in the HZ position of the front-panel resolution switch, the instrument truly measures hertz — cycles per second. In the KHZ position the gate is held open for one millisecond, with cycles per millisecond being directly equivalent to kHz.

The totalizer section of the counter consists of five decade counting units, one for each significant digit of the indicated count. Prior to each opening of the count gate, the totalizer is reset to zero. During a counting interval, the totalizer operates in much the same way that one would manually add a column of figures. The input or units decade counts every individual pulse which passes through the gate; for every tenth pulse counted, it, in turn, passes a "carry" pulse to the tens decade. For every ten pulses counted in the tens decade, a "carry" pulse is passed to the hundreds decade, and so on for the duration of the counting interval. At the end of the counting period, the input

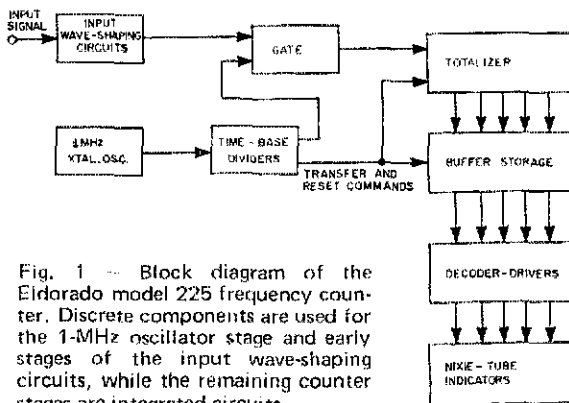
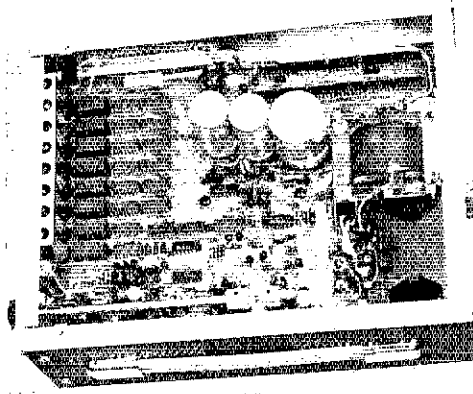


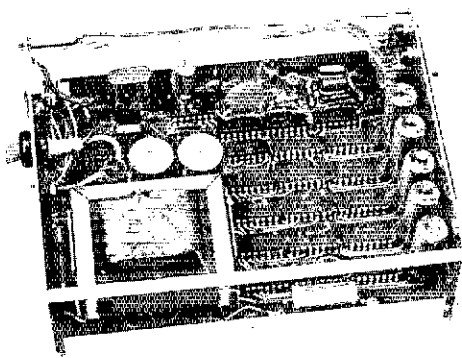
Fig. 1 — Block diagram of the Eldorado model 225 frequency counter. Discrete components are used for the 1-MHz oscillator stage and early stages of the input wave-shaping circuits, while the remaining counter stages are integrated circuits.



A view of the 225 frequency counter with the top cover removed. The power-supply components occupy the lower left section of the counter as shown in this view, and the time-base section may be seen along the top edge. Just to the right of the power transformer may be seen (vertically) the row of decade-divider ICs, to their right the buffer-storage ICs, and to their right the decoder-driver ICs for the Nixie tubes.

counting decade may have recycled hundreds or even thousands of times from 0 through 9 and back to 0, and the remaining decades have tallied the recycle times. In this manner, the sum of all the pulses counted is contained in decimal form in the decade counting units. Because the input or units decade must operate at frequencies much greater than the other decades, it is constructed differently, using a Motorola MC726P J-K flip-flop IC and three MC790P sections, an MC790P IC being a dual J-K flip-flop. The remaining four decade counting units are Fairchild C_{ML}9958 decade-divider integrated circuits.

The count information from the totalizer, in binary-coded decimal (1-2-4-8) form, is then transferred upon command to the buffer storage stages. The storage element for each significant digit of the display is a Fairchild C_{ML}9959 IC. This IC contains four gated-latch circuits, each latch being a flip-flop which will assume a state depending on the state of its input signal, but only at the time when a gating command is present.



Eldorado Electrodata
Model 225 Frequency Meter

Height: 2 1/8 inches.
 Width: 5 1/8 inches.
 Depth: 7 inches.
 Weight: 34 ounces.
 Power Requirements: 115 V ac, ± 10% 50 to 400 Hz, 8 watts.
 Price Class: \$395.
 Manufacturer: Eldorado Electrodata Corp.,
 601 Chalomar Rd., Concord, CA
 94520.

Four outputs from each storage IC, still in 1-2-4-8 form for each significant digit, are fed to a Fairchild C_{ML}9960 decoder/driver IC, which converts its 4-line input information into 10-line output information, 0 through 9. These ten outputs are mutually independent, and are used to drive directly the appropriate segments of the associated gas-filled Nixie readout tube. A 220-volt section of the power supply powers the indicators, and regulated voltages of +3.6 and -12 volts power the ICs and transistors.

In an EPUT frequency meter, the accuracy of measurement is directly proportional to the accuracy of the time-base frequency reference. In the model 225 counter, the 1-MHz crystal is not oven-mounted, and therefore the frequency of oscillation is dependent upon the ambient temperature of the air surrounding the crystal. Some heat is generated by the power transformer and integrated circuits in the 225, so a definite warm-up frequency-change characteristic exists. As with all devices where such warm-up occurs, adjustments or precision measurements should not be attempted immediately after turn-on. Rated frequency change is less than 2 parts in 10⁷ (0.2 parts per million) per degree Centigrade. Because the 225 is intended to be used as a small self-contained instrument, no provision is included for the use of an external frequency standard.

The Model 1650 Counter

A "big brother" of the 225 is Eldorado's model 1650 frequency counter, available in the \$1800 price class, and also shown in the title photograph. This counter may be used to count directly or totalize frequencies between 20 Hz and 200 MHz, and contains a built-in switch-selectable pre-scaler (biquinary divider) which permits measurements to be made of frequencies up to 500 MHz. Counting intervals from 1 millisecond to 100 seconds may be selected, and readout display times (intervals between successive counting periods) adjusted

Wall-to-wall ICs are displayed in this view of the model 1650 frequency counter. The cluster of ICs shown at the left are the decade dividers, buffer-storage, and decoder-driver stages for the eight Nixie indicators. In the upper right-hand corner of the chassis is the time-base section. The pre-scaler section is constructed on another circuit board which is mounted underneath the main board shown here, and is not visible in this view.

from 0.1 to 10 seconds or switched to infinity. In addition, frequency-ratio measurements of two signals may be made, i.e., how many cycles of one signal occur during the period of one cycle of a second signal. This feature may also be used to perform time-interval measurements, by controlling the gating time with an external signal while "counting" the internal 1-MHz signal, or an

external frequency standard may be used. The 1650 was designed to meet general laboratory and industrial requirements, and to meet the needs of the communications industry, including mobile radio, vhf TV, telemetry, and fm transmitters. Needless to say, the 1650, with its present-day state-of-the-art features, would represent the ultimate in a counter for the ham shack. - *K1PLP*.

QST ————— QST ————— QST

The Hy-Gain Model 400 Rotator

HY-GAIN Electronics Corp. recently announced a new product, the Model 400 rotator, that should be of interest to hams who use rotatable antenna arrays. It is apparent from examining the rotor and specs. that Hy-Gain has come up with a unit that can tolerate a very large amount of abuse. For example, the unit has 5000 inch-pounds of braking torque (that's 2 1/2 tons!). In addition, if the wind load on the antenna system should exceed 5000 in.-lb, the rotator has the unique advantage of having a disk clutch that will permit the motor shaft to slip. This, of course, prevents damaging the gears in the unit. Also, the rotor will support a vertical load of 800 pounds and will accommodate mast sizes from 1 1/4 to 3 inches OD.

Steel spur gears are used in the rotator and these are enclosed in a cast-aluminum housing which helps to reduce the overall weight to 28 1/2 pounds. Another feature of the unit is the use of ductile iron serrated clamps which secure the antenna mast to the rotator. These clamps attach to a flat platform which allows the mast to rotate concentrically with the output shaft for *all* mast sizes up to 3 inches OD. If you have ever tried to center a rotator inside a tower so that the mast doesn't bind you can see quickly what an advantage the adjustable clamps can be. There are several options for mounting the rotor on a tower or mast. The unit will fit inside any tower with a face width of 8 1/2 inches or more. Mounting kits are available for installing the rotor on the outside



Here is the rotator and indicator. Note the serrated clamps on top the mast mounting platform.

of a small tower or mast. For mounting inside towers, the unit is designed to fit most of the tower manufacturer's mounting plates, or a universal mounting plate can be obtained from Hy-Gain.

Five wires are required to interconnect the rotator and indicator. For cable runs up to 150 feet, three No. 16 and two No. 18 conductors are needed. On runs from 150 to 250 feet, three No. 14 and two No. 18 conductors are used. The indicator uses a solid-state logic circuit which senses which way the unit should rotate to position the antenna in the desired direction. The indicator permits 360 degrees of rotation, plus a 20-degree overlap. Provisions are made for either desk or wall mounting of the indicator. Additionally, four dial faces are furnished. Three are great circle maps centered on the Western, Central, and Eastern portions of the U.S., and the fourth is a compass rose.

The first rotator tested here at Hq. developed a problem in that the indicator gear in the rotator motor housing slipped on its shaft, causing erratic operation of the unit. On checking with Hy-Gain, we found that they were aware of the problem and had corrected it. A second unit was installed on top of an 80-foot tower and supports monoband 20- and 15-meter beams, one mounted 10 feet above the other. Every indication shows that the unit will handle practically any antenna system a ham can dream up. The price class of the unit, less cable, is \$190. - *W1ICP*

We're sure you'll agree that "rugged" is the word for the gear train in the Model 400.

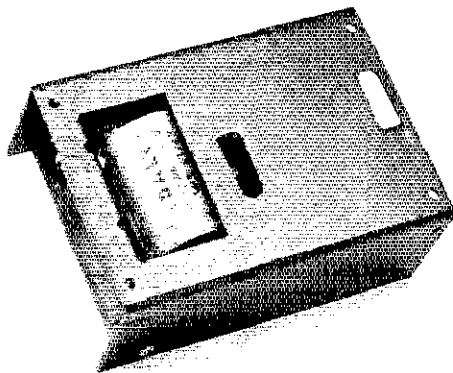
• New Apparatus

Sinclair IC-10 Audio Amplifier

An English manufacturer, Sinclair Electronics, has introduced an audio integrated circuit with several unique features that make it ideal for amateur applications. Designated the IC-10, this device offers very high gain (120 dB), high input impedance (1 megohm), and five watts of power output (using an 18-volt supply). Thus, a direct-conversion receiver which previously required two gain stages before an audio power IC can utilize the IC-10 as the complete audio channel.

Much of the current amateur solid-state gear is designed for 12-volt operation. The Sinclair IC does well at lower voltages, also, delivering a full two watts RMS output into a four-ohm load using a 12.6-volt supply. Tabs are provided on either end of the dual-in-line package for heat-sink connections. These tabs are at ground potential, so they may be bolted directly to the chassis.

Sinclair also manufactures a line of power-supply modules. Devoid of frills, the primary feature of these units is their low cost. Four models are available, all of which have 117/240-volt primary windings on the power transformers. The PZ5 provides an output of 25 volts at up to 1.5 A, while the PZ6 utilizes a four-transistor regulator to deliver a stabilized 15-45 volts at 1.5 A. The PZ7 is adjustable from 6 to 24 volts with a maximum current rating of 1 A, and the higher-



power PZ8 has a regulated output adjustable between 40 to 50 volts with a current rating of 3A. Price classes for the IC-10, PZ5, PZ6, PZ7, and PZ8 are \$12, \$14, \$24, \$17, and \$38, respectively. Information on the Sinclair line is available from Audionics Inc., 9701 S. E. Mill, Portland, OR 97216. — WIKLK

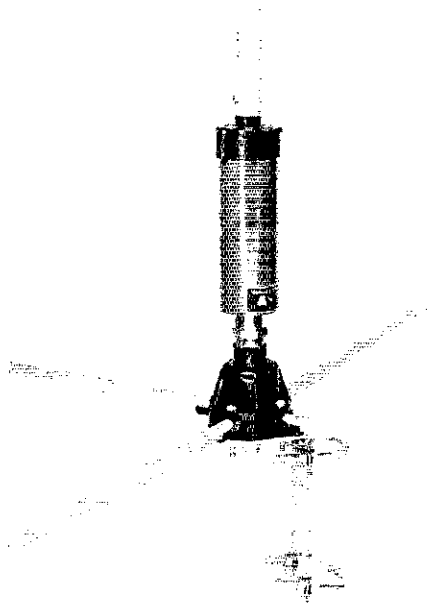
QST ————— QST ————— QST

The Varitronics AS2G Antenna

Varitronics recently introduced their first antenna, a $5/8$ -wave length loaded ground-plane design. The unique feature of this imported 146-MHz antenna, designated the AS2G, is its mechanical excellence. Using quality components throughout, the Japanese manufacturer has produced an antenna which compares favorably with those made for commercial services, but costs only about one third as much.

The driven element is made of two pieces which telescope together to provide fine adjustment of the operating frequency. An inductor is used to tune out the capacitive reactance of the $5/8$ -wave-length radiator. The coil is encased in a water-tight housing which is mounted on a chrome-plated base. A heavy-duty bracket clamps the antenna to a support pole. The radial elements have solid ends which contain a threaded hole for the mounting screw, over which a top clamp provides extra support for the ground radials.

Assembly of the antenna takes only minutes. An SWR bridge can be an aid in the final adjustment of the radiating-element length. However, use of the dimension given in the instruction sheet yielded a standing-wave ratio of 1.1 to 1. Price class is \$20. An information sheet on the AS2G is available from Varitronics, Inc., 2321 East University Drive, P.O. Box 20664, Phoenix, AZ 85036. — WIKLK



A Ham in the People's Paradise

BY RALPH McCLINTOCK,* K1SCQ

ROBOT SAT squarely on his padded chair expounding on the greatness of the Korean mechanized agrarian society which over his shoulder looked strangely like a brownish-gray ox pulling a single-blade plow. But my mind was about 12,000 miles away as my fingers tapped out the QSO I was in with FB8ZZ. The QRM was bad but we could make a fairly good go of it. After him, Paul FR7ZC/MM called and said he was on his way back to Reunion. The band was going out fast -- but not before Robot finished his lecture.

Robot was a senior major in the North Korean Red Army and he had just spent the past three hours enlightening us on the glorious achievements of Communism. It had been about six months since I had last had an actual QSO, let alone seen a receiver or anything remotely resembling a rig.

In December, 1967, I was a communications technician stationed with the U.S. Navy near Yokohama, Japan, and spending my off time operating as KA2KS. On December 27th, our section was standing a day watch (7:00 A.M. - 4:00 P.M.) when a few of us were asked by the division chief petty officer if we would like to go out on some trips. These "trips" were actually temporary assignments to various ships of the U.S. 7th Fleet and normally lasted from 30 to 60 days, after which time we would return to our home base of operations in Japan. In this batch were trips on aircraft carriers, including the U.S.S. *Enterprise*, destroyers and a new intelligence vessel which had just arrived in Japan, the U.S.S. *Pueblo*. After some bickering back and forth I wound up "volunteering" for a 30-day trip on the *Pueblo* to the coast of North Korea.

The "HI. DXpedition"

On the afternoon of January 23, 1968, the ship was about 15 miles off the small island of YO-DO outside Wonsan Harbor, North Korea. We had finished a turkey dinner with all the trimmings and in two more days we would be back in Japan. The day watch was on and four of us had just gone up to relieve the men in the research shack so they could eat. Up to that time, we had been receiving and recording fire-control radars from the North Korean coast but now we were receiving a navigational radar from a high speed surface vessel. At about 1:30 P.M. from off the port bow, a North Korean SO-1 class subchaser was approaching at high speed towards the *Pueblo* and the "DX-pedition" was about to begin.

On watch, activity on the hf hands had not been too busy so I had time to drop one of my R-390As down to 14,220 MHz and was listening to

*44 Parkway Crescent, Milton, MA 02187.



Panmunjom, December 23, 1968. The crew of the *Pueblo* (including K1SCQ, WA6KXE, and K7RSM) crosses the "Bridge Of No Return" to freedom. (U.S. Navy photo)

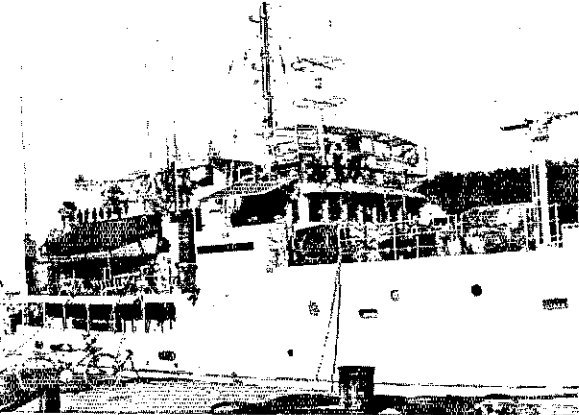
Willard (WJFG) and Charlie (WIFH) working some of the Far East DX that was getting through to the east coast. For most of the trip I had a chance to listen on the ham bands (we ran in silence so no transmitters were allowed on the air) and conditions on 20 were fairly decent. I didn't realize it then, but in about one hour I could be taking a sledge hammer and fire axe to those R-390As along with all the other juicy receiving equipment on board *Pueblo* (about five million dollars worth).

At about 1:30 P.M., as I said, the natives were getting really restless and we had brought up one of the transmitters on RTTY trying to raise Japan. While the natives began getting restless throwing spears (50-caliber machine gun and 57-millimeter cannon) at us, the crew held them off with a volley of four-letter words and the RTTY pecked away. Finally our ammunition was spent and the battle was over.

The rest is pretty much history and sometimes seems like too recent history. After the ship was tied up at Wonsan harbor the crew was tied and blindfolded and thrown on buses. We were then driven through what appeared to be a military base

Why should QST record the account of Ralph McClintock, K1SCQ, who along with his shipmates on the USS Pueblo, spent many long months in a North Korean prison? Because ham radio was a valuable diversion during his internment. Here is his story.





Many hours of silent vicarious hamming were spent by the author aboard the *USS Pueblo* (AGER-21), shown here 20 days before her capture.

and crowds of civilians screaming "Kill American." The driver of the bus sounded like a woman and while driving through these crowds, she was continually blowing the horn. It was bad, but it was Morse code. She spelled out, perhaps a dozen times, MEGUKDIE. It was not for two months that I found out what she was sending. MEGUK simply meant "American National". Over the next nine months we discovered that all of the people in the Korean People's Army were quite proficient at code.

C. W. Communication!

We were kept eight in a room, and guards would come in at all hours spelling out various things in code. Their favorite was to use Q signals for different questions they were trying to ask.

The one that always got me was when a six-and-a-half-foot guard would kick the door in and stand there with his AK-47 sub-machine gun and simply say in a high pitched voice "LALALILA - LILILI - LILA." I finally broke down the QRM and figured out he was sending "DADADITDA - DITDITDIT - DITDA." I was sorry, but I had to give him a "DITDITDITDITDIT - DADADADADIT - DITDITDITDITDIT;" he just had to get that bad chirp out of his transmitter!

As the days dragged on into weeks and the weeks dragged on into months, we settled down into a life of waiting - mainly waiting for night, so that we would be alone and there would be freedom in sleep. From time to time the Koreans would come up with schemes to speed our "Repatriation" and reunion with our grief-stricken families, or simply more junk propaganda.

Letters Home

The first important program was a series of letters to our families telling them of the kind and lenient treatment (they leniently beat us into line with their kindly kicks) and how the U.S. Government must admit and apologize for the grave criminal acts of *Pueblo*. After these first letters we fell into the system of writing and rewriting them at least ten times. They would first spend about two days telling us what we would put in them. We would then sit down and write a chatty letter to home, not even mentioning the *Pueblo* or the fact that we were in North Korea. Through the process

of American ingenuity and Korean confusion, we would arrive at a letter they would approve of.

In the second series of letters in August, 1968, I wrote a letter to my mother. I was trying to put as much meaningless dribble in it about as many people as I could. The purpose being to show that we did have some part in writing the letter and that we still did have some sanity. The one passage I did add that I later lived to regret was one concerning my cohort in crime, Al Burnett, WJNV. The letter was five pages long and one of the statements was, "You might call Al and tell him I hope his swinging link is better but if it's not, to keep taking his medicine as Dr. Pabst and Dr. Coax had ordered." Good old Al and his bottle of Pabst Ale (adds at least .3uv sensitivity to the receiver). About a month and a half later I was taken down to see Robot and he produced a picture of "Uncle Al McClintock" standing next to a radio antenna in Vietnam. Al works as a heavy crane operator at the General Dynamics Shipyard in Quincy, Mass. The picture was taken one afternoon after he came home from work when he was in his coveralls standing next to his beam and tower, and wouldn't you know it, his work clothes were green along with a green swampy background. But the worst of all was the fact that he was sticking his tongue out.

That one took about three days to explain and it finally came down to my convincing them that Al was crazy and the picture was taken at a mental hospital where he was being treated for his swinging link.

Freedom Planning

On summer afternoons we were taken out for "sports time." Starting with pushups and jumping jacks, we progressed into kickball, soccer, and basketball. After some time the soccer was transformed into American football with 15 to 20 men on a side. We started with tag football but with all the built up emotions and aggressions inside, we started taking them out on ourselves and it soon evolved into semi-tackle football. After a broken nose playing football, dislocated knee playing basketball, and a broken finger playing kickball, we wound up with 41 men on a side for "volleyball." With this many men playing volleyball you don't get much exercise so a lot of us started jogging. There were two other hams on *Pueblo*, Dave Ritter, WA6KXE, from Northridge, California, and Mike (Axle) Alexander, K7RSM, from Richland, Washington. I had known Dave for about a year back at KA2KS, and we would talk continually about equipment and antennas. He had been working in his room on a mobile linear to run one-kilowatt peak, taking a space of about six inches square. I got interested in the ideas and we worked out plans for marketing it "when we got out." It featured a broadband toroidal input-output circuit utilizing a tube like the 8122 or the

Except for "sports time" and thinking ham radio, there was little entertainment provided by the captors. Here the author (right) and a shipmate pretend to concentrate on a game of chess. This photo by the North Koreans was staged (both kings were placed on the board in the check-mate position).



4CX350. The plans looked great and if everything worked it would have a single band switch and loading capacitor for controls. It seemed paradoxical to sit in our rooms, with all of the usual anti-American literature deploring capitalism in front of us, while we thought continually of how to make money "when we got out."

Along about August through the first part of September, things were going badly for the Koreans at the Panmunjom talks. The propaganda schemes were getting nowhere and under no circumstances would the U.S. believe that the *Pueblo* ever did intrude — and stated emphatically that the ship was seized in international waters. The only thing the Koreans could ever come up with was more of the same propaganda.

"Radio" Appeals

This time there was going to be a slight twist to it. We were going to make radio appeals aimed at the U.S. They wanted us to choose prominent people in the U.S. who would be in a position to help us in our dilemma. In the last campaigns we had literally earned our battle scars, so now we knew the routine. We would begin with massive resistance toward the Korean plans and then turn around and go along with them. As I said before, by doing this, we could keep guessing and generally get more by their censors.

Our crew was busy picking prominent people to make appeals to such as the sewer commissioner of Kalamazoo, Michigan or the great humanitarian Elmer Suggins. Considering the situation at hand, there seemed only one person to appeal to other than the Divine Being, that being K7UGA.

I sat for four days writing my appeal and after it was finished I was branded everything from a coward to a collaborator (the exact words are not quite printable) by the crew, till they were educated. The Koreans were pretty up on what they wanted for these appeals so it was going to take something special to get through this time. The best approach was to give them what they wanted the first time and to work it to a point where as editing of the tape recording later by the Koreans would render it meaningless. Because of this, I concentrated all of my efforts on the first two sentences.

Dear Senator Goldwater.

You may not recall, but we first met in Kansas on the 7th of May at Uncle George Appleby's. We also met later at Quentin, Rose and Roger Raymond's.

I leave it to the reader to "break" the cipher system. Anyways, the whole plan of radio appeals was dropped as the two sides at Panmunjom suddenly seemed closer on agreement. So the one

thing I did want to get out of North Korea was never used, to my knowledge.

Expanding Horizons

The latter part of September, as I said, brought new expectations and for the first time we were taken out on trips to various points of interest in the country. Till this time, the only thing to look at, other than the required reading material, was the radar antenna on the hill in back of us and its associated Surface-to-Air-Missile battery. Each missile battery has three sets of radars with it, and this seemed to be the older Russian type, vintage around the mid 1950s. Being an avid DXer, I found this particular radar interesting because of its configuration. We were about a half a mile away from it and at that distance it looked as if it had two sets of diagonal spreaders about the size of a 20-meter quad. After eleven months of looking at it and listening to it turn, I was convinced the Koreans got stuck with one of our old propitch rotors we gave to the Russians during Lend-Lease.

To get back to the story, in September the buttering-up period began. For seven months we had been kicked, beaten and starved and to say the least, it blew our minds when the guards came in to see if we were well, or if we were warm at night. But the biggest thing of all was the meals. We now had some potatoes in the soup besides the turnips and grass (that's the green lawn type), the rice was now white and there weren't any 74-legged, crawly beasts running through it.

There were four little trips in all, three of them to Pyongyang, the capital, to see Army shows in which they do nothing else but kill Americans. The fourth and final trip was to a town called Sinchon which just happened to be 7 miles from the DMZ. Sinchon was the sight of a horror museum consisting of atrocities committed by the U.S. Army during the Korean War. They took us through bunkers where thousands of innocent women and children were supposedly burned alive, showed pictures of cities burned to the ground (looked strangely like *Life* magazine pictures of Nagasaki after the bomb) but the best of all were the pictures of U.S. spy activities in the 1930s.

The first photo was of an old U.S. Navy RBA receiver which the Koreans had labeled a "High Power Spy Transmitter." The second photo was of the hidden antenna system — or for the uninitiated, a church with a cross on top. After a ten-minute lecture on this display, the officer asked if any of us knew what this was. Being pretty sharp on military gear and having a big mouth, I volunteered (someday I'll learn), "That's definitely a Super snooper-detector-collector, Cracker-Jack-spy transbobulator, utilizing a Barabas cross antenna array." I said before, that Sinchon was about 7 miles from the DMZ and Panmunjom. When the trips began the scuttlebutt was pretty high that something was up, and you can imagine how we felt when we were given new clean clothes, haircuts and candy before we left for Sinchon.

Back to The Ranch

As it turned out, the negotiations at Panmunjom had speeded up and the Koreans were told the U.S. would sign an agreement saying that the *Pueblo* intruded into Korean waters and to have the crew ready to pass across the border. While we were enjoying the educational tour at Sinchon, we found out later the U.S. was telling the Koreans that they would never sign any agreement for there was no amount of documents they could be shown that would prove the ship was not captured in international waters. The train trip back to Pyongyang and the camp was something else. About the only thing I can relate it to is hearing Gus on a barren reef in the South Indian Ocean — you're the only one to hear him, he comes back and blows your call, then his rig fizzles out.

The months of October and November were times of utter boredom and disappointment. We were back to a diet of turnip soup and hot water. The boredom started to take its toll and we found ourselves arguing with each other to the point of fighting.

Once in a while, we would get a letter from home (2 months old) but about the strangest thing that happened occurred around November 5th. We knew the elections were coming up but that was about all. Robot came around one day passing out a few letters for us and he gave me a large white envelope. I claim a record for it so if anyone can top it I'd like to hear. The white envelope contained an absentee ballot for the 1968 Presidential elections. I thought the skipper, Captain Bucher, would bust a gut when he saw that thing.


December dragged on and we were in our 12th month of the DXpedition and still weren't on the air. Christmas was about two weeks away and we were at an all-time low. On December 12, 1968, we were taken up to the meeting room and met General Pak.

The Koreans read all of the U.S. news magazines, and all of them had pictures of us taken by the Koreans. These pictures were included in the two letters we had written home. The articles pointed out hand signals supposedly spelling out the word "help," as well as excerpts from our letters concerning meaningless dribble.

The General screamed and swore at us for the way we had used him and the generosity of the Korean people. We were told we would live to regret it and we would never cross them again. This was the beginning of hell week, the first time we really thought we might never make it.

They weren't pressed for time and because of this they were able to carry out a methodical system of beatings on each man. To make a long and painful story short, on the seventh day of hell week, the North Korean command at Panmunjom sent the word to get us ready to move out. This time the U.S. was ready to sign an agreement for our release and all I can say is it came just in time.

Again we boarded the trains for Sinchon then the buses to Panmunjom. At 11:30 A.M. Korean time, one by one we started across the Bridge of No Return. We had made it, 82 men and one dead shipmate, that of Duane Hodges, a tall quiet kid from Creswell, Oregon, blown to pieces 335 days before.

The flight across the Pacific and our return to the United States is history but something that none of us will ever forget. From my experiences, I do feel bad at times, but I will always be thankful to the North Koreans for one thing. They took 82 human beings and turned them into 82 good Americans, for this I can say thank you. 

RULES FOR LIFE MEMBERSHIP

1. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U.S. or Canadian licensed) Member.
2. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
3. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, the application will be presented to the Executive Committee for approval.
4. Life Memberships are non-transferable and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
5. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$2, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
6. Application forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.

Lightning Strikes!

Are You Ready?



BY RICHARD HAMMELL, *W2FRC

AN UNBELIEVABLE crash and flash . . . a moment of quivering silence . . . the thump of two big feet hitting the floor of a third-story bedroom and racing down the stairs. Our deafened, shaken son announced, "My ceiling is on fire!" At 4:00 A.M., with the house burning and a torrential rain falling, we had neither lights nor telephone. Shortly after we used a neighbor's phone, three beautiful fire trucks arrived. Otherwise, the house would have been severely damaged, and perhaps lost.

Since that exciting day, June 2, 1969, I have observed a number of interesting effects and, with the help of several Bell Telephone Labs colleagues, have tried to understand them better.

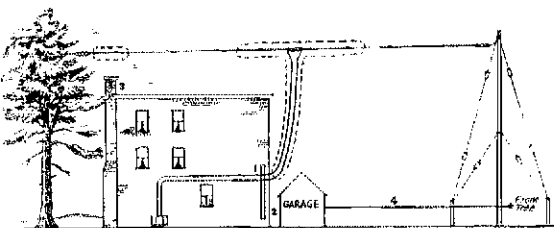


Fig. 1 - Sketch of the scene of the "lightning drama."

Fig. 1 shows the general scene. An 80-meter doublet, 50 feet above ground, was supported at one end by an 80-foot oak tree and at the other end by a wooden mast. The mast is supported by guy wires that terminate six feet above the ground on wooden posts. A galvanized steel wire "dog run," extending from a tree to the wall of the garage, passes near the top of one of these posts.

The antenna flat top was No. 12 solid copper and the transmission line was the spaced, 300 ohm, copper-clad steel variety which is often used for fringe-area TV reception. The antenna crossed the roof with about 10 feet of clearance. The feeders dropped straight down for about 35 feet and then ran horizontally across the back of the house, mounted on 6-inch standoff insulators. With another 90-degree bend, the line descended to a basement window where the ham shack is located.

*24 Canoe Brook Parkway, Summit, NJ 07901.

The antenna was "grounded" only through the inductance of the tuning unit, as shown in Fig. 2. More will be said about this later.

There were a number of interesting things to be seen outside the house. First, we have lost the thirty feet of oak tree above the antenna support point. Next, the portions of flat top and feeders enclosed in the dashed borders disappeared without a trace, as the wire and molded plastic spreaders were blended into the air pollution. At a point close to where the line approached the house, the feeders passed within about two inches of an ungrounded aluminum downspout. The path from feeders to the downspout, and thence through the wall of the house into water and sewer piping, wiring, and a steel-tiled lavatory wall, must have presented much lower impedance than the "grounded" path through the antenna tuner inductance. At the place marked 1, the intersection of feeders and downspout, there was a sizeable area of blackened paint and the transmission line along the house wall beyond this point showed no damage. At 2, the corner joint in the clapboards was opened about $\frac{3}{4}$ inch by the violent generation of steam in the moist wood, as the current went inside the house from the downspout.

At point 3, where the roof contacts the chimney, some copper flashing was blown away from the chimney face. There also was a strong current which traveled down the mast guys, jumping the egg insulators as though they weren't there. Some of this hopped to the "dog run" wire, 4, knocked a big hole in the garage inner wall, and scattered steel garden tools far and wide.

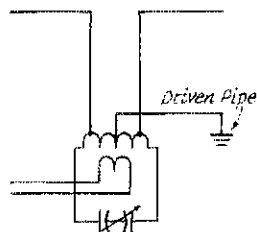


Fig. 2 - The antenna was grounded through the coil in the antenna tuner.

Internal Damage

So many things happened inside the house that we were still finding some of them six weeks later. Near point 2, a lavatory is walled with steel-backed tiles, one of which had been blown from the wall. In the ham shack, all branch fuses were blown in a power distribution box, but the entrance line fuses were not damaged. One fuse was blown to bits, as shown in Fig. 3, and the back of the steel box door was blackened.

The rig was undamaged because the antenna had been disconnected from it, but a portion of the surge got through the fused line cord into the power supply and zapped one diode. There is something to be learned from a study of this one. The current must have jumped across the open switch on the transceiver panel to get to the transformer. The fuses in the line cord plug did not blow. The blown diode, part of a voltage doubler circuit, showed a dead short and was found to have a wiggly hole blasted through its silicon wafer.

Fuses are not designed to be used as lightning protectors and should not be relied upon to perform this function. Even though they do open sometimes, current is likely to continue flowing across the gap. And of course, semiconductors can blow a lot faster than fuses. Fuses in line cord plugs are intended only to minimize or localize damage due to power shorts, and to prevent blowing the next higher-rated (15-20A) fuse.

Although the antenna feeders were connected to the matching coil only by small alligator clips which do not have large contact area, there was no charring or melting to indicate that much current had gone this way. There was a large IR drop in the driven-pipe ground. Together with the IZ drop in the line and tuning coil, this may have built up enough voltage to force the breakdown to the downspout.

Also in the basement, the telephone protector block, an old style porcelain one, did an admirable job of protecting the premises but, as Fig. 4 shows, was demolished in the process. There were open pairs in the lead-sheathed telephone cable behind the house, but there was no damage to interior telephone wiring or instruments.

Throughout the basement and first floor, a number of lighting switches were destroyed; one of these was solidly welded closed and the others were badly burned by arcing. Many lamp bulbs were blown, even though the switches were off, and the push button was blown physically out of a doorbell switch on the front porch!

A new solid-state dimmer unit in the dining room was destroyed. It is likely that all units of this kind would be ruined by a hit on the power system, because they have a much shorter thermal time constant than any fuse.

Additional Havoc

On the second floor, a bathroom ceiling fixture was blown from the ceiling. But it was on the third floor, in a bedroom by the chimney, that the scene was wildest. A lighting fixture was demolished, Fig. 5, and the ceiling was half-consumed by fire. An

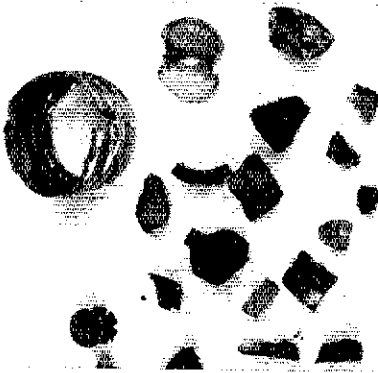


Fig. 3 — This was a fuse.



Fig. 4 — Telephone "protector" block.

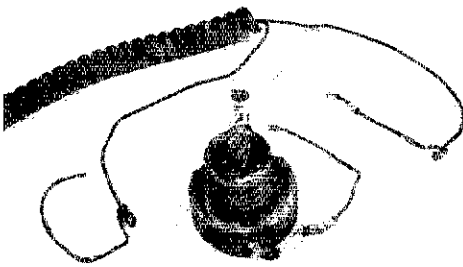


Fig. 5 — Ceiling fixture.

Fig. 6 — Exploded wooden stud.



arc through the wall switch was violent enough to blacken a big area around the switch plate. Above the ceiling were the remains of *three* old antennas which I had abandoned long ago. Although these were forty feet above ground, *none of them had been grounded!*

After a burst of lightning hit the chimney flashing, a current had gone through the roof via the nails. It then jumped to the three abandoned antennas and arced from one of their transmission lines to a nearby BX cable shield, starting the fire. One path to the antennas included a stud, built-up of several 2 x 4s. This was blown to splinters, Fig. 6, one of which was found sticking, like a seven-inch dart, into a vertical board several feet away.

Fig. 7 shows a portion of one of the old antennas. The heated wires had melted through the insulation for part of their length, and there were bumps along the conductors at fairly regular intervals. A magnified section through one of these bumps, Fig. 8A, shows what remained of the seven strands of copper-clad steel wire. According to my friend Bob White, the mottled area, enlarged further in Fig. 8B, is a mixture of copper and steel, indicating that the wire temperature had reached about 2800 degrees F for a fleeting moment. Intense magnetic fields may have accelerated the mixing of the two metals.

Jim Hays, who has worked for many years in telephone plant protection, furnished Fig. 9, a typical waveshape of an intense lightning stroke. In this example, the current reaches a peak of 60,000 amperes in about 5 microseconds and decays to half value in the next 15 microseconds. Jim said that our lightning damage is as extensive as he has seen in a house and estimates that the stroke may have reached a peak of 100,000 amperes. Only about two strokes in a hundred carry this kind of clout.

In a general discussion of grounding practices, Jim told me that telephone microwave relay buildings on high mountain tops are struck frequently, but that there is very little trouble. The practice is to bond *everything* together, *i.e.*, metal structures, conduits, pipes, etc. This provides the largest possible "sink" and minimizes the chance of destructive arcing within the structure.



Fig. 7 — Portion of 300-ohm feedline.

In future antenna work, my rule book will include the following practices:

1) If there is a well-grounded water piping system, use it in preference to driven rods. A driven ground is poor for lightning protection because of its resistance. For example, consider that a 25 ohm ground¹ and a typical 30,000 ampere stroke would put 750,000 volts on the line.

2) Remember that the lightning will select the best grounds, no matter where they are located. Don't be afraid to run the ground lead into the house to get to the water pipes. The bare wire can be stapled directly to wooden structures; however, if it passes near other grounded things, such as soil pipes, bond it to these as well.

3) Consider that every piece of metal within *six feet* of the antenna system may become part of an alternate path for lightning. If you can visualize it as forming a path to ground, either move it or ground it to water pipe or power conduit.

4) Don't put inductance, such as matching coils, in series with lightning ground paths.

5) Install either a good lightning arrester or a husky transfer switch. The lightning arrester offers

¹ Few driven grounds are this good.

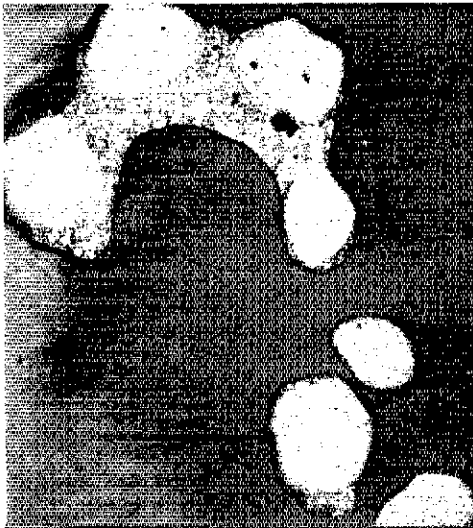


Fig. 8 — (A) Cross section of copper-clad twinlead magnified 100 times. Note the melting of the seven strands. (B) Cross section of copper-clad twinlead magnified 400 times.

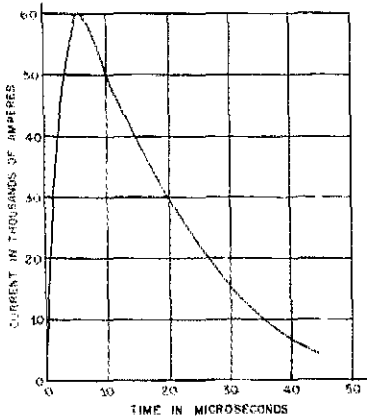


Fig. 9

an advantage in always being connected; however, solid-state components may be destroyed unless you disconnect the transmission line from equipment before a storm. The lightning switch would appear best, provided that you remember to operate it.


6) A wooden mast should have some kind of grounding, to prevent it from being splintered by lightning. Apparently, a set of guy wires will serve this purpose if they run from the top of the mast to ground; lightning will jump the egg insulators as though they were not there. If the guy wires terminate on support posts, the lower ends of the guys should be grounded by bare wire stapled directly to the posts. When there are non-metallic guys, heavy, bare wire should be stapled to the mast for its entire height. A short, stiff, vertical whip or pipe should be mounted at the top of the mast and connected to the ground wire.

7) When a tall tree is used as an antenna support, consider equipping it with its own ground system, similar to the one recommended for the wooden mast. Some large trees in our area (which do not support antennas) are equipped with such systems.

8) Do not leave unused antennas in the air without solidly grounding their transmission lines. This includes antennas inside the house.

9) Stop laughing at the "old ladies" who unplug everything before a storm. It's not a bad idea, especially with solid-state components.

10) Re-read the fire insurance policy. At today's fantastic real estate prices, is the coverage enough to replace the structure?

I am grateful to several friends who contributed to this study. These include J. B. Hays, Jr. and L. H. Sessler, who provided much lightning lore and discussion; P. R. White, who did a metallurgical analysis of the bumpy Twinlead; R. A. Westbrook, who sectioned the shorted diode; and S. S. Mumford, W2CU, who loves to wrestle with almost any problem. The metallurgical photos were taken by M. J. O'Brien, the shattered stud was photographed by my son Steve, and the other excellent pictures were made by Lenny Ciuffo. 

1970 ARRL Sweepstakes

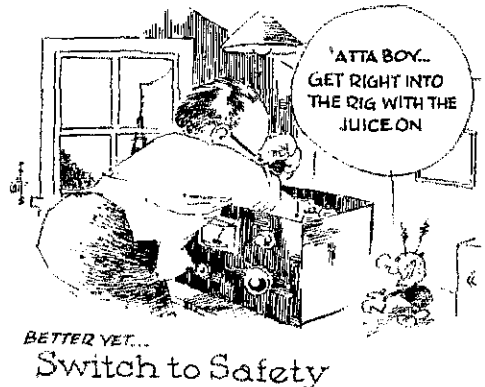
High-Claimed Scores

The following high-claimed SS scores are those received at Hq. by December 18. From left to right are shown the call, claimed score, number of contacts, number of multipliers. Full results will appear in a later issue. — W1AKQM

PHONE	SCORE	CONTACTS	MULTIPLIERS
K7VPL/7	113,550	1160-75	
K6FBB (K2EJ), opr.)	109,075	1098-75	
W9YT (K9KGA, opr.)	100,750	1014-75	
K3RHZ	100,000	1000-74	
W2DLD	100,150	979-74	
W7TR	100,000	983-73	
W1BUD-2	100,000	943-75	
W5PU	100,000	900-73	
W8SH (K7NHV, opr.)	100,000	900-75	
ESOH	100,000	900-75	
E1DIX	100,000	900-75	
WA87DE (WASRWU, opr.)	100,000	900-75	
W8DQL	100,000	900-74	
K0DQJ/1	100,000	867-75	
K4PI	100,000	867-75	
W4RQ/1/3	100,000	848-75	
W4AZ	100,000	840-75	
W5RSZ	100,000	854-75	
WA1LD	100,000	834-75	
W3KH	100,000	836-75	
K1PKO	100,000	800-74	
WA9WY	100,000	814-75	
W57EWC	100,000	822-74	
K110L/3	100,000	823-73	
W44HR	100,000	809-74	
W5RTR	100,000	811-72	
W7OAD (W7MWR, opr.)	100,000	811-73	
W34LEW	100,000	784-75	
K1VIM	100,000	797-74	
W111U/4	100,000	800-73	
W3IN	100,000	803-72	
W43FX	100,000	764-75	
W44DEW	100,000	778-73	
W89JX	100,000	760-75	
W60JT	100,000	790-72	
K1ZND	100,000	755-74	
K4BA1	100,000	743-75	
W4TRG	100,000	740-75	
W3FZ1	100,000	743-75	
W410Y (W2YEW, opr.)	100,000	767-72	
W2MB	100,000	764-72	
E8UNG	100,000	743-74	
E4CG (W4JKR, opr.)	100,000	714-75	
K5RLW	100,000	714-75	
W6MY	100,000	728-75	
W2DKM	100,000	709-75	
W8OSP	100,000	717-73	
W6CFL	100,000	747-70	
K6BPF	100,000	700-75	
E3MNI	100,000	710-73	
W4W0Y/1	100,000	683-75	
W4KFC	100,000	678-75	
W4ZCPD	100,000	699-73	
K0VYU	100,000	671-75	
W6ZUO	100,000	688-75	
W3RF	100,000	667-75	
W1EY (3 opr.)	100,000	907-75	
WA0JJ (3 opr.)	100,000	850-72	
E9QZF (K9R1P)	100,000	787-75	
KH6RS (KH6S GXX, 15PO)	100,000	778-74	
K4SKD/4 (W64FC)	100,000	755-75	
W8EDU (4 opr.)	100,000	719-75	
W6W8 (3 opr.)	100,000	743-75	
W2SZ (10 opr.)	100,000	719-75	
W6SOF (9 opr.)	100,000	716-71	
K7ZWT (3 opr.)	100,000	667-75	
W6DDU (+W6KG)	100,000	691-72	

CW

W6GAR	132,641	915-75
W9WV	131,838	910-75
W7RM (K7VPL, opr.)	124,200	842-75
W7CJ	124,027	856-73
E2KJR	121,192	856-72
K4G5U	121,472	837-73
W1BUD/7	118,800	797-75
K5RH/7	117,216	792-74
K11PL/3	115,200	800-72
K4JIG	114,840	806-72
W7DI	114,756	786-73
W3CFE	112,650	751-75
K6AHV (W6KWE, opr.)	112,472	790-72
K1ZND	110,890	771-72
W8WBC (K8BFX, opr.)	110,408	746-74
W8SH (K7NHV, opr.)	108,900	776-75
K5RLW	108,144	755-72
W4BDF	107,374	727-74
W3IN	107,280	745-72
K00RK	107,237	738-73
E1DIX	108,872	714-74
E4BA1	104,796	739-71
W3R0R	104,259	758-69
W5QJH	103,110	744-70
K5OH	102,130	743-70
K5TSR	100,800	700-72
W1EY/7	100,110	705-71
W6WY7 (multiop.)	125,856	874-72



Hamfest Calendar

FEB

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

Ohio - The Cuyahoga Falls Radio Club announces its annual auction to be held Friday, February 26, at Lincoln School, 3131 Bailey Rd. (same place as last year). Flyers with details are available from WA8RBI, Cuyahoga Falls RC, P.O. Box 106, Cuyahoga Falls, OH 44222.

Illinois - The Wheaton Community Radio Amateurs will hold their ninth Annual Mid-Winter Swap and Shop on Sunday, February 21, at the DuPage County Fair Grounds, Wheaton. The hours will be 8:00 A.M. to 5:00 P.M. Refreshments and unlimited parking. Bring your own tables. Free coffee and doughnuts 9:00 to 9:30 A.M. Hams, CBers, electronic hobbyists, friends and commercial exhibitors are cordially invited. Advance donation is \$1, \$1.50 at the door. Send s.a.s.e. for advanced tickets to WCRA, P.O. Box QSL, Wheaton, IL 60187.

Indiana - The Lake County ARC, Inc., announces its 18th Annual Banquet to be held at 6:30 P.M. on February 20 in Teihel's Restaurant, corner of U.S. 30 and 41, Schererville. Chicken dinner, entertainment, awards, and fellowship. Come! Bring your XYL or YL. Tickets are \$5 each from Herbert S. Brier, W9EGQ, 385 Johnson St., Gary, IN 46402, or from any other club member. Positively no tickets will be sold at the door.

Michigan - The Huron Valley ARA 4th Annual Swap and Shop will be held on Sunday, March 7, from 9:00 A.M. to 5:00 P.M. at the Pioneer High School, Stadium and Main St. across from the University of Michigan football field, in Ann Arbor. Adequate free parking, easy access, an auction, and many surprises. Talk-in on 146.94 and 3.930 MHz. Donation is \$1.25 in advance, \$1.50 at the door. For further information write W8KGG, 2729 Packard Rd., Ann Arbor, MI 48104.

Michigan - The 4th Annual Blossomland AR Auction and Swap and Shop will be held Sunday, March 14, at the Shadowland Ballroom, Silver Beach Amusement Park, Benton Harbor/St. Joseph. Doors open at 9:00 A.M. Half an acre of indoor space will be available. Hot food, indoor restrooms, acres of free parking, and drive-up unloading. You name it and we've got it. Follow Interstate 94 into Benton Harbor (St. Joseph from the east or west); get on U.S. 31-33 if you're coming from the south or north.

Pennsylvania - The Presque Isle ARC will hold its annual Hamfest on February 27 at the Sunset Inn. Music, displays and talk-ins will be provided. For more information please contact the Presque Isle ARC, P.O. Box 1021, Erie, PA 16509.

Texas - The San Antonio Repeater organization will host the first Texas VHF-FM Society Convention in San Antonio on February 26-28. Special program for XYLS and the kids, family dinner, and new equipment exhibits. Pre-registration package from the San Antonio Repeater Organization, P.O. Box 1753, San Antonio, TX 78206.

QST

COMING A.R.R.L. CONVENTIONS

March 26 - Great Lakes Division, Muskegon, Michigan

May 22-23 - Virginia State, Vinton, Roanoke County

July 3-4 - West Virginia State, Jackson's Mills

July 3-5 - Pacific Division, San Jose, California

September 4-6 - Southwestern Division, Anaheim, California

October 9-10 - Roanoke Division, Richmond, Virginia

Note: The Great Lakes Division Convention scheduled for Grand Rapids April 16-17 has been cancelled by its sponsors.

Strays

QST Congratulates . . .

K.D. Symington, MD, VE6XJ, current president of the Canadian Association of Radiologists.

Frank A. Gunther, W2ALS, awarded the Edwin H. Armstrong Medal by the Radio Club of America. Bernard Ostrofsky, W9HTF, on receiving the *Chemical Processing* magazine John C. Vaaler award.

Howard J. Dill, WA6DET, who received a MARS certificate of outstanding service for handling a total of 1434 phone patches in a three-month period.

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

Walter E. Oldfather, W3TO, recently applied for membership in the Old Timers Club.



Try this combination on your morning toast! Both W6FIG and W6JAM are employed by Advanced Communications Inc., Chatsworth, California.

Amateur Radio and the Press . . . and You

BY JAMES E. WEAVER,* WA8COA/WA9FEW

WHY SHOULD I care what people think about us amateurs? If they leave me alone, I will leave them alone. Everyone will be happy. This stuff about public relations is a lot of bunk."

Those who read "Correspondence from Members" in *QST* have seen this attitude expressed several times. Many undoubtedly have heard friends say about the same thing.

Is that, however, the correct opinion? Are amateurs who work at developing and maintaining a good public image for ham radio simply wasting a lot of time and effort?

If we assume that America's top business executives know what they are doing, we can easily see that public relations is worth the effort. Hundreds of thousands of dollars and man hours are spent each year to build and to maintain a "proper" image for the nation's businesses. This does not include expenses on actual advertising to sell products or services.

In a business world where millions of dollars in profit are earned through savings of tenths of a cent, this expenditure in cash, time and talent must pay off . . . or the top brass would scrap the whole idea.

Or, what about professional and trades associations? They have no "product" to sell, so why would they spend many thousands of dollars from membership dues if public goodwill is not worth it?

"Oh," you say, "businesses and other large organizations have professional public relations men - P-R men - to do the job. They know all the right contacts, and just how to get a story published. They have all the answers and we amateurs know nothing about their game."

True, but is it necessary to know all the answers - to be a professional - to get a story printed? Answer: an emphatic no!

*11652 Hollingsworth Way, Forest Park, Cincinnati, OH 45240.

OK, so how do you go about publicizing amateur radio? The main thing is to find a ham P-R man . . . one with a little nerve. The type of man to get for amateur radio's goodwill ambassador in your community or for your club is one who is not afraid to make a few mistakes; who is willing to learn the basic points of public relations and put them into practice.

First and of prime importance to a neophyte, amateur radio P-R man is to write ARRL headquarters and get the League's public relations kit. It contains sample articles for almost every situation you might wish to publicize. All that needs to be done is to plug the appropriate "Five Ws" into the sample stories and you have "Brown 'n Serve" news releases.

The five Ws? They are the backbone, the power supply, of a story. They are the "who is doing it," the "what is being done," the "when it will be done" . . . the who, what, when, where and why of the story. Of course, instead of being written before the event is to happen, the story could be written to be printed as it is happening or after it has happened.

If possible, these five major points should be in the first paragraph of any news story . . . in the first two paragraphs, at least. The rest of the story should be written so that the farther the reader goes into it, the less important the facts become so far as telling what is going on is concerned.

By using this "inverted pyramid" style of writing (most important information at the top of the story) the newspaper copy writer can simply cut off from the bottom to make it fit the space he has available. If you do not use this style, you will run the risk of the copy staff not taking the time and effort to rewrite the story - and it may wind up in the waste basket.

The purpose of this article, however, is not to detail the principles of news writing. With a little

The author's amateur public relations experience began 17 years ago when he joined the public relations staff, and later became Public Relations Officer of the Purdue University "All-American" marching and symphonic bands. His activities have included service as Public Relations Consultant for the Ohio State Council of the Knights of Columbus, and Public Relations Officer for the Ohio Area Navy MARS. His efforts as Public Relations Chairman for the Queen City Emergency Net (Cincinnati, Ohio), and as Assistant EC for Publicity for the Hamilton County (Ohio) AREC led several years ago to his becoming the amateur radio writer for the Cincinnati Enquirer. His "Ham Call" column appears each week on the Radio Page of the Cincinnati Sunday Enquirer.

effort anyone who has a reasonable command of the language ("American" for us fellows in the U.S.) and who is observant can develop a good news writing style.

The main thing is to see what changes the copy writers for your local newspapers make in the stories before they are printed. Try to adapt your style to the style that is used by the newspaper to which you will send articles.

What, then, about some pointers that are not included in the League's P-R kit?

Distribution

If you want to get wide coverage for your stories, send them to several newspapers in your area. Send them to every paper that might have an interest in the people or the club in the news release . . . or the services about which you are writing. If you live in a city, do not overlook the neighborhood weekly, bi-weekly and monthly newspapers (or radio and TV, for that matter). In small towns, be sure to cover the weekly village and county papers.

By all means, do not think that you have to send a different article to each newspaper. Unless you indicate on the release that it is being sent to one newspaper, only, each one will assume it is going to several others. Besides, any copy writer worth his salt will find a few changes to make to individualize the story for his own paper . . . and to show the "boss" that he is doing something to earn his pay.

Names

Include names, call signs¹ addresses and titles (president, communications manager, etc.) for people included in your release. When sending it to small suburban or neighborhood newspapers, or to small-town papers, include the names and addresses of all the people from their circulation areas who were involved in the activity.

Small newspapers rely upon local interest to sell them. Give them that personal, local interest, and they will print your stories. (My publication rate for nearly 30 newspapers, including two "big city" dailies, is about 90 percent for each release. That is not bad. More important, you can be at least as successful - if you learn what newspapers in your locality want . . . and give it to them!)

Slant

Quite often it is desirable or necessary to put a slant to your story. I am not suggesting you "distort" it. Just put emphasis upon the viewpoint that will appeal most to the public, and, therefore, to the newspapers.

For example, a release about your club sponsoring a project to build VHF transceivers may not get too much play in the newspapers. (How many

"men-on-the-street" even know what a vhf transceiver is?) Use a slant that the club is building portable and mobile transmitting and receiving equipment to improve its emergency communications capabilities for disasters, and you can lay money on its being printed.

The slants must be legitimate, though. If you use ones that are not factual, the newsmen will catch on to you before long. Your chances of having news releases printed, then, will be as dead as last month's headlines.

One final comment on this topic. Nearly everything your club or group does can have a legitimate slant, if one is needed, to get your story into print.

Pictures

Most newspapers will use pictures along with many stories. An interesting "action" shot may even help get an article published. Few newspapers, at least the big city ones, will send a photographer to cover an event unless it involves a fairly big story. What can you do to get a picture printed with your release? Give one to them.

I do not mean for you to rush out to buy an expensive press camera . . . or even hire a publicity photographer. Someone in your group, though, probably has a Polaroid camera. Believe it or not, a Polaroid (except for inexpensive models) can take press caliber pictures - provided you know how to use it.

The following pointers on taking pictures for newspaper use may not make you an expert, but with practice you can do a pretty fair job as a press photog. Although not hard and fast rules, you probably should have a pretty good reason before you ignore one or more of them.

These simple suggestions are: (1) Have no more than four people in a picture. (2) Get as close as possible to your subject. (As a press photog once told me, "Everyone knows that people have arms and legs, so chop off the legs and the lower parts of the arms, and get in close.") (3) Be sure you have a sharp, high contrast picture.²


Needless-to-say, be sure to take black and white pictures, only, for newspaper use.

Sentences and Paragraphs

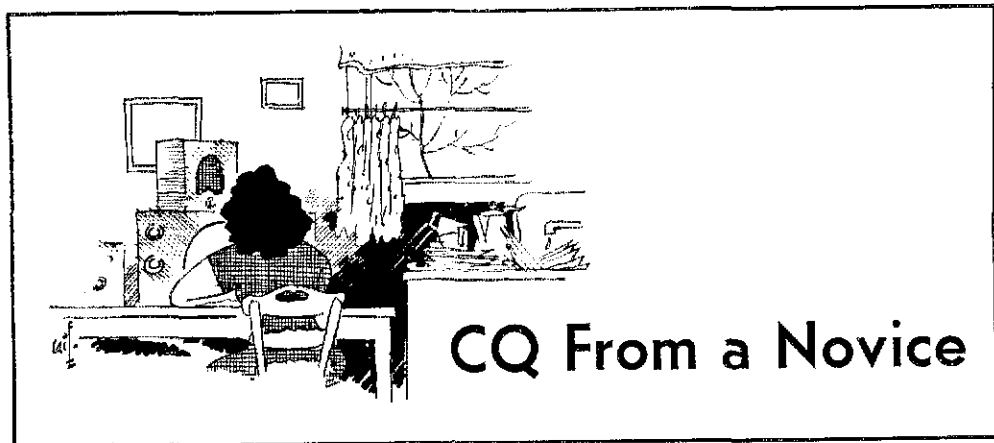
Keep them reasonably short. Long sentences and paragraphs lower the degree of comprehension for the average reader.

Aim

Whom should the story be aimed at? If it is to be read by the general public, aim it for non-hams. Be sure the average John Q. Public will be able to understand what you have written.

OK, so what do you have now? You have a story to tell, the ability to tell it and a picture to go with it. What are you waiting for? Get it to your local editors before their deadlines have passed! 

²To increase sharpness and contrast of Polaroid (black and white) pictures simply move the light-dark setting on the lens by one or two marks farther to the light side than normal, and develop the film for 45 to 60 seconds instead of 10 seconds as recommended in the Polaroid instructions.



CQ From a Novice

BY MARGARET KOERNER,* WNØBEM

THREE WEEKS ago, as I was walking my dog through a thicket of willows near my home, I heard a bird sending cw. Clearly and joyously he was sending his message, "Chickadee, chickadee-deedee," and after a few seconds delay (for I am still a Novice) I copied him. "U 2," he was saying. U2, you 2, you too!

I have spent many hours since that time puzzling over the message and wondering, me too, *what?* I shall never know for certain because the QSO ended abruptly. My dog saw a squirrel. ORN overwhelmed us, and immediately the bird flipped from transmit to receive. Perhaps it would be more accurate just to say that the bird himself flipped, for that is what he did, probably to join a nearby repeater whose QTH was obscure but whose voice came to me faintly from around the bend.

I never heard an explanation of his message but I am convinced of two things. First of all, the bird was a Novice. I know this because he was sending cw at a speed I could copy (I gave him a 599C report), and because of his manner — enthusiastic, triumphant, completely unabashed. I also am certain that his U2 was telling me that code (and by inference, all amateur radio) is not strictly for the birds but is for people. People everywhere; people like you and like me.

Of the total number of U.S. amateurs, about 22,000 are Novices, and all of them (all of us) had one thing in common, regardless of our many differences. We had, at long last, achieved a greatly-looked-forward-to goal. I say "long last" because for me it was long. For others, with a good background in electronics, with a bent for and experience in mechanics, and with other important qualities or situations going for them, the road may have been short. It may even have been easy. But for me it was not easy; it was a struggle, every inch of the way. For months I was carried along by a current which oscillated between despair (usually during the night) and hope (during the morning hours), and if the motivation had not been so great, if there had not been helping hands along the way, I would not have made it. But I did get there.

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along with an unseen multitude of others travelling the same route, and I am now well on the way to my next goal.

But what of the ones who didn't make it? The ones who shorted out somewhere along the line; who, letting their moments of despair overwhelm them, turned off their generators during a negative cycle and never turned them on again? Can any of them be revived and can future beginners be saved that fate?

Salvation

I think they can. I think they can be rescued by the same sort of help that rescued me. And since I am now a ham myself, and because one of the outstanding characteristics of hams is their desire to help each other; and because I not only was helped to *become* a Novice but have been helped every step of the way since that time (at this point, I originally planned to specifically mention KØZCM, without whose aid I would never have gotten on the air or remained on it, but because he is filtering this manuscript for me and removed that sentence, I am unable to do so) — because of these things, I am determined to see if I can now help as I was helped.

And how will I do this?

Well, in the first place, I have a long-term goal. In coming weeks I am going to try to write, in Novice language — which is very different from textbook language — basic things I have learned, and the methods (most of them unconventional) by which I learned them. All the manuals and textbooks on radio theory which I have encountered assume that every one entering the field of electronics for the first time at least knows *something*. I knew *nothing*. And when you try to build a four-story super-structure on nothing, you are in trouble right at the beginning. So I shall try to explain, in words that even someone who knows nothing can understand, what finally, after long struggling, I managed to absorb. Maybe, by so doing, I can lay some sort of foundation for someone else.

I shall try to choose, and solder together, various isolated facts and theories so that some basic principles, with recognizable forms, can emerge.

I shall think back to the times I consulted my panel of experts when I was in complete desperation and went to them for help, and shall try to remember exactly what it was that made me finally say, "Oh, is that what that means!" - "Is that how it works!" - or simply, "Yes, now I see." Here is a word of advice. If you are a would-be Novice and do not have such a panel of experts (other hams, electronic engineers, electricians, etc.) get one right away. Choose them carefully. They must be patient; very patient. They must be capable of regressing to the point where they can communicate with you. They may even have to be capable of figuring out the questions which you want to ask but don't know enough to put into words. And there should be at least three of them, if possible, so that you can ask them different questions at different times and no one of them will ever know how scramblebrained you are.

All this writing and remembering which I hope to do will take time and will not be easy. Eventually, however, it may develop into a kind of primer for would-be and are-now Novices, written by a Novice who hopefully will have become an ex-Novice by the time the writing is completed.

A Novice Primer, then, is my long-term goal. (Everything you want to know about radio but are afraid to ask.)

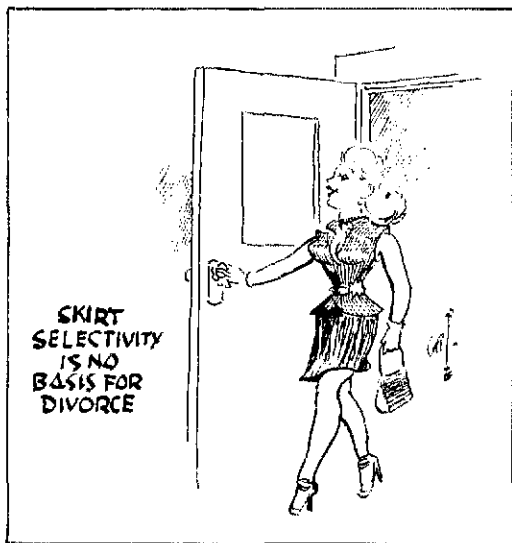
But there are three important items of information which you (if you are a would-be Novice) should know today, before you go one step further in your radio career. Here they are.

Negative Definitions

1) In the study of electronics, things are not always what they seem. A partial list of easily misunderstood terms is given below. Read it carefully.

Conversion has no religious implication.
Exciting voltages can be dreadfully dull.

Plates, leaks, mixers, screens and splatter have nothing to do with household equipment or problems.



Dissipation does not involve drug use.

Lag and Lead, and *Push-Pull* are not children's games.

Beat frequencies have nothing to do with the number of transients in town.

Hum won't be counted as music (music is forbidden on all amateur bands); it may, however, be counted against you.

Discriminators are not racial bigots.

Henry is not your next door neighbor.

Logs are not for burning (most amateurs use midnight oil).

Break-ins are not felonies.

Negative-feedback and *quelching* have nothing to do with the parent-child or parent-parent relationship.

Parasitic suppression does not require an exterminator.

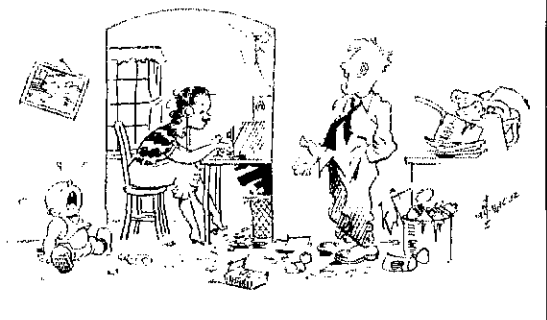
Skirt selectivity is no basis for divorce.

2) You should know that a number of things sound alike, but are really very different. These can be put together in groupings, like plants, according to species, and you may be able to remember them better by using the plant classification method.

The first grouping contains the "ors" and the "ers." Included in the ors are generators, resistors, capacitors, detectors, oscillators, and modulators. In the ers are amplifiers, couplers, receivers, reproducers, rectifiers, transformers, filters, and repeaters. (As a sub-species in the er group we have wattmeters, wavemeters, ammeters, ohmmeters, and voltmeters, all with similar root patterns.) And there is one group of hybrids which have resulted from the crossing of two different species. These are transmitters, transceivers, and transistors. This last group is particularly important from an economic standpoint.

Then there are the "ances." This is a group which Novices have found to be particularly difficult as far as distinguishing between species is concerned. Here we have resistance, reactance, impedance, inductance, conductance, reluctance,

PLATES, LEAKS, MIXERS, SCREENS AND SPLATTER HAVE NOTHING TO DO WITH HOUSEHOLD EQUIPMENT OR PROBLEMS ...





"I LIVE ON 9TH STREET, I'M
NOT IN THE 9TH GRADE!"

resonance, and capacitance. They are closely related to (some of them even the offspring of) the "or" group - resistors, capacitors, etc.

In addition, there is one very important one which I have never seen described in any of the many textbooks I have read, and that is the happenstance. Happenstances are very numerous, particularly among Novices, and many of them can be real problems. As an example, I shall tell you about one of mine.

I happen to be a YL. If you (the reader) are not a ham, I should explain that a YL is a woman amateur radio operator, and the letters mean Young Lady. This is strictly ham terminology and has nothing to do with chronological age, since YLs of widely different serial number can be found in each one of the ten call areas. The YLs radio counterpart is the OM or Old Man. Why there should be this discrepancy in age I do not know. As a matter of fact, it has been a source of real distress to me, since it could easily result in mismatching (am I not right about this, Technicians?) or something worse, and that is unmatching. (Note: In the original version of this manuscript, I included several interesting possible results and problems of mismatching, as seen from the Novice viewpoint, but they were all filtered by KØZCM, who, from his Extra viewpoint, saw electronic complications and implications of which I, as a Novice, was of course completely unaware.)

The Ticklish Question

So BK to U. What I didn't know, what no one warned me of ahead of time, is this: Whenever a YL gets involved in a QSO with an OM she must be prepared to have him ask her, subtly or bluntly, what her age is. When that happens, what does she do?

My first experience with this problem came on my second radio contact. Someone named Gene, in South Dakota, was the exciting factor. I had told him, in my best cw, that I lived on 9th Street in Boulder, Colorado. Imagine my surprise when he replied (in his best cw, which is obviously far better than mine), "Now, Margaret, I understand you are in the 9th grade. I am 35 years old. How old are you?" The first thing I did was to laugh; the second was to worry for fear he heard me and thought me rude; the third was to realize that I was on cw, so he couldn't; and the fourth was to find myself stricken with the thought: Do I have to tell

him? Is this expected of all YLs? And how, if it isn't can I *not* tell him, and do it politely?

Please do not misunderstand. My age is not classified information, filed away in some secret place. Most of my friends know it, and strangers, when they see me or meet one of my three married daughters (incidentally, and this is a good excuse to include it, one of them is a ham, WAØVDO, married to KØPFV, and not mismatched), can make a good guess at it. But the idea of sending out that information at the speed of light (186,000 miles/sec. or 3000,000,000 meters/sec. see page 18, *How to Become a Radio Amateur*) to all parts of the world (including my own home town) really appalled me. I felt I just couldn't come right out and say it. So I told Gene that I lived on 9th Street and was not in 9th grade. I thought that he would laugh when I told him I was older than he was. But he didn't. "How can I laugh," he answered, "You haven't told me, dear." And he was right. I sure hadn't.

Then there was Joe, down in Louisiana. He was 21, in college, and an engineer. He requested similar information about Margaret. I told him it had been many years since I had been in college, and hoped that was an adequate answer. I told Mike in New Jersey that the QRN was so bad I couldn't copy all of his questions. (I couldn't, but I did hear that one.) As for the polite 17-year-old in Iowa who said, "You are the first YL I have contacted. May I be so bold as to inquire how old you are?" -- well, I was miraculously saved that time. The band went out.

The solution? I have finally found it and all of you YLs who face the same problem are welcome to it. I now tell everyone, in my gentlest cw, "Yes, I am a YL, but I am not very Y." If I wish to be extra polite, I add SRI. And that, I think, will take care of the problem from now on.

3) *You must always remember that being an amateur is fun.* For me it has been, is, and will continue to be so much fun and so exciting an adventure that I am beginning to feel like an over-charged capacitor, in danger of blowing my dielectric. As a matter of fact, one of my reasons for writing this article is the hope that it may serve as a bleeder resistor (see Question 40 of the Novice exam, Question 38 of the General, Question 53 of the Advanced, but don't waste time looking through the questions for Extras; if they don't know about bleeder resistors by that time they never will) to drain off some of the excess voltage generated by the enjoyment I have had.

There are many more things you should know and remember, but they all add up to three things you must *do*. (1) Keep trying, and never give up. If you get discouraged, just say "If she did it (emphasis on the she), I can." (2) Get your license. (3) Get on the air.

If you do these things, I can promise you something. Some enchanted evening you will greet a stranger, and another and another and another, across a crowded Novice band. And somehow you'll know that this is what you have always wanted; something that all your life you have been looking for. When you have found it, never let it go!

QST

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity NRH

CONDUCTED BY GEORGE HART,* WINJM

INFILTRATION

SINCE THOSE amateurs interested primarily in public service are a minority of the active amateur population, there are only two ways in which public service will get the attention its importance deserves in the overall operating scheme of things. One of these is recognition of the part of our policymakers of that importance and what it means to the long-term future of amateur radio. In that connection, we are already receiving more attention at top level than the sheer number of active participants would justify in other types of activity.

The other is by "infiltration" of the ranks of those amateurs whose only purpose in holding a license is for the spare-time amusement they get out of it. The infiltration we speak of is not the type you read about in accounts of the fighting in the far east, but a sort of propaganda infiltration. Many amateurs are so intent on their own pet activity that they are unaware what's going on elsewhere. Would you believe that a majority of amateurs don't know what the letters AREC, RACES and NTS stand for? Probably not, anymore than a vhf enthusiast would believe that a majority don't know what EME stands for. (Come to think of it, what *does* it mean?)

The idea of "infiltration" came up at a meeting of one of the NTS area staffs in a discussion of the SET and liaison between NTS nets and local emergency nets in general. Since they won't come to us, the consensus went, let's go to them. We'll infiltrate them. We'll become members of their nets, and when they start talking about how to route their out-of-net traffic we'll be there to tell them that we represent the League's organized system for handling long haul traffic, the National Traffic System, and that we'll take their traffic. Of course one man can't do it, any more than one man can infiltrate an army. So we'll organize a "corps" of trained infiltrators, a highly-selective

*Communications Manager, ARRL.

Eleven members of the Culver City (Cal.) AREC provided communications for the twenty-third annual Western Hemisphere Marathon Race on Dec. 6. More than 300 runners were entered in the event which covered a 25 mile course. Seven two-meter fm stations were located at strategic points along the course to provide information on the progress of the race. K6AEH, left, and K6RMR are pictured at the start/finish line station. *Photo by K6YGH.*

group of versatile traffic men who will join the "enemy's" ranks and spread the word of what's being done elsewhere. Eventually, in this way, the system may get recruits. Either that or we'll lose our infiltrators; but that's one of the risks of all kinds of espionage.

So the NTSers intend infiltrating the AREC and RACES, the cw traffickers intend infiltrating the phone ranks, everybody is in one way or another infiltrating somebody or something to carry his own story and his own message - why don't we amateurs who are interesting in seeing that amateur radio renders the kind of direct public service that best justifies our existence, why don't we do a little general infiltrating of the ranks of those amateurs who are interested only in using their licenses for their own amusement or aggrandizement?

The consensus regarding how to get more recruits into the AREC and NTS has varied between those who feel we should "preach" that it is our responsibility to render such service and we should therefore do it whether we like it or not, and those who feel we should tone down the "responsibility" approach and try to show them how much fun it can be, or how much inner satisfaction comes from knowing you are doing something really useful. There is probably some merit in both approaches, the big problem being to know which of them will be most effective against a particular individual or kind of group. If you can't win 'em over with threats, win 'em over with candy, or vice versa.

Who wants to become part of the cadre for the ARPSIC - Amateur Radio Public Service Infiltration Corps? The qualifications are high, the pay



BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Nov. Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL/4	291	664	1520	47	3472
E90DNK	195	275	707	29	1656
W3VAV	117	496	6	490	1109
W3VBR/4	181	459	429	11	1050
W7BA	10	578	469	46	1043
SSLEY	1	493	483	1	948
W0LFO	426	243	237	6	912
W9LXC	52	463	363	16	894
W9IBQ	7	390	378	9	784
W69BXA	21	304	312	9	656
W6JCH	19	316	256	48	620
W4NFX	49	361	270	3	623
W6BHC	3	315	275	27	620
W5SRM	85	265	210	13	573
W4ZEP	85	263	189	55	572
W6VNO	12	277	255	7	554
W4MBH	127	300	100	100	527
K9LZX	2	256	252	3	513
W7PI	28	245	228	9	507
WB4OMG	58	230	211	6	502

More-Than-One Operator Station

W2DSC	53	246	180	38	517
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BPL for 100 or more originations-plus deliveries

W4ABK 300	W9INH 123	W4EYY 102
W7AXT 251	W4QOQ 119	W4EIQ 101
K8ONA 232		
W8OCU 175		
W4FN 164	W7GF 117	KRZJU 100
W8TEL 164		
W4MPX 126	W4ZHW 113	Late Report:
VE3IRU 125	W4GJ 108	WB4HRP (Oct.) 149
	W4BYZ 104	

More-Than-One Operator Station

E2DEL 331

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA1GCE, W4OVI, WB9BXX, WA9VZM.

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.

low but the reward for success great — a bigger and better group of service-dedicated amateurs. — WINJM.

Public Service Diary

Much of northwestern Pennsylvania was in the grip of a severe snow storm on Nov. 23 and 24. Amateurs in the Erie area called out their road patrol to help stranded motorists, accident victims, etc. Many vehicles were marooned in the storm and travel was extremely slow, but finally W3JTF was able to reach a city bus which had become stuck in the snow. Contacting WA3HDK on six meters, he made arrangements via phone patch to summon the proper assistance from the bus company garage. In addition to six meters, stations were using ten meters, and several stations operated in ECARS to provide weather and road information to inquirers. Eleven amateurs participated during the snow emergency. — W3KPJ, SEC W. Pa.

When normal communications channels failed to provide the necessary assistance after a member of the USAF Southern Command Band had suffered a ruptured spinal disk on Nov. 25, a communications network of amateurs in Venezuela (where the band was performing), Ecuador, Colombia, New Jersey and the Canal Zone, went into action to see what could be done.

YV1EL, a Maracaibo doctor, checked into the Intercontinental Traffic Net in search of a station in the Canal Zone. The NCS in Colombia advised that none was present, but WA2CFA of Clifton, N. J., broke in and said he could reach a station in the Canal Zone. KZ5FH on the Atlantic side of the canal was contacted and the three stations moved off frequency to try to contact the band's home station on the Pacific side of the canal by phone patch. Poor telephone connections, however, prevented a successful completion of the phone patch.

Meanwhile, HC2HV in Guayaquil had heard the progressing situation and without the knowledge of the first three stations had contacted KZ5EH on the Pacific side of the canal and directed him to the frequency YV1EL, WA2CFA and KZ5EH were using. The result: the necessary arrangements were made to have the proper equipment aboard the plane that was to pick up the band the following day.

When fire broke out in his apartment building on Nov. 29, W1FCJ of Cambridge, Mass., called for assistance on two-meter fm utilizing the WA1KPY repeater in Marlboro. The call was answered by W1ELU and W1NPT who notified the police and fire departments. A sightless amateur, W1FCJ remained at the rig until the police arrived and he was evacuated from the blazing building. W1WSN.

After being notified, on July 4, that his father, W6OA, had suffered a heart attack and was in the

The Miami Springs (Fla.) Amateur Radio Club operated K4OSQ/4 at the Miami Springs International Swim Meet Aug. 7-9. The amateur facilities were used to dispatch information on team standings to amateurs in their home countries, mostly in South America. WA4ABY is shown at the controls in this photo by W4IYT.



hospital in serious condition, W1WMK got on the air and contacted W6MSR and W6ZRJ to obtain further information on the incident which apparently had been brought on by a neighbor's suit involving W6OA's on-the-air activity. W6ZRJ immediately contacted WB6TZG for the full particulars and offered every possible assistance in the case. Fortunately, W6OA has recovered, but has been curtailing his activity after a close call. - W1WMK.

Members of the Redwood City (Calif.) Civil Defense and Disaster Communications Team provided communications for the Mexican Independence Day parade on Sept. 11. Nine amateurs participated and communications were routine. The Redwood City group had been recommended for the job by another satisfied customer, the Peninsula Celebrations Association. EC W6DEF and his able crew have provided communications assistance for the association's Fourth of July Parade for a number of years. - W6DEF, ED Redwood City, Menlo Park, Calif.

Members of the Albert Lea Spiderweb Amateur Radio Association of Albert Lea, Minn., provided communications for the clean-up of the Shellrock River on Sept. 19. A base station was set up in Glenville and seven mobile units took to the field to help dispatch the volunteer work crews. The group, under the direction of EC W0FIT, operated continuously on six members for about seven hours. - W0FIT, EC Freeborn Co., Minn.

On Sept. 27, the Valley Radio Club of Eugene, Ore., provided communications for the Eugene Cycling Championships. W7LVN, K7CIY, K7CJB, WA7DVY and WA7HYL covered the race course from different points along the route and reported any missing riders and possible emergencies. The operation continued for four and one half hours. - WA7GGD.

Amateur Radio portable and mobile stations were used to provide administrative communications between the headquarters and 42 field check points during the U. S. National Championship Road Rally held in southern Ohio on Oct. 2 - 4. Thirty-seven amateurs participated using 75, 6 and 2 meters. W8ETW operated from rally headquarters through the radio control point at the Scioto Trail State Forest Fire Tower, which was manned by W8GKN and W8ERD. It was necessary for many of the portable stations to move to various check points during the rally. In connection with this, W8CRX acted as a roving trouble shooter to assist with difficulties in setting up rigs and antennas. K8EHE accompanied the rally club president constantly to keep him informed on the competition's progress. - W8ERD, EC/RO Columbus, Ohio.

On Oct. 3, the Tusco Radio Club of New Philadelphia, Ohio, provided radio communications for the Ohio Swiss Festival at Sugarcreek. W8LWV

Members of the West Florida Phone Net gathered, on Aug. 15, for a picnic. Some of those in attendance were, left to right: WA4ISJ, WB4GTY, WB4LOQ, K4VWE, W4BIM, K4SVX, K4LAN, W4RKH, K4ADM, WA4EOQ and K4BDY. Photo by WB4PFV.

acted as master of ceremonies and was assisted by W8ZX, K8ZJG, WA8s JTS and SHP on two-meter fm, and W8GAC, K8CQA, WA8s JPW and YEG on ten meters. Approximately 45,000 spectators attended the festival. - WA8SHP, Assistant EC, Tuscarawas Co., Ohio.

Eleven Owensboro, Ky., AREC members provided safety and administrative communications for the annual Battle of Perryville Trek in which nearly 2000 Boy and Girl Scouts participated. One emergency message and one priority message were handled in addition to some 120 routine pieces of traffic. - W4OVI, SCM, Ky.

Several reports on Halloween Goblin Patrols have been received at headquarters. In Melrose, Mass., nine local amateurs assisted the police in patrolling the streets Halloween night. Taking part were W1CDJ, W1CE, W1DFS, W1HYZ, W1JVZ, W1PGN, W1QXB, W1WJH and K1FW. - W1AOG, SEC E, Mass.

Hamden, Conn., amateurs used two-meter fm gear to assist the local auxiliary police for several hours on each of the last five evenings in October. Assistant EC W1UKX directed the exercise in which 13 amateurs took part. - W1NFG, EC Hamden, Conn.

In Columbus, Ohio, 33 amateurs assisted local police by donating their time, driving skills and radio equipped vehicles to augment the usual force of police cruisers. Ten-, six- and two-meter fm was used. A special station was located at police headquarters to send assignments to the emergency operating center, where all dispatching of the special cars took place. - W8ERD, EC/RO Columbus, Ohio.

Forty reports were received from Section Emergency Coordinators during the month of October, thus equaling the record low for the year set in March. These reports encompassed an AREC membership of 13,001. This compares rather poorly with October, 1969, when 47 reports were forwarded to headquarters, listing 16,332 AREC members. Sections reporting: Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPA, Ida, Ind, Iowa, Kans, Mar, Mich, Mont, Nebr, Nev, NMex, NLI, NNI, NTex, Ohio, Okla, Ont, Org, Orego, Que, SDgo, SF, Sask, SDak, SNJ, Tenn, Utah, Va, WVva, WFla, WMass, WNY, and WPa.

Traffic Talk

Much has been said, in this column and elsewhere, about "service" messages. As a topic, it seems endless. A service message is not just a



PUBLIC SERVICE HONOR ROLL, November, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total in the nine categories below. In some cases scores have been adjusted to reflect new maximum points which took effect with the Oct. 1970 listing. Use CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 QST for initial description and page 72, Sept. '69 for latest point evaluations. Please note new maximums for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	20	3	5	5	
W4SETX	10	10	12	12	12	4	3	5	5	68
W6RNX	10	10	12	12	20		3	5	5	62
W4QVYV	10	10	12	12	6	12				62
WB8BBG	10	10	12	12	12			5	5	61
K8BHH	10	10	12	12	13		4	6	1	61
W4QOLS	10	10	12	12	3	9		5	5	61
W2OF	10	5	12	12	12		3	4		58
W42KHQ	10	10	12	12	12					56
WB40MG	10	5	12	12	12		3			54
W4SUPI	10	10	12	12	12	5		5	5	54
WB9BXX	10	10	12	6	12		3			53
K1EIR	10	10	12	3	12			5	5	52
W2OUX	10	10	3	12	12			5		52
W7L BK	10	5	12	12	12					51
W4QVAS		10	9	9	9	20	2			51
WA1HOL	10	10	9	9	12					50
W4QVYB	10	10	12	6	12					50
WA2VYS	10	10	12	12				5	5	49
W8IM	10	10	12	12				5	5	49
W9HKY	10	9	12	12				5	5	48
W0LXC	10	5	12	12			3	1	5	48
W3MPX	10	5	12	12	3		3		5	47
K4ZNP	10	5	12	12	3			5	5	47
W5SBM	10	5	12	12			3		5	47
W7BO	10	5	12	9	6			5		47
WB8WD	10	10	12	3	12					47
W4SNOQ	10	10	12	12	2					46
W4SVJW	10	5	12	12	6					45
K0MRI	10	6	12	12					5	45
WA2DRH	10	10	12	3	9					44
WA2EVH	10	10	12	12						44
WB4NQZ	10	5	12	12				5	5	44
K5ROZ	10	10	12	12						44
W6BGE	10	5	12	12				5	5	44
W6LRU	10	5	12	12				5	5	44
W7PI	10	10	12	12			3			44
WB9HLY	10	5	12	12				5	5	44
WA0UTT	10	10	12	12						44
VE3GI	10	5	12	12					5	44
NB1Y/W4	10	7	12	12	3					44
W7HLA	10	9	12	12						43
W43MKQ	10	5	12	12	2					42
W6VNO	10	10	12	12	3		5		5	42
W7AXT	10	12	12				3	5		42

VE4ERU	10	5	12	12				5		42
W6MNY	10	5	6	5	12				5	41
WB8ALU	10	10	9	12						41
W1ZPB	10	5	12	12	1					40
W3FLS	10	5	3	6	9	1			5	40
WA2BEX	10	5	12	12						39
WB20LI	10	5	12	12						39
W2FR	10	12	12						5	39
WA2ICU	10	5	12	12						39
W2RUF	10	12	12						5	39
W3LOS	10	12	12						5	39
W3NEM	10	12	12						5	39
W6JIT		10	12			17				39
W8MPD	10	5	12	12						39
W0BV	10	5	12	12						39
W4QNNL	10	5	12	12						39
W4NQG		5	12			16			5	38
W6DEF	10	10	12	6						38
W7JWJ	10	5	12	5	6					38
W1HVR	10	3	12	12						37
WB6ZVC	5	5	12	6	9					37
W8LKY	6	10	9	12						37
WA3JSU	10	12	9						5	36
WB8BLH	10	10	3	12	1					36
W2MTA	10	2	12	6					5	35
WB4SMA	10	5	8	12						35
W4UO	10	1	12	12						35
K1SXP		5	12	12					5	34
W2FR	10	12	12							34
K2KTK	10	12	12							34
WB2LGA	10	12	12							34
K3HKK	10	12	12							34
WA3IYS	10	12	12							34
K4KNP	10	12	12							34
W46FOQ	10	12	12							34
W6INH	10	12	12							34
W6YBV	10	12	12							34
WA8DUL	10	12	12							34
W8IZ	10	12	12							34
W4SPIM	10	12	12							34
W0HI	10	12	12							34
WA0HTN	10	12	12							34
VE3FXI	10	12	12							34
WA2JIM	10	10	12							32
W6LI	10	6	12	16						32
K8LGA	8	12	12							32
WB0AEM	10	10	12							32
WA0JYC	10	10	12							32
WA0HRM	4	10	12						5	31
W3ELZ	5	7	12	1					5	30

Category Key: (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing assigned liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; (9) Serving as net manager.

message between amateurs, it is a message having to do with the status of another message. It usually concerns delivery status, but can also have to do with relaying data, such as that requested by the originating station in the form of an HX prosign. Service messages should carry the symbol SVC before the number (not before the check). They count in your traffic total exactly the same as other formal written messages in standard form. A check count is required and, unlike regular messages, common amateur abbreviations may be used. We mention all this because these points seem to continue to be unknown by many amateurs handling traffic.

Now VE3GI, manager of the Eastern Canada Net of NTS, comes forward with the statement that less than 10% of the service messages he sends out receive a reply. The messages in question remain in his file, undelivered, forever more. Is this typical?

Whether it is or not is immaterial. The important point to drive home is that service messages which request a reply should be

answered. It is a part of our responsibility in handling messages. If you get a GBA (give better address) and you don't have a better address, you message the station telling him so and instructing him to cancel the message. If you get an "Annie doesn't live here any more" type of SVC, either send a later address or request cancellation. Only you, the originator of the message in question, can cancel it. If you ignore a SVC message you are shirking your responsibility in traffic handling, for often you are the cause of non-delivery, or at least the unaccounted-for disappearance of a message being handled by amateur radio.

Compliance with an HX is a courtesy to the originator which usually takes little or no extra effort on the part of the handler - but it is not considered mandatory. Compliance with a request made in a service message, especially one concerning delivery, is not in the same category.

Much traffic is originated by stations set up in public places. The public is solicited for it, the traffic is usually taken in large quantities at booths manned by people unfamiliar with amateur

radiograms and the procedures used in handling them. Under such conditions identifying the originator is usually neglected, thus service messages cannot be acted upon — and at the same time they are even more subject to garbling than the run-of-the-mill amateur message. Anything done in quantity and haste by unfamiliar people is subject to being fouled up.

The solution is obvious, but costs a little more trouble. Make sure that the name and address of the originating person is included on every message filed, then keep all messages on hand. When services are received, notify the originating party what happened to his message. If you don't do this, all they will know is that the message was never received, and this doesn't do much for our image. Setting up a message booth can be just as deleterious as helpful to the amateur image if it is handled ineptly.

How about MARS refiles? You service these to the amateur station refiled from MARS, whose call letters should be indicated as the station of origin. You amateurs in MARS should know from what MARS station you received the message and be able to relay the service information back to the MARS originator.

Any other questions re SVC messages before we drop the subject for a while? — WINJM.

National Traffic System. W0INH reports that CAN recorded the second highest rate for November in its history. W2FR says he has issued 2RN wall paper to WA2DHS, WB2s DLJ LQP and VEJ. W7BQ reports traffic took a good rise during the month and is looking toward a good December. Ninth Region Net certificates have gone to WB4NQZ, W9YT and WB9FFY, according to manager W9HRY.

November Reports

Net	Sessions	Traffic	Rate	Avg. Rep. (%)
EAN	30	1709	1.305	57.0 99.4
CAN	30	1153	1.196	38.4 100.0
PAN	30	1182	1.118	36.1 96.7
1RN	60	645	.390	10.8 91.7
2RN	60	506	.731	8.4 99.7
3RN	60	471	.414	7.9 99.4
4RN	53	537	.411	10.1 85.2
RN5	60	691	.397	11.5 93.1
RN5	60	820	.678	13.7 100.0
RN7	54	443	.515	8.2 59.5
8RN	60	536	.402	8.9 96.7
9RN	60	604	.637	10.1 96.7
TEN	60	528	.556	8.4 70.7
ECN	60	149	.196	2.7 88.3
TWN	47	226	.239	4.8 53.3
ICC Eastern	120 ¹	880		
TCC Central	90 ¹	660		
TCC Pacific	120 ¹	982		
Sections ²	1901	10,780		5.7
Summary	2705	25,608	EAN	13.0 87.7 ³
Record	3211	30,541	1.315	17.8

As can be seen by the photo, quite a few traffic handlers attended the 1RN Meeting at the National Convention in Boston, Mass., last September. W1EFW conducted the forum, which discussed problems on 1 RN and NTS in general.



¹TCC functions, not counted as net sessions.
²Section and local nets reporting (3x): EPAEPTN, PTTN, EPA, WPA (Pa.); AENG, AERD, AENR (Ala.); FMTN, QFN, GN, FTTN, TPTN, NBN, QFBN, VEN (Fla.); VN, VSNB (Va.); QMN (Mich.); CN (N. & S. Car.); MSN, MJN, MSPN (Minn.); WMN (Mass.); PVTEN, JNU (N.J.); BSN (Ore.); TEX (Tex.); WSN (Wash.); PTN, SGN (Me.); NYS, NLI (N.Y.); CN, CPN (Conn.); GPN, GSN (Ga.); EPTN, KYN (Ky.); NCN, SCN (Cal.); MDCN (Md.-D.C.); QZK (Ark.); CFN (Colo.); LAN (La.); GPN (Ont. Que.); GBN, OPN (Ont.); RISP (B.L.); BUN (Utah); BN, OSSE (Ohio); W. Que. VHP; QRS (Kans.); BEN (Wisc.).
³Overall Effectiveness percentage.

Transcontinental Corps Eastern Area TCC certificates have been issued to K1SSH and W8RYP by director W3EML. TCC Central Director W0LCX has issued wallpaper to W4ZJY, W5MI, W9s CXY DND, WA9VZM, WB9DPU, W0s HI INH ZHN, K0AEM, WA0s LAW and WEZ. WA6BRG has also received a TCC certificate from Pacific Director W6VNO. Bob also apologizes for inadvertently omitting W6EOT from the TCC roster on June through Oct. reports.

November Reports.

Area	Function % Successful	Traffic	Out-of-Net Traffic	
Eastern	120	94.1	1187	880
Central	90	96.8	1346	660
Pacific	120	95.0	1964	982
Summary	330	95.2	5597	3522

The TCC Roster: Eastern Area (W3EML, Dir.) — W1s BJG EJI NJM, K1SSH, WA1JTM, W2s FR, GRZ QC, K2KFK, WA2s BLV UWA, W3EML, K3MVO, W4s NLC SOQ UO, K4KNP, WA4EUL, WB4s GTS NNO, W8s PMJ RYP, K8KMO WA8CX, WB8AL, VE3RRU; Central Area (W0LCX, Dir.) — W4s OGG ZJY, WB4KPE, W5MI, W9s CXY DND, WA9VZM, WB9DPU, W0s HI INH LCX UCE ZHN, K0AEM; Pacific Area (W6VNO, Dir.) — W5RE, W6s RGF BNX FOT (PW MLE MNY VNO VZT, K6s DYX KCB, WA6s DFI LFA, W7s DZX EM KZ PI, K0JSE.

Independent Net Reports.

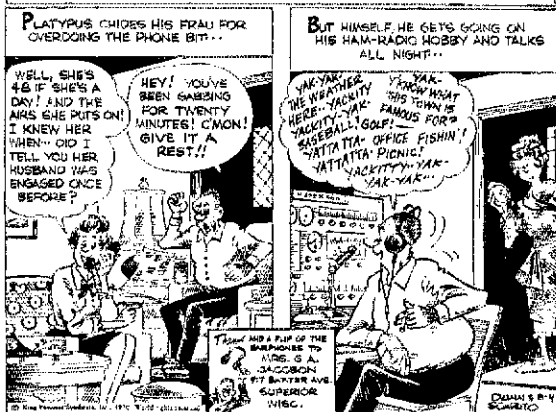
Net	Sessions	Check-Ins	Traffic
All Service	5	46	44
North American SSB	25	486	487
7290 Traffic	40	1716	731
Eastern Area Slow	28	163	101
Northeast Traffic	30	461	360
Interstate 20 Meter	20	1970	2340
Clearing House	25	409	232
Interstate 75 Meter	30	1189	405
Hit & Bounce	30	337	801
Eastern U.S. Traffic	26	102	112

Strays

Most BPL certificates are signed by the SCM. Loyd Peek, W7BA, got one signed by the Governor of Washington. That's right, Governor Dan Evans, as "Honorary SCM," issued him a BPL certificate in recognition of his handling approximately a half million messages during the past fifty years. In an accompanying letter the Governor declared W7BA the "Big Brass Pounder" of Washington State.

Strays

Harlo's They'll Do It Every Time



(King Features Syndicate copyright)

Bell Telephone in Canada is continuing to release a limited number of teleprinters to licensed amateur stations. Waivers must be signed in order to procure this equipment.

For information concerning price, waiver, requirements and types of machines available, contact either of the Amateur Radio Fraternity Co-ordinators listed below:

Bell Canada, C/o C.B. Taylor, VE2MR/VE3OR, Room 603,

1 Nicholas Street
Ottawa 2, Ontario.

Bell Canada, C/o G.E. Blanchett, VE3BAD, 6th Floor,
10 Hunter Street,
Hamilton 10, Ontario.

Interested in the latest news of what's happening with amateur space projects? Amsat, the Radio Amateur Satellite Corporation is now conducting a net at 2400 GMT on the second and fourth Mondays of each month at 3855 kHz. Net control station is WA110X (Talcott Mountain UHF Society) under the direction of Dave Sumner, K1ZND. The net is open to anyone interested; listen in and get the latest info on plans for amateur satellite communication!

Silent Keys

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

- W1ACM, James A. Mulligan, Ipswich, MA
 W1CG, Henry L. Sepessy, Piermont, NH
 W1DGT, Elmore J. Fitz, Lanesboro, MA
 W1DNL, Robert H. Lewis, Boston, MA
 W1HP, Joseph C. Saunders, Merrimac, MA
 K1JLV, John S. Lyons, Sr., Boston, MA
 W2AAG, William Kohler, Port Washington, L.I., NY
 W2COB, George T. Millar, Fort Plain, NY
 K2EBX, Richard B. Braine, New Rochelle, NY
 K2EJU, Edward C. Glenn, Browns Mills, NJ
 W2KFM, Edward D. Samplin, Woodmere, NY
 W2TW, John W. Smith, Madison, NJ
 W3HHH, Harold W. Dodds, Brockport, PA
 W3GHO, David H. Stang, Sr., Wilmington, DE
 W3KOU, James F. Burns, Baltimore, MD
 *W3YA, Gilbert L. Crossley, State College, PA
 W4CMP, Alexander Van Carter, Bowling Green, KY
 W4EBR, Cecil D. Newton, Hickory, NC
 K4EO, Clarence V. Blalock, Albemarle, NC
 W4GWD, Bluford E. Atkins, Tuscaloosa, AL
 W84OC, Peter A. Wilson, Richmond, VA
 W4PB, Marian H. Vater, Tampa, FL
 W4QGW, Jaime L. Rigau, Gloucester, VA
 W4UKN, Richard K. Hunter, Greensboro, NC
 K5EHC, Walter W. Stockton, Bartlesville, OK
 W5OJC, Robert L. Plummer, Dallas, TX
 K5OYJ, Gerald W. Bird, Orange, TX
 WA6DKW, Eugene A. Soulligny, W. Sacramento, CA
 W6DUP, Raymond G. Wieweg, Alpine, CA
 WB6LUB, Leo J. McQuaid, Victorville, CA
 W6EKC, Robert C. Fote, San Ysidro, CA
 W6ERC, Cecil C. Caves, La Crescenta, CA
 K6JC, James W. Brannin, Rohnert Pk., CA
 W6RDB, Donald A. Cofone, Fullerton, CA
 W6RDI, Ray Alves, Jacumba, CA
 W6TL, Clare A. Riggs, Carlsbad, CA
 W6WSA, Edward E. Dorn, Joshua Tree, CA
 W6YEB, George H. Strachan, Hemet, CA
 K7GRM, Ivan Owings, Phoenix, AZ
 W8DZ, Jacob W. Schott, Cincinnati, OH
 W8EA, Samuel H. Zaayev, Columbus, OH
 W8HW, Lehr Hakenberger, Findlay, OH
 W8OFR, Clarence Hall, Cleveland, OH
 W8OGG, John G. Silterson, Calumet, MI
 W8PY, Robert B. Palmer, Allen Park, MI
 W8QF, Leo F. Strasel, Saginaw, MI
 W8TOR, William H. Hunt, Middletown, OH
 W8WGV, Harry McNutt, East Palestine, OH
 W9BZO, Charles H. Rippie, Beloit, WI
 W9FAA, John J. Dilworth, Cassville, WI
 W9FFF, James H. Chittenden, Vevey, IN
 W9HLH, Emery E. Toops, Jr., Terre Haute, IN
 WA9SGB, Mark T. Keith, Peoria, IL
 WA9YBU, Arvil Giedinghagen, Cottage Hills, IL
 W0DQW, Jay M. Hare, Delphos, KS
 W0EJK, James H. Reppy, Winfield, MO
 W0GAD, Raymond C. Hunt, Kansas City, MO
 W0GKP, Carl W. Johnson, Duluth, MN
 W0HKT, Robert V. Randall, Omaha, NE
 W0IX, Jess M. Powell, Minneapolis, MN
 W0RBJ, William K. Adams, Ferguson, MO
 W0VUV, Rev. Robert D. Hudson, Wabasha, MN
 VE1EV, G. E. Brown, Albert, NB
 G6QS, Stanley Roberts, Yorkshire, England

*Charter Life Member, ARRL

The Poughkeepsie Amateur Radio Club's recent Novice contest was won by 12-year-old Larry Halstead, WN2MSE. Larry has already worked all 50 states with his neat Heath DX-60/HR10B set-up. Dipoles for 80 and 40 and a 15-meter beam do the radiating.

Happenings of the Month

NEW SPEEDS PROPOSED FOR RTTY

The Federal Communications Commission has issued a Notice of Proposed Rulemaking which would permit speeds of 60, 75 and 100 words per minute for radio teleprinters used in the amateur bands (as opposed to 60 only in the present rules). The Notice is in response to separate petitions filed by Keith B. Petersen, W8SDZ in December 1968 and R. Bruce Peters, WB2LRS, filed in November 1969.

If the idea is eventually adopted, Section 97.69 of the amateur rules will be amended to read:

(b) The normal transmitting speed of the radio teleprinter signal keying equipment shall be adjusted as closely as possible to one of the standard teleprinter speeds, namely, 60 (45 bauds), 75 (56.25 bauds) or 100 (75 bauds) words per minute, and in any event, within a range of plus or minus five words per minute of the selected standard speed.

Anyone interested in this matter may file his own comments with the Commission by March 1, 1971; replies to the comments of others may be filed until March 22. An original and 14 copies are required for formal participation under Section 1.419 of the Commission's rules; however, even single sheets in letter form probably will be considered by the FCC as "informal comments."

BEACONS GET SPECIAL CALLS

The Department of Communications in Canada has made available, at ARRL request, the callsigns VE8VHA through VE8VHF for beacon stations in the Arctic. Amateurs of the Canadian Division are cooperating with the Region 1 Division of the International Amateur Radio Union in a study of such mysteries as "Auroral E" propagation.

One of the beacons is already on the air, under the call VE8YT assigned before the present announcement. It operates from Clyde River, on

the northeast coast of Baffin Island in the Northwest Territory, on 50.08 MHz A1, with 65 watts output and a halo antenna. Reports of reception may be sent to ARRL hq.

Beacon stations acquire their licenses in the normal manner through DOC Regional Offices which will then obtain the specific call from Ottawa.

EXAMINATION SCHEDULE

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

No advance notice is required of the applicant, except as noted. Of course, no tests are administered on national holidays. Additional examination points are listed after the office schedule in most districts; at such places, appointments should be made during the month previous through the district engineer. He will probably ask that the completed form 610 and check or money order for \$9 be filed in advance. An applicant may appear at any FCC examination point regardless of where he lives.

Recent changes are in boldface.

1 Boston, Mass. 02109; India & State Streets; Thurs.-Fri., 9-11 A.M. Exams with code test, Friday only. Also conducts examinations at Bangor, Me. in May; Hartford, Conn. in March and Sept.; Portland, Me. in Apr. and Oct.

2 New York, N.Y. 10014; 641 Washington Street; Tues.-Thurs., 9-12 A.M. Also conducts examinations at Albany, N.Y. in Mar., June, Sept. and Dec.

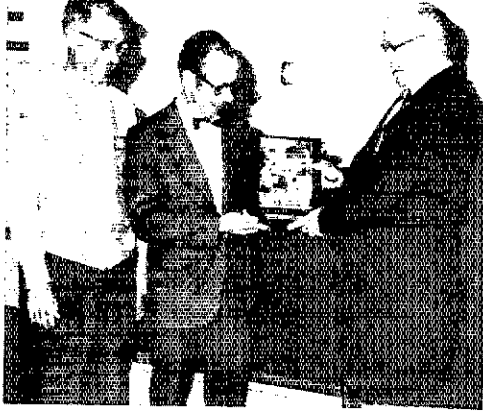
3 Philadelphia, Penn. 19106; 2nd & Chestnut Streets; without code test, Mon.-Wed., 10-12 A.M.; with code test, Tues.-Wed., 8-9 A.M.

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

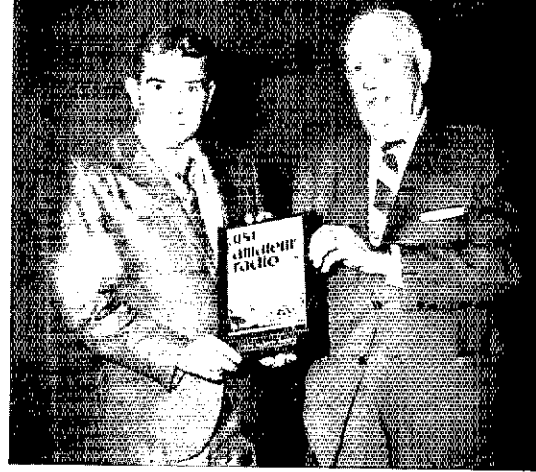
5 Norfolk, Va. 23502; Military Circle, 870 North Military Highway; with code, Thurs., 9 A.M.; others, Wed. and Fri., 9 A.M. to 12 noon. Also conducts examinations at Salem, Va. in Apr. & Oct.; Wilmington, N.C. in June & Dec.; Winston-Salem, N.C. in Feb., May, Aug. and Nov.



ARRL President Robert W. Denniston, W0DX and General Counsel Robert M. Booth, W3PS, appeared before the Senate Subcommittee on Communications to support Senate Bill S-1466, the measure introduced by Senator Barry Goldwater which would allow future citizens to obtain FCC licenses. The bill has been adopted by the Senate and has cleared the Subcommittee on Communications and Power in the House. It's touch and go whether the bill will be adopted before Congress adjourns.



The June Cover Plaque went to Bill Briles, W7ABW and Robert Gervenack, W7FEN for the article, "Slow-Scan TV Viewing Adapter for Oscilloscopes." W7FEN accepts his plaque from Robert B. Thurston, W7PGY, director from the Northwestern Division (at right), while Loren Hole, WA7DCD, president of North Seattle ARC looks on.



"Automatic Amplifier Tuning" was picked by ARRL directors as best article in the September issue of QST. Here, Great Lakes Director Alban A. Michel, W8WC, presents the Cover Plaque award to author Frank Walsmith, W8PHR.



The four states of the Roanoke Division all enjoyed proclamations of amateur radio week in 1970. Here is the South Carolina document for November 1-7, 1970 being signed by the Hon. Robert E. McNair, Governor, while Beth Miller, WA4EFP (SC SCM), Bannie Stewart, W4CE (assistant director of the Roanoke division) and SC SEC Dick Miller, WA4ECJ look on.



The Governor of Nebraska, Norbert T. Tiemann, personally signed the certificates for the Nebraska QSO party last year — how's that for prestige?



"Operation Whitecane" (QST, September 1969, page 52) was originally an Ontario project, but now it's spreading out across Canada. Walt Jones, VE1AMR, at right, teaches a class of blind newcomers in Moncton, New Brunswick.

The QST Cover Plaque award for May went to Richard Preiss, W7HCV for his article, "The 2-Meter QRP Mountain Topper." Robert B. Thurston, W7PGY, director from the ARRL Northwestern Division, made the presentation.



6 Atlanta, Ga. 30303; 1602 Gas Light Tower, 235 Peachtree Street, N.E.; Tues. and Fri., 8:30 A.M. Also conducts examinations at Nashville, Tenn. in Feb., May, Aug., and Nov.; Memphis, Tenn. in Jan., Apr., July and Oct.; Knoxville, Tenn. in Mar., June, Sept. and Dec.; Birmingham, Ala. in Mar., June, Sept. and Dec.

6S Savannah, Ga. 31402; York & Bull Streets; 2nd & 4th Tues., each month by appointment only.

7 Miami, Fla. 33130; 51 S. W. First Avenue, Thurs., 9 A.M. Also conducts examinations at Jacksonville, Fla. in Apr. and Oct.

7T Tampa, Fla. 33602; 500 Zack Street; Tues.-Fri., 8:15 A.M. by appointment only.

8 New Orleans, La. 70130; 600 South Street; with code, Tues., 8:30 A.M., others, Tues.-Wed., 8:30-12 A.M. Also conducts examinations at Jackson, Miss. in June and Dec.; Little Rock, Ark. in Feb., May, Aug. and Nov.

8M Mobile, Ala. 36602; 113 St. Joseph Street; Wed. 8 A.M. by appointment only.

9 Houston, Texas 77002; 515 Rusk Avenue; Tues., 8-9 A.M. Also conducts examinations at San Antonio, Texas in Feb., May, Aug. and Nov.; at Corpus Christi, Texas in Mar., June, Sept. and Dec.

9B Beaumont, Texas 77701; 300 Willow Street; Tues. by appointment only.

10 Dallas, Texas 75202; 1314 Wood Street; Tues. 8-12 A.M. Also conducts examinations at El Paso, Texas in Feb. and Aug.; Lubbock, Texas in Feb. and Aug.; Oklahoma City and Tulsa, Okla. in Jan., Apr., July and Oct.

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

11SD San Diego, Calif. 92101; 1245 Seventh Avenue; by appointment only: with code, 1st & 3rd Fri.; without code, Wed.

12 San Francisco, Calif. 94111; 555 Battery Street; Fri., Extra & Advanced, (no code) 8:30 A.M.; General and Advanced (with code) 10 A.M. Also conducts examinations at Fresno, Calif. in Mar., June, Sept. and Dec.

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

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

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

16 St. Paul, Minn. 55101; 4th and Robert Streets; Fri., 8:45 A.M. Also conducts exam-

inations at Jamestown, N. Dak. in Oct.; Marquette, Mich. in May; Sioux Falls, S. Dak. in Mar., June, Sept. and Dec.

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

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

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

20 Buffalo, N.Y. 14203; 121 Ellicott; Fri., 9 A.M. Also conducts examinations at Pittsburgh, Penna. in Feb., May, Aug. and Nov.; Syracuse, N. Y. in Jan., Apr., July and Oct.; Williamsport, Penna. in Mar., June, Sept. and Dec.

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

22 San Juan, P.R. 00903; 322 Federal Building; Fri., 9 A.M.

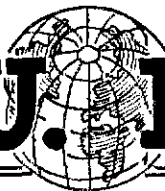
23 Anchorage, Alaska 99501; 4th Avenue at F & G Streets; Mon.-Fri., by appointment only. Also conducts examinations at Fairbanks, Juneau, and Ketchikan in Apr. and Oct.

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

Gettysburg, Penna. 17325; 334 York Street; Exams are no longer offered at this office. **QST**

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

I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

JA OPERATION BY FOREIGNERS BEGINS

Operation under new Japanese laws permitting use of special amateur club stations by alien amateurs has recently commenced. (See *QST* for November, 1970, pg. 83) Among the first signals to hit the air waves as a result of the new provisions were those of JH1YDR, the Kashiwagi Amateur Radio Club station operated by Armin H. Meyer, W3ACE, the U.S. Ambassador to Japan.

U.S. amateurs seeking to operate in Japan will be accorded frequency privileges similar to those provided by the U.S. license class held. The Japanese power limit is 500 watts output. Application forms and assistance are available from the Japan Amateur Radio League, PO Box 377, Tokyo Central, Japan.

SPECIAL VE/VK THIRD-PARTY AGREEMENT

To facilitate the post-launch exchange of information about the Amsat-Oscar B satellite, the Canadian and Australian authorities have concluded a special agreement. Accordingly, the exchange of third-party traffic relating to the technical experiments to be conducted with A-O-B will be permitted between Canadian and Australian radio amateurs for the period beginning with the launch of the satellite and ending four months after it ceases to transmit. Further details on the A-O-B satellite will appear in a future issue.

5N2: NEGATIVE AMATEUR GROWTH?

Amateurs the world over seem interested in the growth of the amateur population. Nigeria, too, is concerned with the health of its amateur population. But, for some time, this country gripped by civil war has maintained a policy of not issuing amateur licenses to new applicants. Existing

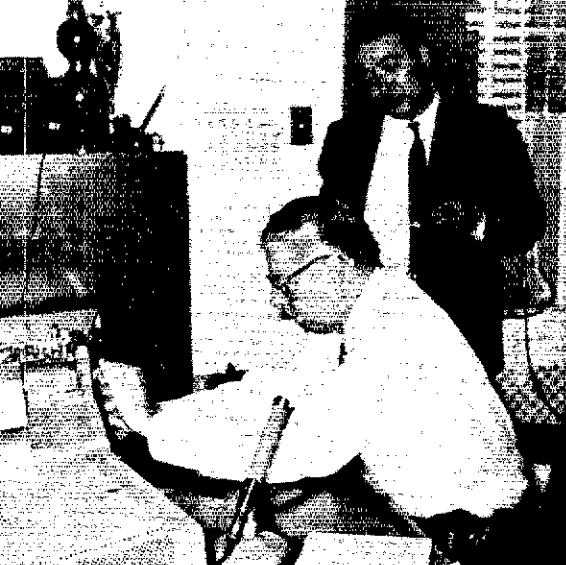


Shown at a meeting of the Southern California and Mexico Amateur Radio Mobile Group are, from left, XE2EBC, president of the Radio Club of Ensenada, and W6OZD, president of the Southern California group.

Members of the Region I (Europe and Africa) Executive Committee met recently at The Hague. Shown from left are F3FA, G2BVN, W0DX (IARU President), DL3NE, SM5ZD, PA0DD, and YU3AA. A major item of business was the World Administrative Radio Conference on Space Telecommunications to be held in June, and the concurrent Telcom 71 Exhibition. IARU will have a display at the exhibition, with responsibility for local arrangements delegated to the Region I group by W0DX.




QST for



Shown operating JH1YDR is U.S. Ambassador W3ACE, while Japan Amateur Radio League president JA1AN looks on.

licenses could be renewed but no new authorizations would be issued. With peace and unification coming to Nigeria in 1970, amateurs hoped that new amateur licenses would again be issued. But, as reported by the *Nigerian Amateur Radio Society*, "So far, this has not happened. One new amateur license has been issued to an educational institution. One amateur who had been out of Nigeria for a number of years was unable to renew his license and obtain a call sign in the new series which had been reserved for him should he return. Even so, another amateur who had himself been concerned with the issue of radio licenses while he was with the P. & T. ten years ago, returned to Nigeria after a longer break, and was not able to renew his license." Thus with the current policy restricting new licenses plus a natural attrition in the amateur population, the number of 5N2s is decreasing.

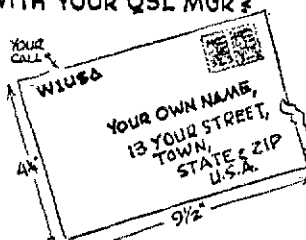
Lamenting the current predicament NARS writes, "This situation has not encouraged the development of a real interest in amateur radio among young Nigerians, and has caused frustration among those members who have given up their spare time in training potential amateurs in code and theory. Interest wanes very quickly when the ultimate reward - a license to transmit - appears as unattainable as the end of the rainbow." 

IMPORTANT NOTICE

Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying, please give old as well as new address. Your promptness will help you, the postal service and us. Thanks.

IS YOURS ON FILE WITH YOUR QSL MGR?



A.R.R.L. 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 4 1/2 by 9 1/2 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,WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2,K2,WA2,WB2,WN2 - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3,K3,WA3,WN3 - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4,K4 - H. L. Parrish, K4HXF, RED 8, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4¹ - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
- W5,K5,WA5,WB5,WN5 - Kenneth E. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701.
- W6,K6,WA6,WB6,WN6¹ - No. California DX Club, Box 11, Los Altos, California 94022.
- W7,K7,WA7,WN7 - Willamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8,K8,WA8,WB8,WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio 43215.
- W9,K9,WA9,WN9 - ARRL 9th area QSL Bureau, Box 519, Elmhurst, Illinois 60126.
- W0¹ - Reggie Hoare, W0QYP, P.O. Box 115, Mitchellville, Iowa 50169.
- WA0¹ - Lloyd Harvey, W0QGI, P.O. Box 7, Attica, Iowa 50024.
- K0,W0¹ - Dr. Philip D. Rowley, K0ZFL, Route 1, Box 455, Alamosa, Colorado, 81101.
- KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.
- KZ5 - Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KH6,WH6 - John H. Oka, KH6DQ, PO Box 161, Alea, Oahu, Hawaii 96701.
- KL7,WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - L.J. Fader, VE1FO, PO Box 663, Halifax, N.S.
- VE2 - John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R.H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 - D.E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JJ, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 - Karel Tettefaar, VE6AAV, Sub. Po 55, N. Edmonton, Alberta.
- VE7 - H.R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 - George T. Kondo, c/o Ministry of Transport, Norman Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.
- SWL - Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹These bureaus prefer 5x8 inch or #50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of QST.

Note: Stations operating portable should continue to receive their QSL cards at the bureau in their home call area; i.e., WA1QRX/VE8 gets his cards through the W1 Bureau.



Correspondence From Members -

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

ECUMENICAL HAM MOVEMENT

● I enjoy my hobbies, primarily amateur radio, only when time and family permit. Therefore, to get the most out of my time with it, I have found that I must use a great deal of *patience* and organization in my operation. You noticed that I underscored the word "patience." That, in my opinion, is one thing that all too many hams use too little of.

I feel that each and every one of us should *slow down* an awful lot and take a "full-spectrum" look at where we as amateurs stand today in all facets of the service to which we are licensed. I am personally sick and tired of reading articles that gripe about incentive licensing, learning cw, good and bad ham periodicals, etc., etc. Let's take the situations and laws that we now have and make the best of them, bringing about the needed changes through honest and constructive criticism. Let's help each other with what ever tools we might be most accomplished with. Let's start an "Ecumenical Ham Movement," to bring together all these divided factions to one common bond.

I am proud to be an American and enjoy the on-the-air freedoms that we have. Let's use the decidedly most efficient means we have to cure the ills of amateur radio today - the ARRL. - *Robert W. Schmidt, WA0VNY, (ex-HS3ACY) APO, NY*

HAM'S WIDE WORLD

● Channel 26, WETA, (National Educational Network) in Washington, D.C., recently presented "The Ham's Wide World".

Congratulations! It's excellent; I didn't think so much could be covered so well in only 30 minutes! - *Jack Wichels, WB4GAH, Vienna, VA*

● I just saw the film "The Ham's Wide World." I liked it and it made me feel proud to be a ham.

But at the same time I think it missed the mark in two ways. First, for the non-ham viewer it was overly technical. Who but a ham would understand terms like "15-meter beam," "a kilowatt rig in the van," and "73"? Secondly, if the aim was to attract people to amateur radio, there should have been something more specific than "for more information on amateur radio ask any ham." Not everyone knows a ham; why not add "... ask any ham or write to the American Radio Relay League," then give the League's address.

If the film should be revised or updated, perhaps these suggestions will be helpful. - *Theodore M. Hannah, K3CUI, Silver Spring, MD*

● Your movie on amateur radio came on a station we can receive in this area and it was very good with one jarring note: It showed a Novice using a paddle key at 5 wpm or a little more. We have too many beginners that think they are ready for a bug at five wpm and the result is a lot of sloppy cw with a bug or automatic they are not nearly ready for. - *Wilbur E. Flake, K3HYE, Cumberland, MD*

● Most "flicks" have a sequel; there should be another picture like "The Ham's Wide World." - *Carl Wood, W6K YX, San Pedro, CA*

[EDITOR'S NOTE: There is a "sequel" - "This is Ham Radio," a shorter version of the original, with its accent on youth. It's available for rent or purchase from Media Five, Dept. PW, 1011 N. Cole, Hollywood, CA 90038. Meanwhile, the public continues to view the original on both commercial and educational TV and at all manner of club meetings; 80-plus prints are in constant circulation, through ARRL directors and regional offices of Modern Talking Picture Service. And say, did you miss W6BVN, Dave Bell's story on the making of the flick in the August issue? Worth going back to!]

RED AND BLACK INK

● Under "Red and Black Ink," in the League Lines column of December *QST* I would agree with the idea of instituting various degrees of membership if this held the cost of *regular* membership down to \$6.50 per year. Hundreds like me are retired from industry and living on pension. We are not hurting at present, but we do have to keep our eye on the rising cost of everything, including membership in good old ARRL. If you have to make special classes of membership would you give us old timers our special class and keep us at the present rate until claimed by silent keys. - *Ernest L. Dawson, W2DTF, Java Village, NY*

● After 50 years of membership without lapse give "honorary" status without further dues! - *Bill Uzzell, W2ML, Garden City, NY*

● Regarding special classes of membership, with the same \$6.50 minimum, it can't hurt . . . - *Thomas F. Carten, WA1DJC, No. Dartmouth, MA*

● Every organization to which we belong today has similar problems, where, in spite of raised dues, life memberships and organizational economies, expenses always rise to meet income. It has been my experience that a straight-forward statement to the membership, outlining the problem and presenting solutions, will normally bring support from the majority. There will always be the lunatic fringe who, in their short-sightedness or ignorance will complain, gripe, or otherwise resist - but those that believe that responsibility goes hand-in-hand with privilege, will usually rise to the occasion. In many facets of society today, those who can afford it pay for those who, for one reason or another, cannot.

I have enjoyed 38 years of amateur radio which would not have been possible without the ARRL, and in spite of my life membership, I would be happy to donate on a yearly basis to see the League preserved. (Think what a buck a piece from the membership would do!) We acquired land, built a building and an organization largely on faith in ham radio and regardless of what you call the tax, this is one I would be happy to pay! - *Fred A. Linn, W9NZF, Milwaukee, WI*

● I am completely in favor of the special classes of membership proposal, as stated under League Lines in December *QST*. The concept appears to be fair and sound. — *George Douglass, Dublin, CA*

● Although I have only recently rejoined the League, I was a member and active in club activities in Lake County Illinois for several years before moving to Virginia. . . . Would it be practical to publish a regular edition of *QST* with all the news, but without the construction articles? A supplemental section devoted to construction could be included in a "technical" edition for a higher class (higher dues) for those who want it. No doubt this would raise some protests, but maybe you have been giving more for the money than is really needed. I would personally prefer to get the news for the price of minimum membership dues. . . — *Jim Greene, W4DGR, Sterling, VA*

NOVICES BEWARE!

● I worked a Novice. Bad? You bet, since he was on about 7040 kHz and I was on about 21120 kHz. He was the latest of several beginners I've worked in this peculiar cross-band mode, was about four hundred miles away, and just as much at a loss for what to do about his trouble as any of the others.

No, I didn't cuss him out, but I sure do cuss the ubiquitous "them" who manufacture Novice transmitters that don't operate properly when tripping to fifteen.

I'd like this note to be a warning to the Novices stuck with transmitters that pull this stunt, and a plea to the Novice Editor to write an article which may help them to cure the trouble. — *Gus Baird, K4VGO, Atlanta, GA*

[EDITOR'S NOTE: Right on! See the Beginner and Novice article, January *QST*.]

"POLLUTION SOLUTION"

● You might be interested in the policy I established for our store here in Seattle — specifically, that we will not sell transmitting equipment having an input to the final amplifier of more than 5 watts to anyone not holding a valid amateur operator license. We have a sign posted in our Amateur sales area to this effect, and have abided by it for some time. I feel that the adoption of this policy can contribute something worthwhile to the reduction of "pollution" on the citizens and amateur bands. We would be even more gratified if other leading amateur suppliers would also adopt and publicize such a policy.

I have personally been continuously licensed since January 1935 (W7EWW, W8UBY, W3ITY and now W7PV), so you know I value my ham license considerably. — *R. E. Aspinwall, W7PV, President, Radio Supply Co., Seattle, WA*

"HAM VS. CATV"

● Being employed in the CATV industry, I particularly enjoyed reading the humorous article, "Ham vs CATV: A Light in the Darkness" in November *QST*. The situation the author refers to as "the unadulterated misery of living in a CATV area" may be true in some cases where a ham signal inadvertently gets into the system via the antennas or "head end," but I would like to point out that in general, CATV systems have been a boon to hams living in TV fringe areas. I am not aware of

any instance in this area where we hams have been at odds with a CATV system nor vice versa. In fact, in one notorious case a few years back, one of our fellow hams who was not too careful about TVI proofing his rig, was happily considered by the local CATV owner to be the prime motivation for many TV viewers to become subscribers!

Incidentally, I wonder if Mr. Capson and the CATV engineer at Los Infernos were on speaking terms? Perhaps with a little co-operation and investigation of the "state of the art," the Nevada School for the Deaf would not be in its new location! — *Robert W. Johnson, W8IJJ, Kingsford, MI*

● In all the years that I have been a member of the League, I cannot recall ever seeing such pure trash in *QST*.

As if the virtually nonexistent literary value of this article was not enough, Mr. Burris went on to insult the integrity of the American Indian (and possibly Mexican-Americans as well) by lumping them with "hippies" and "Edsel dealers". The connotation is clear.

It has always been my belief that the ARRL was dedicated to good will and public service; certainly an article such as that written by Mr. Burris does little to foster such an image. — *Morrie Goldman, WA9RAQ, Chicago, IL*

ANOTHER NEW INCENTIVE

● Enclosed is a renewal in membership and a story on how it came about. Our club president, W8CUP, came up with an idea for increased incentive in our club. He donated \$6.50 to the club treasury, to be given to the first person who advanced his license grade. I was the beneficiary, going from General to Advanced. Now W8EMV has donated another membership renewal for advancement in our club. — *Pete Reuter, WA8ZPH, Sandusky, MI*

QRP CONQUERS!

● For those who want more evidence about reliability of QRP for DX and emergency — with Ten-Tec PM-2 using two watts input, I worked JASBJC/MM off W7 coast with 489 report in heavy QRM. Believe might have record for QRP of 3000 miles on 80. The antenna is a 65 foot wire, end fed. — *James L. Warner, W1FUR, Marblehead, MA*

HELPER!

● Along with ARRL membership I am also active in MARS and presently engaged in amateur activities at the Maryland School for the Blind.

Through MARS I recently acquired four single-channel receivers made by Collins Radio (Model No. 51N-7) which can be set up for any single frequency from 4 to 8 MHz.

After acquiring crystals and putting speakers in each unit, every receiver was capable of very sensitive reception on 7020 MHz your code practice frequency. Each of these units being loaned to a blind student in the area who merely has to insert a 10-foot wire for an antenna and plug it into an outlet.

Incidentally, W1AW's daily code practice, especially at 9A.M. is an excellent service for anyone trying for his license. — *Al Alexander, K3ROJ, Baltimore, MD*

The World Above 50 Mc.

1215-1380 2300-2450 3300-3350 5650-5925 10,000-10500 21,000-22,000 50,000-7

CONDUCTED BY BILL SMITH,* KØCER

Meteor Observations on 432 MHz

AL TYLER, WØDRL, has probably spent more hours on 432 MHz in the past four years than anyone else I know. Much of this time has been logged in an attempt to prove that meteor-scatter communication is possible on 432. In the November, 1968, edition of this column we made mention of a study at the Massachusetts Institute of Technology, reported in the *Journal of Geophysical Research*, November, 1965. It seemed to offer little hope of successful work by amateurs, using m.s. techniques in the 420-MHz band. Apparently this prompted several of the more dedicated 432 amateurs to try to prove the experts wrong. After three years of 432 m.s. tests, WØDRL offers these observations.

Path length seems to be one limiting factor. Al has yet to hear "a real ping" on any path under 700 miles, during a meteor shower. The best distance appears to be 1000 to 1150 miles, over east-west and northeast-southwest paths, from the WØDRL location, Topeka, Kansas. The greatest number of pings and bursts are heard on the east-west path at a distance of 1000 miles. Al's best results, including a 30-second burst from W4FJ,

*Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington, Conn. 06111.

Richmond, Virginia, were obtained during the 1970 Quarantrids, 1970 and 1969 August Perseids, 1969 Ursids, 1969 Geminids, 1970 May Aquarids, and on October 21, 1970, during the Orionids. He has tried little random m.s., but has heard pings during some nonshower schedules.

Observations indicate that signal strength is not a determining factor. It can be very good, ranging 3 to 15 dB or better above the noise, with some very strong pings. Burst duration is the problem. There is a theory that a burst will last nine times longer at 144 than at 432. Several stations are being equipped to transmit simultaneously on 144 and 432, to test this. Al reports that the average burst duration observed is approximately 10 seconds. This is plenty long enough to receive calls and a signal report, but two or three such bursts are needed during a schedule for exchange of information, and there just aren't enough 10-second bursts.

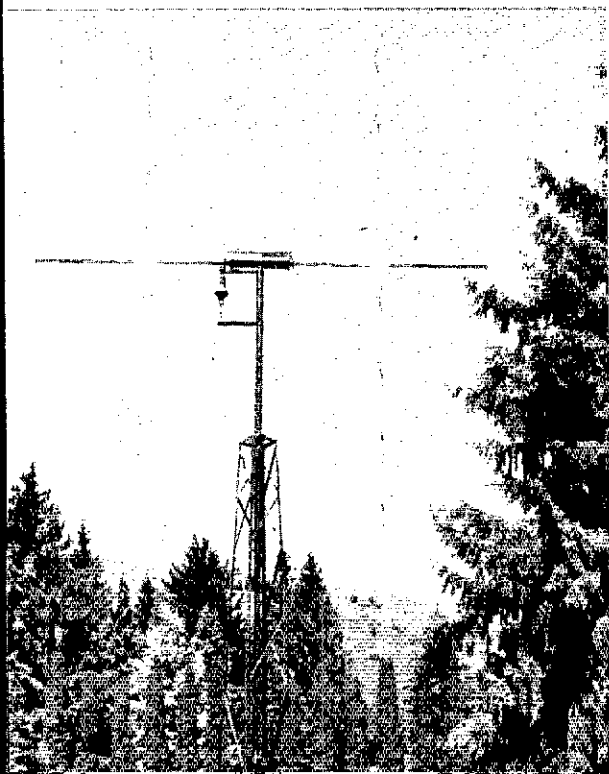
Al is convinced that if 5-second sequences had been used in some past schedules he could have made two or three solid m.s. contacts. Fifteen-second sequencing has been used commonly in the past. WØDRL does not have conclusive evidence that both stations hear the same burst, as is common on 144, and he believes that this makes 5-second sequencing even more important.

Winter showers have produced the best results. Perhaps they are better showers for 432, but absence of widespread and pronounced inversions during the winter months may be a better explanation. A marked inversion can have the effect of preventing uhf waves from passing through the troposphere to the ionospheric E region, which they must reach if they are to be returned to earth by reflection from ionized meteor trails. Al believes that tremendous path distortion occurs during pronounced tropo, minimizing the amount of signal available, and adversely affecting its course, for meteor-trail angle reflection. The higher the frequency, the more readily the wave is bent or trapped in the troposphere.

Some observers say that pings and bursts can be caused by signal scattering off intense electrical storms. Such scatter signals have been widely observed, and through use of m.s.-type sequencing some contacts have been made. However, the

11DMC and 11LEA, in Italy, are listening for 2-meter moonbounce signals with this 80-element collinear array and will soon be ready for EME schedules. Their receiving equipment is all homebuilt solid state except a Drake R-4B receiver. The station is located at Caglio, 30 miles north of Milan.

QST for



WB4, RK, Aiken, S.C., caught the November 8 *E* opening on 50 MHz — and got two TVI reports to prove it. W1DGJ, Mass., and W2MCY, New York, both reported "seeing" him on channel 2!

likelihood of electrical storms being responsible for 432 scatter over 1000-mile paths, and during the dead of winter, is quite remote. Certainly there is m.s. at 432, as demonstrated by W2AZL, W4FJ, K4GL, K4IXC, K8DEO, WØDRL and WØLER.

What equipment is needed? WØDRL suggests 300 watts output, at least 18 dB antenna gain, a feedline loss not exceeding 2 dB, a front-end noise figure under 4 dB, selectivity of 400 to 1200 Hz in a drift-free receiving system, and highly-accurate frequency readout. Al recommends an array of four Tilton 11-element Yagis at 50 feet, with the lowest possible feedline loss. Receiver stability and calibration accuracy are extremely important. It should be remembered that even crystal-controlled converters may have appreciable drift at 432. The brief signal duration and low burst counts at 432 just do not permit second-rate frequency readout.

WØDRL offers some less-technical suggestions: plenty of coffee, toothpicks to prop open eyelids, a comfortable chair, and an understanding boss. He has some other ideas that may open eyes without toothpicks. Al believes that extremely intense E_s may propagate 432-MHz signals. He also observes that auroral signal attenuation is not as great at 432 as he at first thought, but antenna aiming is critical, due to widespread use of antennas having much sharper patterns than those on lower bands. When effective antennas such as the Tilton array are aimed properly, and optimum equipment is used elsewhere in the stations, auroral signals can be quite good at 432; nearly comparable to those on 144 at a given optimum time. More activity and observations are needed, but it seems probable that aurora potential on 432 is considerably greater than we have thought it to be in the past.

Tropospheric bending is the form of propagation most used at 432 to date, but it is not being used to its fullest extent. Al has run some 200 tests over a 450-mile tropo scatter path, hearing signals on 95 percent of the tries. These were run in all seasons and weather conditions and, except during heavy rain, signals were nearly always present. WØDRL believes a 50-percent reliable tropo scatter circuit exists over an 800- to 1000-mile path east-northeast from Topeka, based upon evidence accumulated from his 450-mile tests. It will be interesting to see if such circuits can be made usable on 432 and up by amateurs.

Uhf TV broadcast stations are used by some amateurs as tropo indicators. Bob Cooper, K6EDX-W5KHT, ex KV4FU, has curtailed his amateur operation while establishing a cable TV products business in Oklahoma City, but has done much TV DXing lately. I asked Bob what good commercially available equipment may be used for TV DXing. He recommends the Blonder Tongue BTX-11A uhf converter preceded by their CMA-U uhf mast-mounted preamp and a 7-foot dish. With



antennas made by Pinco and Channel Master, the entire system may be purchased for less than 100 dollars. The noise figure is not the best, but it can be around 9 dB with selected 1N82As. Using this type of equipment, Bob consistently sees 300-mile scatter signals from Topeka, Kansas, and Springfield, Missouri, on Channel 27.

Don't rely on uhf TV as the sole indicator of good tropo conditions, however. There may be amateur activity where there are no TV stations and there is much evidence that uhf TV and amateur signals on 432 do not necessarily follow similar paths. Also, amateurs are capable of communicating with much weaker signals than are needed for TV reception. There is no substitute for a few CQs and careful listening, on a seemingly-dead band.

OVS and Operating News

50-MHz DXers are keeping an open ear on their favorite band and after that November 7-8 show, and who knows what this solar cycle has yet to offer. A few more reports on that opening have been received. WA6HXM worked KH6GRU, Hawaii, and nearly every other stateside call area. WA7GOZ, Yuma, Arizona, worked GRU on some 5 watts of a-m, November 7, but Roger says the 8th was even better for signals from throughout the states. He heard, called, but couldn't raise a station signing CO1HJR, Cuba, calling "CQ U.S.A." on 50.4. K7ICW, Nevada, called November "typical," except for the 7th and 8th, when Al worked KH6GRU and others. Al needs only a Maine contact for 50-MHz WAS, all on *E*. WB9DTW, Indiana, worked throughout the contiguous 48 and said the signals were exceptionally strong. Similar reports came from WA6SIK, Colorado, and WØPEP, Iowa, who also noted *E* backscatter from W5s.

KH6GRU, one of the three Hawaiian stations so popular during the opening, worked 80 stateside stations between 1835 and 2357 GMT, November 7. Bert says KH6NS had 38 contacts on the 8th and 9th between 2357 and 0200 GMT. Bert sent a list of KH6NS contacts which shows 8s and 9s did very well on paths up to 4500 miles! We do not have a report from KH6IJ, but know that he had similar success.



Perhaps happiness is just a thing called "fm," or maybe it was the venison stew prepared and served by K1GZU, that brought smiles to these faces. Left to right are: Bob, W1CH; Ray, W1RH; Doug, W1KLL; Paul, W1ELU; Doug, W1CER; Steve, K1IIG. This shot was made during the December K1IIG fm conclave in Farmington, Conn.

DX was workable on other November days. KH6GRU had contacts with WB6MVF and WA6JRA around 1845 GMT, Nov. 21st, exactly 27 days after a similar F-layer opening October 23. He also worked LU1MBJ, Nov. 15 and KX6HK, Nov. 22. Bert has now worked eleven countries from Hawaii, in North and South America, Oceania and Asia. Thanks, Bert, for your reports.

W1HDQ says there was a "pretty fair" 27-day recurrence December 6th of the November opening, producing strong, single-hop signals in Connecticut. Ed says ARRL has issued 50-MHz WAS number 91 to W5WAX. Sam worked Hawaii on November 8th for his 50th state. WB2WIK reported on several northeastern six-meter stations. Steve says K1HFK, N.H., has an outstanding signal from a pair of 3-500Zs and 6-element Yagi. K8EFS has one of the best Great Lakes area signals and VE1AFB does well from N.S. WB2WIK works scatter with a kW and 5-element Yagi. Except for Nov. 7-8, W51YX, San Antonio, says November was disappointing, with the F-layer muf no higher than 41 MHz. Pat says meteor activity was exceptional the night of December 13th during the Geminids shower. More on that in the 2-meter news. From Oregon, WA7GMI has stacked a pair of Yagis and is getting good results into California. Even though Wilbur is retired, he has difficulty finding time for all his vhf projects, which include gear through 432.

During a November 18th aurora, W0PFP, Iowa, got solid RTTY copy from K8YUS, even though the signals sounded terrible. He will try further RTTY aurora tests with suitably-equipped stations and says RTTY may prove much better on aurora than ssb. WA0S1K, Colorado, says a Golden area group meets Saturdays at 0230 GMT around 50.11 ssb and welcomes others.

Ray Clark, K5ZMS, is now stationed in the Ryukyu Islands, signing KR6RI. The Ryukyu Islands are 160 miles southwest of Okinawa and 145 miles east of Taiwan. That should put Ray in a favorable location to observe six meters. He is running a Clegg Venus and 3-element Yagi and will be active until September. Ray monitors 50.105 from 0200 to 0400, after 0800 (evening in the Pacific) and 2100 to 2130 GMT daily, except weekends and holidays, when he'll be active most anytime. Ray will accept schedules and may be contacted by writing SSGT Ray Clark, Det 1 - 2152nd Comm Sq., Box 7995, APO SF 96235.

VE2AIO says the F-layer continues to look very good from Quebec and reports a VE3 heard a station signing ZK2AU at 0607 GMT, December 6th. At 1447 GMT, December 5, a Brazilian station answered a VE2AIO CQ in Spanish, but faded

before contact could be made. Geoff reports the muf at or near 50 MHz on several days in November and December to Central and South America but the lack of activity in those areas probably prevented contacts.

144 MHz meteor chasers appear to have found the December Geminids disappointing. Few reports were available at deadline, and those indicated limited success. Last year, K0MQS made at least ten contacts during the Geminids, but this year came up empty-handed in schedules with two California stations and one in Idaho. Dick also had an inch of ice on his antenna.

W0LER, Minnesota, worked W2AZL, N.J., and VE2BDZ (ex VE3CWT), Quebec, and had a near contact with K7ICW, Nevada. John also scheduled WB6CXE, near San Diego, over a 1500-mile path and heard nothing, but got pings off K7BBO, Tacoma, at 1450 miles. John called the shower "normal to slightly below par for the Geminids and not as good as in 1968 and 69." W0LCN, Minneapolis, worked K3CFY, near Pittsburgh, on ssb.

K0CER, S.D., had seven schedules, five of which were over paths in excess of 1250 miles, and heard nothing. Also not heard was K3CFY, 900 miles, but a contact was made with K7ICW, Nevada, on several strong, short bursts, over an 1100-mile path. The Geminids, which apparently peaked the morning of December 13, is a low-velocity shower not good for paths over 1200 miles.

After two years of trying, K5WXZ, Texas, worked Delaware's W3BDP for Al's 37th state on 144. The contact brought W3BDP to 27 worked. W5WAX found the Geminids good for two new states, bringing Sam to 31 worked. Sam's new ones were W7JRG, Montana, and W8BKI, West Virginia, but he had unsuccessful schedules with Arizona, Wyoming, California, Idaho and Delaware. Sam comments, "Geminids not up to par this year." K4GL, S.C., doesn't agree. He called the shower "interesting and quite good up to 1200 miles." Jack worked VE2BZD and Texans WA5UNL, W5GVE, and K5WXZ, and had a near contact with K0AWU, No. Dakota. K7BBO, Tacoma, had four ssb m.s. contacts with WA6NRV and also worked K6PXT and W6ZBD.

K4GL observed excellent aurora early the morning of December 14, working New York, Illinois, Missouri and Nebraska. At deadline few reports had been received, but I know aurora was heard and worked on 50 MHz as far south as WASHNK, Houston, and near San Francisco by WB6NMT. K7BBO worked KL7GFB and KL7GLL, both in Sitka. W0EYE says the magnetic storm was the most intense observed by the National Bureau of Standards in ten years. On an index scale of 9, the early morning December 14 aurora registered 8. More on this next month.

Several additional November Leonids reports have been received. On the 17th, VE2DFO worked K5AGI, La. on a one-minute burst over a

K1IIG (standing) demonstrates his 450-MHz repeater to a group of Hartford, Conn. area fm'ers. Using touchtone control, a link via 52.525 MHz with the WA1KFY repeater, some 30 miles west of Boston, roughly 75 miles separation, was effected to provide good quieting. Other amateurs in the photo are WA1ELA, W1WHO, W1PYO, K1PAI, K1TFA, WA1AGJ, and WA8RUC/1.



From Canada, VE1MX at Halifax, N.S., writes that he, VE1AFB, VE1ALQ and VE1WL are all active on ssb and cw. VE1PL in New Brunswick, VE1AFY at Sidney and VE1LN, Yarmouth, are likewise good catches. In Quebec, VE2DFO spent all summer and most of his savings, building a large array and mount for EME.

And ZL1AZR, New Zealand, says he has accepted a new position at a satellite tracking station and has had to curtail his EME activities, which resulted in 30 contacts with SM7BAE in the past two years! John says Frenchmen F8DO and F9DT are on EME and that he hopes to be scheduling them again within a year. In the meantime, New Zealand will be represented on EME by ZL1IMO.

220 MHz activity continues to make slow but steady progress. Meteor scatter fans gave the December Geminids some play on 220. K9HMB, Chicago, worked K4JXC, Florida, during a 2-hour schedule. Their contact is the first on 220 between their respective states. W0EYE, Colorado, ran unsuccessful schedules with W6WSQ, WB6NMT and K9HMB, but did hear pings and short bursts.

K7BBO is working on a kW amplifier preparing for 220 m.s. work from Tacoma. Dave also has a 432 kW in the planning stage.

K4GGI/1, at W1MX, heard November 18th aurora signals from K2CBA, W2CRS and K9AQP/1. That same evening, VE2HW made his first 220 aurora contact, exchanging buzz with W2CRS. VE2HW is building a WB6IOM 1296 amplifier with hopes of tropo and EME work, but also wishes more stations in the Northeast would look towards Quebec on 220 and 432.

432 and UP reports are not plentiful during the winter months. VE1MX says VE1AFB, Halifax, has worked some good tropo on 432, with 80 watts and an 11-element Yagi. Chuck is the only VE1 currently active on 432. W6GZJ, with 250 watts and a 32-element extended collinear, has successful 300-mile schedules with W6DQJ. W6FZJ is interested in other schedules. Perhaps he and W0EYE could try 432 m.s.

One of England's leading vhf men, G3LTF, says he does not understand why apparently there is no one in the U.S. interested in 1296 EME. Peter has a 15-foot polar-mounted dish and excellent transmit and receive systems operating — and hears his own echoes with no trouble.

W4HIK, Tenn., is continuing 2300-MHz tropo scatter schedules with WA4HGN, Alabama, over a 118-mile path, helping WA4HGN check receiver capabilities. Paul is also refining his system for more EME tests.

1420-mile path! K1HTV, Ct., worked his 35th state on a 40-second burst from K0AWU, North Dakota. Rich also worked W5WAX, Oklahoma, and K9UUT, Wisconsin, on a random CQ. The burst, at 1505 GMT, Nov. 17, lasted 2 1/2 minutes! K3CFY, Pa., worked W4CKB, Florida, and W5ORH, Oklahoma. W9YYF, Illinois, had meager results in a schedule with W7QX, Utah, but did work W7JRG, Montana, Nov. 22, on random meteors. Sure would be FB if more of you m.s. operators would report on your schedules.

W1MX, at MIT, noted above-normal tropo on several November and December nights. K4GGI/1, who does the reporting for W1MX, says nine months ago ssb on 144 MHz was not too common, but now there are more than 50 stations regularly heard in the Boston area on ssb, and the list is growing. Frequencies around 144.11 and 145.025 are the most popular. WB2WIK sent a lengthy report on various vhf activities in the Northeast. Steve says WA1FFO has put W1YK at Worcester Polytech on 144 with a fine low-power signal. WB2WIK congratulates K1PXE for the Connecticut station's fine work on two. K1PXE runs a kW and 15-element Yagi. Not an unusual station arrangement, but Pete is blind and built his own kW amplifier. He is also very active on 432. W4JFU has a good a-m signal in the New York City area from Virginia, topped only by the ssb of WA4TTG and K4QIE. And finally, Steve reports the Interstate Vhf Society, WB2GKE, has a kW on both six and two, and 500 watts on 432.

W4UUF, Pensacola, Florida, has finished a 500-watt amplifier and seeks schedules in Arkansas and Oklahoma. He says most activity on 144 in his area is fm. WB4LRK, Aiken, S.C., found tropo above normal Nov. 25, when W4ISS, WB4KXO and K8UPR/4, all in Augusta, Georgia, were worked with exceptionally strong signals. W4ISS has also been doing fine work on 144 m.s.

November 29 saw good tropo from Muskogee, Oklahoma, and W5WAX worked WA5UNL, Marshall, Texas. K0MQS, Iowa, and W9YYF, near Chicago. Sam also saw good TV signals from New Mexico but heard no amateur activity.

At Seattle, WA7OXA says WA7HJJ is completely solid state on 144 and 432, W7TLZ has converted a single-band hf Swan transceiver to 144 with a transistor converter, and that W7VHX is also active on 144 ssb. Thanks Mike for the report from Seattle. We don't hear too often from you fellows. K7BBO, Tacoma, keeps busy on 144 m.s. with a kW and large collinear array. Dave's EME project has been set aside until next spring and better weather.

Apparently W0MOX and other high-power stations in the Boulder, Colorado area have received complaints from lower-powered stations that they aren't hearing them. Louis comments these fellows should take into account the Boulder stations have good elevation and antennas, plus kW's, which may account for signal differences.

News of open repeaters in all sections of the country is solicited for use in this column. Please include frequencies and access information. — WICER

FM on 6

Spot-frequency fm on 6 is increasing in the Independence-Kansas City area, according to K0LCB. Operation is mainly on two frequencies: 52.475, the nb' primary frequency of the Independence Amateur Radio Club, and 52.525 MHz.

James N. Brannin, K6JC

This department lost a long-time friend and valued contributor, when Jim Brannin, K6JC, passed away in his sleep, in his home in Rohnert Park, California, Dec. 5. A ham since 1920 (first as 50K, Mineral Wells, Texas) Jim enlightened the vhf scene over many years, first as W6OVK, Tucson, Arizona, and later at Redwood City, California. His work in breaking down the rugged path from Tucson to Phoenix, with W6QLZ at the latter end, made many lines of copy for early editions of this column, in 1940 and 41, and did much to convince skeptics of the Southwest that the vhf bands *could* be useful in such terrain.


Jim did outstanding work in the US war effort in the '40s, first with the MIT Radiation Laboratory and later on early naval radar, with the Submarine Signal Company. He recruited the writer of these lines to similar work in 1943.

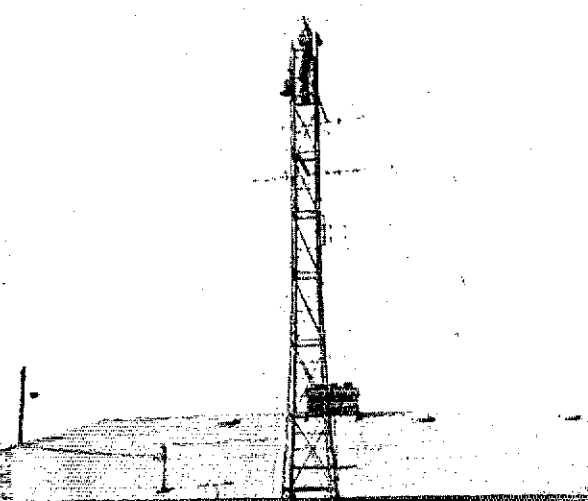
The war over, W6OVK jumped into the vhf field immediately after the wartime close-down, and from his home in Redwood City was soon working far beyond the mountains that were often thought to confine vhf waves to local paths. Always one to point the way, Jim authored a June, 1948, *QST* article on tripling to 432. He was an early fm enthusiast, and he labored to sell that mode with a description of an fm receiving system in the March, 1946, issue. He saw the worth of solid-state techniques early, and described a transistor preamplifier for 432 in October, 1965, and a complete transistor converter for 432 in June, 1966.

He retired last year, after a long career with the Southern Pacific Railroad where he came up with many innovative ideas in railroad communication and electronics systems, and moved to Rohnert Park. K6JC was active to the final day of his life, building high-performance gear for 432, for his own use and for other enthusiasts. — *W1HDQ*

Texas VHF FM Convention

Effective use of repeaters demands planning and cooperation, preferably on an area-wide basis. Nowhere has the job been done better than in the vast and diverse area served by the Texas VHF FM Society. A factor in this success has been their practice of holding semiannual conventions, the next of which will be in San Antonio, Feb. 26 - 28. The Society holds a business meeting, as opposed to a hamfest, and any fm and repeater enthusiast in the Southwest should find the technical programs on Saturday and Sunday very helpful. Social aspects are included, too, and the convention will be a family affair that all will enjoy.

Advance reservations at the Tropicano Hotel, the convention site, and more information about the affair, can be obtained from Robert G. Wheaton, Chairman, San Antonio Repeater Organization, Box 1753, San Antonio, Texas 78206. 



K9ZNK, La Porte, Ind., recently completed building a 60-foot tower and immediately worked 19 states with 5 watts ssb and stacked J-Beams. His wife, K9EEE, helped with the tower construction project.

New England Repeater News

Despite a heavy snow storm, the K11IG "28-88" gang held a meeting of some 38 fm enthusiasts Dec. 11, in Farmington, Conn. Technical advice on touchtone and duplex operation was provided by guests from the WA1KFY repeater group of Marlboro, Mass., including Ray Pichulo, W1HRH, and Paul Hoffman, W1ELU. WA1KFY (22-82) is equipped for future touchtone access to repeaters in Providence, R.I., the Boston area, and New Hampshire and Connecticut.

The "Tulsa Repeater Story" slide show (available to ARRL-affiliated clubs, no charge) was presented by WICER and W1KLK of the Headquarters Staff. Steve Tripp, K11IG, demonstrated a 52.525-MHz touchtone-actuated linkup between his repeater and that of the Marlboro group, using a 450-MHz station at the meeting site.

Other New England items include recent installation of a repeater in Vernon, Conn., presently operated on 25-82 as WA1DMX. They have COR access, touchtone and duplex operation. WA1KGD (11-61, COR access) is in service in Southern Connecticut. K11IG, Avon, Conn. (28-88, COR) also has a 450-MHz system, and is experimenting with touchtone and duplex operation. Late word comes that Southeastern Connecticut will soon have a repeater in the Groton and New London area.

The Connecticut Valley is well served by K1ZJH (34-94, COR) on Mt. Tom, north of Holyoke, Mass., with a commanding view of many Valley cities.

Farther north, the Valley and much other territory are covered by a new system (16-76) on Mt. Ascutney, Windsor, Vt. These are all open repeaters, available to all New England visitors.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Who else:

All of us have our pet peeves and chronic complaints which we broadcast loud and clear. The right protest at the right time in the right way is what makes the world go 'round. Most of us also manage to find a few things in life worth equally outspoken appreciation. Not everybody. Like beauty to the poets, only gross iniquity and conspiracy lie in the eyes of some beholders.

Kissin' cousins of the DX kooks discussed here last month are amateur radio's scattered crepe-hangers, the howling hand-wringers whose monotonous bag is to proclaim endlessly that every day in every way hamming gets worse and worse. They're easier to tune out, fortunately. The sour apples range from niggling nitpickers to grandiose prophets of imminent doom. You can usually spot them by large chips on the shoulders. They're consistently loud and consistently wrong. These Chicken Littles have a particularly rough time in our world of DX. How can you badmouth real big when the audience is too happily absorbed to listen?

February is probably the toughest month of all for would-be DX deprecators. As far as their jaundiced eyes can see are the hard-working backs and elbows of thousands of determined DXers preparing for another ear-popping ARRL DX Competition. Up, down and up the tower, where's that solder gun, and maybe we'd better send for another batch of logsheets. "Your mother, dear? Oh, no - not THAT week end!"

A gently murmuring DX pessimist of weak conviction grows especially hesitant in such an atmosphere. Dare one cautiously suggest, just as a passing observation, that propagation conditions may not be up to last year's? That 28 MHz has a middling chance of falling flat on its smiling face? That a small solar flare at this stage of the game could fold 21 MHz for all paths but South America? That even - perish the thought - good old 20 may wash out miserably in hours of darkness? No, at the risk of catching a mike in the mouth, one had better not.

Safer merely to point out that the DX weather-vane is swinging toward 7, 3.5 and 1.8 MHz as sunspots continue copping out. Gloom-and-

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doomers won't get much satisfaction from this argument, either - ARRL's Five-Band DXCC challenge is right on. Oh, well. Maybe next year will bring something substantial to gripe and grouse about, rant and rage even. Back to the shack, moaners; miss out on the phone fun February 6th-7th and the code sport over the 20th-21st and *really* have cause to weep.

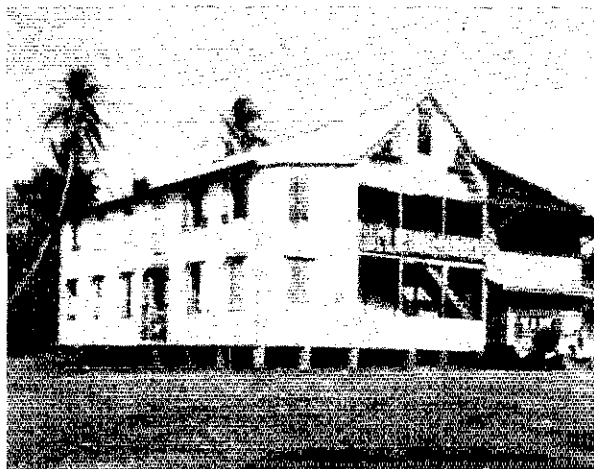
+ + +

What:

With the Test looming ahead this is prime time to check our bird-watchers to see what game lurks in yon DX bush. It's such a lushly stocked preserve that space limitation causes us to concentrate on reported species, not count, a census quite suitable to purpose. *Wow* - it can be stated, as oft before but more emphatically, that never has so much delicious DX been so handily available to the Yank and Canadian crowd. With an ear toward potential Contest multipliers, then, we start with

10 PHONE where "How's" helps Ws 1PL 3HNK 4YOK 5GB 5KKW 8EFW 8YGR 9LNO, K1OME, WAs 2FOS 4ZZU SSOG SUCT 5YMW 9SQY 9TZD and WB4KZG recently encountered such areas as AP CF CN CP CR4-5-6-7-8 CT2-3 CX C31 DL DM DU EA6-8-9 EL EP ET3 F FB8X FG7 FH8 FP8 FR7 FY7 G GC GD GI GM HA HB0 HC HL HK-0 HL HP HR HS HV IA JW JX JY KC4U KG4 KG6 KJ6 KL7 KP4 KR KS4-6 KV4 KW6 KX6 KZ5 LU LX LZ M1 MP4B-T OA OD5 OE OX PA PJ1-2-3 PY PZ SV TA TF TG TI TJ TR8 TU2 TY TZ UA2 UC2 UD6 UI8 UJ8 UL7 UM8 UO5 UP2 UR2 VK-9 VP1 VP2A-M-V VP7-8-9 VQ9 VR4-5 VS6-9 VU2 XE XT2 YA YB YN YO YS YB ZB2 ZC4 ZD5-8 ZE ZP ZS-3 3B8 4U 4X 5H3 5N 5R8 5U7 5V 5X5 5Z4 6W8 6Y5 7P8 7Q7 7X 7Z 8P6 9G1 9HI 9J2 9L 9NI 9Q5 9VI and 9XS.

10 CW finds Ws 1PL 4YOK 8EFW 8KZO 8YGR, Ks 1OME 4BYK 5MHG/6, WAs 2HZR 2KEA 5YMW 80ME 9SQY 9TZD, WB4KZG, 11ER and VE7BAF collecting CE CN CP CR6-7 CX DL DM EA6-8 EL EP ET3 F FO8 FP8 G GC GD GW HA HB-0 HH HK II IS1 JA JW KA KH6 KL7 KP4 KV4 KZ5 LA LU LX LZ M1 MP4B-T OA OD5 OH-0 OK ON OX OY OZ PA PJ2 PY-0 PZ SM SP



Your QTH of the Month is Hotel Jackson, Corn Island. Though the place isn't in the Hilton chain yet W5QPX and WB9BUV find the rugged establishment most hospitable in housing such DXpeditionary efforts as their HT4s IM and CI caper.

February 1971



VP2DAJ (right) relaxes with VE3EWY during the latter's recent Caribbean DXcursion with VE3GCO. Austin is Dominica's most enthusiastic DX chaser.

SI2 SU SV TA TF TI TU2 TY UA-2-9 UB5 UC2 UD6 UF6 U7 U8 UL7 UN1 UO5 UP2 UQ2 UR2 VK-9 VP1-2G-8-9 VR2 VS6 VU2 XE XT2 XW8 YN YO Y YV ZB2 ZC4 ZD5-9 ZE ZL ZP ZS-3 4U 4W1 4X 5N 5R8 7Q7 9H1 9J2 9V1 and 9Y4. How long can ten hold on?

15 PHONE is a hall for Ws 1PL 2DY 2KXK 3HNK 4YOK 5BZK 5GB 5KKW 5YGR 9LNQ, Ks 10ME 401 4TWJ 8PYD, Was 1JKZ 2FOS 3JHB 5SOG 9SQY 9TZD, WBS 2JNA 2JYM 4KZG and 9AVY with input from AP CE-0 CO CN CP CR3-4-5-6-7-8-9 CT1-2-3 CX c31 DL DM EA-6-8-9 EI EL EP ET3 F FB8X FC FG7 FH8 FL8 FM7 F0B F8 FR7 FY7 G GC GD GM GW HA HB0 HC-8 HI HL HP HS HV II ISI JA JT JW JX JY KA DC4U KC6 KG4 KG6 KH6 KJ6 KL7 KM6 KP4 KR KS4 KS6 KV4 KW6 KX6 KZ5 LA LU LX M1 MP4B-MT OA OD5 OE OH-0 ON OX OY OZ PA PJ2-3-7 PY PZ SM ST2 SV-0/r TA TF TG TI TJ TR8 TT8 TU2 TY TZ UA-9 UB5 UD6 UH8 UI8 UL7 UO5 UP2 VK-9 VO2 VP1 VP2A-D-E-K-L-M-V VP8-9 VQ9 VR1-2-4-6 VS5-6 VU2 XE XT2 XW8 YA YB YN YO YS YU YV-0 ZB2 ZD3-5-8-9 ZE ZF1 ZP ZS-3 3B8 3V8 4U 4W1 4X 5H3 5N 5R8 5T5 5V 5Z4 6W8 7P8 7Q7 7X 7Z 8P6 8R 9G1 9H1 9M2 9N1 9Q5 9U5 9V1 9X5 and 9Y4.

15 CW gets a thorough workover by Ws 1BV 1OHA 1PL 2KXK 4YOK 4ZYT 5BZK 5JPC 5OM 5KZO 5YGR 9LNQ, Ks 10ME 3CUI 4BYK 5MHG/6, Was 11RY 1JKZ 1JMR 2BCT 2BHU 2BLE 2DFD 2FOS 2HDZ 2KEA 2YWR 3GVP 3JGY 5SOG 5UAX 5YMW 5ZEH 7CWM 8OMF 9DOY 9TZD 9WKA, WBS 2DRS 2JNA 2JYM 4KZG 9AVY 9BBC 9CJS, 11ER and VE7BAF due to radiotelegraphy rolling in from A3C CE-0 CM CN CR3-4-6-7-8 CT1-2-3 CX C31 DL DM EA-6-8-9 EI EL EP ET3 F FB8X G Y FC FG7 FK8 FL8 FM7 F8 FY7 G GC GD GI GM GW HA HB HC HI HK HL HS II ISI ITI JA JDI JW JX KA KC6 KG4 KG6 KH6 KJ6 KL7 KP4 KR KS4 KS6 KV4 KW6 KX6 KZ5 LA LU LX LZ MP4M OA OD5 OE OH OK ON OX OY OZ PA PJ2-4-7 PY PZ SM SP ST2 SV TA TF TG TI TJ TT8 TU2 TZ UA-9 UB5 UC2 UF6 UH8 UI8 UJ8 UL7 UMS UO5 UP2 UQ2 UR2 VK-9 VP1 VP2G-M-V VP7-9 VQ9 VR1-2 VS6-9 VU2 XE XT2 XW8 YB YN YO YS YU YV ZB2 ZC4 ZD8-9 ZE ZF1 ZL Zp ZS-3 3B8 3V8 4S74U 4W1 4X 5H3 5R8 5U7 5Z4 6W8 6Y5 7P8 7Q7 7X 7Z 8P6 9G1 9H1 9J2 9M2 9Q5 9V1 and 9Y4. Note that quite a few regions show regularly on 21-MHz phone that are rarely on cw and vice versa.

40 PHONE offers more than readily meets the ear. Ws 1PL 5YGR, KIOME, WA2FOS and the clubs press combed the swbe clutter and came up with signals from CE CO CN CT2 DU EP ET3 F8 G GD HC HH HK HP HR HV II JA JW KG4 KG6 KH6 KL7 KP4 KZ5 LU OA OD5 OH0 ON OX PJ2 PY-0 PZ TH TI TR8 UA9 UD6 VK-/h VP1-2V-7-9 VU2 XE YN YV ZB2 ZC4 ZL ZP 5Z4 6W8 6Y5 8P6 9G1 9H1 and dependable 9Y4. Contest pressure may appreciably swell this turnout.

40 CW is productive for Ws 1PL 4YOK 8YGR, Ks 10ME 4BYK 5MHG/6, Was 1JKZ 5UCT 8OMF 8VRB, WBS 2JYM 9BUV 9CJS, WNs 4OJD 7OLT and 0VJF thanks to keying from CE-0 CM UN CR7 CT2-3 CX C31 DL DM DU EA-8 EI EL EP ET3 F FB8X FC FP8 G GC GD HA HB HC HI HK HL HP II ISI JA JDI JW JX KA KG4 KG6 KH6 KG4 KG6 KH6 KL7 KP4 KR KV4 KX6 KZ5 LA LU LX LZ MP4B OA OD5 OE OK ON OX OY OZ PA PJ2 PY PZ SM SP SV TA TI TZ UA-2-9 UB5 UC2 UD6 UF6 UH8 UI8 UJ8JL7 UMS UO5 UP2 UQ2 UR2 VK VP2A-D-L VP8-9 VS6 VU2 YA YB YJ YO YU YV ZB2 ZL ZS-3 3B8 4S7 4U 4W1 5N 5R8 5T5 6Y5 8P6 9G1 9H1 9J2 9M2 9Q5 and 9Y4.

75 PHONE is surprisingly solid at times but the long hauls separate DX men from the boys. KIOME and the clubs press account for activity in CO CN CR4-6-7 CT2 C31 EA-6 EL EP ET3 FP8 G GC GW HB0 HC HK HR HS HV JW JX KG4 KG6 KP4 KV4 KZ5 LA LU LX MP4B OA OD5 OX OY PJ2 PY7 PZ TI TJ UA9 UO5 VO1 VP2A-E VP9 VS5-6 VU2 XE YN ZB2 ZC4 ZD5 ZF1 ZL 3V8 4S7 4U 4W1 4X 5Z4 6W8 6Y5 7X 8P6 9G1 9H1 9V1 9X5 and 9Y4 in pockets near 3800, 3700 and 3600 kHz.

80 CW isn't so tricky but the 5B-DXCC competition is fierce. Ws 1BV 1SWX 4YOK 6EAY, WN4PFE and the club contingent specify action in CE-0 CR6 CT3 DL DM EL G HB0 HP JA LX OH OK ON OX OZ PA PJ2 PZ TJ UH8 UM8 VK VP2D VP9 VR1 YU ZB2 ZC4 ZL ZS 4X 6Y5 and 9Y4. Further up the dial on 160, according to Ws 1BB 1HGT 6EAY 6KWE and WB9BUV, are representatives from DL G GI GM GW KH6 KY4 OE OK PA PY VK VP1-2E-9 ZC4 ZD9 and ZL with the season just getting under way at this writing.

* * *

Twenty is a story by itself and we may look into it next month if opportunity offers. Maybe 't would save space by just listing the few prefix areas not reported using 14 MHz - wotta band! In the preceding documentary it sufficed to identify each multiprefixed country by only one label, usually the most common. How's your Five-Band AKRL DX Century Club collection coming along?

+ + +

Where:

HEREABOUTS - EA6BD, FG7TD, FR7AG, HC8GS, KA9AG, LZ2EE, SV0WO, VS6CW, W3HNK, WA3HUP and 5H3MB came through with DXceptionally fast QSLs to K4BYK, Was 2HZR 5UHR 9E2T 9ZCP and VE7BAF and are hereby installed as QSLers of the Month. Any commendable quickies in your records? . . . W2ECO hunts help toward landing HC8AA's pasteboard, both W5BZK and WA9ZCP need similar nudging re W5NM, WN5CKR will settle for a tip on LZ1ZNC, and K2HYM is frustrated by VP1DM, VQ8CR and YJ8JM, Any 'alp? . . . WA2HZR, WBS 6ZWS and 9BJR offer to serve as QSL aides to needful ops at DX points. . . My *Callbook* address is my station location and has no mail service so please use the QTH given in the list to follow. - KP4DJJ. . . I am QSL manager for FY7AE as of November 28, 1970. - WA4WTG. . . Although W2CTN has been indi-

cated as manager for FM7WF, to the best of my knowledge I'm still handling his QSLs, as well as those for FM7s WQ and WS. I'll check with Jack for misdirected cards. - *W4OPM*. . . . As of February 1, 1970, I am no longer QSL manager for EG7TG. - *W5OB*. . . . Please note that I have no QSL arrangements or other connection with VP5s NB and TH. - *W1WQC-VP5AA*. . . . VP9GR QSLs are handled by W2GHK from September 17, 1970, also cards for WA4MMO/KP4 QSOs between October 5, 1967, and April 27, 1969. - *FER-ON*. . . . Most DX stations realize that our Novices really appreciate their QSLs and they usually come through the ARRL Bureau, DX-working WNs had better keep self-addressed stamped envelopes (s.a.s.e.) on hand with their local Bureau manager. Some juicy ones may be waiting there for you now. - *CARA, W8ZCQ*.

AFRICA - We note that some overseas bureaus are very tardy. Some batches of QSLs recently received go back at least four years, further in some cases. There is no excuse for this. Two or three months should be the longest that any bureau need hold a card before forwarding it, even if it is the only one filed for relay to a given bureau. Incidentally, temporary use of the 4N prefix by Yugoslavia caused a few QSLs to be mis sent to our 5N Nigeria bureau. - *NARS*. . . . I became ZSIACD's QSL manager in late October and now have Max's logs back to February 8, 1967. - *WA9UET*. . . . As Stateside-only QSL manager for 9U5CR I can promise prompt returns via s.a.s.e. - *WB8BTS*. . . . Please indicate that I do not manage 6W8 QSLs. - *WB2KHO*. . . . G2BVN manages QSLing for a former ZD3P, not the November '70 version whose cards go to DJ6QT. - *DXNS*.

OCEANIA - Older members of the Christmas Island Radio Club confirm that ZC3s AA AB and AC were the only such calls used here, no ZC3RF. Mathews, ex-ZC3AC, is still on the island as VK9MV. - *VK9XT* via *VEIOC*. . . . Say, does the Samoa gang ever QSL? - *VE7BAE*. . . . That VR5DX address in November's "How's" should have been for VR5DK, call of my late OM, WA6DKW. I am unable to help with VR5DX QSLs. - *WN6PSC*. . . . Those who have not yet received QSLs for their KM6DU/KH6 Kure QSOs on July 18-20, 1970, should now QSL to K7UNB direct or via ARRL's Seven bureau. Some delay can be expected as I will be traveling until March. I believe most of the cards received by late November have been answered. - *ex-KM6DU*.

ASIA - I will handle 4Z4IB QSLs beginning November 18, 1970, and I continue to manage 4Z4AI's as well. - *W4ZKWP*. . . . As of December '70 I'm QSL manager for KR6HR. - *W3HNK*. . . . QSLs for JA8BI's QSOs from 9K2AH go via JA1ZZ, and JDIABO may be QSLd via JA1s BA KSO or JHIEXV. - *DXNS*. . . . Former 4W1B, for QSOs in 1964 only, can be reached through B. Semadeni, 500 Riverside Dr., New York, N.Y., 10027. - *Veron*.

EUROPE - EA7DJ's QSOs with the U.S.A. can be confirmed through me. - *K1WPS*. . . . DA1QP affirms that former American, British and French DL4-5-6 calls will be reissued to German nationals. Noncitizens will become DAs. By the way, when QSLing via managers why not hold down the superfluous scribbblings, greetings, messages, etc.? The extra jazz only slows us down. Just simple, normal, one-side-filled-out cards, please. - *W5QPX*. . . . QSL bureau abbreviations such as the RCV in "4M4AMT (via RCV)" derive from *Callbook* and periodic QSL "IARU News" directories. Therein they're found spelled out with addresses to match. Now let's lick some stamps. . . .

- CR4BS, P.O. Box 73, Praia, Cape Verde Islands
- DK2NU, J. Mueller, Bel der Muehte 2, D-3011, Laatzen, Germany
- EL2CK, L. Graham, Box 98, Monrovia, Liberia
- FG7TI/ES7 (via VE3EUU)
- FM7AB, J.-P. Viode, Observatoire de la Martinique, Martinique, F.W.I.
- HC8AA, P.O. Box 289, Quito, Ecuador
- IS1DRD, Box 25, Cagitari, Sardinia, Italy
- JA0CUV/1 T. Hollister, 4166 Halupa St., Honolulu, Hawaii, 96818
- K2LQQ/TF, Box 22, WSNCS, FPO, New York, N.Y., 09571
- K3QOS/KB6, c/o IDXA, Box 125, Simpsonville, Md., 21150
- KP4DJI, J. Fitzpatrick, Jr., P.O. Box 219, APO, New York, N.Y., 09845
- SV0WO, c/o U.S. Embassy, Athens, APO, New York, N.Y., 09253
- VP1BH, P.O. Box 27, Stann Creed, Br. Honduras
- VP2KX, 39 Canyon St., Basseterre, St. Kitts, Leeward Islands VPs 5NB 5TH 9GR (see text)
- VR4CG, G. Cruickshank, P.O. Box 310, Honiara, Solomons
- VR4EN, P.O. Box 322, Honiara, Solomons
- WA4OCC/VE8, C. Leffler, c/o ITT Arctic Svc., Hanger 9, International Airport, Winnipeg, Man., Canada
- YB2AR, Hadi Sis Wanto, 56 Ganefo St., Bombog, Java, Indonesia
- YJ8JM, J. MacIntyre, Dept. Radio/Telecomm., Santo, New Hebrides
- 5H3MV, G. Davis, P.O. Box 23059, Oyster Bay, Dar-es-Salaam, Tanzania
- 5W1AM, Box 25, UNDP, Apia, Western Samoa
- 9Q5GR, P.O. Box 39, Moerbeke, R.C.

- AX6CIF (via W2GHK)
- CP5CY (to CP5CYS)
- CP9AB (via K3SWZ)
- EA7DJ (see text)
- EL0H/mm (via LA6EM)
- F91E/6W8 (to F91E)
- F0MZ (via DK3JP)
- F0WV (via ON4TJ)
- FM7WF (see text)
- FP8HE (via REF)
- ex-FR7ZR (to FM7AB)
- FY7AE (via WA4WTG)
- FY7ZO (to DK4MD)
- GM6UW/p (to G6UW)

Harmonic-powered beam rotators may show up again in your ARRL DX Test this month. This team's call escaped us. The furry bunch is KL7GSG's antenna maintenance crew putting finishing touches on a quad in 20-below-zero moonlight at Port Clarence.



HB0AIC (to HB9AIC)
 HB0XKQ (to DJ1BP)
 HC8RF (to HC1RF)
 K9CQV/HK0 (to K9CQV)
 ex-KA3DX (to K5LLK)
 KA9AG (to K1VYF)
 KM6DU/KH6 (to K7UNB)
 KR6HR (via W3HNC)
 LX1JAE (via LX1DC)
 MP4BR (via RSGB)
 OA4XK (via RCP)
 PJ8DZ (via W9ZRX)
 SM4DHF (via W7HKI)
 SP5PWK (via W7HKI)
 TA3HC (via LA3UE)
 TR8VV (via DK2NU)
 TY9ABC (to DJ1QP)
 TY0ABD (to DJ6QT)
 VP2AAC (via WB4GGA)
 VP2EF (to W9IGW)
 VP2LR (via W9ZRX)
 VP2LX (via G3GFP)
 VR5DX (see text)
 VS6BC (via GM3JDR)
 VS6CW (via HKARTS)
 VS6DO (see text)
 W9UCW/HK0 (to W9UCW)
 WASZTY/YV (via RCV)
 XE0QB (to W5QBM)
 XT2AB (to DJ1QP)

XT2AC (to DJ6QT)
 YA1CV (to DJ8CV)
 YB0AAF (via DL1SU)
 YR0AAG (via DJ2JB)
 YN1ZZ (to DL3OH)
 YV5AK (via W7HKI)
 YV5BPI (via WA5UHR)
 ex-ZC3AC (to VK9MV)
 ZD3N (to DJ1QP)
 ZD3P (see text)
 ZE1GDS (via WA9UET)
 ZK1AG (via ZL4NH)
 ZSIACD (see text)
 ex-ZS9L (to 5H3MV)
 ex-3B8CC (to GM3MBS)
 3C1A (to DJ1QP)
 3Y3CC (to LA3CC)
 4F4O (via RCP)
 ex-4W1B (see text)
 4Z4IB (via WA2KWP)
 5J4BNC (to HK4BNC)
 5U7AR (via F6ACT)
 5V4AH (via DL1HH)
 6W7GE (see text)
 7P8AZ (via VE2JH)
 8P6DM (via W7VRO)
 ex-9G1HM (to OK3HM)
 9U5CR (see text)
 9X5VL (via ON5TO)
 9Y4VU (via W3EVW)

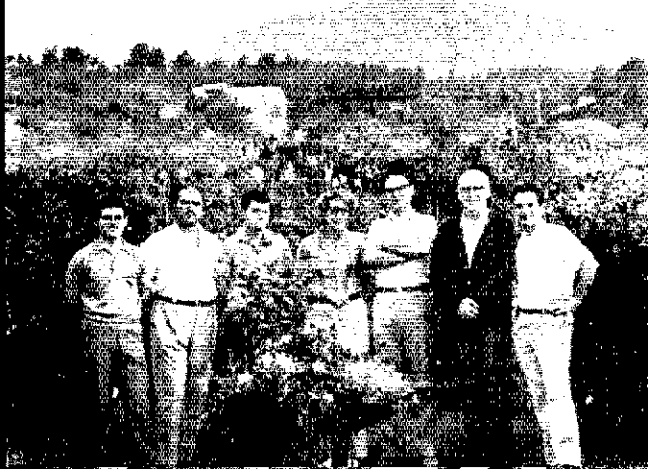
Whence:

ASTIA — Amateur radio, with the exception of a few short-term special event stations, is still taboo in Cyprus. Consequently our CARS membership has dwindled to a small group of ZC4s and a few stalwart ex-5B4s. Our finances have fallen with our number so we regretfully announce cessation of Cyprus Award issuance as of March 31, 1971. It is hoped that the backlog of applications soon will be cleared. — *ZC4IM*. . . OH2BH plans more ZA work and has hopes of activating Iraq this spring. VU2OLK indicates that only Indian nationals will get a chance at the Laccadives. — *DXNS*. . . The present JD1ABH, very busy on 15 cw, expects to remain available into April. — *VE7BAF*. . . Been working about ten 28-MHz JAs a day, receiving outstanding signals from JAs 1A6A 1CG 1NSJ 1MOW 1WUY 2AAT 2EWE 2NNF and 8HGT. — *W6NYG*. . . UI8Z looks for Kans., N. Dak. and Nev. to complete WAS. He's active nightly near 14,010 kHz at 0100 GMT. — *W8ELL*. . . I'm QRT from Singapore and back to GM3WRN. — *9V1PM*. . . Ex-VS6AA pops up from Krefeld as DA2YW. — *VERON*. . . KAs 2AH (WB2HDS), 2RD (K4UTI), 5FE (K4ZIE), 8AP (WA5STD), 9JA (KL7GPV), 9QCCZ, WA6STA and WN6GHN are new or renewed members. — *FEARL*. . . Those who expect the Jerusalem Award airmail must supply ten IRSs. Two Coupons cover only surface mail. — *4X4SO*. . . One of those BY1PKs shows up at 2300 on 21,360 kHz. — *W4YOK*.

AFRICA — EA8GK, licensed for about two years now, likes 10, 15 and 20 sideband with a linear and TA-33. YL EA8GZ is often found on 14,332 kHz at 1600 GMT. — *Ks 2QHT 6GAK*. . . 3B7DA reports his equipment badly damaged by sea water and he may need assistance with gear to fulfill his promise of early 3B9 activity. Check with Alex via his 3B8DA address. He made 2900 contacts from St. Brandon between July and November. — *K2QBW/3, DXNS*. . . 5N2JKO closes down in favor of G3JKO after twelve years in Nigeria. Recently elected NARS officers include 5N2s AAJ pres., ABG secy. and AAN treas. — *5N2ABG*. . . ZS6ME, ex-VQ2WM, pours out steady cw with a 100-watter on 20 through 80 meters. — *W5QPX*. . . ZE1GDS was active from Gwelo over the mid-October Boy Scout Jamboree. — *WA9UET*. . . ST2SA's new sideband signal comes courtesy International DX Association. — *WA5REU*. . . TU2CX and TQ7AA are regularly solid copy on 28-MHz cw. — *WA2HZR*.

These arrived through the benevolence of good providers Ws 1CW 2DY 3QKZ 9DY 9UCW, K4BYK, WAs 2HZR 9TZD 9ZCP, WB9CJS, G3VMH, KP4DJI, VEs IOC 7BAF, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, Nor.72 T, England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4FRO), International Short Wave League *Monitor* (A. Miller, 62 Warward In., Selly Oak, Birmingham, 20, England), Japan DX Radio Club *Bulletin* (JA3UD), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), *UBA's On the Air* (ONs 4AH 5VA), *VERON's DXpress* (PA0s FX LOU to VDV WWP) and West Coast *DX Bulletin* (WA6AUD). More!

EA8HD, an SWL, EAs 8EZ 8GZ 11Y, 8GZ's OM and 8GY, left to right, enjoy a floral Canaries hamfest with 12,000-foot Pico de Tenerife in view. At right 9Y4s BW VT RK LP KR VV MM and VE gather during a visit by VE3s EWY and GCO who are shown as 9Y4s RK and VE. (Photos via K2QHT and VE3GCO)



OCEANIA - Marshalls activity includes KX6S DC on 7035-kHz cw Fridays at 0500 GMT, also 28,655 sideband daily at 2300-0000. KX6DR joins the fun on week ends with sideband on 28,610. - *WASUCT*. . . . Fifty watts of cw on 21 MHz scored 150 QSOs with a six-foot window whip at Kauai's Wailua beach. - *KH6FMO/KH6*. . . . WA6DKW, who passed away while operating VR5DK with wife WN6FSC, was buried on Tonga. - *KS6CG*. . . . KC6RM (WB6NTL) likes sidebanding on 15 and 20 from Truk. - *W6DOR*. . . . Bumped into VK9OM of Lae in Honolulu. Mac, a missionary, was circling the globe with his XYL. - *K2DUV/KH6*. . . . ZL1AYG works W/Ks with a quarter-wave vertical on 80, two half waves in phase on 160 meters. - *WA9UET*. . . . Two new hams will relieve VK0s KW and LD on Macquarie, ZL2AFZ considers a spring ZM7 fling, and ZK2AG (ZL3TV) may knock off next month. - *DXNS*. . . . VK9XI of Christmas is active week ends and Mondays at 1200-1400 GMT above 14,200 kHz. - *VE1OC*. . . . I'm not fast at cw but knowing the code saved by life once so I expect to retain a certain facility with it. - *ex-KM6DU*. . . . K3QOS/KB6 fired up in mid-December for three months or so on a Canton radar assignment. - *WCDXB*.



VR5LT does booming DX biz as the only resident Tonga amateur. Bill signs VK6LT when home from Nukualofa. (Photo via W2NIN)

EUROPE - 3Y3CC's 20-meter cw work from Queen Maud's Land may conclude this month. - *VERON*. . . . One of the Market Reef light-house crew is getting a license and intends to keep OJ0 active on cw. - *LIDXA*. . . . DL1IN achieved his long ambition of top Honor Roll listing before recently joining Silent Keys. - *W1CW*. . . . This is my 50th year as a DX hound. - *I1ER*. . . . Cambridge U. Wireless Society, usually signing GD6UW over Easter vacations, breaks with tradition this year to put GM6UW/p on the air from rare Angus, Sutherland, Caithness and Nairn counties in that order over March 14th-24th. In addition to ssb on 10, 15 and 20 at 0900-1700 GMT we'll be watching for W/K/VEs on 160 meters at 0730. - *G3YMI* of G6UW. . . . F8VO made WAS with 45 watts and vertical hidden inside his chimney. - *W1YYM*. . . . Collected 2463 cw QSOs with my DX-60 last year as DL7NS/OH0 in the Alands. - *DL7NS*. . . . HB0XSB, operated by DJ8KB, DK1PG and DL7AV in October, made nearly 3000 QSOs from Liechtenstein with 101 countries and 48 United States, mostly on cw from 80 through 10 meters. - *DJ8KB*. . . . My HB0XKW camping location was in two-foot snow near Triesenberg. I operated from the back of a station wagon with ac borrowed from a near-by house. - *DL4VA* (WA4WME). . . . SP5PWK, station of the oldest (since 1922) radio club in Poland, works 14 through 3.5 MHz with 250 watts. - *W7HKL*.

HEREABOUTS - OA3Y and I will be leaving Huaraz this month for Sweden. We have been working 7 through 28 MHz often 21,155 kHz. - *OA3A*. . . . HK0AI coordinated our venture to San Andres with emphasis on 160-meter DX possibilities. - *W9UCW, K9CQV*. . . . YV5AK will be in the 80-through-10 5B-DXCC action this year. - *W7HKL*. . . . FG7XT is getting DXcited about slow-scan TV. - *WCDAB*. . . . Wandering WA2LTQ has confirmed all six continents from each of the six continents. - *WAC-squared!* - *NNRC*. . . . VE3EWY liked St. Lucia so much during his visit as VP2LY that he's moving there permanently. - *VE3GCO*. . . . I plan to try for DXCC with five watts of 14-MHz code from my new Maryland post. QRP cw gives a certain sense of accomplishment. - *K7UNB*. . . . I believe FM7WS is still schooling in Paris. - *W4OPM*. . . . Two thousand QSOs from PJ8AR and VP2VY make me determined to become an ES7 this fall. - *W3HNK*. . . . Son WN1NNC snagged his first Asian, a JA on fifteen. - *W1s CW, YYM*. . . . WA4OCC/VE8 is stationed with the Coast Guard at Cape Christian, Baffin Island. - *K4BYK*. . . .

Watch for ZF1WP on 21 and 7 MHz in this month's ARRL DX Test voice week end, my fourth Grand Cayman operation since 1968. Still need Africa from there! - *W4YKII*. . . . Our International DX Association, growing at the rate of 35 or 40 a week, now has some 800 members. - *WASREU*. . . . W9s 1GW ZTD, K9RHN, PJ7JC and I logged more than 3500 October contacts as VP2EE. - *W9ZRX*. . . . There are now some thirty hams among Newark News Radio Club members. - *J. Heien*. . . . Hope to have a go at RTTY DXing from WB8-land. - *WP4DKA*. . . . Many changes and strange new prefixes after being away from DXing for about nine years. - *W1CTW*. . . . Military club station KL7EEY operates at Port Clarence northwest of Nome at a USCG Loran transmitting site. Thirty-three men are stationed there. - *KL7GSG*. . . . With 10, 15 and 20 checked off I'm ready to concentrate on 40, 75 and 80 meters toward Five-Band DXCC. - *WA3HGV*. . . . I occasionally sail my 40-footer through the Canal to Florida with Caribbean stops. - *WN6MKV*. . . . Better hit 28 MHz for 5B-DXCC credit before the sunspots leave it high and dry, gang. - *SCDXC*. QST

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YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

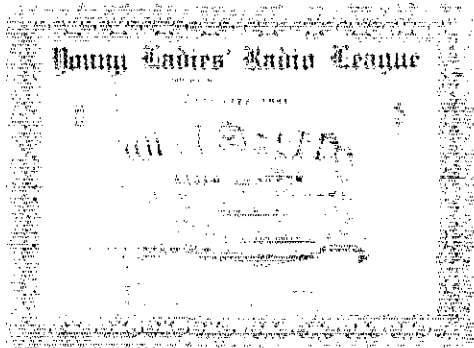
WAS - YL

ONE OF the comments we often hear an amateur make is that the best part about amateur radio is making friends everywhere. As Novices, we envy some old timer who says that after such a long time on the air there isn't a state that doesn't have someone he knows. As we build up our on-the-air time with logs filled with contacts we find that they aren't kidding - the WAS certificate not only proves it; the QSLs on the wall show that we know a lot more than one person in each state. Then we begin to check into the YL nets and our file of contacts with women increases and the lure of WAS-YL becomes a siren-song.

It's the prettiest certificate, and the hardest to earn of any of the YLRL awards, for this search for 50 gals in 50 states isn't as simple as it sounds. In many states the YL population is quite extensive, while in others it is less than 20, and to be able to locate them can be tough because not all states are found on the major YL nets. Nor do they all show up in the YL-OM contest. Often, particularly on cw or RTTY, the gals sign a name that could be either YL or OM so that, masked by the impersonality of the code or the lines of a printer, the identity is lost.

Since the first WAS-YL certificate was awarded in 1949 (to? - who else but Howie, W2QIH), only 130 of these awards have been issued, and of that number only two DX amateurs have earned it: ZL2JO and VE7AKB. Even back in the 48-state era, when W1MCW was the first custodian, only 16 people qualified between 1949 and 1956. The next twelve years brought 106 applications while W9GME was custodian. Since 1968, Irene Akers, W3RXJ, the present custodian, has mailed 8 more.

*YL Editor, QST. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, CA 91001.



WAS-YL certificate.

The requirements for this pale blue certificate with the American flag on it aren't hard. (1) The WAS-YL certificate is available to all amateurs. (2) Two-way communication must be established on amateur bands with all 50 of the United States. Any and all bands may be used. A QSL from the District of Columbia may be submitted in lieu of one from Maryland. (3) Contacts with all 50 states must be made from the same location. (4) Within a given community one location may be defined as from places no two of which are more than 25 miles apart. (5) Contacts may be made over any period of years provided that all contacts are made from the same location as defined in No. 4. (6) 50 QSL cards, or other written communications, from stations worked confirming the necessary two-way contacts should be sent to the YLRL certificate custodian for WAS-YL, Irene Akers, W3RXJ, 594 1/2 St. Clair Drive, Washington, DC 20031. A list of the contacts must accompany the cards, and sufficient postage must be sent to finance their



Autumn MIMINOW Net get together. Back Row left to right: Bobbi, K7RAM; Dixi, WA7DXI; Frieda, K7PVG; Lucy, WB6RFE; Joan, WA7BDD; Willie, WA7IRD; Alma, W7FDE; Gladys, K7MFS. Front Row: June, WA7FRM; Jessie, K7TWQ; Ethel, W7WLX; Tiny, WA7LOQ; Esther, WA7IXR; Verda, K7UBC.

QST for

return. The YLRL will not be responsible for any loss or damage to same.

There is no easy way to acquire any of the many certificates offered to the amateur operator. Those who enjoy this particular activity might say with Gilbert and Sullivan's policeman that their "lot is not a happy one" when they begin the search for another of these exciting awards. The real happiness is the indescribable satisfaction that comes from bucking crazy conditions, or finding an elusive station, and the harder it is to acquire, the prouder we are of the accomplishment. For one of the really tough ones, try WAS-YL.

31st YLRL Anniversary Party Results

Cw Winners

YV5CKR	3718.75	Gold Cup, 1st Place
AX3KS	3400.00	Certificate, Second
WAØKVL	3266.25	Certificate, Third

Phone Winners

K7LPZ/VE7	6897.00	Gold Cup, 1st Place
VE3EZI	6625.00	Certificate, Second
ZL2JO	5557.50	Certificate, Third

Top Combined Scores

K7LPZ/VE7 ¹	9398.00	WAØKVL	3266.25*
KS5YB	8143.75	WAØYNC	1820
AX3KS ²	7978.75	KØEVG	828
K1QFD	7250.00	VE1AMB	1595*
YV5CKR	6945.00	VE3EZI	210*
K4RHU	6921.75	VE5DZ	1125*
VE3EZI	6835.00	K7LPZ/VE7	7250.1
ZL2JO	6412.50	YV5CKR	3718.75*
W9GHO	5977.00	AX3KS	3400*
K8ITF	5627.50	ZL2JO	855*
		SMØCX	286
		F2QS/2	113.75*
		OH5RZ	101.25*
		G5LY	82.5*
		JA1YL	10

Cw Scores

K1QFD	3050*
WA1LGU	1260
WB2PYY	1836
WB2JCE	1720*
K2OYG	950
K3SQX	2125*
W3CDQ	1276
K4RHU	2973.75*
WA4BVD	2610*
K4LMB	1944
KS5YB	2636.25*
WA5VJW	2301
K5TXQ	1960
K5MXO	1955*
WA5JFZ	1715
K6LUZ	1500*
WSQWI	617.50*
WA5OVX	292.50*
WB6QMD	2394
WA6IRT/6	1330
WA6MIW	1110*
W6ISY	220*
WA7BDD	960*
WA8USU	2517.50*
WA8FKQ	2358.75*
K8ITF	1425*
W8IEO	1200
WA8FSZ/8	1110
WA8YPPY	918
K8LHF	742.50*
WA9TVM	1850
W9GHO	1700
WA9HLW	1640*

Phone Scores

K1QFD	4200*
WA1LGU	2964
K2OYG	3741.25*
W2YFGS	120
W3TNP	3741
K4RHU	3948
WB4COP	3936
W4HWR	2736
K4LMB	2730
W4EHN	2496
K4AOH	2226
WA4UWK	1650
KS5YB	5507.50*
WASTYH	3564
W5ZPD	3510
WA5VJW	3000
WA5JFZ	2560
KS5UJ	2169.25
WA5OVX	1767
K5TXQ	1617
KS5PF	1290*
K5MXO	243.75*
K6DIL	4600
K6KCI	4560
WA6MIW	3997*
WB6QMD	2738
W6UHA	1848

K7MRX	4070*	WAØPWY	4838.50*
K7UBC	3034	KØEVG	2809
K7RRS	2405	WAØYNC	2565*
WA7FLC	2257	WØZWL	1392
W7WRS	1578	KL7BJW	1890
K8ITF	4202.50*	VE3EZI	6625*
K8LHF	3217.50*	VE4ST	1383.75*
WA8EKQ	3250*	K7LPZ/VE7	76897
WA8FSX/8	2000*	ZL2JO	5557.50*
W8IEO	2886	AX3KS	3226.25*
W8HUX	1912.50*	PY1MHB	1587
WA8YPPY	1785	G8YL	448
WA8VXE	1050*	JA1YL	210
W9GHO	4277	LX1YL	104
WA9FRS	2125*	JH1GMZ	84
WA9TVM	125*	JA4LHE	11.25
WØJUV	5047	SMØCX	1.25

¹Corcoran, and North American Hager Award.
²World DX Hager Award.

*Indicates low power multiplier claimed.

Confirmation logs submitted by WB2JCE, K3SQX, and KS5FJ for the Phone Contest.

Midwest YL Convention Plans

For those who want a QSL with a very rare suffix the 1971 Midwest YL Convention will supply one with the temporary call, W8YL, assigned for use by those who will be working the station during the convention at the Airport Ramada Inn, in Cleveland, Ohio, on May 14-16, 1971. The station custodian will be Carmella Cicereffo W8NAL, and the Buckeye Beaux who are working with her are Jim, W8BU, Ed, WA8VRX, and Ori, W8BF who are making plans for antennas for operating W8YL on 20, 40, and 75/80 meters. This call was assigned to the gals for the 1964 YLRL International Convention, so this will give anyone who is interested a second chance to work a gal in the United States with the YL suffix.

Time's marching on: only four months to go. See you there.

6th International YLRL Convention

The sixth YLRL International convention will be held on April 15-17, 1972, aboard the *Queen Mary*, in Long Beach Harbor California. Roxanna Griggs, K6ELO, has accepted temporary chairmanship of the organization planning of this quadrennial affair, and will be working with the memberships of YLRC of LA, and the BAY-LARCS of northern California, who will be the joint hostesses. Historically the 15th of March have long been famous. Now the gals from the "Golden State" plan to make the 15th of April, in 1972, equally outstanding with their slogan, "Join the crew in 72." Plan now!

Ontario Trilliums 1971 Officers

President, Doris Cody, VE3BBO; Vice-president, Irene Williams, VE3BEI; Secretary, Louise Konyar, VE3AUZ; Treasurer, Barbara Newman, VE3BFN; Publicity, Shirley Lewis, VE3GNG; Editor *TOT Topics*, Betty Peterson, VE3ASZ; Social Convenor, Audrey McDermott, VE3CCO; Sunshine Convenor, Eva Jarvie; Membership Convenor, Devon Wilkins.

DX YL - Leela Chowdappan, VU2CP

In 1966 Leela held the call, VU2CPZ, but now that she has received her Grade 1 License, the two letter call has been assigned to the best known of



Leela Chowdappan, VU2CP.

India's YL operators. Leela, and the OM, VU2FC, were the first OM/XYL combination, but now the family has more operators with a niece, VU2MI, and another niece who is studying to take the examination and join the growing ranks of the YLs from India.

Leela holds an MA degree and was an instructor in the Indian Air Force Administrative College until the demands of her home forced her to leave. Formerly on the editorial staff of the *Indian Radio Amateur*, she is constantly encouraging more YLs to become amateur radio operators. Other than radio, her hobbies are stamp collecting and photography.

Irene Akers, W3RXJ

The custodian of WAS-YL, W3RXJ, took her Novice Class exam the first day that it was offered, on July 1, 1951, and passed General Class the following December. During the 1950s, her pet operating times were when the 10-meter band was open, and ten is still her favorite band. She was active in the Washington Mobile Radio Club, acting

as net control for the mobiles going to and from work, and was Secretary and Treasurer of that club.

Irene is active in Civil Defense, CAP drills, and other public service functions. She is a charter member of the Washington Area Young Ladies Amateur Radio Club (WAYLARC) and has held all the offices in the organization. She is the club columnist, and Net Control for the WAYLARC Net that meets each Wednesday at 9:00 EST on 3917 MHz.

A member of ARRL and YLRL, W3RXJ has served as 3rd District Chairman of YLRL, and as club editor for *Auto-Call* for about five years. She has also been Coordinator of the Washington TVI Committee handling complaints and liaison between the FCC, amateurs, and complainants.

Irene likes to rag chew and check into YL nets. Prior to going back to work with the Naval Weather Service, she liked contest work. QST

Strays

I would like to get in touch with . . .

. . . other radio amateurs who have had experience with a low-power radio-control unit for use in a model boat. WAØUCG.

. . . hams who have established radio/TV repair shops as retirement activities. W1WMK.

. . . anyone interested in joining an amateur communication unit for the Shriners Conventions. W7HKL.

. . . operators interested in a 10-meter cw net. K6RXX.

. . . anyone interested in forming a D.C. — Maryland area Novice net. WN3OUE.

. . . amateurs interested in the whole earth net which monitors 7260 and 14,295 kHz. WA2RUD.

. . . any radio operators who have hemophilia. WASEIN.

. . . anyone interested in forming a broadcast station manager's net. W9AJR.

. . . professional musicians who are also hams who are interested in joining the International Music Hams Club. K2PLT.

. . . any amateur radio club exclusively for private pilots, or any hams operating air-mobiles interested in discussing mutual problems and trouble shooting and installation techniques. W1YNT.

. . . any owner of a Yaesu FTDX-560 transceiver who would like to join the Yaesu Club for exchange of ideas. W8GV.

. . . any radio amateurs who are members of fire departments and interested in working all states with firemen and dispatchers. W6LKT.

. . . anyone interested in forming a U.S. Coast Guard Aux. net. WB6LAI.

. . . groups who meet on the air for discussions of astronomy or moonbounce, etc. K9AHS.

. . . hams who enjoy the Live Steam (model railroad) hobby. W9YLD.

. . . anyone interested in forming a Northwest chess net. WA7KWV.

. . . any amateur named "Earth" — object: first two-way contact between "Earth" and "Mars." K8PVC.

Operating Events

de W1YYM

FEBRUARY

3 W6OWP Qualifying Run (W6ZRJ, alternate); at 0500 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PST the night of February 2. Copies to ARRL for grading.

6-7 DX Competition, phone, first session, full 48 hours GMT. WVEs send report plus state or province. DX stations transmit report and input power. Stations and multipliers count on additional bands. Full rules page 72, Dec. 1970 issue.

6-21 Novice Roundup, full rules page 86 January. Operate no more than 40 hours during the contest period, exchanging serial number and ARRL section. Novices may work anybody, non-Novices may QSO Novices only. Here's your chance to learn snappy operating, improve your code speed and pick up new states for your WAS.

11 WIAW Qualifying Run, 10-35 wpm, at 0230 GMT on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz. This is 2130 EST the night of February 10. Underline one minute of top speed copied, state no aids used in copying (typewriters OK), sign and mail to ARRL.

13-14 QCWA QSO Party, full 48-hour period GMT. Check page 53 Nov. for info.

14 Frequency Measuring Test, now open to all, starts with a callup at 0230 and 0530 GMT Feb. 14. The periods for measurement start at 0237 (80 meters), 0245 (40 meters) and 0253 (20 meters), for the "late" run 0537, 0545 and 0553 respectively. Each measuring period lasts five minutes. Submit your average for each 5-minute period which will be compared with the umpire's average during the same period. (The umpire is a professional frequency measuring lab.) Tell how many readings you took to form the average. Approximate frequencies for the early run 3524, 7011 and 14,068. Late run frequencies 3525, 7023 and 14,098 kHz. We must have your report by Feb. 25 to qualify for the competition. WIAW will transmit the official readings starting Feb. 26. (Next FMT May 15.)

20-21 DX Competition cw, first session, full 48 hours GMT. WVEs send report plus state/province. DX stations send report plus input power. Check page 72 December for info.

27 Colonie Central H. S. Annual "Operations Day," 8:00 am EST until 8:00 pm EST on 75-40-20-15 meter phone bands as well as 40-15 meter Novice bands. QSL WAZDNR via the school radio club, Herb Insley W2KZN, trustee, 100 Hackett Avenue, Albany, N. Y. 12205.

27 VE2 Contest, limited to Quebec amateurs and sponsored by RAQI, will take place as follows: cw, 1500Z Feb. 27 to 0300Z Feb. 28; phone, 1500Z Mar. 6 to 0300Z Mar. 7. The total time of 12 hours may be used. Any station licensed as a VE2 or any portable VE2 station (fixed, mobile or portable) can take part on all bands. Contacts permitted only with other VE2s. Crossband or repeater contacts invalid, phone to cw not permitted. Each contact counts 1 point with the exception of contacts with directors (5 points) who will be issued a special identifier (ZA to ZZ) in place of their country. The 108 Quebec counties count as multipliers only once regardless of times worked or bands used. Stations in Bas du Fleuve, Chicoutimi and Abitibi multiply their score by 1.5, and those north of 50N by 2. Call CQ VE2 and exchange RST, year licensed, county or identifier. Logs in GMT and marked as cw, phone all-bands or 75-meter phone should be sent to RAQI Contest Committee, C.P. 124 Mont Joli P.Q., no later than April 1, 1971. Awards will be presented at the RAQI Convention at Trois Rivières.

27-28 French contest phone; 1400 GMT Feb. 27 - 2200 GMT Feb. 28. (CW section last month.) Exchange report and QSO number, 3 points per QSO (with F or DUF countries, only). Multiplier per band, one point for each different F "department" (2 figures) and each different DUF country. Note that stations of HB 4U1 LX ON 9Q 9U and 9X are good for points. For these multipliers use the HB cantons, ON provinces, 4U1, LX, 9Q, 9U and 9Z. Score figures on multiplying total QSO points by total band-multipliers. Logs go to the REF, bvd. de Bercy 60, 75, Paris-12, France.

27-28 Vermont QSO Party, sponsored by the Central Vt. ARC, from 2300 GMT Feb. 27 to 0300 GMT Mar. 1. Vt. stations score 1 point per QSO times total number of ARRL sections and countries. Outside stations score 3 points per QSO times the sum of Vt. counties worked on each band. No power multipliers and repeat contacts permitted on different bands/modes. (Phone/cw segments considered as the same band.) Exchange QSO number, RST(1) and county (Vt.) or section/country (outside Vt.). Suggested freqs.: 3685 3932 3909 7060 7265 7290 14060 14290 14235 21060 21375 28100 28600 50.260 50.360 144-144.5 145.8 and Novice frequencies. Logs must be postmarked by Mar. 31 and sent to the CVARC c/o Vt. SCM E. Reg Murray, KIMPN, 3 Hillcrest Dr.,

Montpelier, Vt. 05602. Stations sending an s.a.s.e. will receive a copy of the results.

27-28 YL/OM Contest phone, starts/ends 1800 GMT. All licensed operators throughout the world invited to participate, exchanging QSO number, report, section or country. Full details page 101 Dec. CW session March 13-14.

27-28 TRW Systems QSO Party, 2000Z to 2400Z Feb. 27, 0200Z to 0600Z and 1600-2000Z Feb. 28. Call CQ TRW. Freqs. 28.680 21.380 14.280 7.280 3.980 28.080 21.080 14.080 7.080 3.580 50.25 145.35. Five contacts with club members earns nice award. To apply submit list (call, date/time, freq.) to: TRW Systems ARC, Group Box 1435, One Space Park, Redondo Beach, Cal. 90278.

MARCH

4 W6OWP Qualifying Run (W6ZRJ, alternate), at 0500 GMT, 3590/7129 kHz, 10-35 wpm.

6 VE2 Contest, see Feb. 27 details.

6-7 DX Competition phone, rules p. 72 Dec.

12 WIAW Qualifying Run at 0230 GMT.

13-14 YL/OM Contest cw, see Feb. 27-28 listing and check page 101 Dec.

13-15 Virginia QSO Party, 1800 GMT Mar. 13-0200 GMT Mar. 15, no power or time limits. Same station can be worked on different bands. Va. amateurs in independent cities will use a neighboring county in the contest exchange and keep their designation throughout the contest. Max. counties 96. Phone/cw/rty and vht (2 meters and above) are separate contests requiring separate logs. Novice also separate. Log must state mode of operation. Send QSO number, RST(1) and county (Va.) or state/province/country. Va. stations may work other Va. stations. One point per QSO times Va. counties for out-of-Va. stations. Va. stations multiply QSOs by number of states/provinces/countries/Va. counties. (Do not count Va. as a state or Canada as a country.) Freqs. 3560 7060 14060 21060 28060; 3930 7260 14285 21375 28750. Full logs by April 30 (clearly printed) plus stamped and addressed 4 X 9 1/2 inch envelope to Roanoke Valley ARC, c/o Van Wimmer WA4BJX, Route 4, Box 446, Salem, Va. 24153.

13-15 BARIQ Spring RTTY Contest, 0200 GMT March 13 to 0200 GMT March 15, no more than 36 hours operation permitted. Listening counts as operating time. The 12 hour non-op. period can not be taken less than 2 hours at a time. 80-10 meter operation, repeat contacts permitted on different bands. Exchange time in GMT, number, and RST. Only two-way RTTY contacts permitted. Within own country, QSOs earn 2 points, outside own country contacts earn 10 points; a bonus of 200 points per country worked (including your own). One country may be counted again on another band, but continents are counted once only. Scoring: points times total countries; add to this country points times number of continents. One log per band, show rest periods (logs to indicate band), GMT, message and RSTs. Logs must be received by May 22 to qualify. Send to Ted Double G8CJW, 89 Linden Gardens, Enfield, Middlesex, England.

13-21 QRP Contest, 10th anniv., from 0000 Mar. 13 to 2300 Mar. 21, open to all, cw only. Members send RST(1), ARRL section or country, QRP nr.; non-members send RST(1), section or country, power and NM. Suggested freqs. 3540 7040 14065 21040 and 28040. Novice 3710 7160 and 21100. Stations may be worked once per band for QSO and multiplier points. Member contacts count 3 points; non-members count as 2 points. DX QRP members only may claim 4 points per contact. Total QSOs multiplied by ARRL sections or countries worked. Additional multipliers as follows: 100 watts input X 1; 25 to 100 watts input X 1.5; 5 to 25 watts input X 2; 1 to 5 watts output X 3; below 1 watt output X 4. Certificates to high scorers in each ARRL section or country. Certificates also to top 3 WVE and top 3 worldwide (including KH6, KL7 and DX1), and to lowest-power stations submitting a log showing at least three genuine skip contacts. Readable logs showing date/time, exchanges, bands, emissions, equipment, power and scoring (with usual declaration) by April 10 to Elmer Worth K3YNN, 946 Franklin St., Reading, Pa. 19602, S.a.s.e. for further info, on QRP ARC.

20-21 DX Competition cw, rules p. 72 Dec.

22 CWA High-Speed Code Test, full rules March.

27-28 New Mexico QSO Party, sponsored by the ARCs of New Mexico. Starts 2200 GMT Mar. 27 to 0100 GMT Mar. 28; 0200Z to 0600Z and 1700Z to 2200Z on Mar. 28. Suggested freqs.: 3565 7065 14065 21065 and 28065; 3900 7250 14275 21350 and

(Continued on page 114)

Operating News

GEORGE HART, WINJM
Communications Manager

ELLEN WHITE, WIYYM
Deputy Comms Mgr.

DXCC: ROBERT L. WHITE, WICW
Contests: ALBERT M. NOONE, W1KQOM

Training Aids: GERALD PINARD
Public Service: WILLIAM O. REICHERT, WA9HHH

Ending Signals. From time to time your ARRL adopts procedural signals as standard recommendation for amateur use. These often have commercial or military origins, but sometimes they are purely amateur-derived for use in the "amateur service," of which your League is the principal (only?) spokesman.

"Ending signals" are in this category. Unlike the practice in most other services, amateurs do a lot of "fishing" around the bands, listening for a piece of rare DX or that elusive missing state, or maybe just someone to chew the rag with. In the process, many signals are tuned in during the middle of a transmission, or maybe just on the tail end of one. If you're on cw, you might hear a transmission ending with KN. What in thunder, you may ask, does that mean? On phone, someone ends his transmission with "clear." Is he giving a weather forecast? No, in both cases the transmitting operator is trying to indicate the status of his contact or transmission so anyone just catching the tail end of it will know whether it indicates a private contact in progress, the end of one, the end of a CQ call, the end of a call to another station, or what.

When ARRL-recommended ending signals first came out, after World War II, they applied only to cw. The new (comparatively) Op Aid 14 (free on request) goes all out in giving such ending signal equivalents for phone as well, along with a time conversion chart, the ICAO phonetic alphabet and the RST system. Perhaps ending signals are not so much needed for phone as for cw, since most phone operation these days is by sideband using VOX procedure. Nevertheless, they are included, along with their cw equivalents. ARRL now recommends standard ending procedures to be used at the end of phone as well as cw transmissions.

Some of you probably won't agree with some of the ending signals proposed for voice. For example, "go" is considered by many to be pretty "phony" procedure. However, from a perfectly logical standpoint, there is not a thing wrong with it. It is short, imperative, easily understood. "Over" is used to indicate the end of a call, before contact has been established; "go" is used after a CQ and at the end of transmissions during a QSO when there is no objection to "breakers." These ending signals correspond to AR and K respectively on cw. "Clear" corresponds to the cw SK indicating the end of a contact, and "clear and leaving the air" corresponds to the cw prosign CL.

The phone equivalent to the cw KN, which means that only the particular station being contacted is wanted, is "go only." We have never heard this used, but KN was similarly unheard of before the League recommended it in the late forties, so we hope it will catch on. We tried it once on the air and it sounded sort of insipid. Anyone think of something better? Let's use it anyway, until or unless we adopt something else. How about "clear and out" instead of "clear and leaving the air"?

Your cooperation and participation is needed and wanted in these small operating details. Every group of amateurs, and in some cases every individual amateur, has its or his favorite prowords, and naturally thinks they are best and should be used by all. Armed forces procedure is also used widely, but it isn't always all that applicable to amateur requirements. Let's have our own procedure, but let's *all* use it — amateur procedure for amateurs!

Sportsmanship in Contests. The word "sportsmanship" connotes a combination of rules, ethics and just plain consideration for the other guy. A recent letter from WA9ULU of Evanston, Ill.,



Ever copy the high speed code practice from W1EIA? Or try to? Here's where it comes from. Conn. Wireless Assn. Trustee W1NJM at the operating position, tape perforator above typewriter, one of three rigs in background. The tape reel mounted on a Boehme sending head is in the foreground, just beyond photo limits. Practice sessions are all recorded on audio tape prior to transmission. Take a listen on 3637 or 7120 kHz some Monday (Sunday evening) at 0130 GMT. The next CWA High-Speed Code test is scheduled for March 22. Oh yes, this same station also signs W1NJM.

QST for

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

November 1 - 30, 1970

New Members

WA4TSP	282	KG6AGQ	140	W5HIC	110	WB2FSC	105	WS2JRA	102	K2GXP	100
K8IFE	279	LA3XG	126	JH1VOE	110	WB6RKH	105	W3SDV	102	KH6LP	100
VE3DBT	249	OH2BFJ	126	JX3DH	109	GM3LYI	104	W4UPJ	102	W1GUP	100
VE3EHG	169	W0KPH	126	K0MKD	109	JH1WKS	104	WA9SOY	102	WA1GNA	100
YU4HA	169	WSQBM	120	WA3FR	109	K7DXJ	104	WA3JZR	101	W3EFK	100
6W8XX	161	WARTDY	120	VU2VAE	108	LU3EAN	104	WA6CMX	101	W6AR	100
OE1NY	159	WS1W	119	WAS5OG	107	WB4INE	103	WA6GRQ	101	WB8CCF	100
W4YUU	143	DL4JS	113	W7JAC	106	K4CFE	102	WR8AX	101	WA0WBG	100
WA9SVY	141	DL7JY	110	K0MOL	105	K6DOF	102	YU2REY	101		

W6EJC	310	OZ5GF	123	K9VQK	110	VE3EHG	104	DK3PG	102	WB2VKO	100
G3JEC	298	W0HLU	122	WA2EAN	107	W2YRK	104	K8RGO	102	WA3JZR	100
W2PFZ	194	HB9AMV	120	D17QB	106	W3FSK	104	WA6LFN	102	WB4KCL	100
K8IFE	160	WSQBM	120	ZL2ACP	106	K1IXP	103	WA91ZQ	102	WB6IDZ	100
WA9SVY	140	DK2SI	119	DR1LW	105	W5EL	103	K4IVJ	101	DK2FHW	100
YV5AG	132	I1DX	117	K6TXA	105	WB6RKH	103	WA5ZGH	101	WA0SVD	100
CO2FA	125			WA9VLI	105			KR6LY	100		

Endorsements

In the endorsement listings shown, totals from 120 through the 249 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.

ZL1HY	345	W4RRB	305	G2IO	270	W2AH	240	W7RI	200	K2QHT	140
K6OJ	340	W6KYJ	305	K1UDP	270	W7YBX	240	W7ZHZ	200	VE2UN	140
W1MV	340	DJ5DA	300	OK1ZL	270	WB8QV	240	WA8NDL	200	VF3CQA	140
W2AEB	330	G3JEC	300	W56DR	270	DK1YK	220	WA0HVR	200	YU2LA	140
W4BBR	330	JA8ADQ	300	W2NIN	270	HB9AT	220	K2UFM	180	W1WSN	140
W4IF	330	WA2FQJ	300	W4GYP	270	K4YXJ	220	SM3CJD	180	WA2QFF	140
W5PM	330	W3PVZ	300	WA6GFE	270	K51W	220	VE3DKL	180	W3ADO	140
W51TZ	330	W6KNH	300	W8ZCK	270	K8TVO	220	YU1SI	180	W3BRB	140
DL7HU	325	W7TDK	300	W0MYN	270	K0DYM	220	W2NCG	180	WB4GPI	140
W2CKY	325	W91TR	300	YV5AE	270	W1DXB	220	WR2NDI	180	WB4JLG	140
W9TKV	325	ZL1AJU	300	CX1RY	260	W1QUS	220	W45D	180	W9HE	140
JA1AG	320	JA7AD	290	K3ILI	260	WB2CDZ	220	W7NP	180	W9ZEN	140
OH2BH	320	K1IGO	290	G6GAK	260	W4JK	220	WA9CYV	180	CF6LF	120
W3DRD	320	K4IFX	290	OH2QQ	260	W5TXN	220	DL9YC	160	JA1AS	120
DL7AB	315	SM5FC	290	W2FR	260	WA3GTX	220	FSNW	160	K4IN	120
K4ID	315	W2BXC	290	W4QRT	260	WR1JA	220	K2MTY	160	K0CML	120
PY7YS	315	W3NB	290	W6MUM	260	DJ4PI	200	K7GYA	160	P12ARI	120
W1WQC	315	WA4MUB	290	K2POA	250	JA8MS	200	K9VQK	160	W3EAD	120
W9QLD	315	WA9VL	290	K6SVT	250	K6FZX	200	SM5UU	160	WA3LH	120
HB9PL	310	K1GR	280	KH6SP	250	SP9P1	200	W1CTW	160	W4VON	120
W2QK	310	SM6CK5	280	OZ3PO	250	W1ESN	200	W1HRJ	160	WB4IDT	120
W5AG	310	VE3GCO	280	W3NV	250	W4JD	200	WAZBJ	160	W6IQN	120
W2PTM	310	W1AA	280	DK2BI	240	WA4MSU	200	W4SHS	160	W6RQ	120
W7CSW	310	WA2HSX	280	K3MNJ	240	W5HCJ	200	WB6WHM	160	W7FIM	120
W9RQM	310	W4JUV	280	K0GXR	240	W6LH	200	WA0EMS	160	WA9VIV	120
K2AB	305	W8DX	280	OK8RI	240	W7BCV	200	DL5QO	140	W8SQD	120
OK3MM	305	DL3ZA	270	PA0XPQ	240	W7OH	200	K1WJB	140		

PY2CK	345	W1AA	280	I1WT	260	K6SVT	240	K4HX	180	W6ETP	140
W2WMC	320	WA2FQJ	280	K1OZR	260	OE1MEW	240	K7RDH	180	WB6WHM	140
W1WQC	315	W4JUV	280	VF3GMT	260	WA4GUZ	240	KZ5FN	180	W9LHM	140
W4UWC	315	WA4TSP	280	W1HOO	260	WB6DXU	240	W2WNW	180	WA0EMS	140
WA2FOQ	310	WA51FV	280	W1MLM	260	WA91VL	240	W4SD	180	WA01VC	140
WA2HOR	310	W6CCB	280	W6KOF	260	ZL1AV	240	W7VRO	180	K1FIN	120
PY7YS	305	W6DQ	280	WB6LJO	260	W2PBI	230	W8JJA	180	K5VY74	120
VE3MR	305	W91TR	280	WB7TD	260	DK2BI	220	K7GYA	160	PY2ETK	120
W2QK	305	WPOQI	280	AP2MR	250	PA0XPQ	220	K0WXX	160	SV1AA	120
W5AG	305	W0AOAH	280	DJ0PN	250	W3HNK	220	OD5AU	160	WA3NRV	120
K8LSG	300	YV5EC	280	G5AFA	250	DK1YK	200	VF1ARN	160	W5MIG	120
W5IPH	300	WA2HSX	270	K1DRN	250	DL7AB	200	VOICU	160	W6QJW	120
W9TKD	300	WB2RLK	270	K4BBF	250	LA6RL	200	W1ESN	160	W7FCD	120
W3EYV	290	W3DRD	270	OK4BS	250	VE4JK	200	WA1KYW	160	W7RI	120
WA4MUB	290	W6GRV	270	VE3DBT	250	W4QAW	200	WA4DWR	160	W8AQF	120
W6KYJ	290	W6ABA	270	W1DO	250	W4WVF	200	W6YRA	160	W8DX	120
WA8QJ	290	W0MYN	270	W3NV	250	WB6GKK	200	WA9CYV	160	WARTOY	120
W9QLD	290	DJ5DA	260	JA1AG	240	W7YBX	200	K2QUT	140	WA2CO	120
YV4IQ	290	E47IR	260	K2AB	240	DL5GJ	180	K8IQB	140	W9KAA	120
KH6BB	280	G6LK	260	K4BKF	240	K2KGB	180	WB4GPI	140	XE1HS	120

brought the matter into focus. Ed is concerned mainly with vhf operating, but the comments evolved apply just as well to operation in the "dc bands."

We don't know that the ethics of contest operation have ever been specifically delineated, although they have been discussed at various times by various people. Nevertheless, in most contexts there has evolved a sort of understanding among the top operators to the effect that it isn't very nice to plop on a busy frequency with a superior signal and wrest control of it away from those who were occupying it when you arrived. For example, a moderately-rare station finds a hole and calls a "CQ contest." Ethically, that frequency is his to control as long as stations keep calling him. After one contacts him, one moves off and gives the other callers a chance. One doesn't stay there and call CQ on top of him. If he is completing a contact with someone you want to work, you don't call that guy on the same frequency. If you are a CQer instead of a caller, you find a comparatively clear spot before you make your call. If you are a caller, you call briefly, stand by for a reply, call again if no answer — and if the called station answers someone else, either wait until the contact is completed before calling again, or tune elsewhere for another station to call.

Fortunately, there seem to be about an equal number of "CQers" and "callers." If everybody did either one or the other there wouldn't be any contacts made. As a general rule, if you are a "big signal" you get your best results by CQing; if you are one of the mob, you are better advised to do mostly calling. Anyone who sticks strictly to one or the other may be exercising his basic personality, but chances are he won't wind up among the top scorers.

Refer to the above treatment of ending signals. In contests they are especially important. If you end a transmission with K (or "go") and someone starts calling you and QRMs the station you just called, that's *your* fault for using the wrong ending signal. If you call a CQ and end it with AR or "over" and don't get an answer, that's similarly your own fault.

Let's have more courtesy in contests, and prove that nice guys don't always lose, that exhibiting sportsmanship is not out of style, that there are still moralistic rules of conduct even in this permissive society of ours.

CD Personnel note. For ten years Arline Bender labored quietly and unobtrusively in her corner, handling code proficiency copy and certificates, Old Timer's Club, A-1 Operators Club, the FMT and, last but by no means least, the Rag Chewer's Club. In fact, for a time she was affectionately known around the diggings as "The Old Sock." Now, with the retirement of Lillian Salter, W1ZJE, Arline is taking a crack at some more crucial administrative chores and henceforth will be handling club affiliation, SCM elections, the appointment files and sorting and distribution of CD mail. Lil did it for forty-odd years; it was second nature to her. Arline will be "breaking in" for some time, so don't be too hard on her.

What happens to "The Old Sock"? Sharon Haggart inherits this title, while Mona Williams undertakes Sharon's previous supplies job. That's the way it works; qualified people move up and the vacancy occurs at the bottom. — WINJM.

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the ARRL Section of the Division, hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, WINJM, Communications Manager

Section	Closing Date	Current SCM	Present Term Expires
N. C.	2/10/71	C. M. Dempsey, WA4UQC	4/10/71
Sac. V.	3/10/71	J. F. Minke III, W6KYA	2/25/71
B. C.	3/10/71	H. E. Savage, VE7FB	5/1/71
W. I.	3/10/71	J. Medina-Hernandez, KP4CO	5/1/71
Wash.	5/10/71	H. W. Lewis, W7WJ	5/3/71
N. Mex.	3/10/71	J. R. Prine, W5NUT	5/9/71
L. A.	3/10/71	H. D. D. Hetland, WA6KZI	5/18/71
Me.	4/9/71	P. E. Sterling, K1TEV	6/9/71
Tenn.	4/9/71	H. A. Phillips, K4RCT	6/14/71
E. Pa.	4/9/71	G. S. Van Dyke, Jr., W3HK	6/15/71
Ore.	4/9/71	D. T. Justice, K7WWR	7/1/71
S. Dgo.	5/10/71	R. E. Leifler, WA6COE	7/10/71

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections, completing their election in accordance with applicable rules, each term of office starting on the date given.

Idaho	D. A. Crisp, W7ZNN	12/10/70
Michigan	I. J. Olinghouse, W8ZBT	12/10/70
Alberta	D. A. Sutherland, V16FK	1/10/71

Balloting results: In Kentucky, Ted Huddle W4CID and Charles D. Wright WB4KPE were nominated. W4CID (whose term began 10/30/70) received 158 votes and WB4KPE 115 votes. In Md.-D.C., Karl R. Medrow W3FA and Robert B. Weinstock WA3LYS were nominated. W3FA (whose term began 1/1/71) received 745 votes and WA3LYS 231 votes.

W1AW CODE PRACTICE

W1AW transmits daily code practice according to the following schedule showing speeds, local times/days and GMT times/days. Frequencies are: 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz. For practice purposes, the order of words in each line may be reversed during the 5-13

WIAW FALL-WINTER SCHEDULE

(Oct. 25, 1970—April 25, 1971)

The ARRL Maxxim 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 Nov. 26, Dec. 25, 1970; Jan. 1, Feb. 15, Apr. 9, 1971.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	.....	.....	.....	.....	RTTY OBS ¹	.....	.....
0030	←.....	.....	CODE PRACTICE DAILY ¹		10-13-15 wpm	.....	.....
0100	.....	←.....	.....	.....	CW OBS ¹		.....
0120-0130 ⁴	.....	.....	3.700 ⁵	7.020	3.520	7.150 ⁶	7.020
0130	.....	.....	3.700 ⁵	7.080	3.555	7.150 ⁶	7.080
0200	.....	←.....	.....	.....	PHONE OBS ²		.....
0205-0230 ⁴	.....	.....	3.820	50.120	145.600	1.820 ⁷	3.820
0230	←.....	CODE PRACTICE DAILY ¹ (35-15 wpm TThSat), (5-25 wpm MWFSn)				.....	.....
0330-0400 ⁴	.....	.....	3.555	.....	1.805	.....	3.555
0400	RTTY OBS ³	.....	.....	.....	RTTY OBS ³	.....	.....
0410-0430 ⁴	.....	.....	3.625	14.095	7.095	14.095	3.625
0430	PHONE OBS ²	.....	.....	.....	PHONE OBS ²	.....	.....
0435-0500 ⁴	.....	.....	7.220	3.280	7.220	3.820	7.220
0500	CW OBS ¹	.....	.....	.....	CW OBS ¹	.....	.....
0520-0530 ⁴	.....	.....	3.700 ⁵	7.020	3.945	7.150 ⁶	3.520
0530-0500	.....	.....	3.700 ⁵	7.080	3.945	7.150 ⁶	3.555
1400	.....	CODE PRACTICE ¹ (5-25 wpm MWF), (35-15 wpm TTh)					
1800-1900	21.28 ⁸	21.28 ⁸	21.28 ⁸	21.28 ⁸	21.28 ⁸	21.28 ⁸	.....
1900-2000	14.280	7.255	14.280	7.255	14.280	14.280	.....
2000-2100	14.280	21.28 ⁸	14.095	21.28 ⁸	7.080	7.080	.....
2130-2230	14.100	CW OBS ¹	14.100	CW OBS ¹	14.100	.....	.....
2230-2330	7.255	RTTY OBS ³	21.1 ⁹	RTTY OBS ³	7.255	.....	.....

¹ CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.
² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.
³ RTTY OBS (bulletins) 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 Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
⁶ WIAW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
 Maintenance Staff; WIs QIS WPR. *Times-lays in GMT. Operating frequencies are approximate.

wpm transmissions. Each tape carries checking references.

10-13-15	7:30 P.M. EST dy	0030 dy
	4:30 P.M. PST	
5-7½-10-	9:30 P.M. EST SntThS	0230 MWFSn
13-20-25	6:30 P.M. PST	
5-7½-10-	9:00 A.M. EST MWF	1400 MWF
13-20-25	6:00 A.M. PST	
35-30-25-	9:30 P.M. EST MWF	0230 TThS
20-15	6:30 P.M. PST	
35-30-25-	9:00 A.M. EST Th	1400 TTh
20-15	6:00 A.M. PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit

improving your fist by sending in step with WIAW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and December *QST* practice text to be sent in the 0230 GMT practice on the following dates.

- Feb. 17: It Seems to Us
- Feb. 23: Correspondence
- Feb. 26: League Lines
- Mar. 4: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

- Mar. 8: Accessories for your Receiver, p. 159
- Mar. 11: WWV Converter, p. 163



Strays

Feedback

In the January issue, page 86, we congratulated Al Hix who was named a Fellow in the Instrument Society of America. Al's call, erroneously reported as WA2HIU, is W8BT.

It's time again for the Colonie Central H.S. "Operation Day" (see Operating Events). Here's the 1970 award winner WA2HUK (right) receiving the award from the club's president WA2HVH.



• 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, John L. Penrod, K3NYG - SIC/PAM: W3DKX. RM: W3EEB. Renewals: WA3HWC as OVS and W3DKX as PAM. 1971 officers for the Maverick ARC are W3GAF, moderator; K3RUJ, recorder; WA3LYN, custodian; K3EPB, WA3IIX, K3RUD and W3ZNF, dir. W3HKS still is looking for the Kent county station he missed during the Delaware QSO Party. WA3LTD now is spotting an SR-160. W3EEB is back and busy in the traffic nets. Under the direction of W3GQJ, the St. Andrew's school now has a radio club, and club station K3HOE. The U. of Del. ARC has acquired the new Heath SSB line and are now working on a large type mystery type transmitter. Traffic: (Nov.) W3EEB 51, WA3KZO 4R, W3DKX 7, WA3LTA 7, WA3DUM 6, K3NYG 3, W3TRC 2. (Oct.) WA3KZO 47.

EASTERN PENNSYLVANIA - SCM, George S. Van Dyke, Jr. W3HK - SEC: W3ICC. RMs: W3EML, W3MPX, K3MVO, WA3AFI. PAMs: WA3GLI, K3PSO, VHF PAM: W3FGQ. OQ reports were received from W3NNC, K3RDT, K3HNP. OVS reports from WA3JZB, WA3EFC, W3CL, K3VAX, WA3MCK, WA3FMI, WA3NVO, WA3KFT. OBS reports from W3CBH, WA3FMI, WA3AFI, WA3KFT, WA3NVO. BPLs: W3MPX and WA3MKO. PSHR: WA3MKQ and W3MPX.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	6:45 P Dy	318	361	W3MPX
PTTN	3610	6:00 P Dy	256	231	WA3AFI
PFN	3960	5:30 P M-F	481	385	K3PSO
EPAEP&TN	3917	6:00 P Dy	228	79	WA3GLI

WA4TMY/3 is now W3ZTD. W3EML says traffic picking up and WA3LMO reports his traffic picking up also. W3CDB looks like material for TCC. WA3ATQ had a swell time on YLAP. W3HNR's DX QSL Bureau is growing. W3ADE doing a little in 160. K3MVO has been visiting family in the south but still worked plenty of ssb and cw with portable antenna and rig. W3BNR's XYL has given him another harmonic. WA3NVO has a new rig on 2-meters. K3WEI is back from Jamaica and busy with the ham gang at the Inglis house. W3EU is on 160 and met W3ADE. W3EU also installed a heater in the shack for winter operation. K3FOB has a new R4B receiver. K3QCQ is limited to 2-meters because of TVI. WA3IHA graduated from Electronics Inst. and now has his First Class Phone and big Advanced Class tickets. New officers for Warminster ARC for 1971 are WA3JGK, pres.; WA3HMW, vice-pres.; WA3OBI, secy.; K3ZAC, treas. Officers for Central Penn. Arc are K3SEW, pres.; WN3ONG, vice-pres.; WA3CPI, secy.; W3AVJ/K3JSX, treas. They have regular classes for hams every Thurs. at 6:00 P.M. Hope you all had a Merry Christmas and are on the way with a Happy New Year. Don't forget to write me with your ham activities. Traffic: (Nov.) W3MPX 436, W3EML 435, WA3LMO 194, WA3AFI 117, W3CDB 112, WA3LVC 93, K3PSO 67, WA3ATQ 60, W3HK 54, WA3CFU/3 48, W3HNR 42, W3OY 35, W3ADE 21, WA4TMY/3 18, WA3BSV 16, W3CBH 16, W3NNL 16, W3FFC 14, WA3JZB 14, W3JKX 12, WA3MCK 9, K3HKW 8, WA3EEC 6, K3RTH 5, W3OML 5, W3CL 4, WA3IAZ 2, K3MVO 2, WA3BJQ 1, W3BNR 1, W3EU 1, K3FOB 1, WA3JKX 1, WA3NVO 1, K3VAX 1, W3YR 1. (Oct.) WA3JZB 42.

MARYLAND - DISTRICT OF COLUMBIA - SCM, John Munnholland, K3LFD - SEC: W3LQY. PSHR (Nov.): W3ICS (40), WA3IYS (38), W3TN (31), W3EZF (30). BPL: W3TN. New appointments: WB6KGB/3 as EC, Anne Arundel and Howard Counties; WA3MMX as EC, Harford County; WA3LKI as EC, St. Marys County; WA3MSW as ORS. Johns Hopkins ARC became an

ARRL affiliated club in Oct. WA3NUL, voice of the Randallstown Sr. High ARC, is running an HW-100, mostly on 40- and 15-meters. Unofficial observers report "RST 593" on the signals of WA3PJQ in the Dec. issue of NMARC's newsletter. The beacon. W3ZSR spent most of Nov. working on the conversion of his 2-meter fm rig. W3CBG will be a school boy again for about five months before flying to Turkey in June on a 2-year assignment. Jury duty has cut into the daytime schedules of W3CDQ. W3FZY ran up a good Nov. traffic total and made 202 SS contacts besides. W3EOV had a busy month on the work bench refurbishing audio and mike circuits. WA3APQ is building a 6-meter amplifier. W3FUS is assisting the Severna Park YMCA with a Novice training program. W3ABC says more than 400 Md. amateurs have signed the call letter tags petition. W3HXF has taken over the "legislation watch" while W3ABC handles an assignment in 5RN-Land. WA3LWT is a proud father - father of the new MDDS Bulletin, that is, W3CZ is county hunting with a QRP rig, score now stands at 238, is shooting for 500 in all 50 states.

WA3IYS keeps OB schedules on 3643 kHz at 2345 GMT, Mon. through Fri. In his first report to the SCM in 30 years, W3BHE, in Cumberland, says he's active again keeping cw skeds with recently licensed No. 1 son, WN3PKS, in Silver Spring. While W3FA pounded the brass furiously in the Nov. SS, MDC voters pounded the ARRL polls decisively and swept him into office as their SCM. Congrats. W3OCW has a new inverted "Y" working just great on 75. At a dinner meeting, Dec. 1, the Antietam ARA toasted W3EPC, our Division Director, and a new slate of officers: W3SQA, pres.; WA3EOP, vice-pres.; WA3MXG, secy.-treas.; W3GEL, act. mgr. The Itchiboo Park VHF Amateur Radio Society will sponsor a World-Wide VHF Activity, Mar. 6, 8, 1971. Now, with our final column-QSO concluded, your current scribe pulls the big switch and goes QRT. Thanks to all for your reports and help with NIS, AREC, OBS, OO and OVS assignments. It's been a pleasure working for and with you and we'll BCNU around the bands. ARL sixty to everyone for seventy-one! Traffic: WA3IYS 488, W3TN 299, W3FZY 98, W3FA 74, W3ECS 68, W3OKN 57, WA3LWT 50, W3EOV 42, W3EZF 35, K3LFD 35, W3CBG 33, WA3MVO 20, WA3MJF 11, WA3AFQ 9.

SOUTHERN NEW JERSEY - SCM, Charles E. Travers, W2YPZ - SEC: W2LVW. PAM: WB2FJE.

Net	kHz	Time(PM)	Sexs.	QNI	T/c.	Mgr.
NJPN	3930	6:00 Su	5	—	—	WB2FJE
NJEPTN	3950	6:00 M-S	30	524	162	WA2TAA
		9:00 Su				
NJN Early	3695	7:00 Dy	30	440	210	WA2BAN
NJN Late	3695	10:00 Dy	24	234	76	WR2FEH

I am happy to report that WA2KAP is back on NJEPTN. Best wishes for your continued good health Joe. SEC W2LVW reports WA2SEA as the new Red Bank EC. W2LVW is back on NJEPTN with an excellent signal and reports 113 AREC members with 3 active emergency nets, 2 of which are NTS hanson. More help is needed in this area. Contact your SEC for assignment so that all areas in the Southern New Jersey section can be covered in case of necessity. W2ORS, reports excellent results with his "beer can" co-ax antenna on 2-meters. WB2JSS operating the college station WIKBN, scored 56-k points in the recent SS. WA2DVU is a new member of Army MARS. W2YPZ, was elected treas. of the Delaware Valley Chapter of QCWA at a recent dinner meeting held in Pa. Also present was W2CDZ a recent new member and his XYL W2FGS. K2RXB is back after a busy fall with an excellent report of activity. OBS K2ARY reports the transmission of 7 bulletins during Oct. and Nov. Traffic: (Nov.) WB2VEJ 169, K2RXB 80, W2YPZ 43, W2J1 13, WB2FJE 10, W2IU 10, W2ZQ 10, W2ORS 8, WB2SFX 7, WB2HMU 6. (Oct.) WB2HMU 16.

WESTERN NEW YORK - SCM, Richard M. Pitzeruse, K2KTK - Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. Section nets appear in July QST. Welcome to WN2IKL. WA2GZC expresses interest in an OO appointment as does WA2UJM. WN2OXL 13, WN2OXA 11, WN2LNB 14, are harmonics of W2VDX and W2FWE, who are also proud of their new TH-6DXK. After two years of trying WA2EWC has made WAS. He now is temporarily QRT awaiting the arrival of a new FT-DX560. WB2ZOW and WB2YEE

(Continued on page 116)

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new
ball game!
NOW...
buy SWAN
amateur
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ship provided by knowledgeable distributors. Thus with no sacrifice in Swan's high standards of engineering, reliability, and craftsmanship we can now offer our products for prices which are more than competitive with any foreign-made equipment.

Write for the complete 1971 Swan catalog. We invite you to select either of the following purchase plans.

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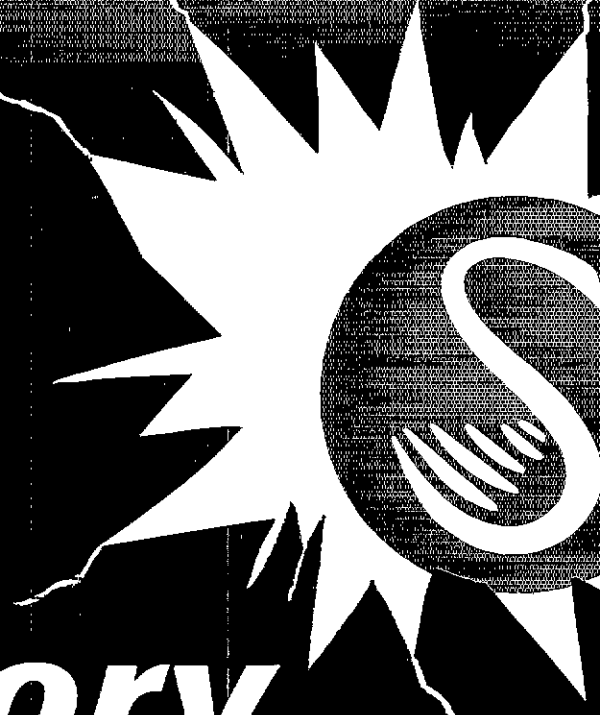
Direct purchase from our East Coast branch or from our factory in California, without trade-in; payment by check or money order or through Master Charge or BankAmericard, or arrange your own financing with your local bank. Freight prepaid by Swan.

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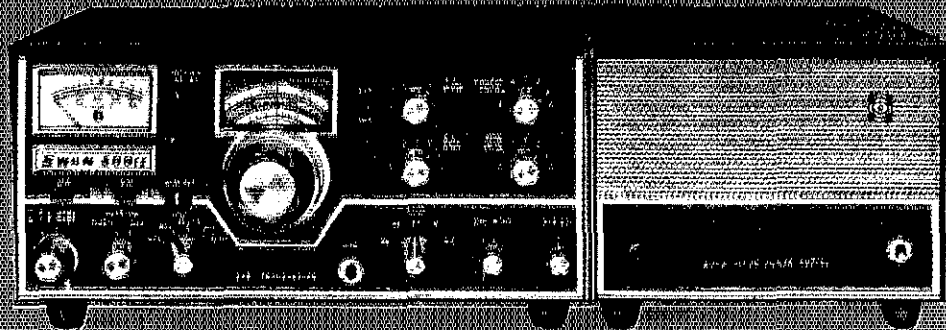
Ask the ham who owns one.



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500CX



550 WATT 5 BAND SSB-CW-AM TRANSCEIVER

SPECIAL DESIGN FEATURES

All Swan Transceivers feature single conversion which results in greatly reduced image and spurious response. The successful application of this design is made possible by the unique combination of a high frequency IF system and a multi-range variable frequency oscillator. The only thing better than single conversion is no conversion at all.

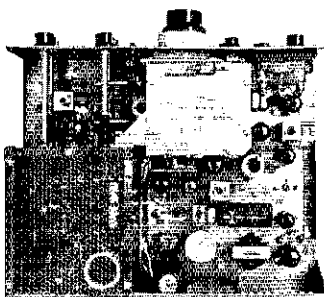
Selectivity is provided by a high frequency crystal lattice filter second to none. The 5.5 MHz carrier frequency and 2700 Hz bandwidth were carefully selected for optimum results. Swan's 5.5 MHz design produces the optimum shape factor, steepest skirts and greatest ultimate rejection. The more commonly used 9.0 MHz filters simply cannot provide comparable skirt selectivity or ultimate rejection of strong adjacent signals. The 2.7 kHz bandwidth was chosen for maximum readability of voice under conditions of noise, and ORM. As this bandwidth is reduced the transmission and reception of intelligence is rapidly depreciated. Swan Transceivers both transmit and receive audio which is virtually flat from 300 to 3000 Hz, resulting in truly natural sounding voice quality. This is why Swan Transceivers consistently sound better than others which pass 300 to 2400 Hz or less.

Superior selectivity is available with the optional SS-16 filter. This is a special 16 pole network designed exclusively for Swan by CF-Networks. A shape factor of 1.28 to 1 and ultimate rejection greater than 140 db provide the highest degree of selectivity ever offered in amateur or commercial gear. Bandwidth is the same 2700 Hz as the standard Swan filter, for the same reasons of high voice quality and readability under adverse conditions.

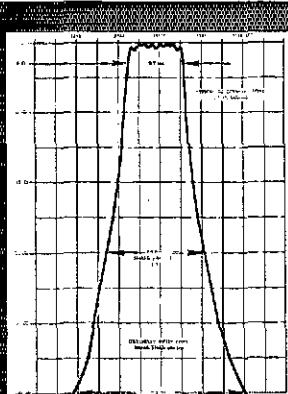
\$449

Sensitivity of the Swan receiver circuitry is second to none. Using the best vacuum tubes available for the R. F. amplifier, signal to noise ratios run as high as the state of the art permits, without the inherent overload problems found in solid state receivers. The new automatic gain control circuit employed in the 500CX further reduces cross modulation and front end overload to extremely low levels.

The Velvet Tuning dual-ratio planetary dial drive in the 500CX is without question the smoothest system you'll find. It is virtually free of backlash!



TOP VIEW



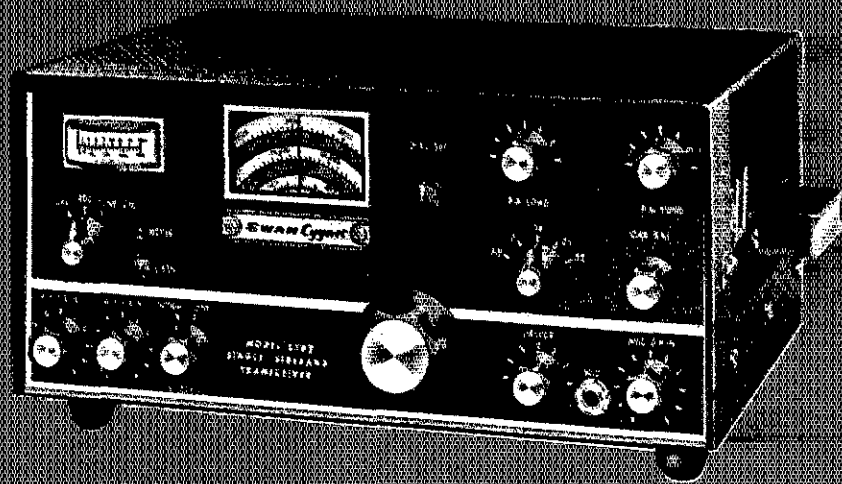
SWAN'S NEW 500CX
 The 500CX is a 5-band, 550-watt SSB-CW-AM transceiver. It features a 5.5 MHz carrier frequency and a 2700 Hz bandwidth. The transceiver is designed for high selectivity and readability, with a high frequency crystal lattice filter and a multi-range variable frequency oscillator. It is available with an optional SS-16 filter for even higher selectivity. The 500CX is a true performer, offering the best in voice quality and readability. It is the only transceiver that can handle the toughest conditions of the airwaves. The 500CX is a true performer, offering the best in voice quality and readability. It is the only transceiver that can handle the toughest conditions of the airwaves.

Swan Prepays Freight!*

(*See order page for details.)



Deluxe *Cygnets* 270B



SSB TRANSCEIVER 5 BANDS—260 WATTS WITH BUILT-IN AC POWER SUPPLY AND LOUDSPEAKER

The deluxe Cygnets is a complete amateur radio station beautifully integrated into one package. It contains all the features required for home station operation with enough power to work the world. Its surprising low cost is a result of our continuing program of value engineering.

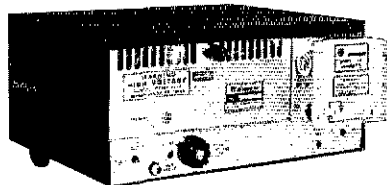
The lightweight, compact design of the Deluxe Cygnets makes it an ideal traveling companion. You can take it with you on your vacation or business trip, and operate from your motel room, summer cabin, boat or car. All you do is connect to an AC power source, plug in your microphone, and antenna—you're on the air. Twelve volt DC operation may be obtained by using the optional plug-in accessory, Model 14A DC converter.

The Swan Deluxe Cygnets is the most versatile and portable transceiver on the market, and certainly the best possible value.

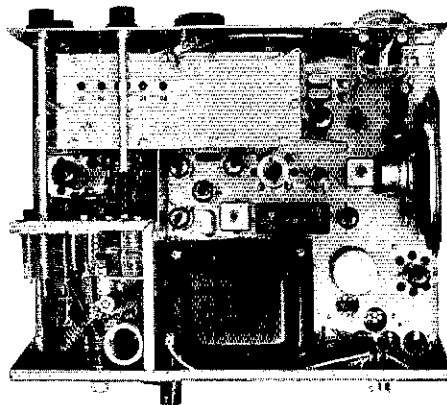
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Model 14A DC Converter

Shown in rear view above..... **\$29**



REAR VIEW

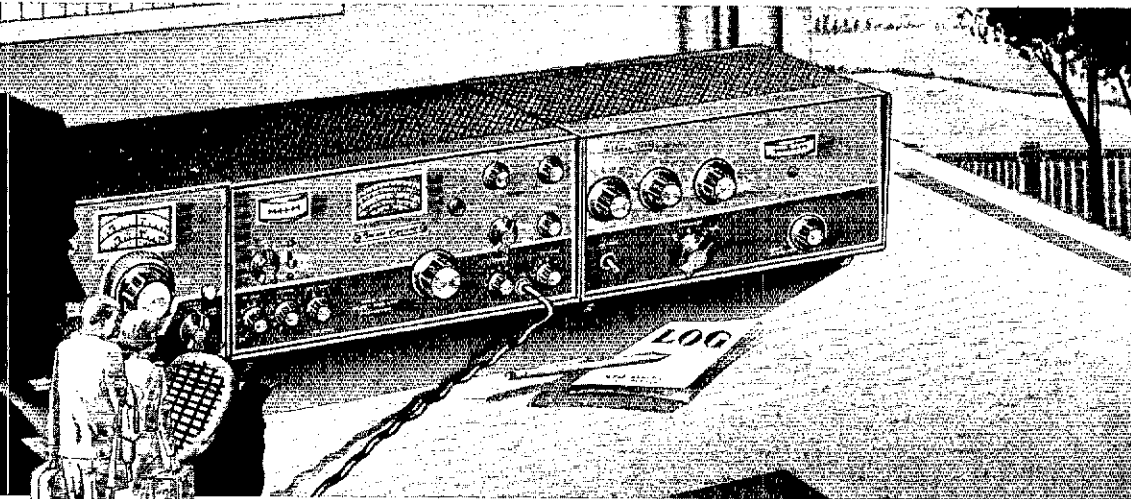


TOP VIEW

Swan quality at import prices!

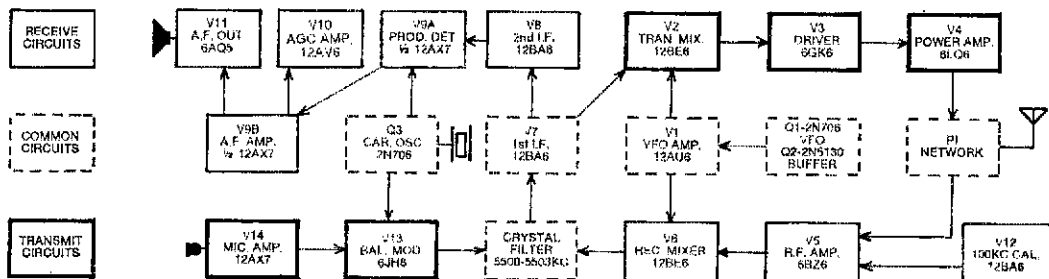


Portable...Versatile



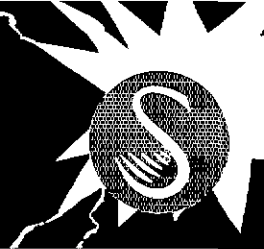
Cygnet 270B SPECIFICATIONS

- Power Input: 260 watts P.E.P. SSB and 180 watts CW
- Frequency Range: 3.5-4.0 mHz, 7.0-7.3 mHz, 14.0-14.35 mHz, 21.0-21.45 mHz, 28.0-29.7 mHz
- C.F. Networks: Crystal Lattice Filter. Same as used in the Swan 500 CX 2.7 kc with 1.7 to 1 shape factor. Ultimate rejection exceeds 100 db
- Unwanted sideband suppressed 50 db
- Carrier suppressed 60 db. 3rd order distortion down approx. 30 db
- Audio Response: flat within 3 db from 300 to 3000 cycles in both transmit and receive modes
- Pi Antenna coupler for 50 to 75 ohm coaxial cable
- Grid Block CW keying with off-set transmit frequency
- Solid state VFO circuit temperature and voltage stabilized
- Receiver sensitivity better than 1/2 microvolt at 50 ohms for 10 db S + N/N ratio
- 100 kc Crystal Calibrator and dial-set control
- S-meter for receiver, P.A. Cathode meter for transmitter tuning
- Improved AGC and ALC circuit. Separate R.F. and A.F. gain controls
- Sideband selector
- Provision for plug in of VOX unit, external VFO, headphones, and Cygnet Linear
- Tube Complement: 12AU6 VFO amp., 12BE6 trans. mixer, 6GK6 driver, 6LQ6 pwr. amp., 6BZ6 rec. R.F., 12BE6 rec. mixer, 12BA6 1st I.F. amp., 12BA6 2nd I.F. amp., 12AX7 prod. det. A.F. amp., 6AQ5 A.F. output, 12AX7 mic. amp., 6JH8 bal. mod., 12AV6 AGC-ALC amp., 12BA6 xtal. cal.
- Voltage Input: 117 volts 50-60 Hz. Available on special order for 208-220-240 volts.
- For 12-14 volt DC operation, a plug-in converter, model 14-A, is available. This unit is only 1 1/2x3x4 in., and plugs onto the back of the 270B in place of the AC power connector.
- Dimensions: 5 1/2 in. high, 13 in. wide, 11 in. deep. Net weight: 24 lbs.



BLOCK DIAGRAM 270B

***Swan Speaks Your
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600R

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ELECTRONICS



SWAN'S NEW FACTORY DIRECT PRICE LIST

MODEL & ORDER NUMBER	DESCRIPTION	FACTORY DIRECT PRICE
TRANSCEIVER:		
270B	Deluxe Cygnet, 5 Band Transceiver	\$399.00
500CX	Deluxe, 5 Band Transceiver	\$449.00
250C	6 Meter Transceiver	\$399.00
TV-2B	2 Meter SSB Transverter	\$289.00
FM-2X	2 Meter FM Transceiver	\$229.00
EXT. OSC'S:		
510X	10 Channel xtal osc. for use with all 5 band transceivers	\$ 44.00
508	Full coverage VFO for 270B/350C/500C/500CX	\$129.00
210	6 Meter VFO for 250C only	\$ 99.00
POWER SUPPLIES:		
117XC	117 VAC 50-60 hz AC Supply for 350/500 series with spkr.	\$ 95.00
117X	Basic AC Supply, no cabinet or speaker	\$ 59.00
14-117	12 volt DC Supply with 117 volt AC Supply	\$118.00
14C	12 volt DC Converter for 117-X AC Supply	\$ 59.00
14A	12 volt DC Converter for 270B	\$ 29.00
AMPLIFIERS:		
VHF-150	2 Meter FM/CW/SSB 150 Watts Power Amplifier	\$249.00
1200W	1200 Watt Linear Amplifier with self-contained Power Supply	\$189.00
Mark II	5 Band 2000 watt linear amplifier with Power Supply and Tubes	\$499.00
Mark 6B	6 Meter 2000 watt linear amplifier with Power Supply and Tubes	\$499.00
MOBILE ANTENNAS:		
55	5 bank remote control switching	\$ 99.00
45	5 band, manual switching	\$ 69.00
35	Single band high Q model	Various
BEAM ANTENNAS:		
TB-4H	4 element, heavy duty	\$119.00
TB-3H	3 element, heavy duty	\$ 99.00
TB-3	3 element, standard	\$ 84.00
TB-2	2 element, standard	\$ 69.00
1040	Trap Vertical for 10, 15, 20 & 40 Meters	\$ 49.00

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- ★ THE RADIO AMATEUR'S LICENSE MANUAL
- ★ LEARNING THE RADIO TELEGRAPH CODE

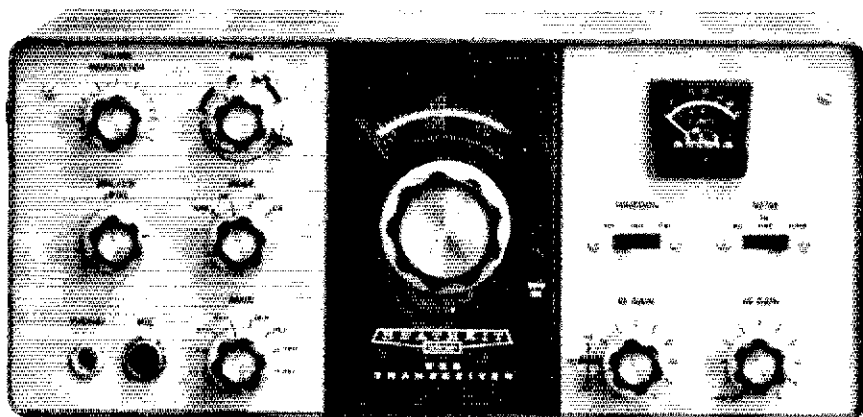
Anyone starting out in amateur radio will find these publications a necessary part of his reading and studying for the coveted amateur radio operator's ticket. Written in clear, concise language, they help point the way for the beginner. Tried and proven by thousands upon thousands of amateurs, these ARRL publications are truly the "Gateway to Amateur Radio."

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NEW Heathkit® HW-101... \$249^{95*}

World's best low cost rig is now even better. The Hams at Heath have done it again... by adding important new performance features to the famous HW-100... without adding to the price. That's Heathkit value... and this is the rig...

Improved receiver circuitry now delivers 0.35 μ V sensitivity for 10 dB S+N/N.

Improved dial drive mechanism. New ball-bearing drive assembly provides a 36 to 1 knob to dial turning ratio... delivers 34 velvet-smooth knob revolutions per 500 kHz band segment.

Front panel switch selection of SSB or CW filters. Now choose the built-in 2.1 kHz or optional 400 Hz filter with just a flip of a switch.

Plus all the features that made the "100" the world's most popular transceiver. Add it all up and you've got the new HW-101... a lot more rig for a little less money. From the Hams at Heath, of course.

- Kit HW-101, 23 lbs. \$249.95*
- Kit HP-23A, AC supply, 19 lbs. \$51.95*
- Kit HP-13A, DC supply, 7 lbs. \$69.95*
- SBA-301-2, 400 Hz CW filter, 1 lb. \$21.95*
- SBA-100-1, mobile mount, 6 lbs. \$14.95*

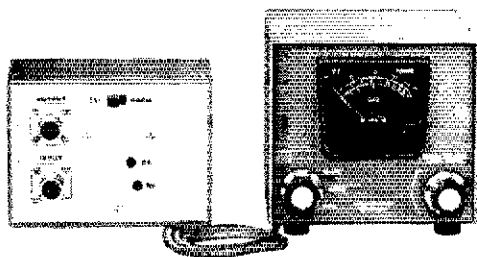
HW-101 SPECIFICATIONS — RECEIVER: Sensitivity: Less than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 dB down; 7 kHz maximum at 60 dB down (3.395 MHz filter). **CW selectivity:** (with optional SBA-301-2 CW crystal filter installed); 400 Hz min. @ 6 dB down; 2.0

kHz max. @ 60 dB down. **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. **TRANSMITTER:** **DC power input:** SSB, (A3J emission) 180 watt PEP (normal voice, continuous duty cycle). CW, (A1 emission) 170 watts (50% duty cycle). **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohm to 75 ohm with less than 2:1 SWR. **Oscillator feed-through or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker or headphone in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of -45 to -55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF compression (TALC*):** 10 dB or greater at 1 mA final grid current. **GENERAL:** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. **Less than 100 Hz for \pm 10% line voltage variations.** **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Transistors:** MPF105 FET-VFO; 2N3393-Voltage regulator. **Rear apron connections:** CW Key jack; 8 ohm output; ALC input; Power and accessory plug; RF output; Spare. **Power requirements:** 700 to 850 volts at 250 mA with 1% maximum ripple; 300 volts at 150 mA with .05% maximum ripple; -115 volts at 10 mA with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14 1/2" W x 6 1/2" H x 13 3/4" D. *Triple Action Level Control™

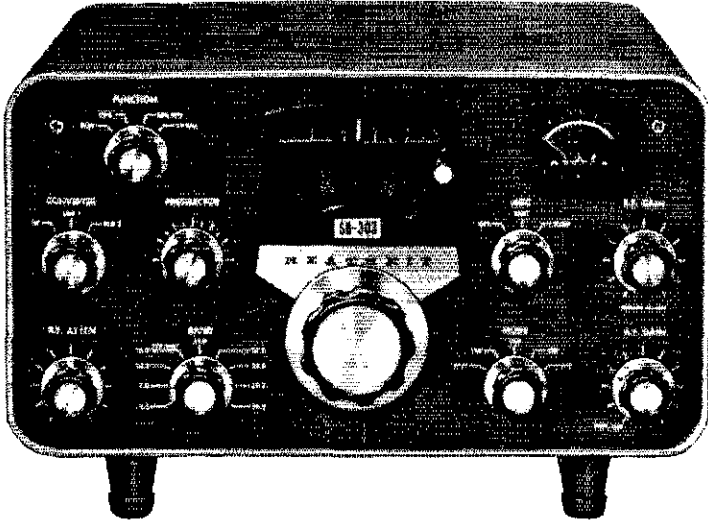
New Heathkit® Wattmeter... \$29.95*

You asked for it... a low cost high quality Heathkit wattmeter. New HM-102 measures RF power output from 10-200 W and 100-2000 W in two switch-selected ranges. Built-in calibrator permits 10% accuracy throughout the 80-10 M bands. Built-in SWR capability. Negligible loss permits permanent insertion in any 50 ohm line. Exclusive remote detector allows placement of meter in any location. Put the new HM-102 in your shack now... it's another powerful value from the Hams at Heath.

Kit HM-102, 3 lbs. \$29.95*



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the Heathkit® SB-303... \$319^{95*}

The "303"... a new performance standard for receivers. The renowned Heathkit "300" & "301" are a tough act to follow because of their obvious performance superiority and value. But the Hams at Heath have come up with the last word again in the new solid-state SB-303, already a standard-setter for the industry.

Advanced solid-state design using 27 silicon transistors & 1 IC delivers instant warmup, 100 Hz stability in 10 minutes and better LMO linearity. The exclusive Heath factory assembled solid-state LMO with 1 kHz readout gives the smooth, linear tuning that the SB-series is famous for. A dual-gate MOSFET front end provides greater dynamic range and large signal handling capability with low distortion.

Features built-in, not added on... no costly options in this rig. Compare the "303": full transceive capability with the "400" or "401"... 3-position AGC... 25 kHz calibration... antenna & power connection for two VHF converters... 15 MHz WWV reception. Check the specs: 2.1 kHz selectivity... less than 0.25 uV sensitivity... 60 dB image rejection.

Send for a free spec sheet, then order your "303"... and learn what hundreds of owners call their new "303": the hottest one yet from the Hams at Heath.

Kit SB-303, 19 lbs.\$319.95*
SBA-301-1, optional 3.75 kHz AM Xtal filter \$20.95*
SBA-301-2, optional 400 Hz CW Xtal filter...\$21.95*

SB-303 SPECIFICATIONS - Frequency Range: (MHz) - 3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.5, 15.0 to 15.3, 21.0 to 21.5, 28.0 to 30. Intermediate Frequency: (IF) - 3.395 MHz. Frequency Stability: Less than 100 Hz drift per hour after 10 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% line voltage variation. Fre-

quency Selection: Built-in Linear Master Oscillator. Modes of Operation: SSB - Single sideband (suppressed carrier, with selectable upper or lower sideband). CW - Keyed continuous wave. AM - Amplitude modulated continuous wave. RTTY - Radio teletype (frequency-shift keyed continuous wave). Sensitivity: Less than 0.25 uV for 10 dB S+N/N for SSB operation. Overall Gain: Less than 1.5 uV input for 0.5 audio output (single tone SSB). AGC Characteristics: Blocking - Greater than 3.0 V CW/SSB/RTTY. Dynamic Range - Greater than 150 dB CW/SSB. RF Attenuator: Variable 0-40 dB nominal. Selectivity: SSB - 2.1 kHz @ 6 dB down, 5.0 kHz maximum @ 60 dB down (crystal filter supplied). CW - 400 Hz at 6 dB down, 2.0 kHz maximum at 60 dB down (crystal filter available as an accessory). AM - 3.75 kHz at 6 dB down, 10 kHz maximum at 60 dB down (crystal filter available as an accessory). RTTY - 2.1 kHz at 6 dB down, 5.0 kHz maximum at 60 dB down (uses SSB crystal filter). Image Rejection: 60 dB or better. IF Rejection: 3.395 - greater than 55 dB. 3.595 - greater than 50 dB. Spurious Response: All below 1 uV equivalent signal input. Temperature Range: 10°C ambient. Dial Accuracy: Electrical - Within 400 Hz after calibration at nearest 100 kHz or 25 kHz point. Visual - within 200 Hz. Calibration: Every 100 kHz or 25 kHz. Dial Backlash: No more than 50 Hz. Antenna Input Impedance: 50 ohm nominal unbalanced. Power Requirements: 105 to 125 or 210 to 250 VAC, 40 W max. Dimensions (with knobs & feet installed): 12¼" W x 7¼" H x 14" D. Net Weight: 15¾ lbs.



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For over 40 years Henry Radio has served the world amateur radio fraternity by offering fine communications equipment and all the specialized responsible merchandising services which make amateur ownership of such equipment possible and pleasurable. This record establishes Henry Radio as one of the pioneer amateur electronic distributors in the world.

Now in recent years, through an unfortunate combination of circumstances, the entire amateur distributing business in the United States has come under severe economic pressure. More than half of the established amateur distributing businesses have either closed their doors or shifted into some other activity during the past ten years. At Henry Radio we feel that this is both a tragic and unnecessary turn of events. Part of the problem has been the shrinking size of the total amateur market at a time when most other leisure time activities are vigorously growing and expanding. Part of the problem has been a series of destructive merchandising policies by some manufacturers and distributors. Now the problem assumes new urgency as a principal manufacturer changes over to a direct sales policy.

At Henry Radio we are proud of the long term contributions we have made to the well-being of the amateur fraternity in the United States and throughout the world. We believe that Henry Radio and other local amateur distributors are a vital ingredient in the continuing well-being of amateur radio. We are cognizant of the service we have always provided and will continue to provide. We believe your local distributor is also capable of making such a contribution.

For this reason, at a time when many distributors no longer have an adequate choice of fine equipment to offer their customers, Henry Radio, in order to more fully support radio amateurs throughout the United States, is offering its exclusive merchandise to other selected distributors. This merchandise includes the famous Henry 2K-4 amplifier, the Kenwood receiver and transmitter, and the Tempo SSB and FM transceivers. In the past many of these distributors might have been considered competitors of Henry Radio. However, at a time when the entire future of amateur equipment distributing may be in question, we take this unusual and dramatic step, so that our fraternity will fully comprehend Henry Radio's commitment to a strong healthy distributing program in the United States. We solicit your support for this program.

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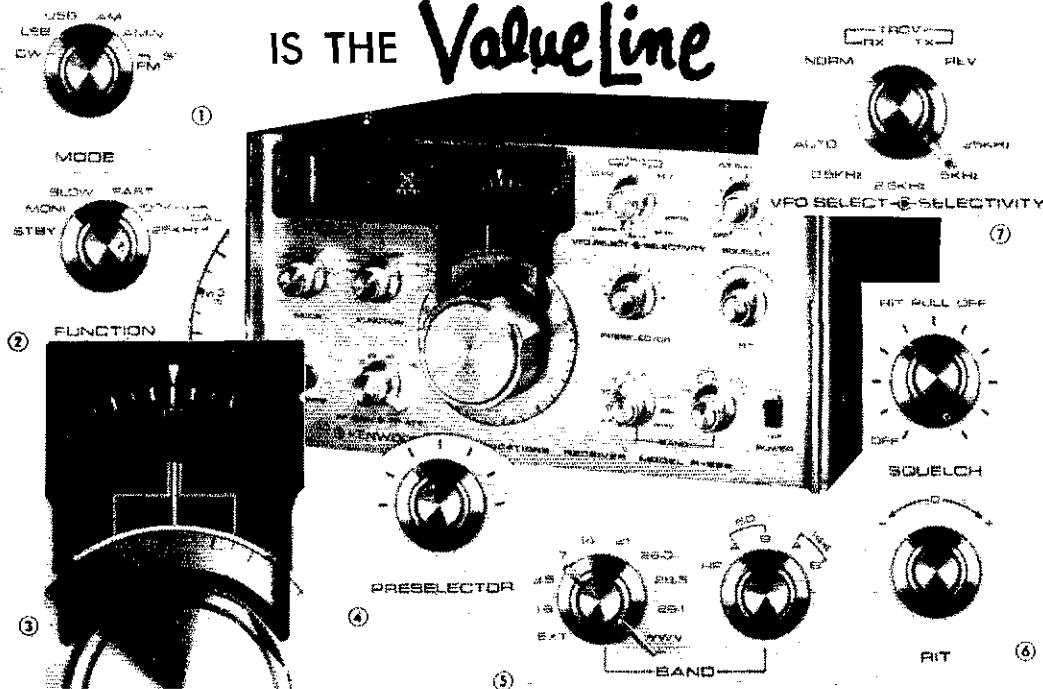
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ing of receiver when Kenwood units are operated in transceiver configuration. ⑥ **SQUELCH** — Allows squelch feature for receiver, turns RIT off by pulling knob out. ⑦ **VFO SELECT** — Chooses VFO of either unit in transceiver operation or allows each VFO to operate independently. ⑦ **SELECTIVITY** — Automatically selects appropriate filter for selected mode or choose 2.5 KHz filter for LSB and USB, 500 Hz filter for CW, 5 KHz filter for AM (and AM with noise limiter), and 25 KHz filter for FM.

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Operating Events

(Continued from page 95)

28600. Exchange serial nr., RS(T) and county (New Mexicans), state or country for others. Stations may be contacted once on each band and mode. Score 1 point per QSO on 40, 20 and 15; 2 points on 80 and 10; 3 points on all other bands. Mult. is the sum of states plus countries for New Mexicans (KH6, KL7 and USA do not count as countries), and the total nr. of New Mexico counties (max. 32) for others. New Mexico stations may work other New Mexico stations for a multiplier only. A certificate to top New Mexico scorers and to high scorers in each state/country making a minimum of 5 contacts. Additional awards to state and national winners. Full log data (including exchanges) should be sent to WSPDO, the Los Alamos ARC, Box 787, Los Alamos, N. Mex. 87544 no later than May 1, 1971. Dupe sheets required from all stations with more than 25 QSOs. Include an s.a.s.e. for a copy of the results.

29 W1AW Morning Qualifying Run at 1400 GMT.

APRIL

2-5 The Old Old Timers' Club will hold its 1971 QSO Party starting and ending at 2300 these dates. Suggested freqs. for locating the gang are plus or minus the following: 3520 3530 3820 3830 7020 7030 7240 7260 14279 14290 21021 21030 21270 and 21280. Participants should avoid any possible interference to any of these frequencies which may be used for net operation. Further info, if necessary from W6MLZ.

3-4 Connecticut QSO Party.

3-4 Florida QSO Party, sponsored by Fla. Skip on Sat. 1500-2000 Sun, 0000-0500 and 1400-2359; all times GMT. All amateurs invited to participate. Fla. stations send RS(T) and county, non-Fla. stations send report and state, province or country. Sequential QSO numbers are NOT to be exchanged. No power or time limits. Suggested freqs.: 1807 3571 7071 14071 21071 28071, 1817 3971 7271 14217 21371 and 28371. Stations may be contacted once on each cw and each phone band. Cw and phone are separate entries not to be summed for any awards. Multipliers count only once. Fla. stations score 1 pt. per QSO times nr. of states, provinces and countries (DX counts as Md.). Other Fla. stations may be worked but only for contact points, NOT for a multiplier (max. mult. 71, 49 states, 10 provinces and 12 DX). No more than 12 DX countries will count toward the multiplier. Multiplier. Single transmitter per mode, minimum 50 QSOs. Non-Fla. stations score 1 pt. per QSO times nr. Fla. counties (67 max.). Appropriate certificates and trophies. Logs postmarked by Apr. 30, 1971 mailed to Fla. Skip Contest Chairman, Box 501, Miami Springs, Fla. 33166. A summary sheet with your name, call, address, claimed score, category, station location and customary declaration must be included or the entry will be disqualified. Messy entries will not be considered. Scores to appear in the June or July issue of Fla. Skip, include a 6 cents stamp with your log if you wish a copy. Copies of rules also from same address for an s.a.s.e. Decisions of the Contest Committee are final.

3-4 SP DX Contest, 1500Z Apr. 3 to 2400Z Apr. 4. Object for non-SP stations to contact as many SP stations in as many SP powiats as possible. Contacts between SP and foreign stations only will count for contest points, cw only 80-10 meters. Non-SP stations send RST plus QSO nr., starting with 001. SP stations send RST plus their Powiat abbreviation. Each SP (or 3Z) counts 3 points, only 1 contact per band. A multiplier of 1 for each different powiat, which can be counted as a multiplier only once during contest. Single op.'s final score equals total QSO points times the number of powiats. Multi. same as single except that the nr. of powiats on all bands may be summed and used. Multiops score same as multiband single op. No more than 1 transmitter may be used with the same call. First place awards in each category, each country; multiband awards 2nd and 3rd place where justified. Log in GMT, separate sheet per band, plus summary sheet and clear name/address and usual declaration. Logs postmarked no later than May 1 to Contest Mgr. PZK, Box 320, Warsaw 1, Poland.

7 W6OWP Qualifying Run.

13 W1AW Qualifying Run.

17-19 CD Party cw. This is a quarterly event for League appointees and officials, notified separately by bulletin. Check with your SCM, page 6, to see if you can qualify for an appointment. The July event is open to all ARRL members.

24-26 CD Party, phone version.

JUNE

12-13 VHF QSO Party.

26-27 Field Day.



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Station Activities (Continued from page 100)

took 1st and 2nd places respectively in the Delta QSO Party. WB2YEE also received the BFARS award put out by the Boeing Employees ARC. Sorry to report the passing of W2UAT. More than 50 stations participated in a snow-storm emergency in an unscheduled session of the Western New York Emergency Net. RAWNY scheduled one monthly meeting with no business, no guest speaker, just eye-ball QSOs. For details of the experiment contact them any morning at 1430Z on 3910 kHz. W2RAZ is vacationing in Europe and is keeping skeds back home. W2KZ who looks 40 is celebrating 50 years of ham radio. W2EAF who QSYed here from ENY and his XYL are befuddled by WNY weather. WB2VND is having rig trouble. W2CTP spoke on ECARS at the Nov. RAGS meeting and also is doing the same for the club down Erie way in Feb. W2EMW QSYed to 40 when the tribander's rotor got stuck. The 1971 New York State QSO Party will be held May 1 and 2 and is sponsored by the LERA ARC. For details contact WB2OZC. RAGS plan on having QST author K3JH as a speaker in the near future. If interested in attending, contact K2KIR. ESS lists W2s DSS and RQF, K2s IML and UIR, WA2s DHS, ICB, ICU, WB2s LQP and VND as roster stations. The WNY hamfest will be May 15 in Rochester. Traffic for Nov. with the * indicating a qualifier for PSHR: W2OE* 435, W2FR* 291, WA2ICU* 241, W2RUF* 155, WA2BEX* 153, K2KQC 119, W2HYM 107, W2MTA* 106, K2KTK* 99, WA2IB 90, WB2LQP 67, W2EAF 55, W2FEB 53, W2RQF 53, W2MSM 49, W2DRU 43, K2OFV 38, WB2RHJ 37, WA2DHS 36, WB2JNW 35, WB2VND 30, W2WS 18, K2IMI 14, W2PVI 12, W2CKM 10, K2RTQ 10, W2AFB 8, K2BRE 6, WB2GTU 6, WB2YEE 6, W2CFP 4, WA2EWC 3, WN2EKL 3, K2POF 3, W2FMW 2, WA2AIV 2, W2RUT 2, WA2OHV 1, (Oct.) W2AFB 15, WA2IYB 6, WA2AIV 4, WA2GLA 3.

WESTERN PENNSYLVANIA - SCM, Robert F. Gawryla, W3NEM - SEC: W3KPI. PAM: K3ZNP. RMS: W3LOS, W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 P.M. local time; WPP meets daily on 3955 kHz ssk at 10:00 P.M. local time; KSSN meets on 3585 kHz at 6:30 P.M. local time. The Radio Association of Erie elected new officers for the coming year: K3UPC, pres.; K3VXL, vice-pres.; WA3KAI, secy.; WA3MAU, treas.; W3SN, WA3HDK, W3KPM, WA3GIV, dir. W3KT has 347 DX countries confirmed. The Etna RC elected the following officers for the next year: K3VYO, vice-pres.; W3OJM, secy.; W3RIH, treas.; K3HZL, act. mgr.; K3JOTY, dir.; K3HZL, trustee. The Etna Club is looking for a qualified amateur operator to instruct and assist as radioman at the Western Pennsylvania School for Blind children. Anyone interested contact W3TZW. Our SEC says the severe snow storm in the Erie area on Nov. 23, 24 activated the RoadPatrol with 13 amateurs participating. Steel City ARC says WA3GXO and K3ZVB now are operating amateur TV stations. Also WA3LIA and W3SVJ operated the club station W3KWEI in the Boy Scout Jamboree. Two Rivers ARC advises the Mon-Yough fire defense council conducted a disaster drill and the TRARC had no prior warning but ended up shining with participation. K3AFO reports hams in the Erie area performed their annual "Rat Patrol" on Halloween. Presque Isle RC had W3RRB as guest speaker who gave a slide and talk report on his recent trip to Russia. WPA Traffic Net had 30 sessions, 421 QNI and 262 messages (a new record). WPP, 26 sessions, 94 QNI and 19 messages. Traffic: WA3IPU 216, W3KUN 158, K3HKK 156, W3LOS 135, W3ATQ 116, W3NEM 80, K3ZOB 66, K3SOH 38, WA3LIA 29, K3VQV 28, K3SMB 18, K3SJN 15, K3HCT 14, W3UHN 8, W3SN 5, W3IDO 3.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. PAMS: WA9CCP and WA9PDI (vtd). RM: WA9ZUF. Cook County EC: W9HPG.

Net	Freq.	GMT/Days	Tfr.
IEN	3940	1400 Su	14
ILN	3760	2330 Dy	169
NCPN	5915	1300/1800 M-S	73
III PON	3915	2245/1430 M-F	510
III PON	145.5	0200 MWF	20
III PON	50.28	1200 M	6

My very sincere sympathy to the family and friends of W9MSG, Ray Birren who recently passed away. Ray was the manager of the 9 QSL Bureau for many years and was a tireless worker for the League. With deep regret I also report the passing of W9YTO. The 9RN Net passed a traffic count of 580 reports Net Mgr. W9HRY. WA9PYU gave a color slide report on his DXpedition to Northern France at the Dec. meeting of the York Radio Club. K9SJM is in HL9-Land with a call of HL9TH on a once-a-week schedule on

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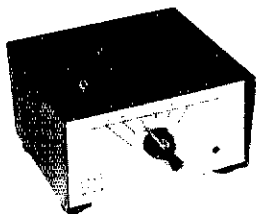
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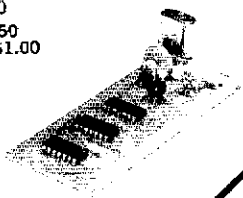
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21.39. The Sterling-Rock Falls Amateur Radio Society held their annual Chicken Dinner and election on Nov. 19. K9LFA was appointed City of Belvidere Communications Director and groundwork is being laid for their CD plan. The new officers of the Six Meter Club of Chicago, Inc. are K9FNZ, K9ZVU, K9YJQ, K9ZVW, WA9NTA, WA9RIJ, WA9WBW and Blanche Thurma. K9GUH is the new pres. of the Prairie Amateur Radio Club of Galesburg and reports that the club is working out details for a spring code and theory course at the Carl Sandburg Junior College. W9D9V now is operating with a daily schedule on 20- and 40-meters. WB9FDP is a new (VYS (vhf) appointee. WA9NEJ now is an Extra Class licensee. WN9APF now is WB9APE. W9TAL's equipment includes the Drake Twins T4-XB and R4-B at his new QTH. New Novices in the Princeton area include WN9FTU, WN9FLS and WN9ELV. Ex-K8LDW now is W9LZK. W9LVT obtained his Advanced Class license. New 2-meter repeaters are planned for Maton and Peoria. Decatur and Bloomington repeaters are in operation. WB9FJK is a new call heard in Bloomington. W9LMT has a new TR-4. WN9DGP is a new Novice. K9DQU/WB9AIE, WB9FHK, K9RAS and WA9VRS are the new officers of the Motorola Amateur Radio Club (Chicago). K9DRS's QTH is now Orland Park. The Hamfesters Radio Club held their annual banquet for the workers of the Hamfesters picnic in Nov. WB9BXX is the only BPL recipient for Nov. Traffic: (Nov.) WB9BXX 656, WB9DPU 219, W9NXG 186, WA9ZUE 111, W9LXV 88, W9DOO 46, W9FHJ 32, WA9LDC 32, WB9AJB 23, W9LNQ 22, W9PRN 22, WA9NZF 21, W9FLU 19, W9HOT 16, K9RAS 12, K9HJK 10, W9HJM 9, W9IDY 2. (Oct.) W9LXV 72, W9FLU 21, K9RAS 10.

INDIANA — SCM, William C. Johnson, W9BLU — SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT, WA9ZKK, WA9ZKA. PAMs: K9CRS, WA9OHX, (vhf) W9PMT.

Net	Freq.	Time(Z)/Days	Zfc.	Mgr.
I Trc N	3910	1330 Dy 2130 M-S 2300 Dy	508	WA9OHX
QIN	3656	0100,345 0300 Dy		WA9WMT
ITN	3740	0100 Dy	64	WA9ZKK
PON	3910	1245 Su	111	WA9UMH
PONVHF	50.7	0200 M-S	80	WA9JJS
Hoosier VHF			76	W9PMT

The Indiana Teenage Net report for Oct. was 72. The Indianapolis Radio Club's Third Annual "Award of Appreciation" Dinner was held in Nov. The award went to W9DNO. New officers of the Clark County ARC are WB9FJK, pres.; WA9YKA, vice-pres.; W9HRY, secy.; WA9FCM, treas. WA9WMT has moved to a new QTH. K9LSB is the Northeastern Ind. EC. Allen, Langauge, Streuben, Noble, Whitley, Huntington, DeKalb, Adams and Wells counties have been using their repeater W9INX. Input 146.460-52.640, output 146.880-52.880. The Allen County Amateur Radio Technical Society is 100% ARFC. Your SCM would like a list of all active repeaters in the state. QIN has missed several sessions because there is no Net Control to take over when one is missing. All amateurs should read "It Seems to Us" in the Nov. issue of QST. If your county does not have an EC contact SEC W9FC, QIN Honor Roll: WB9ANT 17/23, W9QLW 19, W9BDP 18, WA9ZKK 17, W9QXF 16, W9IRQ 15. Amateur radio exists because of the service it renders. BPL certificates went to W9LYO, W9JBO, K9FZX, W9EQD and WA9OOQ. Traffic: (Nov.) W9LYO 912, W9JBO 784, K9FZX 513, W9HRY 380, WA9WNH 325, W9FCU 251, WA9VZM 217, W9EQO 204, WA9ZKK 198, WA9OOQ 119, W9QLW 103, WA9OHX 90, W9FVH 86, K9CBY 77, WA9WMT 76, K9RWO 61, K9YBM 55, WA9WA 47, WA9NYU 43, W9BLU 39, WA9AUM 37, W9HWR 23, WA9OMI 20, WA9HIG 19, W9PMT 17, K9RPZ 17, K9JQY 16, K9ILK 15, K9VHY 15, WB9BAP 13, W9DZC 13, K9DYL 11, W9LG 11, WA9AXE 10, W9YX 10, WN9BAQ 9, WA9VBG 9, WA9CHY 8, WA9WSX 6, WA9YXA 6, W9FC 6, W9IOH 5, W9KWB 5, W9BDP 2. (Oct.) WA9VHG 2.

WISCONSIN — SCM, S.M. Pokorny, W9NRP - Asst. SCM: Joseph A. Taylor, W9OMT. SEC: W9NGI, FAMS: WB9CKE, WA9IZK, WA9OAY, WA9QKP, WA9QNI. RMs: WB9FCY, K9KSA.

Net	Freq.	Time(Z)/Days	QIN	QIC	Mgr.
WSSN	5662	0030 11HS	98	16	K9KSA
WIN	3664	0115 Dy	347	94	WB9FLY
WRN	3620	0130 Su (RTTY)			K9GKS
SW2RN	145.35	0230 Dy	290		WA9LZK
SW6KN	50.4	0300 M-S	245		WB9CKE
BWN	3985	1245 M-S	464	206	WA9OAY
BN	3985	1800 Dy	226	95	WA9QKP
W-PON	3925	1801 M-F	209	70	WB9FC
WSBN	3985	2300 Dy	1586	191	WA9QNI

Manicard ARC officers for 1971 are K9RFZ, pres.; WB9BDZ, vice-pres.; W9ZGO, secy.-treas. W9LOC has a new SB-102

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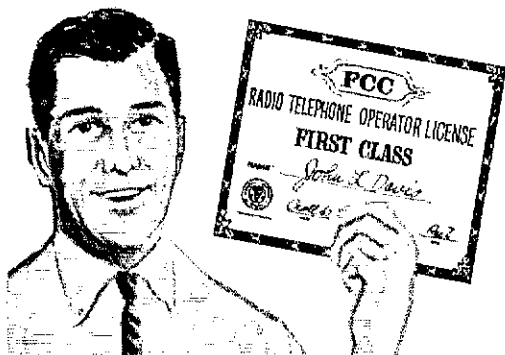
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DC Mobile Supply	ORDER NO. 802	\$129.95	AMATEUR NET
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WA9TXN is attending WSOE, Milwaukee. K9VEK has a new phone patch. WN9EMU is a new Novice at Mt. Horeb. WB9DWC WB9EMQ and WB9EMP are now Advanced Class licensees. WB9FMP and WB9EMQ are moving East. Silent Key is W9FAA who passed away suddenly Nov. 30. We all express our sympathy to his family. Appointments renewed: WA9LHJ as EC; W9NGT as SEC; W9KCR as OO; K9LGU as OPS; W9CXY, W9DND, WA9RAK and WA9TXN as ORSS; W9CBF as OBS; K9GSC as OO, ORS and OV3. Traffic: W9CX 399, K9CPM 230, WB9BJR 163, W9DND 162, WB9FEY 105, W9ESJ 79, K9FHI 70, WA9ONI 69, WA9YSD 68, K9KSA 63, K9JPS 42, WB9ABF 41, W9ZGQ 36, W9OMT 35, W9IHW 34, W9KRO 33, W9NRP 30, WA9OAY 26, W9DXV 24, W9RTP 17, WB9DXK 16, WA9PKM 16, K9VER 15, WA9LRW 7, WA9YFC 7, WA9EDZ 5, WA9IHF 5, K9TBY/0 4, WA9SAB 2.

DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, K0MVF - Asst. SCM Edna M. Thorton, WA0RRA. SBC: WA0MZV. RMs: WA0IAW, W0AAU, PAMS: WA0HRM, WA0DLJ, WA0JWW, WA0MMV. Correction on K0ZXE's 40-meter beam as reported last month Frank worked 33 countries on one week end recently. WA0MQ and WA0PXT have been running phone patch traffic out of Vietnam on MARS as their contribution to morale overseas and stateside. W0VUV joined the ranks of Silent Keys Nov. 26. Promises of QSL from Yogi Bear in Yellowstone Park caused pileups on 75 for WA0ZDJ during an Oct. week end. WA0JPR reported that the ham in Winona provided communications for a "Walk For Development in that community recently. W0AIIH furnished the operating base for a recent contest week end in Virginia, Minn. W0IYP, WA0VHR, WA0WEZ, WA0PRS, WA0RBW, W0BE, WA0TWW, WA0YML, K0ORK, WA0UCU, WA0VIS and W0AIIH kept the station on the air for 48 hours running up more than 1.3 million points. They had sideband capability simultaneously. Station activity reports are on the rise and net check ins consistently good. A net on 146.94 out of 9:00 p.m. at 0300Z on Fri. and Mon. (note local time would be 5:00 P.M. Thurs. and Sun. 11 affix: (Nov.) WA0VAN 1109, K0CSC 396, W0ZHN 203, K0ZRD 152, W0BUC 115, WA0EPX 105, WA0IAW 104, WA0VYV 96, WA0WEZ 93, WA0EJ 86, WA0RR, 77, K0MVF 74, WA0ONE 64, WA0VTZ 63, W0AAU 54, WA0YMI 53, WA0NOH 47, W0EHH 44, WA0RKY 39, WA0TEU 35, WA0HRM 36, W0WFA 31, W0RAFM 23, K0CJG 23, WA0VYR 22, W0DAJA 20, K0ORK 20, WA0QIT 20, WA0YAH 19, K0FLT 18, K0DID 17, WA0PXT 17, WA0GRX 16, W0EQO 15, WA0JPR 14, W0YYVT 14, WA0CGZ 13, W0NYWA 12, W0BUO 11, WA0UAH 9, WA0DOT 8, W0BRG 7, WA0MMV 7, K0SRK 7, W0ADP 6, W0BE 6, W0KNR 5, W0MBD 5, W0SZJ 5, K0ZBI 5, W0KLG 4, W0UMX 4, K0ZWG 4, WA0STJ 1, K0ZXE 1. (Oct.) WA0EPX 53.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC WA0AYL. OBS: K0SPH. PAM: W0CAQ. RM: WA0RSR. OC: W0BE. W0GB and WA0GRX gave a farewell party for K0PY, before he left to spend the winter in Chicago. They also had W0MND and W0LEJ with them for a few days while W0EJ had check up at the hospital. WA0GRX also reports a very fine meeting at Farbaull for the Handi-Ham meet. The Grand Forks Amateur Radio Club reports WA0AYL, pres., W0NAUA, vice-pres.; K0OSI, secy-treas.; K0RSA, act. mgr. WA0IUD reports a couple of broke ribs from a car mishap on those slippery roads. W0EUP reports new baby boy in their household. WA0LOI received his Advance Class license while WA0MSJ garnered his General Class and also commercial license. WA0AIN is now located in Elbow Lake, Minn. WA0LXC reports five new Novices in Minn. The Minot Club holds on-the-air meetings for anyone studying for the Advanced Class license. W0GNS has a daytime session on 3990 in the afternoons. If you have some time, join 'em, K0TYY kept his station on after the telephone service went out during one of our winter storms this month. Welcome to W0NMV. WA0BIN has a new SB-630 in operation and is planning to build an SB-610. K0IIP is the top traffic-handler for Nov.

Net	KHz	CDT/Days	Seas.	QNI	QTC
Grasse River	3990	0900 Su	5	72	
YL WX Net	3994	0730 S-Su	2.3	567	52
NDRACES	3996.5	1730 M-F	41	1274	31
		1830 M-F			
NUPON	3996.5	1830 S-S	15	351	2
		0900 Su			
NDCW	3640	2100 M-F	16	35	5

Traffic K0STP 182, WA0RSR 48, W0DM 31, W0VWL 29, K0SP 28, WA0BIN 25, W0CDO 25, WA0REW 25, WA0KS 24, WA0SJS 23, W0HBR 22, W0R1K 21, WA0MND 19, WA0ZPI 18, WA0IU 16, W0BHI 10, K0RSA 9, WA0ELO 8, WA0JPT 3.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - Amateurs SDSU have received the club call W0BDAY. They have a station

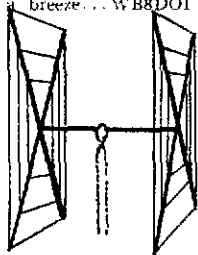
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BEAMS "Just a note to let you know that as a Novice, your 3-EI, 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

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| 4 EI 15. 27* | *20-ft. boom |
| 5 EI 15. 30* | |

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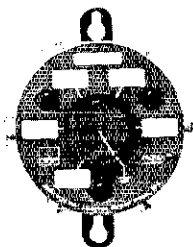
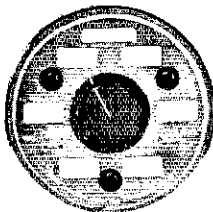
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Net	Freq.	Time(GMT)/Day	Mgr
MTTN	3665	0945Z Dy	W5SBI
GC5HN	3925	0330Z Dy	W5JH
CGCHN	3955	0100Z Dy	WASGO
MSBN	3960	0015Z Dy	WASUYV

Traffic: W5SBM 573, W5WZ 65, W5LEIN 51, W5LUT 47, W5NC 47, W5BW 22, W5KEY 19, W5SABR 14, W5SSUE 6, W5RUB

TENNESSEE SCM, Harry A. Phillips, K4RCT - SEC
WB4ANX, RM: K4AMC, PAMS: W4PEP, K4MQL, WA4EWW.

Net	Freq.	Time/Day	Sess	QNT	QTC	Mgr
TSSB	3980	2330 T-Su	25	1279	125	K4MC
FPN	3980	1145 M-F 1300 S-Su	30	1358	46	W4PE
LIPN	3980	1040 M-F	21	556	32	WA4EW
7PON	3980	2330 M	5			K4RT
TN	3635	0000 Dy	30	189	87	K4AM
E1VHF	145.2					WB4IO
FTVHF	50.1					WB4IO
E1FM	28.7	0200 W&F	6	59	1	WA4OX
MITM	28.8	0200 T&F	9	110		WA4GL

K4RTA has turned the TN PON reins over to new mgr. WB4BH. W4OGG received the Delta ARC "Ham of the Year Award," TH ARRL Contest Advisory Committee is soliciting ideas to simplify the Field Day rules or to improve them. W3GRF is chmn. W4WH has completed his first year as Delta Division Director and is to be congratulated on a fine job. He needs your help and support in order to express your wishes at the upcoming board meeting. RN liaison stations are present on the evening nets to take out-of-state traffic to the region net. Thanks to W5RUB for his efforts in the Delta QSO Party. High scorers were Delta Div. K4PUZ, portab W5RUB/5, outside div. K0GJD. Traffic: W4ZJY 164, W4OGG 131, WA4UAZ 121, W4WBK 87, W4SQE 85, WB4DAJ 44, K4AMC 30, WA4GLS 16, WB4MPJ 16, WB4MYZ 16, W4PEP 15, WA4ZNX 1, WB4ANX 13, W4LBD 13, WB4DYJ 9, WA4YEM 9, WA4COK 8, W4TYV 6, K4UMW 5, WB4GTW/4 4, WB4GSS 2.

GREAT LAKES DIVISION

KENTUCKY - SCM, Ted H. Huddle, W4CID - SEC: K4YZU
Appointed: WB4MTT as ORS. Endorsed: K4DZM as ORS
WB4KCV and WB4LLF as OPSs, W4OTP as OVS. BPL: WA4MKH

Net	QNT	QTC	Net	QNT	QTC
KRN	264	25	KNTN	123	3
MKPN	596	116	EYN	314	26
KTN	1088	207	ECAFN	91	3
KPON	70	39	CANN	40	40

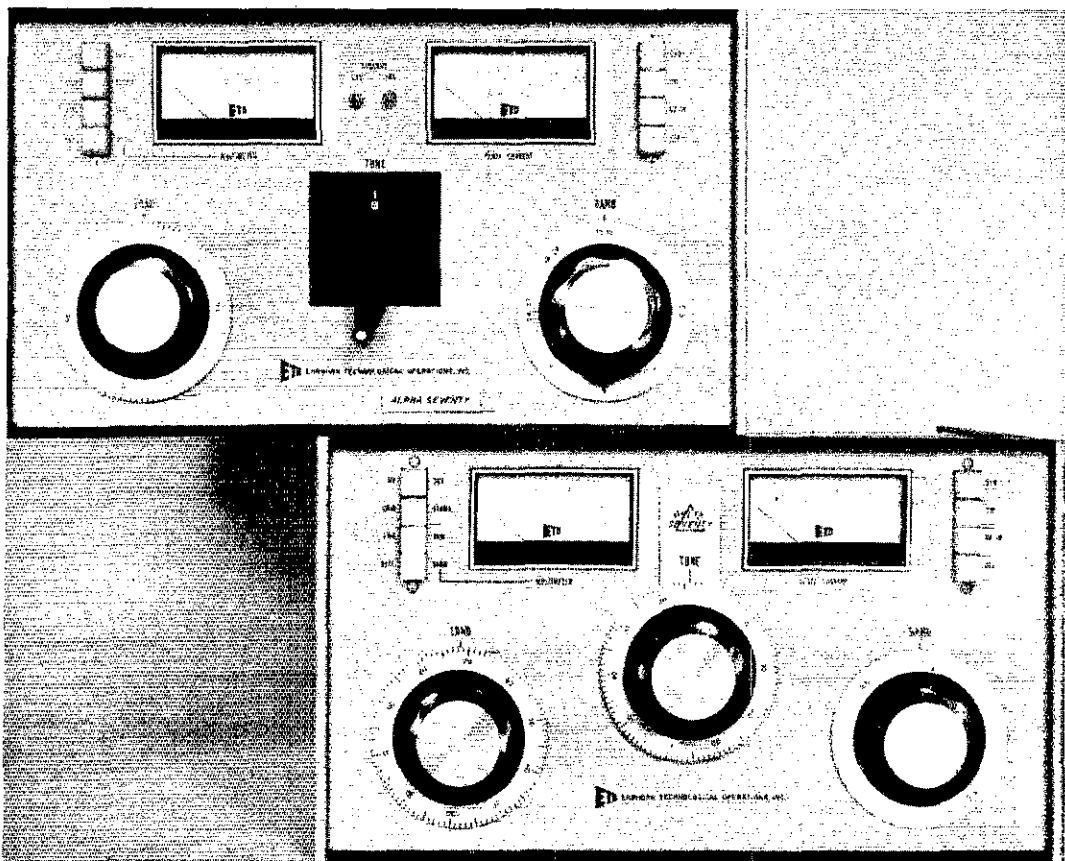
Roses to W4OYI on a job well done. It's going to be a tough act to follow but we'll try our best. WB4NOZ is doing an FB job on the Novice Training Net and is looking for even more novice activity of the net. WB4CTV has a new quad and is planning a new line. G4CKJ passed his Extra Class exam. The Owensboro group plan another envelope exercise soon. This emergency exercise was held several years ago and was written up in QST. WB4LL has new beam up. W4MRF has a new linear and W4CID finally got DXCC. We're getting good liaison between the cw and phone net. Traffic: WA4MKH 527, W4ABK 305, WA4VZZ 295, WB4KPE 261, WB4NOZ 265, WB4LIL 190, W4BAZ 120, WB4MTT 115, K4MA 91, WN4PSP 74, WA4FAF 73, W4OYI 72, WB4HOW 58, K4TR 58, WA4GHQ 56, WB4AUN 41, WB4EOR 40, K4YZU 40, WB4AXQ 31, W4UK 27, K4UNW 26, WA4AGH 25, WB4OYL 2, W4CID 20, WB4EQY 10, WA4MEX 9, W4BTA 8, WB4GCV: WB4BDE/4 7, K4FPW 6, K4AVX 3, WB4LKP 3, WB4LFZ, WN4R1XX 1, WA4ZSJ 3.

MICHIGAN - Acting SCM, Ivory J. Olinghouse, W8ZBT - SEC
WRMPD. RMs: W8PIM, WRRTN, W8WVL, K8KMQ, W8SDT
PAMS: W8VXM, WARTAN, K8PVC. VHF PAMS: W8CVQ, K8AEM

Net	Freq.	Time/Day	QNT	QTC	Sess.	Mgr
QMN	3663	2300 Dy	1065	350	89	WA8PI
WSSB	3935	0000 Dy	922	166	30	WRVX
BR/MEN	3930	2230 S-F	885	60	26	W8ASTA
UPFN	3920	2230 Dy	382	39	29	K8MJ
GLETN	3942	0230 Dy	874	83	30	K8PY
PON-Dy	3955	1600 Dy	604	325	30	K8LN
PON-CW	3625	0000 M-S	158	39	25	VE3DP

Silent Keys: W8LMS, W8PY, W8OGG, K8WRJ and W8UGD still a in the hospital. 1971 officers for the Genesee County Radio Club are W8VOU, pres.; W8PDR, WANCYT, W8BCNW, W8BON vice-pres.; W8BHT, secy.; K8KMQ, treas. K8ACQ is working DX club station W8ACW. Association for Advancement of Amate Radio is a newly-affiliated ARRL club at Owosso. W8FOV is nc K6SX. W8PHJ/7 is back in Las Vegas, look for him on 15-mete WA8UIC is ON8VF of Brussels and can be found on 15-mete Ex-W8OWG is now W8KGO in Columbus, Ohio. W8ICE/4 is

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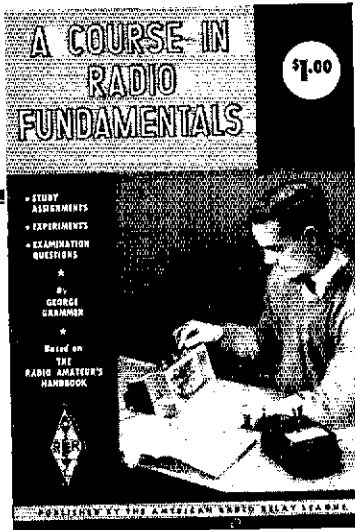
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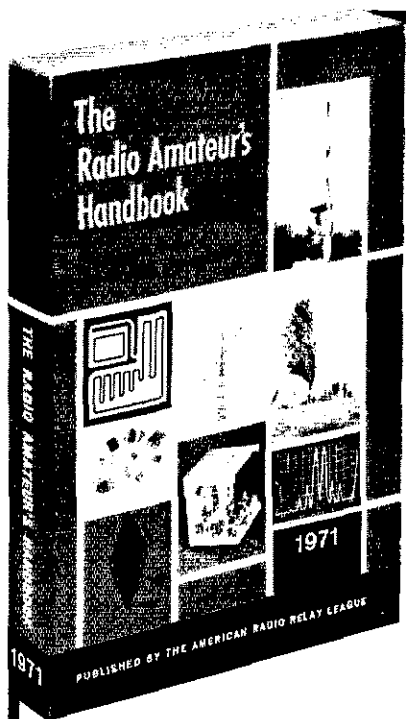
The American Radio Relay League
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Lexington, Ky. and can be found on 20-cw, also on the high end of 10-meters, K8HKM has a new QTH. The Lansing 2-Meter AM Net was activated Nov. 10 with 13 check-ins on 145.134. WNSDR is building a 15-watt cw transmitter. WB8AUN is almost finished with a home-made converter for RTTY. Who says we don't build? W8PHH is busy assembling a new station - SR-102, SR-610 and SR-630. Nice going Mark. WB8DKU has a new FTDX-560 which is fine for nets and DX. W8IAQ has a new TR-4 and a very nice signal. W8ZUD now has his General Class ticket. W8NIBR is new at Warren. W80GR reports from Florida. K8GOU again was Santa Claus for the kiddies of Wolverine Net members via ham radio. Traffic: K8ZJU 457, K8KMQ 355, K8LNE 263, W8DUI 200, W8PMJ 185, W8WZ 92, W8IYA 92, W8ZBT 67, W8FZ 56, W8FEU 53, W8MO 51, W8NOH 50, W8ZAV 49, W81XR 47, W8MPD 46, W8ONZ 45, W8FTAN 42, K8JED 40, W8RTN 39, W8KBZ 38, K8PVC 36, W8WVL 36, W8ALXY 32, W8VXM 31, W8ENW 28, W8FX 26, W8BBY 24, W8FZL 20, W8MSK 19, W8DCN 17, W8BYB 16, W8IUC 16, W8PHH 16, W8BLZ 15, W8GAI 14, W8IAQ 14, W8RANR 13, W8SH 10, K8TYY 9, W8SCW 8, W8TBP 7, W8FWO 6, K8TYK 6, W8UFS 6, K8AFM 5, W8AQO 5, K8QOJ 5, W8LRC 4, W8BFEK 2, K8CKD 2, W8JBU/8 1.

OHIO - 5CM, Richard A. Egbert, W8FTU - SEC: W8OUI. RM: W8IML PAM: K80BK. VHF PAM: W8RADU. Nov. net reports:

Net	QNI	QTC	Secs.	Freq.	Time(Z)	Mer.
OSSBN	2416	971	60	3972.5	1530	K8DBK
					2345	
BN	640	484	59	3580	0000	W8IMI
					0300	
O6MtrN	385	65	60	50.61	0000	W8RADU
				50.16	0200	
OSN	198	60	30	3580	2325	W8WAK

BPLs for Nov. were earned by W8ETX, K8ONA, W8OCU and W8TLL. Buckeye Net Bulletin announces a new schedule for 8RN representatives. Details available from W8IML. Net certificates for participation in the Ohio Six Meter Net were earned by K8CKY, W8RCUC, W8CXY, W8RDZ, W8ENI, W8BEWK, W8GDC, W8BLD, W8IMI and K8TOW. Ohio Single Sideband Net traffickers receiving certificates were: W8BAUK, W8BAR, W8BLH, W8BZX, K8DHD, W8EJX, W8FOG, W8ETW, W8FGD, W8GNL, W8GTS, W8HII, W8IMI, W8KIR, W8KVU, W8LAG, K8LFI, K8LXA, W8MBV, W8MGA, K8MGK, W8MHO, W8MIH, W8MOK, W8NAL, K8NCV, W8NOQ, W8OE, K8OBN, K8ONV, W8OUU, K8PRE, W8PNP, W8QZU, W8QZK and W8RRO. Receiving Net Certificates for Buckeye Net activity were: W8ENI, W8OLF, W8GRR, K8BHI and W8BCW/8. Those submitting scores for listing in PSIR are once again reminded to check QST for Sept. 1970 for revisions in scoring. New officers of Columbus ARA are K8IF, pres.; W8OSL, vice-pres.; W8ACK, secy.; W8KJM, treas. I attended a meeting of the Ohio State U. RC and enjoyed addressing the members and discussing ARRL programs with them. The Inter-City RC has scheduled a "new-timers" night, giving recognition to the newly-licensed. RM W8IMI reports that Buckeye Net membership is up 30% over 1968. OVS W8TYE reports working NH for his 37th state on 2-meters. FC K8CKY and 6 other VHLers relayed election returns from points in Highland Co. to the county seat for posting and broadcasting. Central Ohio AREC provided communications and transportation for collections in the Nov. Muscular Dystrophy drive. Congratulations to new Extra Class W8BCFA. W8ETX made the top of Post Office Net's traffic list for Nov. W8LZF had a visit from DM 2JO. ORS W8GQD passed his commercial phone first class and now is going for amateur extra. EC W8MIHO is leaving his Mansfield location for northern Ohio for business reasons. OVS K8TUT reports excellent 6-meter openings to the West Coast early in Nov. Reports were received from 44 ORSs, 17 OPSs, 6 OOs, 7 OVNS, 11 FAs and 39 non-appointees in Nov. OOs W8BU, W8DPW, W8ETX, W8GRG and W8MCR took part in the Sept. FMT. SFU W8OUI reports that our AREC organization has 1205 members. We need a sponsor for the 1971 Ohio QSO Party. Traffic: (Nov.) W8ETX 623, K8ONA 356, W8LAG 355, W8OCU 301, W8PMJ 215, W8BLH 208, W8TEL 205, W8GVX 204, W8WAK 204, W8AVS/8 202, W8UFI 199, W8BDWL 193, W8NOQ 176, W8AKW 173, W8CXY 161, W8JD 157, W8SFD 153, W8CWD 147, W8LTC 144, W8IMI 137, W8MOK 137, W8DSV 135, W8ALU 121, W8BDHY 115, W8UDG 106, W8QEK 96, W8RYP 78, W8ETW 77, K8LXA 69, K8UBK 69, W8CUT 66, W8QZK 64, K8BHI 61, W8CQ 59, W8WFO 55, W8TTC 51, W8GRR 50, W8IY 48, W8ZTV 46, K8OYR 45, W8ADU 42, W8ETU 40, W8AJC 38, K8LGA 37, K8DHJ 33, W8RAY 31, W8BDZ 31, W8FSS 31, W8TFC 31, W8GOE 29, W8BZX 28, W8VWH 28, W8JEH 27, W8GRT 26, W8BCH 24, W8OB 24, K8BYR 23, W8GRG 23, W8ORO 23, W8VKE 22,



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HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SIN - Asst. SCM; Kenneth Kroth, W2VJB. SEC: W2KCC. RM: WA2VYS. PAM: WB2VJB. VHF PAM: WB2YQU. Section nets: See Dec. QST for complete listing. On the club circuit: The Schenectady SARA heard K2CBA on moon-bounce experiments. Harmonic Hills showed the ARRL film in Nov. The Westchester ARA speaker for Nov. was W1CPC on antenna comparisons. New Rochelle club's K2BVC Award for services to club and hobby went to K2JQB at the annual dinner Nov. 28 and presented for CCNR by Director W2TUK. All section members please note: New Asst. SCM for ENY is WB2VJB, Delmar. Keeps his PAM appointment concurrently. Individual station activities: Welcome to newcomer WN2RH in Delmar. The annual Thanksgiving Day parade in New Rochelle, biggest yet, was helped by K2JQB, W2DPV, WB2NOY, WB2RLS, WB2VEQ, WB2VEG, W2RAE, WA2PLU and CCNR's club station K2YCI. I regret to report K2EBX as a Silent Key. K2KKU assisted the American Legion to set up Vietnam patches for holiday family calls. WA2EAH reports missing VE8 and a clean sweep in the SS. WB2IXW is working toward 160 capabilities. WA2HQ reports the Spring Valley HS is looking for donations of equipment to get their club station WB2OOV on the active list. W2FYG needs help with general class instruction in the Coxsack area. Volunteers please contact him. W2DPV is trustee for K2YCI. WA2FIQ made his 3rd BPL in Nov. Congrats. Appointments and renewals: W2QER as OBS (RTTY). WA2FMD as OPS. WA2FBI as ORS, W2SZ as ORS, OPS, OVS. Two new OBS appointees are WA2NJR and WA2FIQ. W2ODC renewed as ORS. Watch for renewal dates on your appointments, please. Traffic: WA2VYT 244, WA2FBI 148, WA2FIQ 117, WA2VYS 48, W2ODC 36, W2ANV 35, K2SIN 29, WB2IXW 28, W2URP 21, WA2MGT 20, WB2BXL 5, K2HNW 5, WB2YQU 4, WA2VLS 2.

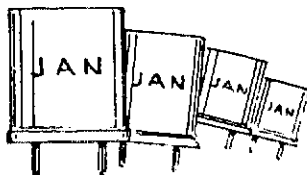
NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2DGI SEC: K2OVN. RM: K2UAT. HF PAM: WA2UWA. VHF PAM: WB2ROF.

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NLI Phone*	3932 kHz	1600 Dy	WA2UWA PAM
Clear House	3925 kHz	1100 Dy	WA2GPT Mgr.
Mic Farad	3925 kHz	1300 Ex. Su	K2UBG Mgr.
East U.S.	3683 kHz	0001 Nightly	K2UBG Mgr.
All Sev.	3925 kHz	1300 Dy	K2AAS Mgr.
NYSPTEN	3925 kHz	1800 Dy	WB2VJB Mgr.

*Section nets; all times are local.

The New Year is under way and with it our section clubs are sporting new officers: 1st-Boro RC - WB2JPO, pres.; WA2LUXK, vice-pres.; WB2LGA, secy.; W2VZO, treas. Order of Boiled Owls - W2SUC, pres.; K2DDK, vice-pres.; W2KDD, secy.-treas. The boys at W2DSC really put out a wal of a signal on 40. Seems they set off the alarm system when they use high power! WA2FTS is a civilian again after a stint in the army. W2FW is moving the walls of his shack to accommodate his new sb gear! K2DDK reports confirmation of contact 302 for the YUCP award! Also, sticker for 270 confirmed for DXCC! Congratulations to WN2KJO who passed his General Class exam and is awaiting his new call! WA2LJS is on the air with a new Communicator IV. Welcome to the Electchester VHF Society, now an affiliated club of ARRL. W2PDU has migrated to the south with other snow birds for the winter with an NCC-200. W4CAZ, ex-W2DID, can be heard on 14.315 at 7 A.M. daily, and Sat. at 9 A.M. on 21 370. New officers at the Big G Radio Club are WB2MPP, pres.; K2UAT, vice-pres.; WA2JFA, secy.; WA2FWV, treas. WA2PRB now is operating 2-meter fm in Tex. while attending San Jacinto College. WB2ZN is looking for stations to join in the festivities of the newly-formed SON Net on 3.707 MHz at 1900 local, Mon., Wed. and Fri. W2PF reports the passing of W2WZ; licensed for over 50-years and director of QCWA since it was first organized. W2PCI, WB2CKS, W2GGE, W2SUC operated ZF1AN during the CQ DX Test and made over 2800 contacts. Looks like they have an unofficial high score for North America. W2OQI reports W2ODB now is operating from Fla. with same schedule as W4CAZ. New officers of Rockaway ARC are WA2ZHA, pres.; WA2UDD, vice-pres.; W2AHV, secy.; W2VZO, treas. WB2TUL of NLI fame reports W2FMZ traded in his W2 for a W1FYJ. With all

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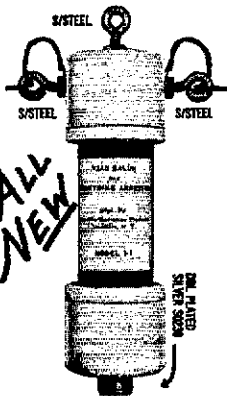
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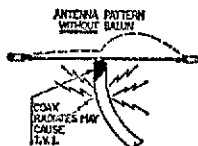
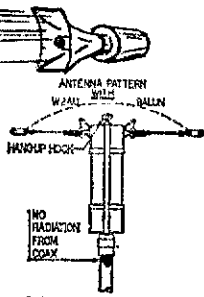
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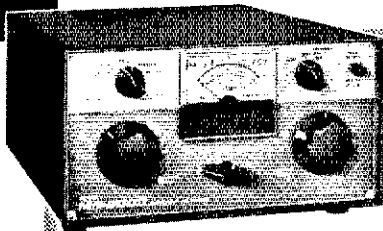
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the rumors and happenings concerning fm in the area, it appears that at long last some form of organization appears in the works concerning fm repeaters. My thanks to those stations and individuals who participated in the Jan. SFT and especially to those individuals who acted as Net Control Stations. It is tests like this that show us how badly we are prepared for an emergency situation. Be it lack of procedures in handling traffic, or the breakdown of equipment that has never stopped working we find at times like this that we have to hone up first chance. Unfortunately, that chance only comes at the next SFT for some strange reason. How about making it for '72 and check into any of the many nets available, or at least listen to know what to do if you are needed in an emergency! Traffic: W2DSC 517, WB2LGA 192, WA2GPT 133, WB2DIJ 100, WB2DZZ 85, W2EC 71, WB2LZN 51, W2EW 33, W2GP 38, K2SAS 36, W2LGR 24, W2DDB 18, W2PF 5, WB2EUH 3, WA2LJS 3.

NORTHERN NEW JERSEY — SCM, Louis J. Amoroso, W2ZZ — SEC: K2KDO. RMs: WA2BAN and WA2TAF. PAMS: K2KDO, K2SGX, WA2TAF and WA2TBS. ARPS: section net schedules.

Net	kHz/Time (P.M.)/Days	Secs.	QRM	Yrs.	Vgr.
NJN	3695	7:00 Dy	30	380	168 WA2BAN
NJN	3695	10:00 Dy	29	224	76 WA2BAN
NJNS	3740	8:00 Dy	19	43	35 WA2DRH
NJPON	3930	6:00 Su			
NJEPFN	3950	6:00 M-S	30	524	162 WA2TAF
NJAN	50425	8:00 M-F	21	153	16 K2SGX
PVETN	145710	7:30 Dy	30	246	209 K2KDO
ECFN	145800	8:30 Su			
	146700	8:30 Su			

New appointments: WB2FEH as FC for Linden and vicinity. WA2JIM as OPS and WA2EPI as ORS. Endorsements: WB2WNZ as OPS and WA2LDX as ORS. New club officers for the BARK club are: WB2RJJ, pres.; WB2GHM, vice-pres.; WA2EZG, treas.; WN2KNW, secy. New officers for the NJDXA are: WA2DIG, pres.; W2BOK, vice-pres.; W2ZTV, secy.; W2JLH, treas. W2NCY is using a new KWM-2. WB2VPR will attend Stevens Tech in the fall. WA2CCF added the Heath frequency counter to his shack. The group at K2DFL had a traffic booth set up at Willowbrook taking Christmas traffic. WA2LYS passed the General and WA2LUX passed the Extra Class exams. WB2IWH reports his DXCC totals as 90/74 using a 1R-4 and attic dipoles. WA2EPI added a new 2-meter converter to his shack. WA2DMF is on with the Eico-720. The group at K2MFF have a new BT-1 linear. WA2CAK received his Advanced Class license and now is using the SB-100. W2EWZ reports completing QSO No. 23000. WB2JAE is a new member of NJN. WB2LTW has the Viking Adventurer on cw. Here is a club record: 27 of the 39 members in the NJDXA are on the current ARRL DX Honor Roll. Also 29 of their members hold the Extra Class license. We begin another term as your SCM. It has been enjoyable. How about a few more reports. Good luck to all in the DX contest and hope to hear you in the pileups. Traffic: WA2EPI 572, WA2BAN 370, K2DFL/2 339, WB2DDO 239, K2KDO 198, WB2VPR 175, WA2OHV 151, WA2KHQ 148, K2DFL 121, WB2TUL 70, WB2WNZ 60, WA2FVH 56, WA2DRH 48, WA2DMF 43, WA2CCF 42, WA2IDX 42, W2ZZ 42, WA2FUI 41, WA2TAF 38, WB2LTW 37, WB2BKC 36, WA2JIM 35, WB2YPO 29, WA2JNO 25, WB2OHV 20, WB2JAE 19, K2MFF 19, W2EWZ 17, K2OJ 17, K2RXO 15, K2SGX 15, W2CU 12, WA2JNO 11, WA2EUX 10, K2EOP 9, WA2JXE 9, W2CVW 8, WA2GLI 8, WN2MXY 8, WB2WID 8, WB2CDI 5, K2DQT 5, WA2YXO 4, W2ABL 2, WB2IHL 2, K2ZFI 2.

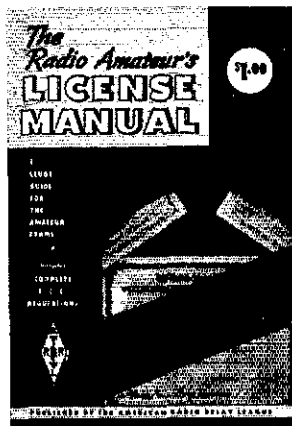
MIDWEST DIVISION

IOWA — SCM, Al Culbert, K0YVU — SEC: K0LVB. New appointments: WA0YIW as ORS. Congrats to the following on recently passing their exams: General Class — W0QBN, W0N0CI, W0NBRI; Advanced Class — W0Q0UE, WA0MIT. W0NFI finally worked VK-Land and now has his sights set on Africa for a 160-meter WAC. W9OPD has moved to the Cedar Falls area and is awaiting a 0 call. W0BW has been on a QRP kick and has worked 30 plus countries so far. New officers for the North Iowa ARC are: K0RHN, pres.; W0QZP, vice-pres.; WA0NGZ, secy.; WA0IRP, asst. mgr. Section Net certificates were recently sent to the following for TLN participation: W0s KB, LCX, MOO, PKH, TIU, UCE; K0s AZJ, DDA, LUZ, LVB, YVU; WA0s OTQ, SSU, UIG, VRG, VKI, YVR, YGA and ZQW. Our thanks to K0AZJ for the new TLN roster and the annual Tallcorn topics. A telethon was held over 8 PVO Nov. 28 and 29 to raise funds for Cerebral Palsy, with the following teams acting to relay the donation figures to the center: W0s BV, DMX, FVT, PKA, PSY, RWB, SWY, UPS, YRL; K0s BBL, BRE, CRE, EJR, FMN, IOV, JGI, JZP, MEP, ONK, YPP; WA0s BJA, DHR, JCE, LUD, NNR and WB9BPI. I am sure that the ham image in the Ottumwa area was brightened by your service.

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Net	KHz	GMT	QNI	QTC
Iowa 75 Phone	3970	0000	1202	52
Iowa 75 Phone	3970	1830	1294	166
FLCN (ews)	3560	0030	204	125

Traffic: W0LCX 894, W0MOO 136, W0VZH 77, K0AZJ 68, W0AUX 62, W0BZD 42, W0BW 12, K0LKH 10, W0A1W 8, K0DDA 8, W0YJW 7.

KANSAS - SCM, Robert M. Summers, K0BXF - SEC: K0LPL. PAM: K0JMF. RM: K0MRI. VHF PAMS: W0CCW, W01RO. I recently have updated ARRL official station appointments: ECs: W0LLC, W0OZP, ORSS: W0CHI, W0U1I, K0BKF, W0PTZK. W0PTZK also appointed as RM. Renewed: K0JMF, W0WFD, K0GII, K0JID and W0U1T as OPSs, K0AYO, W0LYC and K0LHB; as OSs. W0BHSZ and K0BFX as ORSS. W0CCW reports sb activity as well as am on nightly 145.35. Why not join the Kansas PI Net group too! Zones 1,3,7,8,9 and 10A all report fine participation on their AREC nets. I will publish a listing of all AREC nets in the near future. AREC membership now is at 440 members with 23 nets all NTS liaison. Net activity for Nov. is as follows: QKS - 60 sessions, QNI 482, QTC 210, KSBN - 25 sessions, QNI 1202, QTC 111, KPN - 18 sessions, QNI 246, QTC 13, KWN - 30 sessions, QNI 647, QTC 34, Ks EC Net - QNI 94, QTC 1. Kans. 2-Meter PI Net - QNI 29. If you have not sent an SASE to the League for a copy of the current Net Directory, do so now. It is a handy reference when asked about nets. W0HH, Wichita, recently was awarded his 25-year pin from ARRL. Dec. appears to be the month of most club elections. Drop me a card, letter or get on a net and let me know the results. Traffic: W0IHH 360, W0HI 278, W0LBB 225, K0MRI 113, W0LLC 99, W0MA 80, K0JMF 62, K0BKF 61, W0NEE 51, W0JLC 48, W0FCI 45, W0U1T 42, K0LPE 38, W0GCU 30, K0PSS 22, W0CHI 19, W0GUR 19, W0BGX 14, W0NSEV 13, K0UVH 13, W0CV 12, W0DZT 8, W0OZP 6, W0BYV 4, W0LYC 4, W0DWH 4, K0HIG 2, K0GZP 2, W0HOZ 2, W0SXR 2, W0TRO 2, K0JID 1.

MISSOURI - SCM, Robert J. Peavler, W0BV - SEC: W0ENW. RM: K0RPH. Net reports:

Net	Freq.	Time(L)/Days	Sex	QNI	QTC	Mgr.
HBN	7280	1805 M-F	21	638	149	W0LPA
MOPON	3933	2300 M-S	25	104	34	W01AA
MEN	3905	2330 M-F	13	239	19	K0KUD
MOSSH	3963	2400 M-S	25	1275	122	W0RTO
MNSN	3585	0100 Dy	28	160	137	K0AEM
PHD	5045	0130 L	5	145	5	W0AKUH
MON 2	3585	0345 Dy	24	86	59	K0AEM

My thanks to K0AEM for managing MON 2 during Nov. W0HH took over Dec. 1. Condolences to W0BGC, whose daughter passed away. K0JPI now is a minister of the Methodist Church in Ash Grove. W0KJ moved to Tulsa and now is W5SNP. The Parkway West ARC, a high school club, is just starting and needs some low-cost equipment; all who can help please get in touch with Bill Ames, W0WBJ, 1909 Karlin Drive, St. Louis 63131. Amateurs in Northeast Missouri and Iowa helped out during the Cerebral Palsy Telethon on K1VO. Nov. 28 and 29. New officers of the St. Louis Amateur Radio Club are K0AEM, pres.; W0TDR, vice-pres.; W0RUR, treas.; W0DSW, secy.; K0TOW, W0RUR and W0KMF, directors. W0HH talked of his experiences as a radio operator on the hospital ship Hope to the Tri-State Club in Joplin. Congratulations to: W0WSS, who passed the General Class exam, and to W0BYE and W0CNS, who passed both General and Advanced. W0DRG is an engineer at K1SB in Joplin. Traffic: K0ONK 1656, K0AEM 328, W0BV 1131, W0HH 76, W0HTN 56, W0QUD 47, W0GJ 31, W0TAA 20, W0WQA 14, W0AKUH 10, W0BYCN 6, W0BVI 4, W0ZLU 2, W0YST 1.

NEBRASKA - SCM, V.A. Cashon, K0OAL - It is with regret I report the passing of John Solt, W0NV as a Silent Key. He will be missed by all. W0ADH is operating a new Cygnit 270-B. W0MV, formerly W0EUT, Omaha and recently of Aurora, Ill., now is in Nebr. Welcome to the nets, Bob. Congratulations to the new officers of the Pine Ridge Amateur Radio Club - K0PTK, pres.; W0BFN, vice-pres.; W0PUI, secy.-treas. All station activity reports will be accepted for this column. Renewed appointments: W0BHM, K0JTT, W0LWF, W0AGK, K0WPH and W0CJ as ECs; K0PTK as OPS; W0CJ as PAM; W0VEA as OBS and ORS. Nov. net reports:

Net	Freq.	GMT/Days	QNI	QTC	Mgr.
NSN I	3982	0030 Dy	1241	37	W0LOY
NSN II	3982	0130 Dy	763	16	W0LOY
Nebr 160	1995	0130 Dy	565	1	W0CJ
NEB	3590	0400 Dy	132	30	W0HWR
NMN	3982	1330 Dy	1029	24	W0JUE
WNN	3950	1400 M-S	582	47	W0NIK
AREC	3982	1430 Su	193	0	W0RZ
CHN	3980	1830 Dy	1142	62	W0GHZ

Traffic: K0UWK 72, W0LOD 58, W0SCP 52, W0NIK 46, K0KJP 36, W0CBJ 28, W0HWR 28, W0CAU 25, K0JFN 25, W0DMY 23, K0FRU 18, K0ODE 18, K0DGV 15, W0GHZ 15, W0PCC 15, W0FMG 14, W0LBB 12, W0AGK 9, W0IHH 9, W0LEI 6, W0LWF 6, W0BHE 6, K0SFA 6, W0LOY 5, W0ATU 4, W0VJI 4, W0BYG 4, W0RZ 3, W0VEA 3, W0YFR 3, W0BOK 2, K0HNT 2, W0KGD 2, K0OAL 2, W0GQX 2, W0QLI 2, W0OLE 2, W0RJA 2, W0VIT 2, W0WZR 2, W0ADH 1, W0JUE 1, W0SGA 1

NEW ENGLAND DIVISION

CONNECTICUT - SCM, John J. McNassor, W1GVT - SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sex	QNI	QTC
CN	3640	1845 Dy	30	350	349
CPN	3965	1800 M-S	30	485	179
		1000 Su			
VHF 2	145.98	2000 M-S	21	71	53
VHF 6	50.6	2100 M-S	21	124	27

High QNI: CN - WA1GF, WA3SU/I, K1EIR, W1MPW and W1CTI. CPN - W1DQJ, W1GVT, W1EHR, W1MPW, K1SXF and K1YGS. SEC W1HHR invites ECs and AREC members to check in to the Conn. AREC Net Wed. at 6:30 P.M. on 3965 after CPN. The Annual SET scheduled Jan. 30 and 31. Our Director has been re-elected for another term. Congratulations to Director W1QV and new Vice-Director W1AX. Clubs are going full blast on winter schedules. Please send program to W1QV, also comments on any proposed FCC rule changes. Clubs should encourage member participation in traffic nets on a regular basis. Candlewood ARA will host the Conn. QSO Party again this year on Apr. 3, 5. Please take part in this event. The Tri-City Club Hamfest will be held in New London the end of Apr. Note: OBS appointees, send current sked. to ARRL to remain on mailing list. A sincere "Get Well Soon" to K1CSY and W1DHP both in hospitals. Congratulations to: W1EWF for WAZ; W1ADW, W1AICA, W1EWF, W1AKMP, W1EYF, W1IHO, K1EIR, K1YGS, W1FTD, W1EJON and W1IIG for excellent work as Bulletin Editors; W1H PAM K1SXF is on 6- and 2-meter nets every night! More check-ins are needed. Please join in and share the fun! Traffic: W1EJ 343, K1EIR 230, W1IHO 183, W1GFB 173, WA3SU/I 165, W1JVV 162, K1SXF 102, W1GVT 93, W1BSN 84, K1YGS 69, W1CTI 64, W1LMO 38, K1EIC 35, W1MPW 34, W1JGA 25, W1BDI 22, W1NFS 22, W1WU 19, W1BNB 14, W1QV 14, W1AW 8, W1YRI 8, W1CUC 6, W1DQJ 6, W1EUF 6, W1ZEC 1 6, W1KAM 5, W1JQC 3, W1KRG 1 2, W1YH 2.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - SEC W1AOG received reports from W1LE, K1S DZG, N1WZUP, W1AS ENM, DXL, W1DNL is a Silent Key. W1BEZ is the new RO for Quincy. W1NKRZ is a YL. W1EZY is in Littleton and on with an HW-12A. W1ATECY is home and out of service. K1EPL reports the New England Emergency Net had 5 sessions, 107 QNIs, 1 traffic. E2M2N had 21 sessions, 160 QNIs, 170 traffic. Barnyard Net had 540 QNIs, 6 traffic. W1IQU is now in Avon. W1GG7 is retired and in Reno, Nev. K1ZII, W1ACZ were heard on 2, W1EYI/I has an HW-17 on 2 and is going to Tufts College. K1JLE/I is on the air at W1AF and W1MX. W1THT rebuilt his shack. W1KCO and XYL celebrated their 25th Wedding Anniversary. W1IH dislocated his shoulder. The T-9 Club met at W1TJP's. K1ISH is on 6. W1HSV is on 10. W1EYB is now in Mills. W1PKV had an operation. W1BHD retired and finished his SST receiving monitor. W16JE/I is on 2 and 6 in Brockton. W1NF worked Z3SAW. He is NCS for the New England Chapter CW Net of OOTC on 14115 RTTY, 1600 GMT, Sat. W6MLZ is control. W1ZQM gave a talk on RTTY at the South Shore Club. W1ABC has an SWR bridge for 2. W2TPV/I leaves in Mar. for Hamilton AFB in Calif. W1EJN is on 6 and got cards for DXCC. W1DJC is helping in the "Intruder Watch." K1JLE says W1AF now has 10 members. W1EJN has antenna for 40-80. W1LE monitors 145.152 MHz all day. Middlesex ARC had an auction. W1DUL says 6 opened up for all but New England. W1EJN is NCS for the new Northern Essex Area Net on 6 for AREC. New appointments: W1PJ as EC for Hollbrook, W1QYV, K1ZYW as ORSS. Endorsements: K1PRB as ORS, W1IIE as OPS, GVS, W1IKF gave a demonstration on Filters and W1WSN on FM repeaters at the Framingham RC. W1ANSF is interested in handling traffic. W1NINON has an HQ-170 and T-60. W1CTR says he is chasing DX since retiring to Maine. W1AED is on the air from Yarmouth. The Capeway RC met at the OTH of Mrs. Edna Russell. K1HGI visited W1SED in Fla. K1VKW/4 is at Robins AFB in Ga. W1ONC is in Palmerton, Pa. W4EYE is ex-W1CMM in Fla. W1EFSI puts out a nice FMNews, give her your support. W1GFW/1 checks in from Lowell. W1NUG is

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the call of Marblehead HS RC. WNINUL is a new YL. The 6-Meter Crossband Net had 20 sessions, 34 QNTs. The New England Chapter of OOTC met at Lord Wakefields. Officers elected are W1PFS, chmn.; W1KJ, vice-chmn.; K1SAY, secy-treas. These officers and K1RTV, K1AAQ, W1VN are on a committee for antique wireless equipment for a museum. K1ZYW is operating at WA1JUY. W1PI says he worked 420 in the SS and 650 in the DX Contest. New officers of the Capeway RC are W1UOH, group mgr.; K1LOE, asst. group mgr.; K1HPB, treas.; K1MAK, rec. secy.; K1HGT, certificate chmn. W1AINLX has his General Class license. Traffic: (Nov.) W1OJM 475, W1ALYY 385, W1PEX 356, W1AIFD 223, W1EMG 166, W1ABC 126, WA1JUY 124, WA1BYM 100, W1UX 98, WA1UFE 68, K1PRB 58, W1MNK 45, W1PL 41, W1DOM 32, W2TPV/1 30, WA1MFG 29, K1ESG 14, W1ROL 13, W1M1BSB 11, W1F1N 9, K1LCO 7, WA1DJC 5, WA1DFL 2, WA1FNM 1, W1LE 1. (Oct.) W1AF 1.

MAINE - SCM, Peter E. Sterling, K1TEV - SFC: K1CFE, PAM: WA1FCM. RM: W1B1G. The Yankee Repeater Assn. has gained more members. The repeater, located at Stereked Mt., should be in operation by spring. It will be on 2 meters. Sea Gull Net certificates have been issued to W1CET, WA1KOZ, K1TMK, W1YA. New hams in Maine are W1N1NTS, W1N1NTT, W1N1NSB, W1VLU has moved back to Maine and now lives in Wiscasset. K1TZH is home after a stay in the hospital. WA1JYZ is building a new rig for 6-meters and hopes to have it on soon. K1SGU is active on 20-meter RTTY. I still am looking for news for the column, any tidbits are welcome. WA1EXN is active on 6-meters with a new SB-110. The Sea Gull Net meets on 3940 Mon, through Sat, at 1700. Pine Tree Net meets at 1900 on 3596 Mon, through Sun. The New England Novice Net meets on 3733 Mon, Wed, and Fri, from 1830 to 1900. Sorry to hear of the passing of W1FFP, Portland. Traffic: WA1FCM 294, W1YA 76, W1NND 61, K1TEV 7.

NEW HAMPSHIRE - SCM, Donald Morgan, K1QES - The GSPN reports 642 check-ins and 53 traffic for Nov. The VTNH Net and the NHAREC reports are missing this month. SFC W1LUD has been in the hospital but now is out and on the mend. QO reports were received from W1BUT and W1EEF. Congratulations to W1QV and W1AX as Director and Vice-Director for this term. W1JY and NYL have returned to the West Coast after two weeks in Europe. Also W1JY/6 took first place in the 6th call area for Class C Field Day. Congrats, W1CHA made W1N7OMX happy by giving him N.H. and WAS. W1BYS reports working several repeaters while mobile in New York and Ohio. W1WMK reported happily that the League was of help to him in time of need. Traffic: K1BCS 611, W1UBG 187.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - SFC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF: PAM: K1TPK. RISPAN report: 30 sessions, 516 QNT, 86 traffic. The Rhode Island State Phone Net meets at 1830 EST daily at 50.6 and invites all hams in the state to join. K1KVV of the ORI Amateur Radio Club W1KMY would appreciate amateurs returning borrowed equipment to the club at the Kingston Campus. K1VYC has a new HA-800 receiver added to the ham shack. WA1JST is on a trip and will be operating mobile in 3-4 and K1HMO has added a Swan 500-CX to his equipment and is putting a loud signal on the low bands. W1WAC is making progress on his 6-meter station. He is about to install a five-element beam to complete the station. WA1CO is constantly working the south pole and phone patching calls to the local area. K1LH is setting up his station at his new location and hopes to be on the air soon. K1CBO has been experimenting with TV and RTTY. Traffic: W1TXL 199, K1QED 15, WA1HBW 11, WA1CXF 7, WA1JST 7, K1VYC 3.

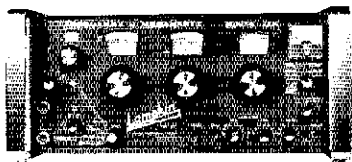
VERMONT - SCM, E. Reginald Murray, K1MPN

Net	Freq.	Time(Z)/Days	QNT	QTC	Net Mgr.
Gr. Mt.	3932	2230 M-S	513	45	W1J1Z
Vt. Fone	3955	1400 Su	84	4	W1K1M
Carrier	3945	1400 M-S	456	11	W1B1C
VTPO	3909	2300 Su	81	24	K1BQB
VTCD	5990%	1500 Su	32	8	W1AD
VTSB	3909	2230 M-S	420	47	WA1HSG
		1300 Su			

Welcome to new Novice W1N1TE (St. Albans) and new Technicians WA1NSR (E. Middlebury) and WA1N1M (Bennington). WA1GKM, the Mt. Ascutney repeater is in operation on 146.16 and 146.76. The Vt. QSO Party will be Feb. 27, 28 and we hope all Vermonters will be as active as possible. The Middlebury College Amateur Radio Club now is active under WA1JXN, pres. Traffic: K1BQB 161, WA1JGK 34, K1MPN 20, WA1GKS 18, K1YGR.

WESTERN MASSACHUSETTS - SCM, Percy U. Noble, W1BYR
SEC: WA1DNB. CW RM: W1DVW. VHF PAM: W1KZS
(Berksire County 6-meter). The SEC reports that Western Mass. now has 5 local emergency nets active with all having NTS liaison.

Signal Generator Capability



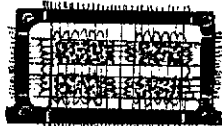
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200	.07	.07	.15
400	.09	.09	.22
600	.12	.12	.28
800	.16	.16	.39
1000	.22	.22	.59

*microminiature

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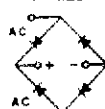
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<input type="checkbox"/> 4000	1.65
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<input type="checkbox"/> 8000	3.50
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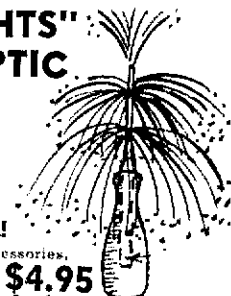
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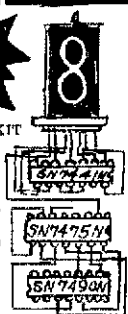


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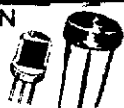
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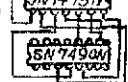
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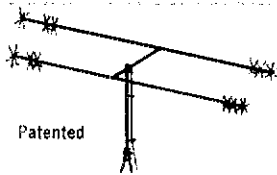
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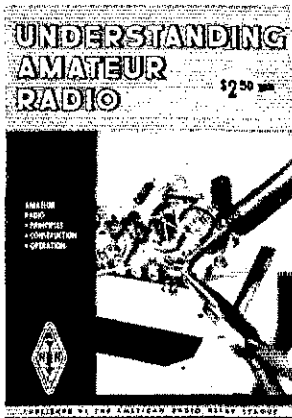
Add to nets previously listed in this column - Berkshire Hilltoppers Sun, 10:00 A.M., \$0.25. The CW RM reports that WMN had 176 QNHs and handled 121 messages. Top five in attendance were WA1LPI, W1ZPB, W1RVR, K1SSH and WA11NF. WMN had 100% attendance during Oct. by its representatives to IRN. W1EOB was with the DXpedition to P10CB where the crew of 13 broke all records in the CO WW DX Contest. WA1MFB now has his Advanced plus 3rd Class commercial. By the time you read this, K1WZY will have completed her session of student teaching. W1ZPB now is head of the Executive and Discipline Committees at the Mt. Hermon School. New officers of the Central New England Net are WA1HFY, mgr.; W1QHG, secy.; W1CUE, asst. mgr. K1GVN has moved to Florida. W1BZJ recently celebrated 4 anniversaries: 45 years as W1BZJ, 36th Wedding Anniversary and eligibility for medicare! from CMARA - WA1FFB now is an Advanced Class licensee. From HCRA - WA11NB and WA11UO gave a talk on the amateur satellite program. A group from HCRA were entertained at a Payoff Dinner by the Talcott Mt. VHF Society (dutch treat). From MARC - Nov. speaker was W1EXV on the subject of "The Drawing of Copper Wire." W1YXN is on sbb with an H1-32A. W1GUA worked ZM1BPH on 15. Top leaders in NE Field Day (Class B, 2 operators) were WA1JQT and WA1LZJ. From VARC - Chuck Watts gave a sparkling presentation of the VHF repeater operation. WA1HJD was selected as Top Flight Operator of the month by the YL Sidebanders. The club now has a crystal bank for the benefit of Novice members. 75 cents per crystal with 50 cents refund when returned. WA1LGU worked JY1 in the middle of a YL only contest. Fratic (Nov.) K1SSH 265, W1ZPB 147, W1DVG 67, W1RVR 50, WA1MFB 47, W1HH 43, WA1LPI 42, W1KK 36, WA1LNF 17, W1EOB 11, WA11ZS 8, W1CSF 7, W1K7S 6. (Oct.) K1WZY 52.

NORTHWESTERN DIVISION

ALASKA - Acting SCM, Kenneth R. Klopf, K1TEVO - K17FIQ is now in Kenai where he is a regular with the crowd on 3880. K17DRZ has repaid K17FHN for getting him started on SSTV. FHN is on R1TY. Looks like K17FNU will also be there as soon as he unbends his tower. W17HRD and OM are back from Prince Creek after a successful cleanup and plan to visit 4-1 and. HRD nerved up WL7HAQ enough to check into the Slow Speed Net on 3735. WL7HAQ received his K17 the same day that his XYL presented him with a boy. K17HAC is wondering where the snow went. K17GNP is patiently waiting for longevity to take a whack at the Extra. K17FKH and OM are wintering in the bush between Manley Hot Springs and Tanana. She frequents 75-meters. K17GFU and K17DJJ are both keeping 10-meters busy. K17GPT is putting Anchor Point on the map. K17FC is hammering it up on that hydro project outside of Juneau. K17DG may be persuaded to vibration test mobile rigs on his jogging jaunts. K17FKZ and bride should be on the air again soon. Congratulations AI. Now is the time to build your battery powered emergency and camping gear, while its still dark out. Transistors are the only way and you hardly ever burn out a filament. Remember the Sourdough Net on 3915.

IDAHO - SCM, Donald A. Crisp, W7ZNN - SEC: WA7EFWV. The FARM Net convenes at 0200 GMT each day on 3935 kHz. The Idaho RACES Net meets week days at 1515 GMT on 3991 kHz. The PO Net meets Tue., Thurs., Sat. (GMT) on 3930 kHz at 0130. W71Y lost his antenna in a big wind storm and is planning to install a new tower. W7SJJ passed away. W7JHY's XYL, who was well known by area hams, passed away. K7RVJ has a new all-band W81K stacked beam up 50-feet. WA7GPO has a new 60-ft. tower and tri-band beam. W7WLV is moving to Nagel. WA7LEQ is a new ham in Lewiston. W7GHT is on the air with a temporary antenna from his new QTH at Lewiston. Need a program for your club meeting? Contact your SCM, W7ZNN or SEC WA7EFWV. W7NPOU has a new receiver, installed a new tower and built a transmatch. FARM Net report: 30 sessions, 1103 check-ins, 60 traffic handled. Traffic: K7KBX 197, W71Y 136, WA7BDD 68, W7YON 28, W7ZNN 19.

MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA71ZR. VHF PAM: W7IAC. New hams in the section are WA7PZO of Butte and W7QSR of Helena. The 2-meter repeater on Mt. Royal is WA7QAA. Missoula also has a repeater license. Inversions for the past 6 weeks have given the 2-meter gang some good openings in the state. The Butana N.D. Radar site boys have been listening in to the Mt. Royal Repeater and it looks like they may get some equipment on in the Northeast part of the state. New officers for the Capital City Radio Club are K7YLR, pres.; W7MKY, vice-pres.; K7SRA, secy. Electric City Radio Club officers are WA7HYH, pres.; K71NR, vice-pres.; WA7KHP, secy. W7LR has the following on one mast 20-, 15-, 10-, 6-, 2-meter beams and a 2-meter ground plane. Butte and Anaconda are working on their repeater and possibly will have it on



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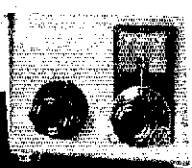
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XL heights. The repeater in Helena is operating on a shake down and the boys are looking for bugs. I still am waiting for the names of individuals for the Montana Council of Amateur Radio. If you are interested please appoint one of your members for this position. Traffic: WA7JOS 137, K7EKB 126, W7LBK 123, WA7JZR 58, K7FGT 44, K7IOG 10.

OREGON - SCM, Dale T. Justice, K7WWR - SEC: W7HLF, PAM: K7ROZ. Section nets: WA7GIX reports for the ARFC Net, sessions 28, traffic 36, contacts 81, check-ins 507, max. no. of counties 17. WA7KLU reports for the ONS, sessions 21, traffic 44, check-ins 147. K7ZQU reports for the HSN, sessions 60, traffic 147, contacts 203, check-ins 1352. WA7MUB reports the formation of the American Radio Teenage League (ARTL), which meets Sat. and Sun. at 2100Z on 7285 kHz. W7HLI made an official visit to the Southern Oregon ARC in Grants Pass. W7LDB used a borrowed rig to get on 2-meters while staying in a Portland hospital. W7QNC reports for the NWNN, sessions 29, traffic 23, contacts 196. WA7FTN reports 751 phone patches to S.E. Asia for Nov. Traffic: K7ROZ 265, WA7JFS 135, K7QFG 133, WA7ICX 81, K7OUF 66, WA7KIU 56, K7WWR 28, WA7KRH 25, WA7HF 24, WA7HF 20, W7QNC/7 19, W7MLL 12, W7BFX 10, W7BNS 10, WA7MLL 7, K7EPT 5, W7LT 3, WA7MOK 2.

WASHINGTON - SCM, Harry W. Lewis, W7JWJ - Two Northwest amateurs have been elected to life membership in the North Seattle Radio Club. One is former SCM W7F1X and the other is the ARRL Northwestern Division Director, W7PGY. The U. of W. station W7YD now is active each day with WA7FKM at the mike. WSU station W7YH also now is showing up on the nets from Pullman. Two active students at Pullman are WA7BTZ and WA7BUL. Former FCC Delegate Jack Kane now is back on the air with the old familiar call, W7DZX. One of the few cw stations in the Northwest on 160 is W7HJ and he can usually be found on 1977 kHz. We regret to report that K7JVL, Elmer Bergstrom, has joined the ranks of Silent Keys. W7FQI reports that stations check-in to WSN and then disappear when traffic is directed to them. Your SCM might be in this category as he (W7JWJ) hit seven nets, is in, out, and gone to teach night school at the local community college. W7GYE of Moses Lake is the new manager of WSN. W7PV, manager of Amateur Radio Supply, has been attending classes along with his wife. Seems both are studying Spanish. Any DXpedition plans Dick? The Radio Club of Tacoma is planning on sponsoring an ARRL Division Convention in 1972! Traffic: W7RA 1043, W7PI 507, W7AXT 263, WA7HKR 245, W7DZX 223, K7CTP 86, W7MCW 86, W7JLY 56, W7BQ 48, WA7LMO 48, W7BUN 40, W7APS 33, W7FQI 23, WA7MFO 31, W7IFU 13, W7ALB 12, K7OKC 11, W7RXH 9, W7JHZ 5.

PACIFIC DIVISION

EAST BAY - SCM, Paul J. Parker, WB6DHL - RM: WA6DHL. The East Bay Radio Club is forging ahead in their General class with 16 members at present. W6LPW is now set up to transmit high speed code practice from 25 to 50 wpm. W6ZLF is 1971 frequency chmn. for SARO. Ron has his new antennas up for winter and is all ready for the long winter nights. K6UWR recently passed his Advanced Class exam as well as being elected pres. of SARO for 1971. W6DSV, vice-pres.; W6AX, secy.; W6CMZ, treas.; W6BUY, comm. mgr. WB6VEW is spending some time on NUN 2. Congrats to W6AR, he finally made DXCC. Bill needs only two more zones for WAZ. W6CBF recently participated in the Nov. FMT. W6RGG has been spending quite a bit of time working as OO and from the impressive lists he sends in he is really busy. That's about it for this month gang, hope to hear more from all next month. Traffic: W6LPW 277, WB6VEW 19, W6AR 6, W6ZLF 6.

NEVADA - SCM, Leonard M. Norman, W7PBV - SEC: Lewis L. "Mike" Blain, WA7BFU, 560 Cherry St., Boulder City, NV 89005. SNARS 1971 club officers are WA7MEH, chmn.; WA7FBU, vice-chmn.-treas.; K7YYT, pub. rel.; WA7MOD, secy.-treas.; WA7DUI, W7DNX, WA7EGW, dir. SNARS was honored by having K6RI as speaker at a recent meeting. K7OLO is active on 75-meters. K7QGO is vice-pres. of the YI RI National Organization. K7QHI is a Silent Key. W7HQ and WA7DSP assisted in hosting the 82nd Annual NARUC Convention in Las Vegas. FCC chmn., Dean Burch, was the principal speaker. W7SJR reports many DX contacts. Mobilizing in Nevada remember WCARS-7255. WPSS-3952, along with W7AKE, WA7HXO, K7UGE and K7UGT fm repeaters are at your service.

SACRAMENTO VALLEY - SCM, John F. Minke, III, W6KYA - Congratulations to the Thunen Memorial ARC of Crescent City on becoming an ARRL affiliated club. WA6QFS, Nevada City, has been awarded the Worked All California Counties (WACC).

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certificate No. 88 by the Oakland Radio Club. Rick also is attempting to stimulate 2-meter fm activity in Nevada County. New amateurs in Nevada Co. are WN6ANB, WN6CYD, WN6VNL, WN6BYO and WN6CBI as a result of a course conducted by W6ZUZ. WN6CBI says he passed the Advanced Class exam on the first try in San Francisco. The Nevada County ARC has a 160-meter net on 1990 kHz at noon, daily except Sun. Silent Keys are WA6DKW, Sacramento and W6CWH, Paradise. W6JON, the RAMS pres. has moved to Baltimore. New members of the Sacramento ARC are WN6ANX, WN6DPI, WN6DEO, WN6DKM, WA6BUX, WA6CFO and WB6DSE. Feb. will be an active month contest-wise with the ARRL DX competition and the Novice Roundup. Fire up and join the fun. Winner of the California QSO Party for Sacramento Valley was WA6JVD, Woodland, with W6NKR, Sacramento second. Your SCM came in third among the rocks and manzanita bushes in Sierra County. Traffic: W6LNZ 27.

SAN FRANCISCO - SCM, Kenneth S. McTaggart, K6SRM - With the New Year upon us it is time for a state of the section message. As of Dec., AREC had 79 members, 65 of whom were full members and 14 were limited members. The section had eight FCS. There were the following number of current appointments: OVS 12; ORS 10; OO 4; OBS 4; OPS 10. The number of Form 1s received during the year indicated that ORS appointees reported most often. From the beginning of Feb., when I became acting SCM, through Dec., I was reimbursed by the League in the amount of \$60.25 for envelopes, stamps and travel to one Division meeting and three club meetings. From my card file of ARRL members in the section, I would estimate we have approximately 650 ARRL members. So there we are! I wonder how we'll look next year. Happy to report that WN6'RR is now WA6CRR and sharing a TR-4 with his son. WB6FZN is busy building a new station console. W6EAJ says heavy rain damaged the water wheel used to power his rig. W6WLV reports that QST Bureau traffic has slowed up a bit. WA6NOZ has his 4-400 linear in operation. W6FCX spent the winter months in Yuma, Ariz. NPG, Navy Radio at Skaggs Island will man a cw frequency especially for novices to work Armed Forces Day in May. Subject to the availability of transmitters and the frequency, 4016.3 will be used. I have Form 610 (RCC) available to anyone needing to renew their ticket. An RASE will have one off to you within two days of your request. Traffic: (Nov.) WA6BYZ 234, W6WLV 179, W6KVO 116, W6FAY 38, W6CFR 15, W6BWV 14, W6BIP 6, K6SRM 3. (Oct.) W6FZN 170.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6IPU - At the time of this writing, Dec. 1970, an amateur radio operator, can put up a radio tower over 35-feet. An ordinance has been proposed, headed by W6IUK, but the city of Fresno, (without an ordinance) is not in any hurry. All this commotion was caused by one of our local amateurs who thought he was right, and the rest of them were wrong. WB6TJDJ has a Galaxy 530 receiver. W6DDP has a Clegg 22er am and an fm rig. WB6SVY is the chairman for the Fresno Radio Hamfest to be held in Fresno at the Tropicana Lodge. Any communication should be sent to FARC, P.O. Box 783, Fresno, Calif. WA6JDB made BPL in Nov. W6BUA is in Italy on vacation. WN6DRJ is on 15-meters with a beam and causing pileups. WN6DRK is on 15-meters with a 6146 final. W6BUH has a Clegg 22er fm. K6VFE had her antennas and lead-ins overhauled by the Fresno Amateur Radio members. W6ZBX and TB6TIA are on 220 MHz. W6GLCM has a Tempo I. W6PELL is on 2-meter am. WA6WXP and K6RPH have eleven-element beams on 2. WA6ZCH has a TC-2B. W6ARR has a Swan transceiver on all bands. W6NDJ is on 2 am.

SANTA CLARA VALLEY - SCM, Albert F. Gaetano, W6VZT RM: WA6LFA. Welcome WA6BJL, ex-WA7JMD, Oregon, to the Santa Clara Valley section. WA6NVU is the new pres. of the San Carlos C.D. Radio Club. About this month the band conditions on 80-meters ought to be improving. The high noise levels and the skip on 80 make handling traffic very difficult and requires a lot of patience with the other operator. Don't give up fellows, it can only get better. W6WGO is the new pres. of the Santa Cruz Amateur Radio Club. WA6LZU has been elected pres. of the North Peninsula Electronics Club. I hope W6ZKJ has recovered from all the Christmas parties he attended with the clubs in the area. W6BPT has been checking into RN6 quite regularly to help with the MARS traffic. Pinky says he could use more help in getting MARS traffic off of NTS and into the MARS system. This is good Public Relations for amateurs so if anybody can afford the time please give him some help. Traffic: W6RSY 495, W6YRV 294, W6BVB 210, WA6LFA 204, W6WN 105, W6DEF 93, WA6NHV 63, W6VZT 64, W6BPT 57, W6AUC 44, WA6BJL 8, W6RFP 8, W6OH1 6, WA6DKE 4.

ROANOKE DIVISION

NORTH CAROLINA - SCM, Calvia M. Dempsey, WA4UQC - SEC: W4FVN, PAM: W4AJT, VHF PAM: W4HJZ, RM: W4WXZ. W4FVN is working on a 4-400-A linear. The Wayne County Boys Club station, W4SHY has recently installed a new two-element Tri-Band Quad. Helping in the antenna raising party were W4HBO, W4OTA, K9ZC/H4, W7CQX/4, WA6BJH/4, WA4GTB, WB4QKU and Jerome Coffen who has taken his Novice exam but has not received his ticket. WA4SHY now is on the air 80 through 10 meters with a kilowatt and a phone patch. W4WXZ our RM says he will be happy for everyone to check into the Carolinas Traffic Net on 3573 kHz at 2345Z and (1800Z). We are sorry to report the passing of K4LEU. The ham bands will miss him very much.

Net	Freq.	Time(Z)/Days	QTC	Mgr.
CN	3523	2345 Dy	69	W4WXZ
N.C. SSB	3938	0030 1y	14	WB4AD h.

Traffic: W4EYN 246, W4WXZ 108, K4MC 40, K4VBG 36, W4RWL 31, K4TTN 22, W4PNY 17, WA4VNV 13, WB4HGT 12, WA4UQC 9, WB4JMG 5, W4TYE 5, WA4KWC 3, WB4RCH 2, WB4HGS 2, WA6BJH/4 1.

SOUTH CAROLINA - SCM, Mrs. Elizabeth Y. Miller, WA4EFP - SEC: WA4ECJ, Asst. SEC: W4WOM, PAM: WA4GAW, RM: K4LND. WB4MCI rasslin' a cello and still weaving up a storm on her loom. She cooks, besides! K4NJS is a recent newcomer to 75-meters with an H1-37. Two years ago W4ELW needed a patch to one of his hammocks in West Point, and was helped by WA4GTB/3. Recently he needed a patch to his daughter in Goldsboro, N.C. Who should show up to do the honors in response to his CQ? You guessed it. Good ol' WA4GTB/4. Many S.C. hams had a ball during the 6-meter opening the early part of Nov. K4HDX is rebuilding his frequency meter after 2-cycle fiasco in the Nov. I.M.T. W4ZLQ was exceptional with 1.8 ppm with barefoot lm. Operation '70 was quite a success as an S.C. simulated emergency test.

Net	Freq.	Time(Z)/Days	Mgr.
SC SSB	3915	0000 Dy	WA4GAW
SCPN	3930	1700 M-S	

CN	3573	2345 Dy (early)	W4WXZ
CN	3573	0300 Dy (late)	WB4GHK
ARFC Forum	3915	2330 W	W43ECJ

SC SSB 188, CN 104. Traffic: K4LND 160, W1OA/4 70, K4OCU 59, W4ISD 30, W4WQM 29, WA4EFP 28, W4ELW 14, WB4MCT 10, W4JA 6.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, W4THV, SEC: WA4PBG, Asst. SEC: WB4CVY, RMs: WA4EUL, K4MLC, W4SHJ, PAMs: W4OKN, WA4YXK. I regret to report the passing of Ed Johnson, W4FV, one of the founding members of VN and VFN. W4UQ reports traffic picking up. WA4JJE received a canned ham at his retirement ceremony. WB4GFS is working on an antenna farm. W4ZYT made DXCC, adding 1A-33. W4THV's Digi Key now working. UCU's WB4IAV should be on the air now with WB4IDT and WA4TNS. Our Director, W4KFC has been wandering around the Caribbean with W4GF. K4PJL moved to Lorton and is using a clothes line until he can get the antenna up. W4YZC was in both phone and CWSS. W4KAO is overhauling a tri-band beam with noise bridge. W4DM reports strenuous time of year. W4UJ is active in parties and pushing 2000 counties. W4ZV got a nice write up with picture in The Richmond News Leader for fifty years of hamming. WB4GXE is getting together a Tidewater QSO Party for next spring, watch for details. VARC reports new officers: WA4OPW, pres.; WB4DKE, vice-pres.; WB4NVJ, secy.; WB4IGZ, treas. W4QYG is now on the air. WA4WXR is back from bear hunting. WA4NNJ is settled in the new QTH. WA4ZMH is back at sea as radio operator. WA4QEI is back in school at VCU. W4SQO and WB4NNO got frustrated by RPI. in Nov. See you on VSBN 3935 at 6 and 10 P.M., VSN on 3861 at 6:30 P.M., VN on 3680 at 7 P.M. and VFN on 3947 at 7:30 P.M. Traffic: (Nov.) WB4NNO 456, W4SQO 429, W4NLC 185, W4UQ 184, WB4KSG 171, K4KNP 134, WA4JJE 123, W4TE 112, WB4GTS 75, W4OKN 55, WB4KIT 54, K4GR 53, K4JM 48, K4PSS 41, W4ZYT 41, W4THV 33, WB4KBJ 27, WA4PBG 25, WA4HQW 24, K4VCY 18, K4RHQ 16, WB4EDT 14, WB4IEZ 14, WB4JMD 14, WA4WQJ 11, K4AWV 10, WA4NJG 10, W4MK 8, W4KFC 7, WA4TNS 6, W4KAO 5, WB4NDO 5, W4OP 5, K4PQL 5, W4SHJ 5, WB4DRC/8 4, WA4YRH 4, W4YZC 4, W4DM 3, WB4DRB 3, W43YS/4 3, W4JHK 3, K4JYM 3. (Oct.) W4KAO 4, WA4TNS 4.

WEST VIRGINIA - SCM, Donald B. Morris, W8JM - SEC: W8RNDY, RM: W8RBBG, PAMs: K8CHW, W8DOW, W8YU. Phone Net Mgr.: W8LEW, CW Net, 0000Z and 0300Z on 3570. Phone Net, 2300Z at 3995. W8LD received an Honorary Doctor of Science Degree and reports from club station, WB8EJO at Wesleyan College in Buckhannon. W8ZO, now retired, passed the Extra Class

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exam. WBBBG had 39-K in CWSS and is active on RTTY on 80 and 20. New Kanawha ARC officers are WB8DRH, pres.; WA8YTP, vice-pres.; WN8YQ, secy.; WA8HJC, treas.; WB8ICY, W8VZO, act. New officers of the Buckhannon ARC are WB8DXF, pres.; WA8YHJ, secy.-treas. The CW Net reports 51 sessions with 276 stations and 114 messages handled. Phone Net, 29 sessions, 442 stations, 90 messages. WA8YCD reports the Morgantown Traffic Net on 145.135 at 0300Z on Fri. The 1971 State Radio Convention officers are WB8YD, pres.; W8JM, vice-pres.; WA8OKG, secy.; K8NVP, treas. WB8DXE, WA8SHT and WB8ARQ are new ORSs. I regret to report the passing of K8RLC from injuries received in an auto accident. The Opequon Radio Club has a new club house. Traffic: WBBBG 188, WA8NDY 93, WB8DXF 39, W8JWX 40, W8HZA 35, WB8CYB 28, WA8LFW 25, W8DUV 13, W8JM 12, WA8WCK 12, WA8ZNH 12, K8QEW 5, W8AEC 3, WA8LFW 3, WB8ARQ 2, WB8AKR 1, WB8AQI 1, WB8DQX 1, W8ETF 1, K8HUH 1, W8BOS 1, W8QEC 1, K8QYJ 1, K8SVH 1.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Charles M. Cotterell, W8SIN - Asst. SCM: Neal S. Morris, K8TIV, SEC: WA8HLQ. PAM: W8CXW. Hi-Noon PAM: K8JGA. 160-Meter PAM: W8LRW. RM: W8LRN. VHF PAM: W8DAWG. We have a new call on the PSHR, WA8MNL. Congrats. K8ECR has been in Lutheran Hospital but now is back home. K3TEV/D had 4800 plus in the CW SS. The Lamar Amateur Radio Club holds code and theory classes. The Denver Amateur Radio Teletype Society has been organized with WA8YCP, pres.; W8LRN, secy. W8LLA is back in business as an OO. OVS W8MOX reports some long skip on 144. OVS WA8SIK has a new linear brewing for 6. 18 stations have qualified for SNCs and 4 for the AMPS Award on Hi-Noon. Over a dozen stations have qualified for the AMPS award on the Denver Area AREC Net. The Hamsters VHF/UHF Club had their installation banquet Jan. 16. We have three new LCs: WA8RYA, WA8KXD and W8PGX. Welcome! Our SEC has only three districts left to fill. Hope all participated in the SET. The Colorado Hi-Noon Net reports QNI 959, QTC 151, time 1090, SSN, QNI, 164, QTC 49, time 906, 14 other messages, CCN, QNI 148, QTC 69, time 520 mins. Columbine Net, QNI 1217, QTC 96, 270 other types, time 1501 mins. Traffic: (Nov.) W8WYX 286, W8LLA 86, W8LG 81, K8JSP 79, WA8MNL 79, W8LRW 74, W8DAUL 72, W8LRN 38, W8YCD 32, W8SIN 20, K8ECR 19, W8LCL 9, K3TEV/D 2. (Oct.) W8LRN 18.

NEW MEXICO - SCM, James K. Prine, W5NUI - K5MAT has a DXCC certificate in hand and has qualified for a unique 5RWAS achieved by QSOs with a single station in each of the states. It will require appreciable skill to top such a self-imposed handicap. The 2-meter repeater on ME Taylor is operational and provides good coverage rewarding the efforts of WA5JUZ and associates. Sporadic openings on 2-meter fm have been noted with the Capitan Mt. link opening to Fort Worth and other west Texas areas. It is with regret that I received WSPNY's resignation as SEC. WSUH has debugged an LM frequency meter and may soon join the QOs and others in the FMT. WA5JXU has been appointed an alternate RM. The NM Novice Training Net on 40-meters has been rather successful in spite of the heavy foreign IC QRM. Traffic: W5RE 151, WA5UJY 100, K5DAR 90, K5MAT 84, WA5JXU 37, W5LT 32, W5DAD 28, W5DMG 26, W5MYM 24, WSPNY 17, W5SMY 13, W5SOHJ 13, WA5BLI 4, W5NON 4.

UTAH - SCM, Carroll F. Soper, K7SOT - SEC: W7WKE. RM: W7OCX. UARC officers for 1971 are K7GOE, pres.; WA7ARK, ex. vice-pres.; W7CWC, vice-pres.; WN7NHU, Mike Ashby, program; W7VFO, treas.; W7GKO, secy.; K7HKV, editor; WA7JLM, asst. editor. BUN reports QNI 811, QTC 59, average time 16.07. OO K7ZLS reports 100 cooperative notices sent during Nov. W7OCX and K7ZVT claim 52 PSHR points each for Nov. WA7OXZ and W7VTJ are the only two YLs in Utah who are members of YLRL at this time. W7EM received life membership in the Society of Wireless Pioneers. W7MUG had his hf equipment stolen from his car Nov. 15 in Colorado Springs, Colo. The vhf equipment was not disturbed. Davis County ARC/RACES Net held a drill Nov. 24 to demonstrate emergency preparedness. Traffic: K7HLR 186, W7EM 91, K7ZVT 61, W7OCX 53, WA7HCQ 33, WA7LPS 33, K7SOT 31, K7CLO 13, W7NZZ 9.

WYOMING - SCM, Wayne M. Moore, W7CQL - SEC: K7NOX. RM: K7KSA. PAMS: W7TZK, K7SM, OBS: K7SLM, K7NOX, W7SDA, WA7PIA. Nets: Pony Express, Sun, at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7260; Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. W7GSO has a new 2-meter rig. W7VDZ has a new home brew amplifier. Real nice construction and it works good too. A new ham in Casper, W8I KN has the rig on the air and is awaiting his 7 call. W7HIA has been working 160 regularly. How

many others do we have on 160 in the state? WA7NSS is another new one in Casper and is busy on all hands. Don't forget the 1971 hamfest to be held the third week end in July. Plans now call for it being held in Casper and the club already is working on it so, it should be a good one. Traffic: K7NQX 315, W7HLA 55, W7TZK 40, K7VWA 32, W7YWW 25, W7SDA 13, W7BHH 12, W7GME 12, K7S1M 12, K7WNE 4, K7BTF 3.

SOUTHEASTERN DIVISION

ALABAMA - SCM, Donald W. Bonner, W4WLG - SEC: W4DGH, RM: W4H1U. A traffic-handling booth was set up by some members of the HARC recently at one of the Huntsville shopping centers. A large number of messages was originated to people the world over and the whole affair proved to be quite interesting and valuable to the general public. Three transmitters were in operation. W4CNO is new in Montgomery and is looking for some vhf activity. WB4LNM is the public relations officer for the Mobile ARC. For what its worth, the film "Ham's Wide World" was shown five times on Huntsville TV, twice during prime viewing time. K4UMD now is sending and receiving SSTV pictures all over the world. K4RYM has a new 100-ft. tower and a 40-ft. long Yagi, all on top of a mountain. Traffic: W4HFU 183, WB4KDI 106, WB4EKJ 103, WB4OKT 93, WB4JMH 78, K4AOZ 46, WB4OJD 42, WA4FYO 20, WB4KSL 20, WB4LNM 20, W4WLG 16, W4DGH 13, WN4R1X 12, WA4AZC 11, WB4MLV 5, WA4VEK 1, WB4QVR 20.

EASTERN FLORIDA - SCM, John F. Porter, W4KGI - Asst. SCM: Albert Hamel, K4SJH. SFC: W4IYT. Asst. SFC: W4SMK. RMs: W4LLE, K4EHY. PAM 75: W4OGX, PAM 40: W4SDR. Al and Mae Burke are back with us for the winter and going strong. We welcome WA9QV/4 to our section from the cold North. He is stationed at Patrick AFB and already is active in our cw nets. We have another newcomer to our section, K4FAC formerly W9GMC. Congrats to WB4OMG on making his first BPL in Nov. the hard way. W4ID still is looking for comments on the proposed Fla. League of Amateur Radio Clubs. Drop Al a line at his Eau Gallie address. New appointments: WA4HAA as EC Pinellas County, K4ANZ as OO Class IV. During the past six months we have mailed out many section net certificates. If you failed to get yours please contact your PAMs, RMs or your section net managers. They will forward details to me. The Fla. Traffic Handlers Routing Guide still is available from W4LLE. This is an indispensable item for our Fla. traffic men. K8WQV/4 now has his Fla. call K4C DL. Regarding the intelligence of our section NCSs - If you have never been NCS, you have no appreciation for the rapport with the entire net the NCS must keep during a session, so when he QNYs you, he usually knows what he is doing, even though it may not seem quite right at the moment. Please obey the NCS even if you think you know more than he. Maybe you do, but he is running the show. Traffic: (Nov.) W3CUL/4 3472, W3VR/4 1050, WB4OMG 502, WA4LH 317, W4FPC 277, WA9QVT/4 178, W4DVO 137, 8R1Y/W4 120, W4SDR 110, W4YXP 84, WB4PWD 79, WB4AIW 75, K4LJX 69, W4NGR 59, WB4SMA 46, WA4ABY 45, WB4LAA 40, WB4FJY 36, WB4GHD 33, W4OIGX 32, W4FHW 30, WB4HNL 30, WA4CIO 29, WA4HED 28, W4IAD 26, K4HS 24, W4LLE 22, WB4MO 12, W4SMK 21, W4ZAK 21, W4KGI 18, W4BCZ 16, W4BNE 16, K4LPS 16, W4IRS 15, K4BLM 9, W4FJM 9, W4LK 8, K4EBE 3. (Oct.) WB4HKP 220, W4FFT 6.

GEORGIA - SCM, A.J. Garrison, WA4WOU - Asst. SCM: John T. Laney, III, K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4JXO. PAMs: K4HQI, W4LRR.

Net	Freq.	Time(Z)Days	QNI	QTC	Net Mgr.
GSN	3595	0000/0300 Dy	637	242	K4BAI
GTN	3618	2300 Dy	194	86	WB4JXO
GRN (Phone)	3975	0100 Dy	416	36	WA4VWV
Ga. Craacker	3995	1300 Su	141	17	WA4IQU

K4BAI, K4BVD and others had a good time during the CQ DX contest operating P10FC on Curacao. A new world record for the contest was set with over 7000 QSOs during the 48-hour period. Among GSN members seen in the logs were W4KE, WA4WOU, WB4JXO and WB4MNF. K4FLR is the editor for the GSN/GTN bulletin. WN4RSM editor for The Atlanta Ham also is turning out some interesting bulletins. The Atlanta Radio Club and Augusta Radio Club both report that their Christmas parties were a smashing success. W4PCU is back on all hands with a new Tempo-One and sounds great. He also has a Motorola U4KGT-20A on 2-meters fm. The Atlanta Radio Club is busy putting the finishing touches on their 2-meter repeater. Expect to be in full operation early in 1971. All traffic-handlers are urged to get their station activity reports to the SCM by the 7th of the month. Traffic: W4LEP 193, WA4RAV 186, W4PIM 158, K4BAI 100, WA4WOU 90, W4AMR 54, W4C7N 42, W4RNL 39, K4FLR 27, W4FDN 20, WB4KVF 15, WA4ZHV 13.

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WEST INDIES - SCM, Jose Medina-Hernandez, KP4CO - OD: KP4PO. OBS/ORS: KP4CBI/4, KP4CBI/4 meets 4RN regularly representing the West Indies section at least four nights per week. A 3715 kHz cw traffic net is being organized by KP4CBI/4. Please join him over the air. Novices are welcome. The Ponce Rotary Club is offering a very fine certificate. Puerto Rican Radio Hour, to all amateur stations working 50 or more toward the Island of Puerto Rico or working from 50 or more towns of the Island. KP4PO is responsible for the idea and is very active with an excellent mobile signal from over most of the towns. Please send your QSLs to: Club Rotario De Ponce, Box 3777, Ponce, P.R. 00731. Good luck! KP4CBI will soon be on the air with slow-scan TV. KP4DRW, son of KP4KF, is a General Class licensee. Congratulations! Traffic: KP4WT 146, KP4CO 25, KP4CBI/4 11.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB. RM: K4LAN. RTTY: W4WEB. PAM: W4MQO. VHF: W4UUF.

Net	kHz	Time (Z)/Days	Sex	QNI	QTC
WEPN	3957	2400 Dy	M	5QFN	46S1
QFN	3651	0000/0300 Dy	M	..	..

Pensacola: W4NOG is now mgr. of WEPN. WB4ICV was appointed EC for Escambia County. W4UUF keeps nightly sked with W4LSQ in Ala. on 2-meters; he also would like skeds with Ark. and Okla., as at cw. E4QSH is out of the Navy, but plans to stay in Pensacola and chase DX! WB4PKR and WB4PKW are looking for more local activity on 6-meters. Milton: WB4MNM, a new General Class licensee, runs an HW-100 and HW-17. WB4KUF also passed the General Class exam. Fort Walton: New hams in the area include WB4BCA, K4CLM, WB4SPU, WR4STU and WN4TAO. WB4NHH is in Calif. for two months. Construction is underway on a CD FCC for Okaloosa County; local hams will help equip and man it. K4UBR and WB4EQU plan a 10-meter fm repeater. Choctawhatchee High School now has a ham club, with 8 members. Officers are WB4PH-V, WB4NRM and WN4RBD. Defuniak Springs: A 2-meter fm rig has been installed in the Courthouse CD office. Panama City: New officers of the PCARC are WB4GAO, K4AHV and Gene Kelly and were installed at a banquet at which K4AHV also was honored for his long service to the club. St. Joe: K4WOS is on 2-meter fm. WB4QWV is active on 75-meter from Wewahatchka. Traffic: (Nov.) 8R1Y/W4 120, K0BAD/4 52, W4RKH 19, WB4NHH 9, W4FDJ 8, W4ZWD 2. (Oct.) WB4DVM 4, K4CFS 3.

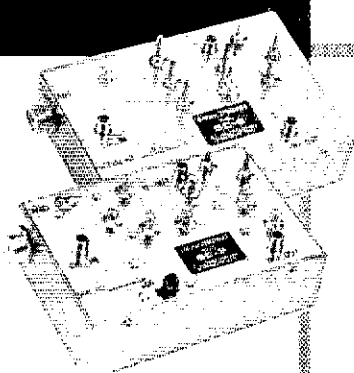
SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. Several clubs have elected officers for the coming year. The Arizona Repeater Assn. elected W7NAP, pres.; K7JWB, vice-pres.; WA7DSW, corr. secy.-treas.; WA7KBN, rec. secy.; W7UXZ, custodian. The ARA meets the 4th Tue. of the month at 7:30 P.M. at 5830 N. 19th Ave. in Phoenix. The Old Pueblo Radio Club elected W7BM, pres.; WA7JCK, vice-pres.; WN7I XW, secy.-treas., at their annual dinner meeting Dec. 9. The OPRC meets the 2nd Wed. at 7:30 P.M. at the Randolph Park Club house in Tucson. The Scottsdale Club elected W7DI L, pres.; WA7JWH, vice-pres.; WA7JDR, secy.; WA7IRZ, treas., and meets the 3rd Mon. at 7:30 P.M. at 35 S. Old Scottsdale Rd. in Scottsdale. The Arizona ARC held a transmitter hunt with W7UXZ the first to find W7CAF. Also, the Arizona ARC set up a display station in the Rayless Old Country Store and accepted messages from the public. The messages were sent from the store on 2-meters and then distributed via W7UXZ, K7UYW and W7PG. W7DRR worked V86DD on 75-meters with only an HW-12 and W7JMO worked Norway, Hong Kong, Alaska and the Caroline Islands on 75-meters. K7ZMA was appointed OBS and will transmit bulletins on 3600 kHz Mon. and Fri. at 19:30 MST on RTTY and on 146.94 MHz at 19:30 MST. Traffic: K7NHL 265, WA7MAD 81, K7NTG 54, W7PG 43, WA7NXX 27, W7CAF 23, WA7GAE 15, WA7JCK 6, W7OUF 7, W7JMO 4, W7OXZ 4, K7ZMA 1.

LOS ANGELES - SCM, Harvey D.D. Hetland, WA6KZI - Asst. SCM: Dick Norton, W6DGH. SEC: Vacant. The 1971 LERC Hamfest is scheduled for May 15. It took two years, but the Ramona RC mustered enough attendance at the Monterey Park RC to get their club gavel returned. W6MMW lost two antennas in the Nov. rains in addition to his plate transformer. WN6DHM has an S8-102 under construction in hopes of bettering his WAS15/13. W6ORG presented a program to the Antelope Valley RC on ATV while WB6ZYF entertained the FRW Systems RC with a program on slow-scan TV. W6USY is interested in a QSK circuit for his Kenwood transmitter. WN6AEI managed 59 QSOs in the SS and reports an impressive 94% QST return on his first 100 QSLs sent. K6HV recently visited 73 Magazine Hqtrs. Members of LERC RC toured the Goldstone tracking station. New officers of the 50 Club: K6HV, chair; K6MH, secy.; K6HAE, treas. W6LYY along with about ten others operated W6VPZ in the phone SS for 418 QSOs.

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WB6MCW is getting a new 11-200. K6EA has returned to the southland, WA6GSV reports 50211 points phone SS and 29400 cw SS. The Crescenta Valley RC awarded W6DSP and K6PWU with the club's achievement award for 1970 in recognition of their contributions to the club's betterment. W6MYB is back on the air after a 31 year absence. WA6IGM got his Extra Class ticket. Officers of BSA Explorer Post No. 312, sponsored by the Monterey Park RC are WA6HFE, advisor; WB6FJ, pres.; WA6EJB, vice-pres.; WB6BJP, secy.; WA6KAL, treas. K6ASK is involved with fm repeater and remotes on 435 fm. W6UEI expects to be transferred to another area. WB6WFI added some military surplus shift converters to his RTTY gear. The Palisades RC has their repeater up in the Hollywood Hills using 146.61 m and 147.33 MHz fm out. W6RPP took part in a Halloween Patrol with the County RACES group. WB6ZVC and W6LYY advise of a new net, So. Cal. Net Trailing at 8:30 P.M. on 3600 kHz using slow speeds and everybody is welcome. WN6BWT is interested in contacting others using IC logic circuits to program message transmissions or those interested in playing chess. K6QPH has a new 1H6-DX antenna and received his Extra Class ticket. WA6FQG spoke to the Ramona Radio Club on the subject of TVI and your neighbors. Next LERC novice classes are scheduled for June 7, 1971. The So. Cal. VHF RC now meets at the Norwalk City Hall. WN6GLT picked up a WL7 and an NE on 7 MHz. Nov. net report: SUN, 3600 kHz, 6-30 P.M., QNI 522, QTC 566, Mgr. W6LYY. Traffic: (BPL/PSHR): (Nov.) K6AHL 0/12, WN6ABL 0/5, K6ASK 2/1, W6BHG 6/10, K6CL 32/0, W6DGH 4/0, W6FD 22/0, W6FJ 15/39, W6FQC 0/7, W6GAQ 5/10, WN6GLT 2/0, WA6GSV 0/1, W6LI 29/31, W6INH 48/734, W6IVC 84/18, W6IBX 0/8, W6LYY 58/15, W6MMW 4/5, W6OJ 39/10, W6OI 10/7, K6QPH 2/1, W6RPP 8/0, W6TXJ 0/2, WB6WF1 0/20, WB6ZTI 12/24, WB6ZVC 144/37, W6QAE 99/25, WA6ASR 0/2, WB6WDS 12/5, W6QJR 6/0, WA6MCK 0/14, W6DOX 4/0, WA6FOC 0/1, W6EJK 0/8, WA6LSH 0/10, W6JPH 0/9. (Sept.) WB6ZVC 252/61.

ORANGE - SCM, Jerry L. VerDuft, W6MNY - Asst. SCM: Richard W. Birbeck, K6CID. SEC: WB6COR, 3 new young hams are WN6DMC, WN6EAU and WN6ELI. New club officers: Desert RATS WB6PPI, pres.; K6ZVS, vice-pres.; WA6RLC, secy.; WB6PDC, treas.; WB6QAH, act. mgr. Riverside County ARA - K6SJA, pres.; WB6IWD, vice-pres.; K9MDX/6, secy.; W6KEF, treas.; WB6YFS, act.; WB6VKL, hospitality. Orange County ARC - WB6COR, pres.;

W6HHC, vice-pres.; WA6FTT, secy.; WB6WOO, treas.; WB6QNU, act.; WA6AAL, TVI; WA6LITB, membership; WA6UBW, pub. rel.; WB6UDC and W6MNY, members-at-large. A newly-affiliated club is the Associated Mountain Toppers (vhl) whose officers are WB6ASR, pres.; WB6RIV, vice-pres.; WB6RA1, secy. The Newport ARS members WA6ISO and WB6KCC passed their Advanced Class exam and the pres. got his DXCC under his new call, W6NT. K6ILB/6 in Modjeska Canyon is using a 400-ft. long-wire on SCN. WB6ZEC is a new member of San Bernardino County RACES. K6YNB was at the West Coast VHF conference in San Jose and was guest speaker at the Nov. meeting of the So. Cal. VHF Club showing his slide collection on VHFing in VEB- and KL7-Land. WA6FOQ worked 68 sections in the Sweepstakes. WA6YWS has compiled a list of active Inyo County amateurs and Asst. SCM K6CID has written them concerning a Feb. meeting to motivate the county's ARCC activities. WB6ASR worked Kansas and Ohio stations on 6-meter Sporadic-E. A new OPS and OO Class 1 is W6FB in Palm Springs. WB6AKR sports a new Clegg Mark II 2-meter transceiver and promises to be on SCN soon. PSHR: W6BNX 66, W6MNY 43, WA6FOQ 38, WB6TYZ 16, WB6ASR 2, WB6ZEC 26 (Sept.) and 10 (Oct.). Traffic: WA6FQG 207, W6MNY 160, W6LCP 71, WB6JYZ 54, WB6ZEC 40, W6BNX 36, K6ILB/6 32, W6WRJ 29, W6QBD 15, K6GGS 6, WA6YWS 6, W6BUK 4, WB6QNU 3, WB6ZOK 3, WB6RA1 2, W6FB 1.

SAN DIEGO - SCM, Richard E. Lettler, WA6COE - Asst. SCM: Art Smith, W6INI. The Jan. SET now is over and it has been one year since the AREC provided communications for the Annual Glider Meet. Again this month the 2-meter AREC gang along with members of the 75- and 10-meter AREC group will provide the 2-day communications required. It should be another fine time of fellowship around a great hobby! Why not get into AREC work this year - get in on the local fun part of your radio work? Forms are always at Western Radio. Just ask. We'll be glad you did! Ham radio also has contributed much to overseas message handling, especially from the active MARS members here. For your information, overseas traffic to servicemen can be handled to Vietnam, Okinawa, or any other APO/FPO address. Specializing in this work are WA6PFP, K6FQN, WB6JPI, all in Fallbrook; K6ROR, K6HAV, W6QP, WB6IPH in Vista; WA6KZN, W6IPP, WA6IQM in coastal No. County and W6QE, WB6RPU in Escondido. WA6PTF traded for a new KWM-2. Sorry to report the passing of W6UQL, Fritz

I would like the following League publications shipped to me postpaid. I am enclosing payment of \$_____ (These prices apply only to the USA.)

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- ANTENNA BOOK** \$2.50
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- SINGLE SIDEBAND FOR THE RADIO AMATEUR** \$3.00
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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 2-71

Alderson, an old-timer in El Centro, W6DLN now has up a new LH6. A new ORS is K6KDF in Poway. WA6JUG, WA6AQL, W6NBJQ are now General Class. There is a new slow traffic training net for the SCN on 3600 nightly at 2030. Good chance to join in and get started on cw traffic-handling. 7 SD section hams are active in SCN. Hope you can join them. Traffic: W6JOU 639, W6VNO 554, W6COT 346, W6BGE 222, W6LRL 125, W6YKJ 58, W6BHM 41, W6INI 13, W6BJQ 3, W6TAI 3, W6CCOE 2.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6OKN - SEC: W6JTA. RM: W6UJ, K6PHI has mailed log sheets to confirm his eligibility for the Captain Cook award garnered by working 50 AX (down under) stations. K6SUA continues to be active in QRP work despite the pressure of school. He has increased his power to 2-watts. On the other end of the power scale, K6CFJ is back on all bands with full power limit. W6BWWC has his new 4-1000 linear on the air. W6BBOJ is new in Thousand Oaks. W6JTA reports the fm repeater in the Morrow Bay area, W6GFSQ, is working F.B. WA6DEI worked SS with 150-watts and found it rough going without the linear. He also reports having received his DXCC certificate. K6BCF is operating with his antenna in the attic because of deed restrictions in Westlake. The Conejo Valley ARC meets the 1st Thurs. of each month at the Conejo Valley Recreation Center at 8:00 P.M. The Ventura County ARC meets the 2nd Fri. of each month at 7:30 P.M. at the Oxnard Community Center. The Santa Barbara ARC is 50-years old and enjoying their Golden Anniversary. Traffic: WA6DJI 160, W6JTA 14.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Gene Harrison, W5LR - Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM, Asst. SEC: W5AKHE, PAM: W5BRO. RM: W5QZG. The Kilocycle Club, Ft. Worth meets at the Oak Grove airport. Congrats to W5VGP on helping handicapped people. W5QFX made 7 observations during Oct. and 18 in Nov. The Arlington RC has a new Novice class. W5IIF of Wichita Falls is returning to Penn. for 8 weeks. W5AKHF, new ORS appointee is on 3951 kHz, M-F 5:00 to 5:30 P.M. W5NSRI is a new Novice in Mesquite. W5AKHE is considering an OO appointment. The Texoma Hamfest is now history, attendance was approximately 500. OO W5ARY is building a new home in Ellis County. W5VLU, Nolan County EC, sent in certificate for

endorsement. The San Antonio ARC continues to issue best club bulletin, thanks to W5BGF and associates. W5PPI is active in O work. I regret to report the passing of W5MSG. W5BDO sends good report. W5IZU reports a nice turn out at Cole Electronics Nov 28. The Panhandle ARC bulletin is the first to show names of a local MARS directors, (Army, Navy and Air Force.) The Arlington ARC Christmas Party was held at the Gbola Inn with an excellent turn out. Many clubs in our area are becoming inactive because they have failed to send in the proper paper work necessary to keep on the active list. All that is required is to fill out forms, mail them stating your membership has 51% of its members belonging to the League together with an up-to-date list of all officers. The regular OO Bulletin just arrived and makes very interesting reading. Anyone wish a copy? Looks as though we have 2 hams in Breckenridge. W5URW and W5BAM. W5JSM wants an OPS appointment. W5VFX, Ft. Worth requests instruction in proper operating procedures. Traffic: (Nov.) W5VJW 150, W5QU 119, W5HVF 64, W5JSM 62, W5HFC 36, W5VLU 12, K5W1-R 10, K5BDC 8, W5AFR 6, (Oct.) W5LUI 46, W5HVF 11.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. Smoky Shaver, K5OOV, SEC: W5ASHN. RM: W5AYRO, PAM: W5MFX, K5DLI, W5WHV and W5ZRUI, QST: Bureau: W5QML. The Hamarama at Lake Texhoma was the biggest and best of a times. Be sure to keep the last week end of Oct., 1971 open for the next one and let's make it even better. Was sorry the W5DRZ/A5DRZ, state MARS director, was detained until late Saturday getting to the Hamarama because of a funeral. Sorry to hear that W5EVI took ill on the way home and was rushed to the hospital but glad it was not serious. The coming of the new year finds some of us still struggling along but W5J is hanging it up after 5 years of federal service. W5IQ is building on an extra room as work shop. K5OCX now is sporting a new SB-220, if must work him as he made 537 CWSS contacts. K5KHA has a homebrewed 1-meter transceiver which works am, fm and cw. Watch for the announcement of the date in Feb. of the Lawton-Fort Sill hamfest. Hope to see you there.

Table with 5 columns: Net, MHz, Local Time, News, QST, QTC. Rows include OPEN, STN, and OWTN*.

*We report, 258. Traffic: K5TLY 948, W2FR/S 103, W5FKL 51, W5MFX 30, W5FW 24, K5WPP 18, W5ZQO 14, W5NSZM 13.

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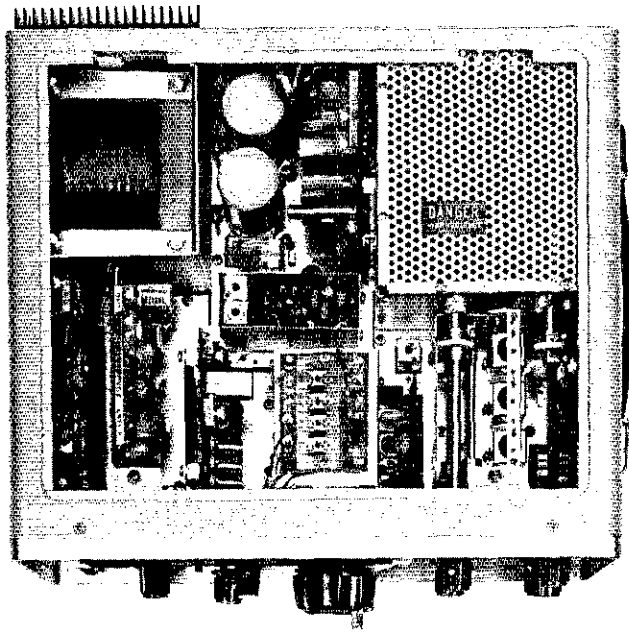
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QS 2-71

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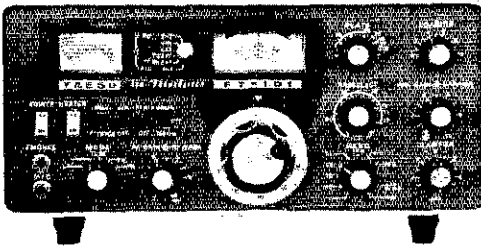
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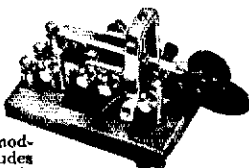
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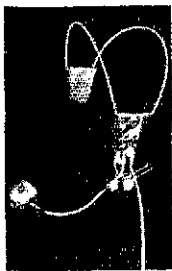


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WASLWD 12, WSPML 11, WSJJ 10, WAFSN 9, WSIO 4, K5OUC 3.

SOUTHERN TEXAS - SCM, E. Lee Uirey, K5HZR - SEC: K5HXR. PAM: W5KLV. RM: W5EZY. I recently journeyed to Victoria for an antenna party at W5HWY's. Principal tower and antenna putter-uppers were K5GDH, W5SBH and W5OIB with an assist from W5LPP, W5EYB and a blob of solder now and then from K5HXR. W5HWY's mother fixed the chow with help from K5IQJ and W5TOW and W5ZJY's XYL. Watchers were W5HWY and W5ZJY. W5KR reports another antenna party with help from W5DX, K5MRT, K5MSQ and W5HBC. W5LJTs antenna farm is sprouting a new 20-meter beam. W5AIR still is an active OBS and keeps his hand in on Sun. at 1400 GMT on 3945 kHz. OBS K5HUA has the following schedule:

OBS SCHEDULE K5HUA		OBS SCHEDULE W5ABQ	
kHz	Time(Z)/Days	kHz	Time(Z)/Days
3910	1400 Su	379K	0130 TW
3915	2000 Su	3750*	0330 TW
3955	0015 F	3770	0545 W

Beginners' speeds, 5 wpm or less one night. Mailed reminder cards to a number of appointees whose certificates had not been endorsed. Response has been slow but gratifying. EC's renewed are: W5LJN, W5ICL, W5KR, W5MTN, K5TOL, W5ATX and W5ZPJ. Welcome back W5QJA, K5HGB as ORSs; K5HUA as OBS and W5BHO as OPS. The Orange ARC hosted a post convention dinner at the Jack Tar House with 56 in attendance. We have one applicant for PSHR for Nov., K5ROZ with 44 points. I acknowledge station activity reports from W5BHO, W5ICL and W5KLV. W5BHO is applying for Old Timer's Club certificate. SEC K5HXR says he has several new prospects for EC appointment. Jim also reports a Hurricane Preparedness meeting in Texas City. Those attending were, Vice-Dir, W5VCE; EC K5LEH; Asst. EC W5QYS; Dist. RACES DR W5CWL; Red Cross Communications chmn, K5YYO and W5ASASA from the pub. health service. From the El Paso ARC bulletin comes this gem, Critics - The galleries are full of critics. They play no ball, they fight no fights. They make no mistakes because they attempt nothing. Down in the arena are the Doers. They make mistakes because they attempt many things. Which category do you belong to? Traffic: K5ROZ 153, W5EJN 131, W5MXY 124, W5ABQ 78, K5HXR 60, W5EZY 39, W5TFW 37, W5AFIP 11, W5RBB 10, K5RVE 9, K5MXO 5.

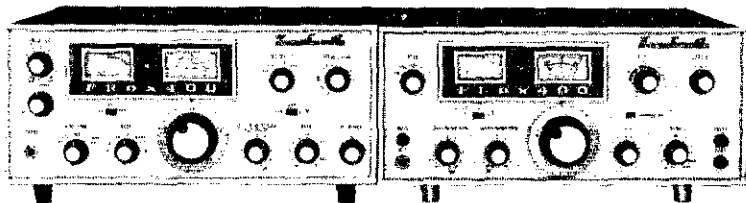
CANADIAN DIVISION

ALBERTA - SCM, Don Sutherland, VE6FK - SEC: VE6XC. RM: VE6LY. PAM APSN: VE6ADS. ECs: VE6SS, VE6AJO, VE6AZU. The 1971 officers of CARA are VE6HN, pres.; VE6AHR, vice-pres.; VE6GP, secy.; VE6GH, treas.; VE6AIZ, activities; VE6ASL, pub. rel.; AE6ADX, VE6AB, VE6XU, dir. A vote of thanks to the retiring executive and best wishes for continued success to the incoming group, VE6AZU and the CARA EC did a fine job on the Miles for Millions (March for man). The NARC looked after communications for the Sports Car Rally. VE6AZU is in Calgary General Hospital recovering from an operation. Congratulations to VE6SA on receiving the CARA "Ham of the Year" award. The NARC 1971 (repeat) 1971 Christmas party is booked for the Edmonton Inn for Dec. 17. The NARC meeting to attract members to amateur radio has been quite successful. Many new classes are in progress. Congratulations to the Amateur Radio Club of McGill U. on being the first winners of the VE6AO Trophy. Maybe participation in the ATN will pick up. Traffic: VE6ATH 112, VE6FK 22, VE6TY 12, VE6XC 7, VE6AHV 5, VE6SS 4, VE6HD 3.

BRITISH COLUMBIA - SCM, H.E. Savage, VE7FB - The British Columbia ARPC Net is showing a definite increase in the past few months. The BCEN is showing a decrease in their check-ins for this period of the season. Columbia reports they have received their 2-meter repeater call VE7CAO. The club's call is VE7CAR. The East Kootenay ARC's report just cleaned up Field Day, one bottle of medicine, 1amb's Navy. North and West ARC reports Slow-Scan TV presentation was well attended. The Beaver Valley ARC always put in interesting schematics. Nanaimo ARC reports code and theory classes progressing with much enthusiasm. Fort George RAC sponsored a certificate and special QSL card for Scout Jamboree. Zero Bear Victoria SWC is always an interesting paper. No reports of activities has been sent in by the Aurora Net which was started in B.C. and still is going strong on 7180 kHz at 0200 GMT. BCEN meets Mon. through Sun. on 3650 kHz at 0300 GMT. Traffic: W47NXO/VE7 147, VE7BLO 43, VE7QO 27, VE7AC 21, VE7DH 15, VE7GG 3.

MANITOBA - SCM, Keith Witney, VF4EI - Things are looking up on MTN. Congrats to VE4EW on his Advanced Class license. He

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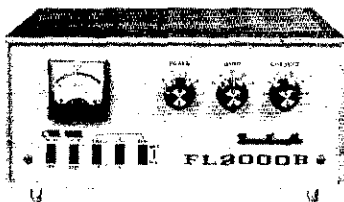
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All prices F.O.B. Signal Hill, Ca.

also reports the old VE4EW now VE2QF, alive and well. VE4LG has finally solved the antenna problem. He plans on moving to the country. VE4KF is enjoying the use of his new SB-102. VE4EA/W9 reports he is doing fine except for missed skeds with our local traffic man. I am looking for a good keen SEC to work on a couple of projects. Any takers? VE4RS has seen the light and joined his friends on 7-m. Traffic: VE4FO 36, VE4RO 23, VE4DI 14, VE4CR 11, VE4DM 5, VE4SI 5, VE4FO 4, VE4IA 4, VE4NE 4, VE4OJ 4, VE4XN 4, VE4LN 2, VE4OQ 2, VE4DQ 1, VE4HS 1, VE4XP 1, VE4XO 1.

ONTARIO - SCM, Holland H, Shepherd, VE3DV - The ARRL DX test is with us again but don't forget those commitments to the traffic nets. VE3AW, holder of the No. 1 Canadian Certificate of Proficiency and the first Canadian amateur to win Italy's Christopher of Columbus Gold Medal, is one of a number of new members of The Toronto West Side Radio Club. This club also has a new editor for their fine bulletin The West Side Signal, VF3GR. A fine turnout for the S-E-T '71, but we can still use more purely emergency power units. The Ontario Science Centre, Toronto, has invited interested amateurs to form a radio club around the Science Centre's station VE3QSC. A planning committee including VE3AKN, VE3ZIL, VF3ERO, VE3ITO and VE3QDM would welcome all suggestions from amateurs interested in helping to launch this new club. Secretaries of all Ontario ARCs could help by sending a copy of their club's constitution and by-laws to VE3PTO for his review. VE3DAV, VE3FVN, VE3ELA, VF3WT, VE3AR and VE3CC enjoyed the time spent at Camp Oba-Sa-Teeka during Scout Jamboree on the air. New officers of the Lakehead ARC: VE3JAYZ, pres.; VE3FCV, vice-pres.; VE3FEW, secy.-treas. VE3JAYZ is giving up PAM of the North West Ontario Net to devote more time to his club duties. VE3AYZ, EC Thunder Bay is totally devoted to public service. It is very nice to hear VE3DQK, lots of the Ottawa area, as he works mobile from the Toronto area. Toronto FM Communications Assn, recently elected VF3DSB, pres.; VE3BDW, secy.-treas. The Association meets on the 3rd Thurs. of each month and all are welcome. VE3CHE with a new HW-12 and an 80-meter folded dipole is enjoying a well-earned retirement. VE3BUX spent Dec. at Daytona away from the snows of Ontario. Welcome to the newly-formed St. Jamestown ARC. Traffic: (Nov.) VE3ERU 267, VE3GI 208, VF3DPO 86, VE3GFN 85, VF3DBG 81, VE3DV 76, VE3FXI 51, VE3CYR 47, VE3AWL

42, VE3DU 25, VE3LK 25, VE3BPC 18, VE3BUR 18, VE3EHL 17, VE3NO 15, VE3CRW 12, VE3WD 8, (Oct.) VE3DV 28, VE3AWL 13.

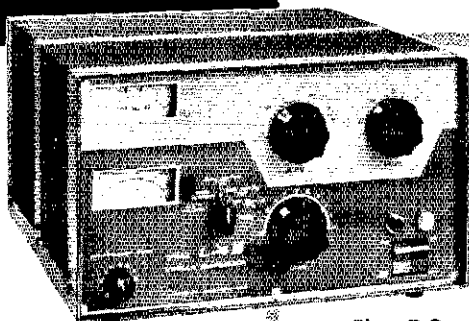
QUEBEC - SCM, Joe Unsworth, VE2ALE - VE2s AKJ, BAL, completed the EMO course in Nov. I regret to report the passing of VE2LJ and also the father of VE2IV in Nov. VE3CZI former VE2CA and VE2AGW both acquired XYLs in late Nov. VE2BU is the proud owner of the new Heath frequency counter VE2TD takes over as Editor of MARCOGRAM from VE2AWO. License plate forms are late from RAQI and could be last time for Quebec hams. VE2DM and XYL are in Barbados. Don't forget the RAQI VE2 contest in Feb. VE2BVY reports FB on SS and WW and looking for 5-Band DXCC. Le comite feminin de RAQI la presidence VE2BRI. discussion tous les jeudis a 2100 sur 3.755 MHz. Vous etes invites a participer nombreux concours VE2. Les nouvelles station de club VE2CEL et VE2CQU sont tres actives. VE2DLQ est tres actif en DX et sur les reseaux. VE2DIP a un nouveau HW-100 et VE2RIO s'est achete un FT-200. VE2JO modifying American HW-12 to Canadian band and getting 15 kHz jump hi. Former VE2KG now is VE3BAZ. Traffic: (Nov.) VE2DR 23, VE2ALE 17, VE2APT 9, VE2OJ 9, VE2BVY 7, (Oct.) VE2BZF 5.

SASKATCHEWAN - SCM, Barry Ogden, VE5BO - SEC: VE5CU, PAM: VE5HZ, OOs: VE5IQ, VE5PK, ORNs: VE5GL, VE5SC, RM: VE5GL, ECs: VE5IL, (Moose Jaw), VE5DO (Regina), VE5RI (Saskatoon), VE5BO (Prince Albert), OVSs (VHE): VE5US, VE5CU, OPS: VE5US. Section Net Certificates were issued to: VE5s WL, FR, PL, XL, UT, SC, LI, OJ, JK, GL. There are openings for additional appointments. Please refer to the ARRL publication, "Operating an Amateur Station" for details as to the duties of the various appointments. RITY enthusiasts is fast building in VE5-Land. More units should be available soon. Net activity is gaining momentum and efficiency of operation is noted for all the nets involved. Real FB! Remember to keep an extra sharp ear out for the mobiles who might be experiencing difficulties because of the severe winter weather. Congrats to SAJN! VE5SC reports SATN broke QNI record in Oct., sessions 28, QNI 191, traffic 31. Traffic: VE5GL 79, VE5QS 18, VE5SC 14, VE5GW 6, VE5OJ 4, VE5TI 3.

QST ——— QST ——— QST

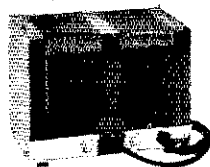
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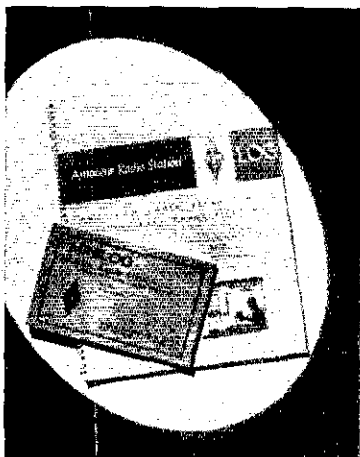
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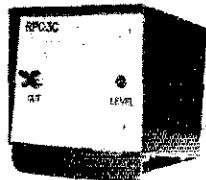


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(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained 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 centered 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.

QSLs?? Personalized made-to-order. Samples 25c. Deluxe 35c. Religious 25c. (Deductible). Rus Salkers W8DEB Box 218 Holland MI 49423.

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WANTED: Old engines from model airplanes. Will trade tubes, transistors, transformers, etc. etc. Frank Schwartz W4RFK 2400 W. End Av. Nashville TN 37203.

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.

ROCHESTER NY will again be headquarters for the huge W.V. hamfest, VHF conference and flea market, May 16, 1971.

TOLEDO Mobile Radio Association's 16th annual hamfest and auction will be held February 21, 1971. Lucas County Recreation Center, Maumee, Ohio. \$1 registration, open table sales. Map and info write TMRA W8HHR, Box 273 Toledo OH 43601.

THE 20TH anniversary Dayton Hamvention will be held on April 24, 1971, at Wampler's Dayton Harra Arena. Technical sessions, exhibits, hidden transmitter hunt and an interesting program for the XYL. For information write Dayton Hamvention, Dept. C, Box 44, Dayton OH 45401.

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.

SYRACUSE NY hamfest - April 17 at Song Mountain off Interstate 81, Exit 14. Flea Market, contests, speakers, nets. R.A.G.S. Box 88, Liverpool NY 13088.

AN invitation NYC area hams and SWLs are invited to attend NY Radio Club Meetings - 2nd Monday of every month, George Washington Hotel, 23rd St. and Lexington Av. at 8 PM - New members wanted.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York NY 10007.

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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.

DUMMY loads, 1 kw. \$9.95. Phone patch \$8.95. Wired. \$4. Ham-Kits, PO Box 175, Cranford NJ 07016.

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100 MFD @3000 volts Aerovox oil-filled filter condensers. Size 13" x 8" x 6". Weight 44 Pounds. \$30 Basil J. Weaver, 1821 Ave., M Lubbock, TX 79401 806-762-2591

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HAM magazines from estate WIDKE: QST from 1951, CQ from 1947, 73 from start, more. Write for list. Mason Southworth, RFD 3, West Redding, CT 06896

450 MC 12 volt transceiver all transistor 70 watt output built in PL tone 5 watt power speaker \$225. WB2ROL 60 Old Oak La., Levittown Ny 11756

SELL SB200 \$150; T5A3 \$190 Watt 7583B and Ham M Bill Adams, Box 241, 29 Palms CA 92277

DON'T guess at operating privileges. 8 1/2 X 14" wall chart displays FCC frequency allocations and authorized emissions for novice through extra class. 3.5 through 149 MHz. 50 cents. K. Nichols, 7280 Danbury Way, Clearwater, FL 33816

COUNSELLOR: Penna. Brother-Sister Camp seeks Ham Radio college man with a General License, David Blumstein, 1410 E. 24th St., Brooklyn, NY 11210

MANUALS R-390/UUR, R-390A/UUR, URM-25D, CV-591A/UUR, \$6.50 each. Hundreds more. S. Consavio, 4905 Roanne Dr., Washington, DC 20021

COLLINS 75A4 \$300, Central Electronics 100V \$325, Swan 350 W6117 P.S. 410 VFO, Vnx \$300, 50" Bud rack with power supply, Plate Fil. choke all new including 6 rect tubes - 4 1/2" sq. meters and a lot more \$100. Send for details. E.A. Stracka, 28455 Leona, Garden City, MI 48135

FOR SALE New Lafayette HA 800 with spkr 100KC crystal and vernier \$100. Drake 2NT with 7 crystals \$100. HJ180A just bad factory alignment \$300 has clock, noise immunizer & speaker. U pay shipping. Dave Thomas WB2JQL, 81 Rosewood Terrace, Lakeview NY 14085

GSB-258B solid state transceiver, perfect condition, no trades, best offer. Bob Gilmarin 1715 Diana Blvd., Merritt Isl FL 32952

NOVICES: Viking Ranger with PTT, \$60 plus shipping, Ed Jones W7PPO/6, PO Box 303, Los Altos, CA 94042

HEATH HR-10B \$65, DX-60 \$55 relay, HG-1UVFO \$20, New RDP-21A mic \$30, Lafayette HA-350, spkr \$99. Rod W3LTF, 218 Messinger, Bangor, PA 18013

FOR SALE - Hallicrafter HT 40 good condition, \$45. Ameco R5 with PV 6 meter preamplifier, \$60. WA3NVD Joseph Bartz Jr., 320 S. Meade St., Wilkes-Barre, PA 18702

DRAKE 2NT \$120, HR10B and calibrator \$70, HG10B and power supply \$35 lot price \$200 used only 3 months. Don Bremer WB9EFP, 21 W 584 Monticello, Glen Ellyn, IL 60137

SELL - HT-40 xmt, SX-140 revr, HA-5 vfo, 6 novice xtals, straight key, headphones, Johnson TR switch, all connecting cables - \$350. M.D. Ringsten, WA9YGS, 1508 N. Morrison, Kokomo, IN 46901

GALAXY V transceiver, AC supply, speaker console, VOX calibrator - Standby rig used little excellent condition \$275 cash pick up - W3MTU, 965 Buck Rd., Holland, PA 18966 (Suburban Phila.) 215-968-4122

SAVE on all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd., Swampscott, MA 01907 617-898-9700/2530

HALLICRAFTERS HT-37, excellent condition, \$165. You pay shipping charges, Joe C. Christian, K5HMD, Box 608, Eldorado TX 76936 915-853-2677

3-WATT solid state 450 f.m. xmt with a.c. & d.c. supply and mike. Not homebrew! Xtals are included. First \$450 check takes it. WA0OHJ - Chris Prentice Box 23, Jalaria, CO 80735

CHANGING QTH must sell: 80 ft Kohn Row \$175, TH6DXK with balun \$85, Mosley A-200C \$50, HAM-M \$75, Pau Darwooder WBK1T, 927 South West St., Findlay, OH 45840

4-1000A 2KW Linear Amp and power supply partially built have all parts \$490. 2KW 6 meter linear - PL 172 Final \$350. 150' RG 17D Coax \$30. Many 6 and 2 meter converters and other VHF gear - PolyCom 6 Transceiver \$100. Jerry Hacker 156 Centre Ave., New Rochelle, NY 10806 914-BE-6053

DRAKE TR-4 with AC-4 and MS-4. Perfect cond. All original cartons and manuals. \$600 or best offer. WA9ULR 6210 E. 56th St., Kansas City, MO 64129

SELL: Central Electronics 100V, immaculate condition \$325. W2DHK 70 Kings Gate S. Rochester, NY 14617

COLLINS 75A4 5 2.1 3.1 filters last built by Collins in Canadian plant. Complete modification of front end by Harrison \$525. HT32A Hallicrafter \$225. HT41 Hallicrafter Linear \$175. All three \$875 manuals mint condition. W. Barrett 43 Kenilworth Dr. East, Stamford, CT K1APY

SELL mint, A-J Collins KWM-2, AC supply and speaker, 301-1 belongs to estate of the late G4FLI, Mike Burkhead RFD Henderson, TN 38340

PROP Pitch Rotor, 10,000:1, unmodified, excellent \$45. Safety belts, climbing, body portion \$15. Counter 100 Kc Berkeley \$80. Gerlach M4/P8S 601% 20-1000 MC \$350; 1W. Handitalia on 146.94, \$55; F01 Link, 1081 Aron St., Cocoa, FL 32922

WANTED: Old Allied Radio Catalogs, Before 1950, have QST from 1927 to 1968 or will trade for Gibson F-4 mandolin or Gibson five string. Mr. Nicholas Vangort 21369 Audette Dearborn, MI 48124 WB0SU

WANTED: To buy, rent, beg or borrow instruction book for 1 meter Gonset "4" will copy and return - What's your price? K2GDG Dixon RFD Saranac Lake, NY 12963

JOHNSON 250W matchbox wanted locally LA W6701. - 24011 Ave. Crescenta, Valencia, CA 91355

SELL: Drake TR-4, AC-4 power supply, MS-4 speaker, TH6DXK Tribander, Ham-m control box, Henry 5-K linear. You proposals welcome. KL7HJRB S.D. Flannagan 1016-7 Chestnut St., Ft. Wainwright, Fairbanks, AK 99701

WORLD Radio's used gear has trial-terms-guarantee! KWM2 - \$649; KWM2A - \$689 755-1 - \$279.95; Swan 550 lite - \$289.95; SB34 - \$249.95; 8N2 - \$79.95; Ranger - \$89.95; HT46 - \$199.95; SX101 - \$159.95; R4B - \$329.95; 2B - \$169.95; SC200 - \$139.95; Hy-Gan KBK rotor & control \$365. Free "blue-book" for many more. 3415 West Broadway Council Bluffs, IA 51501

FOR SALE Galaxy - GP-550, RF-550, RV-550, SC-550, AC-400 G-1000LC, CAL-25, F-3, VOX 35-C, GTM-72M, Heathkit - SB-220; Rohm - 35" VFO, hingeplate, house bracket; Ham-m Rotor; Mosley - Classic - 33 WIAGA

FOR SALE: Novice Station, DX-220 w/crystals, key etc. Heath HR-10B receiver. Bargain for quick sale. Smith, Box 132, Oa Ridge, TN 37830

SELL: Knight RIDA revr, Heath DX50 trans, 30-40 dipole, 40 ft. hinged, extra long, 100 ft. for \$135. Must see for college expenses. Tom Wilson, 5352 Wallace Hall, Ames, I. 50010

W6NLZ Estate Sale - many items; write W6NLZ for free list. High power transmit system: Collins KWS-1 (VFO, 55B, A4 CW) available at \$7,230, 432, \$1,000. Low power transmit system (AM or CW) \$2,220, 432, 1296 - \$350.

SELLING miscellaneous ham equipment. Send for list. W0GE Alton Braley, 720 McLean, Iowa City, IA 52240

HY-QUAD for sale. Never put up. Originally \$130 will sell \$10 WALL-DE, Dave Fisher, 30 Ames Ct., Sharon, MA 02067

MINT SR 150, PS 150-120 HT-45, P45. Coax relay cable complete with books. No scratches. Perfect electrically \$1300 Sell \$580. HW 22 and HP 13 for parts. No work. \$1 takes all. Certified checks please. K6PTM PCB 960 10th St. N 10 Santa Monica, CA 90403

WANTED: 1 1/4 meter 220 MC, Gonset communicator, Johns 6N2 Thunderbolt, 70 foot or larger crankup tower, Large DS Andrews Foam Helix, 4CX250P's New, Frank Miller, 161 Nippersink Rd., Ingleisle, IL 60041, or 312-5871-6080

WANTED: 500, 800 cycle, 6 kilocycle filters and ten met crystals for 75S3B/C, W9GXR, 15 Kingswood, Normal, 61761

CHRISTIAN Ham Fellowship is now organized for Christ fellowship and witness among licensed amateurs. Free govt tract sample and details on the organization on request. Christ Ham Clubbooks listing members. \$1 in donation. Christian H Fellowship 5857 Lakeshore Dr., Holland MI 49423

HALLICRAFTERS SX-130 communications Revr. match R-50 spkr and manual. Excellent condition. Great for ham a SWL paid \$225 sacrifice \$125. DX605 xmt and HG-10 V1 \$99 - user warranty. Wanted Drake HT43 for trade or buy. More equipment. Mike Moore WR9RUR 918 Hunter Whitel IL 60091

SELL: GRT 27 UHF transmitter and power supply w technical manual, mint condition. W1NSH 15 Fletcher Rosindale, MA 02151

SWAN 350C, 117KC pwr. mike, 144VQ antenna, semi-auto k SWR meter, used very little, exc. cond., fact. cartons, \$3 914-783-6459 after 7 PM WR2HEV J. Baird R.D. 2 Monroe,

YAESU FRdx 400 Revr, Fl dx 400 Xmtr, and the Fl dx 2000 linear. 25 Kc Cal. Rejection tuning. CW filters, VVV, etc. etc. Excellent condition - \$500. Also SWAN 500 ac/dc supplies - \$400. Joe Penwell WBGYKR 12728 So. Burgess Ave., La Mirada, CA 90638 213-691-6743

HA-14, HP-24, HP-14, Rotron, #150. Rolek, 1722 Empire. Webster, NY 14580

WANTED: Hikel 2 transverter, 18" sheet metal shear and brake. WAUCH, Haskel Farm RFD 2, Sterling, VA 22170

COMPLETE Station; 75A-4 #325; Eldico 100A plus 100F #300; EZ-Way 55 lower, CDR rotor, Motorola VFA 20-3 beam #300; instruments, parts list SASE. Norman Rowe, W2BKK, 6 Greenbriar Lane, Port Washington, NY 11060

FOR Sale Drake 2-T information receiving 9017 Shady Lane, Wonder Lake IL 60097. Charles Sodergren, W9ELG

FOR Sale: Swan 350C with 117XC power supply #350. Swan TV2B transverter 14MC. I.F. #200. Heath HX-30 #100. Gemset #130 Linear #150. K2LZL Mile Romagosa 2 Plowboy Park, Commack, NY 11725 Area code 516-388-8672

WANTED: Transmitter to cover all MARS frequencies RTTY gear. 2 meter gear to cover 148.5 MC, 1 1/4 X 3 1/4 or 4 X 5 speed graphic. John Waskowitz, 35-30 73rd St., Jackson Heights NY 11372

SELL: QST in binders, mint condition, 8 volumes 1932-1939 inclusive. Will ship COD for best offer, over \$50. You pay postage. W3KB, 1061 Beverly Rd., Jenkintown, PA 19046

FOR Sale: Central Electronics 200V transmitter, 4 KV at 1 amp power supply components, new 4-100A tube and amplifier. \$1300 complete, all in excellent condition. Hydain 40-20 meter beam - working condition - Jack Colson W3TMZ, 3209 Greencastle Rd., Burtonsville, Maryland 20730; 301-384-6878

WANT 238 Early wireless magazines for W4AA Historical Library. Send for List, Wayne Nelson, Concord NC 28025.

MOTOROLA - 2 meters; U43GGT, 40 watts output, transistor supply, very clean, with cables and control head, less crystals - \$146.00, 80D Transmitter strip - \$15.00, Sencison A Receiver - \$20.00, Complete 80D, Dynamotor supply with cables and Head - \$40.00. WAJNO, Box 587, Manchester, CT 06040.

ENGRAVED Call Letter desk marker, Handsome aluminum plaque black lettering, 8 1/2 X 3 3/4 aluminum wedge base. Satisfaction Guaranteed, \$4.00 postpaid. Kapstan, Box 58823, Houston, TX 77058.

GREENE - center insulator, with or without Balun - A tough nut to beat - free flyer. Box 423 Wakefield, Rhode Island 02830.

TELETYPE Equipment, electronics, bought, sold. List Telecommunications Services, Box 4117, Alexandria, VA 22303.

SWAN 350 7 Hrs. use Drake 2-B HT. 37 all Mint cond. Ong. owner. Best offer phone 479-0935 R. Downes, Denton, MD 21629.

R390 \$475, R390A \$850, URR 388 \$400, 7L14 (premium condition) \$750, Transcom-3 \$275, Swan 500 \$375, Drake R47X4 Combo #850, Hallcraftier HP-30 \$150, 6-35 \$50, LA400C \$125, 301L \$225, HA-2 \$150. Laboratory and test equipment at half price - Motorola AM-PM Modulation Meter TR2300, Marconi Noise Figure Generator, Kronbit Variable Bandpass Filter Model 330 N, Measurements 80, Measurements 65-B, General Radio 916A, Hewlett Packard 524 B.C.D. Transfer Oscillator 450 R, H-P 710 pvs, G-R Resistance Limit Bridge No. 1652A. Willing trade equal value for Collins gear. W2ADD.

WANTED summer 1972, buy home St. Louis area, neighbors receptive to ham and acclimated to tower, three bedrooms, Ruffskeller, garage, trees. Vandergitt, MATCOM-DSO, APY NY 09052.

WANTED - KWM2s, 301Ls, 312BAs, 312Bs and 516F2s damaged or in need of repair. Want fully describing electrical and/or physical damage and lowest price for quick cash payment. Al Swettman Jr K3QFR P.O. Box 2, Pleasant Plains IL 62677.

R-390/URR Collins digital readout receiver, 0.3-32MHz. Good working condition \$475. W8CV 1910 Longpoint, Pontiac MI 48053. Phone 313-FE5-1021.

CAPACITORS: Brand new 275 ufd electrolytics at 500 wfd. 10 for \$19.50 plus shipping. Mehafey K4HP, Atlanta GA 20021.

FOR SALE Complete Collins station of estate of W 4 ANT, 301L, 312B, 301A, 755. Fully complete with original factory docs and manuals. Good condition - \$1395. Separate almost brand new 755R - \$550. Contact Mrs. Vera Engelbert, 2055 Bullard St., Montgomery, AL 36106 after 5:30 p.m. Telephone NO. 205-262-3166

UPGRADE Your License! You need Post-Check, Original, expertly devised, multiple-choice questions covering all areas tested in FCC exams. Same form as the FCC exams. Keyed answer, explanations, IBM sheets for self-testing. Over 300 questions and/or diagrams for each class. Each class complete in itself. Basic questions duplicated where they apply. Continuously updated and reprinted since 1964. New prices include first class mailing. General Class \$4.; Advanced Class \$4.25. Extra Class \$4.50. Add 30 cents each copy for air mail. Send check or money order to Post-Check, P.O. Box 3564, Urbandale Station, Des Moines, IA 50322

QST's before 1922 and amateur teletype publications wanted. Orville Mazon 1941 Oakfield Dr., Menlo Park, CA 94025

TRADE: or sell - HW22A for HW22A. Best offer - HQ170, HT32, Hall, HA-1 keyer, Heath audio gen, and linarity gen. precision E200 Gen. 5BP crt. will ship. W2UGM 66 Columbus Ave., Clester, NJ 07624 201-768-1894

WEST Coast Hams buy their gear from Amrad Supply, Inc., send for flyer, 1025 Harrison St., Oakland CA 94607

RECEIVING & Industrial Tubes, Transistors, all brands - Biggest discounts. Technicians, Hobbyists, Experimenters - Request Free Giant Catalog and save! Zalytron 469 Jericho Turnpike, Mineola, NY 11501

BRAND New fully identified epoxy diodes 1000 PIV @ 2 amps includes disc bypass and bridging resistors 10 for \$4.50. Diodes only 10 for \$3.50. G.E. Line spike suppressors with order 50 cents each. Postpaid USA, East Coast Electronics 123 St. Boniface Rd., Cheektowaga NY 14225

SPIDERS for boomless quads. Helare welded aluminum. A1's Antennas, 1839 So. Washington St., Kennewick, WSN 99336

SIGNAL/one CX-7. All new models, warranty, best offer - Bruce Timpe 1144 Ballens Blvd., Alameda, CA 94501 415-865-4605

RED HOT! 5RK Delta Tri-bander - sensational break through in Delta Loop design. Proven out-standing DX antenna. Highest quality-also heavy duty high performance quads. Check our low prices. Island Electronics 4103 Ave. S., Galveston, TX 77550

3-D QSLs - The modern concept that makes all others old-fashioned. Includes 25 cents (refundable). 3-D QSL Co., Monson 2, MA 01057

COUNTERS, relays, meters, switches, transformers, special items. Bargains. Send stamp for listings. Ray Electro Controls, P. O. Box 32, Haddon Heights, N.J. 08035.

FOR SALE: QST issues 1958-1969 except May, Sept. & Nov. 1958, September 1960, and Jan 1964. Make offer. J.P. Long, 30800 Summit Lane, Cleveland, OH 44124

WANTED National 101X receiver good condition at reasonable price. George Smith, Route 1, Box 187, Pottsville, TX 75076

MAGAZINES Fifty year collection ham and photo publications. SASE. W5SG, Jack Stuart box 891 El Paso TX 79946

FOR SALE: Heath Mohawk receiver RX-1 with speaker, #120, and HX20 SSB transmitter with HP-20 AC supply, #130. Roger Roth, 320 Monk Ave., (Apt 509), Hopkins, MN 55343. Phone #12-933-1491.

NOVICES DX-60, HG-10 VFO; E-100 with 8-meter, speaker, xtal calib. Excellent condx, all for \$160. Will ship. K7PCC, 1815 1/2 Alexander, Cheyenne, WY, 82011

FOR SALE: 500 cycle mechanical filter for Collins 75A4. Like new. \$35. W9JA, Box 73, Suding, WI 54174

WANTED: Heathkit HW-18-2 (MARS). Give information on condition (electrical and physical) and price in first letter. Write Walt Sutkowski, K2DPL, W. Redoubt Rd., Fishkill NY 12524

DRAKE: T-4X with AC-4 and microphone \$325; 2-B, 2-BQ \$175. All perfect inside and out. W6UEJ, Gary Friedlander, 4613 La Subida Place, Tarzana California 91356. Telephone 213-987-1430

SELL QST Mags Jan. 1925 to date. Also IRE Proceedings Jan. 1932 to Dec. 1946. Will sell any number of one year groups in sequence from start. Make me an offer. Al Haagensohn, 1304 Park St., Fergus Falls, MN 56537

WEATHER Nets write for free sample sheet, 4-Year Weather Net Log Book. Box 70, Lamar, CO 81052

DRAKE I-4R \$600; T-4XB, AC-4 \$400; SPR-4, Calif. receive system, ham & regular xials \$400; HT-32A \$195; HT-33A \$235. Don Burns 4410 Reading Rd., Dayton, OH 45420 PH. 515-256-0345

SIGNAL-ONE, CX-7, sealed carton, new warranty, latest series, sell cheap, trade for Collins, Drake, Don Payne, R 41D, Box 525, Springfield, TN Nights 615-384-5643

DRAKE R4A w/10m xials, T4X both w/B type knobs, AC4, MS4, \$575 or individual offer. Prefer local pickup. Pete Bayar W6DXJ, 7854 Compass Lake Dr., San Diego, CA 92119, 714-480-1793

HW-16 excellent condition \$90, vibroplex champion bug \$10, rugged homemade ant. tuner \$20, John Bendixen, Box 647, Mt. Hermon, MA 01354

NYC area, RME-4350 recy. and matching preselector, vy gd condx. \$100. Dave, WA2VYI 516-201-390

SB-301 with CW filter, excellent condition, \$225. Selling only because I have two of 'em and don't need both. Viking 2, \$60. James Maynard, K7VDN, 1500 E. Evergreen, Vancouver, WA 98661

CRYSTALS Airmail: QST "Novice Special", all frequencies, 40M - 15M FT-243, active-reactive five or more 39 cents each \$0M \$1.39. Mix OK. Less than five \$1.50. Add postage. Fast service from Mid-America. SSB, MARS - Custom finished, etch stabilized, FT-243 .01%, 3500 - 8600 kilocycles \$1.90, (minimum five, same or mixed \$1.75). (crystalize your net, low same frequency \$1.45) 700 - 3499 and 8601 - 14,000 fundamentals and 10,000 - 30,000 overtones \$2.95, 005% add 50 cents/crystal. HC-6/u hermetics above 200, and 75 cents/crystal. Airmail 10cents/crystal, 161-c, -6 cents. Builders crystals. Free order-bulletin. "Your crystal shop since 1933". Bob Woods - W0LPS, C-W Crystals, Marshfield, Missouri 65706

SX-111, HT-40, Knight VFO, \$130. Nick Kennedy, 125 Boles, Fayetteville, AR 72701

SPECIAL - Aerovox new 100 Mfd, 5000 working volts 29.95, will trade. New Johnson Mess 1 \$94. New Drake HW4A \$250 New Tenna Car Stereo Speakers \$34.50 New Drake 2 meter converter AC. Bryan Edwards 2430 33rd Lubbock TX 79401

DAVCO DR-30 small solid state receiver in perfect condx, commercial pwr supply incld. \$200 or best offer. K3UTH W. J. Sampar 5903 John Adams Drive WA D.C. 20031

HEATH SB-310 receiver, mint, professionally aligned, deluxe SSB crystal, plus in crystal for 15 M novice band, #235. W9DDVV, 335 N. Elmwood Lane, Palatine, IL 60067

SELL QST Oct. '45 to 1970 - W2HQ, 174 E. Crescent Ave., Ramsey, NJ 07446*

COLLINS 32V3 \$150, NC-300 \$115, 4D32 \$25. All excellent. W2WVY Box 863 Smithtown, L.L., N.Y., 11787

HAM AUCTION Half acre enclosed floor space Blossomland Amateur Radio Club Benton Harbor - St. Joseph, MI Sunday March 14 St. Joseph Ballroom Information P.O. Box 175 St. Joseph, MI 49085

COLLINS CW mechanical filter adaptor, 500 cycle for use with Collins 75A-1 receiver. No modifications to the 75A-1 necessary, just plug it in. \$35. Robert M. Myers, W1FBY, 221 Long Swamp Rd., Wolcott, CT 06715

HAMMARLUND SP600XJ receiver, cabinet, manual, Good condition. Make offer. Will consider swap. WATKJ 543A University Village SLC, UT 84108

SELL-Drake Line - R4B receiver-mint condition - \$300 - 2N-CW transmitter, new, never used - \$110. MN-2000 Antenna matching network - new - \$125. Package Deal - \$450. Will not ship. W2RKKJ, 616-541-5516

MATCHING HT37 & HT41 (All Tubes Furnished.) \$330.00 - NET - We ship collect. WA4SWZ, Richmond, VA

FOR SALE: Squires-Randers SS-1R, SS-1RS, SS-1S (all new), \$550. 75S3-B No. 85, 399, \$550. KWM2-A No. 18, \$222. Blanker, 516F-2 \$950. 312B-5, \$275. 351D-2, \$100. 516E-1 (or MP-1), \$125. Viking Thunderbolt, \$225. 30L-1, \$350.

SALE - Clegg 99er - 6 meters. Healthkit Scope H.O.10 Like new, Both \$160. Pardocch, WA2OXD 103 Radcliff Dr., Brentwood, NY 11717

WANTED, old Collins 32V series transmitters, also 310Bs, 708RA PFOs, working or not. Quote price prepaid to me. Gene Hubbell W7DI, 6833 E. Palo Verde Lane, Scottsdale, AZ 85253

RECEIVER wanted. General purpose, 535K-30MHz, SSB/AM/CB. Must be in excellent condition. Will pay up to \$175. S. Kruzansky, 7 Ridge View Dr., New Paltz, NY Tel. 914-255-7588

TRANSMITTER, Gonset GS8-100, \$110. Linear, Johnson Thunderbolt, 2W P.E.P., \$225. Harvey Wells R-9 Receiver. Double-conversion, Ham bands only. \$50. 2000-0-2000 volt, 400 MA. cased transformer, \$20. 1000 & 2000 volt Pyranol filter capacitors. \$1. W8EMUV, Curtis 17180 Copper Hill, Morgan Hill, CA 95037 408-779-2637

\$365 buys my Yaesu FTdx 560 xcvr with Shure 202 PTP mikes, used about two hours. Also, Heath HM-15 SWR meter \$10; Heath HD-15 phone patch \$15. Heath SB-610 signal monitorscope \$45. CDE autrotor AR33 W, pushbutton controls \$25 (new was \$49.95). RTTY: Model 19, \$90 (plus \$20 for coating); Western Union model 105 (similar to model 15), no cover, \$45 plus \$5 crating; W. U. 2B gummed tape printer \$20 plus \$5 crating; Long 11mtr K70TP 2265 E. 3205 S, Salt Lake City, UT 84108 801-466-3820

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 Equipment: New Demo Galaxy GT-550 with warranty, \$369. New Swan 270B Cygnat, \$399. Freight prepaid. New Swan 300UX, \$449. Freight Prepaid with Free Electro Voice microphone. New Robin 60 Ft. Foldover Tower Prepaid, \$213. New Mosley Classic 33 and Demo Ham-M Rotor, \$205. Reconditioned Equipment: Drake TR-4, (late serial), \$519. T4-XB, \$365. R4-B, \$349. Ham-M Rotor, \$79. No reasonable offer on new equipment refused! Try Me! Moory Electronics Co., Phone 301-946-2820 P. O. Box 506, Dewart, AR 72042

NCX-5, NCX-A in Great shape \$375. HRO50P1, speaker, 5 coils, central electronics slicer Qmult 165, 2 Gonset G150 transceivers \$100. Regency HR2 used 1 hr. \$200. Long's Electronics 11 South 55th, Ft. Birmingham AL 35212

HALLCRAFTERS HT37 xmt, SSB and AM in excellent condition, \$180. Prefer local pickup. WITF, Elmer Turner, Barnard Ridge Rd., Meredith, NH 03253

SKILL: Complete Station - HT-46, SX146, Driver with 3-61, Q's and 3x2500 amp, with 4 KV P.S. - extras \$450 or offer - WA9OZC, 312-687-1962

SX-111 receiver. 5-5 khz selectivity; calibrator. Best offer over \$85. WB9FHC 203 Woodbine, Wilmette, IL 60091

WANTED: Heath SB640 LMC. Must be in mint condition with manual. A.H. Watson, Fishie Hill, Sturbridge, MA 01566

COUNSELOR - 20+ General Class operator for Boys Summer Camp in Maine (July & August). Bring own rig if possible. Excellent salary and other benefits. Write-Maurice Steinberg, P.O. Box 178 - Carle Pt., NY 11514

COLLINS 75S3, 32S1, 516F2 \$800. Thomas O. Crow 5801 Ambler St., Sacramento CA 95823

FOR SALE: DX 60R, Year Old, Excellent Condition-\$70. WA7NRP, Box 833, Burley, ID 83318

LAMPKIN 205A-Latest oscillator, 105R, PPM111, New in service - AB \$300. W. H. Stette WA9HJ, 1700 E. Jackson Springfield, IL 62703

COLLINS 75A3, with plug in product detector and xtal calibrator, mint condition \$235. Hygan three-element triaxial - \$40. W8SET, 2001 Parkwood Rd., Charleston, W. VA 25314

GALAXY-HYGAIN FM-210, excellent, \$150; Lakeshore VFO 160-10 (20A/10B etc) \$60; TS-186J Freq-meter 100-10,000mc, crystal oven, \$55; Gerstich FM-4A multiplier up to 3G3 \$195; \$50dard field-strength R.F. receiver w/antennas, inop. probes, power supply \$150; 100mc. 100mc. 5750; trade VLF/UHF/wave list SASE. W5API, Box 4095, Arlington, VA 22204

W7QCV QSL Bureau. We forward QSL's anywhere. 30 cards for \$1.00. 451-145Th, Place N.E. Bellevue, WA 98007

WRITE for free frequency chart and information on Swan equipment. Repeated Special order, 71 Callbooks \$6.95. Amateur Radio Headquarters, 1916 7th Street W., Billings, MT 59102

WANTED T4X AC-4 R4A, Rev. Bittner, 814 4th St S, Virginia MN 55792

SB101 and HP23, excellent, carefully constructed by electronic engineer, \$370. J. Earl WIDRV, 26 Crestwood, Framingham MA 01701 617-872-5180

SIGNAL ONE - Deluxe CW filter, latest model, ten QSO's warranty will ship in original carton, \$1900. W3HUS 2187-27-7374

QST's March 1923 to April 1926 except five issues, also Feb 1936 to Dec. 1964. CQ's Jan. 1947 to Oct. 1963. All good condition. \$75. Old LaFayette 60W AM tube & CW xmt. Needs some attention. \$25. No shipping. W9DF, Hartwell, Box 56, Sadem, WI 53168

HAMMARLUND HQ180A, clock, speaker, manual, \$250. K4SHQJ, Bill Tyler Jr., 3619 Napier Ave., Macon, GA 31204

SB-34, perfect condx, W/mic and mobile bracket. Factory carton, \$299. Will ship W/ALR, 1848 Wasatch, S.L.C., UT 84108 801-484-4671

SEND stamp addressed envelope for list of Ham gear. William Kimball, 61 Hartford Ave., Hopedale, MA 01747 WYUW

SELL Tri-Fx LM-470D motorized 71' self-supporting tower one year old including TA-70, 160-watt accessory, CO-4 coax kit, thrust bearing and 20' mast with 180' wall \$595. Hy-Gain 205H five element 20' meter Long John beam on 46' boom \$250. Bob 212-377-3608, E. C. Titcomb, W6DJQ, 8 Surrey Lane, Rolling Hills, CA 90274

WE guarantee to beat any legitimate written price quote. All factory sealed equipment. Full over-coverage. K4-B (Regular) \$475. SB30, T4XB (\$495) \$415. SPR-4 (\$449) \$379. TH-4 (\$99.95) \$90. Galaxy GT-550 (\$550) \$459. FM-210 (\$229.50) \$185. SB-35 (\$549.95) \$464. SB-34 (\$449) \$378. National NCX-1000 (\$1095) \$919. Hy-Gain Th6Dx (\$179.95) \$140. TH3MK3 (\$144.95) \$115. Mosley CL-33 (\$145.15) \$115. CL-33 (\$171.92) \$135. TA-35 (\$133.10) \$106. TA-36 (\$167.54) \$134. Ham rotors (\$129.25) \$93.55. T4-4 (\$69.95) \$53.95. Tri-Fx W-51 prepaid (\$395.40) \$330. MW-45 prepaid (\$359.85) \$301. Package deals. Write today. Discount Radio Sales, Box 6044, Lubbock, TX 79413

WANTED: High Power modulation transformer, and other high power components for new radio club. Also radio/electronic correspondence course, John Fenter P.O., Box 501 Van Nuys CA

KWM2 and TR4, \$595 and \$395. Will sell one; power supply available. Hunter 200BC trade for SB101 complete. W8BNF, Box 105, Kearney, NE 68847

FREE Sample copy Long Island DX Assn. Bulletin. Latest DX news. Business size w.s.e. to K2AFY, Box 74, Massapequa LI NY 11762

1896-1922 Wireless equipment and catalogs wanted. Correspondence with collectors invited. Dick Sepp, 1945 E. Orangevale Blvd., Pasadena, CA 91104

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St. Elizabeth, NJ 07207. Tel. 201-354-3141

CREATE A QSL with a "Sampler Instruction Kit" 25 cent. Samco, manufacturer of (XTRA-CLASS) and Regular print QSLs. Write: Samco, Box 203, Wyanantskill, NY 12198

SALE: Heath DX-60R \$60 HR-10B w/calibrator \$60 HG-10 VFO \$30 all perfect less than 2 years old w/manuals, Purcell Drakes Branch, VA 23887

SB-301 \$200 Like new, HW-22 HB PWR sup like new 4CX1000A \$50 new or trade new transceiver DX60B with VF HW-32. Off Charlie Atkins, WA4ACM, 604 Henson Dr., Albany CA 31705

FM's: Motorola H24DCN 2-CH UHF w/T, \$225. GE Pre-Pr. 34/94T, 34R \$50. Telemet Mark 60, \$50. Com-Prod stacks 4's on 2-meters, \$50. Hy-Gain DB62, \$20. WA5WGO, 491 Western, New Orleans, LA 70122

CRYSTAL for HT32 to cover 28-28.5 MHz, \$3.00, also 29-29 MHz, \$3. KH6J.

NEED two rack cabinets for 14 inch high panel, 4CX250B tube TMC SBE-3 xcvr & pwr supply to drive my PAL 350, 50 300 MM Nikkor 200M lens. I have, to trade or sell a HA61 receiver, New Eimac 4CX300A and socket, Johnson TR switch, new GR-1650, amp, bridge, and 600 new 2N104 resistors. A. Bruno W27UP 24 Butternut Dr., New City N 10956

WANTED R390, R390A, R389, 5154, 5181, Racal, Net Clarke, Marcom receivers. SWRC, P.O. Box 10048, Kansas City MO 64111

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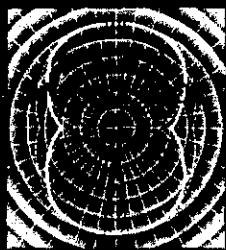
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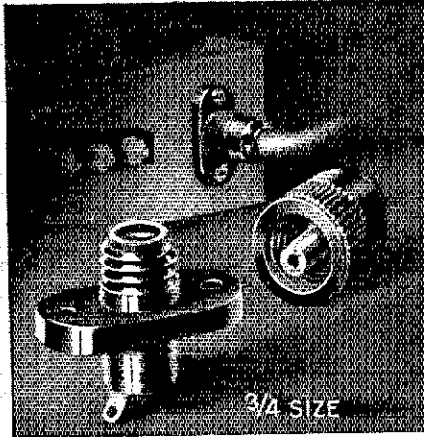


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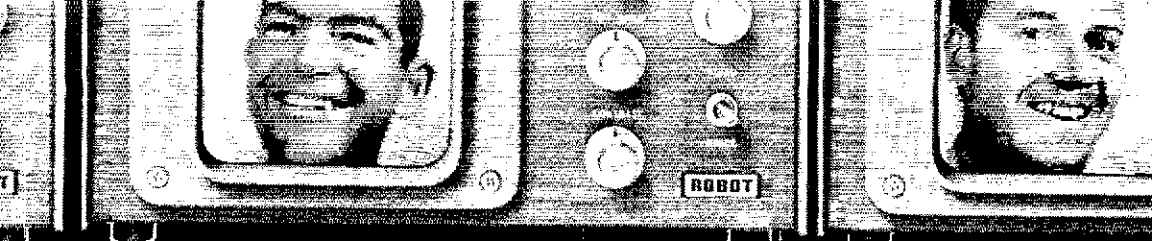
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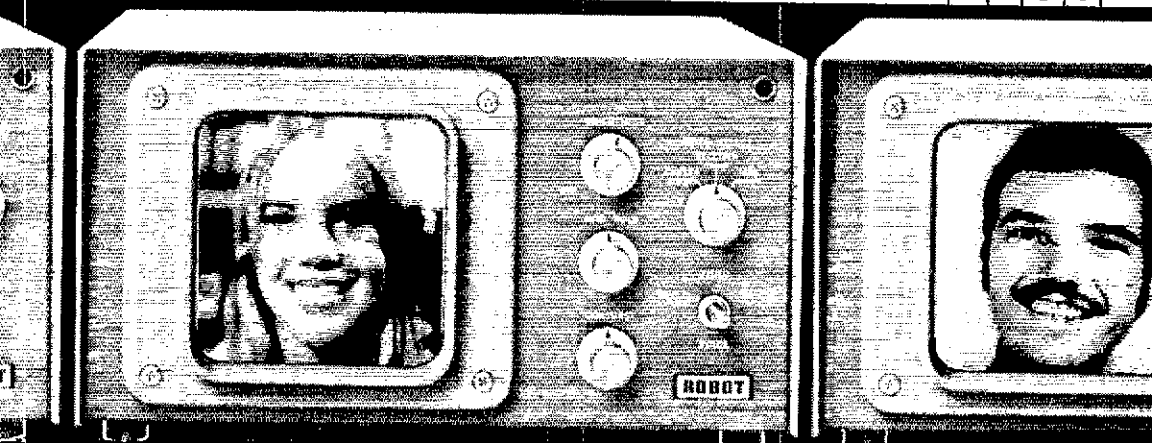
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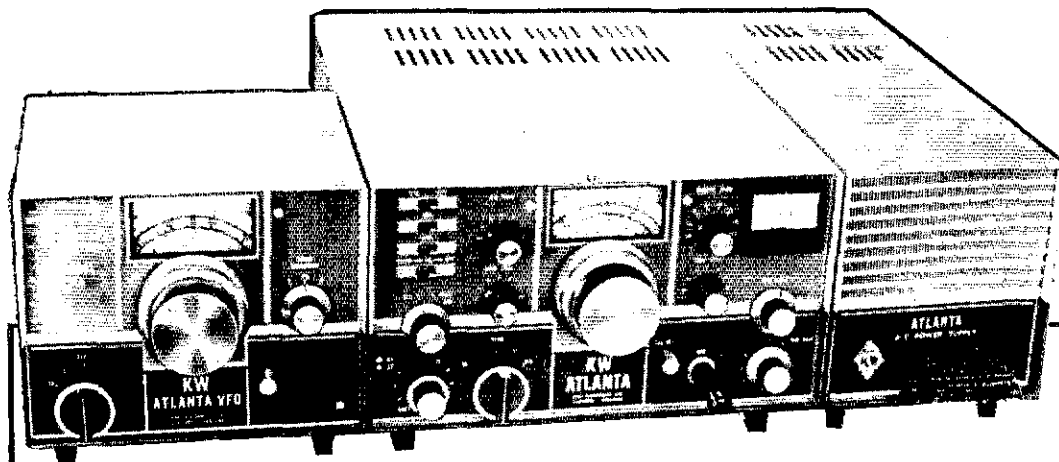
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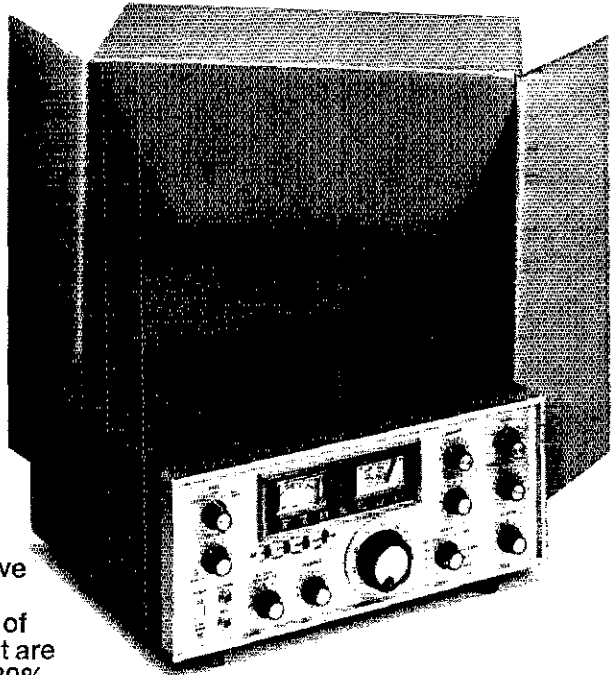
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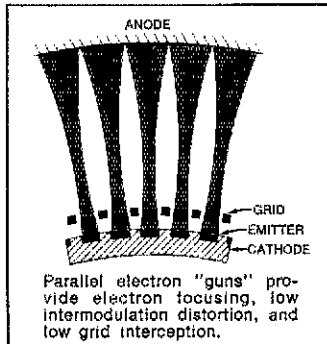
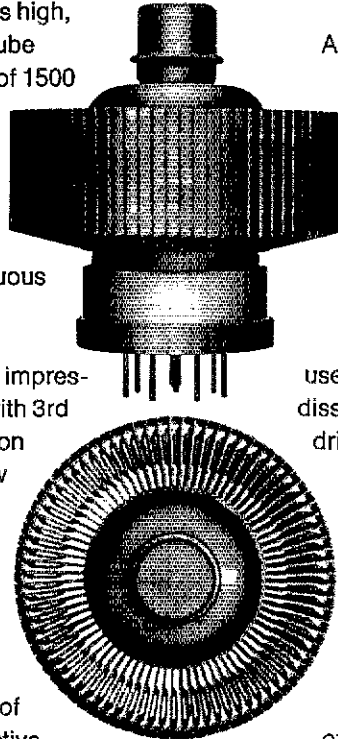
(2000 watts output at 30 MHz is easy)

On your right is the new, rugged, ceramic/metal 8877 high-mu power triode by EIMAC. Another state-of-the-art tube. Only three and one-half inches high, this low-profile, heavy-duty tube has a plate dissipation rating of 1500 watts, a maximum plate voltage rating of 4000 and a maximum plate current rating of one ampere. In the HF region, typically, the 8877 coasts along at a continuous duty level of 3500 watts PEP input. A peak drive signal of only 65 watts is required. This impressive power gain is achieved with 3rd order intermodulation distortion products — 38 decibels below one tone of a two equal-tone drive signal.

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EIMAC segmented, self-focusing cathode provide low grid interception and the low grid drive requirement; both of paramount importance in the VHF region. Although primarily designed for superlative linear amplifier service demanding low intermodulation distortion, the 8877's high efficiency permits effective operation as a class C power amplifier or oscillator, or as a plate modulated amplifier. The zero bias characteristic is useful for these services, as plate dissipation is held to a safe level if drive power fails, up to an anode potential of 3 kV.

The sophisticated circuit connoisseur will appreciate the many advantages of this newly developed power tube. Write for detailed information. And remember — the 8877 is another example of EIMAC's ability to provide tomorrow's power tube today. For additional information on this or other products, contact EIMAC, 301 Industrial Way, San Carlos, California 94070. Phone (415) 592-1221 (or call the nearest Varian/EIMAC Electron Tube and Device Group Sales Office.)



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